State of the Kiski-Conemaugh River Watershed: Community Shift

An update to the 1999
Kiski-Conemaugh River Basin Conservation Plan

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Acronyms and Abbreviations

ACOE – Army Corps of Engineers
AIS – Aquatic Invasive Species
Al – Aluminum
ALD – Anoxic Limestone Drain
AMD – Abandoned Mine Drainage
AML – Abandoned Mine Lands
AWARE – Aultman Watershed Association for Restoring the Environment
BAMR – Bureau of Abandoned Mine Reclamation
BBD – Beech Bark Disease
BCDA – Blairsville Community Development Authority
BCWA – Blackleggs Creek Watershed Association
BCWA – Blacklick Creek Watershed Association
BDA – Biological Diversity Areas
BMP – Best Management Practice
C2P2 – Community Conservation Partnerships Program
$CaCO_3$ – Calcium Carbonate
CAL U – California University of Pennsylvania
CASTNET – Clean Air Status and Trends Network
CCCRA – Cambria County Conservation and Recreation Authority
CDC – Centers for Disease Control and Prevention
CFB – Circulating Fluidized Bed
CPOM – Coarse Particulate Organic Matter
CREP – Conservation Reserve Enhancement Program
CSA – Cambria Somerset Authority
CSO – Combined Sewer Overflow
CVC – Conemaugh Valley Conservancy
CWF – Coldwater Fishery
DCNR – Department of Conservation and Natural Resources
DEP – Department of Environmental Protection
EIS – Environmental Information Services
EPA – Environmental Protection Agency
EQIP – Environmental Quality Incentives Program
EV – Exceptional Value
Fe – Iron
FPW – Foundation for Pennsylvania Watersheds
GIS – Geographic Information System
GPM – Gallons per Minute
GPS – Global Positioning System
HEC-RAS – Hydrologic Engineering Center River Analysis System
HQ – High Quality
HUC – Hydrologic Unit Code
IBA – Important Bird Area
ICCD – Indiana County Conservation District
IMA – Important Mammal Area
IUCN – International Union for the Conservation of Nature
IUP – Indiana University of Pennsylvania
IWRP – Integrated Water Resource Plan
JAHA – Johnstown Area Heritage Association
JCCS – Jaccard Coefficient of Community Similarity
KBI – Kiski Basin Initiatives
KC – Kiski-Conemaugh
KCRBA – Kiski-Conemaugh River Basin Alliance
KSTU – Ken Sink Trout Unlimited
KVWPCA – Kiski Valley Water Pollution Control Authority
KWA – Kiski Watershed Association
LCA – Landscape Conservation Area
LCMDC – Loyalhanna Creek Mine Drainage Coalition

LWA – Loyalhanna Watershed Association
ME – Mariner East
MGD – Million Gallons per Day
mg/L – Milligrams per Liter
Mn – Manganese
MS4 – Municipal Separate Storm Sewer System
MWC – Manufactures Water Company
NBP – Nature-Based Placemaking
NLCD – National Land Cover Database
NORM – Naturally Occurring Radioactive Materials
NOx – Nitrogen Oxides
NPDES – National Pollutant Discharge Elimination System
NPS – National Park Service
NPS – Non-point Source Pollution
NRCS – Natural Resources Conservation Service
NUMEC – Nuclear Materials and Equipment Corporation
O&M – Operation and Maintenance
OLB – Open or Oxic Limestone Bed
OLC – Open or Oxic Limestone Channel
OSHA – Occupational Safety and Health Administration
OSMRE – Office of Surface Mining Reclamation and Enforcement
PASDA – Pennsylvania Spatial Data Access
PASEC – Pennsylvania Senior Environmental Corps
PBS – Pennsylvania Biological Survey
PCB – Polychlorinated Biphenyls
PennDOT – Pennsylvania Department of Transportation
PFBC – Pennsylvania Fish and Boat Commission
PNDI – Pennsylvania Natural Diversity Index
PNHP – Pennsylvania Natural Heritage Program
PWAP – *Pennsylvania Wildlife Action Plan*
RM – River Mile
RRWA – Roaring Run Watershed Association
SAP – Successive Alkaline Producing System
SCD – Somerset Conservation District
SCRIP – Stonycreek Conemaugh River Improvement Project
SEC – Senior Environmental Corps
SFI – Sustainable Forestry Initiative
SIS – Sampling Information System
SMCRA – Surface Mining Control and Reclamation Act
SO_2 – Sulfur Dioxide
SRI – Stream Restoration, Inc.
STP – Sewage Treatment Plant
STORET – Storage and Retrieval
SWAPP – Source Water Assessment and Protection Program
SXL – Sunoco Logistics Partners
TDS – Total Dissolved Solids
TRI – Toxic Release Inventory
UNT – Unnamed Tributary
USDA – United State Department of Agriculture
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
VFR – Vertical Flow Reactor
WCD – Westmoreland Conservation District
WPC – Western Pennsylvania Conservancy
WWF – Warm Water Fishery

The Kiskiminetas-Conemaugh River
was named
Pennsylvania's River of the Year
in 2000
and was a finalist in 2014.

In 2012, the Stonycreek River was
named River of the Year.

Table of Contents

11. Appendix

12. List of Figures

13. List of Tables

Indicator Species in the Kiski Basin

Demonstrating the water quality of the Kiskiminetas River and its tributaries is improving, key indicator species are returning and flourishing in the Kiski Basin.

Above, an immature bald eagle dines on a mallard duck along the Kiskiminetas River. Photo by Marge Van Tassel

Below, an adult female freshwater mussel, the species of which needs confirmed yet, found in the Kiski in Avonmore. Photo by Chelsea Walker

Note from the Author

I grew up in Maple Ridge, a village between Hollsopple and Seanor in northern Somerset County. I was lucky in that there were essentially woods on three sides of me and the Stonycreek River on the other, and it was the 1980s; the electronics of today did not exist! There were people two generations beyond me, including my beloved Bubba, who taught me about the natural world. We would collect hickory nuts for my Mom and Sheepshead and papinki mushrooms, the latter for Christmas Eve soup; stack stones and mud to make pools in the little stream that flowed from an old, busted dam; catch crayfish; make mudpies; play in the rain; jump in leaf piles; identify trees; wipe out on the gravel driveway in eagerness to wave to the "train man;" ride bikes on the steep black boney "rock dumps;" and more. We would occasionally play in the Stonycreek, at the hole locally known as "The Teaspoon." To get to the deep spot, you had to float and use your hands to grip the slippery rocks, because standing and walking across the river meant bruised bodies when skating on the slime. I clearly remember my hands breaking through a crusty layer of orange that I now know was iron oxide and getting a black goo underneath my fingernails. I don't want to talk about what that was! Maybe that's why my fingernails are so nice!

Growing up, I never thought about being a conservationist. For the longest time, I wanted to be a teacher, but biology intrigued me and held my interest – and I'm generally a quiet person, so speaking in front of a roomful of students everyday isn't really my speed! Working with the Stream Team, however, and on this project has been a labor of love (and sometimes a little hate) and it's been an eye-opening experience. I think we all get so absorbed in our own projects that we don't lift our heads often enough to observe what's happening around us and how our collective efforts are impacting the larger environment. I'm still shocked that no one had surveyed the fish communities of the Conemaugh River since 1997 until we did it in 2015 as part of this project! Someone just asked me, "So, are the rivers better?" and I could readily respond, "Yes!"

While the modest increase in the number of different fish species residing in the Conemaugh River, for example, in 1997 versus 2015 may not seem impressive, the key to remember is that fish species sensitive to pollution now constitute the majority of those communities. Most of our rivers that were net acidic or net neutral are now net alkaline, which supports this growing diversity, and as long as our efforts continue, volunteers step up and don't give up, systems are maintained and toxic metals retained, financial investments wisely used, laws and regulations followed and enforced, and biological recovery, not just a good "grab" sample, are our top priorities, then our rivers can only continue to blossom and become even greater economic drivers for the region.

I'm humbled to play a small role in this recovery and revitalization, and I'm happy to work with awesome professionals and volunteers. I've made some amazing friends and "tribe members" who are like family. I love you and I very much look forward to the future our work will bring to fruition.

Executive Summary

The Kiski-Conemaugh River Basin encompasses 1,888 square-miles of southwestern Pennsylvania. Historically plagued by the results of the Industrial Revolution and the boom-bust economy that accompanied this time period, orange veins of polluted water coursed through its heavily forested landscape for decades. Beginning as early as the 1970s, but more in the 90s, watershed organizations and conservation groups mobilized and began addressing the problems within their boundaries. Many of these issues were documented in the original *Kiski-Conemaugh River Basin Conservation Plan* published in 1999. It was not a plan that collected dust on a shelf; it was heavily utilized with about 88% of its 120 recommendations implemented to some degree.

In 2013, the Conemaugh Valley Conservancy's Kiski-Conemaugh Stream Team secured funds to update this plan and document the recovery of our streams and rivers. People recognized that the waterways were improving, but no one had quantified and publicized the collective results of restoration and conservation efforts since 1999.

Over four years of data collection, tabulation, and evaluation created this document, which reveals that many of our streams and rivers have changed from being net acidic to net alkaline; fish poor to fish rich. Yet, much work remains. Many Abandoned Mine Drainage (AMD) treatment systems are aging, failing, or undersized, erosion and sedimentation is replacing AMD as the number one source of water pollution, combined sewer overflows dump untreated waste into rivers on which people are increasingly recreating, new forms of natural resource extraction threaten the ecosystem, and funding sources are far less abundant. On top of that, of the twelve watershed associations that operated in the Kiski Basin, two are defunct from a lack of interest and membership has dropped or remained about the same since the group's inception at seven others. Watershed associations struggle with securing volunteers to serve on their board of directors, replacing aging volunteers, and invigorating the group with new ideas and connections.

Still, hope remains and all past efforts have not been for naught.

The Kiskiminetas River, the receiving waterway of all upstream restoration and conservation efforts, has drastically improved biologically and has become a recreational fishing and paddling destination. In 1980, when the Pennsylvania Department of Environmental Resources (now DEP) surveyed fish at the mouth of the Kiskiminetas River, they found no fish; just one frog. The river was dead largely from uncontrolled mine and industrial discharges, sewage, and runoff. When that survey was repeated in 2015 by the PA Fish and Boat Commission, 386 individuals of 28 species were collected and that doesn't even include some species, like walleye, that anglers report catching in the Kiski and that were captured in the 1990 and 2000 surveys! Species sensitive to pollution like the mooneye and brook silverside were collected for the first time in 2015. This is a tremendous increase that stems from a decline in industry, an increase in regulations, and the start of reclamation efforts.

The Conemaugh River is another great example of what can be achieved through passion, persistence, and public-private partnerships. In 1993, the Conemaugh River in Blairsville had a pH of 4.8, which is comparable to beer and too acidic for most fish to survive. In 1997, the Conemaugh

River in Blairsville had a pH of 6.8 but an alkalinity of only 6 mg/L. Most aquatic life needs a pH between a 5 and an 8 to survive, and Chapter 93 of Title 25 in the Pennsylvania Code requires that alkalinity measure at least 20 mg/L as Calcium Carbonate. Typically, the higher the alkalinity, the more nutrients available to aquatic life and the stream's productivity is higher. In 2017, the pH of the Conemaugh River in Blairsville rose to 7.8. Because the pH scale is logarithmic, that's a 1,000% improvement since 1993. Also, the Conemaugh's alkalinity measured 57.8 mg/L in 2017. This improvement is reflected in the visual appeal of the river, the increase in use and promotion of the river, and the proliferation of the fish diversity in the river. In 1997, fish species tolerant to pollution like bluegill and creek chub dominated the fish community in Blairsville with 14 species documented. In 2015, 16 species were collected. While this may not seem significant, the key is that many more pollution-sensitive species, like banded darter and logperch, constituted the collection in 2015.

In the community of White, before the Conemaugh River and Loyalhanna Creek come together to form the Kiskiminetas River in Saltsburg, an even greater fish community shift was discovered. In 1997, only eight fish species were collected, while in 2015, 13 fish species were netted, including the rare and pollution-sensitive streamline chub and bigeye chub. Additionally, in 2015, twice the number of fish were collected in half the survey length.

After running a metric called the Jaccard Coefficient of Community Similarity that measures how similar a site is in biological composition to another site or to itself over time, the greatest community shift at the three sites surveyed on the mainstem of the Conemaugh River in 2015 was in Seward. Here, only six fish species were collected during a PA Fish and Boat Commission survey on September 17, 1997. Creek chubs dominated the collection by nearly half. Exactly 18 years later, California University of PA and the Conemaugh Valley Conservancy surveyed the same site and collected nine fish species with pollution-sensitive banded darter and longnose dace dominating.

Of course, we remain at a tipping point in that our waterways could revert to their former, near lifeless states if existing AMD treatment systems are not maintained, or if laws and regulations are relaxed to the point that industrial discharges degrade our waterways, or if new forms of resource extraction are not closely monitored and held to high standards. On the other hand, more improvements could be seen as it seems Mother Nature just needed a helping hand to bring life back to our waterways, so with a few more nudges in the right direction, our aquatic communities could blossom even more.

To provide those nudges, we need to get creative with technology, funding, and community buy-in. Since many of the "low-lying fruits" have been addressed, our challenge now is to remediate discharges that were previously thought untreatable. Fortunately, large, active treatment systems like Rosebud Mining Company's St. Michael Treatment Plant are no longer off the table. The PA DEP is pursuing the design and construction of at least two such systems, one for the Wehrum and nearby discharges in the Blacklick Creek watershed and another for the Hughes, Sonman, and Miller Mine Shaft discharges in the Little Conemaugh River watershed. And, being eternally optimistic, I believe an active treatment system will be constructed at some point in the next decade for the Big 4 AMD in Central City, in the Stonycreek River watershed. This would restore 13.1 miles of Dark Shade and Shade Creeks, as well as benefit the Stonycreek River, which is a growing fishery, a popular whitewater recreation destination, and an economic driver in the Johnstown area.

There have been several economic studies to capture the value of eco-tourism, which stems from improved natural resources, though none have focused specifically on the Kiski Basin. Besides the obvious environmental impacts, land and water conservation enhances property values, reduces local taxes, improves the quality of life which attracts businesses and employees, and creates jobs. The Trust for Public Land published *Pennsylvania's Return on Investment in the Keystone Recreation, Park, and Conservation Fund* and found, "that every $1 invested in land conservation returned $7 in natural goods and services to the Pennsylvania economy" (6). This makes it evident that healthy waterways and landscapes not only contribute to personal well-being, but to the economy as well. In 1999, there was only one canoe/kayak outfitter serving the Kiski Basin; now there are five! In 1999, the "Kiski-Conemaugh Water Trail" map was in development and included all 86 river miles on one map. Now a revised map breaks down the Kiski Basin into an Upper and Lower Section, each with its own map highlighting safety, natural and recreation features, and river towns' businesses and points of interest. There's even an interactive online map too.

Unquestionably, we have to be mindful of how our work impacts the environment and those waterways downstream. The collective we, who work on treating AMD, restoring waterways, and conserving resources, might be too good at our jobs! We need to make sure that we do not allow our rivers to have too high of a pH. At a pH of about 8.2, aluminum, which is near lethal levels for aquatic life in some of our waterways, can become soluble on the basic or high end of the pH scale, as it does on the low end, and become toxic to fish. We've seen it on a smaller scale in the Blackleggs Creek watershed, which is a naturally alkaline watershed. Treatment systems here, as throughout the Kiski Basin, focus on generating as much alkalinity as possible, but when that treated water hits the mainstem, pH elevates and the aluminum re-dissolves and limits aquatic life in Blackleggs Creek. We cannot have this happen in our rivers. In general, we must focus more on precipitating metals, thereby keeping them out of waterways, and consider discharging slightly acidic or net neutral water in select waterways.

We also must keep educating youth and the public a priority. In 2017, students at the University of Pittsburgh at Johnstown, under their chosen group name of Mean Machine Marketing, surveyed 100 people in the City of Johnstown and in its suburbs and found that 51% of the respondents viewed the rivers as "dirty." While the survey didn't delve into what made the participants think that, it is concerning that of the 51% who felt that way, 59% were between the ages of 18 and 30! Undoubtedly, this perception and accessibility issues keep potential users away from our rivers and streams, which prevents a personal connection to our water resources from being formed, so we must work to publicize our restoration efforts, the state of the watershed, and what may be found in and around our streams, and let people know the rivers are open!

Pennsylvanians should be proud of the accomplishments of its environmental organizations and agencies. Together we should support legislation that protects this work and its funding sources and contribute time, resources, and talents to these organizations to ensure efforts continue. Preserving and enhancing our resources is paramount, given the strain our natural resources receive and the ever-increasing interest in outdoor recreation for healthy minds, bodies, and communities.

Back to Table of Contents

And so our journey begins….

Introduction

Conemaugh Valley Conservancy

The Conemaugh Valley Conservancy, Inc. (CVC) was formed in 1994 with a mission to promote the conservation and preservation of natural, cultural and historic resources and encourage prudent land-use principles in the Kiski-Conemaugh River Basin. CVC supports restoration and enhancement of land and water-based natural resources and promotes citizen environmental stewardship through low-impact recreation. CVC goals include:

- Creating environmental stewards especially among those who recreate outdoors;
- Engaging citizens in conserving and preserving our environment;
- Inspiring youth to continue the good works of today; and
- Restoring healthy water quality to streams and rivers, thus promoting this region as an eco-tourist destination and making it a great place to live, work, and play.

CVC oversees key programs that include the Kiski-Conemaugh Stream Team, West Penn Trail Council, and the Stonycreek Quemahoning Initiative. It was the Kiski-Conemaugh Stream Team that pursued and implemented this project.

The Kiski-Conemaugh Stream Team is an award-winning, basin-wide, volunteer-driven water quality monitoring and education program. As examples, in 2010, it received the Keystone Environmental Education Award from the Pennsylvania Association of Environmental Educators, while in 2012, it won a Western Pennsylvania Environmental Award sponsored by Dominion and the Pennsylvania Environmental Council. In 2015, it received a Governor's Award for Environmental Excellence.

The Stream Team works collaboratively with the PA Department of Environmental Protection, conservation districts, watershed associations, and others to obtain data that are used to design new AMD treatment systems and measure the effectiveness of existing water restoration projects. Currently, the Stream Team routinely monitors 45 AMD treatment systems in the Kiski-Conemaugh River Basin. It also utilizes data loggers and biological monitoring to evaluate stream health, and, at this time, it assists with nine Trout in the Classroom projects in area schools. It provides technical assistance to its partners through project management and development, grant writing and administration, and more.

Project Goals

The primary goals of this project were to:

- Provide the status of the 1999 Plan's recommendations;
- Quantify changes to the watershed since 1999;
- Collaborate with partners to convey accomplishments and concerns and define priorities; and
- Engage the public to foster a closer relationship to conservation communities.

Back to Table of Contents

Background

The 1999 Kiski-Conemaugh River Basin Conservation Plan

The *Kiski-Conemaugh River Basin Conservation Plan* was published in 1999 by the Kiski-Conemaugh River Basin Alliance (KCRBA), which started as a nine-member committee and grew over time as more watershed groups formed. GAI Consultants, Inc. helped with the project. The Plan identified significant natural, recreational and cultural resources and investigated issues, concerns, and threats to these resources. Public meetings, a geographic information system (GIS), and research led to the development of over 120 recommendations for a ten-year period of which implementation began even before the final plan was published. The following table shows the major basin-wide action items listed in the 1999 Plan, their priority level, and the proposed timetable for the completion of initial planning and the start of implementation. The current status of these and other action items specific to sub-watersheds within the Basin may be found on pages 261–323.

Back to Table of Contents

Summary of Major Basin-Wide Programs
from the 1999 *Kiski-Conemaugh River Basin Conservation Plan*

Action Item	Priority Level *	Timetable **
Land Resources		
Vegetative Stream Buffering Program	1	2 years
River Keepers Program	1	2 years
Land Use Planning	1	2 years
Roads / River Access	2	In Progress
Hazardous Waste Program	3	3 years
Viewshed Protection	2	5 years
Sustainable Forestry Initiative	2	5 years
Green Golf Course Initiative	3	5 years
Water Resources		
Watershed Characterization Model	1	Completed
Mine Drainage Reevaluation Program	1	2 years
Non-Point Source Pollution Control	2	2 years
Stormwater Control	3	5 years
Flood Problem Identification	2	5 years
Sewage Evaluation	2	2 years
Biological Resources		
Alkalinity Program	2	2 years
Use of Limestone in Construction Program	2	2 years
Biological Monitoring	2	2 years
Fishery Management	2-3	2-5 years
Important Habitats Program	2-3	2-5 years
Species of Concern Program	3	5 years
Recreational Resources		
Trail Development	1-2	Varies
Conemaugh River Greenway / Kiski-Conemaugh Greenway	1	2 years
Johnstown Urban Greenway	1	1 year
Mainline Trail / Path of the Flood Trail	1	2 years
Scenic Gorges and Hillsides	1	5 years
Historic / Archeologic Resources		
Pennsylvania Main Line Canal	1	2 years
Heritage Areas	2	Varies
Allegheny Ridge Heritage Park	2	Varies
Historic Sites	3	Varies
Education / Promotion		
Newsletter and News Articles	2	1 year
Classroom Education	2	In Progress
Website Development	3	Varies
Household Hazardous Waste Education	3	5 years
Tourism / Marketing	2-3	Varies
Management		
Plan Update	1	5 years

* 1 represents highest priority
** Timeframe shown represents completion of initial planning efforts / start of implementation.

Table 1

Industrial Heritage

The forested landscape and rich deposits of coal, coupled with the river valleys that served as a conduit for the Pennsylvania Main Line Canal and Pennsylvania Railroad, made this region essential to the boom of the lumber, iron and steel industries. As stated in the 1999 Plan, "In the late 19^{th} and early 20^{th} centuries, the western Pennsylvania coal fields produced about one-fourth of the nation's coal" (ES-2). While the coal mining industry fueled the Industrial Revolution and shaped the development of the region, it left a legacy of pollution, with black coal refuse piles, which are often called "boney piles" in Western Pennsylvania, dotting the landscape, and orange veins of metal-laden water snaking along valley floors, making the Kiski-Conemaugh River Basin one of the most polluted watersheds in the state.

Figure 1 – A coal refuse pile looms over the Yellow Creek AMD treatment systems in Indiana County

Back to Table of Contents

The Kiski-Conemaugh River Basin

Location

The Kiski-Conemaugh River Basin is 1,888 square-miles and includes the southern portion of Armstrong, Cambria, and Indiana Counties and the northern half of Somerset and Westmoreland Counties in southwestern Pennsylvania. One hundred and thirty [130] municipalities lie completely or partially within its boundaries. The following is a list of these municipalities.

Armstrong County

- Apollo Borough
- Bethel Township
- Gilpin Township
- Kiskiminetas Township
- Leechburg Borough
- North Apollo Borough
- Parks Township
- South Bend Township

Cambria County

- Adams Township
- Allegheny Township
- Barr Township
- Blacklick Township
- Brownstown Borough
- Cambria Township
- Cassandra Borough
- Conemaugh Township
- Cresson Borough
- Cresson Township
- Croyle Township
- Daisytown Borough
- Dale Borough
- East Carroll Township
- East Conemaugh Borough
- East Taylor Township
- Ebensburg Borough
- Ehrenfeld Borough
- Ferndale Borough
- Franklin Borough
- Geistown Borough
- Jackson Township
- Johnstown City
- Lilly Borough
- Lorain Borough
- Lower Yoder Township
- Middle Taylor Township
- Munster Township
- Nanty Glo Borough
- Portage Borough
- Portage Township
- Richland Township
- Sankertown Borough
- Scalp Level Borough
- South Fork Borough
- Southmont Borough
- Stonycreek Township
- Summerhill Borough
- Summerhill Township
- Upper Yoder Township
- Vintondale Borough
- Washington Township
- West Carroll Township
- West Taylor Township
- Westmont Borough
- Wilmore Borough

Indiana County

- Armagh Borough
- Armstrong Township
- Blacklick Township
- Blairsville Borough
- Brush Valley Township
- Buffington Township
- Burrell Township
- Center Township
- Cherryhill Township
- Clymer Borough
- Conemaugh Township
- East Mahoning Township
- East Wheatfield Township
- Grant Township
- Green Township
- Homer City Borough
- Indiana Borough
- Pine Township
- Rayne Township
- Saltsburg Borough
- West Wheatfield Township
- White Township
- Young Township

Somerset County

- Benson Borough
- Berlin Borough
- Boswell Borough
- Brothersvalley Township
- Central City Borough
- Conemaugh Township
- Hooversville Borough
- Indian Lake Borough
- Jenner Township
- Jennerstown Borough
- Lincoln Township
- Ogle Township
- Paint Borough
- Paint Township
- Quemahoning Township
- Shade Township
- Shanksville Borough
- Somerset Township
- Stonycreek Township
- Stoystown Borough
- Windber Borough

Westmoreland County

- Allegheny Township
- Avonmore Borough
- Bell Township
- Bolivar Borough
- Cook Township
- Delmont Borough
- Derry Borough
- Derry Township
- Donegal Borough
- Donegal Township
- East Vandergrift Borough
- Fairfield Township
- Hempfield Township
- Hyde Park Borough
- Latrobe Borough
- Laurel Mountain Borough
- Ligonier Borough
- Ligonier Township
- Loyalhanna Township
- Mount Pleasant Township
- New Alexandria Borough
- New Florence Borough
- Oklahoma Borough
- Salem Township
- Seward Borough
- St. Clair Township
- Unity Township
- Upper Burrell Township
- Vandergrift Borough
- Washington Township
- West Leechburg Borough
- Youngstown Borough

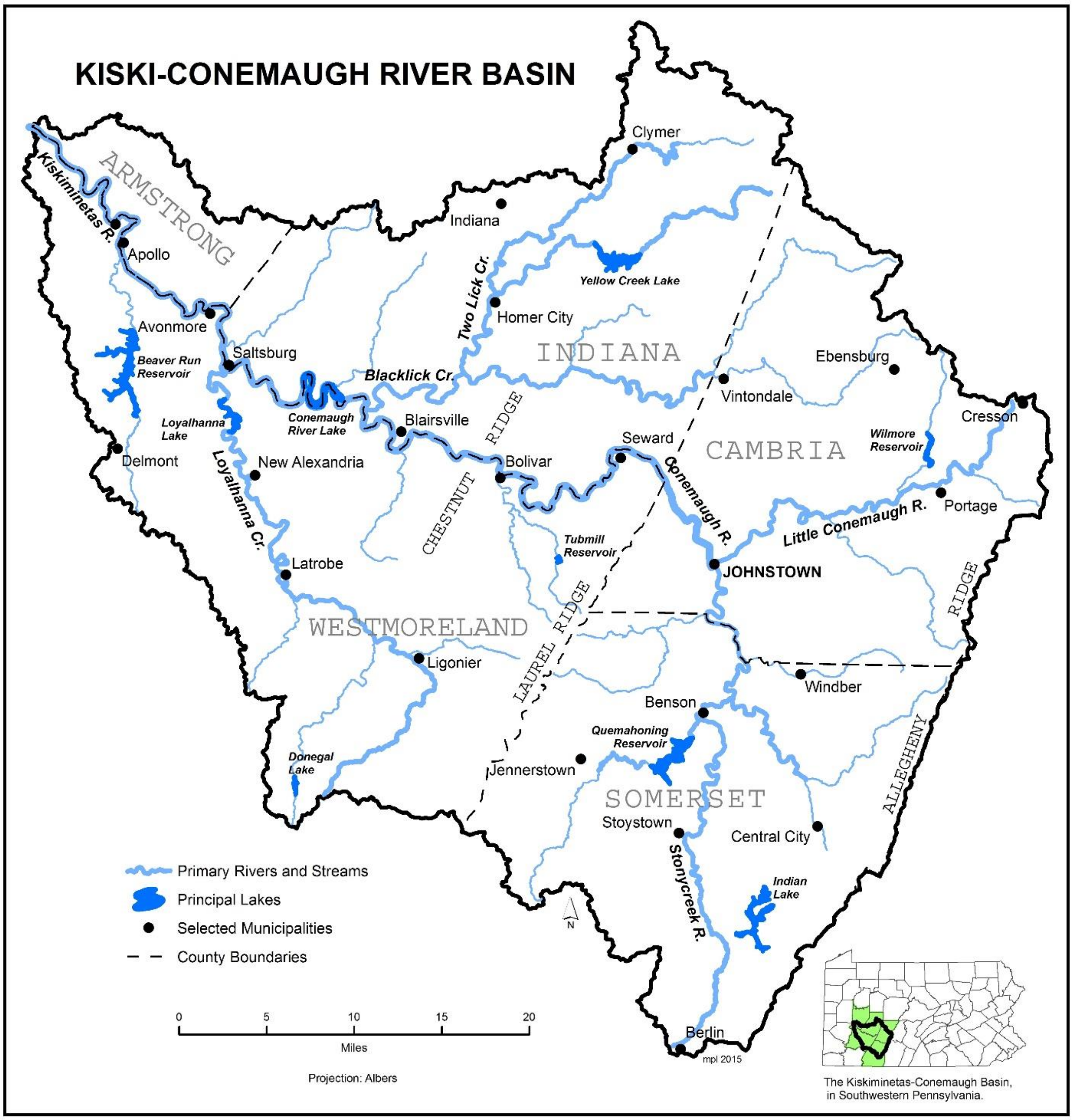


Figure 2 – Location map of the Kiski-Conemaugh River Basin

The Kiski-Conemaugh River Basin begins on the Eastern Continental Divide, which is the ridge that determines whether water flows to the Atlantic Ocean or the Gulf of Mexico, in Cambria and Somerset Counties and loses over 2,200 feet of elevation from its highest point on the Allegheny Front at 3,000 feet to its lowest at 740 feet in Schenley. Laurel and Chestnut Ridges parallel each other through the heart of the watershed, as shown in Figure 3. Millions of years ago, the Conemaugh River formed Conemaugh and Packsaddle Gaps in the Allegheny Mountains. At 1,560 feet (SCRIP), the Conemaugh Gap is one of the deepest gorges east of the Mississippi River.

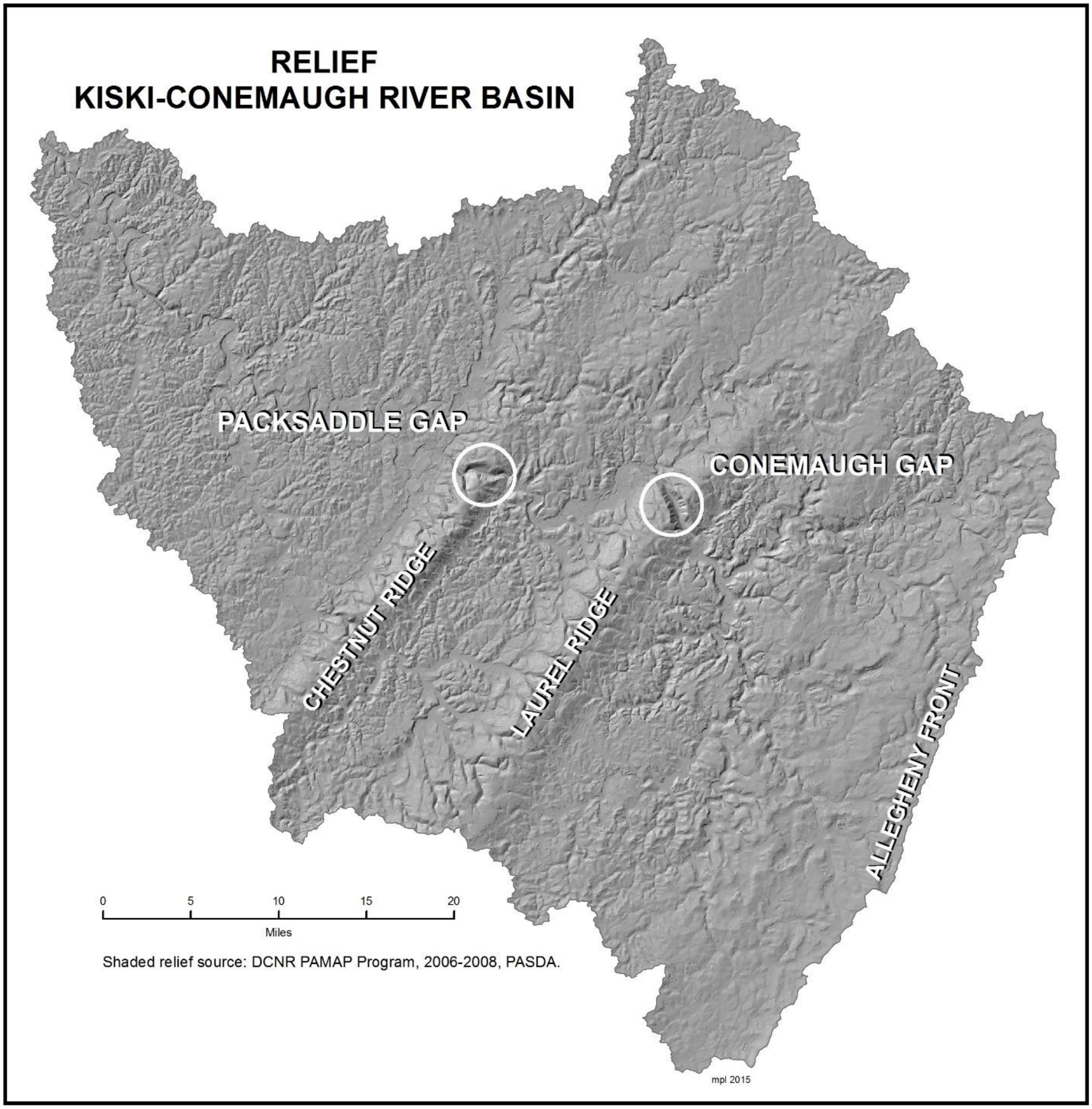


Figure 3 – Relief map of the Kiski-Conemaugh River Basin

Water from the Kiski-Conemaugh River Basin flows into the Allegheny River at Schenley, 30 miles upstream of "The Point" in Pittsburgh, Pennsylvania. It is the largest sub-basin of the Allegheny River, draining 16% of the Allegheny's total drainage area. The Allegheny River merges with the Monongahela River in Pittsburgh to form the Ohio River, which early French explorers called "La Belle Riviere" – The Beautiful River (PA DEP).

Figure 4 – The confluence of the Kiskiminetas River with the Allegheny River. Photo by John Linkes

According to Charles Williams' book, *Along the Allegheny River: The Southern Watershed*, "Conemaugh is derived from the Native American word *Conunmoch*, meaning 'otter'" or sometimes "Otter Creek." Kiskiminetas has many more possible meanings. It is reportedly derived from the Native American word *Gieschgumanito*, which means "to make daylight" and was "probably the word of command given by a chief to his comrades to arise and resume the journey at daybreak" (Armstrong Co. Genealogy Project). It also could mean "River of big fish," "Plenty of walnuts," or "Clear, clean stream of many bends."

Back to Table of Contents

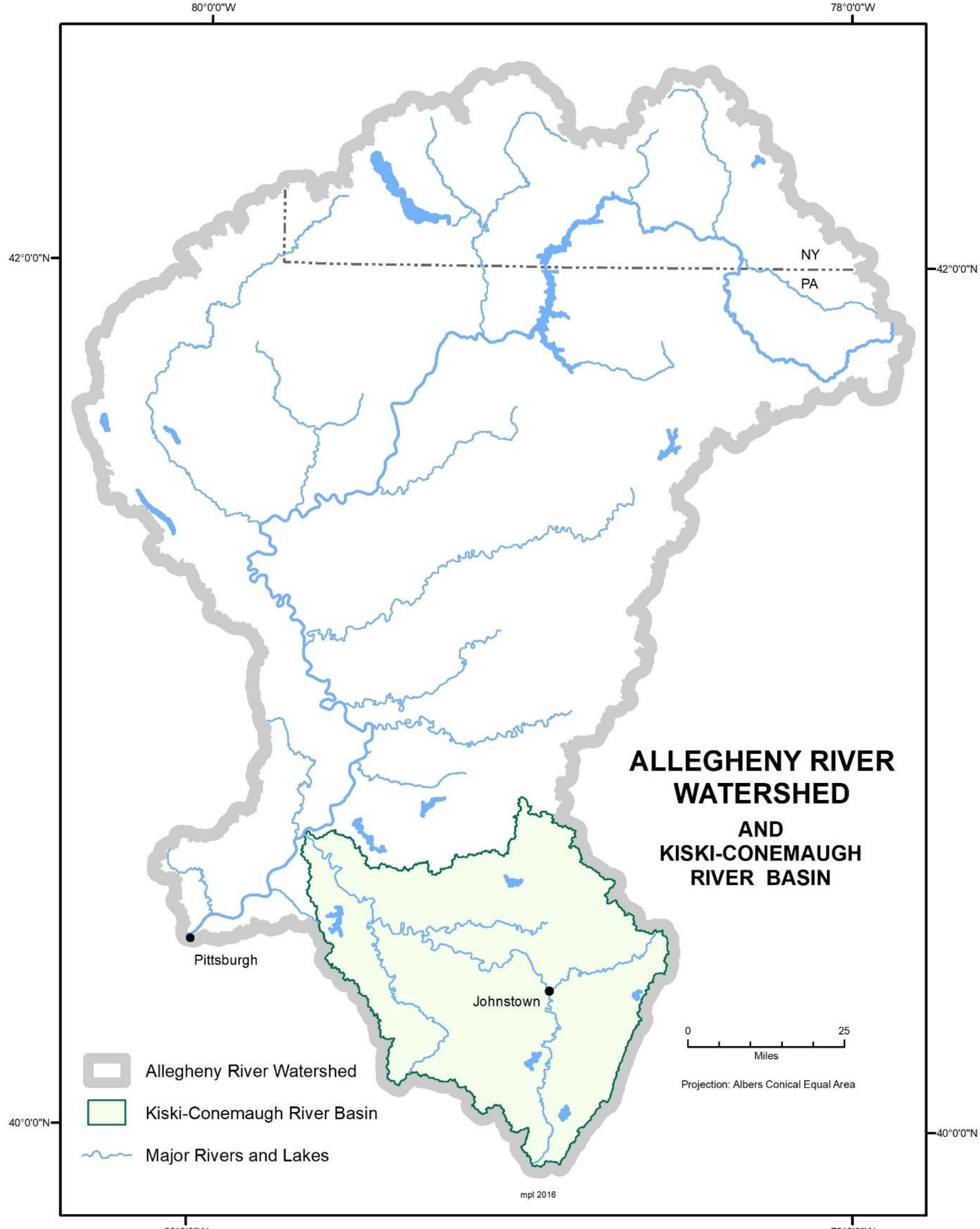


Figure 5 – Map showing the Kiski-Conemaugh River Basin's location within the Allegheny River watershed

It might seem obvious, but it is often a forgotten fact that work in the headwaters benefits waters, and thus communities, downstream. As Pennsylvania Fish and Boat Commission employees Rick Lorson and Tom Shervinskie state in their August 1992 *Kiskiminetas River (818B) Management Report*, "It is important also to keep in mind that water quality improvement in a watershed of this size will improve the quality in the Allegheny and Ohio Rivers too. The cumulative effects lead toward improved quality of life for residents along the river and expanded fishing and boating opportunities" (4).

Few events highlighted the recovery of the Three Rivers in Pittsburgh, Pennsylvania better than the CITGO Bassmaster Classic, which was held on the Three Rivers for the first time in July 2005. According to Bassmaster, smallmouth bass dominated the catch with the downtown Pittsburgh area being the most productive.

Two decades ago, holding a national fishing tournament in Pittsburgh would have been unheard of and even laughable, but collective restoration efforts throughout the Ohio River watershed drainage, smarter use of our resources, laws, and regulations all have improved water quality in Pittsburgh and beyond.

Figure 6 – A smallmouth bass collected during a 2015 fish survey on the Conemaugh River

Back to Table of Contents

Transportation Facilities

Roads

No new, significant highways or roads have been built since 1999. U.S. Routes 22 and 30 are still the major east/west transportation corridors, while U.S. Routes 119 and 219 are the major north/south roads. Route 22 was expanded to a four-lane in the 2000s. Plans to extend Route 219 south to U.S. Route 68 in Maryland are underway.

Waterway access depends largely on county and local roads.

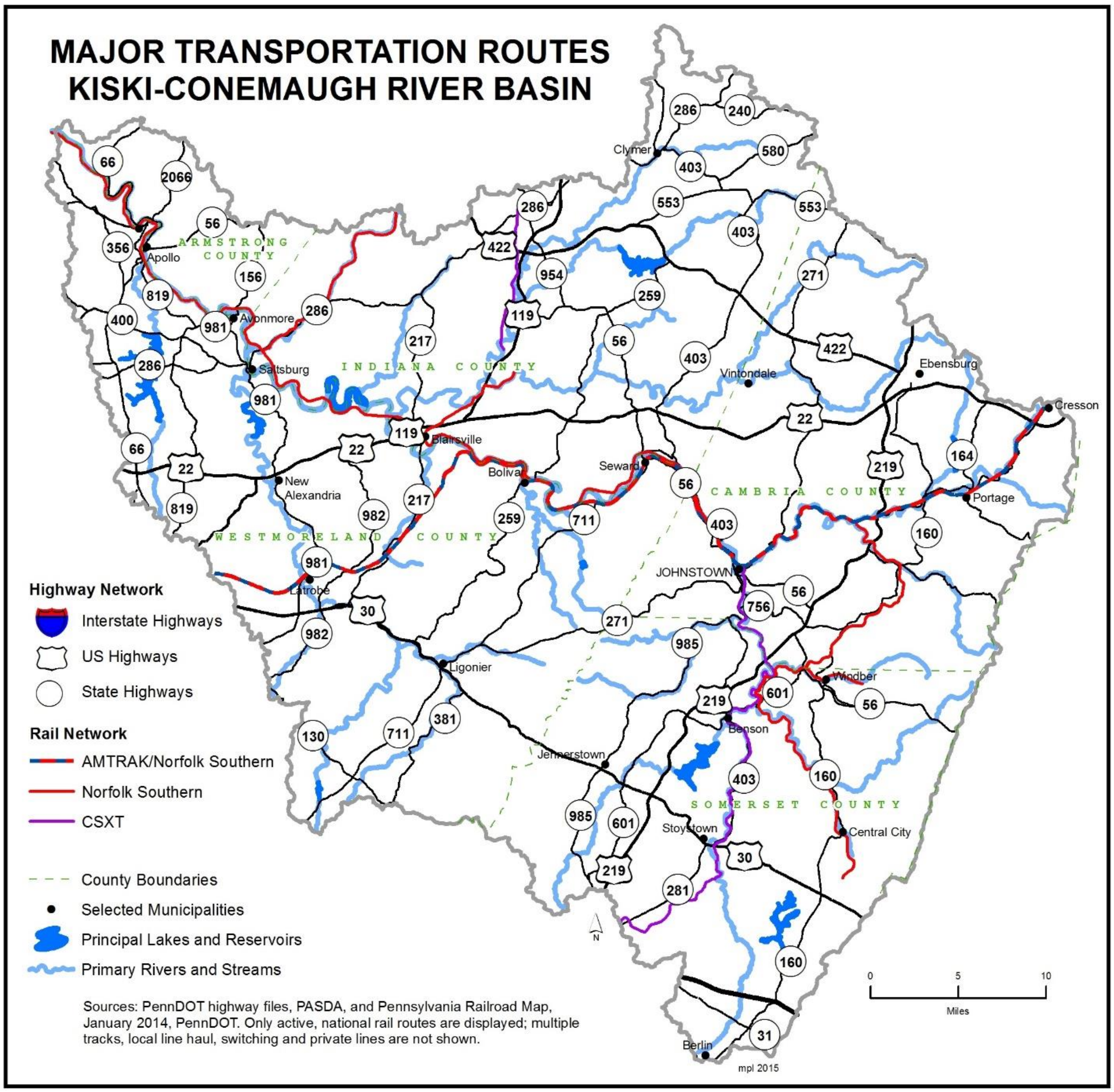


Figure 7 – Map displaying major transportation routes within the Kiski-Conemaugh River Basin

In 2013, the Commonwealth passed the Act 89 Transportation Plan that provided the State Conservation Commission-administered Dirt, Gravel, and Low Volume Road Program a significant funding increase from $4 million annually in 1997 through 2013 to $28 million annually in 2014. Of these funds, $20 million are available for public unpaved roads and $8 million for public paved, low-volume roads. This supports county conservation districts' efforts to enhance water quality while improving public roadways and reducing long-term maintenance costs (Penn State University).

Railroads

The Pennsylvania Railroad connected the east with the west in the late 1800s and early 1900s. In 1999, Conrail owned the former Pennsylvania Railroad, but, upon its disintegration in 1999, more than half of their holdings and nearly all of the Pennsylvania Railroad became part of Norfolk Southern Railway (Wikipedia).

Figure 8 – A Norfolk Southern Railway train

Trails

Over the past 17 years, there has been an uptick in the number of trails developed. Please see the Land and Water Trails sections beginning on page 90 for more information.

Back to Table of Contents

Socioeconomic Data

Census Data

As cited in the 1999 Plan, the Pennsylvania State Data Center projected population growth from 1990 to 2000 in Armstrong, Indiana, and Somerset Counties and loss in Cambria and Westmoreland Counties, but in fact, only Somerset County saw population growth between 1990 and 2000.

According to 2010 United States Bureau of Census data, all five of these counties have experienced a population loss since 2000, as shown in Table 2, even though the state of Pennsylvania gained nearly half a million people. Indiana, Somerset, and Westmoreland Counties saw the least amount of migration since 1990 at 1.8%, 1.1%, and 1.7% respectively. Armstrong County lost 6.6% of its population since 1990, while Cambria County lost 12.6%.

Population by County			
County	**1990 Total**	**2000 Total**	**2010 Total**
Armstrong	73,478	72,392	68,614
Cambria	163,029	152,598	142,448
Indiana	89,994	89,605	88,404
Somerset	78,218	80,023	77,341
Westmoreland	370,321	369,993	364,090

Table 2

The Kiski-Conemaugh River Basin Alliance used a modeling program and 1990 Census data to determine that about 329,314 people lived within the boundaries of the Kiski-Conemaugh River Basin. Understanding that watershed boundaries do not follow political boundaries and without access to that modeling program, total population of the Kiski Basin noted in this document is based on the entire population of the municipalities that are fully or partially within the Basin. Using this rational and U.S. Census 2010 data, there are 430,706 people living in the Kiski-Conemaugh River Basin.

As shown in Figure 12, the land cover map, population loss has not stemmed land development and urban sprawl.

Back to Table of Contents

Population Centers

Principal Communities in the Kiski-Conemaugh River Basin									
Armstrong Co.		**Cambria Co.**		**Indiana Co.**		**Somerset Co.**		**Westmoreland Co.**	
Community	*Population*	*Community*	*Population*	*Community*	*Population*	*Community*	*Population*	*Community*	*Population*
Kiskiminetas Township	4,800	Johnstown City	20,978	White Township	15,821	Somerset Township	12,122	Hempfield Township	43,241
Parks Township	2,744	Richland Township	12,814	Indiana Borough	13,975	Conemaugh Township	7,279	Unity Township	22,607
Gilpin Township	2,496	Cambria Township	6,099	Center Township	4,764	Windber Borough	4,138	Derry Township	14,502
Leechburg Borough	2,156	Adams Township	5,972	Burrell Township	4,393	Jenner Township	4,122	Mount Pleasant Township	10,911
Apollo Borough	1,647	Upper Yoder Township	5,449	Green Township	3,839	Paint Township	3,149	Allegheny Township	8,164

Table 3

According to the U.S. Census Bureau, in Armstrong and Somerset Counties, the same five municipalities in 2010 as in 1990 were the most populous. In Cambria County, Upper Yoder Township replaced Westmont Borough for a spot in the top five, while in Indiana County, Burrell Township replaced Blairsville Borough. Due to the aforementioned modeling, Westmoreland County municipalities cannot be compared to 1990 data used in the 1999 Plan.

Back to Table of Contents

Economic Profile

The following table compares median family or household income based on data obtained from the 1990 and 2010 Census. Dollar figures were not adjusted for cost of living.

Median Family/Household Income		
County/State	**1990**	**2010**
Armstrong	$27,024	$44,118
Cambria	$26,455	$42,191
Indiana	$27,893	$42,267
Somerset	$25,549	$43,215
Westmoreland	$31,360	$51,876
Pennsylvania	$34,856	$56,070

Table 4

Major Sources of Employment

The Pennsylvania Department of Labor and Industry said they, "are unable to provide the number of employees per employer due to confidentiality restrictions," so the largest employers in the Basin will remain unnamed (Gilfillan).

Focusing on industry, the Pennsylvania Department of Labor and Industry's website shows that in all five counties of the Kiski Basin, Health Care and Social Assistance is the industry with the greatest number of establishments. In Armstrong, Somerset, and Westmoreland Counties, Retail Trade and Construction are second and third, while in Cambria and Indiana Counties, Retail Trade is second and Other Services such as Public Administration are third.

Back to Table of Contents

Land Resources

Geology

Nearly all the geologic formations in the Kiski-Conemaugh River Basin are associated with pyrite, which is more commonly known as Fools Gold, and, when in contact with water and air, creates acidic conditions through the formation of sulfuric acid. Only the Mauch Chunk and Shenango/Oswego Formations do not have the acid-forming minerals in them. All of the layers support the fact that this region was once covered by an ancient sea, making this area rich in mineral resources.

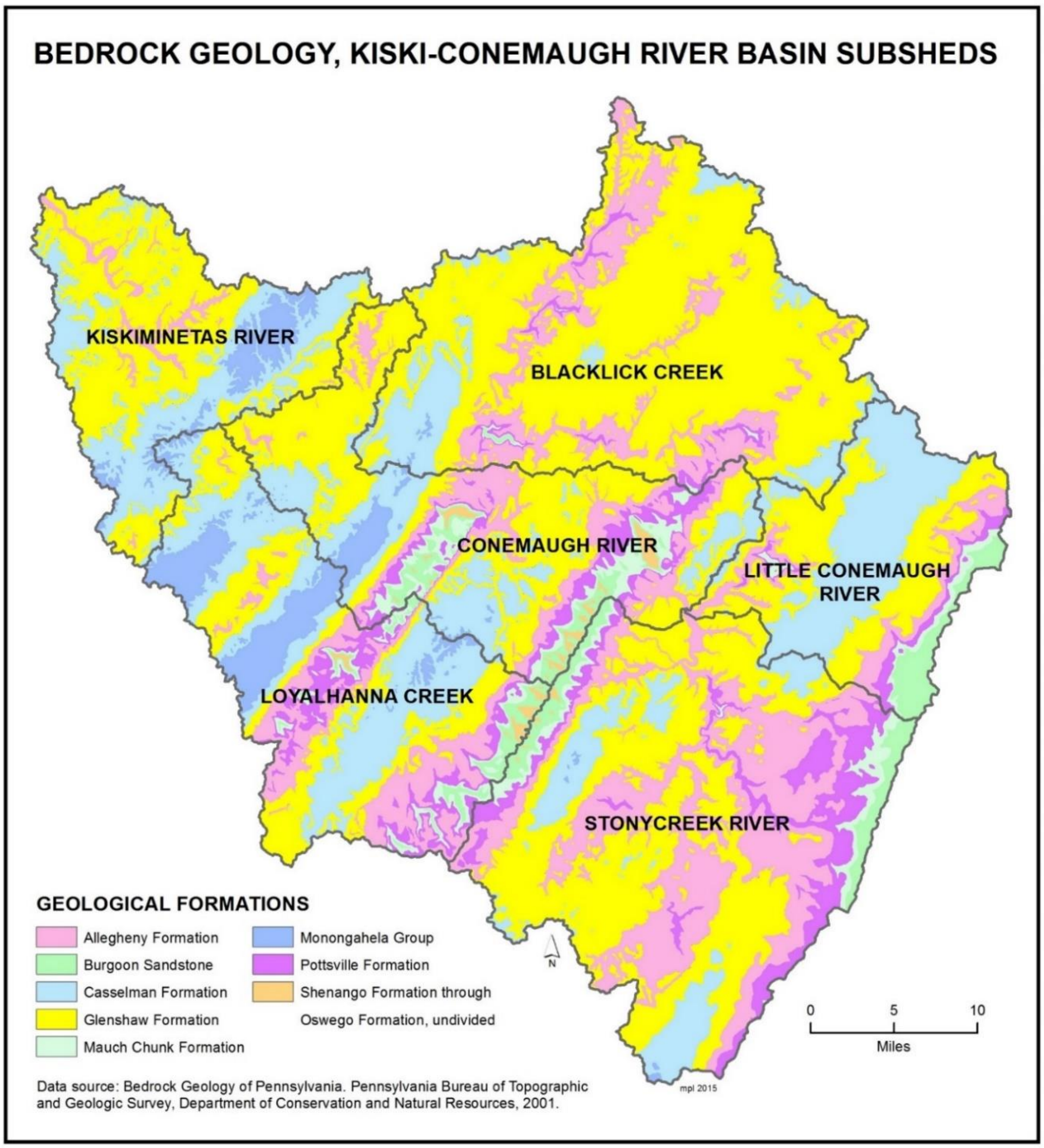
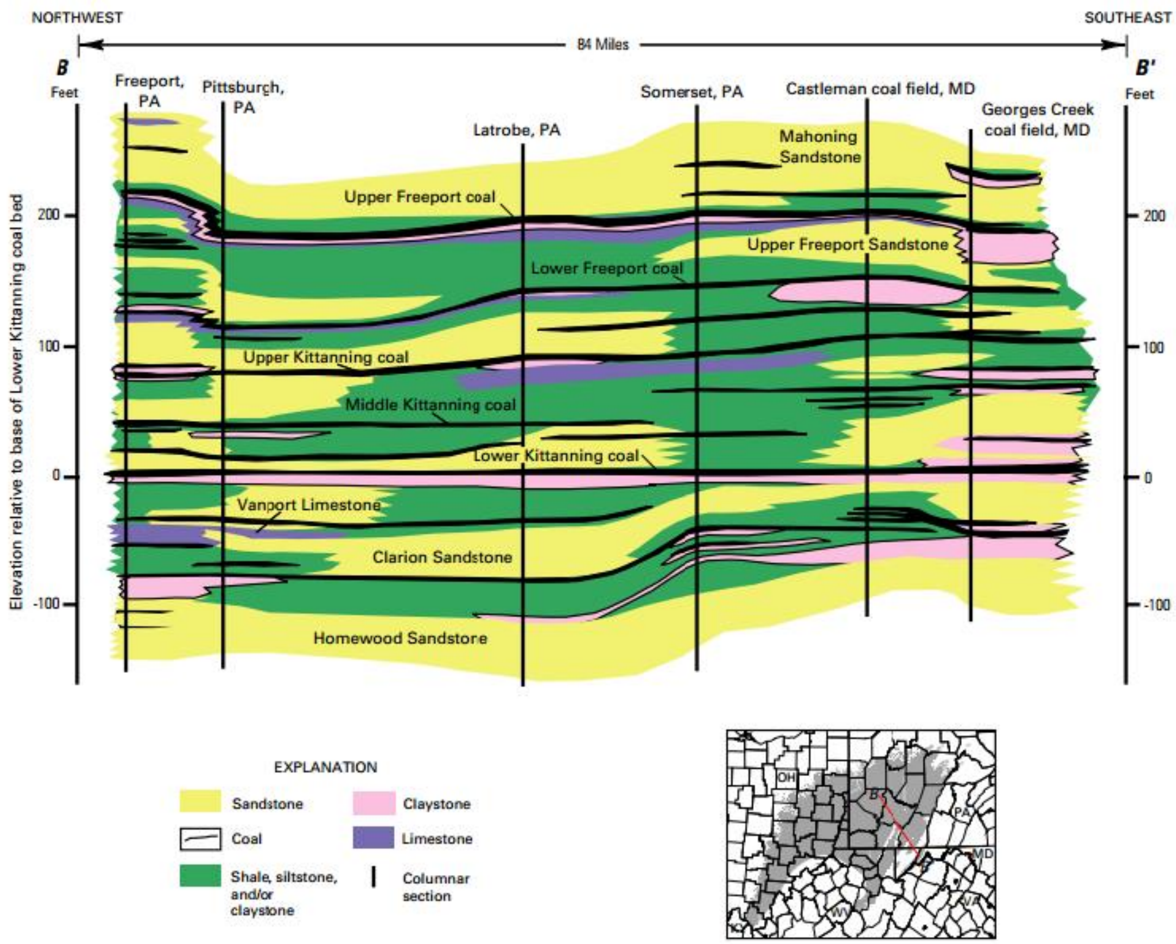


Figure 9 – Map of primary geologic formations

The Allegheny, Casselman, and Glenshaw Formations are dominant throughout the Basin. The Allegheny Formation includes the most mineable, bituminous coal including the Upper, Middle, and Lower Kittanning and Upper and Lower Freeport seams, though its primary rock is sandstone. The Casselman and Glenshaw Formations are mostly shale. The Casselman Formation is mostly made up of freshwater rock, but has some coal layers in Somerset County that are thick enough to mine. The Glenshaw Formation, which has several marine zones, is the thickest in Somerset and southern Cambria Counties and thins as it goes west (PA DEP).

Permeable sandstones can serve as aquifers or groundwater storage and allow for horizontal movement of water, but the slope of geologic strata, as well as the fractures within the geologic layers can transport groundwater vertically.

Figure 11 displays the stratigraphic sections – the layers of rock – of the geologic formations in the Kiski Basin, while Figure 10 shows how the various coal seams are intertwined with sandstone, clays, shale, and limestone northwest to southeast across the Kiski Basin.



1. Cross section B-B′ from Allegheny County, Pa., southeast to Allegany County, Md. (adapted from Swartz and others, 1922). Vertical exaggeration X652.

Figure 10 – Cross-section from the United States Department of Interior United States Geological Survey's Geology and Geochemistry of the Middle Pennsylvania Lower Kittanning Coal Bed, Allegheny Group, Northern Appalachian Basin Coal Region *(Milici)*

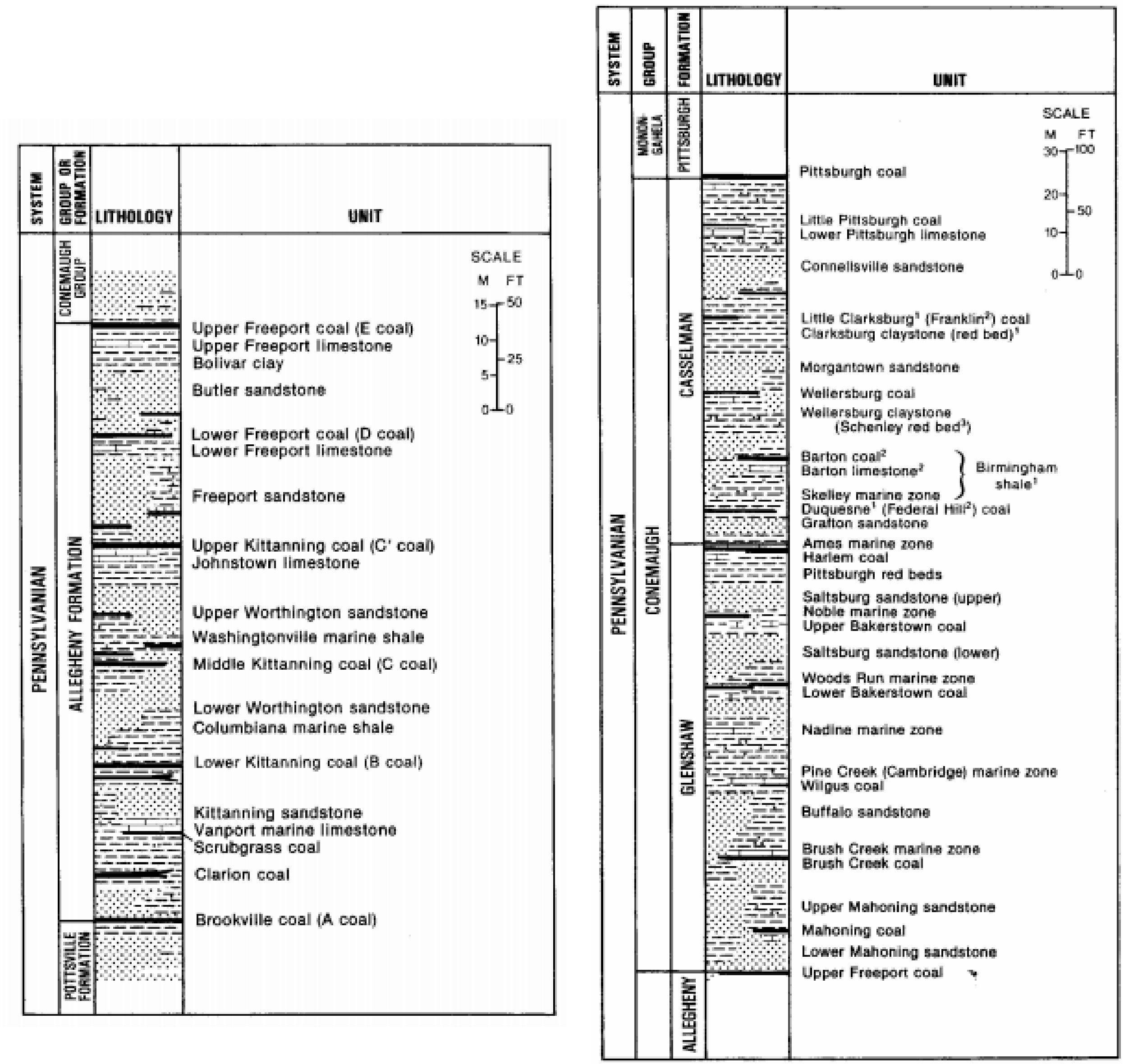


Figure 11 – Stratigraph from PA DEP's Coal Ash Beneficial Use in Mine Reclamation and Mine Drainage Remediation in Pennsylvania *(28)*

Outstanding or Unique Features

The Pennsylvania Bureau of Topographic and Geologic Survey has not added any new outstanding or unique features to the list issued in 1979 and detailed in the 1999 Plan. They include the following, several of which are shown on the Recreation and Scenic Assets map on page 89:

- **Bald Knob** – sandstone outcrops at the topographic crest of Laurel Hill, located about 1.5 miles west of the village of Laurel Summit. The site provides scenic views and displays restricted forest growth due to weather.
- **Bear Rocks** – scenic two acres of weathered, fractured sandstone on the crest of Chestnut Ridge, about eight miles west of New Florence, that forms a miniature "rock city."
- **Conemaugh Gorge** – a scenic cut through geologic time shown in the Laurel Hill ridge. This gorge is one of the deepest east of the Mississippi and lies west of the City of Johnstown.
- **Conemaugh Water Gap** – also known as Packsaddle Gap, this beautiful gap was formed by the Conemaugh River cutting through Chestnut Ridge. It lies about 1.7 miles west of Bolivar.
- **Loyalhanna Gorge** – another gorge through Chestnut Ridge made this time by Loyalhanna Creek. It is located about three miles southeast of Latrobe.
- **Mountain Ridges** – the Allegheny, Laurel Hill and Chestnut Ridges offer abundant recreational opportunities, scenic vistas, and important habitat corridors.
- **90-Foot Rocks** – another outcropping of sandstone, about 1.5 miles west of Laurel Summit, within the Linn Run gorge that provides scenic views and lies within close proximity of notable geologic features like Adams Falls, Flat Rocks, and Wolf Rocks.
- **Suncliff** – a 100-200-foot cliff of alternating shale, sandstone, limestone, minor coal and clay that forms a unique and scenic rock exposure about 3.4 miles east of Brush Valley.

Soils

Each county within the Kiski-Conemaugh River Basin has a County Soil Survey that elaborates on soil characteristics, their limitations, and their suitability. As stated in the 1999 Plan, "The soils within the basin are primarily residual and colluvial products of the weathering of the underlying sedimentary bedrock. These include silty clays, silty sands, and clayey sands. Slopes range from 3 to 100 percent. Soil depths vary with topography. Near the crests of the ridges soils are generally coarse grained and less than three feet thick. Soils in valleys are finer grained and average more than five feet in depth, with locally thicker layers of colluvium. Alluvial deposits along streams consist of silty to clayey sands up to five feet thick" (II-1).

Back to Table of Contents

Land Cover

About 2/3rds of the Kiski-Conemaugh River Basin is forests according to 2011 data obtained from the United States Geological Survey. Forests are important for the habitat and oxygen they provide, the carbon and nitrogen they sequester, and the water they clean and slowly release. David Beale, a Consulting Forester, notes that these forests are mostly under non-industrial, private ownership and that this ownership generally does a poor job of management primarily due to diameter-limit harvests. Agriculture constitutes the second largest land cover classification in the Basin while the third largest is Developed, which includes residential, commercial, industrial, and transportation.

Due to "substantial differences in imagery, legends and methods" (Fry et al. 1), recent data could not be compared to the values presented in the 1999 *Kiski-Conemaugh River Basin Conservation Plan*. However, the Multi-Resolution Land Characteristics Consortium, a partnership of federal agencies led by the U.S. Geological Survey, undertook a reassessment and revision of the 1992 National Land Cover Database to make it compatible with 2001 and subsequent data, although some categories were combined to more easily comprehend the visual and statistical presentations. These values are presented in Table 5.

Land Cover Percentage in the Kiski-Conemaugh River Basin, 1992 – 2011					
	1992	**2001**	**2006**	**2011**	**% Change**
Forest	67.9	67.9	67.6	67.1	- 0.8
Agriculture	20.8	19.6	19.6	19.6	- 1.2
Developed	9.6	10.3	10.4	10.6	+ 1.0
Mining/Barren	0.8	1.1	1.2	1.3	+ 0.5
Water	0.9	1.0	1.0	1.0	+ 0.1
Grass/Shrub	None	0.0	0.1	0.3	+ 0.3
Wetlands	0.0	0.0	0.0	0.0	0

Table 5

When comparing land cover in 2011 and 1992, using the modified values, the largest, albeit slight, change was in agriculture, where 1.2% of land cover was lost. The second greatest change was seen in the developed category, which had an increase of 1%.

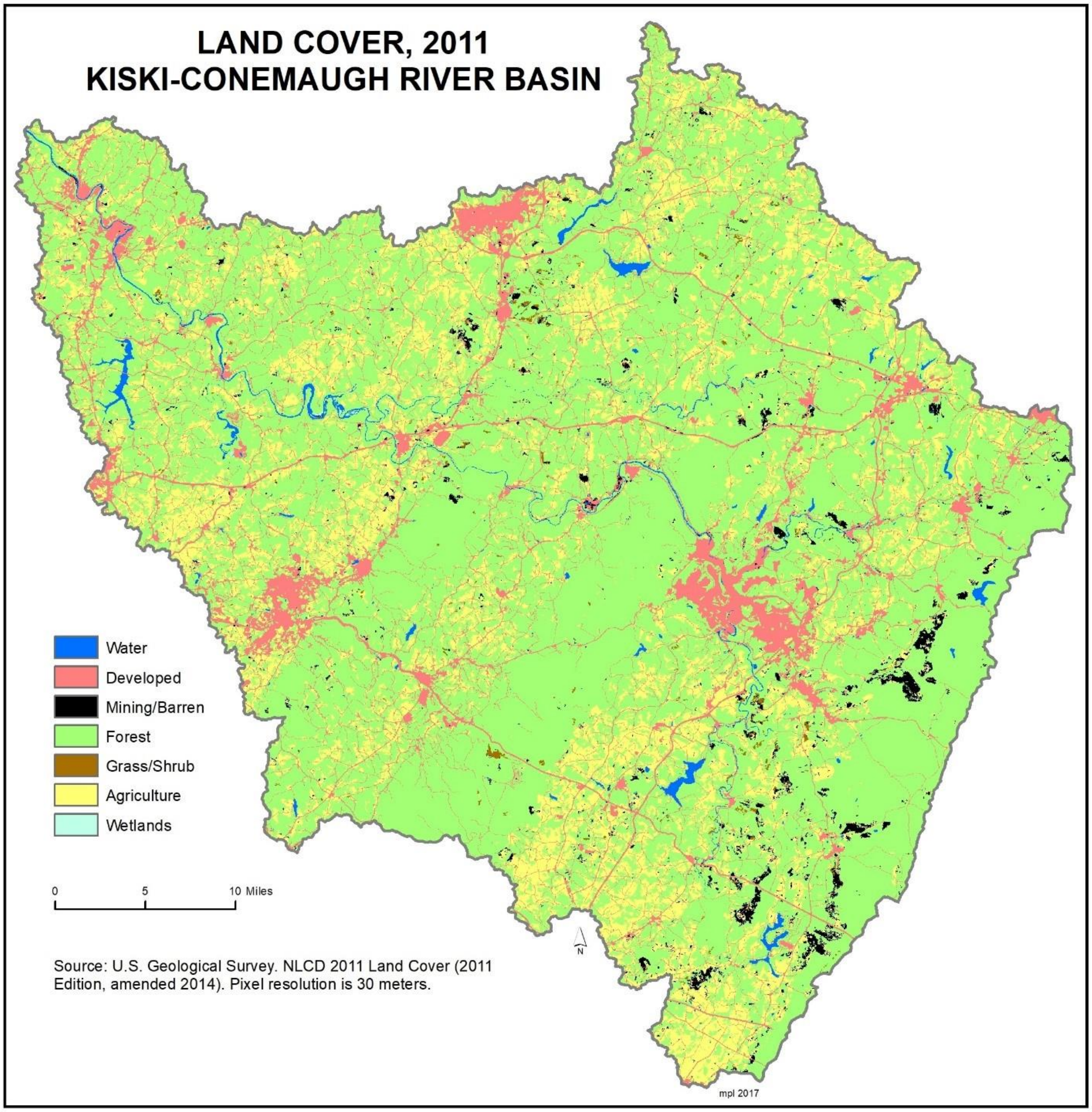


Figure 12 – Land cover map, 2011

Back to Table of Contents

Land Ownership

The 1999 Plan stated that approximately 7% of the Basin was public land, which, in that document, was identified as Pennsylvania State Parks, State Forests, State Game Lands, Pennsylvania Fish and Boat Commission properties, and National Parks (II-1). As of 2011, a little over 10% of the Kiski Basin is public land, and this number does not include lands held by conservancies or land trusts. Figure 54 on page 89 shows some public land; land that is considered not-developable, largely because of conservation easements associated with those lands.

Zoning

Zoning ordinances are the primary way municipalities can control how land is developed and used, but they are just one way of addressing a community's future development. The original *Kiski-Conemaugh River Basin Conservation Plan* stated that in 1999, 34% of the municipalities within the Kiski-Conemaugh River Basin had zoning ordinances, as reflected in Figure 13 (I-20). In 2016, 42% did. The following is a list of these municipalities. Municipalities with other planning tools, such as comprehensive plans, are not listed.

Back to Table of Contents

Armstrong County

- Apollo Borough
- Gilpin Township
- Kiskiminetas Township
- Leechburg Borough
- North Apollo Borough

Cambria County

- Adams Township
- Cambria Township
- Conemaugh Township
- East Conemaugh Borough
- East Taylor Township
- Ebensburg Borough
- Ferndale Borough
- Franklin Borough
- Geistown Borough
- Jackson Township
- Johnstown City
- Lorain Borough
- Lower Yoder Township
- Middle Taylor Township
- Nanty Glo Borough
- Richland Township
- Southmont Borough
- Stonycreek Township
- Upper Yoder Township
- Westmont Borough

Indiana County

- Blairsville Borough
- Clymer Borough
- Homer City Borough
- Indiana Borough

Somerset County

- Allegheny Township
- Benson Borough
- Conemaugh Township
- Indian Lake Borough
- Jennerstown Borough
- Paint Borough
- Stonycreek Township
- Windber Borough

Westmoreland County

- Allegheny Township
- Avonmore Borough
- Delmont Borough
- Derry Borough
- Hempfield Township
- Hyde Park Borough
- Latrobe Borough
- Laurel Mountain Borough
- Ligonier Borough
- Ligonier Township
- Mount Pleasant Township
- New Alexandria Borough
- Oklahoma Borough
- Unity Township
- Upper Burrell Township
- Vandergrift Borough
- West Leechburg Borough

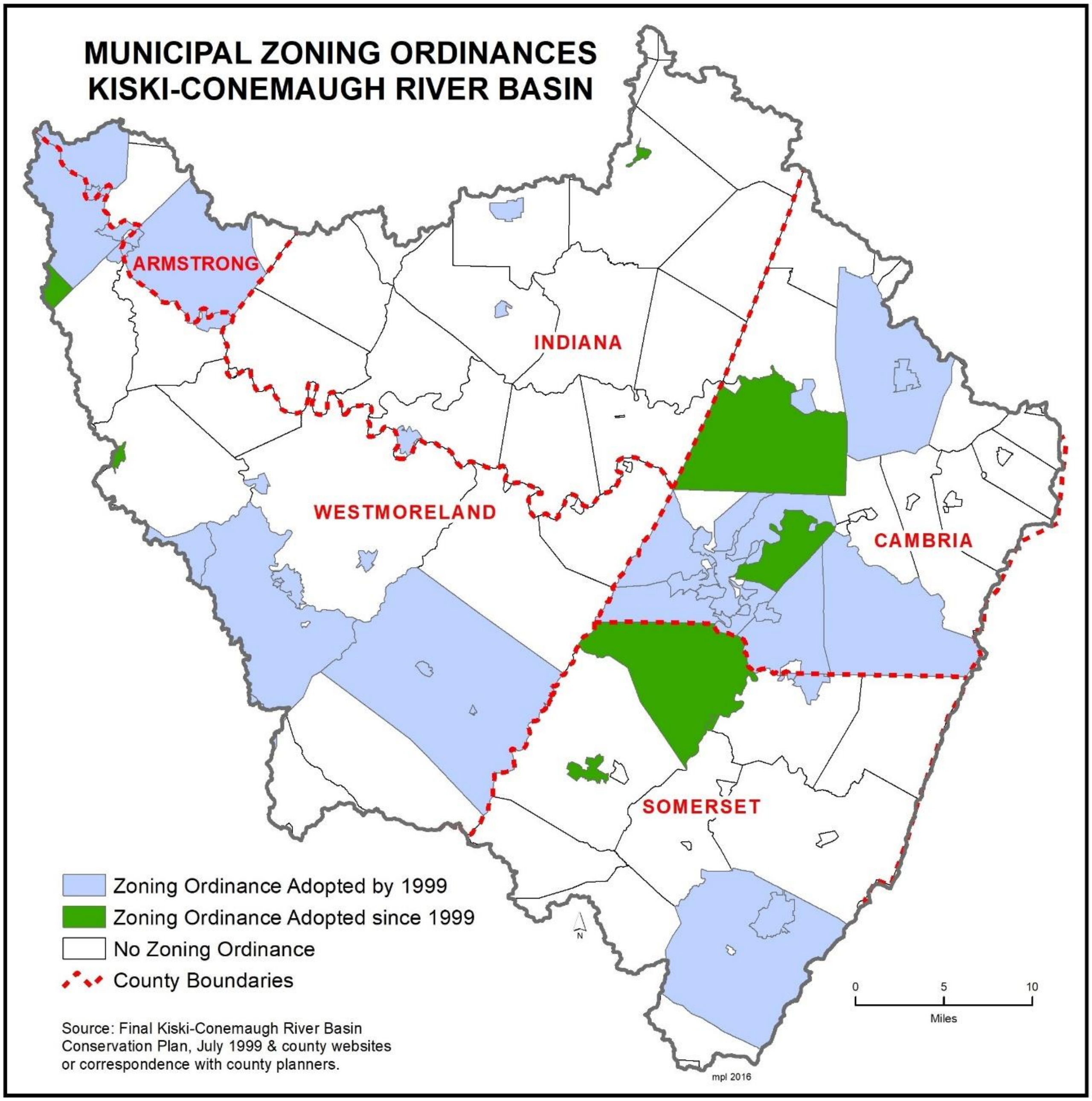


Figure 13 – Map of municipalities with zoning ordinances

Back to Table of Contents

Energy and Hazard Areas

Coal Mines

The 1999 *Kiski-Conemaugh River Basin Conservation Plan* stated that coal was "by far the most important" mineral resource in the Basin (I-2). Bituminous coal was and still is mined from the Kittanning, Freeport, and Pittsburgh seams. The Pittsburgh seam is the thickest, most abundant, and thus, most lucrative coal seam. It is used primarily for making electricity (Ruppert et al.). Metallurgical coal is less abundant, but even more lucrative as it is used to make coke for the iron and steel industries. Bituminous coal has up to six times the sulfur content of its counterpart, anthracite coal, which is found in the eastern part of the state (The Engineering ToolBox).

Figure 14 shows the extensive area underlying the Kiski-Conemaugh River Basin where one or more seams of coal were mined. It also shows reclaimed and unreclaimed bond forfeiture sites. These are permitted mines at which operators failed to comply with regulations and their permit conditions, so the Pennsylvania Department of Environmental Protection (DEP) declares that the mining operator forfeits his or her bonds not yet released at the time of declaration. The DEP then uses the bonds to reclaim the mined area.

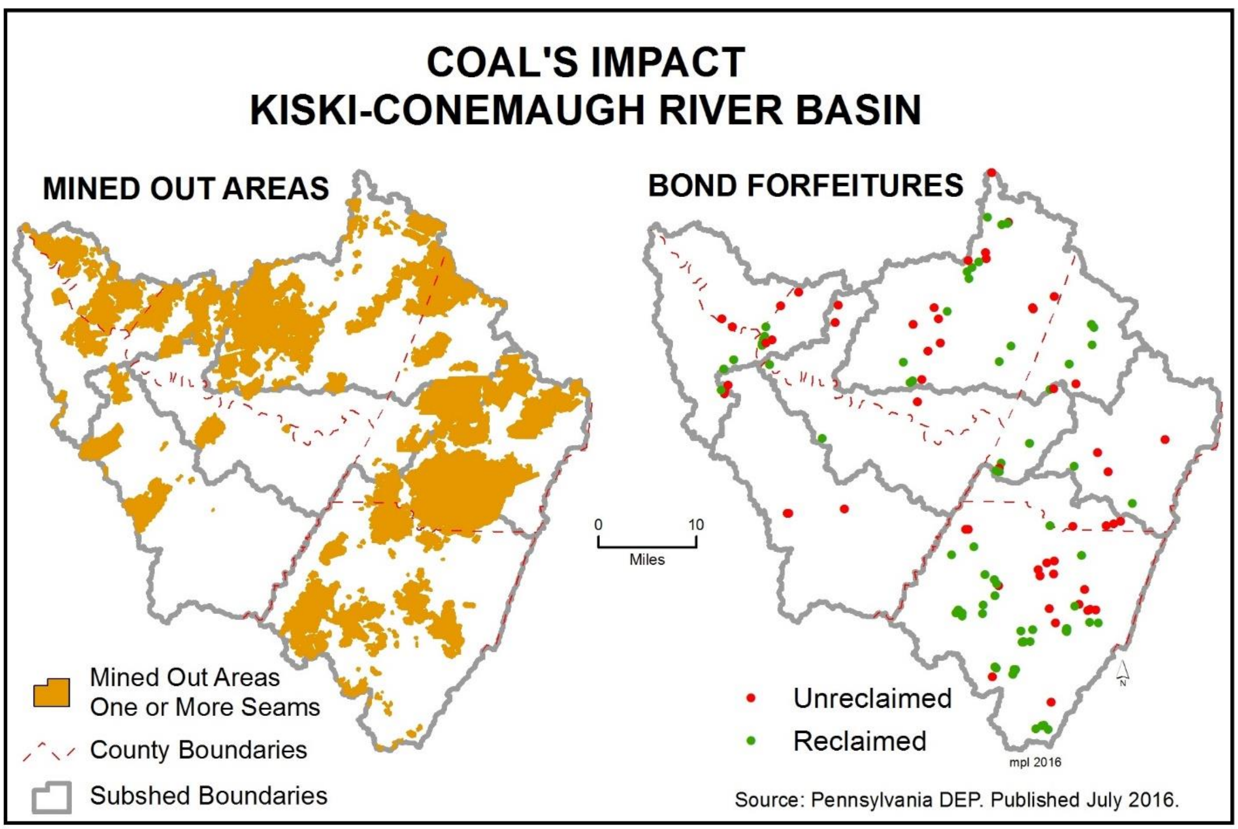


Figure 14 – Map of coal mined areas and bond forfeiture sites as of July 2016

Figure 15 shows active surface and underground deep mines as of July 2016, at which time there were 38 surface coal mines and 23 underground or deep mines in the Kiski Basin. While the number of active surface mines has decreased since 2008, the earliest year from which data could be obtained, the number of underground mines has increased, as shown in Table 6. According to the United States Energy Information Administration, 6% of America's coal was produced in Pennsylvania in 2014.

Number of Active Surface and Deep Mines in the Kiski-Conemaugh River Basin 2008 & 2016			
	2008	**2016**	**% change**
Surface Mines	56	38	- 68 %
Underground Mines	15	23	+ 65 %

Table 6

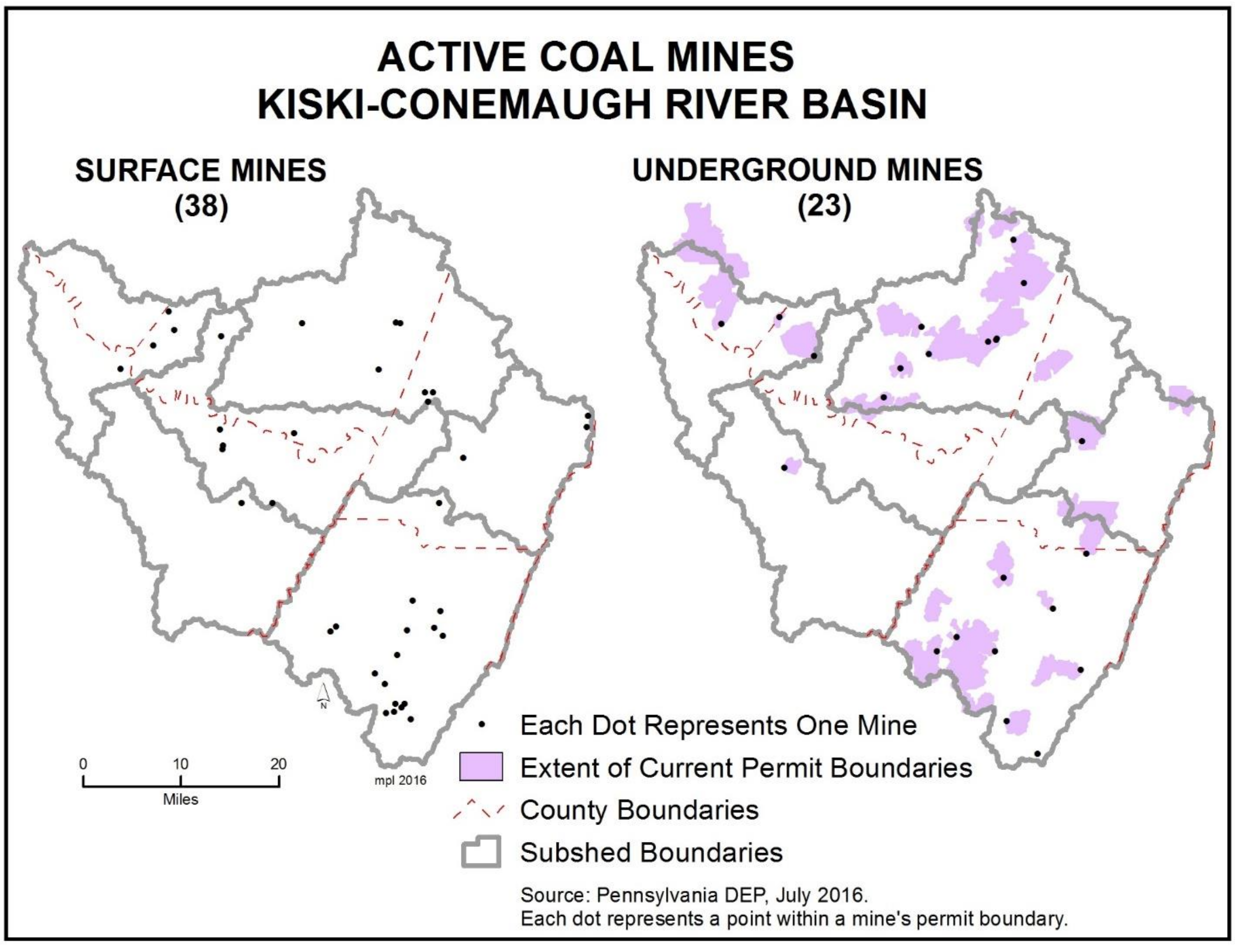


Figure 15 – Map of active coal mines as of July 2016

According to data obtained from the U.S. Energy Information Administration, coal mining production across the country peaked in 2000, when it was more than double the previous productivity spike in the mid-1960s-1970s, and has been on the decline since, though production is still above 1984, the earliest year for which data on production east of the Mississippi were available.

The worldwide market drives the demand for and the price of coal. With decreased global demand for coal, the surplus of natural gas, and more renewable energy sources online, coal holds less of the market share.

Abandoned Mine Lands

The 1977 Surface Mining Control and Reclamation Act (SMCRA) established the Office of Surface Mining Reclamation and Enforcement (OSMRE) within the United States Department of Interior. Its purposes were to regulate surface coal mines and to reclaim abandoned mine lands (AML). OSMRE prohibited the issuance of permits that would "likely" result in post-mining discharges that would need long-term treatment. It also required permittees to have enough funds to treat any discharges that did arise. In the early 2000s, OSMRE established the AML enhancement rule, "which allows coal removal from AML sites in connection with reclamation of the site." Funding for the AML Fund comes from a tonnage fee paid by coal operators. The SMCRA Amendments Act of 2006 extended the collection of this fee until September 30, 2021 (OSMRE).

The Kiski-Conemaugh River Basin has a number of documented AML. AML can include open mine shafts, mine subsidence, burning coal refuse, flooded mines, mine discharges, and unreclaimed disturbed areas. According to an AML Inventory Polygon dataset provided by the PA Department of Environmental Protection through the Pennsylvania Spatial Data Access (PASDA), in July 2008, the earliest year for which data could be obtained, there were 1,262 AML entries for the Kiski-Conemaugh River Basin. Of these, 968 were still listed as abandoned while reclamation was complete for 294 entries. The dataset for April 2016 had 1,301 entries, which are detailed in Table 8. Apparently, more AML issues were identified and logged into this file, though most of the additional sites are seemingly places at which reclamation was completed. Of these 1,301 entries, 965 were still listed as abandoned, nearly same number as in 2008, but reclamation was complete at 336 sites, 42 more site than in 2008. The following table lists the number of AML sites in each Management Unit and displays the acres of AML in each of them, as well as the percentage of the watershed that is AML. Two percent of the Kiskiminetas River Management Unit is considered AML, while 1.7% of Blacklick Creek is.

Figure 16 – AML in the Paint Creek watershed

Abandoned Mine Land Sites				
Management Unit	**Number of AML sites**	**Acres of AML Sites**	**Total Acres in Management Unit**	**Percent AML**
Blacklick Creek	409	4460	267,840	1.7 %
Conemaugh River	114	1338	188,928	0.7 %
Kiskiminetas River	172	2801	138,624	2.0 %
Little Conemaugh River	87	982	121,536	0.8 %
Loyalhanna Creek	110	1092	191,168	0.6 %
Stonycreek River	409	2922	300,160	1.0 %
Kiski-Conemaugh River Basin Total	***1,301***	***13,595***	***1,208,256***	***1.1 %***

Table 7

Abandoned Mine Land Issues in the Kiski-Conemaugh River Basin, 2016		
Abandoned Mine Land Problem	**Number in KC River Basin**	**Percentage of Total**
Dry Strip Mine	629	48.5
Refuse Pile	228	17.6
Spoil Pile	208	16.0
Flooded Strip Mine	70	5.4
Subsidence Prone Area	49	3.8
Coal Processing Settling Basin	45	3.5
Known Subsidence Prone Area	22	1.7
Suspected Subsidence Prone Area	20	1.5
Burning Refuse Pile	12	0.9
Underground Mine Fire	4	0.3
Crop Fall or Subsidence Opening	3	0.2
Mine pool / Flooded deep mine	2	0.2
Vertical Mine Shaft	2	0.2
AMD Discharge Area	1	0.1
Open Shaft / Mine Entry	1	0.1
Untreated Discharge	1	0.1
Not classed	4	0.3

Table 8

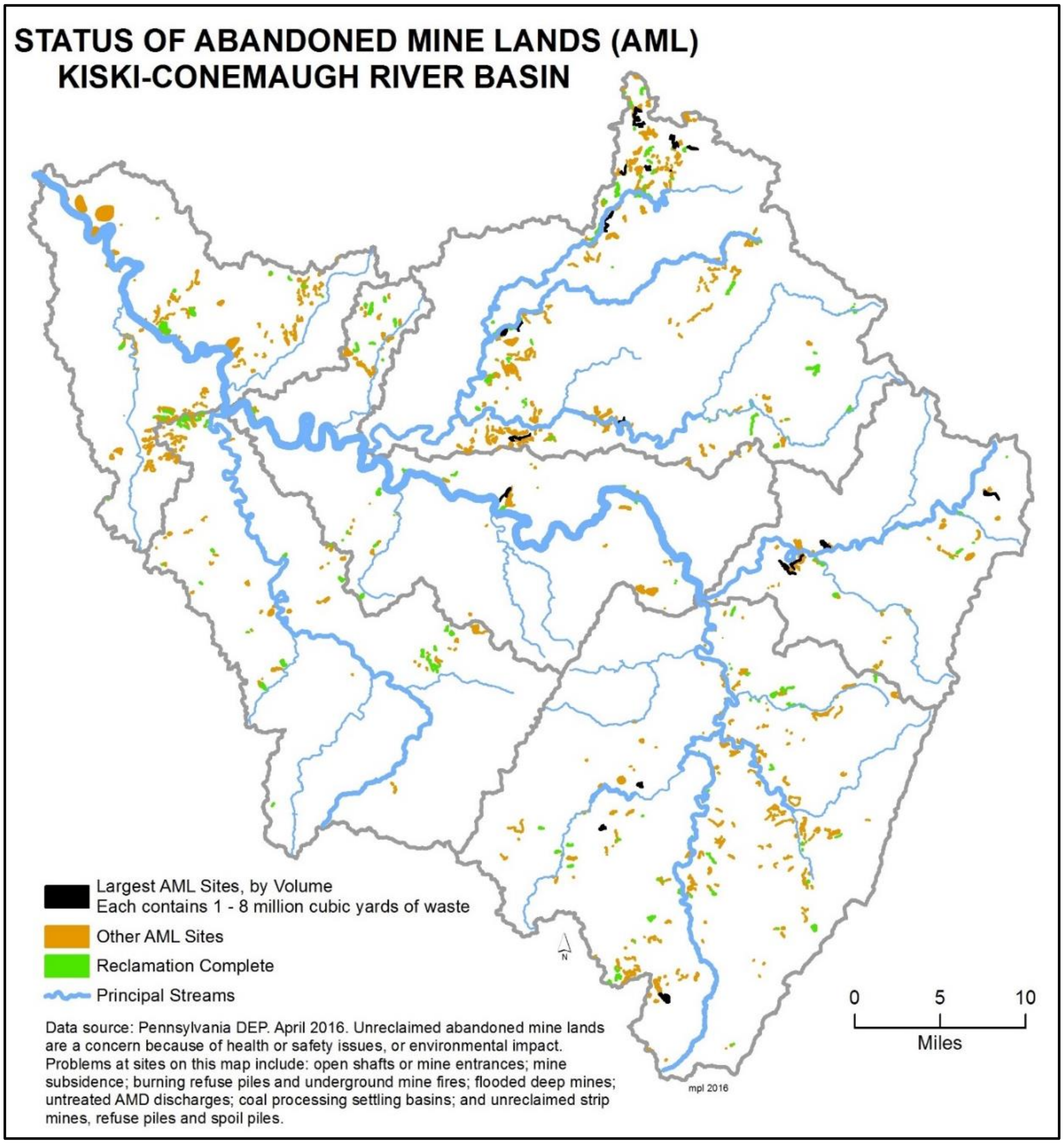


Figure 17 – Map of Abandoned Mine Lands as of April 2016

Not only do AML degrade the environment, but they also cause a public health and safety concern. "Black damp," which is a mixture of carbon dioxide and nitrogen that removes oxygen from the atmosphere, can accumulate in a mine and at its entrance and could cause a person to black out and suffocate. Mine subsidence can damage homes and property, lowering their value and increasing insurance premiums. Burning coal refuse piles can diminish air quality. Coal refuse piles tend to attract people riding quads who could hurt themselves on the loose material or drive over a high wall, and they can leach toxins into nearby waterways, contributing to water quality issues. The following table, which utilizes data provided by the PA DEP's AML Inventory, indicates the kinds of AML issues shown in Figure 17.

Back to Table of Contents

Quarries

As mentioned in the 1999 Plan, the Vanport and Loyalhanna Limestones are the best commercial grade limestones produced within the Kiski-Conemaugh River Basin. Vanport Limestone is a high-calcium limestone, often used to make Portland-cement (Clapp 47). The Vanport Limestone may be found in Armstrong County, southeast Indiana County, and a small portion of north-northwest Westmoreland County. The Loyalhanna Limestone is mostly along the western side of Chestnut Ridge and has been quarried for railroad ballast and paving blocks, among other products (Clapp 46).

Companies quarry sandstone much more than limestone in the Kiski-Conemaugh River Basin with at least nine plants operating near Central City, Derry, Ebensburg, Ligonier, Penn Run and Saltsburg.

Natural Gas

The 1999 Plan stated that, “Only limited oil and gas production has occurred in the Kiski-Conemaugh basin, mostly in Westmoreland and Armstrong County areas in the western part of the basin” (I-2).

That has changed. Drastically.

Marcellus and Utica Shales were not even a thought in the 1999 Plan. Extraction of this resource did not come to light until 2008. Development of the natural gas trapped in the shale layers deep underground has been celebrated by some and bemoaned by others.

The Marcellus and Utica Shales are organic-rich, having formed from the decomposition of organisms from the Devonian Period and the compression of old sea beds. Both layers underlay Western Pennsylvania and the entire Kiski-Conemaugh River Basin. In the Kiski-Conemaugh River Basin, the Marcellus Shale base is at a depth of 6,000 to more than 9,000 feet, and the Utica is located at a depth of 10,000 to 14,000 feet. The Marcellus and Utica Shales can be a dry natural gas or a wet natural gas, but in the Kiski-Conemaugh River Basin, both are dry. In dry natural gas, methane is the primary ingredient, whereas ingredients in wet natural gas include liquid gasses like butane, ethane, and propane (PSU). Wet gas is more profitable now, because of the numerous by-products and the low cost of natural gas.

While experts long knew the natural gas was there, it was not accessible nor was it profitable to retrieve, but technology advanced and when oil and natural gas prices increased, the gas rush was on. The Marcellus Shale play was the first to be developed in Pennsylvania, but the Utica Shale play is receiving increasing amounts of attention due to the volume of gas, gas-products, and oil within it.

Back to Table of Contents

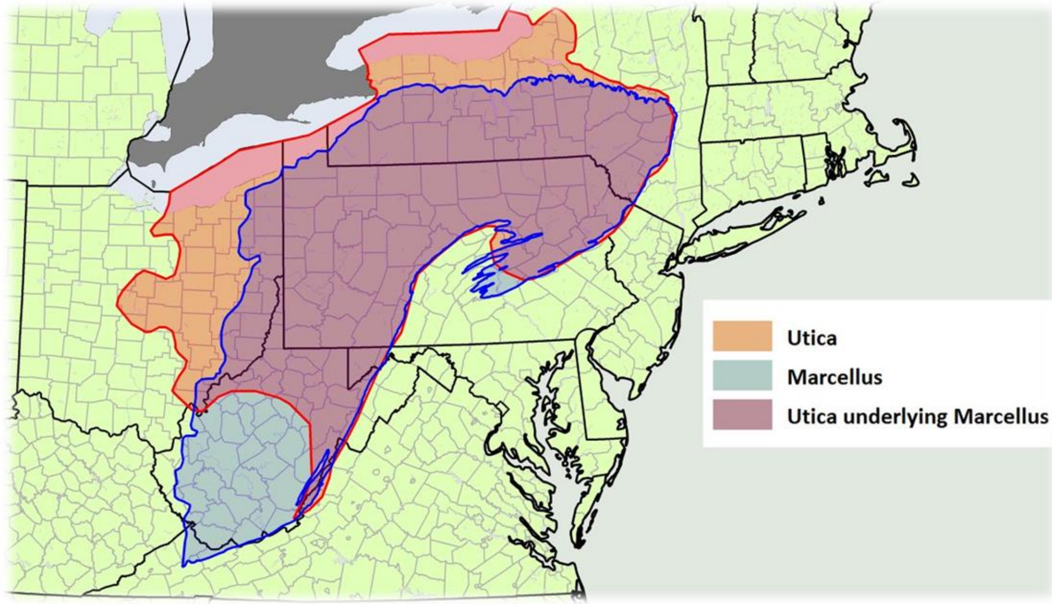


Figure 18 – Map of Utica and Marcellus Shale play from Bing.com

To retrieve the natural gas from both shale plays, hydraulic fracturing, commonly referred to as "fracking," must be used. This involves the drilling of a deep well vertically and then horizontally, up to two miles, using explosives to crack the rock layer, and injecting that well with a proprietary mixture of water, sand, and chemicals with enough pressure to extensively fracture the cracks and release the gas from the formation. The sand keeps the fissures open, releasing the gas for production. Up to 14 wells (Kuntz 1) may be drilled from one well pad, though two or three are common (Clinton County). Each well may take up to 8 million gallons of freshwater during the fracking process (Abdalla). The muds, sludge, and produced water must be treated and properly disposed of, as wastewater from shale gas operations can contain high levels of Total Dissolved Solids (TDS), especially salts, Naturally Occurring Radioactive Materials (NORM), organic and inorganic chemicals, and metals. Please see Oil and Gas Wastewater Facilities on page 42 for more on TDS.

One wastewater disposal method involves injection wells, where the contaminated fluids are injected, usually under high pressure, deep into the Earth. There are concerns of these fluids migrating and contaminating groundwater and/or causing earthquakes. According to the U.S. Geological Survey (USGS), the "largest earthquake induced by fluid injection that has been documented in the scientific literatures was the November 6, 2011 earthquake in central Oklahoma. It had a magnitude of 5.6." There are currently two injection wells in the Kiski Basin. They are listed under the Oil and Gas Wastewater Facilities section.

In 2010 and 2011, the USGS used a geology-based assessment methodology to complete an assessment of Marcellus Shale in the Appalachian Basin that evaluated the volume of gas and gas by-products in the reserves. The USGS estimates that there is a mean of 84,198 billion cubic feet of gas and a mean of 3,379 million barrels of total natural gas liquids in the Marcellus Shale play in the Appalachian Basin Province, which extends from New York to Alabama. This assessment did not address the potential danger to water supply wells, earthquakes, or water-borne or atmospheric emissions from shale gas operations.

In 2012, the USGS completed an assessment of the Utica Shale in the Appalachian Basin. The Kiski-Conemaugh River Basin lies in what is referred to as a "sweet spot" for Utica gas. The Utica Shale in this area, which extends into Ohio, West Virginia, New York, and a small portion of Maryland, has "2-3 weight percent" of total organic carbon, which basically means it is wet and rich with gas. The Utica Shale layer in the Kiski-Conemaugh River Basin is some of the thickest. Also, the Point Pleasant Formation lies under the Utica Shale here. The Point Pleasant Formation is high in total organic carbon and tends to be brittle, making extraction of gas easier. Coupled together, the Utica Shale and Point Pleasant Formation make for a thick layer of extractable gas (GoMarcellusShale.com).

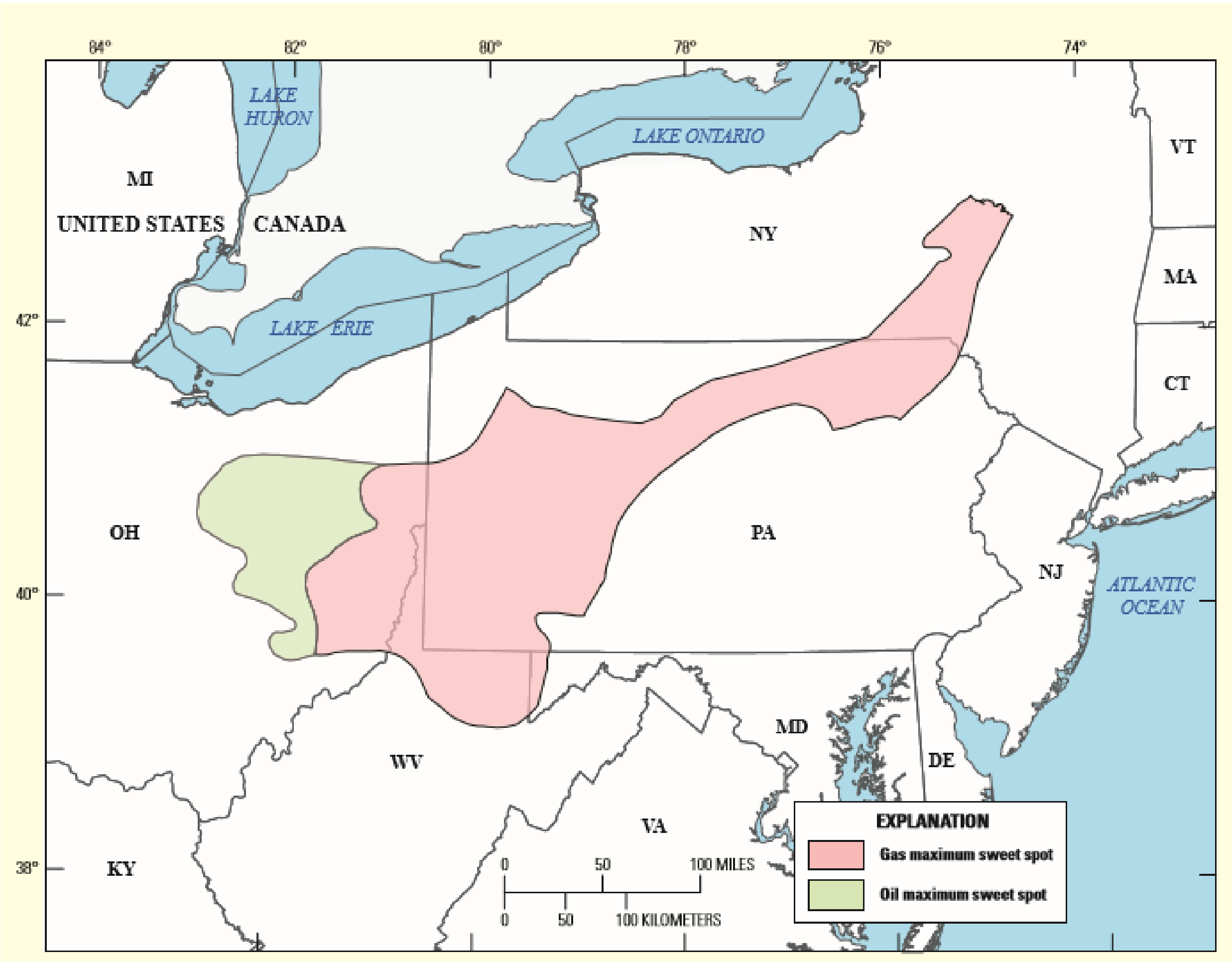


Figure 19 – Map of maximum extent of the oil and gas "sweet spots" from USGS

A well drilled below the base of the Elk Sandstone or its geologic equivalent is classified as an "unconventional" well. To produce natural gas below this layer, hydraulic fracturing typically must be used, so Marcellus and Utica Shale gas wells are usually unconventional. As of August 2016, there were 196 unconventional gas wells within the Kiski-Conemaugh River Basin, as shown in Figure 22.

Development of the shale gas plays slowed in 2014 largely because the increased supply of natural gas caused the price of natural gas to fall and because this region lacks the necessary transmission lines to get the gas to market.

While several gas pipelines are under construction, the Mariner East Projects by Sunoco Logistics is the largest. Sunoco will install the pipelines needed to transport ethane, propane, and other petroleum products from the Marcellus and Utica Shales to market. The gas will be delivered to Sunoco's Marcus Hook Industrial Complex along the Delaware River. The 350-mile pipeline will cross under the Conemaugh River just west of Blairsville, upstream of the Conemaugh River's confluence with Blacklick Creek, and bisect the Kiski-Conemaugh River Basin.

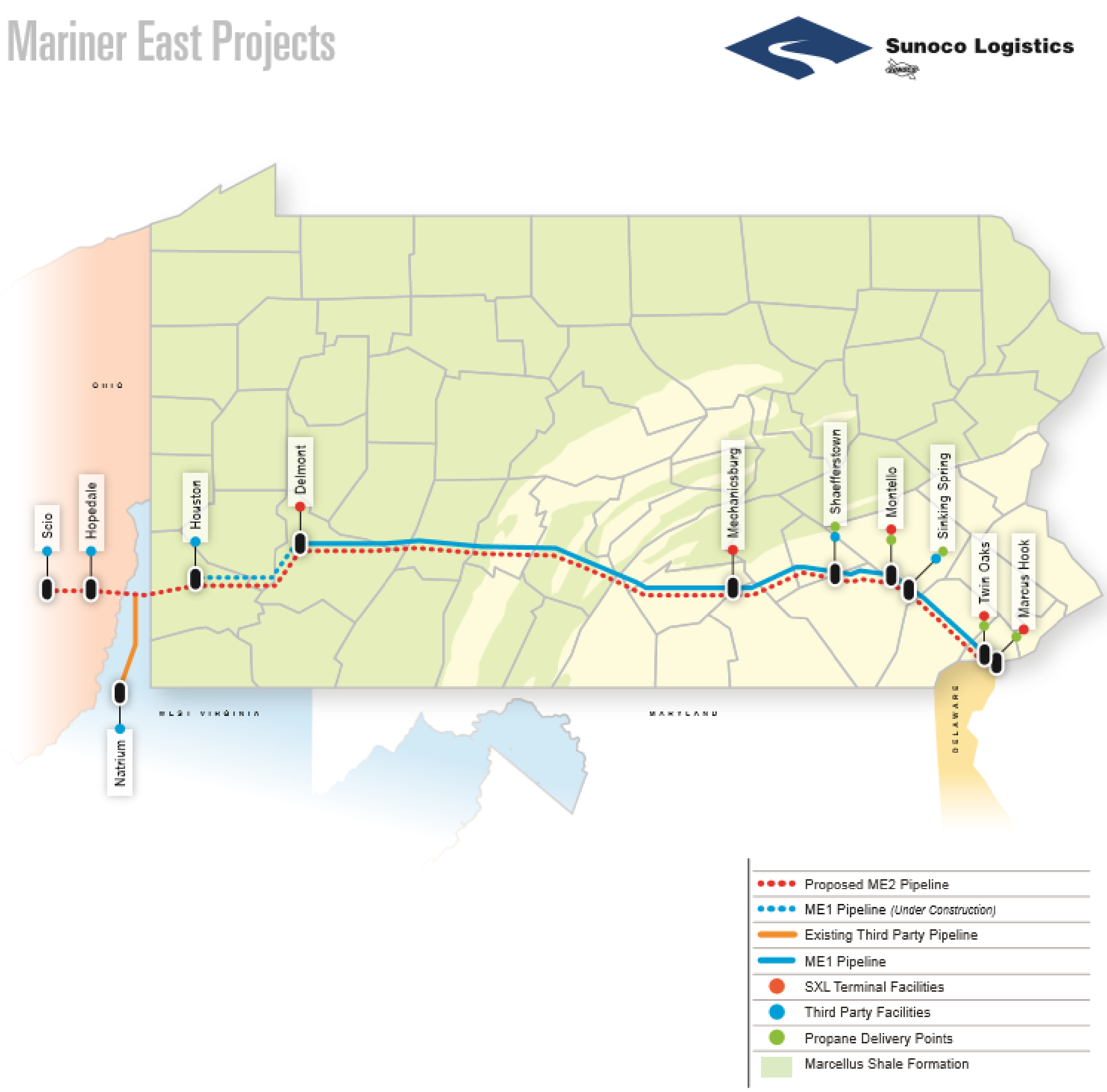


Figure 20 – Map of Sunoco's Mariner East pipeline from Sunoco Logistics

Back to Table of Contents

The volume of water used to hydraulically fracture a well, treatment and disposal of the produced water, and the crisscross of pipelines across watersheds are not the only concerns with "fracking." Other factors to consider include, but are not limited to the placement and concentration of wells, especially in public lands or ecologically sensitive areas; well casing failure; more roads, vehicular traffic, accidents, and noise; forest fragmentation; introduction of invasive species; increased erosion and sedimentation; storage container leaks; increased emissions of air pollutants like carbon dioxide, nitrous oxide, and volatile organic compounds; the use of eminent domain; forced pooling; well closure or plugging; and the overall impact on human health. A lack of quality, accessible data to measure these issues is also concerning.

Figure 21 – Sunoco's Mariner East pipeline crosses the Kiski-Conemaugh River Basin

What doesn't receive a lot of attention are conventional or traditional gas or oil wells. A conventional well is a vertical hole drilled into sedimentary formations or "traps" containing oil and gas that require less stimulation to produce. This means less water, chemicals, and truck traffic. Conventional well pads are much smaller than unconventional well pads and are more adaptable to the surrounding topography. These wells are opened with less pressure, too.

Conventional wells have been drilled since Colonel Edwin Drake drilled the first successful, commercial oil well in Titusville, PA, about 70 miles north of Schenley and the mouth of the Kiskiminetas River, in 1859. As shown in Figure 22, as of August 2016, there are 9,018 known conventional gas wells, 4 oil wells, and 32 oil/gas wells in the Kiski-Conemaugh River Basin. There are also numerous abandoned, orphaned, and plugged wells, as shown in Figure 23.

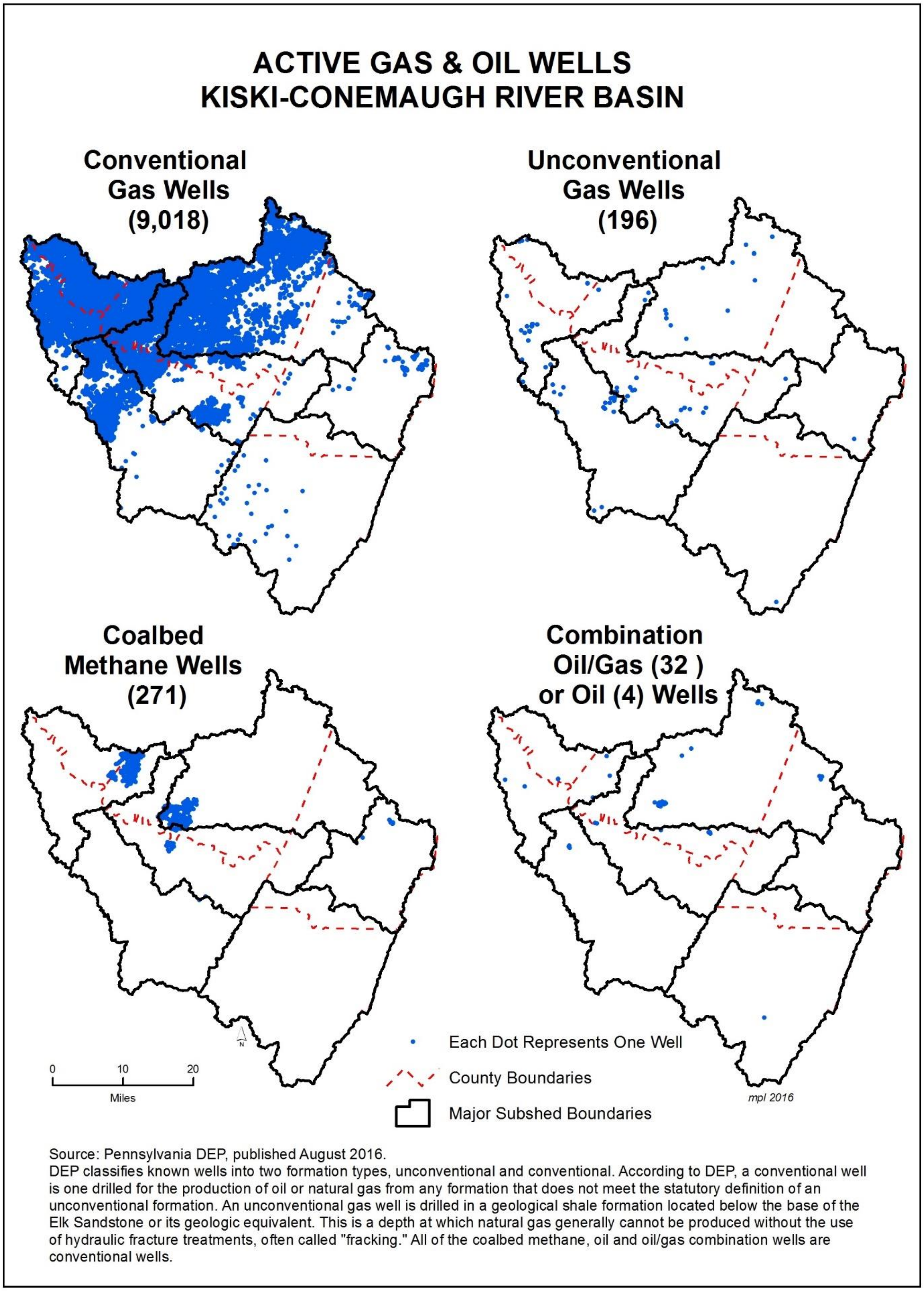


Figure 22 – Active oil and gas wells in the Basin as of August 2016

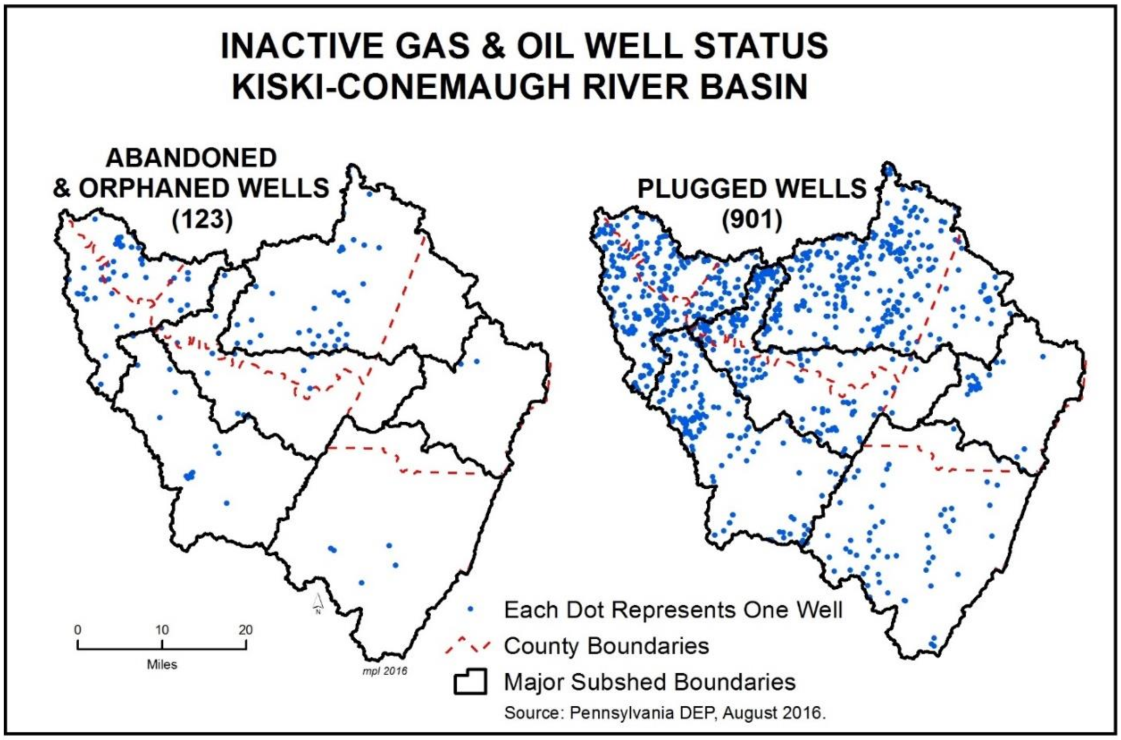


Figure 23 – Map of inactive oil and gas wells

The Pennsylvania Department of Environmental Protection (DEP) is responsible for the regulation and inspection of all oil and gas wells, including shale gas wells. Other regulatory agencies like the PA Fish and Boat Commission, the Delaware River and Susquehanna River Basin Commissions, and county conservation districts may monitor the effects of drilling on natural resources; however, since there is no Ohio River Basin Commission, the Kiski-Conemaugh River Basin lacks an extra enforcement and protection layer.

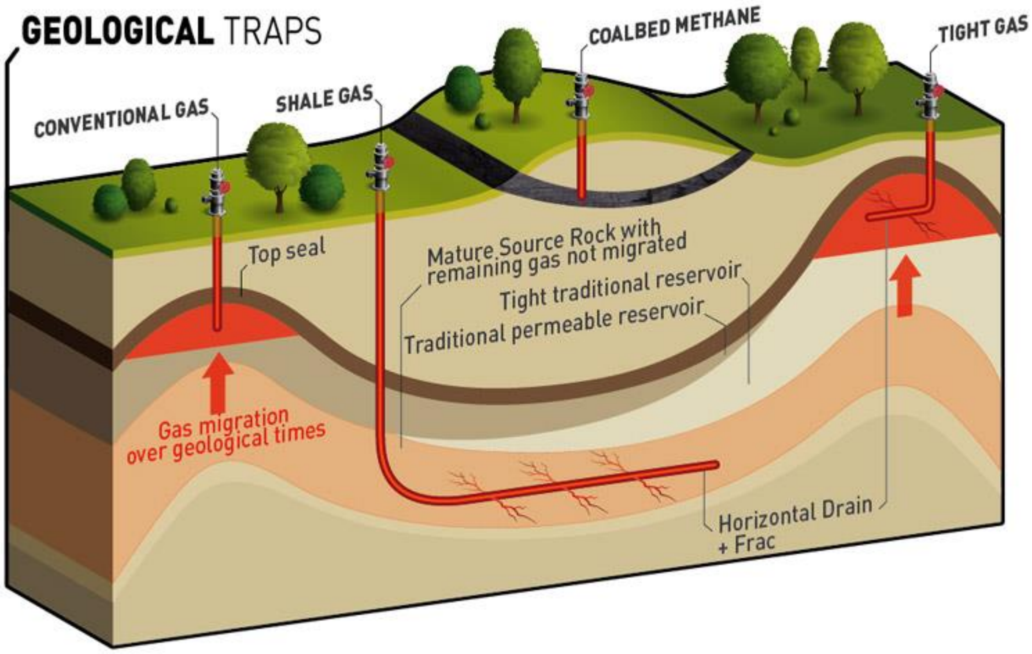


Figure 24 – Graphic of accesses to underground natural gas from Joanquín del Val Melús

Coalbed methane

A lesser known energy source is coalbed methane. When coal was formed millions of years ago, gas was trapped within it. The permeability of coal allows gas - and water - to move throughout its layers. When coal is mined, gas can build up within mines or migrate into groundwater wells if not properly vented. To produce methane from coal, the coal seam must be dewatered to allow the gas to flow, so often saline water must be treated or disposed of, which might mean injecting the water back underground (Nuccio).

Coalbed methane wells are typically shallow and within the fresh groundwater zone. Wells may have vent boreholes and/or separate access and production holes. According to the DEP, "only the production well requires inspection, although it is recommended that the operator verify the integrity of the access hole as well."

According to DEP, as of August 2016, there were 271 coalbed methane wells within the Kiski-Conemaugh River Basin, as shown in Figure 22.

While not developed to the extent of shale gas, in 2000, the USGS estimated that coalbed methane accounted for about 7.5% of total natural gas production in the United States (Nuccio). The U.S. Department of Energy's Office of Fossil Energy said, in 2012, it accounted for 9%. A diagram by the Energy Information Association predicts that figure to drop as shale gas development increases.

Back to Table of Contents

Oil and Gas Wastewater Facilities

Produced water often carries brine (salts) and heavy metals that must be removed through methodologies typically not used at traditional wastewater treatment facilities. Up until 2011, during the early development of the Marcellus Shale gas, flowback and produced water was taken to permitted wastewater treatment facilities, but, because of increased levels of salts and elements like bromide and strontium, the Commonwealth of Pennsylvania requested these facilities to voluntarily stop taking flowback and produced water from the Marcellus Shale. Wastewater from shallow well drilling, fracturing, drilling mud and sludge are not part of the voluntary restrictions (Advanced Waste Services). In 2016, the U.S. Environmental Protection Agency officially, "banned the disposal of hydraulic fracturing waste water at public sewage plants…" (Hurdle).

Prior to this voluntary restriction, the following facilities in the Kiski-Conemaugh River Basin accepted Marcellus Shale wastewater:

- Johnstown Redevelopment Authority's Dornick Point sewage treatment plant – 76,000 gallons per day – discharging into the Conemaugh River;
- PA Brine Industrial wastewater treatment plant in Josephine – 120,000 gallons per day – discharging into Blacklick Creek;
- Tunnelton Liquids Company's industrial wastewater treatment plant in Tunnelton – 1,000,000 gallons per day – discharging into the Conemaugh River;
- Kiski Valley Water Pollution Control Authority / McCutcheon Enterprises sewage treatment plant – 90,000 gallons per day – discharging into the Kiskiminetas River (PennFuture).

Many facilities are not equipped to remove Total Dissolved Solids (TDS), which are elevated by salts and minerals. TDS describes the inorganic salts and organic matter that are dissolved in water. According to the Pennsylvania Code, Title 25 Chapter 95 – Wastewater Treatment Requirements, discharges from a publically owned treatment system may not exceed more than 500 mg/L of TDS or 250 mg/L of total Chlorides as a monthly average.

High TDS can affect the taste of drinking water and can cause problems for drinking water treatment facilities. As an example, bromide, of which natural levels are low in the environment, except in fossil fuels, can bind with chlorine and end up making brominated organic compounds, which are, "associated with negative endocrine, reproductive, and carcinogenic outcomes in humans upon consumption or inhalation" (VanBriesen 1).

Additionally, a Duke University study by Nathanial Warner et al. titled "Impacts of Shale Gas Wastewater Disposal on Water Quality in Western Pennsylvania," published in 2013, linked the disposal of shale gas wastewater at wastewater facilities to elevated levels of radioactive materials and other chemicals in the receiving stream. In this study, Duke University, "examined the water quality and isotopic compositions of discharged effluents, surface waters, and stream sediments associated with" the PA Brine Industrial Wastewater Facility in Josephine, PA. This facility discharges into Blacklick Creek. From the abstract on ACD Publications:

> The elevated levels of chloride and bromide, combined with the strontium, radium, oxygen, and hydrogen isotopic compositions of the effluents reflect the composition of Marcellus Shale produced waters. The discharge of the effluent from the treatment facility increased downstream concentrations of chloride and bromide above background levels. Barium and radium were substantially (>90%) reduced in the treated effluents compared to concentrations in Marcellus Shale produced waters. Nonetheless, ^{226}Ra [radium] levels in stream sediments (544–8759 Bq/kg) at the point of discharge were ~200 times greater than upstream and background sediments (22–44 Bq/kg) and above radioactive waste disposal threshold regulations, posing potential environmental risks of radium bioaccumulation in localized areas of shale gas wastewater disposal.

According to the PA Oil and Gas Reporting Electronic system, as of September 2017, there were 11 oil and gas waste facilities in the Kiski Basin. They include the:

- Aspen Johnstown Residual Waste Operation (Waste Facility ID 7111)
- Evergreen Landfill (ID 6864)
- Fluid Recovery Service Josephine Facility (ID 6772)
- Howard Treatment Facility (ID 6765)
- Jones TP (ID 12354)
- Laurel Highlands Landfill (ID 6867)
- McCutcheon Enterprises, Inc. (ID 6800)
- Morris H. Critchfield F76 Disposal Well (ID 6558)
- Shade Landfill (ID 6894)
- Southern Alleghenies Landfill (ID 6895)
- W. Shanksville Saltwater Disposal Well #1 (ID 6551)

Shale gas wastewater may be recycled for further use, injected underground, or disposed of at an industrial wastewater treatment plant. As of September 2017, there were 12 deep-injection wells in the state, with two located in the Kiski Basin. Both are in Somerset County and are included in the above list. The Morris Critchfield 1 well is operated by CNX Gas Company, LLC in Jenner Township, near Acosta, and the W. Shanksville Salt Water Disposal 1 well is operated by Cottonwood OPR Corporation in Stonycreek Township between Friedens and Shanksville (PA DEP).

Landfills

Residual waste is non-hazardous and may include solid, liquid, or gas waste produced by industrial, mining, and agricultural operations. According to the PA Department of Environmental Protection, the "largest residual waste generators are electric utilities, paper mills, foundries, printing and ink operations, and the iron/steel industry." Ash from coal-burning power plants and residual waste incinerators make up about 40% of Pennsylvania's residual waste.

The original *Kiski-Conemaugh River Basin Conservation Plan* indicated that, in 1998, there were four municipal waste and five residual waste landfills within the Basin; however, the Mostoller Municipal Waste Landfill is not in the Stonycreek River watershed, so it has been removed from this list (II-1–2). The status of the other landfills is indicated in Table 9 (Solloway). The two landfills permitted since 1999, the Evergreen and Shade Landfills, are also listed.

Permitted Landfills					
Facility Name	**Type**	**County**	**Sub-Watershed**	**1999 Status**	**2017 Status**
Evergreen Landfill	Municipal Waste	Indiana	Blacklick Creek	Not yet built	Active
GenOn (former Penelec) Conemaugh Station	Residual Waste	Indiana	Conemaugh River	Active	Active
Homer City Power Station	Residual Waste	Indiana	Blacklick Creek	Active	Active
Latrobe Steel	Residual Waste	Westmoreland	Loyalhanna Creek	Active	Active
Laurel Highlands Landfill	Municipal Waste	Cambria	Blacklick Creek	Active	Active
RCC Landfill	Municipal Waste	Somerset	Stonycreek River	Active	Inactive
Shade Landfill	Municipal Waste	Somerset	Stonycreek River	Not yet built	Active
Smith's Landfill	Residual Waste	Westmoreland	Loyalhanna Creek	Active	Under Reclamation
Southern Alleghenies Landfill	Municipal Waste	Cambria	Stonycreek River	Active	Active
Teledyne Latrobe	Residual Waste	Westmoreland	Loyalhanna Creek	Active	Active

Table 9

Back to Table of Contents

Coal-fired Power Plants

According to data obtained from the United States Energy Information Administration, in January 2017, there were 404 coal-fired power plants in the nation with 27 of them in Pennsylvania. Of these 27, eight were waste coal-fired, co-generation power plants. Only one other waste coal co-generation power plant exists in the rest of the country and it's in West Virginia. There are three conventional coal-fired power plants and four waste coal power plants in the Kiski-Conemaugh River Basin, detailed in Table 10 (US EIA and Sourcewatch). On a clear day, the three conventional plants can be seen from Route 22 on Chestnut Ridge just east of Blairsville. The Seward Power Plant is the largest waste coal-fired power plant in the country by at least four-times (Schuster).

Coal or Waste Coal-fired Power Plants in the Kiski-Conemaugh River Basin						
Facility	**Type**	**Plant Code**	**MW generated**	**Year of Operation**	**Parent Company**	**City, County**
Conemaugh Generating Station	Coal	3118	1700	1970	GenOn Energy	New Florence, Indiana
Homer City Generating Station	Coal	3122	1890	1969	Edison International	Homer City, Indiana
Keystone Generating Station	Coal	3136	1700	1967	Reliant Energy	Shelocta, Armstrong
Cambria Cogeneration Company	Waste coal	10641	88	1991	Northern Star Generation	Ebensburg, Cambria
Colver Power Project	Waste coal	10143	110	1995	Constellation Energy	Colver, Cambria
Ebensburg Power Company	Waste coal	10603	50	1990	McDermott International	Ebensburg, Cambria
Seward Generation LLC	Waste coal	3130	521	2004	Reliant Energy	New Florence, Indiana

Table 10

Figure 25 – Keystone Generating Station at dusk

According to the report *American's Dirtiest Power Plants Their Oversized Contribution to Global Warming and What We Can Do About It* published by the Environment America Research and Policy Center in September 2013, the Keystone, Conemaugh, and Homer City plants are in the top five of the most polluting power plants in Pennsylvania and in the top 54 in the nation. These three power plants produced 28.9 million metric tons of carbon dioxide emissions in 2011, which was the equivalent of 7.01 million passenger vehicles (Schneider et al. 29).

The U.S. Environmental Protection Agency's Toxics Release Inventory Program identified the Homer City Generating Station as the most polluting facility, by total disposal or other releases, in Pennsylvania in 2014. The Toxic Release Inventory (TRI) reported that the Homer City plant released about 5.3 million pounds of chemicals through the air, 109,000 pounds through water, and 1.8 million pounds through land. Manganese compounds constituted 97% of the water releases. The Conemaugh Power Plant ranked #4 with just under 5 million pounds of chemicals disposed of through air, water and land.

None of these power plants are slated for decommissioning.

In 2011, as a result of a lawsuit led by PennEnvironment and the Sierra Club, GenOn Northeast Management Company, a subsidiary of GenOn Energy, Inc. was ordered to pay $5 million for 8,684 violations of the Clean Water Act at its Conemaugh Generation Station in Indiana County. GenOn had violated its permitted discharge levels since 2005 and sent excessive amounts of selenium, manganese, aluminum, boron, and iron into the Conemaugh River. For information from the Centers for Disease Control and Prevention on how these metals could impact human health, please see Appendix 3.

Of the $5 million settlement, $1.25 million went to pay PennEnvironment and the Sierra Club's legal fees, $250,000 went to the PA Department of Environmental Protection, and the Foundation for Pennsylvania Watersheds (FPW) was named the benefactor of $3.5 million that is to be used for restoration and preservation projects in the Conemaugh River watershed. For a time, FPW accepted grant applications for projects in the Kiski-Conemaugh River Basin and distributed $1,020,500 to 18 groups, as detailed in Appendix 1. Currently, FPW is re-evaluating its funding priorities and is not accepting new, unsolicited proposals.

In addition to the settlement, GenOn was ordered to improve its water treatment for compliance and provide water quality data to the PA Department of Environmental Protection (Hopey).

The Conemaugh plant is now owned and operated by NRG Energy.

Coal Ash

Circulating Fluidized Bed (CFB) boilers in coal waste burning power plants circulate a mix of low-grade coal, like that from coal refuse piles, and limestone to create energy through the combustion of coal at low temperatures over a longer burning time. The mixing action allows all the combustible materials to be utilized, and the limestone helps to trap sulfur oxide. The remaining CFB ash is a regulated material that is often returned to the site from which the coal was obtained to reclamate and fill-in the area. The limestone helps to buffer the low pH associated with coal geology and hardens like concrete.

CFB ash is a contentious topic among some environmental organizations. CFB technology allows for the removal and reclamation of coal refuse piles, which are safety hazards that generate acidic mine water and are eyesores in the community. Without CFB, these abandoned mine lands would not be economically viable for generating electricity. The spread of alkaline CFB ash can backfill coal mines and create a barrier between surface water and acidic materials; however, the heavy metals in the coal ash can be a concern to human and ecological health and some people do not agree with the burning of waste coal, as it still creates emissions and contributes to global climate change.

Natural Gas-fired Power Plants

Except for a 24 megawatt natural gas-fired power plant at the Indiana University of Pennsylvania campus in Indiana, PA, there are no natural gas-fired power plants in the Kiski-Conemaugh River Basin; however, Competitive Power Ventures, Inc. of Boston, Massachusetts is seeking to build a $700+ million natural gas-fired power plant that will be called the CPV Fairview Energy Center near Vinco, in Jackson Township, Cambria County. The 1,050-megawatt power plant will generate enough electricity for about 1 million homes and should be operational by 2020 (Sauro).

Back to Table of Contents

Hydroelectric Power Stations

Hydroelectric power is produced when moving water turns a turbine that powers a generator and produces electricity. Traditionally placed on large rivers or at the base of a dam, new technology called "microhydro" is allowing smaller water flows, such as those out of abandoned mines, to power generators (PA DEP).

The only hydroelectric power plant in the Kiski-Conemaugh River Basin is the Conemaugh Hydro Plant below the Conemaugh River Lake between Indiana and Westmoreland Counties. It produces 16 megawatts of energy from two turbine generators (USACOE).

The potential of generating hydroelectric power at the Quemahoning Reservoir has been discussed on and off throughout the years, but no plans to bring this to fruition are in place at this time.

Wind

While wind energy is considered a "green" energy source, in the Kiski-Conemaugh River Basin, most windmills are placed on forested ridges, which means acres of land are stripped of their vegetation, creating concerns of thermal pollution, erosion and sedimentation, introduction of invasive, non-native species, habitat fragmentation, and sourcewater degradation. There is also concern about windmills' impact to birds of prey and bats, particularly along the Allegheny Front, a significant migratory pathway.

While the Chestnut Ridge has been spared, wind farms have been developed on the Allegheny Front. As of January 2017, there were five wind farms with a total of 144 turbines in or adjacent the Kiski-Conemaugh River Basin in Cambria and Somerset Counties, as shown in Table 11 (Saint Francis University). Some of the turbines associated with the Allegheny Ridge and North Allegheny Wind Farms lie within other watersheds, but are part of the same wind farm. Collectively, these turbines are capable of generating nearly 300 megawatts of electricity.

Figure 26 – Windmills in the morning fog

According to Windustry, a two-megawatt wind turbine costs about $3-4 million to install. Windmills are often offline, requiring a backup electrical supply. Large subsidies and production tax credits belie the cost of wind energy production. According to a 2015 *Newsweek* article, "In 2010 the wind energy sector received 42% of total federal subsidies while producing only 2% of the nation's total electricity. By comparison, coal receives 10% of all subsidies and generates 45% and nuclear is about even at about 20%" (Simmons). While it is smart to invest in renewable energy sources, due to its impact on forested ridges, wind energy may not be the best for the Kiski Basin.

Wind Farms in the Kiski-Conemaugh River Basin							
Farm Name	**Parent Company**	**Owner/Operator**	**Municipalities**	**County**	**Turbine Count**	**Turbine Capacity (Megawatts)**	**Farm Capacity (Megawatts)**
Allegheny Ridge	ArcLight Capital Partners	Primary Power LLC	Portage and Washington Townships (Juniata and Greenfield Townships)	Cambria (Blair)	40	2.0	80.0
Forward	NRG Energy, Inc.	NRG Energy Holdings, Inc.	Shade Township	Somerset	14	2.1	29.4
Highland	Terra Firma Capital Partners, Ltd.	EverPower Wind Holdings, Inc.	Adams Township	Cambria	25	2.5	62.5
Stony Creek	E.ON SE and PensionDanmark Holding A/S	EC&R Investco Management LLC and PD Alternative Investments US Inc.	Shade and Stony Creek Townships	Somerset	35	1.5	52.5
Highland North	Terra Firma Capital Partners, Ltd.	EverPower Wind Holdings, Inc.	Adams and Summerhill Townships	Cambria	30	2.5	75

Table 11

Back to Table of Contents

Solar

Even though solar energy generation has not developed beyond the addition of solar panels to private homes and businesses in this region, there is potential for utilizing this free resource to support electricity demands.

Launched in 2011, the U.S. Department of Energy's SunShot Initiative is, "a national effort to support solar energy adoption by making solar energy affordable for all Americans through research and development efforts in collaboration with public and private partners. SunShot funds cooperative research, development, demonstration, and deployment projects by private companies, universities, state and local governments, nonprofit organizations, and national laboratories to drive down the cost of solar electricity."

According to the SunShot Initiative, the cost of solar-generated power in 2010 was $0.42/kilowatt hour (kWh) for residential, $0.34/kWh for commercial, and $0.27/kWh for utility. In 2016, the costs were $0.18/kWh, $0.13/kWh, and $0.07/kWh respectively. Given the advancements in technology and the demand for cleaner power, the SunShot Initiative has set a goal to have the cost of solar electricity down to $0.05/kWh for residential, $0.04/kWh for commercial, and $0.03/kWh for utility by 2030.

Back to Table of Contents

Water Resources

The Kiski-Conemaugh River Basin is rich in water resources ranging from cold, well-oxygenated headwater streams in the mountains to the warmer, but deeper rivers in the valleys or lowlands.

The headwaters of the Kiskiminetas River begin in Cambria and Somerset Counties with the Little Conemaugh and Stonycreek Rivers. The Stonycreek River begins near Berlin, PA at a spot locally known as Pius Springs. The "Stony" flows north/northwest for 43 miles to the City of Johnstown where it merges with the Little Conemaugh River to form the Conemaugh River. The Little Conemaugh River originates out of a wetland near Cresson, PA and flows 29 miles southwest to Johnstown.

Figure 27 – The "Point" in Johnstown; the confluence of the Stonycreek River (left) and the Little Conemaugh River (right) that forms the Conemaugh River

The Conemaugh River flows west/northwest for 52 miles through Laurel and Chestnut Ridges to the town of Saltsburg, where it confluences with Loyalhanna Creek to form the Kiskiminetas River. Loyalhanna Creek begins on Laurel Ridge and flows 35 miles northwest to Saltsburg.

From Saltsburg, the Kiskiminetas River flows 27 miles northwest to the Allegheny River at Schenley.

Back to Table of Contents

Key Water Quality Parameters

There are many ways to determine water quality, and there are several standards to which measured parameters could be applied. Explanations of the most common parameters follow.

pH is the measure of hydrogen ions in solution. pH is a logarithmic scale, meaning every whole number increase is an increase by a power of ten. The pH scale is 0-14. A pH of 7 is neutral, while numbers less than 7 indicate an acidic substance and numbers above 7 are basic or alkaline. The lower the number, the more acidic the water, while the higher the number, the more alkaline. Water with a pH of 5 is 10 times more acidic than water with a pH of 6. Water with a pH of 10 is 100 times more basic than water with a pH of 8. Most freshwater life need a pH between 5 – 8 to survive, though the Pennsylvania Code allows pH of 6 – 9.

Acid is a water-soluble compound with hydrogen-containing molecules that can react with a base. Acidity is the degree or amount of being acid and is pH dependent.

Alkalinity is defined as the ability of water to neutralize acid and is expressed in mg/L as $CaCO_3$ – Calcium Carbonate. The principal components in natural surface waters are carbonates ($CO_{3\text{-}2}$) and bicarbonates (HCO3-) resulting from the dissolution of carbonate-bearing strata such as limestone. Since alkalinity buffers changes in pH and can mitigate the effects of acid mine drainage, alkalinity-generating materials are frequently employed in active and passive treatment systems. It also contributes to the productivity (fertility) of aquatic ecosystems. Chapter 93 of the Pennsylvania Code indicates that alkalinity of surface waters should be at least 20 mg/L as $CaCO_3$ unless natural conditions are less.

Specific conductivity is a measure of a substance's ability to conduct an electrical current as a result of the total concentration of ions in solution – total dissolved solids (TDS). Pollution from a variety of sources including mine discharges, treatment system effluents, stormwater runoff, and industrial sites, as well as the geology of an area, can elevate a stream's conductivity, and the more ions in the water from these sources, the higher the conductivity. Pure water has a conductivity of zero. High conductivity can stress freshwater life. The Environmental Protection Agency notes impairment at 300 uS/cm. Marcellus Shale flowback water can have a conductivity that exceeds 80,000 uS/cm. Mine drainage in Western Pennsylvania usually has a conductivity less than 5,000 uS/cm.

Total Dissolved Solids (TDS) are the direct contributor to conductivity. TDS measures the material that, when dry, would be a solid, but due to the water chemistry, it is in solution. This parameter was originally developed to measure the potential for boiler scale, but is now used in water quality assessments for streams and lakes. The higher the specific conductance value, the higher the concentration of TDS. A conductivity meter provides an easy rapid estimate of TDS versus drying and weighing the sample. The amount of TDS has traditionally been calculated as approximately 65% of the conductivity for Calcium Carbonate ($CaCO_3$); however, other compounds, such as salt or metal, generate much higher conductivities at much lower concentrations than $CaCO_3$.

Temperature can affect conductivity and other parameters. At colder temperatures, a stream's conductivity decreases as water becomes denser, diminishing space for dissolved substances; whereas at warmer temperatures, the opposite is true. All aquatic species have an optimal temperature range and knowing it can help agencies ensure streams are appropriately designated. Fluctuations in water level can influence a stream's conductivity. Typically, it is an inverse relationship, meaning conductivity decreases with water level increase or conductivity increases as water level decreases. This is indicative of a normal waterway. A direct relationship between water level and conductivity is often seen in the winter and spring, when road salts applied to treat wintery roads and parking lots, pollution locked in snow and ice, or agricultural land applications are washed into waterways during snow melt and spring rains. This can adversely affect a stream's health.

Point Source Pollution

The 1999 Plan stated that there were 29 public wastewater treatment facilities in the Basin that discharged about 22 million gallons of treated sewage a day. As of 2017, there were 38 public wastewater treatment facilities, listed in Table 12. Several are undersized and cannot handle the large volume of water during storm events and so combined sewer overflows (CSO) are a serious health and environmental problem in the Basin. As use of our rivers increases, the amount of people recreating upon them increases, and thus their exposure to contaminants in the water. Using the state's 2017 list of streams not attaining their designated use, it appears 13.1 miles of streams within the Kiski-Conemaugh River Basin are impaired by pathogens linked to agriculture, urban runoff, and storm sewers. An additional 63 miles are impaired by pathogens of an unknown or unidentified source. Most of these do not account for the conveyance of raw, untreated sewage into our rivers during high flow storm events.

Municipalities are addressing this problem as a requirement of the United States Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES). The 1999 Plan indicated that, "311 facilities, including industrial, commercial and municipal dischargers have been issued National Pollutant Discharge Elimination System (NPDES) permits within the Basin" (III-7). A recent search of a database provided by the PA DEP's Bureau of Clean Water indicates that 793 sites hold a NPDES permit (Lavine).

Municipal Wastewater Treatment Facilities in the Kiski-Conemaugh River Basin	
Client Name	**Site Name**
Derry Borough Municipal Authority	Derry Borough
Windber Area Authority	Windber Area Authority
Indiana Borough	Indiana Borough Waste Water Treatment Plant
Forest Hills Municipal Authority	Beautyline Sewage Treatment Plant (STP)
Blairsville Municipal Authority	Blairsville Municipal Authority STP
Girl Scouts of Southwest PA	Camp Henry Kauffman
White Township Municipal Authority	White Township Municipal Authority STP
Somerset Township Municipal Authority	Wells Creek STP
Green Township Municipal Authority	Commodore STP
Indiana County Municipal SVC Authority	Aultman STP
Upper Stonycreek Joint Municipal Authority	Upper Stonycreek System
Derry Borough	Derry Borough
White Township Municipal Authority	Morganti STP
Fairfield Manor, Inc.	Fairfield Manor, Inc. Mobile Home Park
Unity Township Municipal Authority	Laurel Bilt STP
Kiski Valley Water Pollution Control Authority	Kiski Valley Water Pollution Control Authority
Ligonier Borough	Ligonier Water Pollution Control Plant
Cambria Township Sewer Authority	Colver STP
Cresson Township Municipal Authority	Cresson Township Municipal Authority
Cambria Township Sewer Authority	Revloc STP
Unity Township Municipal Authority	Wimmerton STP
Ebensburg Borough Municipal Authority	Ebensburg Borough Municipal Authority
Portage Borough Municipal Water Authority	Portage Borough Municipal Authority
Shade Central City Joint Authority	Shade Central City Joint Authority
Adams Township Municipal Authority	Village of 42 STP
Saltsburg Borough	Saltsburg Borough
Indian Lake Borough	Indian Lake Borough
Antiochian Orthodox Christ Archdiocese of N. America	Antiochian Village Camp & Conference Center STP
Nanty Glo Borough	Nanty Glo Borough
Conemaugh Township	Benson STP
Avonmore Borough Municipal Authority	Avonmore Borough STP
Nanty Glo Borough Sanitary Sewer Authority	Nanty Glo Borough
Latrobe Municipal Authority	Latrobe Municipal Authority Kingston Plant
Burrell Township Sewer Authority	Black Lick STP
Johnstown City	Dornick Point Waste Water Treatment Plant
Clymer Borough Municipal Authority	Clymer Borough Municipal Authority
Jenner Area Joint Sewage Authority	Jenner Area Sewer Authority
Iseman	Indian Lake Borough

Table 12

Many communities have Municipal Separate Storm Sewer Systems (MS4s) that convey often polluted stormwater into waterways via storm drains, pipes, and ditches. These systems are separate from sewer treatment facilities, but are point source pollution problems. Hundreds of municipalities across the Commonwealth, including dozens within the Kiski Basin, are required to obtain either a General MS4 Permit or an Individual MS4 Permit. Being the most populous community in the Basin, the City of Johnstown is the only urbanized area with a MS4 Phase II Stormwater Permit that is regulated by the EPA (USEPA).

Figure 28 – A permitted point-source discharge,
associated with the Cambria Iron Stormwater NPDES permit,
enters the Conemaugh River in Johnstown (Lazzari)

Back to Table of Contents

Non-Point Source Pollution

Eighteen years ago when the 1999 Plan was published, Abandoned Mine Drainage (AMD) was clearly the most significant source of pollution in this region's waterways. With an influx of funding from the EPA's Section 319 Non-point Source Management and the DEP's Growing Greener Watershed Protection Programs, organizations tackled more AMD throughout the watershed through the design and construction of treatment systems. AMD still impacts our watershed, but, as AMD is remediated, other sources of pollution come to light, including sedimentation, nutrients from agricultural runoff and wildcat sewage systems, and thermal sources.

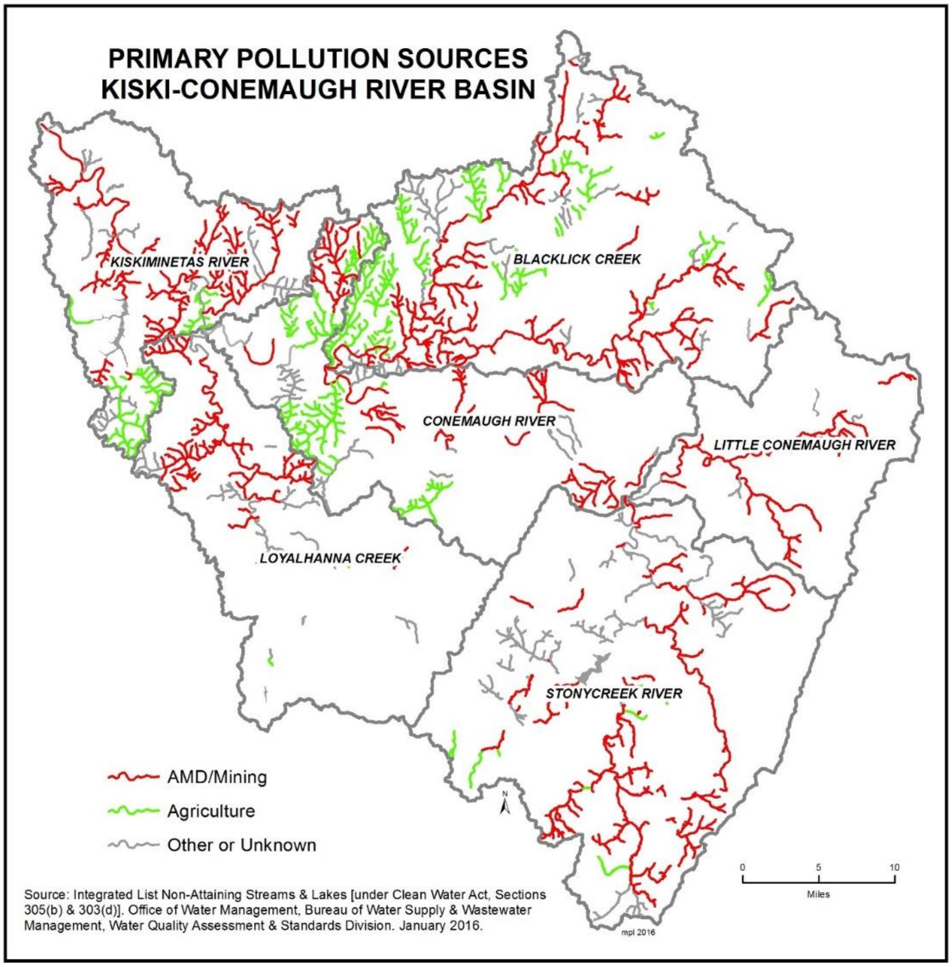


Figure 29 – Map of waterways on the Integrated List of Non-Attaining Streams and Lakes

When the Pennsylvania Department of Environmental Resources (now DEP) surveyed fish at the mouth of the Kiskiminetas River in 1980, they found no fish; just one frog. The river was dead largely from uncontrolled mine and industrial discharges, sewage, and runoff. As shown in Figure 30, when that survey was repeated in 2015 by the PA Fish and Boat Commission (PFBC), 386 individuals of 28 species were collected (Lorson)! This is a tremendous increase that stems from a decline in industry, an increase in regulations, and the start of reclamation efforts.

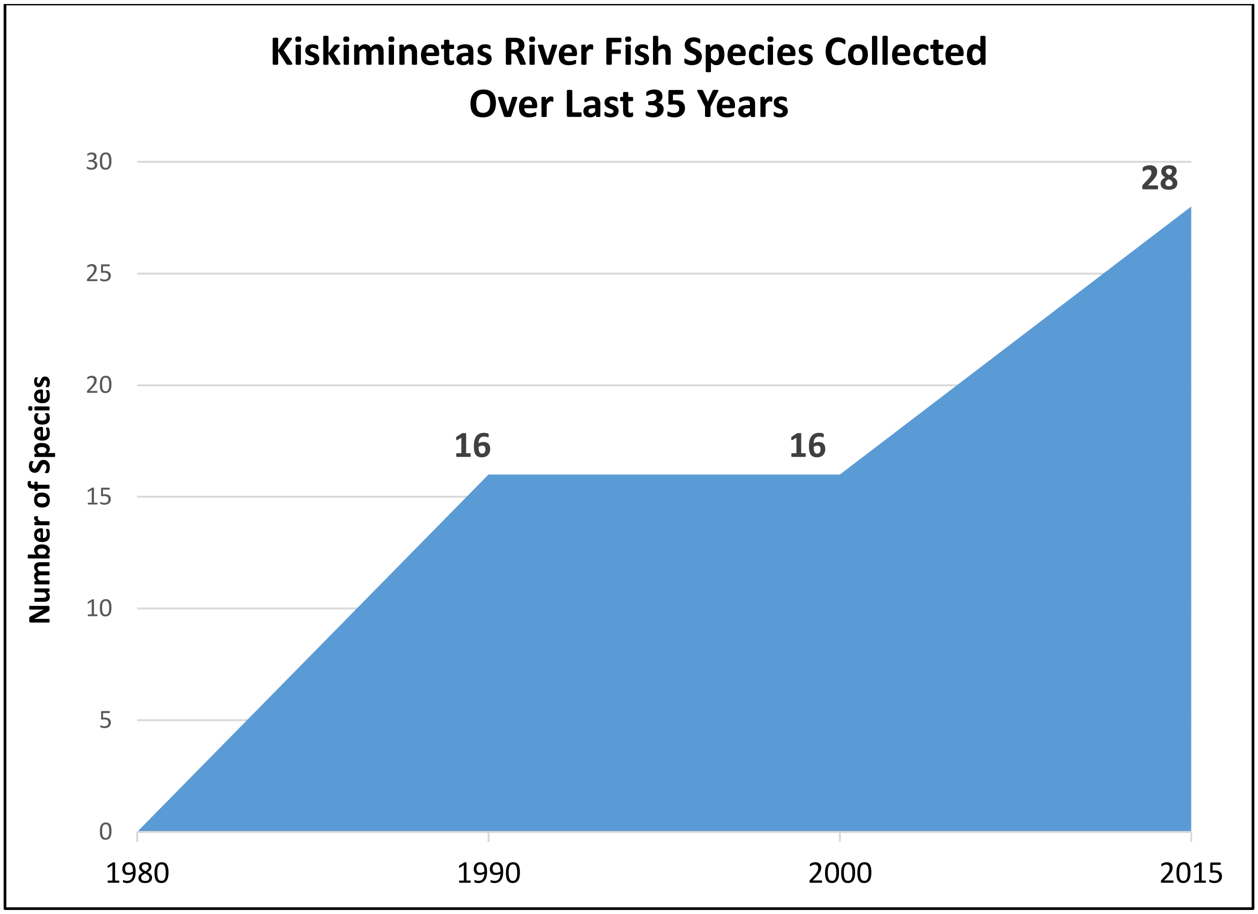


Figure 30 – Graph showing the increase of fish diversity in the Kiskiminetas River

According to the U.S. Environmental Protection Agency's *Cooperative Mine Drainage Survey Kiskiminetas River Basin* published in 1972, the pH of the Kiski River in 1966 ranged from 3.0 to 3.6 and there was no alkalinity (12). Mine discharges were rampant. Twenty-four years later, in 1990, the PFBC measured the pH of the river as 6.9 and the alkalinity as 12 mg/L (Lorson and Shervinskie 6). Between 2016 and 2017, the pH averaged 7.6 and the alkalinity measured 43 mg/L. Additionally, concentrations of AMD-associated metals have fallen drastically. While remediation of AMD isn't the only fix that has improved water quality, it is a significant one.

Erosion and sedimentation is replacing AMD as the number one source of pollution in this area and throughout the Commonwealth. Development, poor agricultural and silvicultural (forest management) practices, and heavier storm events all contribute to the addition of suspended solids, which can smother aquatic life and their habitats as they accumulate as sediments on stream bottoms with decreasing flow. Increased sedimentation can also thermally degrade a stream, as the dark material absorbs and holds heat. Erosion and sedimentation must be addressed to further support the growing fishery in the Kiskiminetas River and its tributaries.

Agricultural run-off is a form of non-point source pollution that can carry excessive amounts of fertilizers, pesticides and animal waste into waterways or there may be direct contamination from farm animal access to streams or a lack of a riparian buffer. While forested buffers are preferred, vegetated buffers can benefit water quality by filtering out sediments, chemicals, and nutrients while cooling stream temperatures and combating climate change. More farmers should develop and implement conservation plans with their local Natural Resources Conservation Service (NRCS) office to limit the impacts of erosion and uncontrolled animal access on their farms and streams.

Excessive stormwater can also create a host of problems beyond exacerbating erosion and sedimentation. Normally, precipitation falls on the landscape and slowly soaks into the ground and is stored as groundwater or used by vegetation and evaporated as part of the water cycle. More development brings an increase in impervious surfaces and conveyance channels and a loss in natural vegetation and water pathways. The larger volumes of water can become channelized, pick up speed, scour pathways to the nearest waterway, and transport pollutants from roadways, parking lots, and agricultural fields. The water may leave its original watershed, lessening stream flow and increasing stream temperature.

Figure 31 – The Stonycreek River at Route 30 in Stoystown, downstream of Beaverdam Creek, which received the brunt of heavy, localized thunderstorms in the spring

Pennsylvania's Storm Water Management Act 167 creates a framework to help municipalities develop and implement best management practices to protect water quality and control water quantity. Technical and financial assistance is available from PA DEP to municipalities preparing Stormwater Management Plans. Plans must be approved by DEP and municipalities must adopt ordinances, including zoning, building codes, and subdivision, consistent with the plan within six months of DEP's approval. To date, in the Kiski Basin, only the Little Conemaugh River and Stonycreek River watersheds have DEP-approved Stormwater Management Plans, which were prepared by the Cambria County Conservation District. These will affect new development in the watershed and encourage developers to determine the amount of impervious surface created, design appropriate infiltration methods, minimize soil and wetland disturbance, preserve trees and riparian buffers, and form natural flow paths (PA DEP).

Figure 32 – Sediment flows into Oven Run along Route 403 during a summer storm

The Westmoreland Conservation District (WCD) and Westmoreland County Department of Planning and Development are creating the Integrated Water Resource Plan (IWRP) that will identify water related problems from and solutions for stormwater including flooding issues, conveyance and management; drinking water from private wells and public authorities; sewage at private, on-lot systems and public wastewater treatment facilities; and pollution and use of water bodies and waterways. Kathy Hamilton, WCD's Landscape Architect and Stormwater Technician, states that a consultant has modeled, "the priority watersheds across the county to develop recommended release rates for new development to be included in the plan. The plan will have a Model SW [Stormwater] Ordinance for municipalities to adapt and adopt for their own use as per Act 167 requirements. It will also have an online decision making tool for developers and planners of utility, land development and conservation projects related to all things water." The IWRP will be launched by March 2018 and could be modeled in other counties.

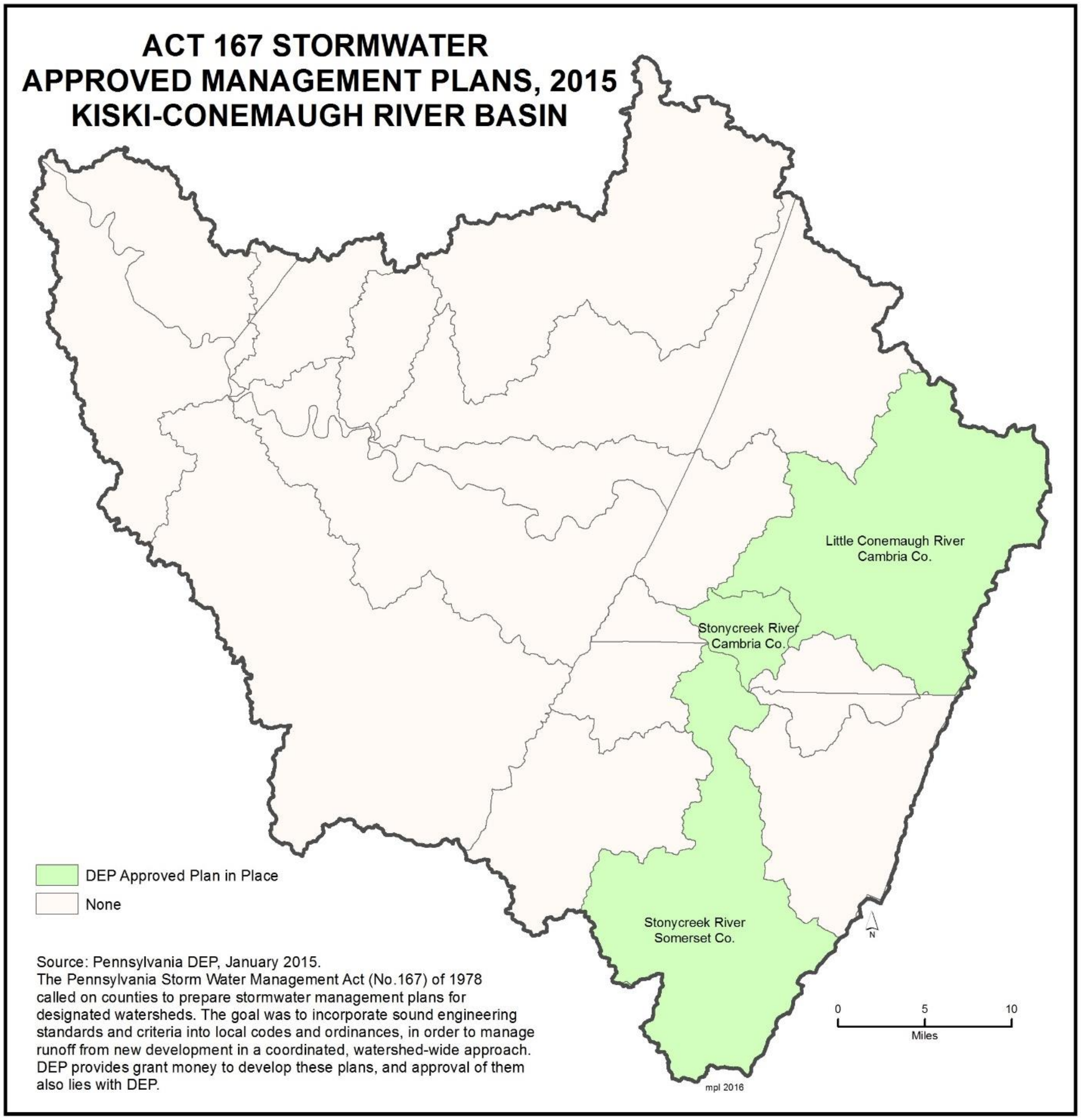


Figure 33 – Map of the watersheds within the Kiski-Conemaugh River Basin for which Act 167 Stormwater Management Plans have been adopted

Back to Table of Contents

Acid Rain

Precipitation, coupled with the Basin's geology, impacts water quality. Due to laws like the Clean Air Act, air quality, and hence, water quality are improving. Figure 34 contains images obtained from the U.S. Environmental Protection Agency's Clean Air Status and Trends Network (CASTNET). CASTNET is a national monitoring network established to assess trends in pollutant concentrations, atmospheric deposition, and ecological effects due to changes in air pollutant emissions. The active monitoring site nearest to the Kiski-Conemaugh River Basin is at Laurel Hill State Park at an elevation of 609 meters. Figure 34 shows how the acidity, as pH, of precipitation has changed over time. In 1990, Pennsylvania's precipitation had an average pH of 4.2. Some beers have a pH of about 4.3 (Shelton). By the year 2000, the pH of precipitation over the Commonwealth had improved to about 4.7. In 2013, the most recent year for which data were available, the pH was closer to 4.9; think coffee.

Acid rain is formed by high levels of nitrogen oxides (NO_x) and sulfur oxides (SO_x), which are produced through the burning of fossil fuels and emitted by automobiles. Acid rain can damage vegetation and seep into soils. The chemistry can affect plants' ability to take up nutrients and lessen their ability to fight disease, pests, and cold temperatures, especially in areas, like the Allegheny Front, where soils and geology do not have a high, natural buffering capacity.

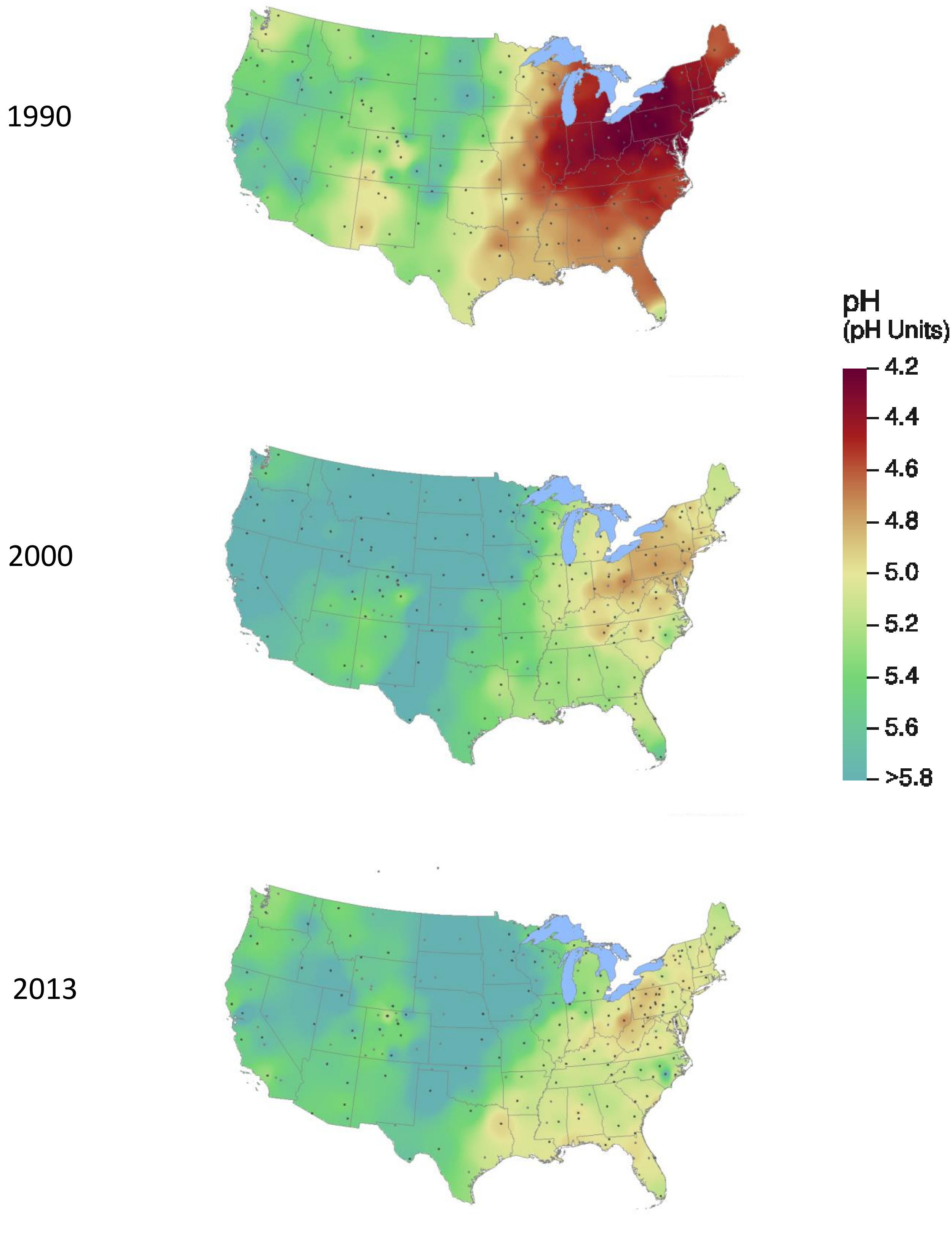


Figure 34 – Maps from the U.S. EPA's CASTNET showing how the pH of precipitation has changed

[Back to Table of Contents]

Floodplains

The steep topography of the Kiski-Conemaugh River Basin makes it prone to flooding. The devastating Johnstown Floods of 1889, 1936, and 1977 attest to that. Flood control structures like Conemaugh and Loyalhanna Lakes and the 1936 Johnstown Local Flood Protection Project protect property and lives; however, the latter limits access to the rivers on which people wish to recreate. Eighty years after their construction, the Johnstown Floodwalls present an economic blight, are not ecologically holistic, and perhaps do not manage flood control in the most efficient or safe way. In 2015, the City of Johnstown, in partnership with Johnstown's Vision 2025 and others, requested the United States Army Corps of Engineers (ACOE) examine and evaluate the flood walls within the city to see how they may be opened up for recreation, similar to an effort in California along the Los Angeles River. In spring 2016, the ACOE approved this request and began a $250,000 federally-funded Flood Plain Management Services feasibility study, which will conclude in mid-2018. The ACOE will be evaluating floodplain, hydrologic, and flood control issues throughout the watershed to determine the amount and type of flood protection that would best serve Johnstown today. Additionally, the ACOE will be facilitating an interagency federal and state working group to determine the resources that agencies such as the Pennsylvania Department of Transportation, United States Department of Agriculture's Rural Development, Pennsylvania Department of Community and Economic Development, and others have in a floodwall revitalization project (Keita). The last time that a study of this scope was undertaken by the ACOE in Johnstown was in the 1940s, and undoubtedly, hydrologic conditions have changed since then.

"This initial study by The Army Corps will then inform 'next steps' for this project and advise on what modifications to the floodwalls are appropriate and feasible" (Kieta).

Figure 35 – Johnstown's floodwalls as seen along the Little Conemaugh River

Elsewhere in the Kiski Basin are two of 16 flood control projects in the ACOE's Pittsburgh District: Conemaugh Dam and Loyalhanna Dam. The ACOE states that the, "Conemaugh Dam is able to reduce flood levels at The Point in Pittsburgh by four feet." When flooding conditions are likely, the dam holds back rain and snow melt and slowly releases it when flooding is not a risk. The Loyalhanna Dam has, "the capability to store the equivalent run-off of 6.16 inches of precipitation from its 290 square mile drainage area."

Figure 36 – Conemaugh Dam. Photo by Marge Van Tassel

Back to Table of Contents

Water Supply

In the Kiski Basin, municipal or other major Public Water Systems use 34 surface water intakes and 85 groundwater wells to supply residents with drinking water, as shown in Table 13 (McCaffrey). Private wells supply water to others or serve as supplements and backups to residents. According to Thomas McCaffrey, a PA Department of Environmental Protection Geologic Specialist, "On the Allegheny River downstream of the Kiski, there are eight surface water intakes serving approximately (roughly) 500,000 people."

In the eastern part of the Kiski Basin, the Mauch Chunk Formation is a significant aquifer supplying water to residents, while in the western part the significant aquifer system is the "coal measures consisting of the Conemaugh and Allegheny Formations" (Bomba).

In 1998, 11 public water systems were developing or implementing local wellhead protection programs. Currently, there are 19 doing the same. Table 13 lists the Public Water Systems within the Kiski Basin with a Source Water Protection Plan.

Public Water Systems within the Kiski-Conemaugh River Basin				
ID	**System Name**	**Source Water Protection Plan**	**Groundwater Sources**	**Surface Water Sources**
4110003	Northern Cambria Municipal Water		4	
4110006	Cambria Township Water Authority		1	1
4110009	Ebensburg Borough Municipal Authority	YES	1	2
4110010	N E Trailer Court		2	
4110014	Greater Johnstown Water Authority Saltlick	YES		1
4110015	Highland Sewer & Water Authority Lloydell	YES	2	
4110016	Highland Sewer & Water Authority Northern End	YES	6	
4110017	Highland Sewer & Water Authority Beaverdam	YES		2
4110023	Nanty Glow Water Authority			1
4110027	Portage Borough Municipal Authority	YES	2	2
4110028	Cle Inc Forest Hills PCH		1	
4110034	Greater Johnstown Water Authority Riverside	YES		3
4110046	Lilly Municipal Water Works		2	
4110053	Vintondale Boro Water System		2	1
4560002	Somerset Township Listie Water System		1	
4560006	Stonebridge Gardens MHP		5	
4560009	Somerset County Quemahoning System			1
4560013	Windber Area Authority	YES	7	
4560019	Reading Mines		1	
4560021	Cairnbrook Improvement Assn		1	
4560025	Indian Lake Borough Waterworks	YES	3	
4560030	Boswell Borough Municipal Authority	YES	2	
4560031	Lincoln Township Municipal Authority		2	
4560032	Gahagen Water Association			1
4560034	Brook Haven Acres		2	
4560036	Gray Area Water Authority of Jenner Township		1	
4560037	Hooversville Municipal Authority		1	1
4560038	Jennerstown Municipal Authority	YES	3	
4560045	Central City Water Authority		2	
4560048	Conemaugh Township Municipal Authority		3	1
4560050	Wilbur Community Water		2	
4560054	Laurel Mountain Village		1	
5320006	Blairsville Municipal Authority		3	1
5320009	Clymer Borough Municipal Authority	YES	2	
5320010	Green Township Municipal Authority Barr Slope		2	

5320011	Green Township Municipal Authority Commodore		1	
5320025	PA-American Water Co Indiana District	YES		1
5320029	Green Township Municipal Authority Cookport		1	
5320040	Central Indiana County Water Authority	YES		1
5320042	Indiana County Municipal Services Authority Pine Township		1	
5320109	Indiana County Municipal Services Authority Crooked Creek			1
5650012	Little Acres Mobile Home Park		2	
5650017	Sun Dial Village Mobile Home Park		3	
5650026	Pine Garden Apartments		2	
5650031	Municipal Authority of Westmoreland County Furnace Run	YES	2	
5650032	Municipal Authority of Westmoreland County Sweeney Plant	YES		1
5650036	Torrance State Hospital			1
5650037	Waterford Waterworks	YES	1	
5650042	Meadows Mobile Home Park		1	
5650049	Derry Borough Municipal Authority	YES	1	2
5650060	Latrobe Municipal Authority			2
5650069	Highridge Water Authority			6
5650080	Ligonier Township Municipal Authority	YES	1	1
5650098	Fairfield Manor Mobile Home Park		2	
	Total	**17**	**85**	**34**

Table 13

The Pennsylvania Source Water Assessment and Protection Program (SWAPP) assesses and prioritizes potential contamination to public drinking water sources and seeks to support the development of voluntary, local, source water protection programs. Pennsylvania's Wellhead Protection Program is part of SWAPP.

Back to Table of Contents

Lakes

Most lakes within the Kiski-Conemaugh River Basin are manmade and serve as water supplies, flood control, or recreation sources. Table 14, adapted from the 1999 Plan, lists these.

Major Lakes and Reservoirs in the Kiski-Conemaugh River Basin		
Name	**Management Unit**	**Primary Use**
Beaver Run Reservoir	Kiskiminetas River	Water Supply
Donegal Lake	Loyalhanna Creek	Recreation
Keystone Lake	Loyalhanna Creek	Recreation
Latrobe Reservoir	Loyalhanna Creek	Water Supply
Loyalhanna Creek Lake	Loyalhanna Creek	Flood Control
Twin Lakes	Loyalhanna Creek	Recreation
Conemaugh River Lake	Conemaugh River	Flood Control
Hinckston Run Reservoir	Conemaugh River	Water Supply
Duman Lake	Blacklick Creek	Recreation
Two Lick Reservoir	Blacklick Creek	Water Supply
Williams Run Reservoir	Blacklick Creek	Water Supply
Beaverdam Run Reservoir	Little Conemaugh River	Water Supply
Lloydell Reservoir	Little Conemaugh River	Water Supply
Saltlick Reservoir	Little Conemaugh River	Water Supply
Wilmore Dam	Little Conemaugh River	Water Supply
Indian Lake	Stonycreek River	Recreation
Lake Stonycreek	Stonycreek River	Recreation
North Fork Reservoir	Stonycreek River	Water Supply
Quemahoning Reservoir	Stonycreek River	Water Supply
Stoughton Lake	Stonycreek River	Recreation

Table 14

Notable since the 1999 Plan was published is the creation of the Cambria Somerset Authority (CSA) by Cambria and Somerset Counties. When Bethlehem Steel Corporation announced that the Manufacturers Water Company (MWC) and their holdings were for sale in 1997, the two counties' commissioners collaborated with the Southern Alleghenies Conservancy, Southern Alleghenies Resource Conservation and Development Council, and the Kiski-Conemaugh River Basin Alliance to secure funds, complete a feasibility study, and garner public support for the purchase of MWC. In 1999, the CSA was formed to purchase and operate land and water properties formerly owned by the MWC, which it did in 2000. These bodies of water – Hinckston Run, Quemahoning, and Wilmore Reservoirs and Border and South Fork Dams – were formerly private water supplies for industry. CSA still supplies water for industrial use, but it also manages over 5,000 acres of land and 1,200 surface acres of water and provides recreational opportunities for residents and visitors to the region. The aforementioned reservoirs are open for fishing, boating, hiking, hunting, geocaching, and mountain biking. Camping and swimming are available at the Quemahoning Reservoir and a 17-mile off-road bicycle trail is being developed around its perimeter. In partnership with the PA Fish and Boat Commission and the Cambria County and Somerset Conservation Districts, the CSA has been installing fish habitat structures at Hinckston Run, Quemahoning, and Wilmore Reservoirs since 2006. There are also minimum daily releases from these three reservoirs: 1.0 Million Gallons per Day (MGD) from Hinckston, 1.5 MGD from Wilmore, and 11.8 MGD from Quemahoning (Waddell).

Figure 37 – A kayaker enjoys sunset at the Quemahoning Reservoir

Back to Table of Contents

Stream Designation

Figure 38 documents the Pennsylvania Code Title 25 Chapter 93 Water Quality Standards designation for streams within the Basin. A few streams, particularly on the Allegheny Front and Laurel Ridge, are considered Exceptional Value. The only stream in the Kiski-Conemaugh River Basin classified as a High Quality Warm Water Fishery is Serviceberry Run in the Loyalhanna Creek watershed. Many streams are classified as warm water fisheries in the Loyalhanna Creek and Kiskiminetas River mainstem watersheds, as is the Conemaugh River and a few streams around Johnstown. The majority of streams are classified as coldwater fisheries.

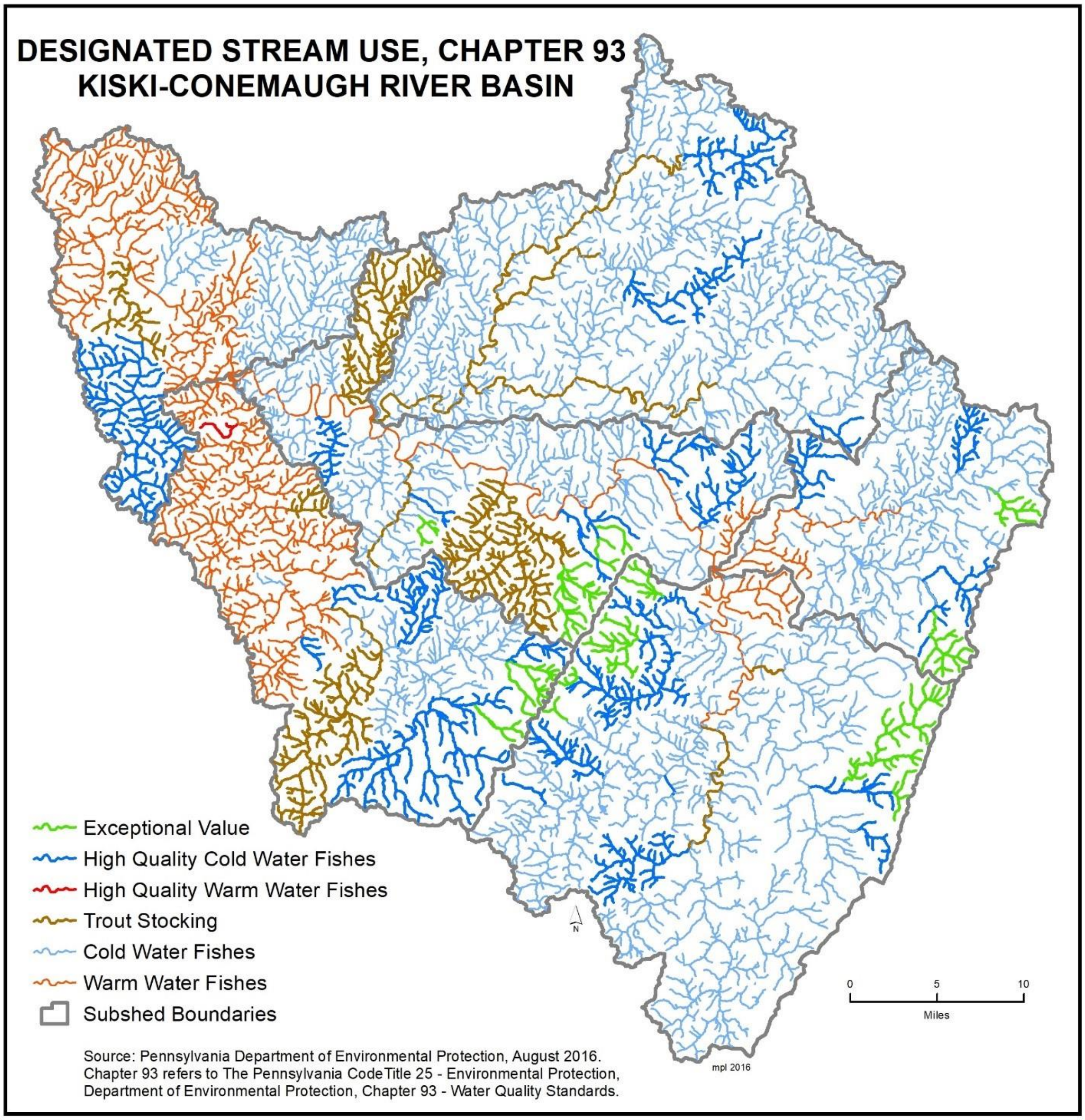


Figure 38 – Map indicating the designated stream use for waterways in the Basin

Exceptional Value streams are located in Cambria, Somerset, and Westmoreland Counties. To qualify as Exceptional Value, the Commonwealth of Pennsylvania states that a waterway must be designated as a High Quality Water and meet one or more of the following requirements:

- Located in a National Wildlife Refuge or a State game propagation and protection area;
- Located in a designated State park or forest natural area, National natural landmark, Federal or State wild river, Federal wilderness area or National recreational area;
- Be an outstanding National, State, regional or local resource water;
- Be of exceptional recreational significance;
- Achieve a score of at least 92% (or its equivalent) using the biological assessment methods and procedures described in Chapter 93.4b;
- Be designated as a ‘‘wilderness trout stream’’ by the Fish and Boat Commission following public notice and comment;
- Be of exceptional ecological significance.

According to the Pennsylvania Code, in Somerset County, portions of the following streams are listed as Exceptional Value (EV): Roaring Run, Clear Shade Creek, Piney Run, South Fork Bens Creek, North Fork Bens Creek, and Unnamed Tributary to North Fork Bens Creek. All of Allwine Creek and Riffle Run are considered EV. In Cambria County, portions of Mill Creek, Bens Creek, and South Fork Little Conemaugh River are considered EV. In Westmoreland County, sections of Baldwin Creek, Tubmill Creek and Trout Run and all of Powdermill Run, Furnace Run, Middle Fork Mill Creek, and South Fork Mill Creek are classified as EV. Detailed maps of each Management Unit may be found in their respective sections.

Sections of the following waterways are classified as Wilderness Trout Streams in the Kiski-Conemaugh River Basin: South Fork Little Conemaugh River; Piney Run; Roaring Run (Somerset County); Left Fork, Right Fork, and South Fork Mill Creek; Shannon Run; Baldwin Creek; and Powdermill Run. Wilderness trout streams allow for fishing in a remote, natural, and unspoiled environment.

While the PA DEP continually evaluates stream use designations, the PA Fish and Boat Commission, as well as individuals, groups, municipal authorities, and industry may petition the Environmental Quality Board to request a stream redesignation. Redesignation can take years. As an example, in May 2003, the Ken Sink Chapter of Trout Unlimited petitioned that Two Lick Creek, in Indiana County, from the Two Lick Reservoir tailwater to its confluence with Yellow Creek, be designated a HQ or EV coldwater fishery (CWF) stream. It was not until 2017 that the DEP approved re-designating this section to a CWF.

Back to Table of Contents

Highest Use Assessment

Every other year the PA Department of Environmental Protection issues its *Integrated Water Quality Monitoring and Assessment Report*, which was previously known as the 303(d) list. This report identifies, "whether or not a waterbody is achieving the water standards that protect and provide for clean water." In Pennsylvania, protected uses of surface waters include Aquatic Life, Potable Water, Recreation, and Fish Consumption. If a waterway is not meeting its designated or existing use, it's listed as impaired. Figure 39 displays the stream segments that are meeting these protected uses and those that are impaired for all classes.

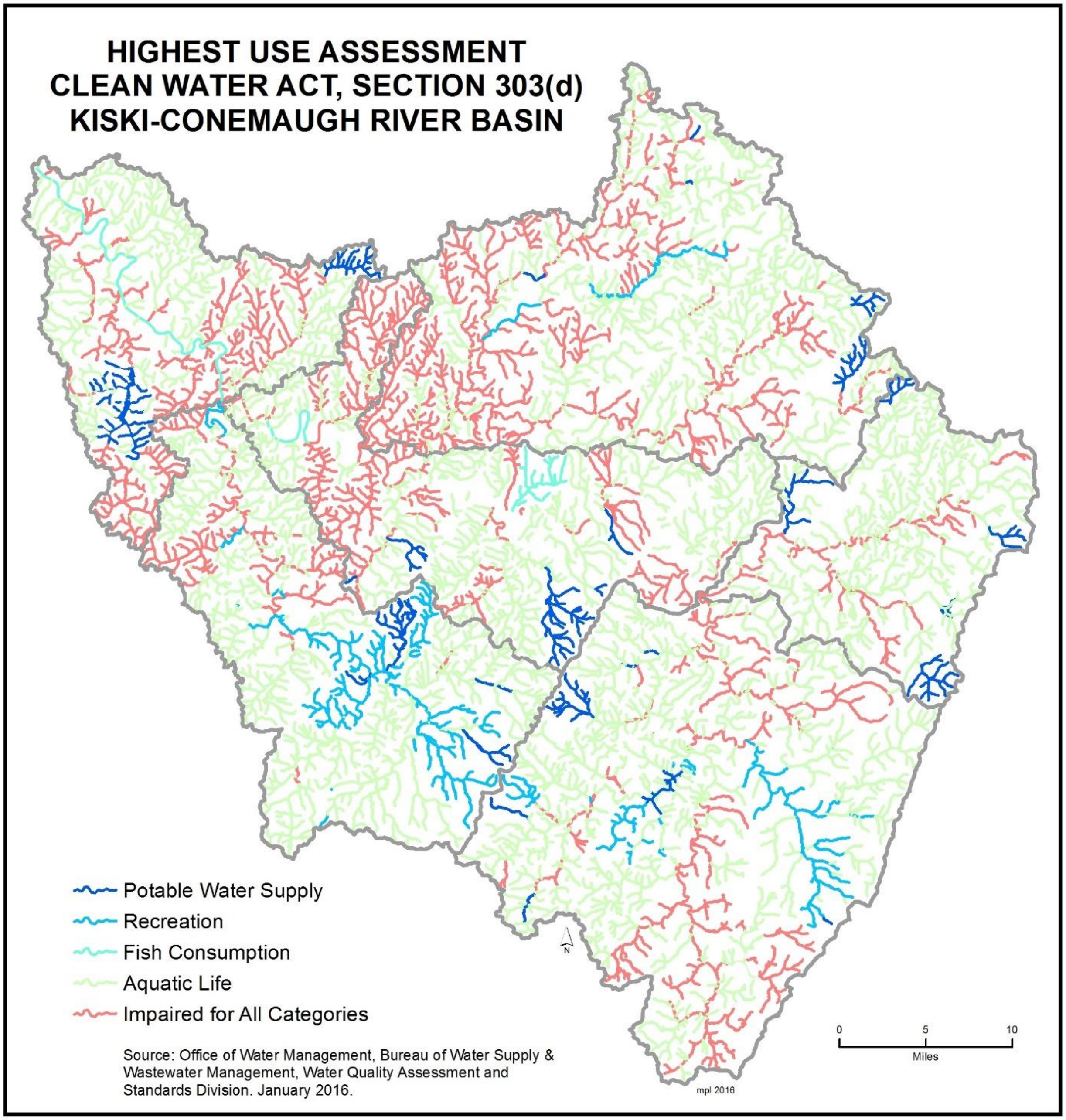


Figure 39 – Map showing waterways' highest use designation

Back to Table of Contents

Kiski-Conemaugh TMDL

TMDL is an acronym for Total Maximum Daily Load. In January 2010, the U.S. Environmental Protection Agency published *TMDLs for Streams Impaired by Acid Mine Drainage in the Kiskiminetas-Conemaugh River Watershed, Pennsylvania*, which was prepared by Tetra Tech, Inc. of Fairfax, Virginia. It states that a, "TMDL establishes the amount of a pollutant that a waterbody can assimilate without exceeding its water quality standard for that pollutant. TMDLs provide the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources to restore and maintain the quality of the state's water resources" (i). It helps with permitting and determining load allocations, while considering natural background levels. A margin of safety is also factored in.

Over 20 waterways within the Kiski Basin already had a TMDL for abandoned mine drainage parameters, but the 2010 TMDL now supersedes all pre-existing metal TMDLs in the Basin. The metals include aluminum, iron, and manganese. Sediment and pH are also included.

Table 15 shows the criteria for metals and pH set forth by this TMDL. Sediment allocations vary by stream, so it is best to refer to the Kiski-Conemaugh TMDL publication.

Kiski-Conemaugh TMDL Criteria	
Parameter	**Level**
Aluminum	0.750 mg/L
Total Iron	1.500 mg/L over a 30 day average
Dissolved Iron	0.300 mg/L
Manganese	1.000 mg/L
pH	6.0 to 9.0

Table 15

Biological Resources

Terrestrial Wildlife

The Pennsylvania Game Commission and the Pennsylvania Fish and Boat Commission published the *Pennsylvania Wildlife Action Plan, 2015-2025*, a document that outlines ways to cooperatively preserve species and protect those in peril, which includes educating the public, though public perception of non-game wildlife is changing. A survey question cited in the *Wildlife Action Plan* indicates that 14% more of those who responded to the survey in 2014 than in 1996 think that managing and conserving nongame wildlife is a "very important" function of the Fish and Boat and Game Commissions (Intro 37).

Figure 40 – Red squirrel

Wildlife populations in the Commonwealth as well as the Kiski-Conemaugh River Basin are both abundant and diverse. Black bears, white-tailed deer, wild turkey, cottontail rabbits, squirrels, and groundhogs are game animals pursued by over 600,000 hunters every year. Game birds include bobwhite, quail, crows, geese, grouse, merganser, mourning doves, pheasants, wild ducks, and woodcock, among others. Trappers pursue badgers, beaver, bobcats, coyote, fishers, mink, muskrat, raccoon, fox, and striped skunks.

Threats to Wildlife

Wildlife face numerous and varied threats. The *Pennsylvania Wildlife Action Plan, 2015-2025* cites the International Union for the Conservation of Nature (IUCN) and its Level 1 threat categories for Species of Greatest Conservation Need in different taxonomic groups. According to this document, mammals are most threatened by what are categorized together as "Invasive and Other Problematic Species, Genes and Diseases." The number one threat to birds, reptiles, and amphibians is "Residential and Commercial Development," although "Transportation and Service Corridors" came in a close second for reptiles. Therefore, land use and habitat management planning along with focused management of natural resources were outlined as the top conservation actions necessary for these taxonomic groups. The *Wildlife Action Plan* indicates that fish communities are most threatened by pollution, which can be a variety of point and non-point source pollutants, so law and policy must be coupled with planning to protect native ichthyofaunal (1-27).

Alien/invasive species threaten the existence of native wildlife. For example, sometimes owners of Red-eared sliders, a popular pet turtle, release them into the wild, where they can displace the Red-bellied turtle, a threatened species in Pennsylvania. Native Paddlefish are threatened by alien/invasive Bighead, Silver, and Black carp while Rusty crayfish could decimate native crayfish species, freshwater mussels, and macroinvertebrates (3-86). Information on invasive plant species may be found on page 79.

*Figure 41 – A native, blue crayfish (*Cambarus monongalensis*) found at the very edge of its range in northern Somerset County*

Disease also threatens wildlife. White nose syndrome, confirmed in Pennsylvania during the winter of 2008-2009, is affecting bat populations across the country. White nose syndrome is caused by a fungus, *Pseudogymnoascus destructans*, that erodes the skin, causes dehydration, and awakens hibernating bats. The resulting stress induced by increased metabolism absent a food source may be lethal. Recreational caving by humans spreads the disease. As the first wave of mortality is over, the PA Game Commission is studying surviving bats and continuing to track the disease (3-87).

Amphibians are affected by a broad range of pathogens, but two notable diseases are the Chytrid fungus (*Batrachochytrium dendrobatidis-Bd*) and the Ranavirus (Family Iridoviridae), neither of which are well understood (3-89).

A fungal dermatitis is an emerging disease that is affecting timber rattlesnake populations, but its extent in Pennsylvania is unknown (3-89).

Figure 42 – A timber rattlesnake in Forbes State Forest

Mosquitoes spread West Nile Virus to birds and sometimes humans. In fact, a case of West Nile Virus was confirmed in a woman in Indiana County in July 2016. Mosquitoes with West Nile have been caught in Cambria and Westmoreland Counties as well (USGS and CDC).

While not yet documented in the Kiski Basin, Chronic Wasting Disease can kill deer and elk by affecting their brain and nervous system. In white-tailed deer, Hemorrhagic Disease is transmitted by biting flies or midges carrying either the Epizootic Hemorrhagic Disease (EHD) Virus or Bluetongue Virus, and usually causes death within 8-36 hours. EHD has been identified within the Kiski Basin (PGC).

Disease and insects are affecting key tree species in the Commonwealth. These include, but are not limited to the emerald ash borer (*Agrilus planipennis*), Gypsy Moth (*Lymantria dispar*), Brown Marmorated Stink Bug (*Halyomorpha halys*), and Southern Pine Beetle (*Dendroctonus frontalis*), which are resident in all counties comprising the Kiski Basin.

Figure 43 – "Blonding" on an ash tree

The emerald ash borer is a bright, metallic green beetle, about half an inch long, native to Asia, whose larvae "feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients." The adults leave a "D" shaped hole when they emerge from the ash tree in the spring. Woodpeckers eat the larvae, so many ash trees suffer from "blonding," where the bark has been pecked off to expose the lighter wood underneath. This is easily viewable along roadways. Quarantining firewood is one way to stop the spread of the emerald ash borer (USDA and MSU).

The Gypsy Moth caterpillar prefers the leaves of hardwood trees, especially oak, weakening and ultimately defoliating the tree, especially after multiple infestations. Aerial spraying of pesticides help curb gypsy moth populations. Additionally, researchers are aware of a fungus, *Entomophaga maimaiga*, which was introduced to the United States from Japan in the early 1900s, that can increase gypsy moth mortality. Researchers are studying this fungus and its impact on gypsy moths (USFS). Cornell University College of Agriculture and Life Sciences indicates that late instar gypsy moth larvae infected with *E. maimaiga*, "die hanging vertically from tree trunks with prolegs extended laterally" and that the fungus is "highly variable and unpredictable" but promising in limiting gypsy moth populations.

The Brown Marmorated Stink Bug feeds on fruit trees and other vegetation, including garden vegetables, making it a great concern for farmers. It can lessen yields, damage fruit, and cause plants to generate less seed. Its population exploded in 2010 (Shaw).

The Southern Pine Beetle is a 3mm insect that must kill the pine tree in question to reproduce and so it can have detrimental impacts on lumber and eco-tourism economies (USDA).

While the Hemlock Woolly Adelgid (*Adelges tsugae*) has not yet been identified in Armstrong County, it is prevalent elsewhere in the Kiski Basin. The Woolly Adelgid, a small, aphid-like insect native to Asia, is infesting hemlocks across the eastern United States. While all species of hemlock are attacked, according to the U.S. Department of Agriculture Forest Service, only the Eastern and Carolina hemlock are vulnerable. "Hemlock decline and mortality typically occur within 4 to 10 years of infestation in the insect's northern range." The loss of hemlocks could be disastrous for headwater streams in the Kiski Basin. The Department of Agriculture is exploring the use of adelgid-specific predators as a population control measure.

American beech trees are getting Beech Bark Disease (BBD), which occurs when the sap-feeding beech scale insect (*Cryptococcus fagisuga*) creates openings in the tree bark for two fungi (*Neonectria faginata* and *Neonectria ditissima*) to enter, stunt, and kill the tree. While insecticides may be used to save individual trees, loss of beech trees in a forest are inevitable, although some beech trees have shown resistance to the infection (University of Maryland).

Figure 44 – Close-up of Beech Bark Disease.
The beech scale is even more apparent on wet trees

Back to Table of Contents

Native Vegetation

Native plants are essential for a healthy ecosystem to support diverse wildlife communities. They are part of the food chain, supporting the insects and caterpillars on which countless animals rely for food, and they provide habitat, including cover and places to raise young. They're adapted to their climate, requiring less water and fertilizer to grow when used in landscaping. Native species are susceptible to habitat loss, irresponsible harvesting, and invasive plants.

Naturalized plants are those introduced to a region, but that do not cause extensive damage or spread the way invasive species do.

In September 2007, the Pennsylvania Game Commission published *Common Beneficial Plants Found in Wildlife Habitat Established Through CREP and Other Farm Bill Programs* to serve as a visual guide for landowners managing property for wildlife habitat or property enrolled in the Conservation Reserve Enhancement Program (CREP) or other Farm Bill Conservation Programs. While not an inclusive list, it highlights the following for their high value to wildlife:

- Asters & Fleabanes
- Blackberries/Raspberries
- Blue Vervain
- Boneset
- Common Ragweed
- Common Milkweed
- Goldenrod
- Hemp Dogbane
- Ironweeds
- Joe-Pye Weed
- Queen Anne's Lace (introduced)
- Smartweeds
- Staghorn or Smooth Sumac (3-15).

Figure 45 – Queen Anne's Lace

Invasive Plants

President Bill Clinton's Executive Order 13112 of February 3, 1999 defines an invasive species as one that is alien or non-native and is likely to cause economic or environmental harm or harm to human health (6183).

In 2004, former Pennsylvania Governor Ed Rendell formed the Pennsylvania Invasive Species Council, and the Pennsylvania Department of Conservation and Natural Resources (DCNR) developed an *Invasive Species Management Plan* for Pennsylvania to serve as a working document for the identification, management, and prevention of invasive species on public lands. Ultimately, an informed work force and citizenry is essential to stopping the spread of invasive species through prevention, early detection, and a rapid response.

Two of the most invasive plants in the Kiski-Conemaugh River Basin are Japanese knotweed (*Fallopia japonica*) and Giant knotweed (*Polygonum sachalinensis*). Japanese knotweed is listed as one of the 100 most invasive species in the world according to the Invasive Species Specialist Group, which is a part of the International Union for Conservation of Nature. In Ireland, people cannot obtain a mortgage if knotweed is present on the proposed property or those neighboring it (Macauley).

Native to Asia, Japanese knotweed spreads via robust rhizomes and a shallow root system that can spread up to 22 feet. Often seen in disturbed areas, utility right-of-ways, and along stream and river banks, knotweed crowds out native species and provides no benefit to Pennsylvania wildlife. Some entrepreneurs are dabbling with its use in the restaurant business. The young stems are edible and supposedly taste like rhubarb. Knotweed is high in resveratrol, a compound that some people believe is good for its anti-aging properties and fighting disease.

Control of this invasive is difficult. The Southern Laurel Highlands Plant & Pest Management Partnership has had the most success treating knotweed with an application of AquaNeat, a glyphosate-based herbicide approved for use around water, in the spring, while the plant is putting energy into growth, and again in the fall, when energy is moving to its roots. Regular inspections and maintenance are necessary for control (Fowler).

Figure 46 – Japanese knotweed

Autumn Olive (*Elaeagnus umbellata*) is a shrub native to Asia that was brought to the United States to provide habitat and food for wildlife and to also control erosion. While it does that, it readily spreads and out-competes native vegetation. Its hardiness allows it to grow in poor soil conditions, and birds that feed on its red berries can spread it as well.

Multiflora Rose is another noteworthy invasive plant that was also introduced from Asia. Planted to provide wildlife cover and serve as a hedgerow, multiflora rose is pervasive in many habitats. Its thorny thickets and easy reproduction can choke out native habitat and negatively impact the nesting of native birds (Forest Invasive Plants Resource Center). Frequent cutting or mowing can eradicate the plant (Missouri Department of Conservation).

Other common invasive plants in the Kiski Basin include Garlic Mustard (*Alliaria petiolate*), Oriental Bittersweet (*Celastrus orbiculatus*), and Tree of Heaven (*Ailanthus altissima*), though there are many other invasives within the Basin. Garlic mustard outcompetes native, spring wildflowers for soil, moisture, nutrients, and space. One plant can produce thousands of seeds, which remain viable in the soil for five years. It is important not to confuse oriental bittersweet with the native American bittersweet (*Celastrus scandens*), which is becoming less common (Pavlovic). Tree of heaven can look like staghorn sumac, ash, or walnut trees and, like walnuts, can exude a chemical that affects the growth of other plants around it, allowing it to establish dense groves, especially since one mature tree can produce hundreds of thousands of seeds a year. Its root system can damage sewers, foundations, and pavement.

In September 2017, the Roaring Run Watershed Association, Armstrong Conservation District, and PA Department of Conservation and Natural Resources began an experimental treatment for tree of heaven, which are abundant along the Roaring Run Trail. The *Tribune-Review* reports that, "John Brundege, a DCNR forester…, brought in the Verticillium fungus, which will produce a wilt, clogging the vascular tissue of the ailanthus tree and killing it. The fungus is not known to harm native tree species." The groups will monitor this effort (Thomas).

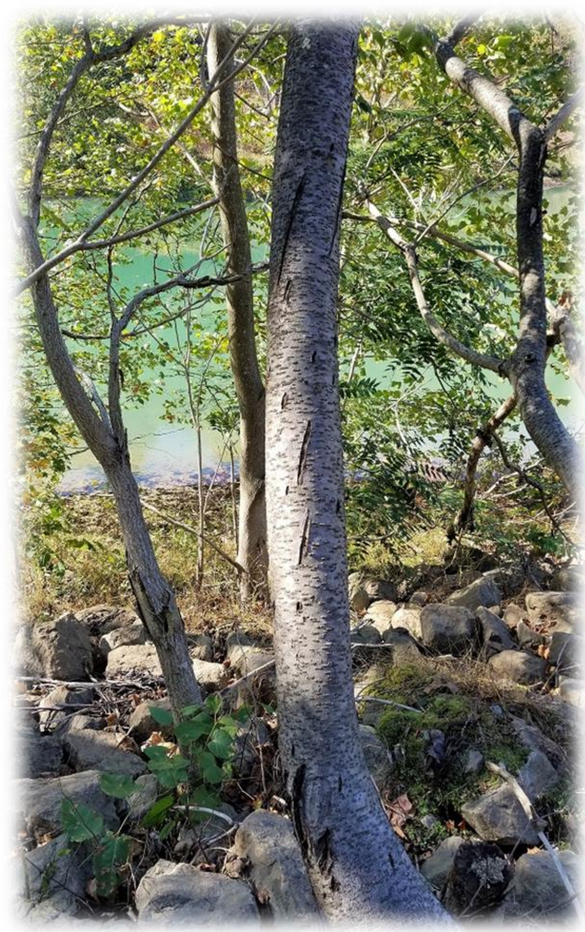


Figure 47 – Tree of Heaven is scored along the Roaring Run Trail to allow the Verticillium fungus to take hold

Back to Table of Contents

Noxious Weeds

Noxious weeds are plants that can harm the ecosystem, including humans. While many noxious weeds are introduced, some are native.

The United States Department of Agriculture Natural Resource Conservation Service's Plants Database lists the following as noxious weeds in the Commonwealth:

- Bull Thistle, Spear Thistle (*Cirsium vulgare*)**
- Canada Thistle (*Cirsium arvense*)**
- Giant Hogweed (*Heracleum mantegazzianum*)
- Goatsrue (*Galega officinalis*)
- Jimsonweed (*Datura stramonium*)*
- Johnsongrass (*Sorghum halepense*)*
- Kudzu-vine (*Pueraria lobate*)*
- Marijuana (*Cannabis sativa*)*
- Mile-a-Minute (*Persicaria perfoliata*)**
- Multiflora Rose (*Rosa multiflora*)**
- Musk Thistle, Nodding Thistle (*Carduus nutans*)*
- Purple Loosestrife (*Lythrum salicaria*)*
- Shattercane (*Sorghum bicolor*)

As of September 2016, the plants with a double asterisk (**) have been identified in every county that encompasses the Kiski-Conemaugh River Basin, as shown on the Early Detection and Distribution Mapping System developed by the University of Georgia's Center for Invasive Species and Ecosystem Health. Plants with one asterisk (*) were found in at least one, but not all five counties in the Kiski Basin.

Giant Hogweed was present in Westmoreland County, but it was eradicated in 2006. There has never been a report of hogweed in any of the other counties within the Kiski Basin, but vigilance is necessary (Carr).

Back to Table of Contents

Aquatic Invasive Species

Aquatic Invasive Species (AIS), detrimental to habitats and native species, are often unknowingly spread by anglers and boaters.

Watercress (*Nasturtium officinale*) is a member of the Mustard family and is often grown for its edibility, yet, in the wild it can choke out native plant communities and is unpalatable to aquatic organisms (USDA).

Eurasian water-milfoil (*Myriophyllum spicatum*) can also choke out native plant species and form thick mats that interfere with recreational uses.

Didymo (*Didymosphenia geninata*) is a microscopic, single-cell organism that could be detrimental to stream macroinvertebrate communities and recreational opportunities. Referred to as "rock snot," though it isn't slimy, didymo grows in moving, coldwater and looks like brownish-tan toilet paper. Its texture is often described as that of wet wool. It forms thick mats that smother bottom substrates and can cause footing difficulty for recreational users. Anglers can unknowingly spread it through a single drop of water on their waders, tackle, or boats.

The iMapInvasives Network indicates the following AIS are in the Kiski-Conemaugh River Basin: Curly-leaf pondweed, Eurasian water-milfoil, Marshpepper knotweed, Sweetflag, True forget-me-not, Watercress, Yellow iris, and Asiatic clam.

There are many good websites with details on identification and recommended control methods including the Plant Conservation Alliance and United States Department of Agriculture.

Prevention is the best defense against invasive species, because once established, they are very hard to control and/or eradicate.

Natural Heritage Inventories

In February 2007, the Pennsylvania Natural Heritage Program published the *Cambria County Natural Heritage Inventory* and in April 2010, it published the *Armstrong County Natural Heritage Inventory*. In February 2011, it published the *Indiana County Natural Heritage Inventory*. The *Westmoreland County Natural Heritage Invento*ry was published in September 1998 and the *Somerset County Natural Heritage Inventory* was published in January 2006 by the Western Pennsylvania Conservancy.

These inventories document important habitats, geologic features, and plant and animal species of concern for conservation. Rare, Threatened and Endangered Species are included. The Pennsylvania Natural Heritage Program maintains a list of these species by HUC 8 Watershed on its website. A table outlining the species of concern in the Kiskiminetas and Conemaugh River HUC 8 Watersheds as of July 2017 may be found in Appendix 8.

The Indiana Bat (*Myotis sodalis*) is listed as endangered federally and in the Commonwealth, while the Northern Long-eared bat (*Myotis septentrionalis*) is federally listed as threatened. The U.S. Fish and Wildlife Service lists the Indiana Bat as present in every county within the Kiski-Conemaugh River Basin. Loss of habitat, winter disturbance, pesticides, and, more recently, white-nose syndrome threaten bats.

The Clubshell (*Pleurobema clava*), a freshwater mussel, is listed as endangered federally and in Pennsylvania. It is the only species in the Kiski-Conemaugh River Basin to have a global rank of G1-G2, meaning that while there is some uncertainty about its exact status, the Clubshell is either at a very high or high risk of extinction due to its rarity. A G1 code indicates that there are often five or less populations, while a G2 code means there are often 20 or less. In 2006, a population of Clubshells was found in the Allegheny River (Smith and Meyer). Clubshells can live up to 50 years. They prefer waterways with gravel or sandy substrates, as they will bury themselves up to four inches, but agricultural run-off, industrial pollution, navigational impoundments, sedimentation, and invasive species have diminished their habitat (USFWS).

Many more species are listed as Pennsylvania Endangered or Threatened including Jacob's ladder (*Polemonium vanbruntiae*) and Upland Sandpiper (*Bartramia longicauda*) and the Allegheny Woodrat (*Neotoma magister*) and Long-eared Owl (*Asio otus*) respectively.

> "The time to save a species is when it is still common. The only way to save a species is to never let it become rare."
>
> *- Rosalie Edge,*
> *founder Hawk Mountain Sanctuary*

Back to Table of Contents

Important Habitats

The aforementioned Natural Heritage Inventories identify Important Bird Areas, Important Mammal Areas, Biological Diversity Areas, and Landscape Conservation Areas. Important Bird Areas (IBA) are a site that is part of the global network of places recognized for their outstanding value to bird conservation and must meet one of several criteria. The Pennsylvania Audubon Society administers the IBA Program. The Pennsylvania Biological Survey provides advice on Important Mammal Areas (IMA). Biological Diversity Areas (BDA) are those containing plants or animals of special concern at state or federal levels, exemplary natural communities or exceptional native diversity. BDAs include both the immediate habitat and surrounding lands important in the support of these special elements. Landscape Conservation Areas (LCA) are large contiguous areas of land important because of its size, open space, habitats, and/or inclusion of one or more BDAs.

Numerous locations within the Kiski-Conemaugh River Basin are listed for their “exceptional” or “high” significance, including, but not limited to the Clear Shade Creek LCA and Crumb Bog BDA in Somerset County; Allegheny Front and Laurel Ridge LCAs in Cambria County; Strangford Cave and Yellow Creek State Park – Lake BDAs in Indiana County; and Loyalhanna Gorge and Spruce Flats Bog BDAs in Westmoreland County. In Armstrong County, the only feature of “notable” significance in the Kiski-Conemaugh River Basin is Roaring Run.

Figure 48 – Pitcher plants

Figure 49 – Crumb Bog

Back to Table of Contents

Trout Waters

Hundreds of stream miles within the Kiski-Conemaugh River Basin are classified by the PA Fish and Boat Commission as Approved Trout Waters. In fact, 577 miles of waterways within the Kiski Basin are classified as Wild Trout Waters with another 336 miles labeled as Stocked Trout Waters. These are stocked with trout by the PFBC and are largely open to the public for fishing. Waterways in the Basin with special regulations include a one-mile section of Clear Shade Creek, which is Catch-and-Release Fly-Fishing Only, and a portion of Loyalhanna Creek that is Delayed Harvest Artificial Lures Only. This section of Loyalhanna Creek is also designated a Keystone Select Stocked Trout Water. The Keystone Select Stocked Trout Waters Program began in 2016 as a PFBC initiative that reallocates its excess brood fish, which are large, 2.5-3.5 year old fish used to provide the egg and sperm for its hatchery program, to very few, select streams (Young 18-19).

Above – Figure 50 –
A young-of-the-year wild brook trout

Right – Figure 51 – A rainbow trout

Below – Figure 52 –
A brown trout

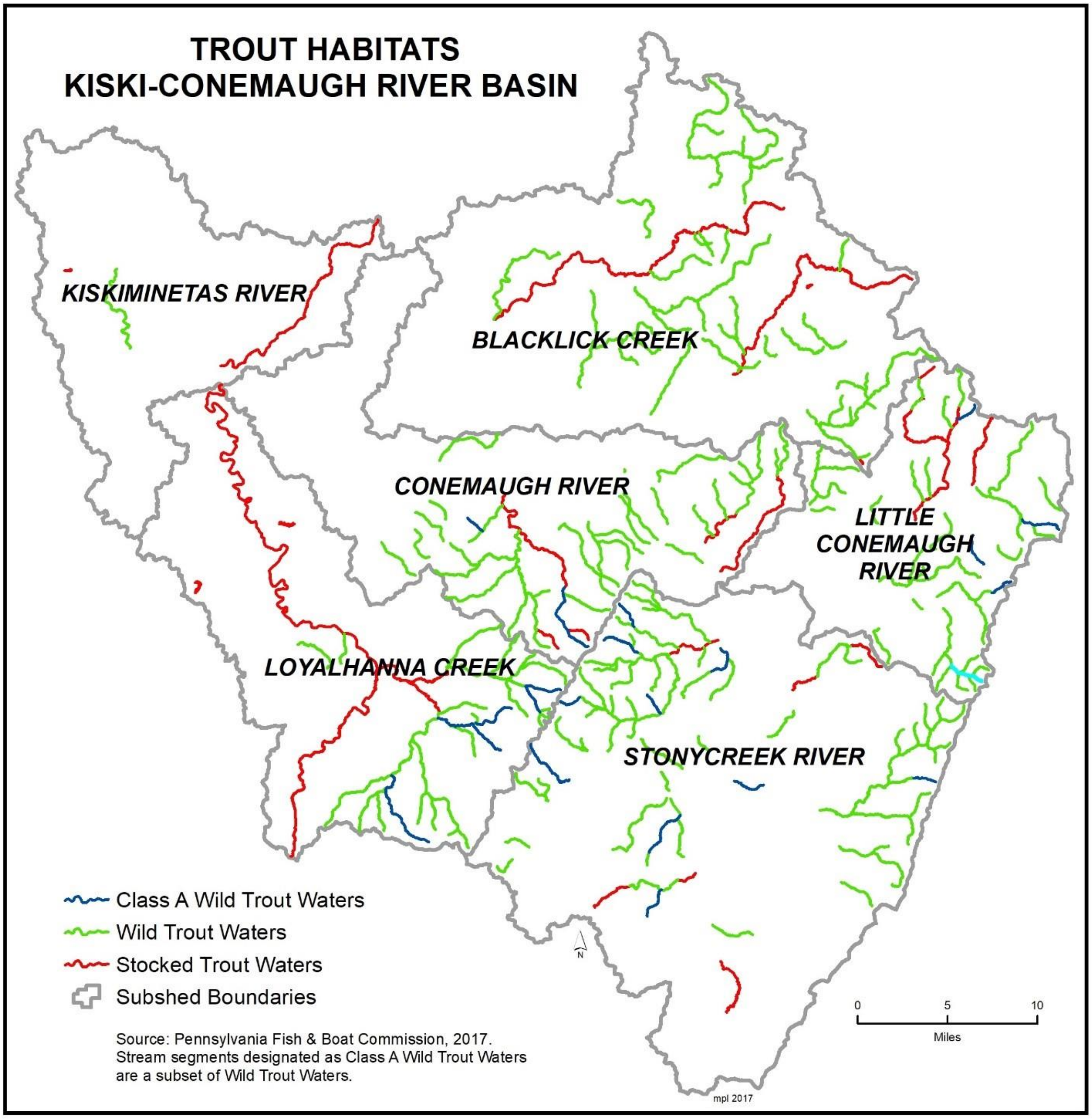


Figure 53 – Map of designated trout waters

Wild Trout Waters are streams that support naturally reproducing populations of trout that may be supplemented with hatchery trout stocked by the PA Fish and Boat Commission. In the Kiski-Conemaugh River Basin, Wild Trout Waters are mostly on and between the Chestnut and Allegheny Ridges or along the Allegheny Front.

Class A Wild Trout Waters may be considered the "cream of the crop" or the "best of the best" and support an abundance of sufficiently-sized fish to sustain a sport fishery. Class A Wild Trout Waters are designated by the Pennsylvania Fish and Boat Commission following public notice and comment. Class A means there are at least 26.7 – 35.6 pounds of wild brook and/or wild brown trout biomass per acre, depending on the species, and that they are naturally reproducing. The necessary biomass of wild rainbow trout is lower – 1.78 pounds per acre. As of 2017, in the Kiski-

Conemaugh River Basin, there were 53 miles of Class A Wild Trout Waters, including, but not limited to portions of the South Fork of the Little Conemaugh River in Cambria County; Higgins Run, South Fork Bens Creek, and Soap Hollow Run in Somerset County; and Tubmill Creek and Laughlintown Run in Westmoreland County as shown in Figure 53. There are no Class A Wild Trout streams in southern Indiana County or Armstrong County (PFBC).

Laurel Hill Eastern Brook Trout Surveys

In 2016, Dr. David Argent and Dr. William Kimmel of California University of Pennsylvania, in partnership with the CVC's Kiski-Conemaugh Stream Team, replicated fish population surveys at 53 of the 61 sites surveyed along the Laurel Hill Ridge in 1983 by Dr. William Sharpe et al. The 1983 study provides rare, historical data to which present day data may be compared. While all species occurrences were noted, focus was on brook trout, which typically thrive in cold, headwater streams and are a keystone indicator species. Twelve species were documented in the 2016 surveys that were absent from the 1983 surveys, including Golden Shiner, Longnose Dace, White Sucker, Northern Hogsucker, Brown Trout (wild and hatchery), Brown Bullhead, Green Sunfish, Pumpkinseed, Bluegill, Largemouth Bass, Black Crappie, and Yellow Perch (Argent et al. 11), though, Dr. Kimmel noted that the warm water fish were only found at the site below Cranberry Lake Dam.

The team found brook trout present in 44 of the 53 streams studied, with 38 of those streams sustaining natural reproduction, as proven by the presence of young-of-the year trout. In 1983, 33 of the surveyed streams supported natural reproduction. So in 2016, 72% of the surveyed streams had a self-sustaining trout population, whereas in 1983, just 54% did; however, in 1983, 1,213 brook trout were collected from the surveyed streams and in 2016, only 469 were, indicating a 62% loss in brook trout. Several streams were missing year classes indicating a devastating event of some kind (Argent et al. 1).

At three of the wild brook trout streams, above and below impoundments of varying sizes on these streams, temperature data loggers were placed in the stream and in the riparian zone. The impoundments were High Ridge Reservoir on the South Fork of Sugar Run, Kooser Lake Reservoir on Kooser Run, and North Fork Reservoir on the North Fork of Bens Creek. Temperature was recorded hourly. Researchers found that, "In general, sites below dams were warmer than sites above and also appear to warm faster" (Argent et al. 8). Summer water temperatures downstream of Kooser Lake and North Fork Reservoir and both upstream and downstream of High Ridge Reservoir exceeded the upper threshold of 18°C (64.4°F) for brook trout.

For the most part, water quality has improved at the survey sites and in-stream habitat and the riparian canopy coverage remains about the same, except at three of the studied streams, where disturbance was significant. Still, there was a loss of brook trout since 1983. Thermal stress is often the primary reason for a loss, but increased sedimentation and nutrification, the introduction of non-native species like hatchery brown trout, and poor riparian buffers can contribute to brook trout decline. At the streams surveyed in 2015 along the Laurel Hill, "changes in land use patterns, loss of riparian vegetation, acid deposition, and introduction of exotic species particularly salmonids of hatchery origin" are the primary reasons for the brook trout decline (Argent et al. 13). In the Laurel

Hill study, streams classified as "culturally impacted" had conductivities more than three times greater than those streams with trout. Additionally, the water temperature was nearly a degree warmer in culturally impacted streams (Argent et al. 8). As stated elsewhere, forested riparian buffers can filter sediments, nutrients, and chemicals while cooling the streams, which help brook trout.

Fish Consumption Advisories

The Commonwealth of Pennsylvania has issued a general, statewide health advisory for recreationally caught sport fish. It is recommended that a 150-pound person not eat more than one meal (8 oz.) per week of sport fish caught in Pennsylvania and that care is taken to safely clean and cook the catch to reduce exposure to organic contaminants, which are usually concentrated in a fish's skin and fat. "Mercury, however, collects in the fish's muscle and cannot be reduced by cleaning and cooking methods" (PFBC).

Contaminants such as mercury and Polychlorinated Biphenyls (PCBs) are called bio-accumulators; they can build up in human body over time and cause health problems. Most susceptible are pregnant or nursing women, women who could become pregnant, and people, especially children, whose diet consists largely of fish. PCBs are man-made organic chemicals that were banned in the United States in 1979; however, they have a long life, are very mobile, and can bio-accumulate in plants and animals, including people (U.S. EPA).

Water bodies in the Kiski-Conemaugh River Basin with a current (2018) fish consumption advisory include:

- Beaver Run Reservoir in Westmoreland County, where a person should not consume more than two meals a month of largemouth bass because of Mercury, and
- Conemaugh River, which serves as a border between Indiana and Westmoreland Counties, from the Conemaugh Lake Dam to its mouth in Saltsburg, where a person should not consume more than one meal a month of carp because of PCBs (PFBC).

> "The way we treat rivers reflects the way we treat each other."
>
> - Aldo Leopold

Back to Table of Contents

Cultural Resources

The following map details many key recreational and scenic assets in the Kiski Basin, some of which are discussed in this document.

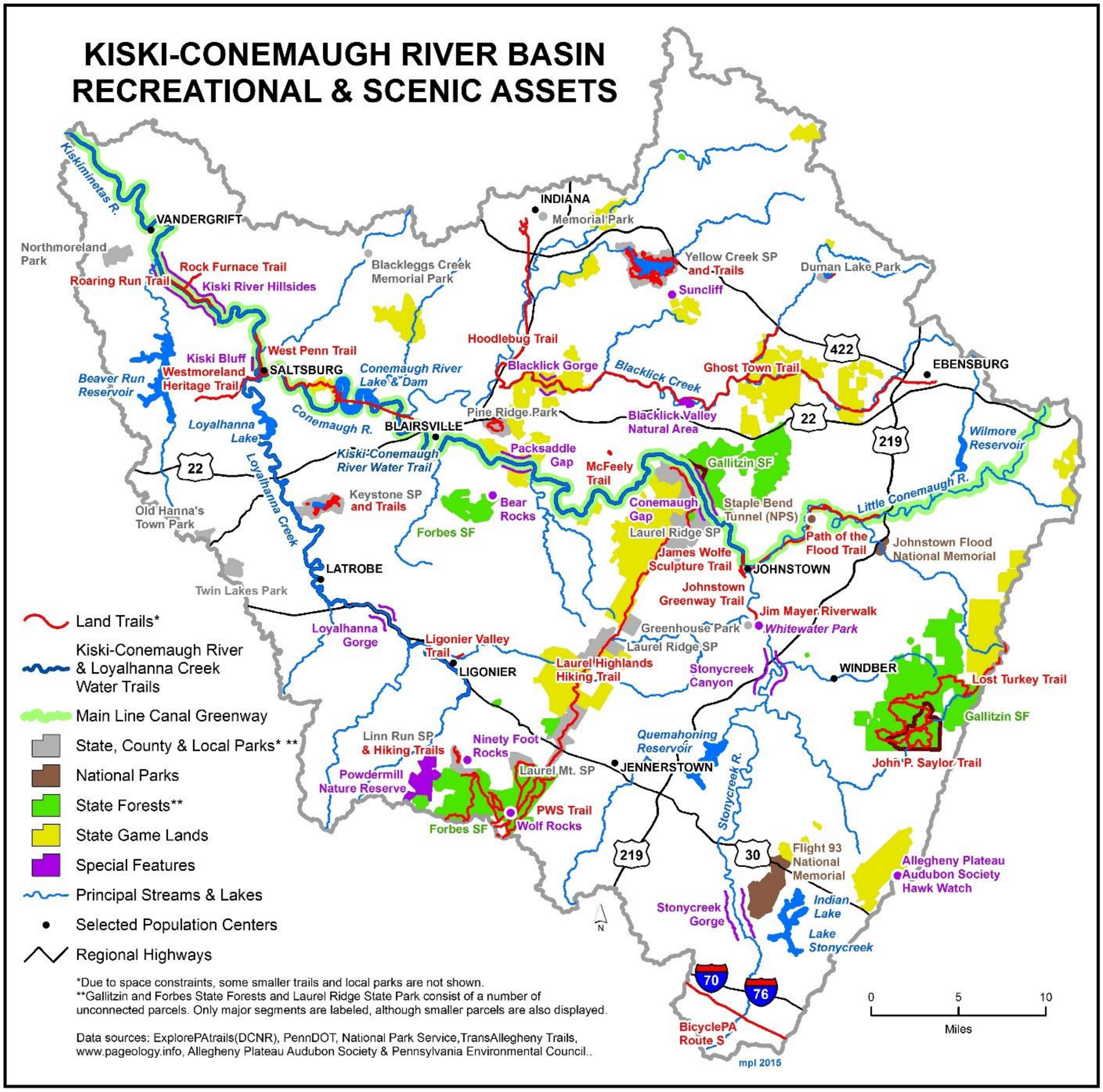


Figure 54 – Map of the Basin's key recreational and scenic assets

Back to Table of Contents

Land Trails

Recreational trails have become a mainstay in southwestern Pennsylvania and a source of health, economic, and conservation benefits to the region. Whether water trails for kayakers and canoers or trails for hiking and biking, there are many miles of trails developed throughout the Kiski Basin that provide unprecedented access to the outdoors with the potential to fill gaps and increase connectivity throughout the region.

Several trail operator groups joined forces after working to implement the 2011 Rails-to-Trails Conservancy Greenway Bike Sojourn. A website and map was created representing 13 trails within what is now called the Trans Allegheny Trails.

Some of the trails in the Kiski-Conemaugh River Basin are listed below.

- The **Ghost Town Trail** is 46 miles with a few branches and spurs, running through the Blacklick Creek Valley from Ebensburg to Blacklick. Portions are owned by the Cambria County Conservation and Recreation Authority (CCCRA) and portions are owned and maintained by Indiana County Parks and Trails.
- The **Jim Mayer Riverswalk** is a 3.1 mile urban trail along the Stonycreek River, from Johnstown's east end to suburban Riverside. It is owned and operated by the CCCRA.
- Indiana Parks and Trails' **Hoodlebug Trail** is 11 miles between Indiana and (almost) Blairsville.
- The **Ligonier Valley Trail and Bikeway** is a one-mile trail from Peoples Road to Weller Athletic Field and Recreation Park in Ligonier that follows the former Lincoln Highway linking Fort Ligonier, the Compass Inn, the Ligonier Valley Railroad Museum, and the Southern Alleghenies Art Museum (Rails-to-Trails Conservancy). It is owned and operated by the Ligonier Township Recreation Board.
- The **Loyalhanna Nature Trail** is a one-mile loop trail that parallels the delayed harvest section of Loyalhanna Creek, which, as of 2016, is a PA Fish and Boat Commission Keystone Select Stocked Trout Water. It is owned and maintained by the Loyalhanna Watershed Association.
- The **Path of The Flood Trail** is 8 miles along the Little Conemaugh River from South Fork to just outside of Johnstown. It is bisected by the Staple Bend Tunnel Trail and is owned and operated by the CCCRA. A share-the-road route connects it to the Johnstown Flood Museum in downtown Johnstown, but a new route is being developed with a one-mile off-road trail.
- The Roaring Run Watershed Association's Roaring Run Recreation Area includes the five-mile **Roaring Run Trail**, a rail trail along the Kiski River, the 1.5 mile **Rock Furnace** spur trail, and nearly 20 miles of hiking and biking trails.
- The 1.5 mile **Kiski Riverfront Trail** connects Apollo to the Roaring Run Trail, offering access to town amenities and an access area in North Apollo.

- The **Staple Bend Tunnel Trail** is a two-mile stretch from Mineral Point to the United States' first railroad tunnel, which is owned by the National Park Service.
- The **West Penn Trail** is 15 miles from just outside of Blairsville, through and just past Saltsburg. It showcases the Conemaugh River Lake and the Conemaugh and Kiskiminetas Rivers. The West Penn Trail is owned and maintained by the Conemaugh Valley Conservancy.
- The West Penn Trail connects with the 15-mile **Westmoreland Heritage Trail** at Saltsburg and currently ends at nine miles in Delmont with a small gap to another six miles from Export to Trafford. Portions of the Heritage Trail hug Loyalhanna Creek. It is owned by Westmoreland County Parks and Recreation.
- The **Quemahoning Lake Mountain Bike Trail** is currently under development and will encircle the Quemahoning Reservoir with a 17-mile trail.

Figure 55 – Volunteers are working to improve and extend the Incline Plane Trail in Johnstown

The Kiski-Conemaugh River Basin is an excellent destination for those who enjoy mountain biking. As examples, Highland Park in suburban Johnstown has 13 miles of mountain bike trails and there are more than 50 miles of mountain bike trails in the Laurel Mountain section of Forbes State Forest. There are over 12 miles of mountain bike trails in the Gallitzin State Forest and over 10 miles of them in the Roaring Run Recreation Area (Clemenson).

Efforts are underway to close the gaps between trails. Those efforts are monitored and updated somewhat regularly by Pennsylvania Department of Conservation and Natural Resources (DCNR) on their website. Priority trail gaps in the Kiski-Conemaugh Basin are listed below by the numbers associated with DCNR's analysis.

- # 162 – In addition to working to connect the Path of the Flood Trail into the City of Johnstown, an urban pathways system throughout the heritage-rich City is being planned. Path of the Flood extensions through the Woodvale neighborhood and East Conemaugh Borough have been completed or are underway, managed by the Cambria County Conservation and Recreation Authority and the Conemaugh Valley Conservancy.
- # 55 – The Conemaugh Valley Conservancy completed a feasibility study for developing a trail through the seven-mile Conemaugh Gap and has acquired property at the Route 56 entrance to Johnstown from the Conemaugh Gap. CVC did considerable work with partners to demolish a dilapidated building at the site, mitigate invasive plant species, and create a "Gateway Park." CVC built a short, hilly trail from the West End of Johnstown to the Conemaugh Gap Gateway Park. Trail development from the Park through the Conemaugh Gap to Seward is on hold due to objections from the Laurel Ridge State Park.
- # 54 – Due to landscape and railroad property challenges on both sides of the Conemaugh River, a trail through the 15-mile Packsaddle Gap is not likely feasible. Alternatives to connect from Seward to the Ghost Town Trail are being considered.
- # 159 – A bicycle-pedestrian bridge over Route 22 at the Route 119 interchanged is slated for possible construction in 2018, providing partial connection between the Hoodlebug/Ghost Town Trails and Blairsville's Riverfront Trail.
- # 160 – A 3-4 mile temporary share-the-road option will be used from the proposed bike-ped bridge (see #159) into Blairsville Borough. The proposed permanent route involves private property and some share-road.
- # 278 – The two-mile gap between the West Penn Trail and the Blairsville Riverfront Trail is challenged by landscape and railroad property.
- # 53 – A 4-5 mile gap between West Penn and Roaring Run Trails involves private property, abandoned railroad property, a river crossing over an existing PennDOT bridge, and landscape challenges.
- # 51 – An 8-mile share the road route on Route 66 is proposed to connect the Roaring Run Trail and Apollo's Kiski River Trail to Leechburg.

Figure 56 – A West Penn Trail marker

The Pennsylvania State Snowmobile Association and others also identified trail gaps that support their sport, including:

- # 99 – A route between Laurel Mountain State Park and Route 30.
- # 72 – Linkages between existing trails in Laurel Ridge and Laurel Hill State Parks and Forbes State Forest.
- # 202 – Snowmobilers have to travel along a township road to avoid a dead-end trail since the PA Game Commission eliminated a portion of the Babcock Snowmobile Trail at Gallitzin State Forest that runs through their property.

In 2008, the Loyalhanna Watershed Association explored the possibility of a walking trail along Loyalhanna Creek linking Latrobe and New Alexandria, but a necessary multi-million dollar bridge crossing the Loyalhanna Creek near New Alexandria tabled that, so the extension from Saltsburg to Latrobe, which was a priority 2 recommendation in the 1999 Plan, remains incomplete (Frye). In 2017, an alternative route for a section from Keystone State Park to New Alexandria was identified and a grant application for this work is pending (Clemenson).

9/11 Trail

Formed in 2004, the September 11th National Memorial Trail Alliance seeks to establish a memorial trail that will link the World Trade Center in New York, NY, the Pentagon in Washington, DC, and the Flight 93 National Memorial in Shanksville, PA. The proposed trail would generally run north to south in the eastern part of the Kiski-Conemaugh River Basin and connect with the Jim Mayer and Path of the Flood Trails in Johnstown. This incorporation of the September 11th National Memorial Trail into the existing trail network is part of the City of Johnstown's *Urban Connectivity Study*, which seeks to connect trails, add dedicated bicycle lanes, streetscape, and make for safe transportation corridors.

Back to Table of Contents

Water Trails

Water trails are recreational waterways between defined points suitable for kayaks, canoes, and sometimes small, motorized watercraft. They promote stewardship of natural resources and encourage low-impact recreational use, while highlighting natural and cultural points of interest.

As mentioned in the River Town section on page 97, in 2010, the Pittsburgh-to-Harrisburg Main Line Canal Greenway™ updated the Kiski-Conemaugh Water Trail map that was initially published in 2003 or 2004, and in 2013, the Loyalhanna Watershed Association sponsored the publication of the Loyalhanna Creek Water Trail map.

The 86-mile Kiski-Conemaugh Water Trail flows from the southern edge of Johnstown, through the Conemaugh and Packsaddle Gaps, to the mouth of the Kiskiminetas River near Freeport, offering several Class II-III whitewater rapids along the way. An interactive map, as well as detailed, printable maps of the water trail and key communities may be found online.

Figure 57 – Participants in the CVC's Stony-Kiski-Conemaugh River Sojourn paddle the Conemaugh River through the Conemaugh Gap. Note the end of the flood walls

The 36-mile Loyalhanna Water Trail begins in Ligonier and flows past Idlewild Park and Soak Zone and through Loyalhanna Gorge to its mouth in Saltsburg. A few Class I-II whitewater rapids dot this waterway.

Published in partnership with the PA Fish and Boat Commission, the PA Department of Conservation and Natural Resources, the U.S. Army Corps of Engineers, and the Pennsylvania Environmental Council, water trail maps provide information about access points, parking, water hazards, and features along the select waterway. Both water trails in the Kiski Basin are influenced by water level; therefore, peak use is in the spring and early summer, when water flows are highest.

Many more waterways that are not official Pennsylvania Water Trails are paddled throughout the year. The Stonycreek River Canyon in Somerset County offers Class III-IV whitewater between the villages of Foustwell and Carpenters Park. With names like "Test Tube Hole," "Dislocation," and "The Wall," boaters can play for hours in the five miles of rapids. River users must portage around Border Dam, a backup water supply owned by the Cambria Somerset Authority (CSA). American Rivers has expressed interest in working with the CSA to conduct a feasibility study here to see if a river-friendly water intake could meet CSA's water supply needs and provide free-flowing access for recreation.

Below Carpenter's Park, boaters can enjoy Class II-III whitewater and end at Greenhouse / White Water Park. White Water Park was constructed in 2007 and was Pennsylvania's first set of constructed rapids. The Benscreek Canoe Club organizes the annual Stonycreek Rendezvous, a weekend of paddling fun, headquartered at White Water Park, that attracts hundreds of boaters from at least 12 states. In 2017, enhancements were made to both White Water and Greenhouse Parks.

Figure 58 – One of many kayakers enjoys White Water Park during the Stonycreek Rendezvous

Paint Creek, which is still heavily degraded by Abandoned Mine Drainage, is notable for being the only solid Class V stream in the watershed, making it suitable for only the most experienced boaters. Paint Creek originates in Windber, PA and flows into the Stonycreek River in Carpenter's Park. Named rapids along Paint Creek include "Mousetrap," "Big Sluice," and "Momma's Crack" (BCC).

Dozens of other waterways throughout the Kiski-Conemaugh River Basin are navigable and used for recreational kayaking and canoeing. At least five outfitters rent canoes, kayaks, or inner tubes for recreation: Coal Tubin' in Johnstown, River's Edge Canoe and Kayak in Leechburg, Saltsburg Canoe and Kayak Outfitters in Saltsburg, Saltsburg River and Trail in Avonmore, and Two Dam Kayak Rentals in Saltsburg.

It is difficult to track water trail users since the trail is accessed without formal entry; however, the Allegheny Ridge Corporation determined that in 2014, there were 9,000 visits and in 2015, there were 9,500 visits to the Kiski-Conemaugh Water Trail. These figures are based on three organized river events and a survey of three outfitters along the river (Hawkins).

Back to Table of Contents

River Towns

Just as engaging low-impact outdoor recreational users in environmental stewardship supports sustainable water restoration, engaging those users in community assets by interpreting heritage and promoting local businesses and services supports regional economic sustainability. Engagement starts with access, and a great deal of work has been done in the Kiski-Conemaugh River Basin to improve and promote access through mapping, land trail development, events, social media and other marketing. This kind of economic revitalization can be challenging along waterways throughout the Kiski-Conemaugh, where pollution and flooding have caused many communities to consider the river an eyesore rather than an asset; however, most communities are overcoming that negative perception and working to capitalize on their town's identity as a river town.

According to the PA Downtown Center, Nature-Based Placemaking (NBP) is the next generation of revitalization strategies. It begins in a community where a natural asset – a park, trail, river, etc. – is recognized and developed as an economic opportunity in the community. The first step in creating a nature-based place is to recognize and embrace the natural asset as a generator for economic activity. NBP is about the connection and collaboration among the focus areas of civic, tourism and business in the following ways: civic, where the focus is on education and emotion; tourism, where the focus is on hospitality and guest services; and business, where the focus is on shopping and entertainment.

In 2010, the Kiski-Conemaugh Water Trail map was updated through the Pittsburgh-to-Harrisburg Main Line Canal Greenway™. Upper (Johnstown to Blairsville) and lower (Blairsville to Freeport) sections created more room for narratives and inset maps illustrating the unique history and features of the towns along the trail. In 2013, interactive web maps and a water trail Facebook page were developed, along with similarly designed interpretive panels at access areas in Johnstown, Blairsville, Saltsburg, Avonmore, Apollo, East Vandergrift, Vandergrift, Leechburg, and Freeport. An update of the web-based maps will be completed before the 2018 paddling season and will offer mobile walking tours for each of the communities, encouraging users to spend time in these river towns after spending time on the river.

Similarly, in 2013, the Loyalhanna Watershed Association sponsored the Loyalhanna Creek Water Trail (Ligonier to Saltsburg) map and guide, which highlights natural and anthropogenic features along the way.

As a result of the 2012 *Kiski Valley Greenway, Trails, and Downtown Connectivity Study*, information kiosks were constructed at river and trail access points in Saltsburg, Avonmore, East Vandergrift, Leechburg, and Freeport. River/trail town maps were designed, fabricated and installed in the kiosks, along with additional interpretive information, to direct water trail users to each town's businesses and points of interest. Heritage tour guides for Blairsville and Saltsburg now include nearby river and trail opportunities in addition to describing historic homes.

Also stemming from the *Kiski Valley Greenway* plan was a need to create distinctive gateway enhancements to communities along the river. All of the communities agreed they wanted signs that thematically connected them to nearby natural resources, to their heritage, and to each other. Stone arch gateway signs were designed to meet that thematic need, referencing the curved culverts associated with the Main Line Canal towpath. Communities agreed to identify as "A Greenway Community" because it represented all parts of their community identities – historic, recreational, and natural assets. The term would let people who knew what a greenway was know exactly what kind of place they were entering, and for others, it would create a "Google" moment. Gateway signs were installed in Avonmore and Leechburg, and public art projects were completed in Vandergrift and Apollo.

Figure 59 – A sign indicates Leechburg is a Greenway Community. Photo courtesy the Pittsburgh-to-Harrisburg Main Line Canal Greenway™

Annual events celebrate the river, reminding local citizens that the river is an asset and showcasing that asset to visitors from neighboring communities and states.

- The Stonycreek Rendezvous is hosted by Benscreek Canoe Club, drawing hundreds of experienced boaters from several states to Greenhouse Park near Johnstown to enjoy white water and other river activities for a weekend in May.
- The Alle-Kiski-Connie River Sojourn has been organized by several partners for nearly 20 years, most recently hosted by the Armstrong County Educational Trust, and typically showcases different sections of these rivers every year.
- The Stony-Kiski-Conemaugh Rivers Sojourn is coordinated every first weekend in June by the Conemaugh Valley Conservancy, traveling about 45 river miles from Johnstown to Apollo over four days.
- The Loyalhanna Sojourn is a nine-mile paddle from Latrobe to New Alexandria held the third Saturday in May and coordinated by the Loyalhanna Watershed Association.
- The West Penn Trail Triathlon, also coordinated by the Conemaugh Valley Conservancy, is a boat-bike-run event, based in Saltsburg, scheduled on the second Saturday in October.

Figures 60 and 61 – West Penn Trail Triathlon transition zones. Photos courtesy the Pittsburgh-to-Harrisburg Main Line Canal Greenway™

Community revitalization groups exist throughout the corridor, complementing the efforts of municipalities to capitalize on their nearby access to outdoor recreation opportunities. To highlight the impact of just a few:

- Lift Johnstown is a dynamic, collaborative partnership working to re-invent Johnstown as a vibrant small city. The organization works with businesses, local government and citizenry to coalesce volunteer opportunities, activities, and events and enhance visioning for the future of the city.

- The Blairsville Community Development Authority (BCDA) was created to administer grant funds received by the Borough and to assist with community revitalization efforts. BCDA has initiated a number of projects to clean and green the community and partnered with the Indiana County Chamber of Commerce to develop a "Picnic and Paddle" event.

- A Saltsburg Area Special Projects Group updated river and trail access signage and designed and installed recreation and heritage-oriented avenue banners. A Visit Saltsburg Community Alliance was initiated in 2016 to build on Saltsburg's tourism-oriented website and initiated a Saltsburg River, Trail, and Park Celebration event with the Indiana County Tourist Bureau.

- Throughout the Kiski Valley, groups like Avonmore Area Community Association, Apollo Area Business Association, Vandergrift Improvement Project, Leechburg Area Community Association, and Freeport Renaissance Association, have incorporated river and trail opportunities into their efforts to promote and enhance their communities. The Avonmore group used a River/Trail Town map developed by the Main Line Canal Greenway to create a tourism brochure. Apollo built two gateway signs showcasing the town's location along the river. Vandergrift's Farmer's Market is a celebration of music and local food throughout the summer. Leechburg installed three information kiosks from their boat launch to their river front park. "September by the River" is celebrated every year in Freeport.

These are just examples. Each of these groups and others have and continue to do much more to help their towns reclaim an identity as a river town.

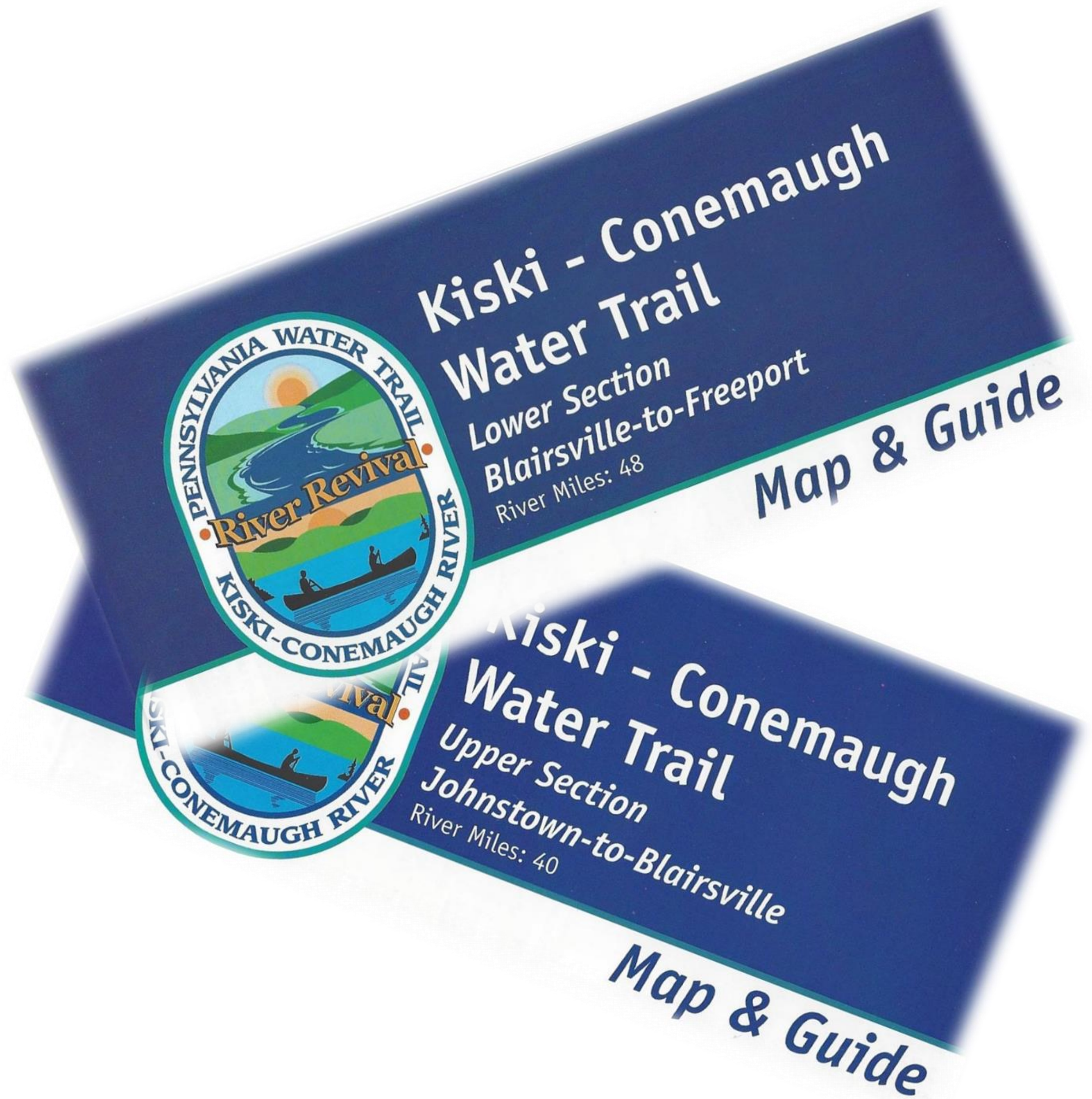


Figure 62 – The Kiski-Conemaugh Water Trail Map & Guide. There are separate guides for the upper and lower sections

Back to Table of Contents

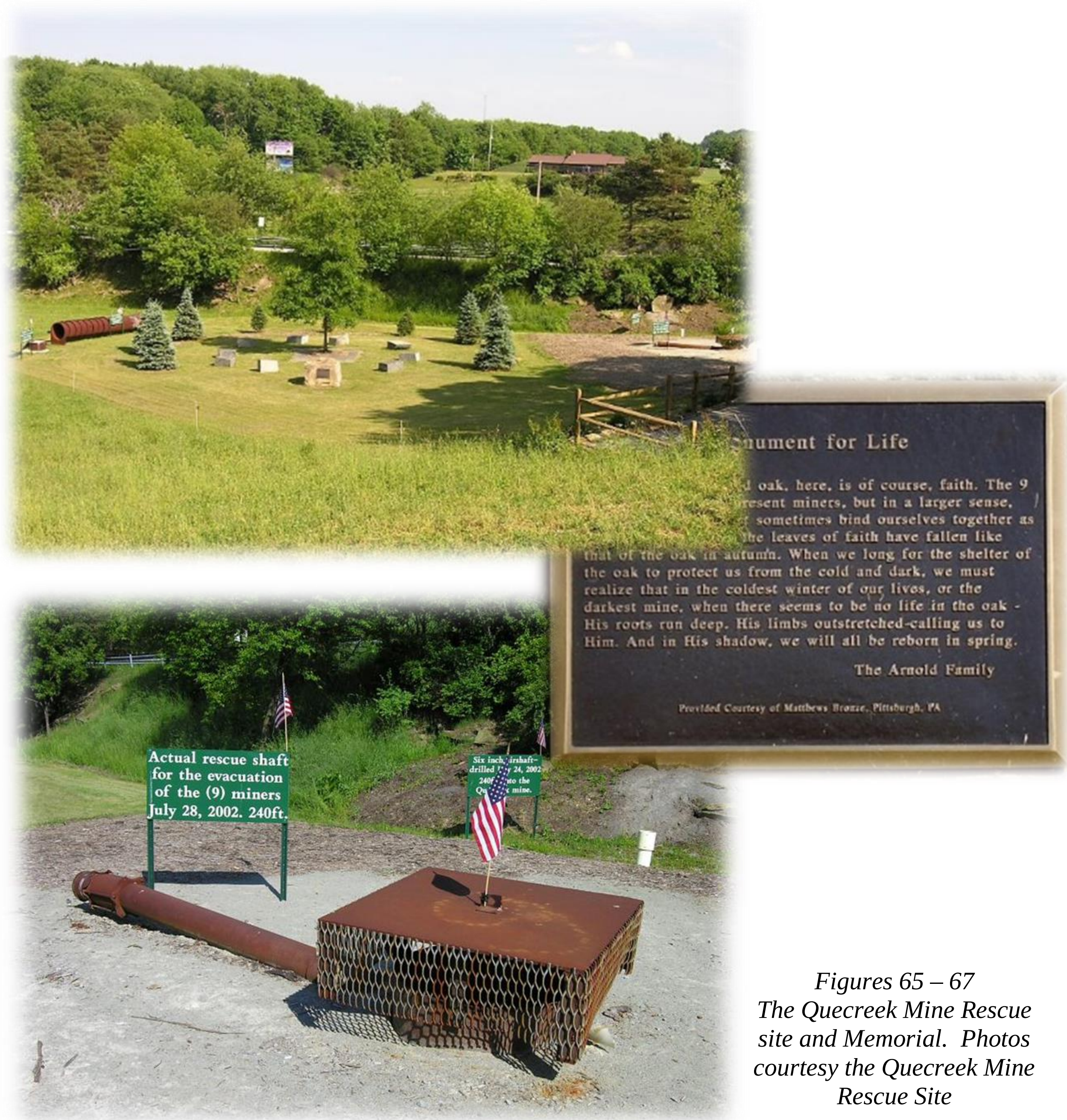
New Landmarks of Significance

The terrorist attacks on September 11, 2001 brought the tragedy directly to the Kiski-Conemaugh River Basin with the crash of United Airlines Flight 93 on a reclaimed strip mine in Shanksville, PA. Flight 93 was the fourth plane involved in the terrorist attacks on 9/11. Believed to be headed to the U.S. Capitol Building, 7 crew and 33 passengers recognized their fate and bravely took action to thwart the terrorists' efforts and fought to take control of the cockpit, which forced the terrorists to down the plane before it reached its intended target. To memorialize these men and women, the strip mine and surrounding areas were purchased to create the Flight 93 National Memorial, which is managed by the National Park Service. A permanent memorial, which is still under construction, has replaced the chain linked fence and couple bales of hay that served as a temporary, spontaneous memorial for several years. In 2015, a visitor and learning center opened that displays artifacts, personal items, and tributes shared over the years. Over 385,123 people visited the Flight 93 National Memorial in 2016 (Siwy).

Figures 63 – The Wall of Names in the foreground with the Visitor Center Complex and Flight Path Walls in the background

Figure 64 – The impact site and debris field with a sandstone boulder (circled) marking Flight 93's crash site

Less than a year after the 9/11 tragedy and less than 15 miles from the Flight 93 crash site, nine coal miners were trapped 240 feet underground in a four-foot high chamber for 78 hours (3¼ days) when water from an adjacent mine breached a wall and flooded the Que Creek Mine in Somerset County. The nation watched as a six-inch air hole was drilled to provide oxygen to the miners and pressurize the chamber while water was pumped out and then celebrated as a 22-inch-wide yellow cage was lowered in a miraculously placed 24-inch hole to rescue the miners one by one on July 28, 2002. The “9 for 9” mission was successful and the Quecreek Mine was dedicated as a state historic site in 2006 (CNN). The Quecreek Mine Rescue Foundation developed and maintains the Quecreek Mine Rescue Memorial and Monument for Life, which people may visit.



Figures 65 – 67
The Quecreek Mine Rescue site and Memorial. Photos courtesy the Quecreek Mine Rescue Site

Back to Table of Contents

Citizen and Governmental Engagement

Watershed Associations

When the 1999 Plan was under development, only five watershed organizations existed in the Kiski Basin. An influx of money from the Growing Greener program in 1999 under then Pennsylvania Governor Tom Ridge's administration encouraged and supported the creation of smaller watershed organizations to address AMD and other NPS pollution in their area. Over the last 18 years, seven additional watershed organizations formed within the Kiski-Conemaugh River Basin, as shown in Figure 68. The Greater Johnstown Watershed Association is currently defunct, while the Little Conemaugh Watershed Association operates primarily through the Cambria County Conservation District. For more on watershed associations within the Kiski-Conemaugh River Basin, please see pages 337–382.

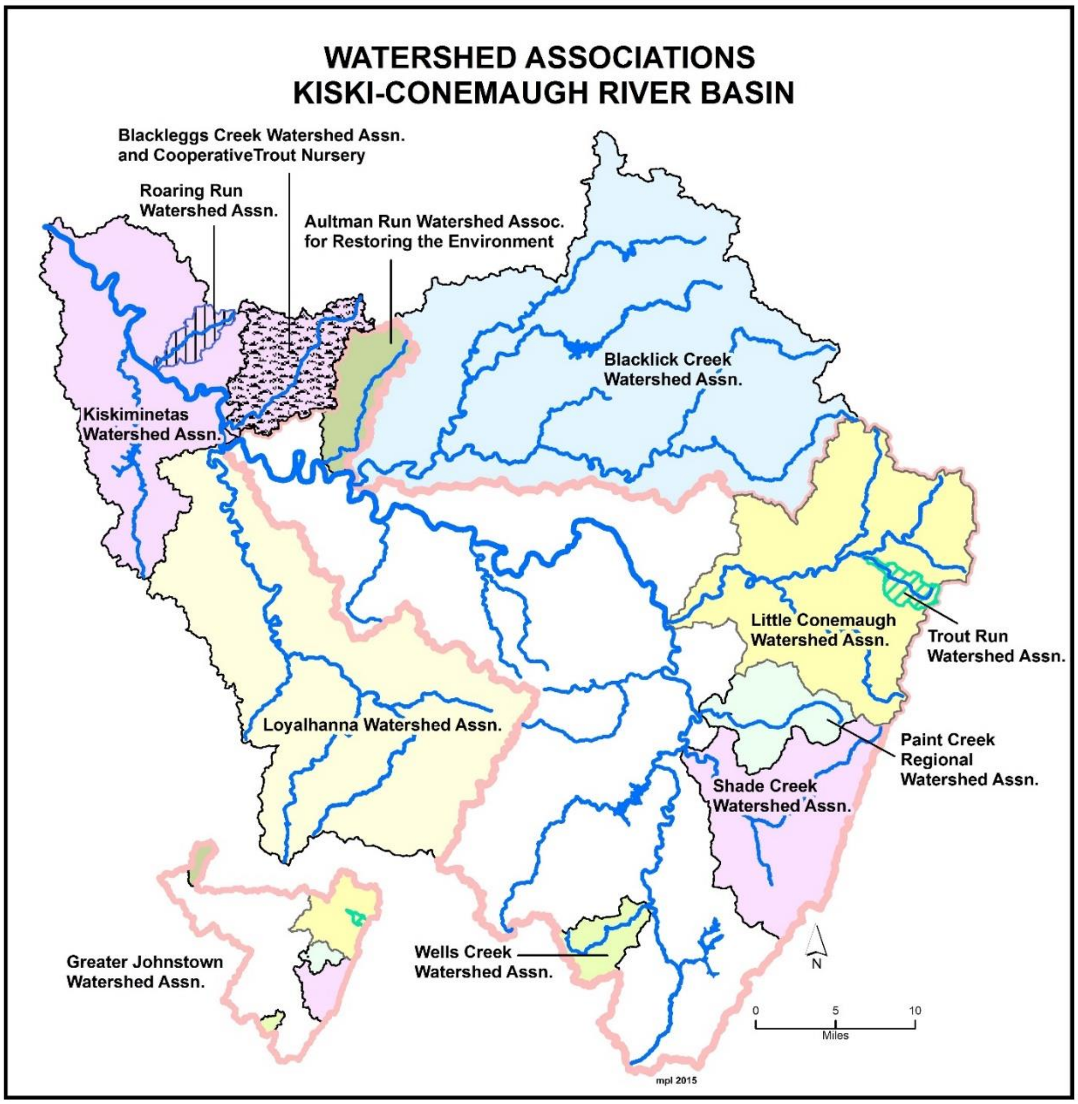


Figure 68 – Map of past and current watershed associations' geographic focus

Monitoring

The 1999 Plan indicated that ongoing monitoring programs were not extensive; however, with the influx of watershed associations and volunteers, monitoring efforts have improved. The Conemaugh Valley Conservancy's Kiski-Conemaugh Stream Team was formed as a result of the 1999 Plan and currently coordinates over four dozen volunteers who collect water samples according to PA DEP protocol from over 260 sites throughout the Kiski-Conemaugh River Basin. Many of the sites are located at the 45 AMD treatment systems the Stream Team routinely monitors, while others are at discharges that may soon be treated or they are of streams and rivers. The data acquired are used by the state, conservation districts, watershed groups, engineering firms, schools, and others to design and construct treatment systems, evaluate existing ones, or rehabilitate those that are failing. Stream Team data are stored in the PA DEP's Sampling Information System (SIS). AMD system data are also available on Datashed, an online repository of AMD treatment system related data, while other data are available from the Stream Team upon request.

Figure 69 – Stream Team volunteers, Alex and Nancy Lezark, collect a water sample from the Kolb AMD treatment system

The Loyalhanna Watershed Association also works with the state to collect and analyze water samples obtained from AMD treatment systems, while the Wells Creek Watershed Association uses funds raised throughout the year to have samples analyzed by a private company.

The Indiana County chapter of the Pennsylvania Senior Environment Corps (PASEC) utilizes volunteers over the age of 55 to monitor waterways within its political boundaries. PASEC, which is overseen by Nature Abounds, is expanding into Cambria, Somerset and Westmoreland Counties.

In 2009, spurred by the increasing development of the Marcellus Shale gas industry, the Somerset Conservation District and partners initiated a Data Logger Program that utilized in-stream data loggers to measure a stream's temperature, conductivity and level every 15 minutes, 24 hours a day. The Kiski-Conemaugh Stream Team expanded this program throughout the Kiski-Conemaugh River Basin and elsewhere in 2011. The Cambria County Conservation District, Evergreen Conservancy, and Loyalhanna Watershed Association also now maintain a Data Logger Program, while other organizations, like the Armstrong Conservation District, partner with established programs.

The Data Logger Program was designed to assess waters on which little water quality data existed and that could be receiving waters from shale-gas development. It was also meant to uncover historical pollution sources, record pollution episodes, direct regulatory authorities' limited resources to areas of concern, assess stream designation, and guide future restoration projects. It was designed to rely on technology and less on personnel, thereby maximizing volunteer and employee time while minimizing hours spent in the field, mileage reimbursement, carbon emissions, and the costs of chemical analysis.

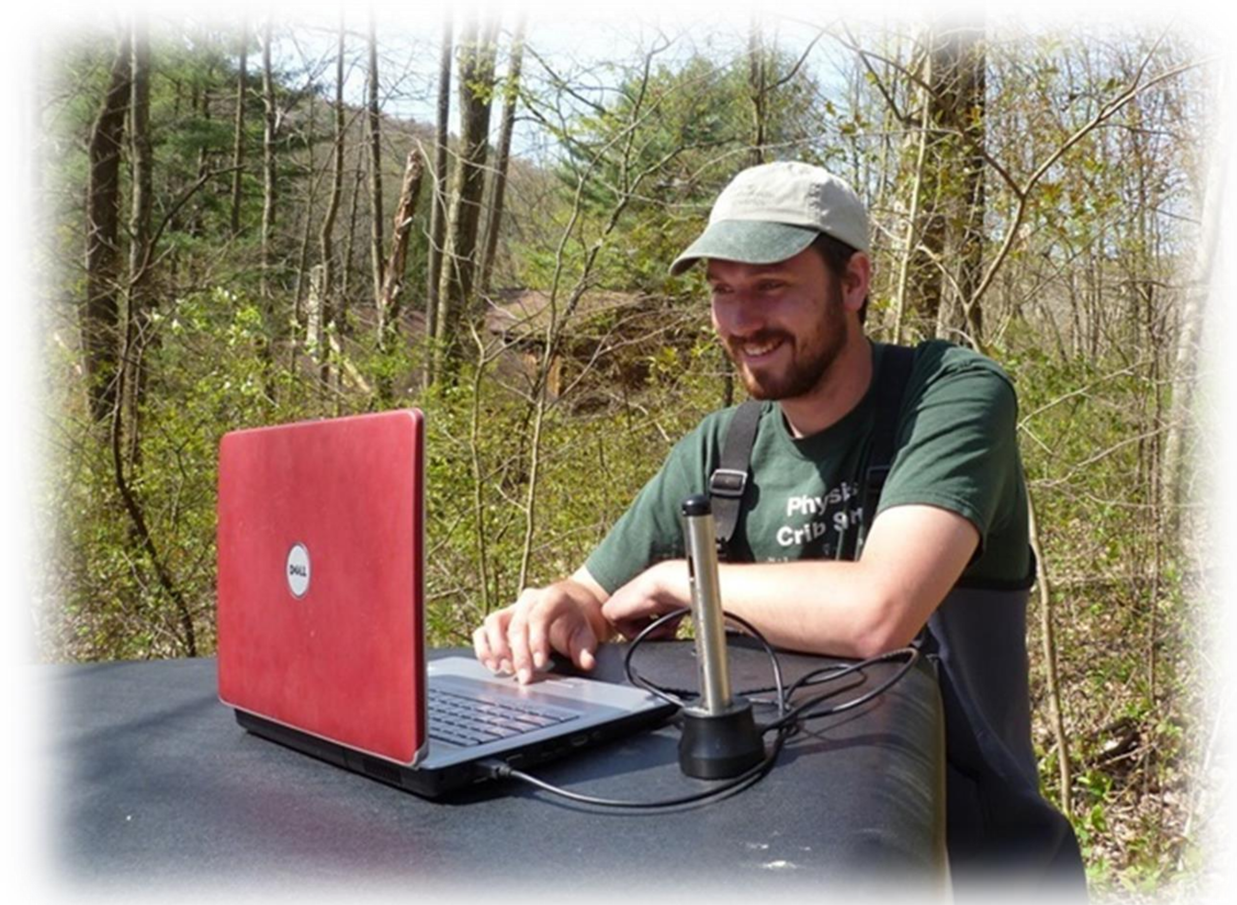


Figure 70 – Armstrong Conservation District AmeriCorps, Will Thomas, downloads a data logger

Many organizations incorporate biological surveys into their monitoring programs. Some examine the macroinvertebrate and fish communities, while others focus on special species like the hellbender. As part of this project, surveys of fish and macroinvertebrates were completed with most of the results available in Appendix 4 and 5.

Figure 71 – A dragonfly nymph

State and federal agencies monitor and survey water quality, water quantity, wildlife populations, climate change, and more. As an example, the PA Fish and Boat Commission (PFBC) routinely completes fish surveys on waters in the Commonwealth; however, in 2010, the PFBC developed its Unassessed Waters Initiative to survey headwater streams that were never monitored and that were vulnerable to human encroachment and/or shale gas development. Between 2010 and 2015, PFBC and its program partners surveyed 4,955 streams and 10,589 stream miles and added 667 streams (1,741 miles) to the Wild Trout Waters list. Wild trout were found in an average of 48% of the surveyed streams (Weber).

The United States Geological Survey (USGS) maintains 15 stream gages throughout the Kiski-Conemaugh River Basin with real-time data available on their website.

- USGS 03040000 Stonycreek River at Ferndale (discharge)
- USGS 03040050 Trout Run at Portage (gage height)
- USGS 03040100 Little Conemaugh River at Wilmore (gage height)
- USGS 03041000 Little Conemaugh River at East Conemaugh (discharge)
- USGS 03041029 Conemaugh River at Minersville (discharge)
- USGS 03041500 Conemaugh River at Seward (discharge & water temperature)
- USGS 03042000 Blacklick Creek at Josephine (discharge & water temperature)
- USGS 03042280 Yellow Creek near Homer City (discharge)
- USGS 03042500 Two Lick Creek at Graceton (discharge)
- USGS 03044000 Conemaugh River at Tunnelton (discharge, water temperature, and specific conductivity)
- USGS 03044810 Linn Run at Linn Run State Park near Rector (discharge)
- USGS 03045000 Loyalhanna Creek at Kingston (discharge)
- USGS 03045010 Loyalhanna Creek at Latrobe (water temperature)
- USGS 03047000 Loyalhanna Creek at Loyalhanna Dam (discharge & water temperature)
- USGS 03048500 Kiskiminetas River at Vandergrift (discharge)

Back to Table of Contents

Climate Change

The debate over whether or not climate change is real is over. Climate change is occurring and will impact Pennsylvania Natural Diversity Index (PNDI) species and important habitats now and in the future.

Increasing stream temperatures and changing stream flows may interrupt connectivity among tributary networks and potentially cause genetic isolation of resident species. More severe weather, including longer droughts or heavier flooding can affect humans and the ecosystem. The *Pennsylvania Wildlife Action Plan* (PWAP) cites climate change studies that indicate precipitation will increase as temperatures get warmer in Pennsylvania. Figure 72 was taken from the PWAP (PGC and PFBC 3-99).

Property	**21st Century Projection**	**Confidence**
Precipitation	Increase in winter precipitation. Small-to-no increase in summer precipitation. Potential increase in heavy precipitation events.	High (for winter); lower for summer.
Snow pack	Substantial decrease in snow cover, extent, and duration.	High
Runoff	Overall increase, but mainly due to higher winter runoff. Decrease in summer runoff due to higher evapotranspiration.	Moderate
Soil moisture	Decrease in summer and fall soil moisture. Increased frequency of short and medium term soil moisture droughts.	High
Evapotranspiration	Increase in temperature throughout the year. Increase in actual evapotranspiration during spring, summer and fall.	High
Groundwater	Potential increase in recharge due to reduced frozen soil and higher winter precipitation when plants are not active and evapotranspiration is low.	Moderate
Stream temperature	Increase in stream temperature for most streams likely. Some spring-fed headwater streams less affected.	High
Floods	Potential decrease of rain-on-snow events, but more summer floods and higher flow variability	Moderate
Droughts	Increase in soil moisture drought frequency.	Moderate
Water quality	Flashier runoff, urbanization and increasing water temperatures might negatively impact water quality.	Moderate
Saltwater intrusion	Increase in saltwater intrusion (in estuaries) due to rising sea levels.	Moderate

Figure 72 – List of the Pennsylvania Wildlife Action Plan's anticipated impacts of climate change in Pennsylvania

As climate changes, migration patterns, selected breeding grounds, community composition, and dominant species will change. For example, as the climate changes and warms, forest structure will change with those, "tree species at the southern end of their range expected to be lost from Pennsylvania, whereas species at the northern edge of their range (e.g., hickories and southern pines) are anticipated to advance further northward" (PGC and PFBC 3-100). Pennsylvania could lose its aspen, birch, hemlock, and sugar maple (Beale). Additionally, Pennsylvania forests are seeing a change from less acid deposition. Cherries, which favored the acidic conditions and thrive on sulfur, are on the decline.

Laurel Hill Eastern Brook Trout surveys conducted in 1983 and 2016 document some of the effects of acid deposition and climate change in the Kiski-Conemaugh River Basin. Please see page 87 for more information.

Figure 73 – Sugar maple trees could be lost in Pennsylvania due to climate change

Back to Table of Contents

Management Units

For the purposes of this plan and data management, the Kiski-Conemaugh River Basin is broken into six Management Units:

- Stonycreek River
- Little Conemaugh River
- Blacklick Creek
- Conemaugh River
- Loyalhanna Creek
- Kiskiminetas River

These Management Units are shown in Figure 74 and are based upon the largest waterways. The 1999 Plan used five management units, combining the Little Conemaugh and Stonycreek River watersheds.

The Kiskiminetas River watershed is 216.6 square-miles or 138,624 acres in Armstrong, Westmoreland, and a bit of Indiana County. The mainstem of the Kiskiminetas River, which forms at the confluence of the Loyalhanna Creek and Conemaugh River in Saltsburg, flows 27 miles until it empties into the Allegheny River in Schenley, near Freeport.

The Conemaugh River begins in Johnstown, at the confluence of the Little Conemaugh and Stonycreek Rivers, and flows 52 miles to Saltsburg. The watershed of the Conemaugh River mainstem is 295.2 square-miles or 188,928 acres.

The 50-mile watercourse of Loyalhanna Creek is located entirely within Westmoreland County encompassing a watershed of 298.7 square-miles or 191,168 acres.

Blacklick Creek begins in Cambria County and flows through Indiana County until it joins the Conemaugh River in Blairsville. Blacklick Creek is 33 miles long, and its watershed is 418.5 square-miles or 267,840 acres.

The Little Conemaugh River is in Cambria County and flows from its headwaters, near Cresson, 30 miles to the Point in Johnstown. Its watershed is 189.9 square-miles or 121,536 acres.

Most of the Stonycreek River is in Somerset County with a small portion in Cambria County. The Stonycreek River is 46 miles long, and its watershed is 469.0 square-miles or 300,160 acres.

Figure 74 – Kiski-Conemaugh River Basin Management Units for key sub-watersheds

Back to Table of Contents

Stonycreek River Management Unit

Location

With a watershed of 469.0 square-miles, the Stonycreek River watershed is the largest of the six Management Units in the Kiski-Conemaugh River Basin. The majority of the watershed lies within Somerset County, though a small portion is in Cambria County. The *Pennsylvania State Water Plan* identifies it and the Little Conemaugh River watershed as Watershed 18E. There are seven sub-watersheds that each encompass more than 25 square-miles within the Stonycreek River Watershed, as shown in Figure 75.

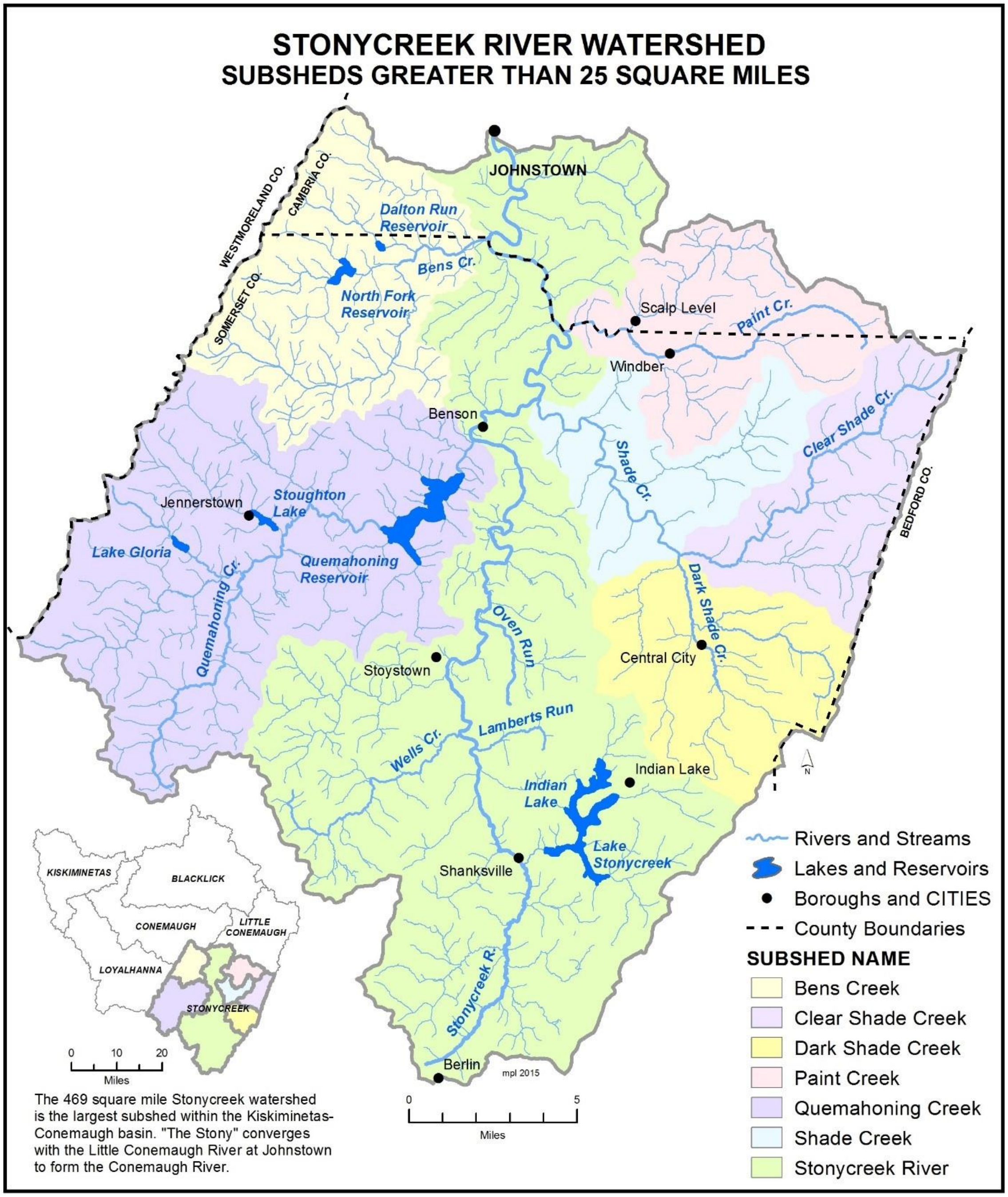


Figure 75 – The Stonycreek River watershed and primary sub-watersheds

Land Cover

Of all the Management Units, the Stonycreek River watershed had the greatest change in land cover between 1992 and 2011, although the changes were very slight. The Stonycreek River Management Unit had the greatest loss of land classified as agriculture with 2%. It tied the Little Conemaugh and Blacklick Creek Management Units for the greatest increase in developed lands. It also tied the Little Conemaugh for the greatest increase in mining with 0.9%.

Land Cover Percentage in the Stonycreek River Watershed, 1992 – 2011					
	1992	**2001**	**2006**	**2011**	**% Change**
Forest	63.8	64.0	63.7	63.1	- 0.7
Agriculture	25.2	23.2	23.2	23.2	- 2.0
Grass/Shrub	None	None	0.1	0.5	+ 0.5
Developed	8.3	9.4	9.5	9.5	+ 1.2
Mining/Barren	1.8	2.2	2.5	2.7	+ 0.9
Water	0.8	1.0	1.0	1.0	+ 0.2
Wetlands	0.0	0.0	0.1	0.1	+ 0.1

Table 16

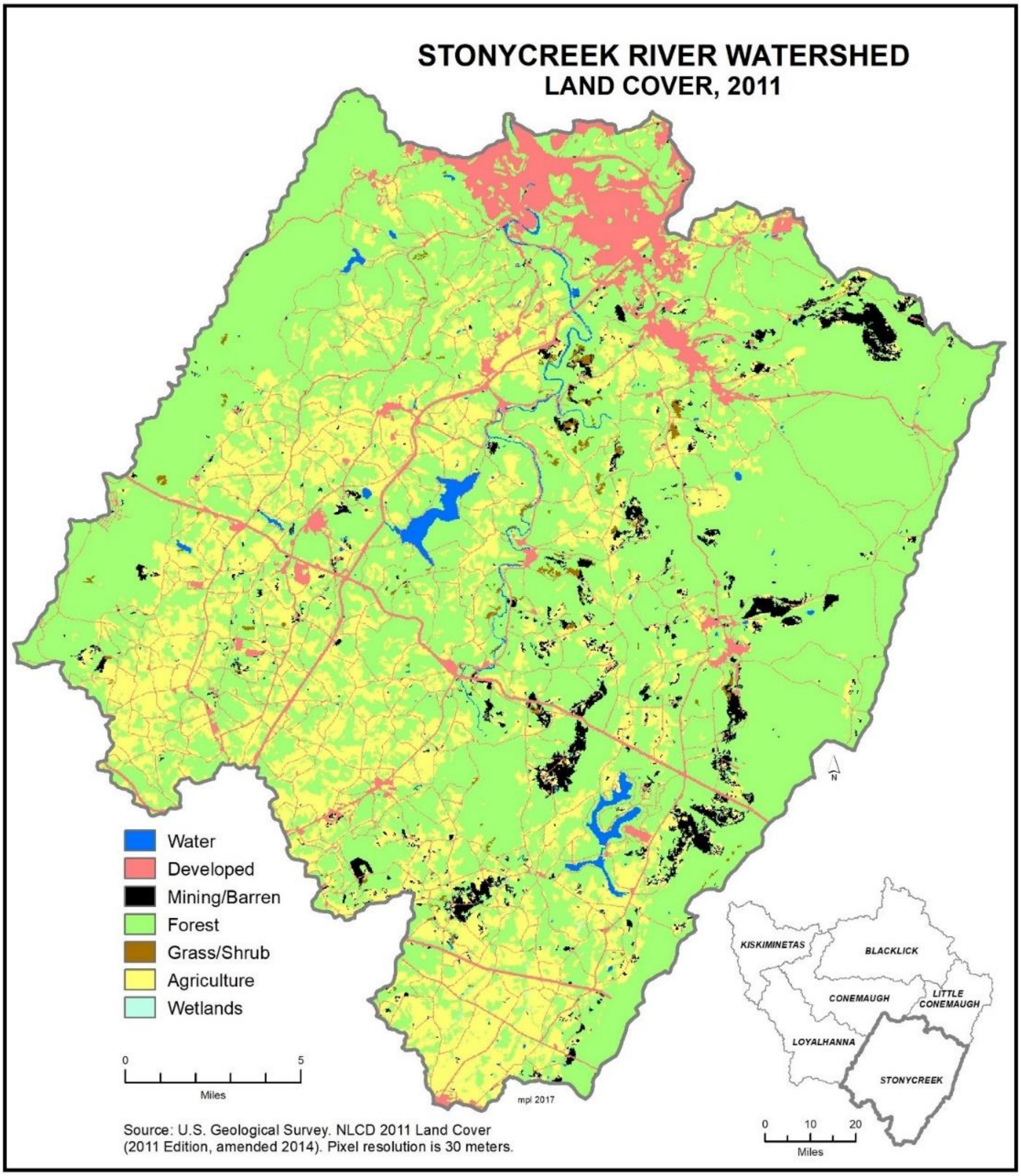


Figure 76 – Land cover of the Stonycreek River watershed in 2011

Back to Table of Contents

Exceptional Value and High Quality Streams

With the Allegheny Front and Laurel Ridge within its borders, the Stonycreek River watershed has several Exceptional Value (EV) and High Quality (HQ) streams, as designated by Pennsylvania Code Title 25 Chapter 93. The following is a list of *named* streams that are fully or partially classified as EV:

- Allwine Creek
- Clear Shade Creek
- Mill Creek
- North Fork Bens Creek
- Piney Run
- Riffle Run
- Roaring Run
- South Fork Bens Creek

The following named streams are fully or partially classified as HQ Coldwater Fishery:

- Beaverdam Creek (flows into Stonycreek River)
- Beaverdam Creek (flows into Quemahoning Creek)
- Beaverdam Run
- Clear Shade Creek
- Dalton Run
- Higgins Run
- Mill Creek
- North Fork Bens Creek
- Piney Run
- South Fork Bens Creek
- Spruce Run

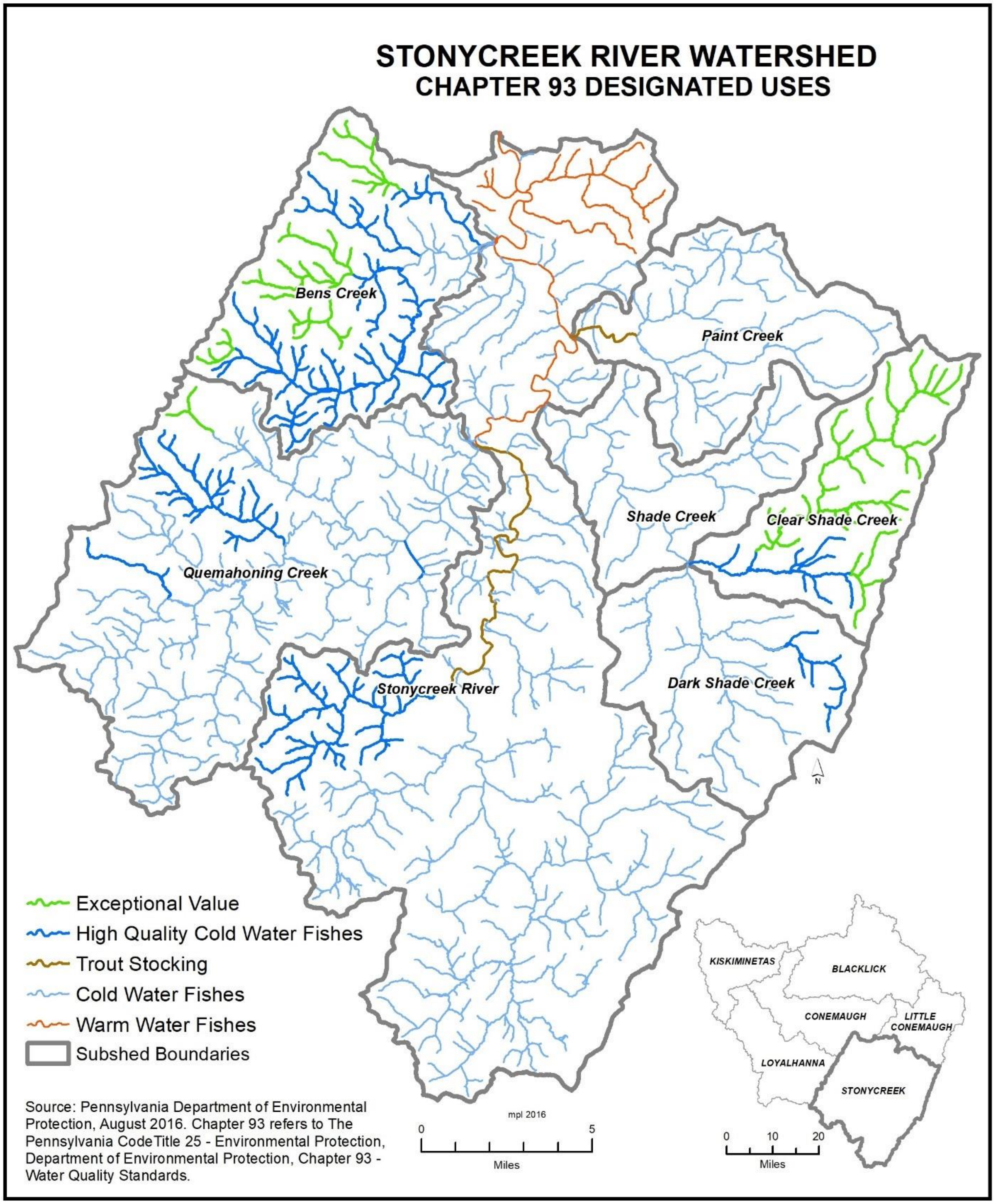


Figure 77 – Designated uses of waterways in the Stonycreek River watershed

[Back to Table of Contents]

Abandoned Mine Drainage

The Kiski-Conemaugh River Basin has often been called one of the worst AMD-impaired watersheds in Pennsylvania, and the Stonycreek River watershed has contributed towards that designation. In 1996, the United States Geological Survey (USGS) published the *Effects of Coal-Mine Discharges on the Quality of the Stonycreek River and its Tributaries, Somerset and Cambria Counties, Pennsylvania*, a document which identified 270 Abandoned Mine Discharges in the Stonycreek River watershed and assigned each a priority number for remediation. A listing of the top 10 worst discharges may be found on page 286.

The USGS study identified the Reitz #4 discharge (USGS #16) behind the Central City Fire Hall in Central City, PA as the worst discharge in the Stonycreek River watershed. With an average discharge of 1,075 gallons per minute (GPM) and a pH of 3.5, plus 74 mg/L of Total Iron and 10 mg/L of Total Aluminum, this discharge is a stream killer. The USGS identified the Loyalhanna (USGS #19) discharge as the second worst discharge in the Stonycreek River watershed. The Loyalhanna discharge is located behind the Shade-Central City Joint Authority's Sewage Treatment Plant and is about 2/3rd of a mile downstream of the Reitz #4 discharge. It discharges an average of 1,700 GPM and has a pH of 5.4. It too is laden with metals and averages 39 mg/L of Total Iron and 2 mg/L of Total Aluminum. These two discharges are part of what are commonly referred to as the "Big 4" in Central City. Along with two discharges emanating out of the Reitz #2 mine, about 4,000 GPM of mine water snakes its way from the Big 4 to Dark Shade Creek and render it largely lifeless.

For decades, there was no hope of treating these discharges due to their large volume of water and their locations in town; space would not accommodate a traditional passive treatment system, and while some companies promised remediation, nothing came to fruition. Finally, in 2016, the PA DEP's Bureau of Abandoned Mine Reclamation (BAMR) began to seriously look at the Big 4 discharges with the idea to replicate the success of active systems like the Lancashire and Rosebud St. Michael treatment facilities. Together with the U.S. Office of Surface Mining Reclamation and Enforcement, BAMR is studying the mine pools in the Dark Shade Creek watershed and collaborating with the Shade Creek Watershed Association and Conemaugh Valley Conservancy's Kiski-Conemaugh Stream Team to monitor the Big 4 discharges weekly to ensure quality data are obtained. This way an adequately sized treatment system may be constructed to negate the impact of these discharges on Dark Shade Creek, Shade Creek, and ultimately the Stonycreek River. While construction of a system is still years away, this effort has been a solid step forward.

Figures 78 – 81
from top to bottom –
Reitz #2 Upper,
Loyalhanna,
Reitz #2 Lower,
Reitz #4
discharges

Another noteworthy discharge, due to the interest surrounding it, is the Incline Plane discharge, located approximately 780 feet downstream of the Johnstown Incline Plane. While the Stonycreek River can buffer the impacts of this discharge, which is about 1100 feet from the mouth of the Stonycreek, its location in the City, its production of hydrogen sulfide, which causes a rotten-egg smell that wafts into Point Stadium, and its potential for innovative use, possibly as a source of geothermal heating and cooling for the City, make it the poster child for AMD remediation. The Incline Plane discharge produces flows between 150 and 770 GPM. A study listed the daily water treatment needs for this site at 0.75 million gallons per day (MGD). The Foundation for Pennsylvania Watersheds and its partners are exploring the feasibility of co-treating the discharge with sewage at the Johnstown Redevelopment Authority's Dornick Point sewage treatment plant. According to Brad Clemenson, Lift Johnstown Coordinator, the Johnstown Redevelopment Authority, "is planning facility upgrades to ensure that the regional wastewater treatment plant can operate well for the next 40 years. Based on the 0.75MGD calculation, there is ample capacity to accept the mine discharge. The current feasibility study is evaluating conveyance options, permit issues, potential 'exotic metals/constituents' that may impact permitting or treatment, and other issues; the study will include project-scale site testing to verify proof of concept." It is important to note that the Johnstown Redevelopment Authority has not formally approved any participation in this project, but has agreed to look at it further (Kane).

Figure 82 – The Incline Plane discharge

Water Quality

Fortunately, with the decline in industry, the enforcement of laws and regulations, and the persistence of conservationists, the Stonycreek River is now hailed as a success story. Except for a brief period in the late 1990s and early 2000s when several of the Oven Run AMD treatment systems were built, the Stonycreek River was a net acidic, heavily metal-laden stream until collective restoration efforts took hold and the Stonycreek became a net alkaline waterway in 2008/2009. In 1999, the river had many dead areas and now the entire Stonycreek River mainstem supports life. The lower reaches are impacted and limited by the metal loading from Paint and Shade Creeks, but they are not dead. The aluminum in this area is high, but not toxic due to the pH; however, the pH is at the maximum limit for non-toxic aluminum. After a pH of about 8, aluminum will re-dissolve and become toxic to aquatic life. Great care needs to be taken when rehabilitating or constructing AMD treatment systems, since large alkaline additions could cause the aluminum in the Stonycreek River to become toxic.

Acidity measures the amount of hydrogen ions that will be released during treatment. Hot Acidity is a net result that considers alkalinity (Beam). For a detailed explanation, please see Appendix 6. Figure 83 shows the Hot Acidity of the Stonycreek River at a common water monitoring point at the Eisenhower Boulevard Bridge in Riverside. Dots above the zero (0) line indicate that the sample was net acidic, while dots below zero indicate that the sample was net alkaline. Years ago, laboratories reported net alkaline water as having a Hot Acidity of zero, hence the readings of zero between 2000 and 2001. The Oven Run B, D, E, and F systems were constructed between 1995 and 2000 and temporarily generated net alkaline water in the Stonycreek. Additionally, modifications in the DEP's Lamberts Run AMD treatment after 9/11 and rehabilitation work on the Somerset County Conservancy's AMD system on Lamberts Run likely contributed to the improved water quality too; however, fluctuating treatment and system failure returned the Stonycreek River to its net acidic condition until 2008/2009 (Lichvar). Chapter 93 of Title 25 in the Pennsylvania Code requires that alkalinity measure at least 20 mg/L as Calcium Carbonate, except where natural conditions are less, and the Stonycreek has been surpassing that criteria since 2009, as shown in Figure 84. A few undesirable results were reported in 2015, which was likely from the Oven Run E system being offline.

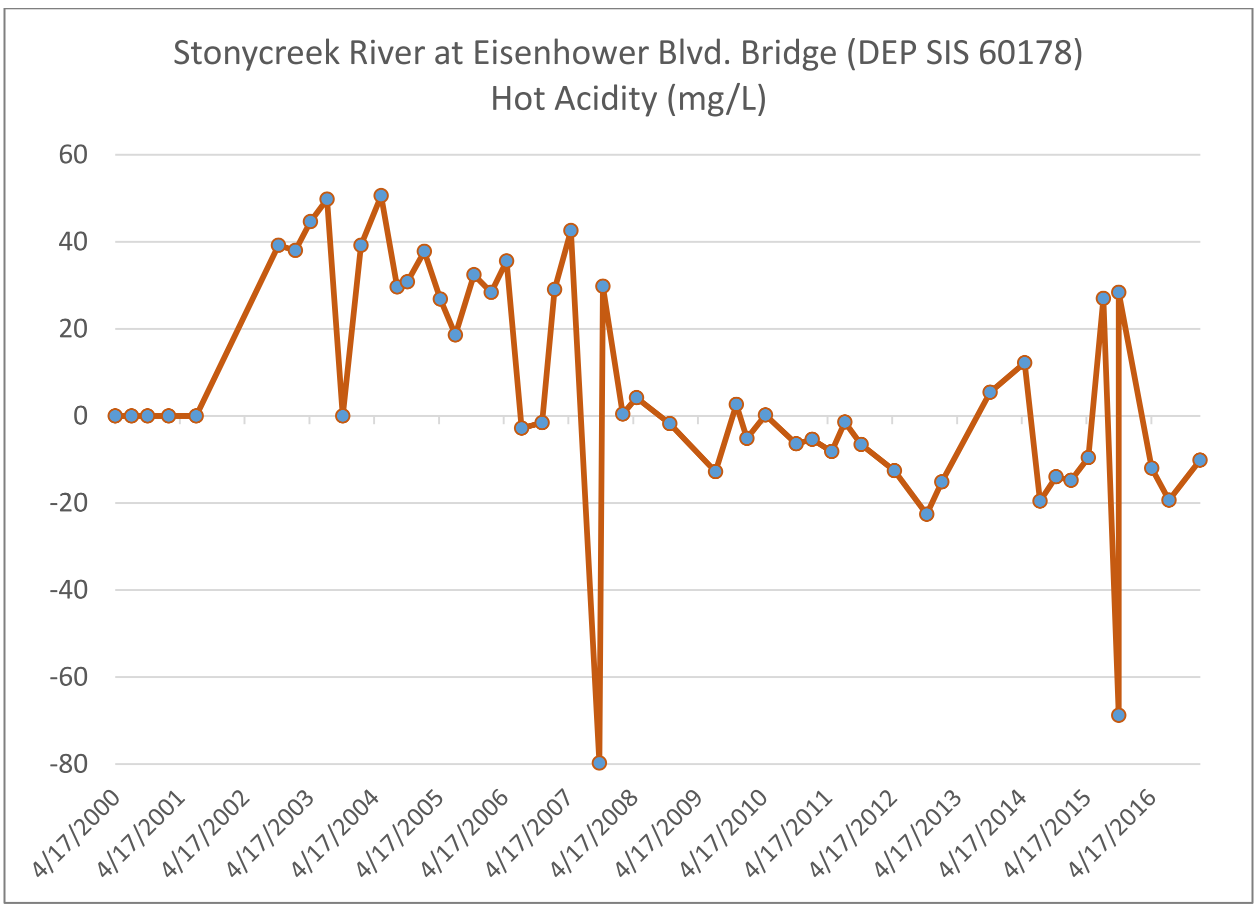


Figure 83 – Graph depicting Acidity levels in the Stonycreek River at the Eisenhower Bridge, 2000-2016. Figures at or below zero indicate net alkaline water

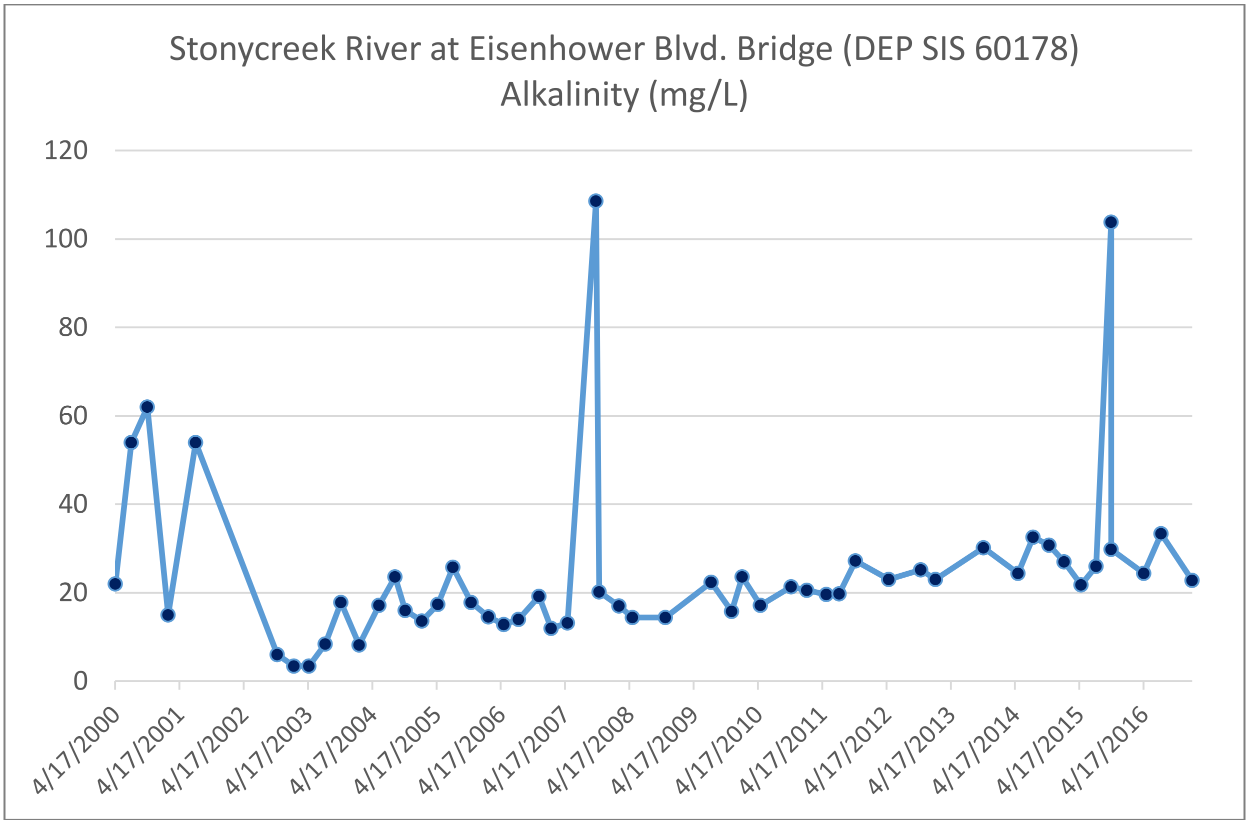


Figure 84 – Graph depicting Alkalinity levels in the Stonycreek River at the Eisenhower Bridge, 2000-2016. Alkalinity levels of 20 mg/L or more are preferred

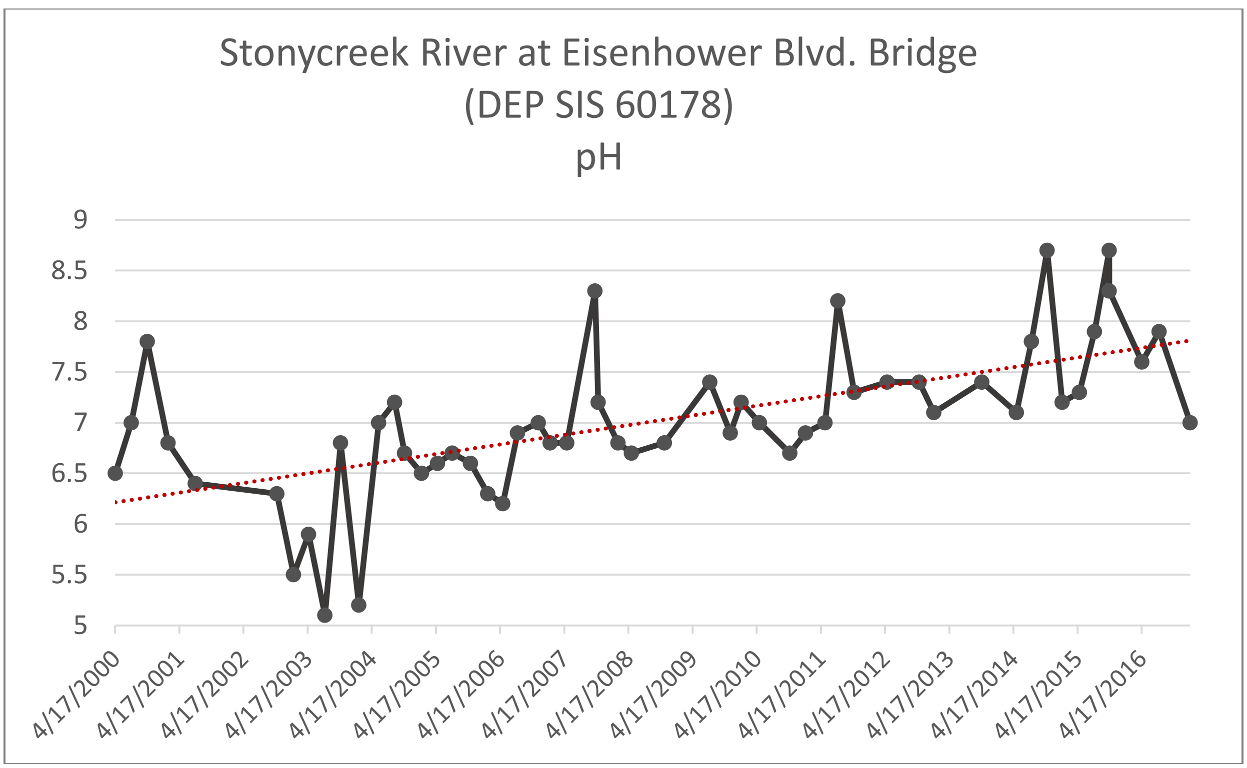


Figure 85 – Graph depicting the pH of the Stonycreek River at the Eisenhower Bridge, 2000-2016. Most aquatic life needs a pH of 5 – 8 to survive

AMD Treatment Systems

There are 23 AMD treatment systems in the Stonycreek River watershed as reflected in Figure 88. The Rock Tunnel AMD system was the first system constructed in 1994. The five Oven Run systems are often hailed as the cornerstone of restoration in the watershed, as they had a significant impact on improving the Stonycreek River's water quality. The systems in the Wells Creek watershed allowed the Wells Creek Watershed Association to stock trout in Wells Creek for the first time in over 100 years and the same type of water quality resurgence has taken place in the Quemahoning Creek watershed.

Time has made clear that passive AMD treatment systems are not truly passive; they require upkeep and maintenance and sometimes significant rehabilitation to effectively treat the water for which they were designed. For example, the Somerset Conservation District is the legally-bound entity to ensure operation and maintenance of four of the five Oven Run AMD treatment systems and is implementing a PA DEP Growing Greener funded project to rehabilitate them by the end of 2018.

Stream Restoration, Inc. is a non-profit based out of Mars, PA that focuses on restoring streams degraded by AMD. SRI is one of many organizations that can design and construct AMD treatment systems and help evaluate and maintain them. In 2012, SRI received a grant from the Foundation for Pennsylvania Watersheds to evaluate all of the AMD treatment systems in the Kiski-Conemaugh River Basin. SRI's findings may be found on the Datashed website.

Figure 86 – Oven Run Site A

Figure 87 – Oven Run Site B

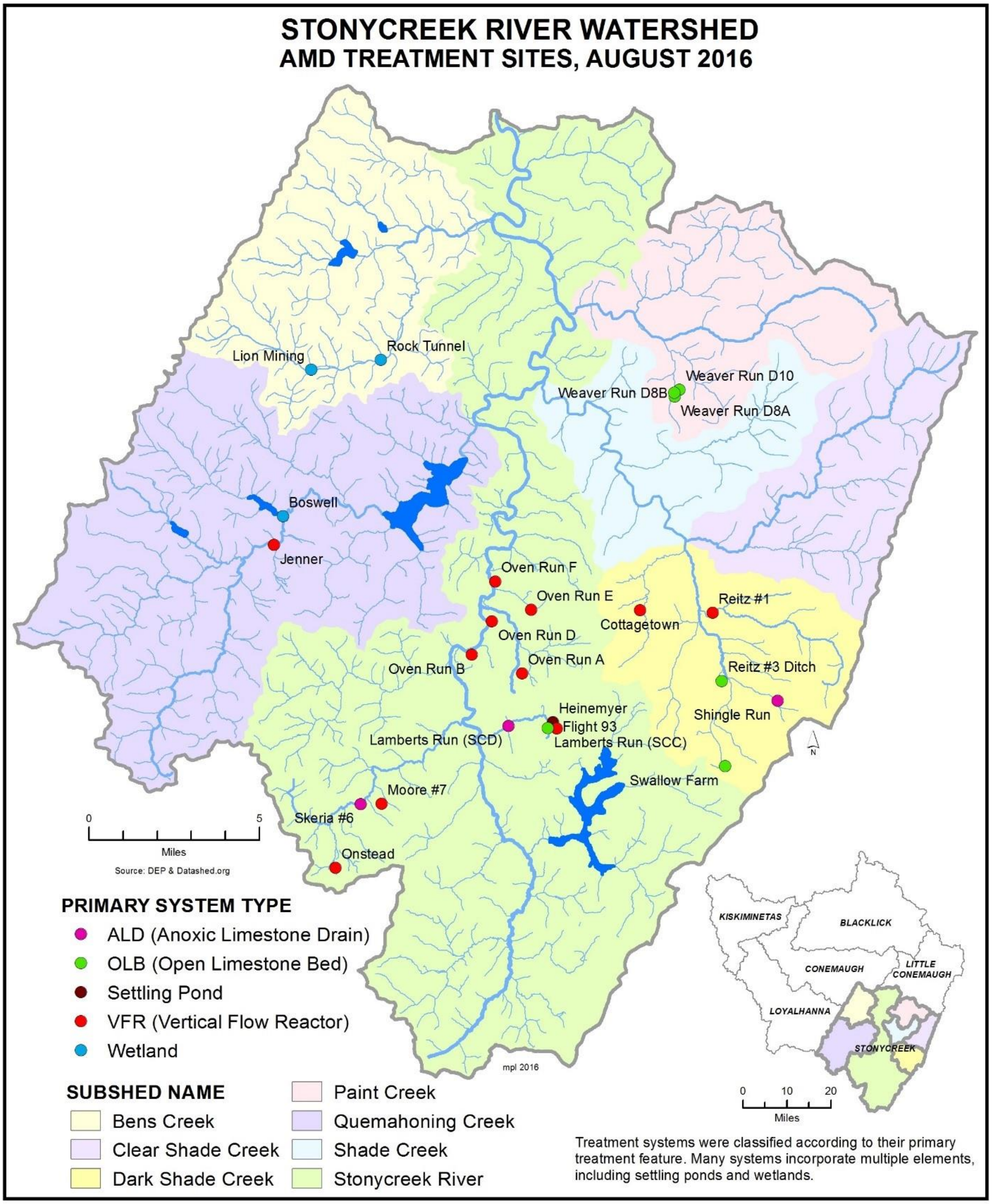


Figure 88 – Map of the passive AMD treatment systems in the Stonycreek River watershed

AMD treatment systems have collectively reduced the amount of metal entering the Stonycreek River. As shown in Figure 89, the levels of iron, aluminum, and manganese – the three most common metals associated with mine drainage – have been cut in thirds or even half.

While these systems need care, their benefit to the Stonycreek River can be seen in the overall appearance of the Stonycreek River, the return of aquatic life and the wildlife that prey upon it, and the increase in recreational use.

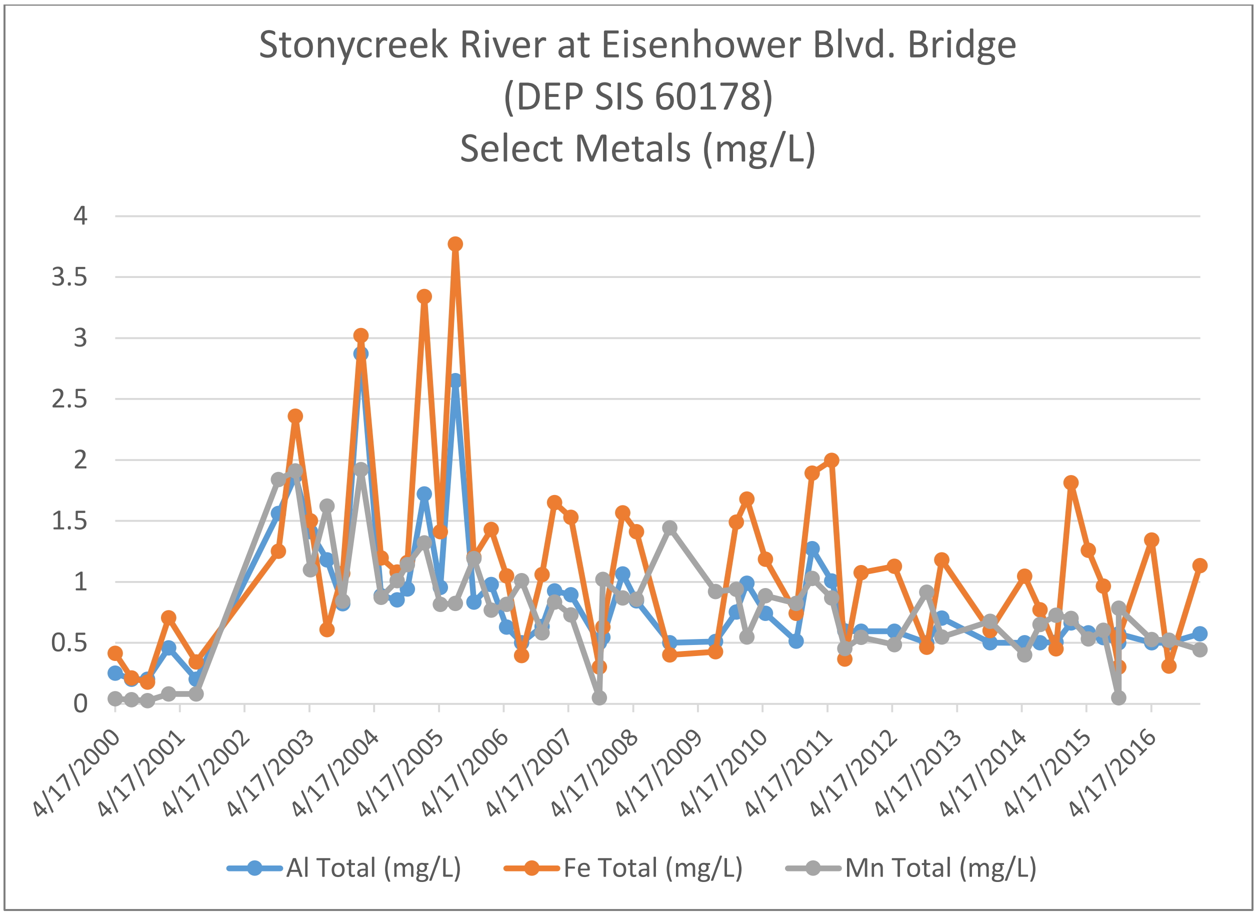


Figure 89 – Graph depicting metals concentrations in the Stonycreek River at the Eisenhower Bridge, 2000-2016. Aluminum levels should be less than 0.750 mg/L, Total Iron less than 1.5 mg/L, and Manganese less than 1.0 mg/L, according to criteria set forth in the Kiski-Conemaugh TMDL

Back to Table of Contents

Despite all of this work and investment, dozens of stream miles are still impaired by AMD, as shown in Figure 90, so efforts cannot cease and maintenance must continue or the Stonycreek could easily revert to its former state.

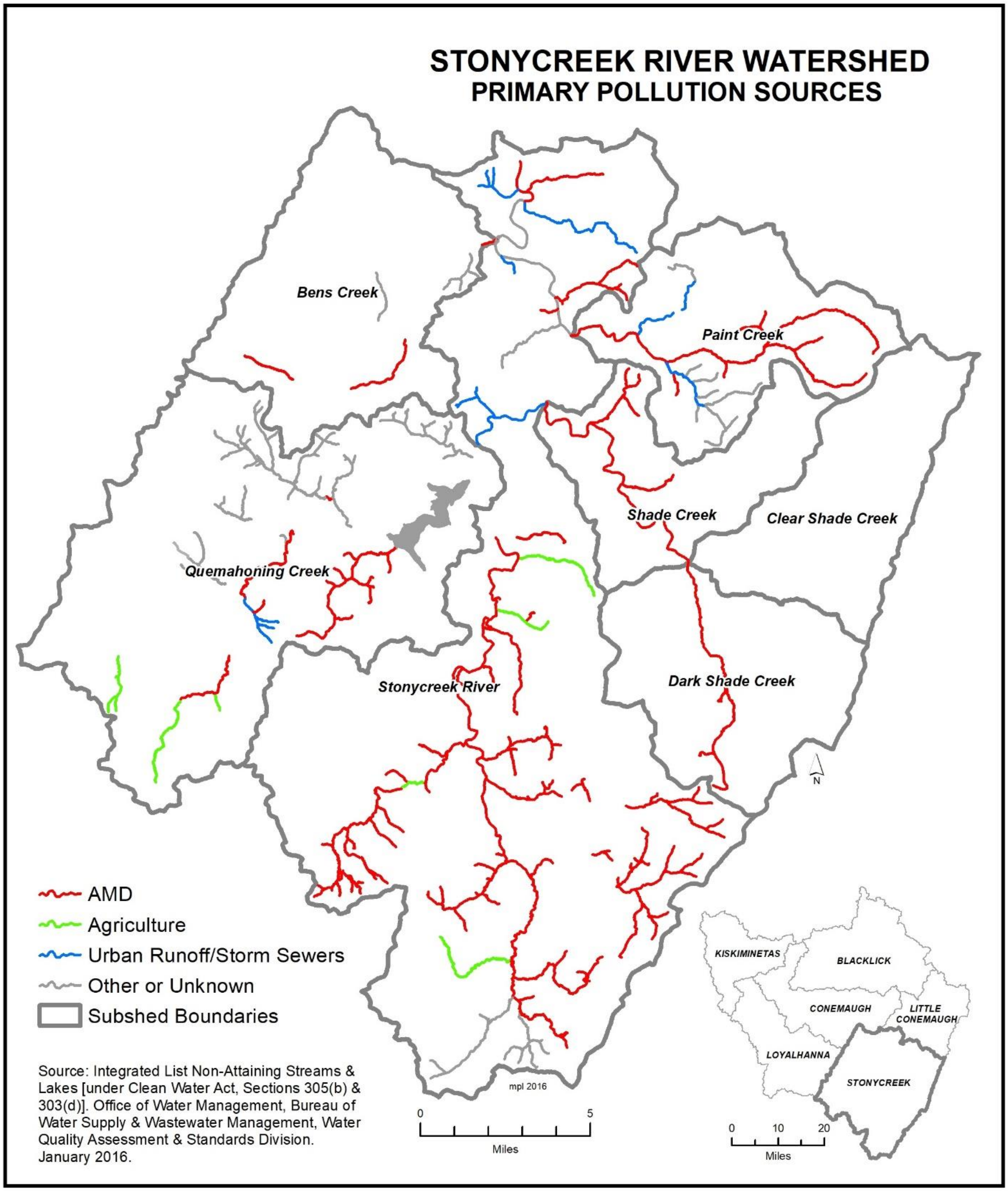


Figure 90 – Waterways on the Integrated List of Non-Attaining Streams and Lakes

Biological Evaluation

The Stonycreek River is a fourth-order tributary of the Conemaugh River. As previously stated, the USGS' 1996 assessment determined that there were 270 mine drainages in the Stonycreek River watershed, and that of the 270 drainages sampled, only 40 met EPA water quality standards (Deal, Null and Lichvar 6). Biological parameters were not assessed during the USGS evaluation. Since then, the Pennsylvania Fish and Boat Commission (PFBC) and others have conducted electrofishing surveys in the Basin.

The USGS evaluation determined that the Stonycreek River was net acidic due to the mine drainage that was present in the watershed. The 1999 *Kiski-Conemaugh River Basin Conservation Plan* noted this condition. In 2007, the Somerset Conservation District (SCD) completed a reassessment of the Stonycreek River watershed, incorporating biological parameters for both fish and macroinvertebrate sampling. As part of the 2007 Reassessment, PFBC electro-fished historically surveyed sites on the Stonycreek River mainstem and its tributaries. No biological parameters had been sampled in the watershed since 1998.

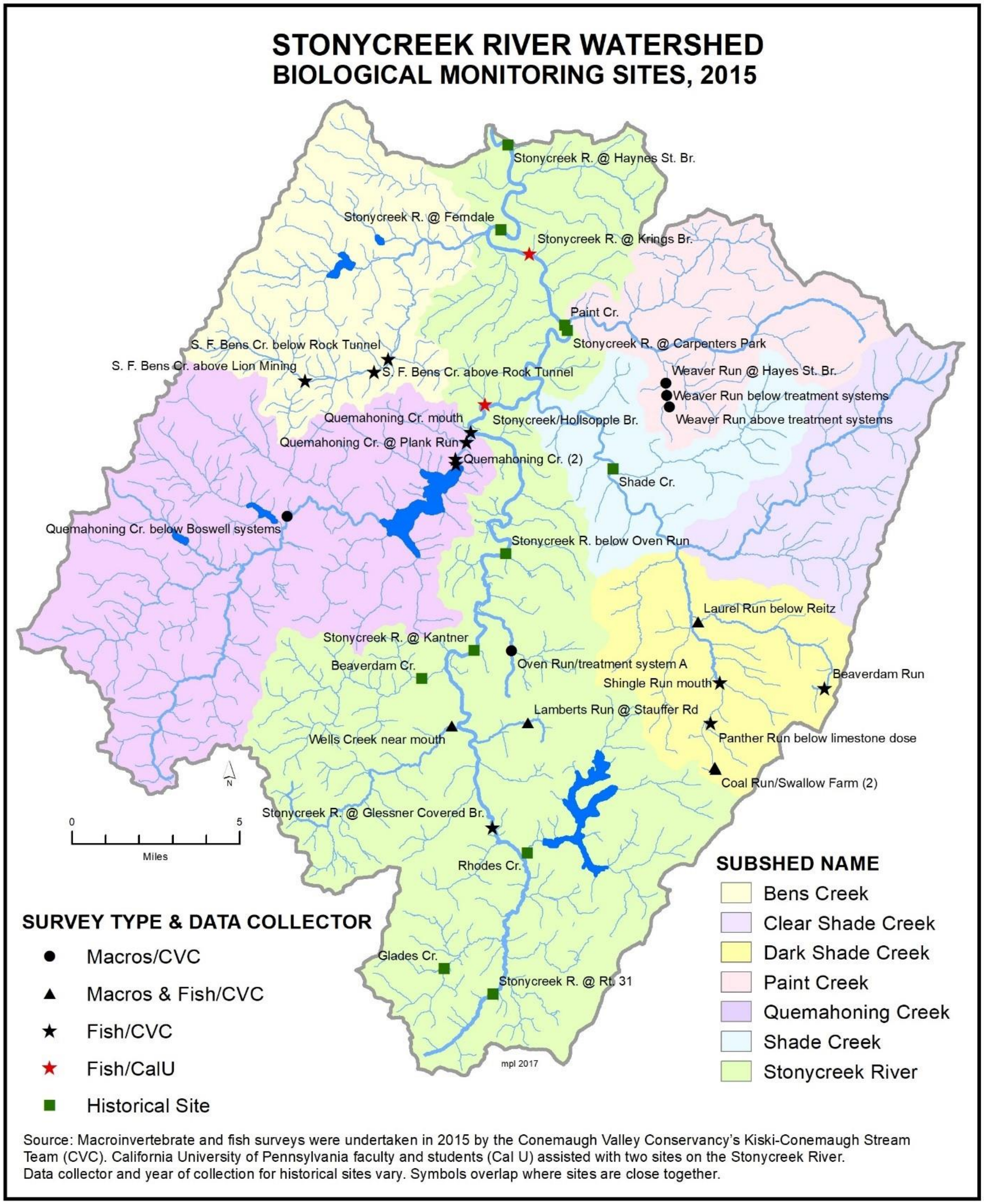


Figure 91 – Map of key biological monitoring sites, Stonycreek River watershed

The *Stonycreek River Watershed Reassessment* of 2007 determined that the Stonycreek River mainstem had become net alkaline since the 1990s.

In 2015, as part of the *Kiski-Conemaugh River Basin Conservation Plan* update, CVC and the California University of Pennsylvania (CAL U) revisited some of these historical sites to assess the biological integrity of the watershed eight years after the Reassessment. The determination of the CVC/CAL U sampling was that the Stonycreek River has remained net alkaline and stable since 2007.

Prior to 1999, the Stonycreek River's biological integrity was severely impacted from mine drainage. PFBC electrofishing surveys performed before 1999 collected a maximum of 12 fish species at a site. Very limited macroinvertebrate data were collected pre-1999 in the Stonycreek River watershed. In 2007, the PFBC electrofishing surveys performed for the Reassessment collected a maximum of 19 fish species at a single location. The increase in fish species since 1999 is an attribute of the Stonycreek River's shift from net acidic to net alkaline chemistry. During the 2007 Reassessment, comparable data were collected on nine mainstem sites. This is the most mainstem sites that possessed comparable data in the six Management Units in the Kiski-Conemaugh River Basin. The Stonycreek's major tributaries and mine drainage treatment systems also possess the best data sets in the Basin. The 2007 Reassessment provided the bulk of the complete and comparable biological data sets in the Stonycreek River watershed.

Back to Table of Contents

Stonycreek River Mainstem Biological Comparisons

Comparable data were collected for nine sites along the Stonycreek River mainstem. The sites are listed below from the headwaters to the Stony's confluence with the Little Conemaugh River.

- Site 1: Stonycreek River @ Route 31
- Site 2: Stonycreek River @ Glessner Covered Bridge
- Site 3: Stonycreek River @ Kantner
- Site 4: Stonycreek River Downstream of Oven Run
- Site 5: Stonycreek River @ Hollsopple
- Site 6: Stonycreek River @ Carpenters Park
- Site 7: Stonycreek River @ Krings Bridge
- Site 8: Stonycreek River @ Ferndale
- Site 9: Stonycreek River @ Haynes Street Bridge

Site 1: Stonycreek River @ Route 31

Site 1 is located in the headwaters of the Stonycreek River where the predominant land use is agriculture. This site contained 11 fish species in 2001 and 14 species in 2007 (PFBC Sites 49904 and 33277). There is minimal mine drainage in this area, but the change in farming practices over the last twenty years have aided in the increase of diversity of fish in this site. Four gamefish were collected in both fish samplings. The dominant fish species collected were creek chubs. Sixteen macroinvertebrate taxa were collected in 2007; the dominant taxa were caddisfly larvae and beetle larvae. The composition of fish and macroinvertebrate taxa confirms the 2007 Reassessment findings that physical habitat of the stream is poor in this area. The rehabilitation of the physical habitat in this area and upstream will allow for further biological recovery.

Site 2: Stonycreek River @ Glessner Covered Bridge

This site is located in an area of the Stonycreek River that is a "Put-and-Grow" trout fishery. This type of fishery is stocked annually with finger-length trout that will grow in-stream to catchable size. This method is used where water temperatures remain cold year round, but chemical or physical factors prohibit successful trout reproduction. When PFBC sampled fish at this site in 1983 (Site 34469), their survey collected six total fish species with two species being gamefish. In 2001, PFBC collected 12 species including four gamefish species (Site 32207). The 2007 PFBC survey (Site 48971) collected 14 total fish species with five species being gamefish, while the 2015 survey by CVC also collected 14 total fish species, five of which were gamefish species. Please see Figure 92 for a visual of these figures.

Macroinvertebrates were sampled in 2001 by DEP and in 2007 by SCD. The 2001 sampling collected seven macroinvertebrate families while the 2007 sampling collected nine families. This site has recovered drastically from organic loading and physical habitat impairment, as well as from some minor mine drainage; however, there has been no documented natural reproduction of trout at this site possibly due to sedimentation and organic loading from historical agricultural operations.

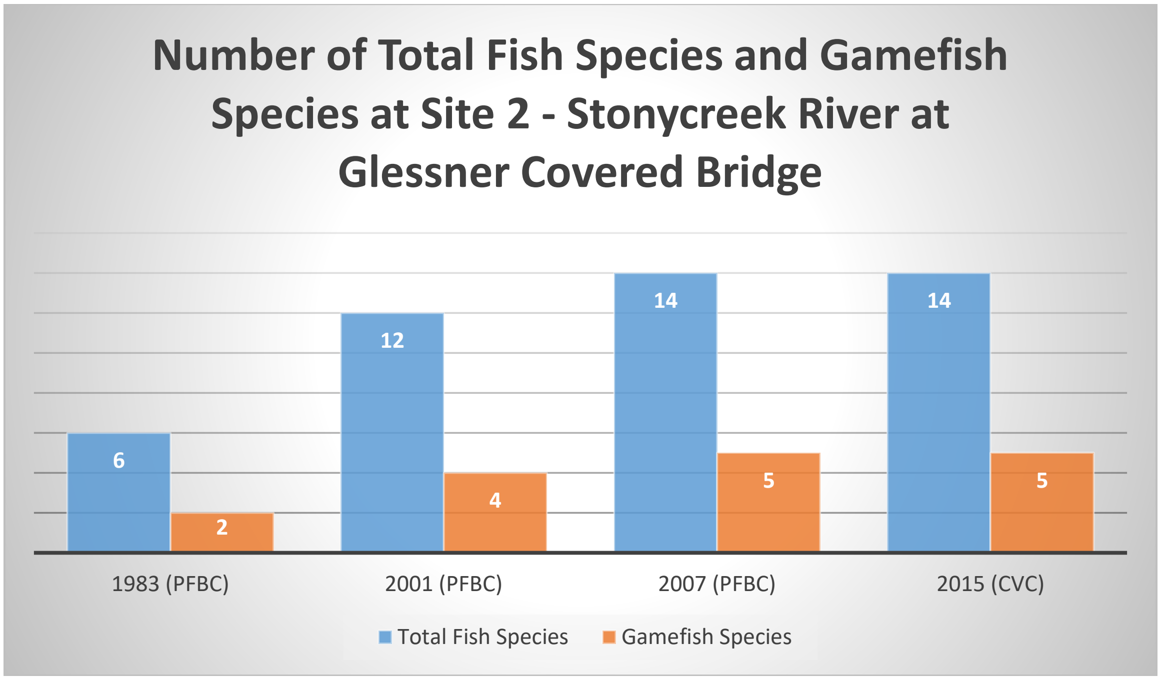


Figure 92 – Graph of the number of fish species collected during fish surveys over time at the Glessner Covered Bridge

Site 3: Stonycreek River @ Kantner

This section of the Stonycreek River is also managed under a "Put-and-Grow" trout fishery. This section was first surveyed by PFBC in 1983 (Site 50754). The 1983 survey collected 11 fish species, two of which were gamefish. The 2007 PFBC survey (Site 50755) collected 19 fish species with eight gamefish collected. Macroinvertebrates collected in 2007 contained 11 taxa with alkaline preferring taxa such as *Gammarus* (scuds). The fish community has recovered in this area, but, as of 2007, the macroinvertebrate community was still recovering. This section of the Stonycreek has become an exceptional fishery compared to its pre-1999 state. The macroinvertebrate community will continue to build and may have already fully recovered. More sampling would be needed to determine the recovery of the macroinvertebrate community.

Back to Table of Contents

Site 4: Stonycreek River Downstream of Oven Run

This site is located about two miles downstream of the Stonycreek's confluence with a second-order tributary, Oven Run, near Hooversville. Oven Run is severely impacted by acid mine drainage. High aluminum and acidity are generated by multiple hot discharges throughout the Oven Run watershed. Oven Run is one of the top three highest sources of acidity in the Stonycreek River watershed. There are five AMD treatment systems in the Oven Run watershed, though untreated AMD remain. Site 4 on the Stonycreek River occurs after the mixing zone of Oven Run. PFBC first sampled this site in 1998 and collected ten fish species and four gamefish (Site 46805). In 2007, a PFBC survey collected 16 fish species with five gamefish species present (Site 11179). Macroinvertebrate communities are very depressed in this area. The recovery of the fish community will continue as long as the correct treatment systems on Oven Run are maintained. The macroinvertebrate community will be slow to recover due to the presence of iron and other participated metals embedding the stream bottom.

Site 5: Stonycreek River @ Hollsopple

This section of the Stonycreek River is stocked with adult trout by sportsmen's clubs from a variety of sources. Angling pressure is heavier in this area than it is in other areas of the mainstem. In 1998, PFBC collected 12 fish species (Site 18174) of which three were gamefish. The 2007 PFBC sampling (Site 43730) collected 15 fish species and five gamefish. The CAL U and CVC fish sampling performed in 2015 also collected 15 fish species and four gamefish. Ten macroinvertebrate taxa were collected by SCD in 2007. This site is showing a stable fish population and a recovering macroinvertebrate population. This area should be monitored to assess how the influence of the Quemahoning Coldwater Conservation Release is affecting this section. The fish recovery is due to the mine drainage treatments upstream and improved agricultural practices.

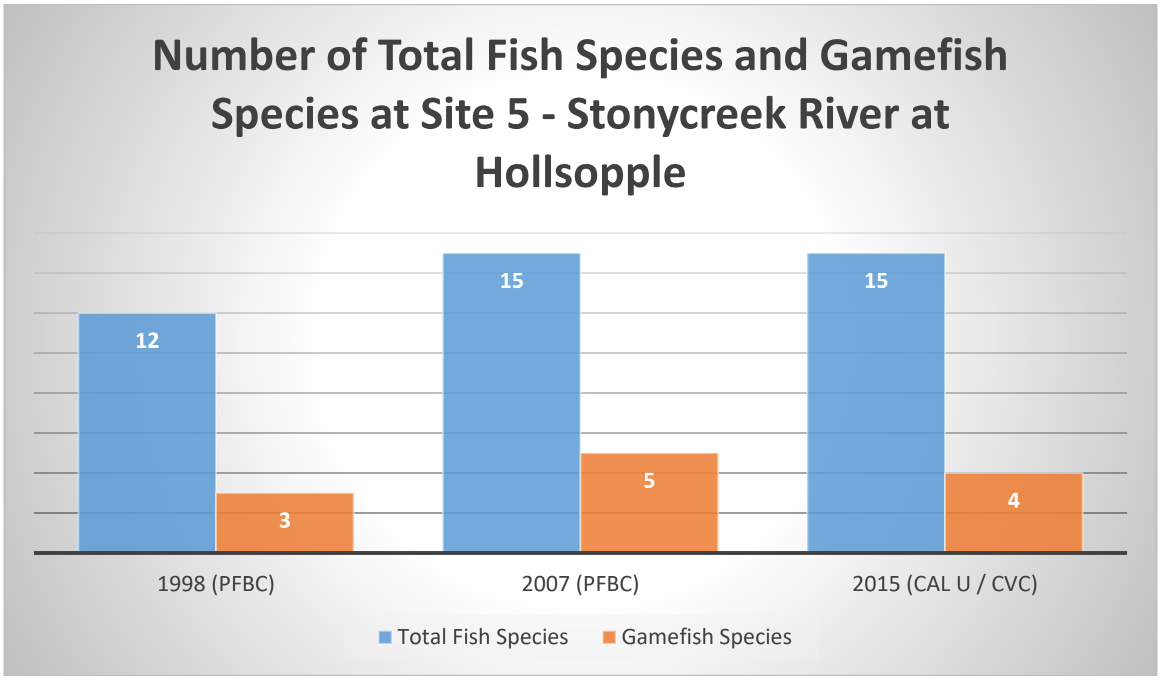


Figure 93 – Graph of the number of fish species collected during fish surveys over time in Hollsopple

Site 6: Stonycreek River @ Carpenters Park

This site is located downstream of the mixing zone of Shade Creek, a large tributary of the Stonycreek River. Shade Creek contains the largest acid mine discharges in the Stonycreek River watershed. This site is embedded with iron from Shade Creek and other discharges. In 1998, a PFBC survey (Site 29068) yielded six fish species with two species being a gamefish. In 2007, PFBC collected 10 fish species (Site 29070), including four gamefish species. The SCD, in 2007, collected four macroinvertebrate taxa during its survey. This section of the Stonycreek River has recovered some and is not biologically dead, but it can still recover much more. The key to the recovery of this section is the abatement of the large discharges in the Shade Creek watershed.

Back to Table of Contents

Site 7: Stonycreek River @ Krings Bridge

This site is located downstream of the confluence of Paint Creek and other mine discharges. This site is also located in a more urban setting than the previous sites. In 1998, PFBC collected two fish species with one gamefish present (Site 2681). In 2007, PFBC collected fourteen fish species and two gamefish (Site 2683). In 2015, when CAL U and CVC sampled this area, eleven fish species and one gamefish were collected. DEP collected five macroinvertebrate families in 2001, while in 2007, SCD collected two macroinvertebrate families. This area of the Stonycreek River has benefitted from the net alkaline shift of the water chemistry, but the massive acidic discharges in the Paint Creek watershed and other unabated discharges still fluctuates water chemistry and embeds the stream bottom in iron. The fluctuations in chemistry are not detrimental enough to decimate the fish population, but they do make an unstable community. The macroinvertebrate community will not be able to rebound in this area due to the iron embeddedness and water chemistry fluctuations.

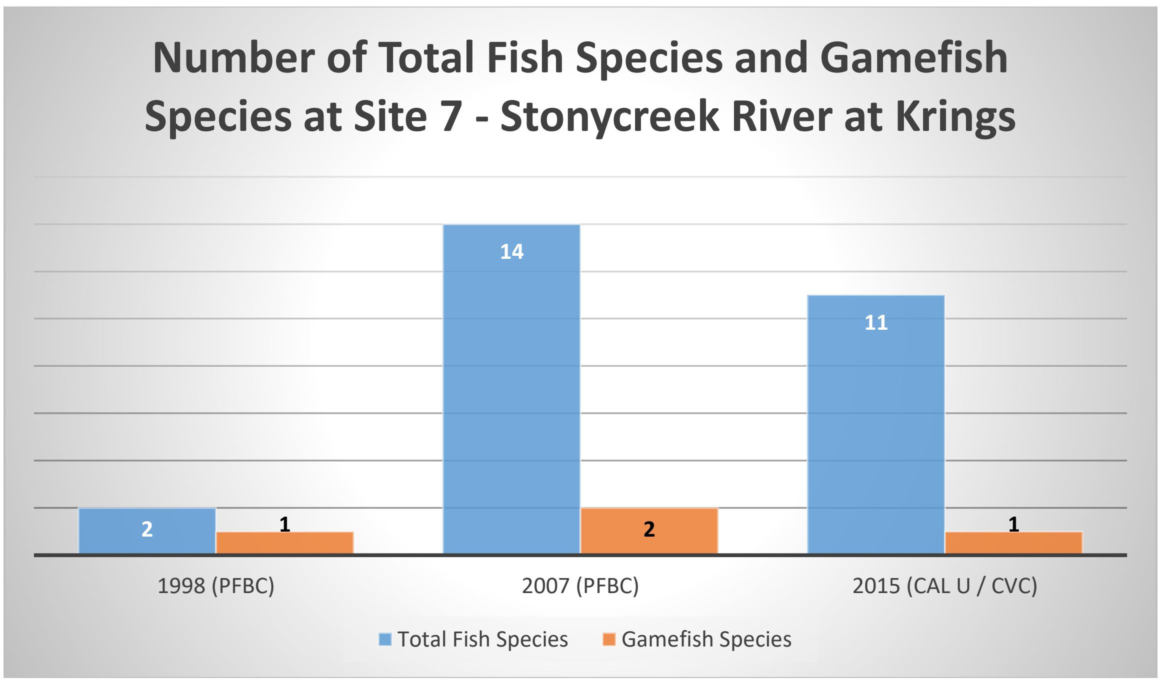


Figure 94 – Graph of the number of fish species collected during fish surveys over time at Krings

Site 8: Stonycreek River @ Ferndale/Moxham

This site is located at the Route 403 Bridge between Ferndale and Moxham, suburbs of the City of Johnstown. The area is industrial and urban thereby lowering this site's physical habitat. In 1998, PFBC collected twelve fish species, four of which were gamefish (Site 10898). In their 2007 sampling, the PFBC collected 15 fish species and three gamefish (Site 10900). The macroinvertebrate community was poor in this site in 2007. As with Site 7, the Ferndale area of the Stonycreek River also suffers from iron embeddedness, which prevents the establishment of robust macroinvertebrate communities.

Site 9: Stonycreek River @ Haynes St. Bridge

This site is located in the City of Johnstown and is the most downstream site sampled on the mainstem of the Stonycreek River. The urban and industrial land use has channelized this portion of the river. Embeddedness and low physical habitat do not allow macroinvertebrates to establish in this area. In 1990, PFBC collected one fish species – white sucker – from this site (Site 30752). In 1998, PFBC collected eight fish species, four of which were gamefish (Site 30753). This site was sampled again by PFBC in 2005. This sampling produced fifteen fish species and three gamefish (Site 30756). This site suffers from degraded habitat. Even if all mine drainage were abated, this site could not fully recover due to past stream channel manipulation.

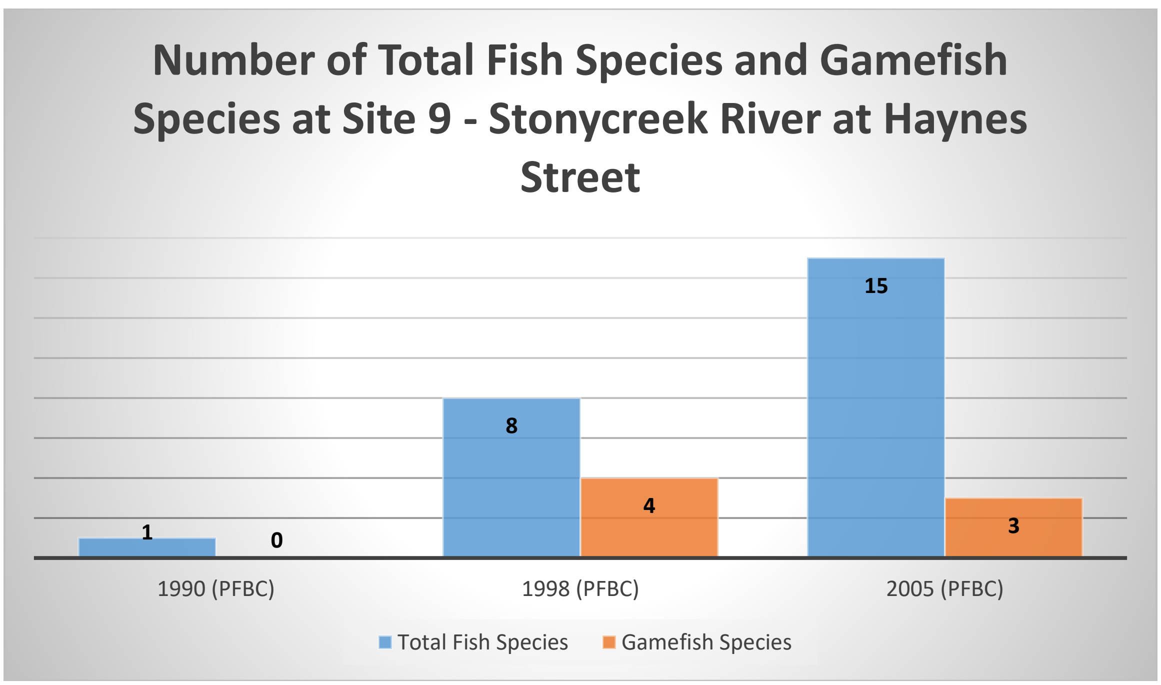


Figure 95 – Graph of the number of fish species collected during fish surveys over time at Haynes Street

Back to Table of Contents

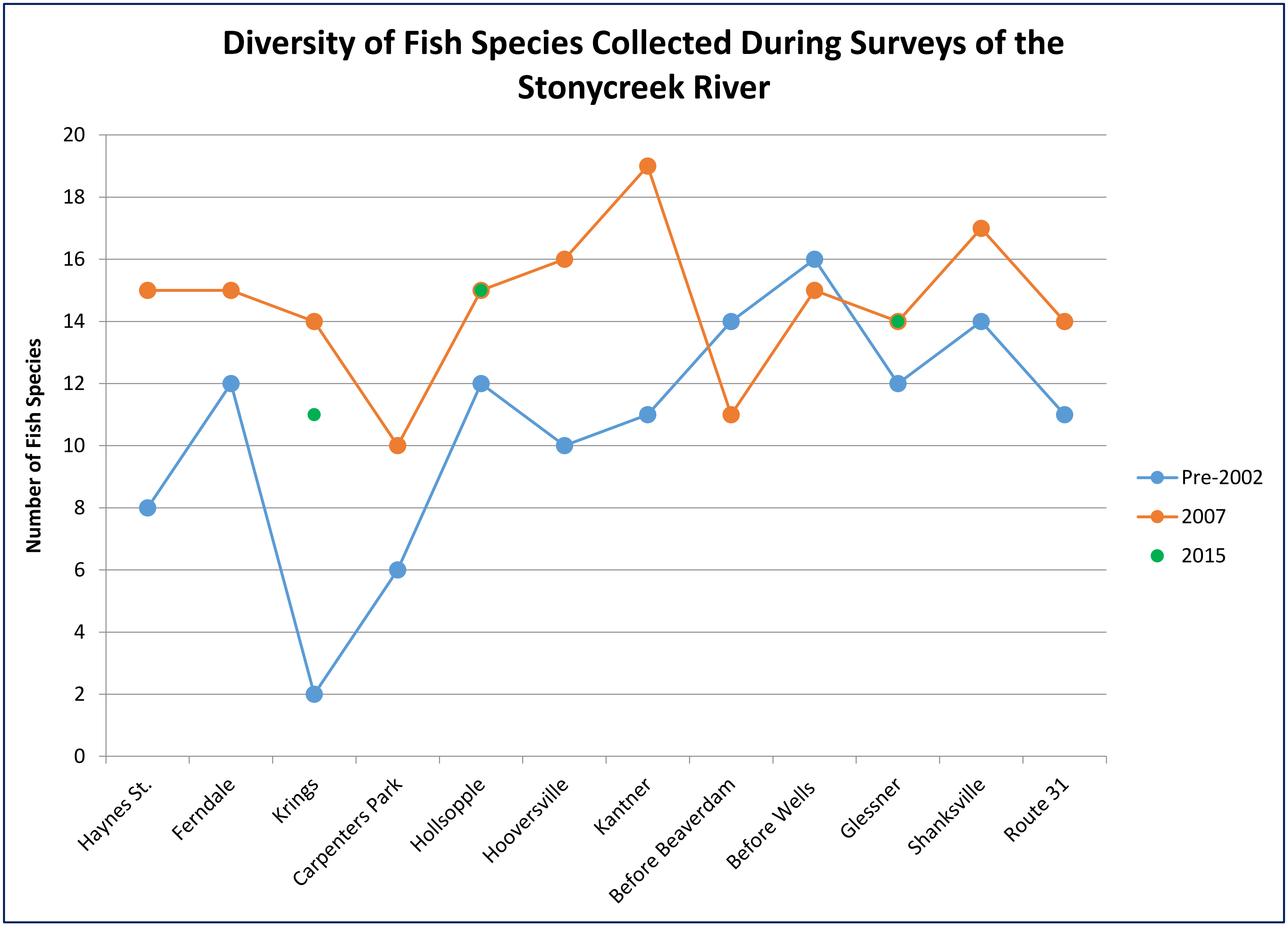


Figure 96 – Graph of the number of fish species collected during fish surveys throughout the Stonycreek River watershed

Select Stonycreek River Tributaries

The Stonycreek River has eight tributaries that are third-order or above. These tributaries are listed below from the headwaters to the mouth of the Stonycreek River.

- Glades Creek
- Wells Creek
- Beaverdam Creek
- Quemahoning Creek
- Rhodes Creek
- Shade Creek
- Paint Creek
- Bens Creek

Glades Creek

This tributary is located in the headwaters of the Stonycreek River and is the first major tributary of it. The predominant land use in the Glades Creek watershed is agriculture. This watershed has been impacted by riparian buffer loss and habitat degradation. Organic loading is a factor in the biological community stability of this tributary. PFBC sampling in 2007 collected eleven fish species with three species being gamefish (Site 35382). SCD macroinvertebrate sampling in 2007 collected 11 macroinvertebrate taxa. Fish and macroinvertebrate taxa were indicative of an area that possessed mild organic loading and degraded habitat. Since 2007, the SCD has implemented several agricultural BMP's in this watershed. To date, no further biological analysis on this watershed has been completed. Future sampling efforts should be conducted to assess BMP installations and determine if more BMP installations are needed in Glades Creek.

Wells Creek

Wells Creek is the second major tributary that flows into the Stonycreek River. Wells Creek has historical, acid mine drainage impacts. Several treatment systems have been installed in the Wells Creek watershed to abate the mine drainage issues. Prior to restoration efforts, the PFBC collected seven fish species including three gamefish species during its 1990 survey of Wells Creek near its confluence with the Stonycreek River (Site 45303). In 2007, PFBC collected ten fish species including four gamefish species at the same location (Site 24264). In 2015, CVC collected 12 fish species, including four gamefish species here. CVC even collected a wild brown trout in 2015. Macroinvertebrate taxa had traditionally been depressed within the survey site near the Wells Creek confluence with the Stonycreek River mostly due to the bottom substrate being predominantly composed of large bedrock. In 2015, CVC sampled macroinvertebrates and collected seven taxa, which is more diversity than the 2007 SCD sampling collected, when just four taxa were collected. This tributary is currently healthy and recovering. Some organic loading is present, but it has not become a biological limiting factor.

Beaverdam Creek

Beaverdam Creek is a predominantly coldwater tributary of the Stonycreek River. This tributary has several mine discharges that are alkaline. Some sections of this tributary are embedded with iron, but the extent of the embeddedness is not a limiting factor to the biological communities. A 1990 PFBC survey collected 11 fish species including four gamefish species from a site about a mile upstream of Beaverdam Creek's mouth (Site 15212). In 2007, a nearby PFBC survey collected 18 fish species, including seven gamefish (Site 18580), while 23 macroinvertebrate taxa were collected during the 2007 Stonycreek Reassessment. This stream is one of the most biologically diverse tributaries in the Stonycreek River watershed. It is also one of the few places in the watershed where new coal mining operations have been proposed. This tributary remains biologically stable, but should be monitored closely if new mining operations begin. This is the second largest biologically diverse tributary within the Stonycreek River watershed and should be preserved to keep its biological resources intact.

Figure 97 – Beaverdam Creek. Photo by Pat Ferko

Quemahoning Creek

Quemahoning Creek is a tributary of the Stonycreek River that is divided by a large reservoir. The Quemahoning Reservoir is a 900-acre impoundment operated as a recreational area and a water supply by the Cambria Somerset Authority (CSA). Quemahoning Creek upstream of the reservoir supports a year-round stocked trout fishery created by yearly adult trout stockings from a cooperative trout nursery and the efforts of local volunteers, but it is impacted by several large alkaline mine discharges. There are also several treatment systems in this watershed that remove large amounts of iron from these discharges; however, the systems cannot remove all of the iron, so iron embedding occurs throughout upper Quemahoning Creek. Since the discharges are alkaline, biological diversity is still present, yet macroinvertebrate communities are depressed from the embedding of the bottom substrate. Fish communities are stable.

Quemahoning Creek downstream of the reservoir has become one of America's newest tailwater fisheries. In 2010, through a condition of their water permit, the Pennsylvania Department of Environmental Protection mandated the CSA to provide a coldwater conservation release of 11.8 million gallons per day from the Quemahoning Reservoir (Waddell). The PFBC, SCD, and CVC have been monitoring this area to track the progress of establishing a tailwater trout fishery. In 2011, SCD, CVC and CAL U sampled fish from this area to obtain a baseline community structure before the coldwater release was fully implemented. Fish species collected were indicative of a warm water community; no trout were collected. Three sites were surveyed and all three sites were noted as having minimal in-stream habitat; therefore, in 2014, the SCD started to install several in-stream habitat structures and have added more structures in 2016 and 2017 in an effort to further enhance the productivity of the PFBC fingerling trout stocking program at the tailwater.

In 2015, the CVC and its partners surveyed the Quemahoning Creek Tailwater to assess the efficacy of the habitat structures that were installed by SCD and the trout stocking program. Four sites were surveyed:

- **Site 1** was located below the confluence of the spillway and coldwater conservation release flume, at the start of the channelized area of the stream below the dam;
- **Site 2** was located upstream of the Plank Road Bridge, which is about the middle of the tailwater section;
- **Site 3** was at the mouth of Quemahoning Creek, before its confluence with the Stonycreek River;
- **Site 4** was the coldwater conservation release discharge flume.

Sites 1-3 were the historical sites surveyed in 2011 by CAL U, SCD and CVC. Site 4 was located directly below the discharge of the coldwater release within the discharge channel. Site 1 lost ten species between 2011 and 2015, but gained stocked brown and rainbow trout that measured between 210 mm – 390 mm, smallmouth bass, white sucker and yellow perch. There were no minnow species collected from Site 1 in 2015. Site 2 lost five species from 2011 to 2015, but gained hatchery brown trout that measured 140mm – 160mm, mottled sculpin, rosyface shiners, and yellow bullheads. These sites' communities are changing slowly into a coldwater community. Site 1 contained less fish diversity and only a few large trout within the habitat structures; however, when Site 4, the discharge flume located directly upstream of Site 1, was surveyed, it produced an abundance of large predatory fish including large trout and walleye. These predators have hunted most of the smaller fish from this section of the tailwater. More micro habitat that can provide cover for small fish is needed in-stream to allow for finger-length and forage fish survival. Site 3 lost three taxa between 2011 and 2015, but gained seven species including blacknose dace, blackside darter, bluntnose minnow, mimic shiner, pumpkinseed, rosyface shiner, and yellow perch. No trout were collected at Site 3. The results of the surveys on the Quemahoning Creek Tailwater are located in Appendix 4.

Figure 98 – A walleye collected from the Quemahoning Tailwater

Rhoads Creek

Rhoads Creek is another tributary that receives the majority of its water from a reservoir release. Unlike Quemahoning Creek, the releases from Lake Stonycreek and Indian Lake are spillway releases and this warms the water in Rhoads Creek. In 2007, a PFBC survey resulted in 15 fish species with nine gamefish species present. Hatchery trout were collected indicating that coldwater refuge exists in Rhoads Creek. The rest of the gamefish species collected were cool and warm water species, the majority of which were lentic (still, freshwater) species, which likely came from the reservoirs' releases. In 2007, the SCD collected eight macroinvertebrate taxa. The lack of macroinvertebrate diversity can be attributed to low physical habitat scores that were recorded by SCD in 2007. There is increased siltation in this stream from the reservoir releases. The water quality of Rhoads Creek is good overall and does not provide detrimental chemistry to the Stonycreek River.

Shade Creek

Shade Creek is the second-largest sub-watershed of the Stonycreek River with very large mine drainage problems. The largest discharges in the Stonycreek River watershed occur in the Shade Creek watershed. An average of 5.76 million gallons of acidic, metal-laden mine drainage flows into Dark Shade Creek daily and is a limiting factor to aquatic life in Shade Creek. When SCD sampled macroinvertebrates in Central City in 2007, only six taxa were collected and all were acid tolerant individuals. There have been multiple attempts to collect macroinvertebrate samples from Shade Creek close to its confluence with the Stonycreek River, but all attempts here have resulted in no living organisms collected. The Stonycreek River's alkalinity buffers the impacts of Shade Creek enough that the Stonycreek does not die from Shade Creek's acidity, but biological communities in the Stonycreek, below Shade Creek, are depressed due to iron embedding and water chemistry fluctuations.

Some headwater tributaries of Shade Creek are pristine and exceptional fisheries since no mining has occurred in their watersheds. Dark Shade Creek and thus the mainstem of Shade Creek contain the most mine drainage. Though some of the most diverse and exceptional fisheries occur in this watershed, without treatment of the multiple, large acidic discharges, Shade Creek will continue to be a biological limiting factor to the Stonycreek River.

Figure 99 – The confluence of Clear Shade and Dark Shade Creeks form Shade Creek

Paint Creek

Paint Creek is the fourth-largest sub-watershed in the Stonycreek River watershed and, like Shade Creek, Paint Creek is decimated by acid mine drainage. The Paint Creek watershed is mostly biologically dead due to severe acid mine drainage resulting in low pH and heavy metal loading. Little Paint Creek is the least impacted of Paint Creek's tributaries until it flows past coal refuse piles and associated discharges in Scalp Level Borough. These impacts degrade Little Paint Creek, diminishing its water quality and aesthetics.

The scale of the mine drainage impacts in the Paint Creek watershed are massive and will require large amounts of land, money, time, and labor to abate. Though Paint Creek is biologically dead and its water is very acidic, the Stonycreek River is able to buffer the impacts enough to sustain limited fish and macroinvertebrate life. Like Shade Creek, Paint Creek is a limiting factor to the Stonycreek River. Extensive treatment of abandoned and active mine discharges must be completed, not so much to restore a fishery to Paint Creek, but to negate Paint Creek's impact on the Stonycreek River.

Bens Creek

Bens Creek is another major tributary to enter the Stonycreek River before its confluence with the Little Conemaugh River. Bens Creek suffers from alkaline mine drainage, and iron embeddedness is a major limiting factor to diversity in this watershed. Fortunately, the majority of the watershed supports a large trout fishery. The headwaters of Bens Creek, specifically the North Fork of Bens Creek and the upper sections of the South Fork of Bens Creek, are designated as Class A Wild Trout Waters by the PFBC and support populations of wild brook, wild brown, and wild rainbow trout. Wild trout and excellent populations of holdover stocked trout have been documented in the mainstem of Bens Creek. In 2015, the CVC conducted fish surveys on South Fork Bens Creek. The results are located in Appendix 4.

Conclusions

The Stonycreek River is the most studied Management Unit in the Kiski Basin. It also possesses many AMD treatment systems and reclamation success stories that date to the creation and coordinating efforts of the Stonycreek Conemaugh River Improvement Project (SCRIP) that was initiated in 1991 through the efforts of the Cambria County and Somerset Conservation Districts with support from the late U.S. Congressman John Murtha. The graph on page 135 nicely depicts the recovery of the Stonycreek River since the *Kiski-Conemaugh River Basin Conservation Plan* was completed. Federal, state and county agencies, as well as volunteer watershed groups and non-profit organizations have had immense success in the recovery efforts of this watershed. Though the Stonycreek River's recovery is impressive, there is still much AMD abatement work to be completed here and existing systems need maintained. The work needed will take more critical thinking, money, and new technologies to complete.

Back to Table of Contents

Little Conemaugh River Management Unit

Location

The Little Conemaugh River watershed is the smallest of the six Management Units within the Kiski-Conemaugh River Basin. It encompasses 189.9 square-miles in Cambria County. Pennsylvania's *State Water Plan* identifies the Little Conemaugh River watershed as Watershed 18E, together with the Stonycreek River watershed. Besides the mainstem of the Little Conemaugh River, only its North Branch and South Fork drain watersheds that are larger than 25 square-miles, as shown in Figure 100.

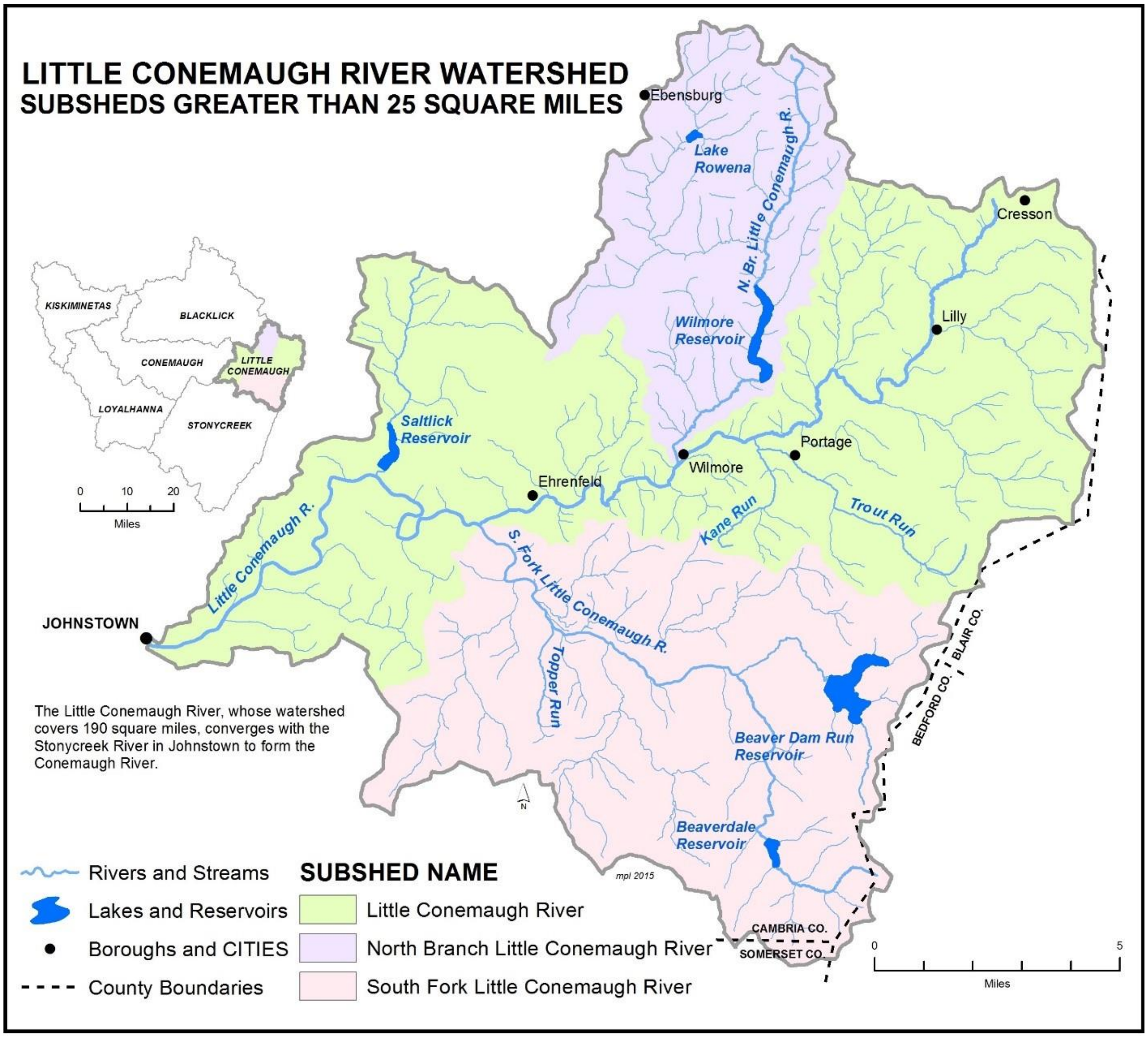


Figure 100 – The Little Conemaugh River watershed and primary sub-watersheds

Back to Table of Contents

Land Cover

Next to the Stonycreek River Management Unit, the Little Conemaugh watershed had the greatest, albeit slight, loss of land classified as agriculture between 1992 and 2011 with 1.6%. Developed lands increased by 1.2%, which was common across the Basin. It and the Stonycreek River Management Unit tied for the greatest increase in mining lands, with 0.9%, which is the same percent it lost in forest.

Land Cover Percentage in the Little Conemaugh River Watershed, 1992 – 2011					
	1992	**2001**	**2006**	**2011**	**% Change**
Forest	73.3	73.0	72.9	72.4	- 0.9
Agriculture	15.3	13.8	13.8	13.7	- 1.6
Grass/Shrub	None	None	0.1	0.2	+ 0.2
Developed	9.2	10.4	10.4	10.4	+ 1.2
Mining/Barren	1.2	1.7	1.8	2.1	+ 0.9
Water	0.9	1.1	1.0	1.0	+ 0.1
Wetlands	0.0	0.0	0.0	0.0	0

Table 17

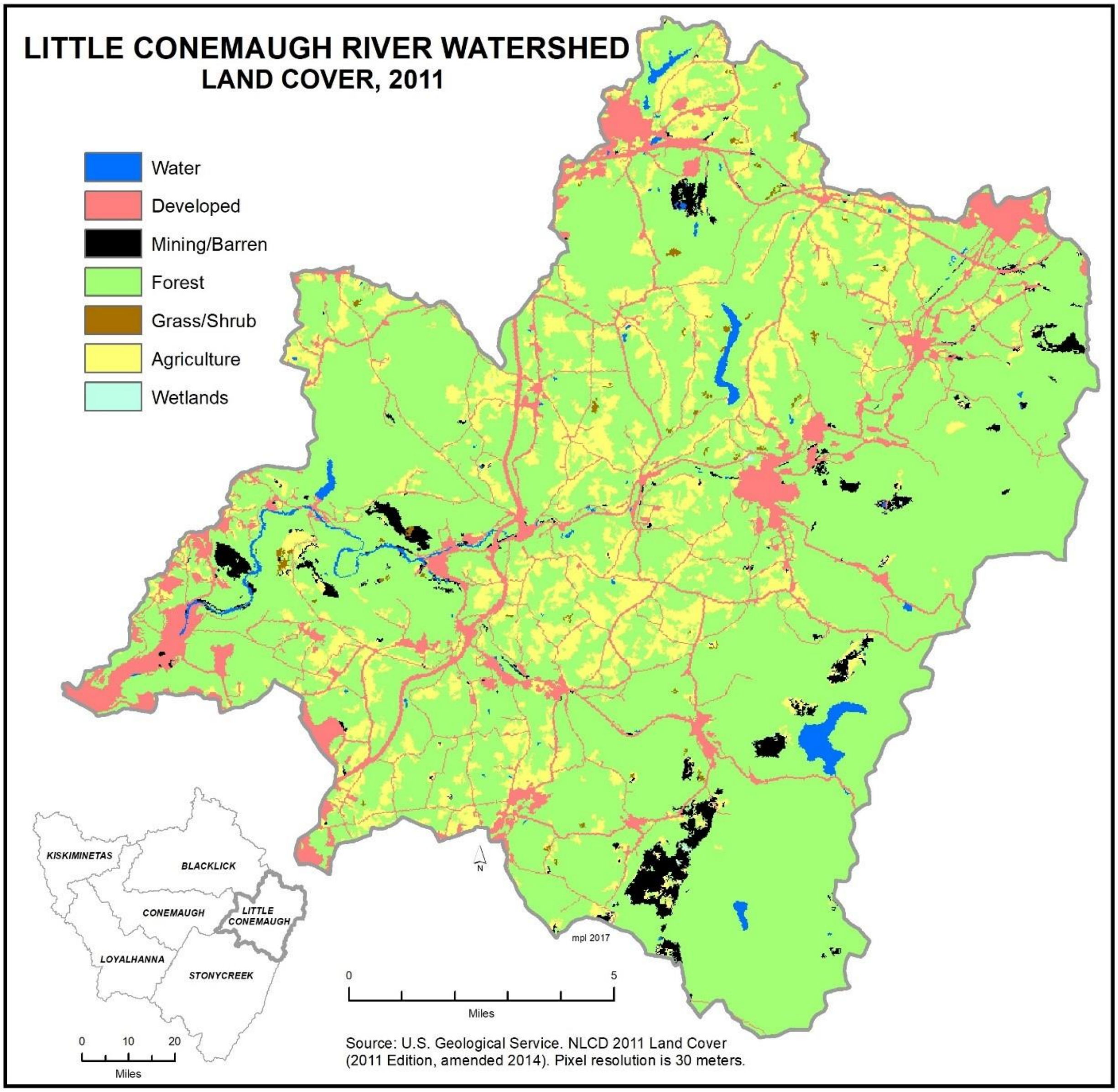


Figure 101 – Land cover of the Little Conemaugh River watershed in 2011

Exceptional Value and High Quality Streams

As with the Stonycreek River watershed, the Allegheny Front makes up the Little Conemaugh River watershed's eastern border. The Pennsylvania Code, Chapter 93 classifies the upper half of Bens Creek as well as the upper portion of the South Fork Little Conemaugh River as EV streams. Beaverdam Run, Bottle Run, Noels Creek, Saltlick Run, and part of the South Fork Little Conemaugh River are named waterways classified as HQ Coldwater Fisheries.

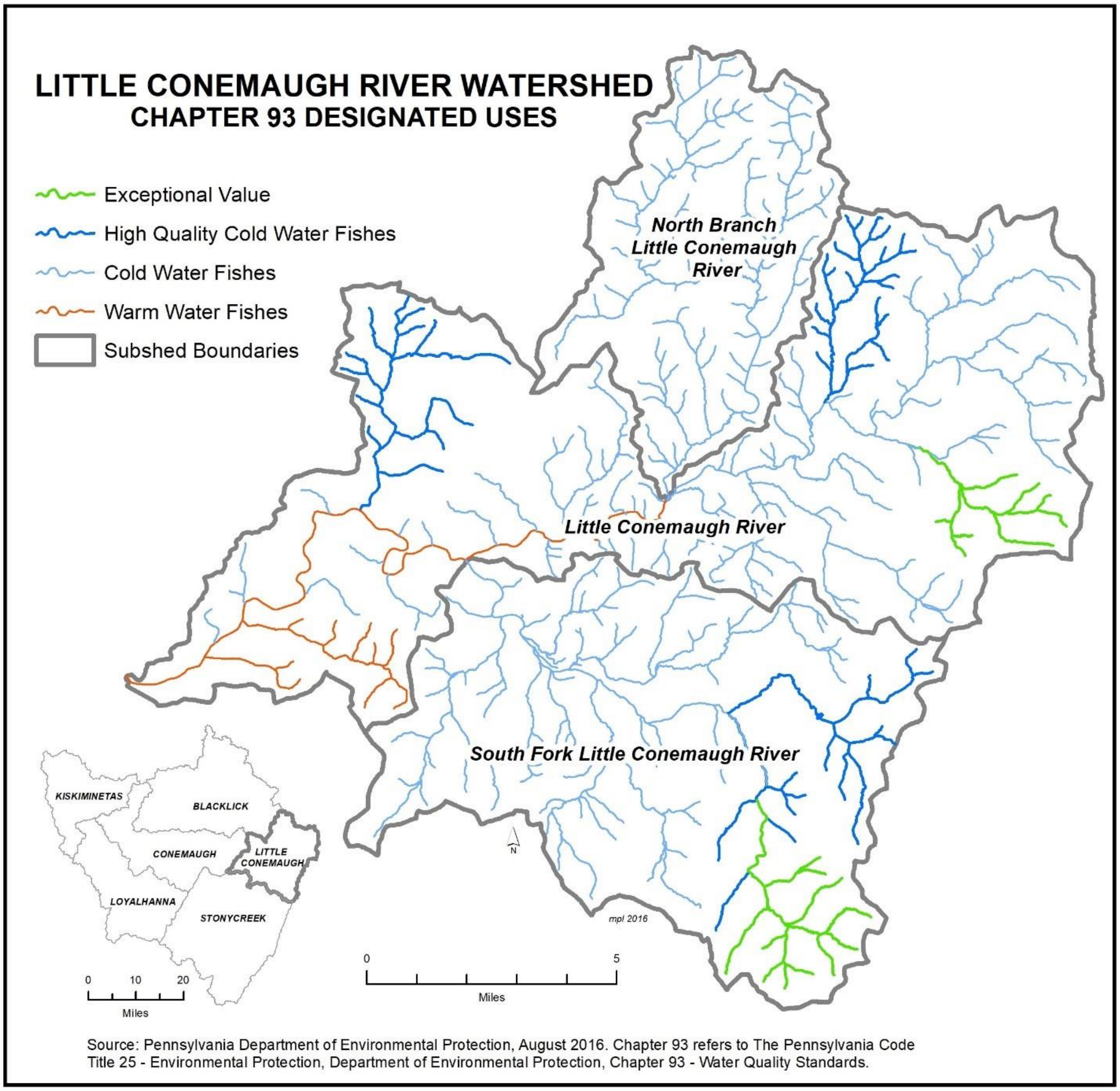


Figure 102 – Designated uses of waterways in the Little Conemaugh River watershed

Back to Table of Contents

Abandoned Mine Drainage

Counterpart to the Stonycreek River, the Little Conemaugh River is still severely impacted by AMD. The 1999 *Kiski-Conemaugh River Basin Conservation Plan* indicated that 17 of the 40 worst major abandoned mine discharges in Western Pennsylvania, as identified by the 1998 *Findings for the Inventory and Monitoring Phase of the Resource Recovery Program*, were located within the Kiski Basin. Of those 17, six were in the Little Conemaugh River watershed and included the following discharges, which are listed in decreasing order of metal loading:

- South Fork/Topper Run
- Sulphur Creek
- Spring Run (near Portage)
- Sulphur Creek
- Hughes Borehole
- Trout Run (near Portage) (II-7-8).

In January 2007, the Cambria County Conservation District published a White Paper to bring attention to nine, large abandoned mine discharges, most of which require remediation with an active treatment system, given their size, severity, and location. These discharges include:

- Beaverdale Ballfield (plus a discharge upstream at the refuse pile)
- Hughes Borehole
- Portage Wetlands (two net acidic and one net alkaline discharge, also referred to as the Sonman Mine discharges)
- Sulfur Creek
- Topper Run
- Trout Run-Miller Shaft.

The following table shows the "Super 7" AMD and their overall contribution to the Little Conemaugh River watershed (PA DEP and Rosebud).

Little Conemaugh River Ranking of Acid Mine Discharges by Load			
Rank	**Site**	**Load (#/day)**	**% of Total**
1	St. Michael	31,141	29.2
2	Sulfur Creek	11,418	10.71
3	Trout Run	14,301	13.41
4	Ehrenfeld	12,742	11.94
5	Sonman	10,370	9.72
6	Hughes Borehole	8,318	7.79
7	Beaverdale	6,755	6.33

Table 18

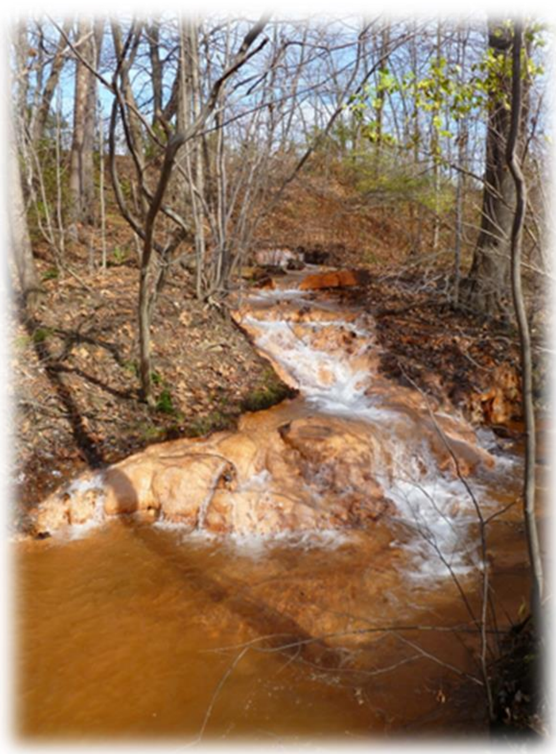
Back to Table of Contents

AMD Treatment Systems

The sheer volume of several abandoned mine discharges and their locations have been problematic when discussing potential treatment of these massive discharges; however, with persistence, creative thinking, and strong partnerships, these sites are slowly being addressed.

To access 10,000 acres of coal in the Upper Kittanning seam at Mine 78, Rosebud Mining Company and the PA DEP created a Consent Order and Agreement that stated Rosebud would build a $15 million active treatment system for the Topper Run discharge in St. Michael, PA, operate it for thirty years, and develop a $15 million trust fund so that the state would have money to operate the system after Rosebud's thirty years (Allegheny Front). This system has a maximum pumping capacity of 10,000 gallons per minute. It was turned online in 2013, has already had a very positive impact on the visual aesthetics of the Little Conemaugh River and on the fish diversity, at least at a historical survey site in Mineral Point. Please see page 156 for more on the fish community.

Elsewhere in the watershed, the DEP is working to design and construct an active treatment system that would remediate the three Sonman mine discharges (D11, D12, and D13), Hughes Borehole, and the Miller Mine Shaft discharge. The Office of Surface Mining Reclamation and Enforcement completed an extensive study and mapped the related mine pools, while completing a Geochemist Workbench Model to support this effort. The DEP is securing rights of entry and land agreements. Exploratory drilling for the first phase was completed on November 15, 2017.



Figures 103 and 104 – Two of the Sonman discharges

Treatment of these discharges would eliminate approximately another 31% of AMD pollution from the Little Conemaugh River and, based on the Qualified Hydrologic Unit, restore the Little Conemaugh River to a "Tier II Restoration," which is a recreational fishery, on the mainstem from Jamestown 22 miles down to the mouth of the Little Conemaugh River in Johnstown (Timcik).

There are four AMD treatment systems along the South Fork Little Conemaugh River in Beaverdale that are helping to remediate a few smaller discharges along this high-quality stream. There are also passive treatment systems along Saltlick Run and Trout Run, as shown in Figure 105. As stated in the Stonycreek River sub-watershed section, Stream Restoration, Inc. spearheaded a project to evaluate these systems and their conclusions may be found on the Datashed website.

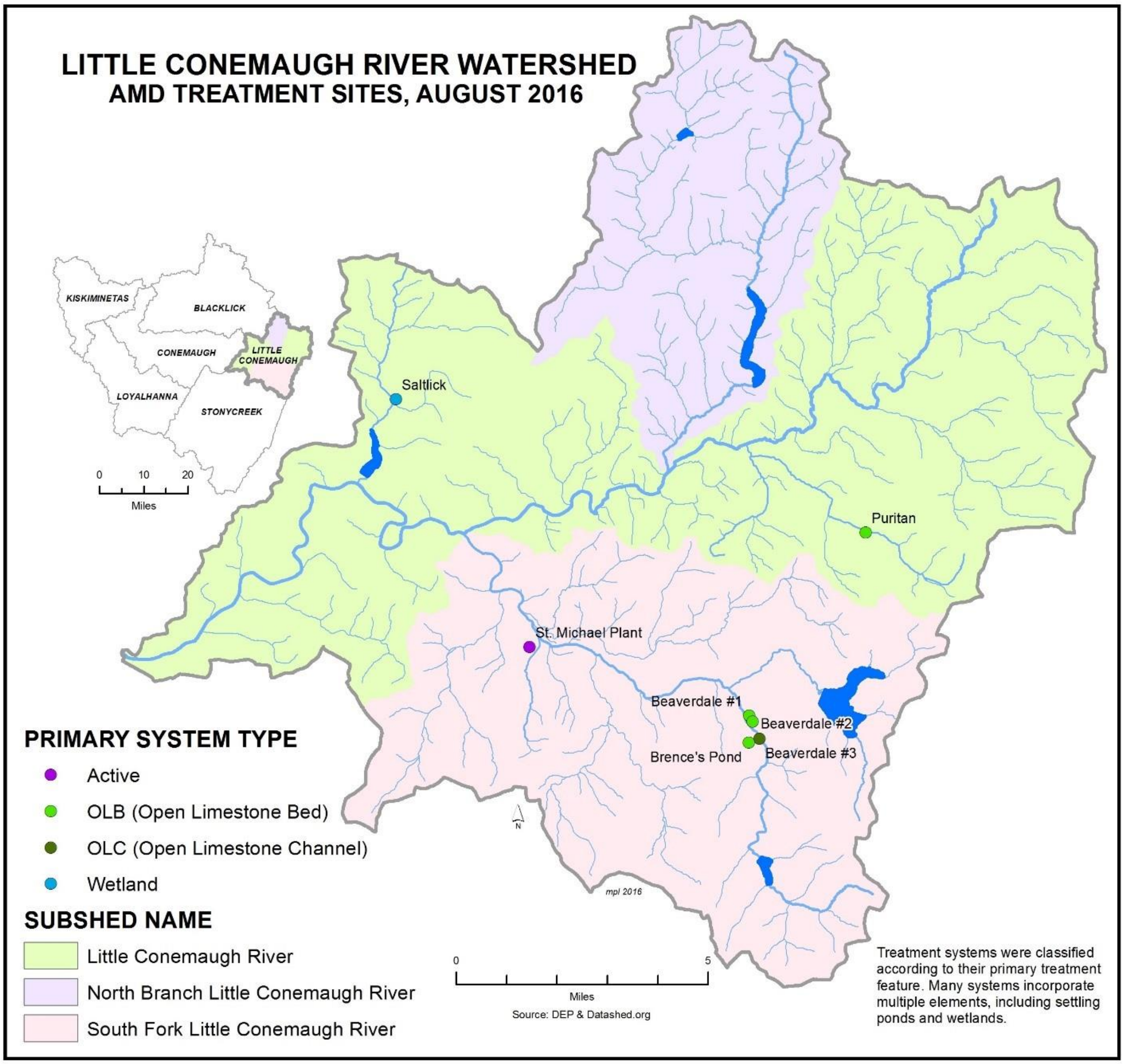


Figure 105 – Map of the AMD treatment systems in the Little Conemaugh River watershed

Water Quality

Despite its appearance, the decline in industry, more environmentally-conscientious laws and regulations, and restoration and conservation efforts have helped the Little Conemaugh River turn from a net acidic to a net alkaline waterway that supports a more diverse community of aquatic life than it did in the 1990s.

Figure 106 shows the Hot Acidity of the Little Conemaugh River at a monitoring point near its mouth at the Johns Street Bridge in the City of Johnstown. Dots above the zero (0) line indicate that the sample was net acidic, while dots below zero indicate that the sample was net alkaline. Years ago, laboratories reported net alkaline water as having a Hot Acidity of zero, hence the readings of zero between 2000 and 2003. These samples were likely taken when flows were elevated, diluting the impact of mine discharges on the Little Conemaugh mainstem (Beam). The graph shows the Little Conemaugh River turning from a net acidic waterway to a net alkaline one around 2007. Further, alkalinity has increased over the last two decades, as shown in Figure 107. Chapter 93 of Title 25 in the Pennsylvania Code requires that alkalinity measure at least 20 mg/L as Calcium Carbonate, except where natural conditions are less, and the Little Conemaugh River has been surpassing that criterion consistently since 2007.

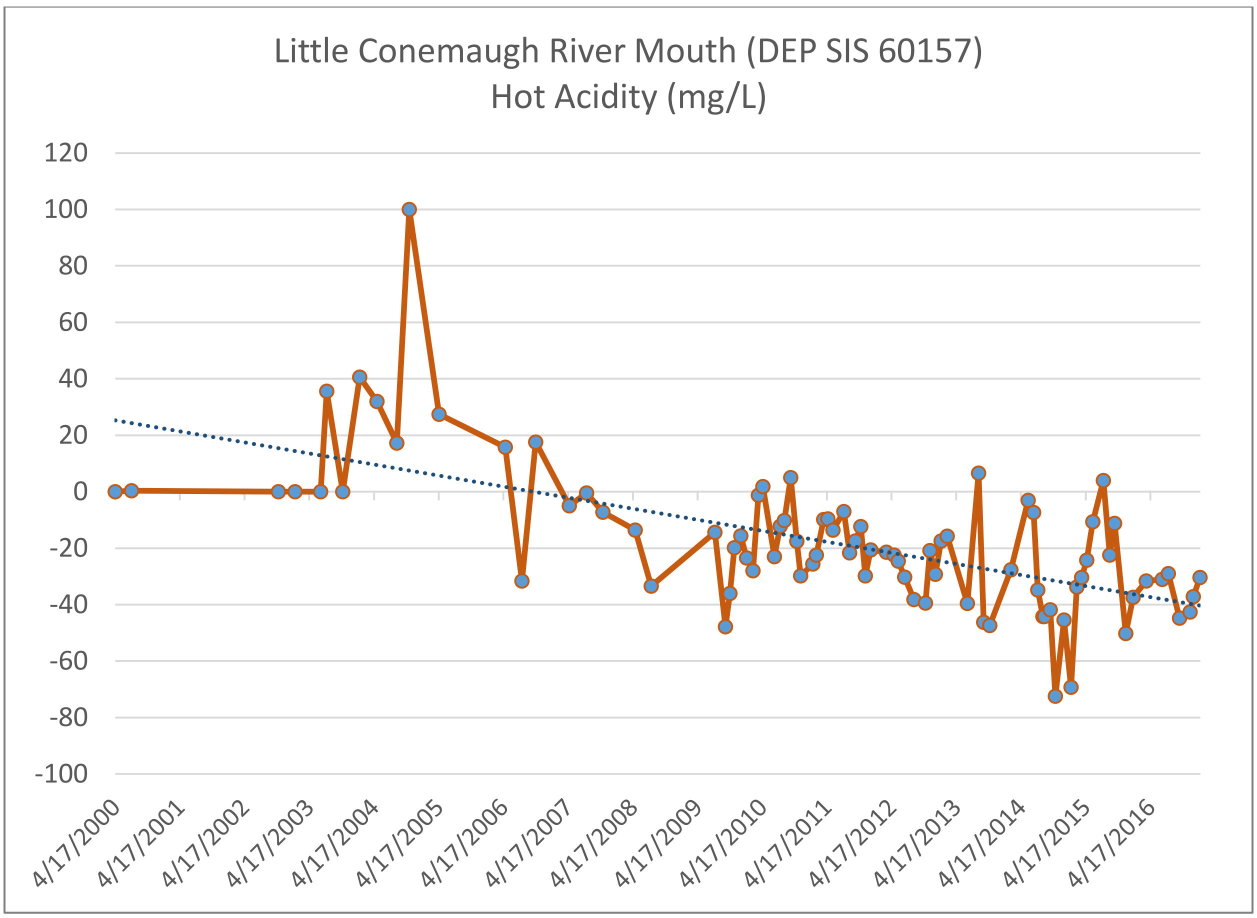


Figure 106 – Graph depicting Acidity levels in the Little Conemaugh River at the Johns Street Bridge in Johnstown, 2000-2016. Figures at or below zero indicate net alkaline water

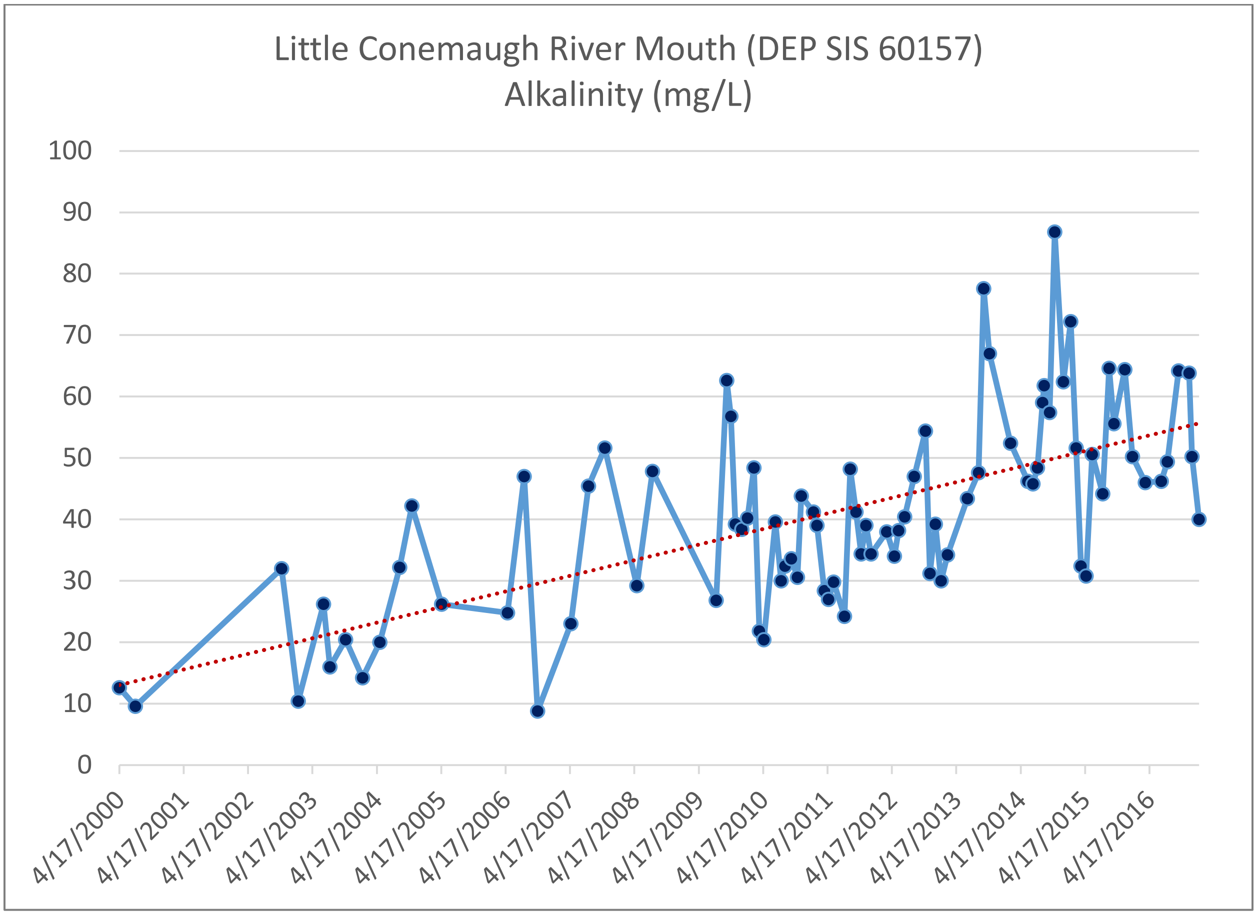


Figure 107 – Graph depicting Alkalinity levels in the Little Conemaugh River at the Johns Street Bridge in Johnstown, 2000-2016. Alkalinity levels of 20 mg/L or more are preferred

While the Little Conemaugh River looks terrible throughout the City of Johnstown because of the high metal concentrations (Figure 108) and the armoring of rocks, its pH is good, although, as commented upon in the Stonycreek section, the risk of making the pH in the Little Conemaugh too high and causing aluminum to re-dissolve and become toxic to aquatic life is very real. As Figure 109 shows, the pH does exceed 8, which, accompanied with aluminum concentrations of 0.8 – 2.5 mg/L, could be a biological limiting factor.

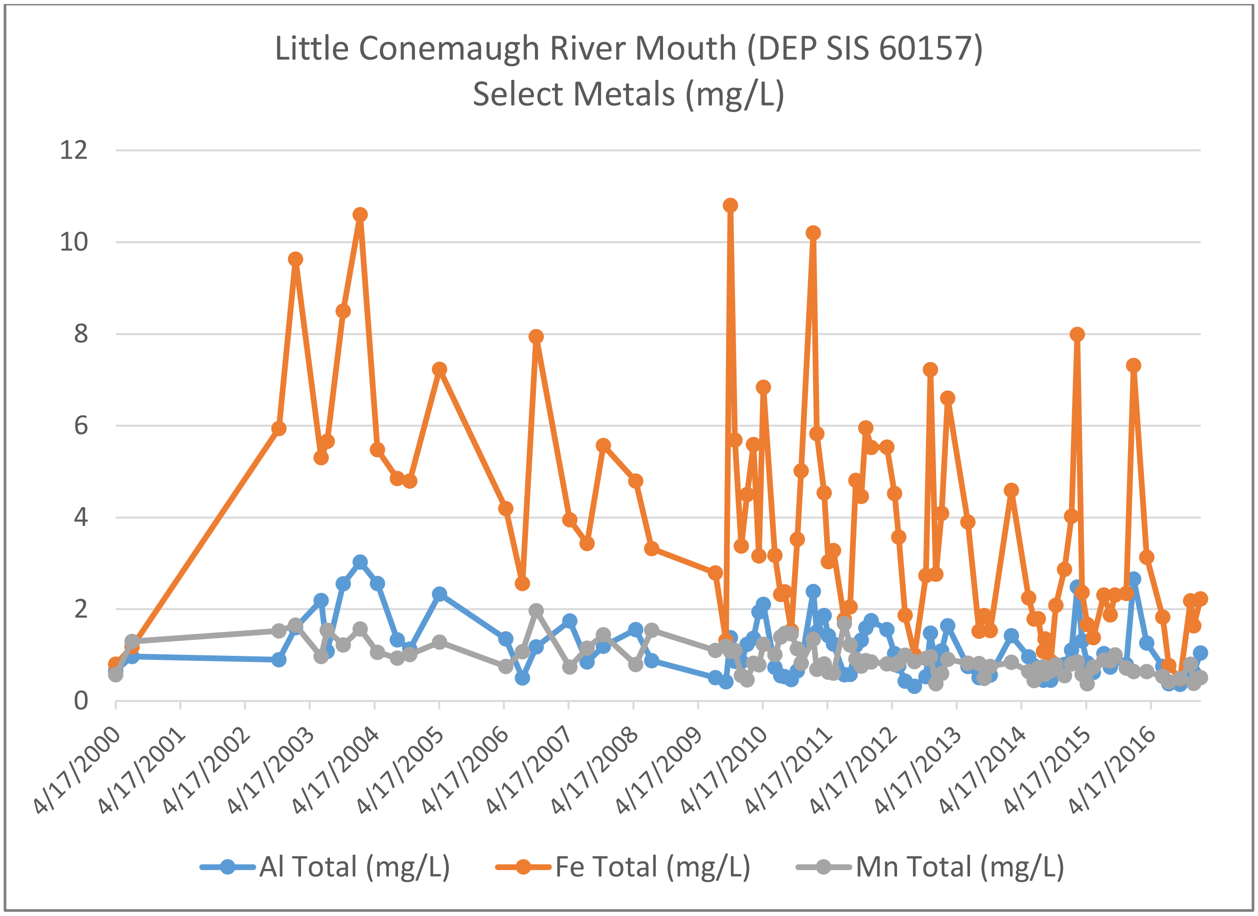


Figure 108 – Graph depicting the metal concentrations in the Little Conemaugh River at the Johns Street Bridge in Johnstown, 2000-2016. Aluminum levels should be less than 0.750 mg/L, Total Iron less than 1.5 mg/L, and Manganese less than 1.0 mg/L, according to criteria set forth in the Kiski-Conemaugh TMDL

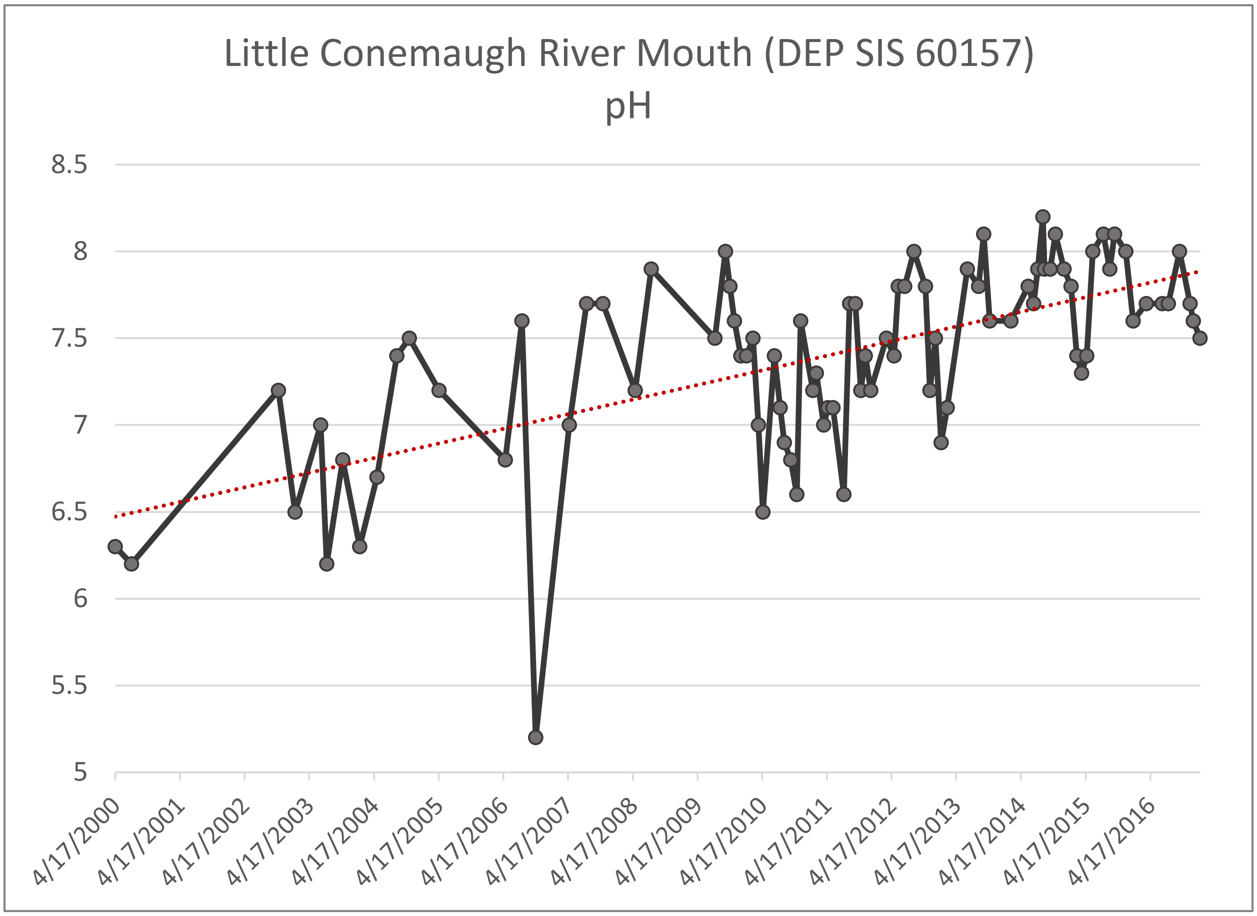


Figure 109 – Graph depicting the pH of the Little Conemaugh River at the Johns Street Bridge in Johnstown, 2000-2016. Most aquatic life needs a pH of 5 – 8 to survive

Further upstream on the Little Conemaugh River, in Wilmore, the metal concentrations are still high. According to data from samples collected by the Kiski-Conemaugh Stream Team and analyzed by the DEP's Bureau of Laboratories, in 2016, the Total Iron measured an average of 6.1 mg/L, the Total Aluminum measured an average of 1.1 mg/L, and the Total Manganese measured an average of 1.0 mg/L. These metals embed the stream substrate, which results in habitat loss and that limits biological integrity. The pH is in a range that keeps aluminum non-toxic; however, the metals must be removed to negate the embedding to improve habitat and biological integrity.

Restoration efforts in the Little Conemaugh River watershed should focus on removing aluminum and iron and lowering the pH so that it is consistently below the toxicity threshold.

Figure 110 shows that abandoned mine drainage is still the primary source of pollution in the mainstems of the Little Conemaugh and South Fork Little Conemaugh Rivers.

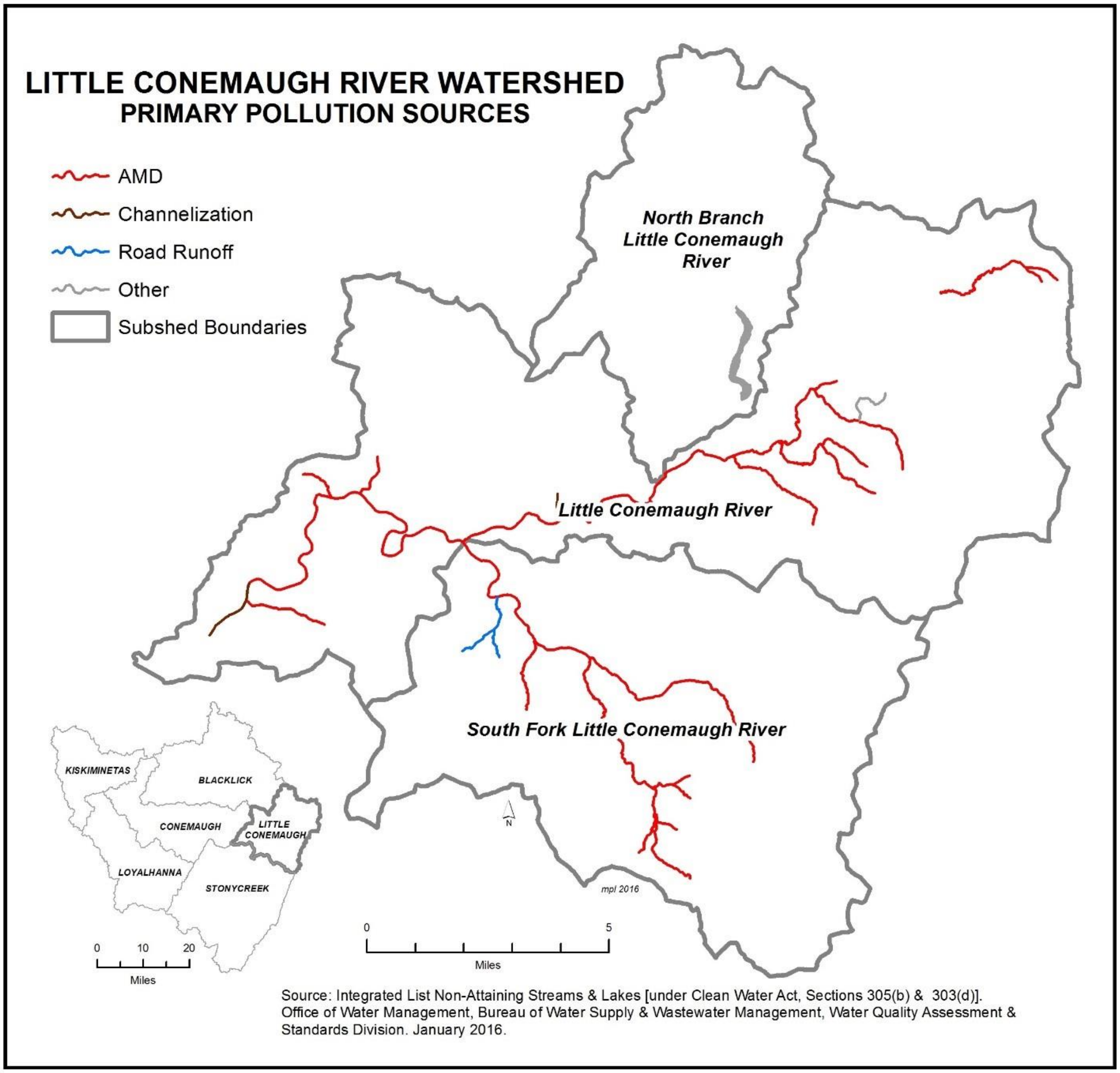


Figure 110 – Waterways on the Integrated List of Non-Attaining Streams and Lakes

Back to Table of Contents

Biological Evaluation

The Little Conemaugh River is a fourth-order tributary of the Conemaugh River located in Cambria County. The Little Conemaugh contains a rich history of America's Industrial Revolution in the form of coal extraction and steel making; however, these industries have left extremely large and very acidic drainages within this watershed.

Limited data show that the biological integrity of the mainstem of the Little Conemaugh River was severely impacted, with historical surveys revealing few fish species, most of which were tolerant to pollution. Because of the size of the Little Conemaugh River, mainstem fish sampling with wadeable gear was only possible in a few areas of the river. The sites with historical, comparable data follow.

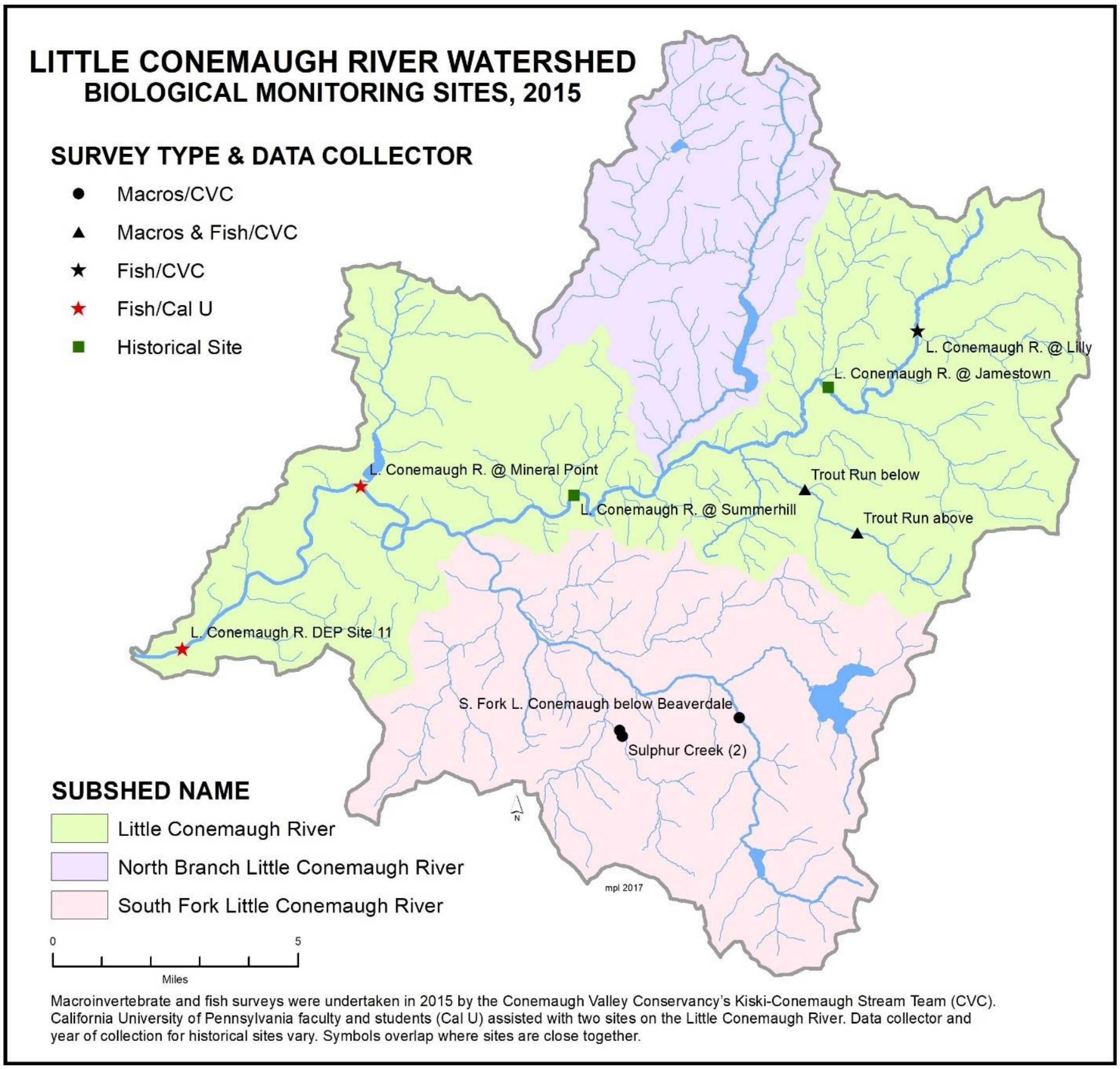


Figure 111 – Map of key biological monitoring sites, Little Conemaugh River watershed

Little Conemaugh River Mainstem Biological Comparisons

- Site 1: Little Conemaugh River @ Lilly
- Site 2: Little Conemaugh River @ Jamestown
- Site 3: Little Conemaugh River @ Summerhill
- Site 4: Little Conemaugh River @ Mineral Point
- Site 5: Little Conemaugh DEP Site 11 in Johnstown

Site 1: Little Conemaugh River @ Lilly

Site 1 is located in the headwaters of the mainstem of the Little Conemaugh River, in the town of Lilly in Cambria County, PA. This site has rural development and a history of coal mining. In a survey conducted by the DEP in 1999 (Station ID 17134) and PFBC (Site 0102), seven species of fish were collected of which one was a gamefish:

- Blacknose dace
- Central stoneroller
- Creek chub
- Longnose dace
- Mottled sculpin
- Pumpkinseed
- White sucker.

In a CVC survey completed in 2015, nine fish species were collected, including three individuals of two game fish – hatchery brook and hatchery rainbow trout.

- Blacknose dace
- Brook trout, hatchery
- Creek chub
- Johnny darter
- Longnose dace
- Mottled sculpin
- Rainbow trout, hatchery
- White sucker

This site has remained very similar over the last two decades. CVC noted severe Black Spot Disease, which is a relatively harmless and widespread parasite, in the blacknose dace.

Figure 112 – The Little Conemaugh River in Lilly

Site 2: Little Conemaugh River @ Jamestown

Site 2 is located near the town of Jamestown in Cambria County, PA and is just above the Hughes Borehole. Site 2 is approximately 3.1 miles downstream of Site 1. The most recent sampling of this site was performed on September 8, 1999 by DEP (Station ID 17132) and PFBC (Site 37611 or 0104). These agencies documented nine fish species including one gamefish:

- Blacknose dace
- Brook trout, wild
- Creek chub
- Fathead minnow
- Greenside darter
- Johnny darter
- Mottled sculpin
- White sucker.

Anglers report catching wild trout in this section. A priority in the near future should be to resurvey this area to confirm the state of the brook trout population.

Figure 113 – The Little Conemaugh River just above the Hughes Borehole.
Photo by James Eckenrode, Jr.

Back to Table of Contents

Site 3: Little Conemaugh River @ Summerhill

This site is located near the town of Summerhill in Cambria County, PA. Site 3 is about 7.5 miles downstream of Site 2. Site 3 is downstream of significant, historical mining activity and several large abandoned mine discharges on the mainstem of the Little Conemaugh River. Typically, the mine drainage impacts in the Little Conemaugh River became worse the further downstream on the Little Conemaugh River due to the cumulative impacts of numerous, large abandoned mine discharges; however, this site is also downstream of the Little Conemaugh River's confluence with the North Branch Little Conemaugh River, the water quality of which has improved, and upstream of Ehrenfeld.

PFBC sampled this site (PFBC Site 0301) in 1999 and collected three fish species – blacknose dace, creek chub, and pumpkinseed (a gamefish) – and nine individual fish. On July 21, 2008, both the DEP and PFBC surveyed fish near this site (DEP Station ID 33120, PFBC ID 8146) and collected a total of 125 individual fish representing the following 11 fish species. The number of each species collected in 2008 is indicated, while an asterisk (*) indicates a gamefish species.

- Blacknose dace – 17
- Brown bullhead – 1 *
- Creek chub – 31
- Johnny darter – 15
- Longnose dace – 2
- Mottled sculpin – 2
- Pumpkinseed – 5 *
- Rainbow trout, wild – 1 *
- Rock bass – 8 *
- White sucker – 42
- Yellow bullhead – 1 *

Site 3 has improved dramatically since 1999. Conservation efforts and the lapse in active mining operations have allowed this portion of stream to recover into a growing fishery. Further improvements upstream should improve the biological communities even more, since this area begins the warm water area of the Little Conemaugh River.

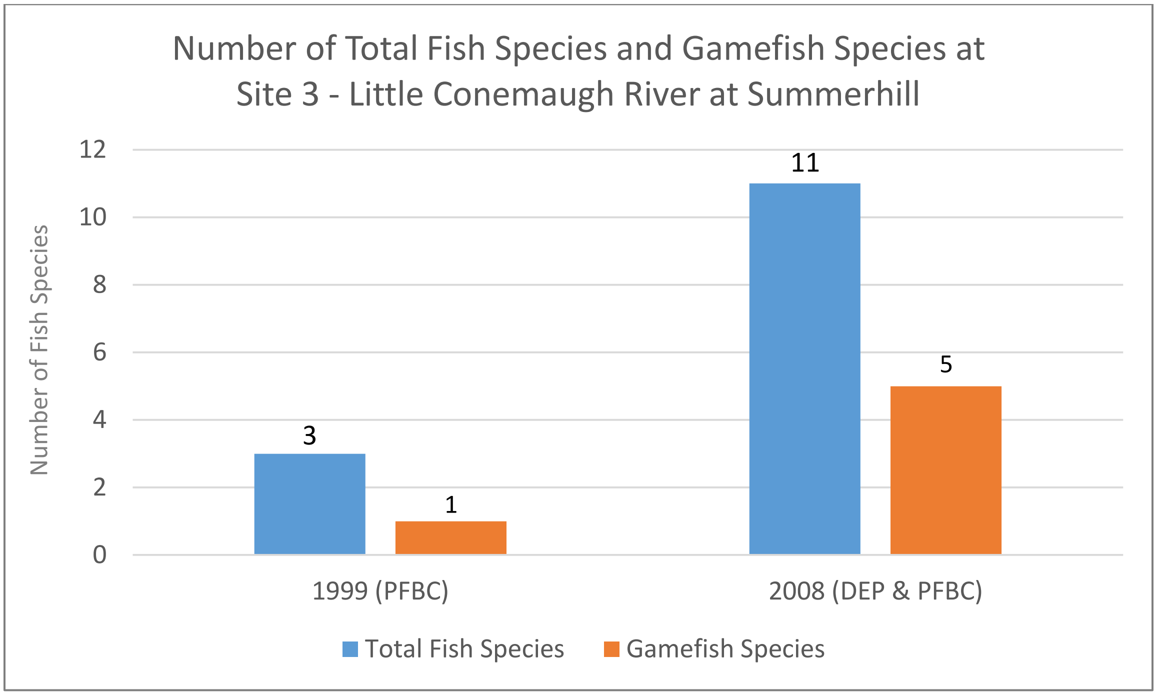


Figure 114 – Graph of fish species diversity in the Little Conemaugh River near Summerhill

Site 4: Little Conemaugh River @ Mineral Point

Historically, massive abandoned mine drainages impacted this site. Mineral Point and the surrounding region were an active coal mining and industrial area that helped fuel the steel industry and transportation needs. Site 4 is located approximately seven miles downstream of Site 3 and is downstream of the South Fork of the Little Conemaugh River.

In 1999, the DEP sampled two sites on the Little Conemaugh River in Mineral Point. One (Station ID 17125) was 300 meters downstream of Saltlick Run and the other (Station ID 17126) was 600 meters upstream of Saltlick Run. At Station 17125, only 22 creek chubs were collected. At Station 17126, 20 creek chubs, seven white suckers, and one blacknose dace were collected. The DEP noted that all fish were collected in shallow water.

In 2015, CAL U and CVC surveyed the Little Conemaugh River in Mineral Point, upstream of the Beech Hill Road Bridge that spans the Little Conemaugh, very near DEP's Station 17126. They collected seven species of fish (blacknose dace, bluntnose minnow, creek chub, fantail darter, Johnny darter, longnose dace, and white sucker) and 357 individuals in half the length of the DEP survey. While no gamefish were ever collected from this site, the 2015 sampling shows remarkable recovery largely due to the St. Michael active treatment plant along Topper Run, a tributary to the South Fork of the Little Conemaugh River in St. Michael, PA, which went online in 2013. This area has a long way to go before its fishery is fully recovered, but with continued efforts upstream, Site 4 should improve dramatically.

Back to Table of Contents

Site 5: Little Conemaugh River DEP Site 11

Site 5 is located in the City of Johnstown, PA. There are many urban, industrial, and mining impacts in this reach of the Little Conemaugh River, which is flanked by concrete river walls that were installed in the late 1930s and early 1940s by the U.S. Army Corps of Engineers for flood protection. This site is approximately one mile upstream of the Little Conemaugh's confluence with the Stonycreek River and the formation of the Conemaugh River.

This area's long history of mining, steel making, and urban sprawl has scarred the Little Conemaugh River's water quality in its lower reaches. During a survey in 1999, the DEP collected two fish species (creek chub and white sucker) and 26 individuals from a 210-meter reach at this site. In 2015, CAL U and CVC collected three fish species (blacknose dace, longnose dace, and white sucker) and 31 individuals in a 100-meter reach. This site has many unabated chemical impacts and lacks sufficient habitat as it is largely channelized. Water quality improvements upstream as well as large scale redevelopment of the channel and the surrounding urban area would be needed to abate both the physical and chemical impacts.

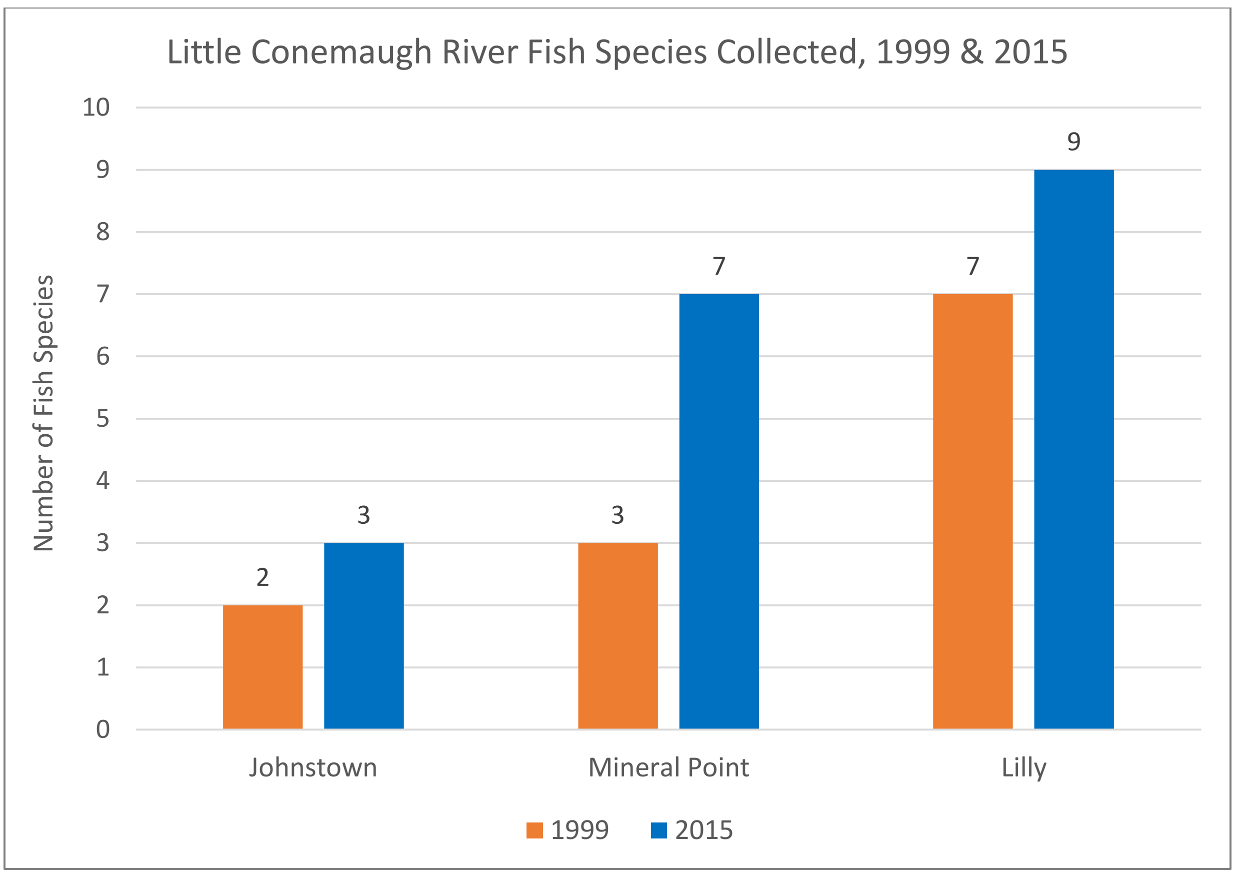


Figure 115 – Graph of the number of individual fish collected during fish surveys over time at select sites along the Little Conemaugh River

Select Little Conemaugh River Tributaries

The following paragraphs provide information on Trout Run and the South Fork Little Conemaugh River, tributaries of the Little Conemaugh River.

Trout Run

Trout Run is a headwater stream and a tributary to Kane Run, which flows into the Little Conemaugh River near Portage. The PA Fish and Boat Commission indicates that the upper portion of Trout Run supports naturally reproducing populations of trout, down to Martindale. In 2015, CVC completed fish surveys on Trout Run above and below the Puritan AMD Treatment System, about 7/10th of a mile downstream of Martindale. Upstream of the system, CVC collected 19 wild brook trout that were 50-170 mm in length, one hatchery rainbow trout, and one blacknose dace. No fish were found at the site below the system. The PFBC said they would confirm the presence of trout and likely extend the trout listing for Trout Run. Stream Restoration, Inc. received a $538,944 Growing Greener grant in 2016 to rehabilitate and potentially expand the Puritan AMD system.

Figure 116 – CVC completes a fish survey on Trout Run

Figure 117 – A male, wild brook trout in Trout Run

South Fork Little Conemaugh River

The PFBC classifies the extreme headwaters of the South Fork Little Conemaugh River, down to the Beaverdale Reservoir, as a Wilderness and Class A Trout stream, given its remote location, pristine, natural environment, and abundance of wild brook trout. The South Fork Little Conemaugh River supports wild trout reproduction down to Beaverdale, where several abandoned mine discharges enter the stream and coal refuse piles line the streambanks. Water quality diminishes after this point and virtually no biological data for the South Fork Little Conemaugh exists downstream of Beaverdale. The DEP collected macroinvertebrates near the mouth of the South Fork Little Conemaugh (Site 48958) in August 2001 and documented few Chironomidae (midges).

Conclusions

While the Little Conemaugh River watershed has been decimated by AMD for decades, operation of the St. Michael active AMD treatment system, reclamation of the Ehrenfeld Coal Refuse Pile, and promise of a Little Conemaugh Treatment Plant to address several large discharges in the near future give hope that the Little Conemaugh River will rebound to its former state and at least support a healthy fish community. Support of these larger reclamation projects is critical, as is treatment of the AMD that degrade the lower portion of the South Fork Little Conemaugh River.

Blacklick Creek Management Unit

Location

The Blacklick Creek watershed is the second largest Management Unit within the Kiski-Conemaugh River Basin, encompassing 418.5 square-miles. This watershed lies within Cambria and Indiana Counties. Pennsylvania's *State Water Plan* identifies the Blacklick Creek watershed as Watershed 18D and is lumped together with the Conemaugh River watershed. Besides the mainstem of Blacklick Creek, there are four sub-watersheds that are larger than 25 square-miles: North Branch Blacklick Creek, South Branch Blacklick Creek, Two Lick Creek, and Yellow Creek.

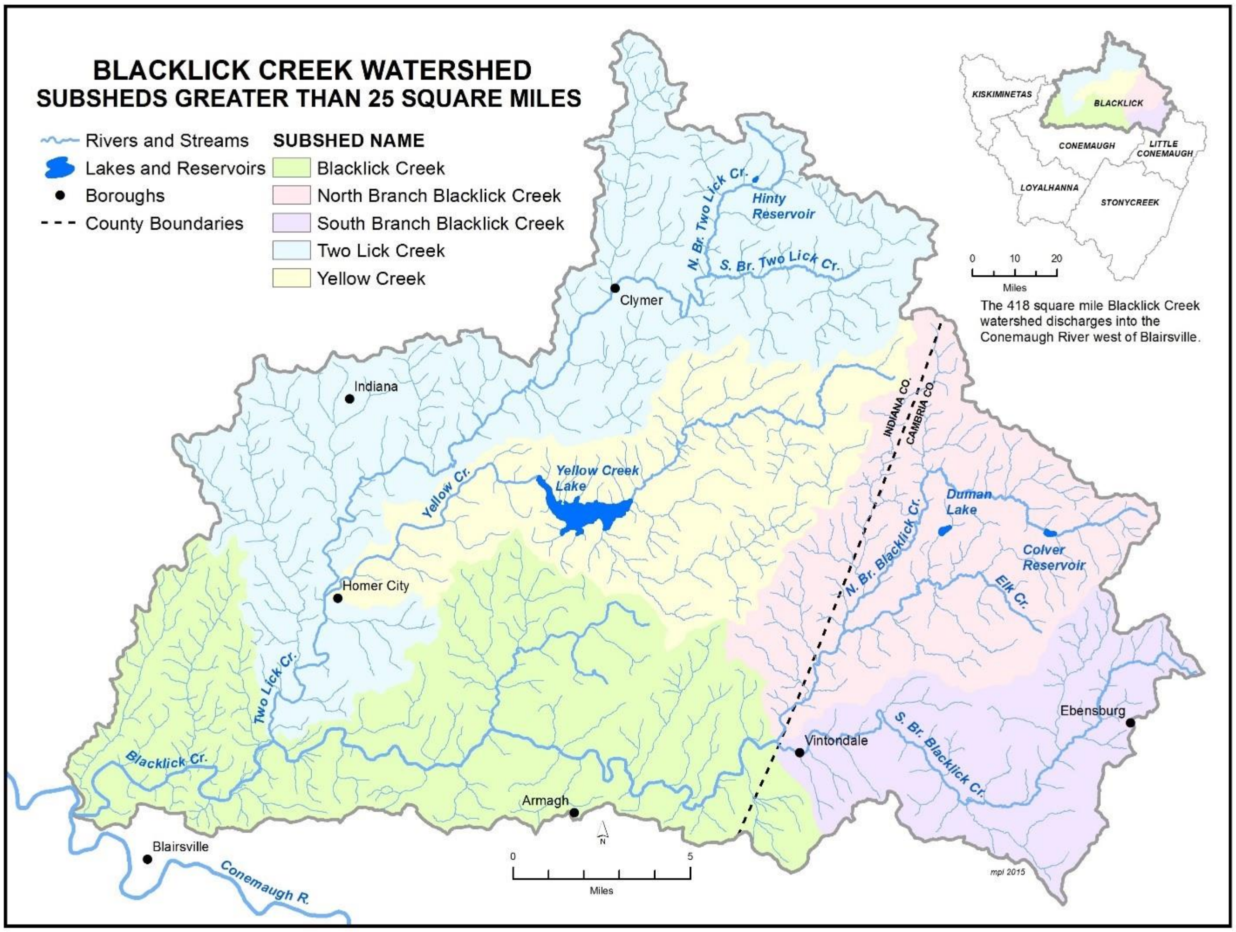


Figure 118 – The Blacklick Creek watershed and primary sub-watersheds

Land Cover

As seen on a basin-wide scale, the greatest change in land cover patterns in the Blacklick Creek Management Unit was in agriculture, with a loss of 1.3% and a 1.2% increase in developed lands. Otherwise, land cover has remained largely the same.

Land Cover Percentage in the Blacklick Creek Watershed, 1992 – 2011					
	1992	**2001**	**2006**	**2011**	**% Change**
Forest	66.5	66.7	66.2	65.6	- 0.9
Agriculture	23.2	21.9	22.0	21.9	- 1.3
Grass/Shrub	None	None	0.1	0.4	+ 0.4
Developed	9.0	9.8	9.9	10.2	+ 1.2
Mining/Barren	0.6	0.7	1.0	1.0	+ 0.4
Water	0.7	0.9	0.9	0.9	+ 0.2
Wetlands	0.0	0.0	0.0	0.0	0

Table 19

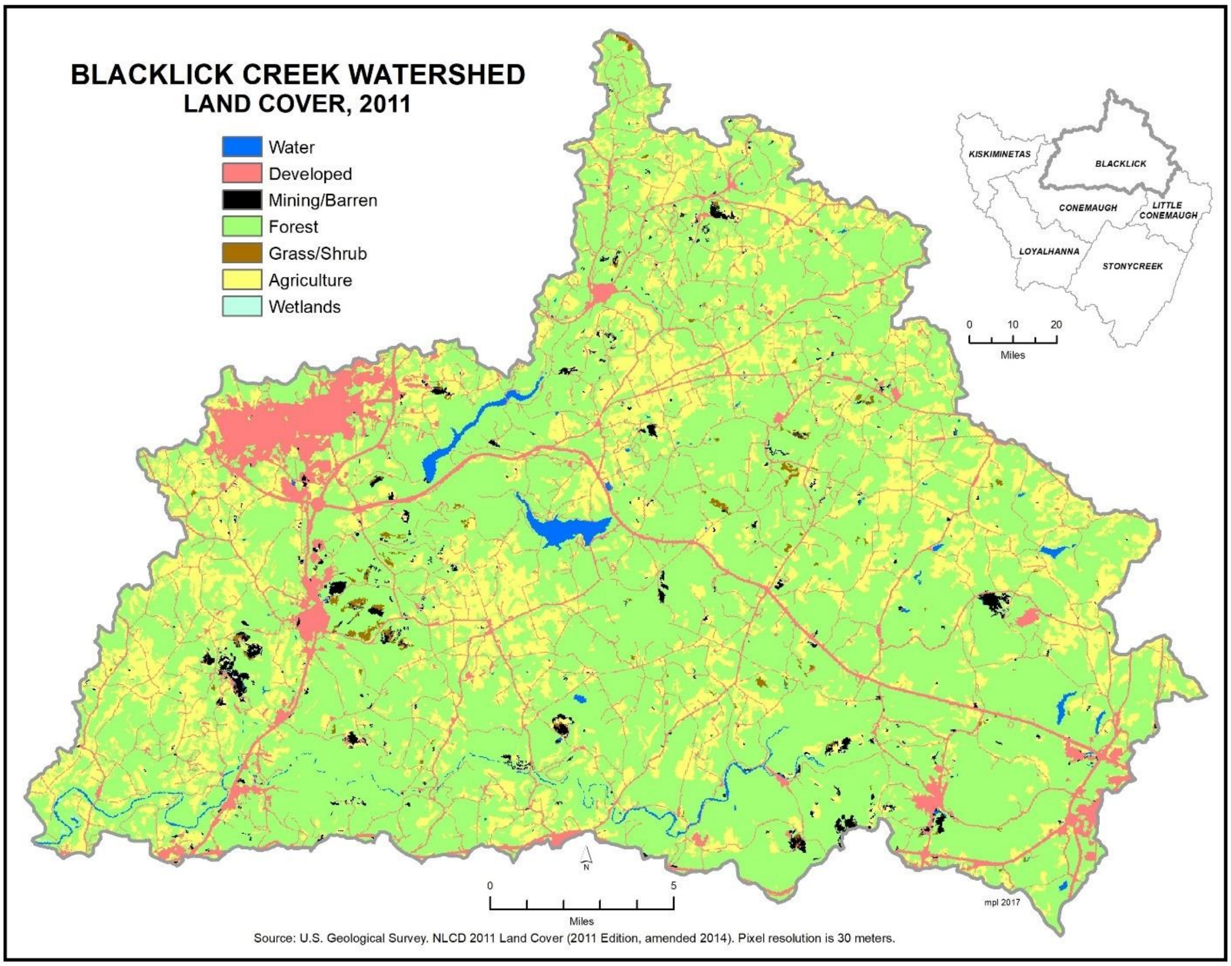


Figure 119 – Land cover of the Blacklick Creek watershed in 2011

Back to Table of Contents

Exceptional Value and High Quality Streams

Land use and resource extraction have taken a toll on the water quality of Blacklick Creek. While some improvement has occurred, much restoration work remains. There are no Exceptional Value waterways in the Blacklick Creek watershed. The South Branch Two Lick Creek and its tributaries including Bakers, Repine, Sides, and Whitaker Runs, Little Yellow Creek and its tributaries including Gillhouser Run, and Stewart Run in the South Branch Blacklick Creek sub-watershed are named streams designated as High Quality Coldwater Fisheries according to PA Code Chapter 93.

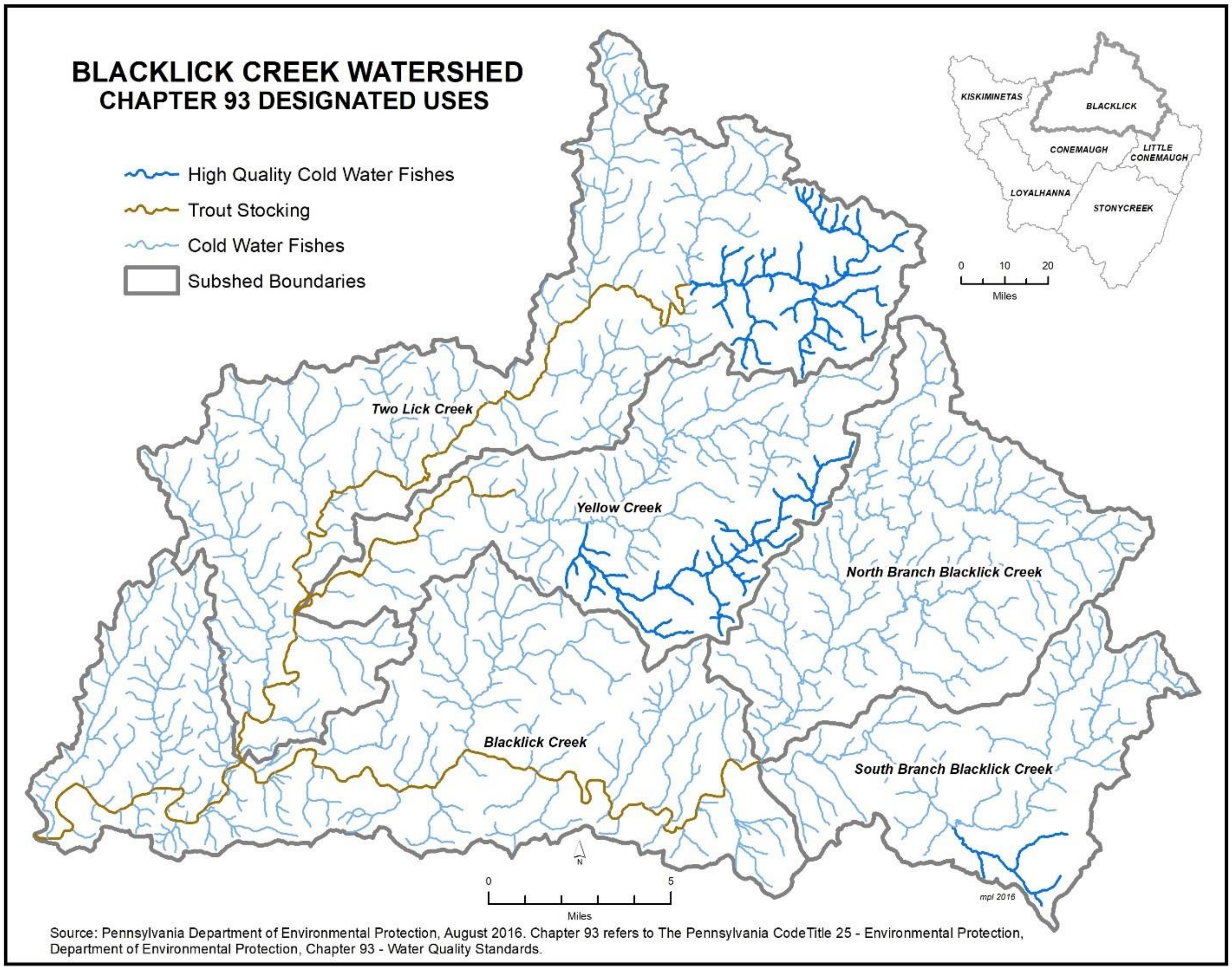


Figure 120 – Designated uses of waterways in the Blacklick Creek watershed

Abandoned Mine Drainage

L. Robert Kimball and Associates completed the *Blacklick Creek Watershed Assessment / Restoration Plan* for the Blacklick Creek Watershed Association in January 2005 to provide a holistic approach to addressing known non-point and point-source pollution throughout the watershed. It lists other known studies of the watershed, so it serves as a nice reference document.

While the *Blacklick Creek Watershed Assessment / Restoration Plan* identified poorly maintained on-lot septic systems and a lack of sewage collection and treatment in the communities of Dilltown, Kenwood, Pine Flats, Mentcle, and Diamondville as problems, (L. Robert Kimball 11), the bulk of the Assessment highlighted the AMD problem throughout the watershed and prioritized the discharges for remediation by sub-watershed. It identified 492 discharge locations throughout the Blacklick Creek watershed, but because of insufficient data at a number of sites, it only ranked 278 discharge locations by assessment, loading, and water quality on a sub-watershed level (L. Robert Kimball 47). The following provides updates to highlights from the 2005 Assessment.

North Branch Blacklick Creek Watershed

In the North Branch Blacklick Creek watershed, the assessment identified the Red Mill Mine discharge, which averages a rate of 900 gallons per minute, and refuse pile seeps as the primary sources of degradation of this waterway (L. Robert Kimball Table 15), which is of good quality above these discharges. While the Red Mill Mine discharge is too large to treat passively, it is expected to be eliminated once the Wehrum active treatment system is constructed in the next few years in a project led by the PA DEP.

South Branch Blacklick Creek Watershed

In the South Branch Blacklick Creek watershed, the assessment gave an Ebensburg Power Abandoned Mine Discharge (Site BCSB-124; R2-A) (L. Robert Kimball Table 19) the assessed rank of #1 and recommended further evaluation to accommodate the extremely high levels of aluminum, which make the site less amenable to passive treatment. This discharge seemingly originated from a coal refuse pile near Revloc that has since been reclaimed.

Six low pH, acidic discharges to Coal Pit Run also made the South Branch Blacklick Creek watershed's Prioritized Sites list. All of these are in Twin Rocks, near reclaimed and unreclaimed coal refuse piles, east of Route 271 and west of the Twin Rocks Sportsmen's Club. In August 2005, the Coal Pit Run Upper and Lower AMD treatment systems were constructed, upstream of the aforementioned discharges, and address discharges BCSB-007 and 008 from an Imperial Cardiff Coal Company Lower Kittanning mine. The Conemaugh Valley Conservancy's Kiski-Conemaugh Stream Team collects water samples from these two treatment systems quarterly and the results show that the systems are working well; however, inconsistent, fluctuating water quality in Coal Pit Run and the 2015 fish surveys completed by CVC above and below treated effluents demand an investigation into sources of degradation that render Coal Pit Run lifeless. The PA Fish and Boat Commission did not find any fish in Coal Pit Run during their survey on July 29, 2017.

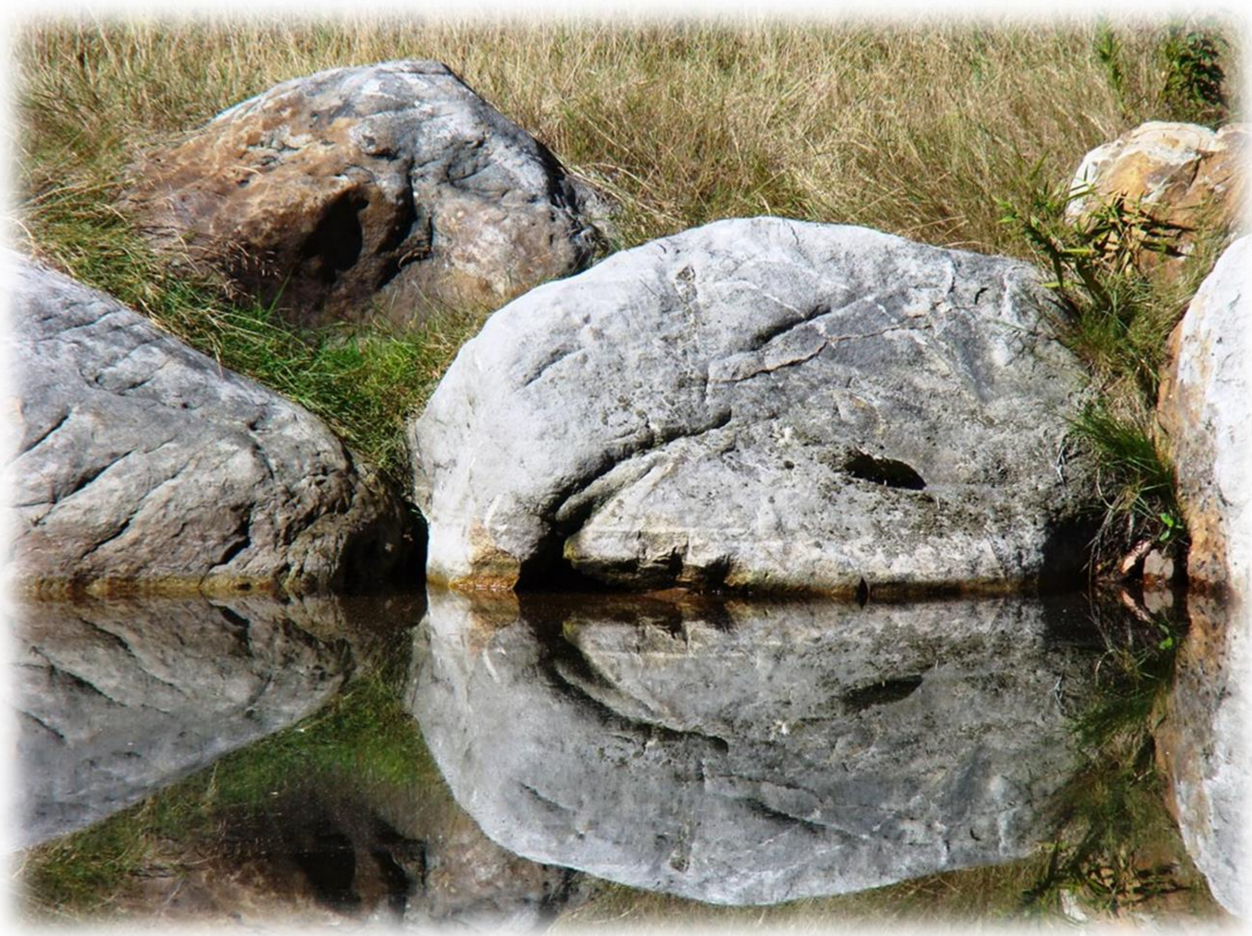


Figure 121 – A reflection yields a smiley face at the Coal Pit Run A system

Upper Two Lick Creek Watershed

The 2005 Assessment identified ten discharges out of 135 for prioritization in this sub-watershed (L. Robert Kimball Table 26). A low flow, very high aluminum discharge (UTLC-191) that comes from a deep mine and coal refuse pile was ranked number one. This discharge is west of Clymer, along Township Road #685. Its status is unknown.

The second discharge listed is UTLC-220, also known as the Diamondville Discharge. This discharge flows into Two Lick Creek upstream of the Richards AMD Treatment Systems and while the stream bottom is coated in iron and aluminum oxides, a diverse community of fish may be found downstream of the Richards treatment systems' effluents. The Conemaugh Valley

Conservancy's 2015 fish survey on the South Branch of Two Lick Creek here found 18 species of fish including one hatchery and three wild brown trout.

The status of the remaining eight discharges appear unchanged since the 2005 Assessment.

Lower Two Lick Creek Watershed

The 2005 Assessment identified six discharges out of 23 for prioritization in this sub-watershed (L. Robert Kimball Table 26). Five of the six discharges were deemed to have high flows, with the worst discharge – LTLC-061, the Risinger Shaft Discharge – having very high flows between 1,115 - 3,376 gallons per minute. The Risinger Discharge flows into Two Lick Creek north of Homer City and about 6.5 miles downstream of the Two Lick Creek Reservoir (KSTU 5). Its poor water quality, high volume, and location along Two Lick Creek make it a continuing impairment to water quality.

LTLC-051, one of the six prioritized discharges, is also known as the Penn Hills No. 1 Mine discharge and flows into Two Lick Creek Reservoir, a facility built by electric companies in the 1960s to provide water for the current Homer City Generating Station. This discharge arises from the Lower Kittanning coal seam and, unlike the Penn Hills No. 2 Mine discharge that is remediated with three AMD treatment systems about 2/3rds of a mile away, it is acidic and has no alkalinity. The pH of the Penn Hills No. 1 Mine discharge is half of the Penn Hills No. 2 Mine discharge and its flow rate seems to have increased over the last several years.

Figure 122 – The Penn Hills No. 2 Mine discharge flows into a settling pond

Lower Yellow Creek Watershed

The 2005 Assessment identified 13 of 54 discharges for treatment (L. Robert Kimball Table 42). While the very high aluminum levels (586 mg/L) of LYC-095 rank this discharge as number one in the assessment for worst water quality, discharge LYC-086 – the Lucerne #2 Borehole at Route 119 – ranks number one for loading. High iron (69 mg/L) and moderate, but toxic aluminum (14 mg/L), coupled with flows measured up to 6,732 gallons per minute make this the largest discharge in the Yellow Creek watershed.

Four identified discharges (LYC-026, 028, 029, and 030) originate north of Route 954 and are collected and treated at the Yellow Creek 1A and 1B AMD treatment systems, which are on the south side of Route 954. These systems did not work well except in the last few years, when flow entering the systems decreased for unknown reasons (SRI & BioMost 69, 72).

Back to Table of Contents

Blacklick Creek Mainstem

The 2005 Assessment identified 10 of 130 discharges for remediation (L. Robert Kimball Table 11). Number one is BCMS-214, also known as Virginian No. 14, a high aluminum and iron discharge with flows ranging from 115 - 2,384 gallons per minute that drains into Aulds Run. It remains an untreated discharge.

The Wehrum Mine Shaft Discharge, BCMS-013, ranked fourth. With very high flows of 958 - 4,058 gallons per minute, high metals, and low pH, it severely degrades Blacklick Creek. As previously alluded to, the PA DEP is negotiating land agreements and designing an active AMD treatment system for this discharge. Using funds from the Title IV AML Set-Aside program, the DEP will oversee the construction, operation, and maintenance of this treatment system. This project will combine three mine pools through a gravity drain and pumping and eliminate the Red Mill Discharge from the Commercial 16 Mine Pool, the "Three Sisters" Discharge from the Vinton No. 6 Mine Pool, and the Wehrum Shaft Discharge from the Wehrum Mine Pool. This project is expected to restore 22 miles of the mainstem of Blacklick Creek to a "Tier Two Restoration Level," which is a recreational fishery (PA DEP BAMR).

Figure 123 – A beaver dam slows the flow of the Wehrum discharge

Figure 124 – The "Three Sisters" discharge creates a stream of many colors in the North Branch Blacklick Creek

Not surprisingly, AMD is the number one source of pollution in the Blacklick Creek watershed, as shown in Figure 125, which displays data obtained from the PA DEP's Integrated List of Non-Attaining Streams and Lakes.

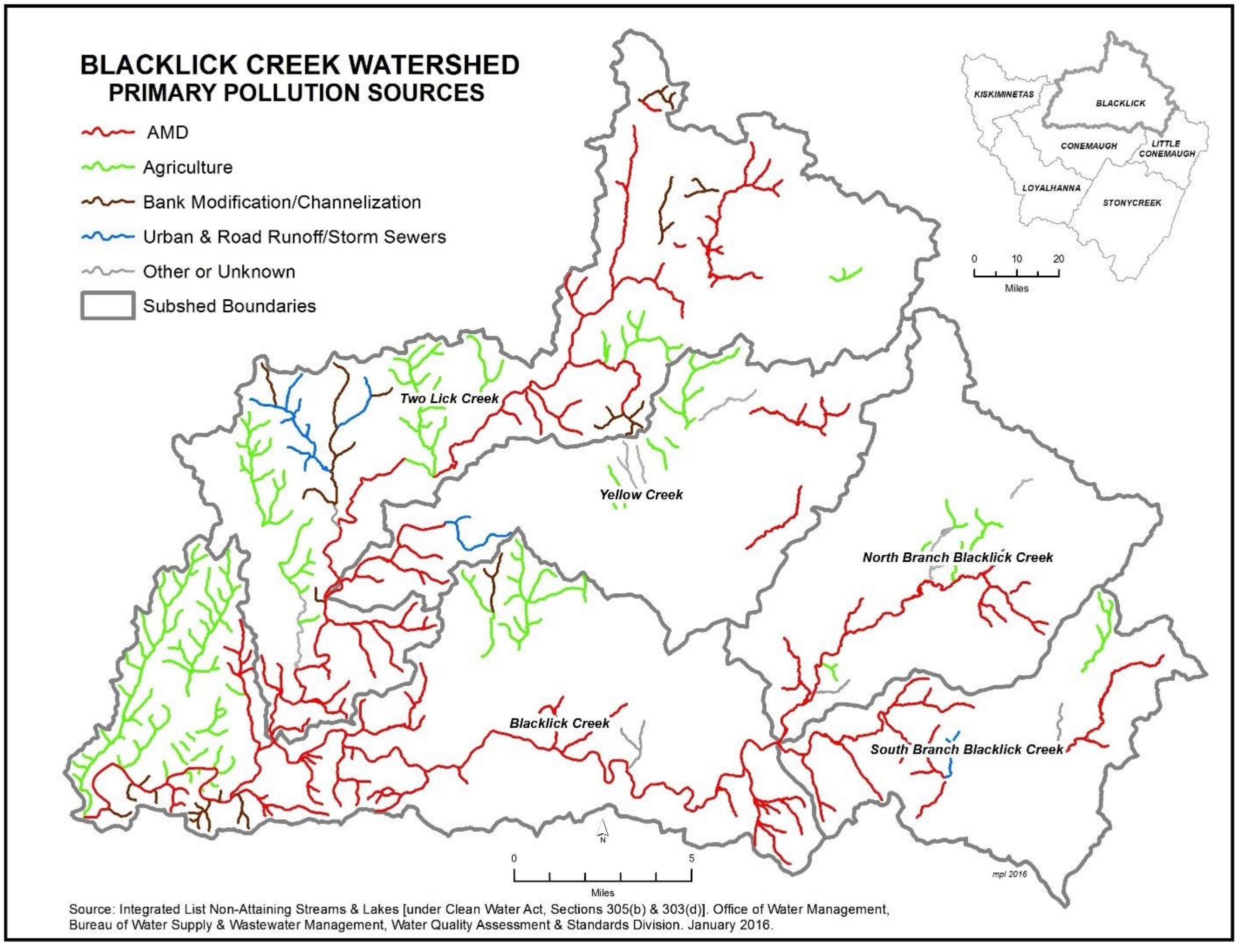


Figure 125 – Waterways on the Integrated List of Non-Attaining Streams and Lakes

Back to Table of Contents

AMD Treatment Systems

As demonstrated, there are numerous abandoned mine drainages in the Blacklick Creek watershed. There are also several AMD treatment systems (please see Figure 126) that work with varying degrees of efficacy.

As mentioned in previous watershed sections, Stream Restoration, Inc. (SRI) worked to evaluate all of these systems and their conclusions and recommendations may be found on the Datashed website.

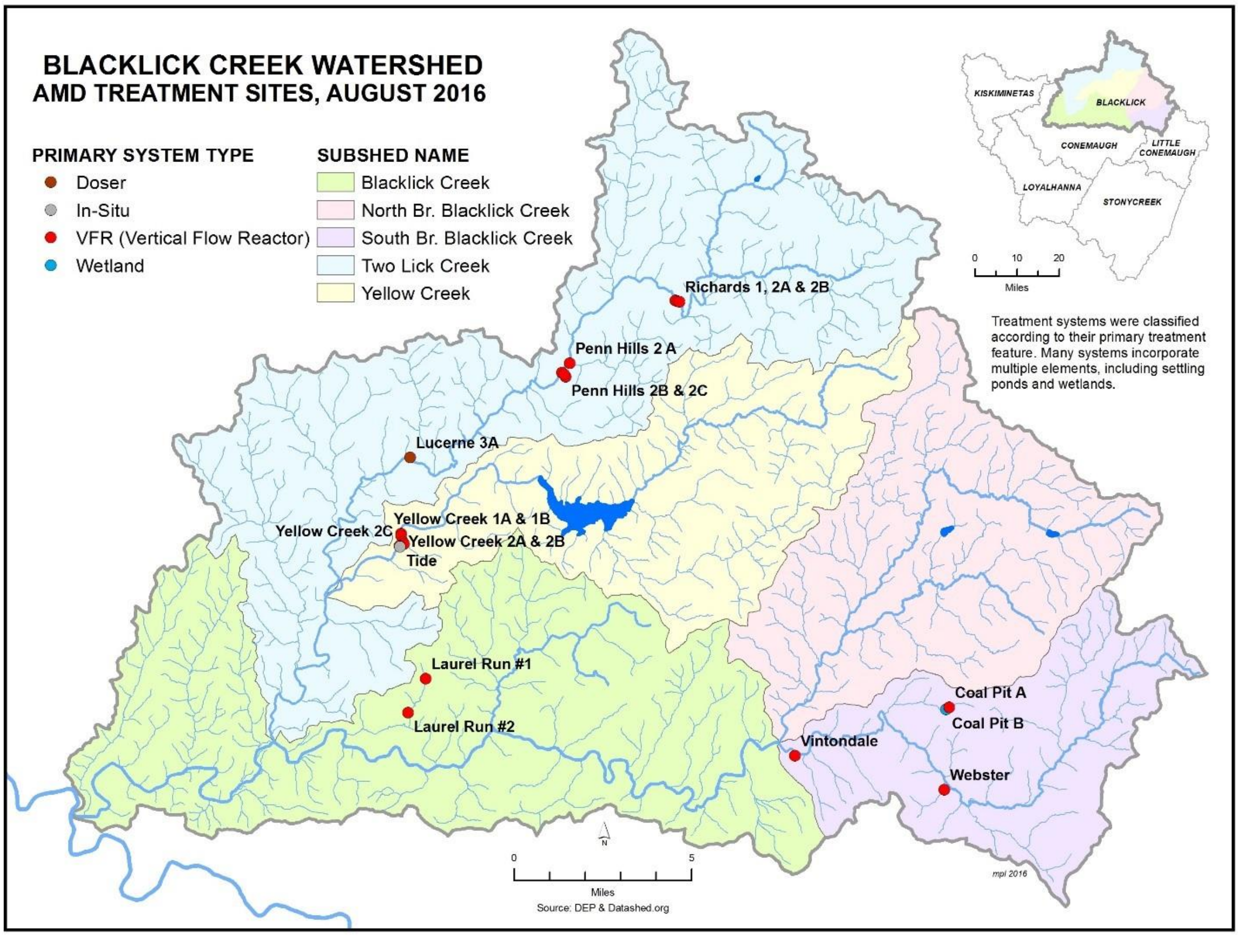


Figure 126 – Map of the AMD treatment systems in the Blacklick Creek watershed

Back to Table of Contents

Water Quality

The water quality of Blacklick Creek, particularly in its lower section, was so poor for so long, very little chemical and biological data exist for it. In the PA DEP's eMapPA program, the most downstream water quality monitoring point on Blacklick Creek is at the Newport Road Bridge, about 6/10ths of a mile from its mouth, and can be referenced as DEP SIS 26296. Sixteen data sets exist for this site for the time period between February 1997 and March 2002. The data show that the pH averaged 5.8 and that Blacklick Creek held about 13 mg/L of alkalinity here, although acidity was present in 60% of the samples. Metal concentrations slightly exceeded State criteria. Total Aluminum averaged 0.8 mg/L; Total Iron averaged 2.0 mg/L; and Total Manganese averaged 0.6 mg/L. This site can receive backwash from the Conemaugh River Reservoir.

Moving 2.9 miles upstream, the next most downstream site is at the Route 217 Bridge (DEP SIS 120224). Five data sets between September 2012 and April 2016 exist for this site. The data show that, at least since 2012, Blacklick Creek has been net alkaline with metals below the State maximum criteria four of the five times.

Moving another 2.5 miles upstream, the next monitoring site on the mainstem of Blacklick Creek is at the Campbells Mill Road Bridge (DEP SIS 120325 and 145964). There are five data sets collected on the same dates as samples from the Route 217 Bridge. A DEP Mine Inspector seems to collect yearly samples from this site under DEP SIS 120325. In November 2015, the Conemaugh Valley Conservancy's Kiski-Conemaugh Stream Team began quarterly sampling at this site under DEP SIS 145964 to begin acquiring seasonal water quality data to capture upstream restoration efforts on the mainstem of Blacklick Creek and of its contribution to the Conemaugh River. Data show that since 2012, the pH has ranged from 6.7 – 7.9. Iron and aluminum levels in the winter and spring are above State criteria, but in the lower flow periods, they are below. There are very little biological data for Blacklick Creek, but fish totals from surveys completed in 2011 and 2015 may be found in the Biological Evaluation section on page 180.

Another two miles upstream, DEP SIS 42063 is a water monitoring point on Blacklick Creek near its confluence with Weirs Run that provides seven data sets between April 1997 and April 2012. Some parameters from this site are displayed on the following graphs and show improvement in pH since 1999, alkalinity measurements trending upwards, acidity being removed, and select metals at or below detectable levels.

Visually, Blacklick Creek looks much better than in the past, but fluctuating water chemistry and embeddedness caused by decades of pollution keep this watershed among the most degraded in the Kiski Basin.

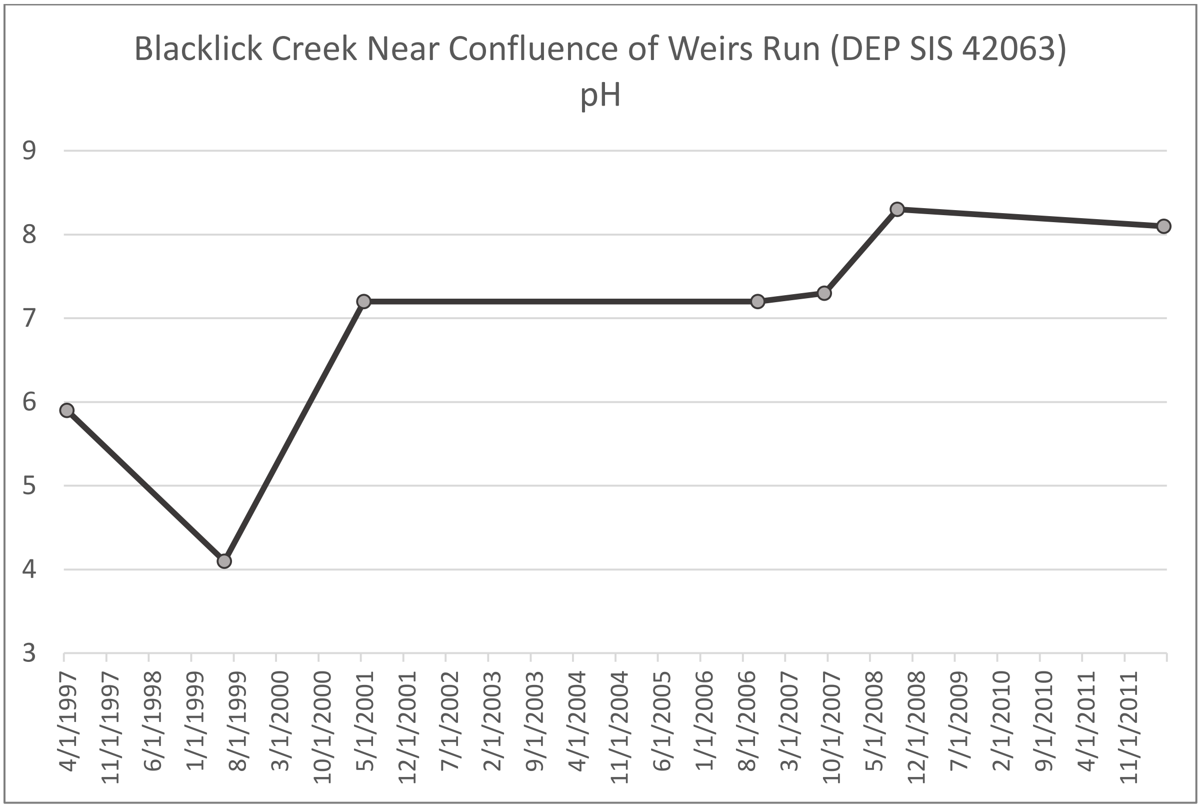


Figure 127 – Graph depicting the pH of Blacklick Creek near Weirs Run, 1997 – 2011. Most aquatic life needs a pH of 5 – 8 to survive

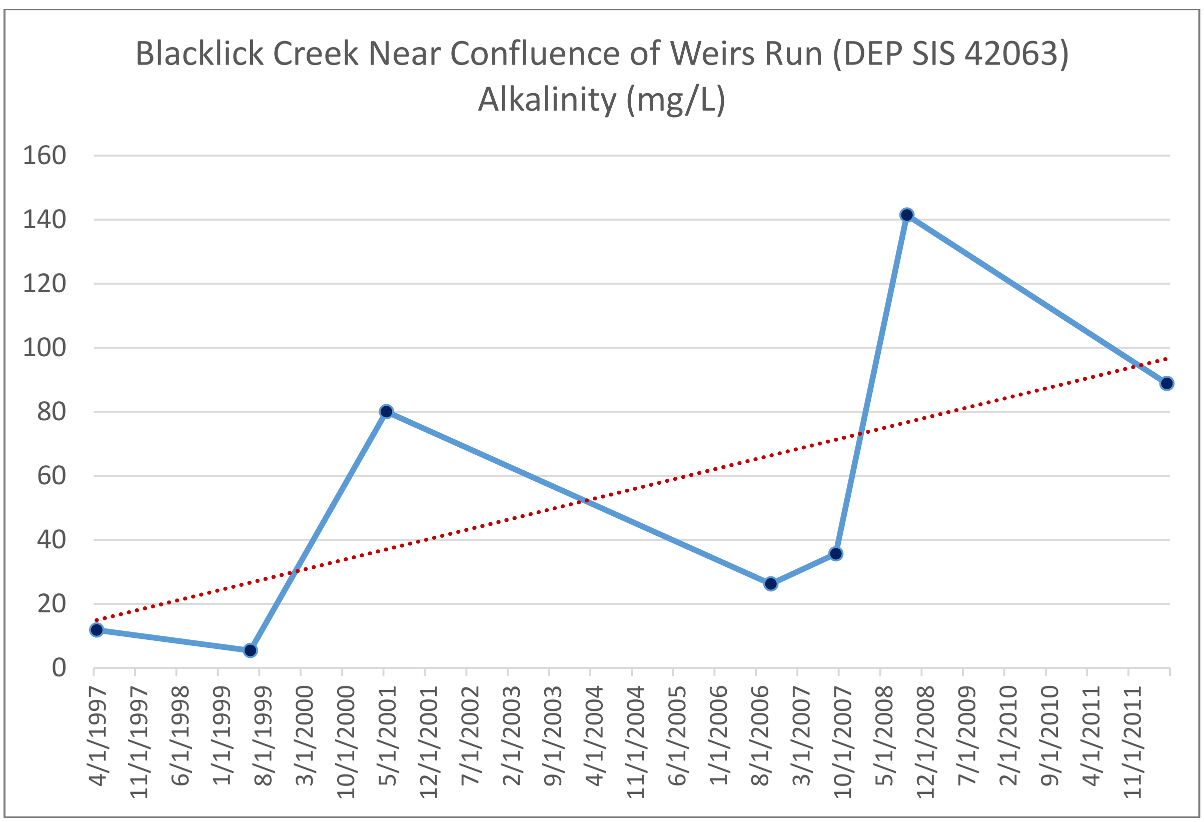


Figure 128 – Graph depicting Alkalinity levels of Blacklick Creek near Weirs Run, 1997 – 2011. Alkalinity levels of 20 mg/L or more are preferred

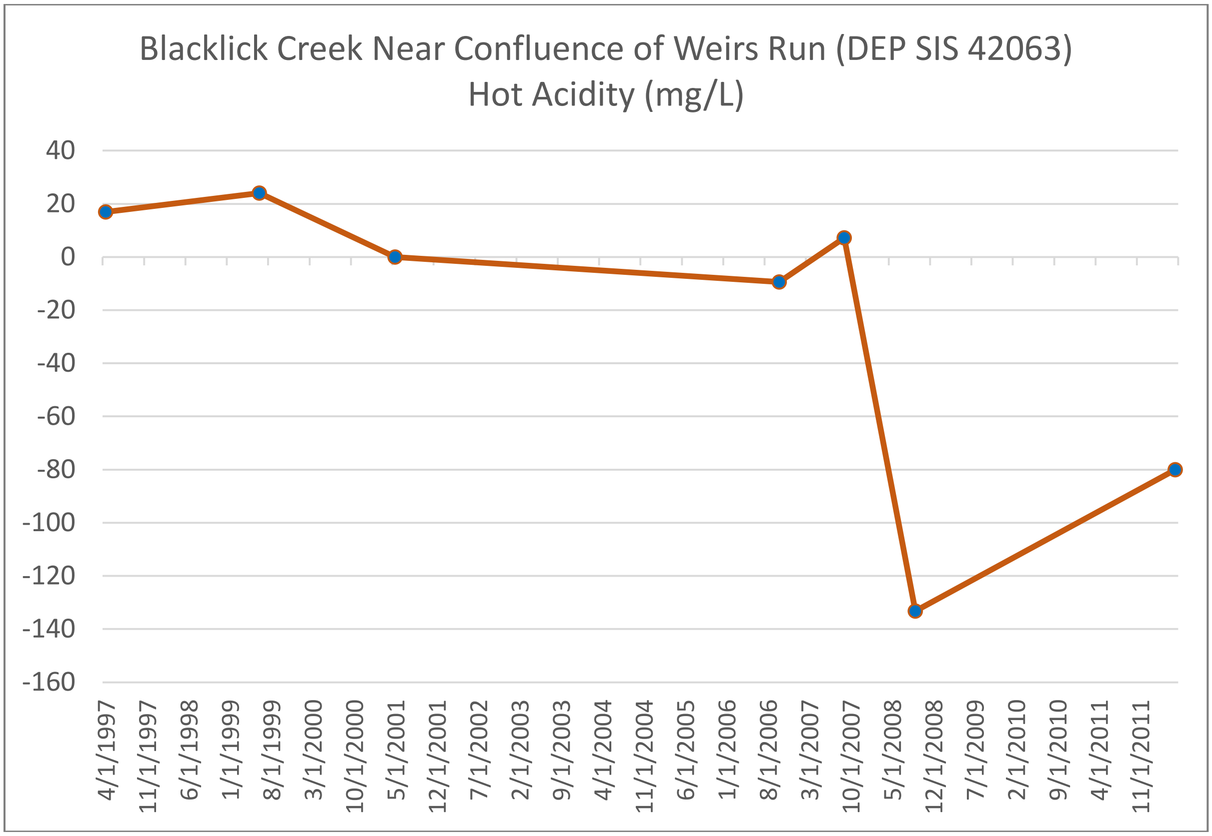


Figure 129 – Graph depicting Acidity levels of Blacklick Creek near Weirs Run, 1997 – 2011. Figures at or below zero indicate net alkaline water

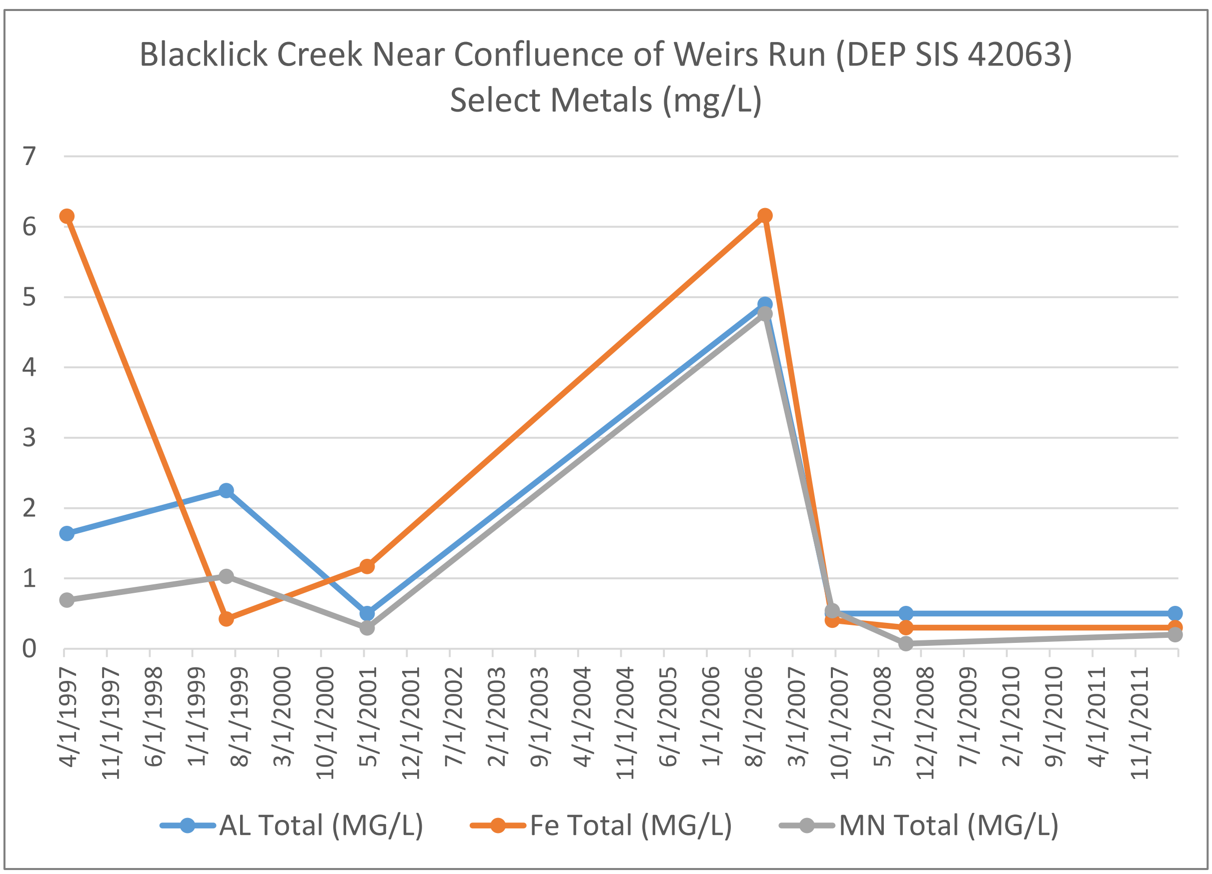


Figure 130 – Graph depicting the metal concentrations in Blacklick Creek near Weirs Run, 1997 - 2011. Aluminum levels should be less than 0.750 mg/L, Total Iron less than 1.5 mg/L, and Manganese less than 1.0 mg/L, according to criteria set forth in the Kiski-Conemaugh TMDL

Biological Evaluation

Blacklick Creek is a fourth or fifth-order tributary of the Conemaugh River. It is the second largest sub-watershed of the Kiski Basin and the least studied. From its headwaters in Cambria County, Blacklick Creek flows through Indiana County to its confluence with the Conemaugh River approximately three miles northwest of Blairsville.

This watershed is the most industrialized of the Management Units and still possesses the most active industrial and mining activity. The legacy of the Blacklick Creek watershed is that of resource extraction, energy production, and industrial business. In the 1980s and 1990s, state agencies considered Blacklick Creek to be too impaired by industrialization and mine drainage to even survey; therefore, the only data available on this watershed are from the mid-2000s to present day.

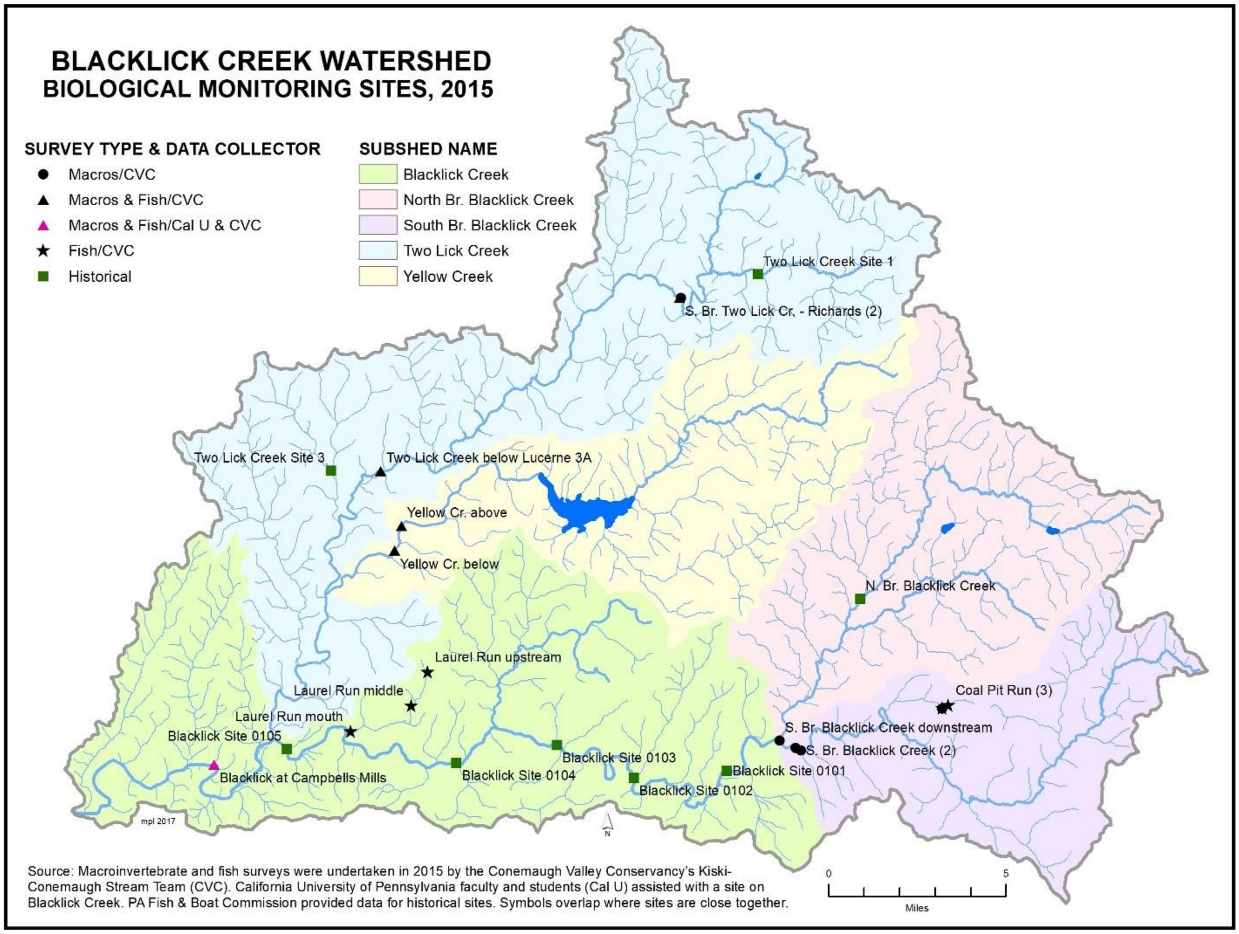


Figure 131 – Map of key biological monitoring sites, Blacklick Creek watershed

Back to Table of Contents

Blacklick Creek Mainstem Biological Comparison

In August 2011, the PA Fish and Boat Commission (PFBC) surveyed six sites along the mainstem of Blacklick Creek:

- Site 0101 – RM 30.32 – Blacklick Creek @ Wehrum Road Bridge in Wehrum.
- Site 0102 – RM 25.39 – Blacklick Creek @ Route 403 in Dilltown.
- Site 0103 – RM 21.28 – Blacklick Creek @ Route 56 north of Armagh.
- Site 0104 – RM 17.78 – Blacklick Creek @ Route 259 Bridge in Heshbon.
- Site 0105 – RM 11.13 – Blacklick Creek @ Old Indiana Road (Township Road 660) near Saylor Park in Josephine.
- Site 0106 – RM 6.21 – Blacklick Creek @ Campbells Mill Road Bridge near Blairsville.

The following graph displays the number of individual fish and the number of species collected during the PFBC's surveys, which encompassed a 200-meter reach at each location, while Table 20 lists the fish species collected at each site.

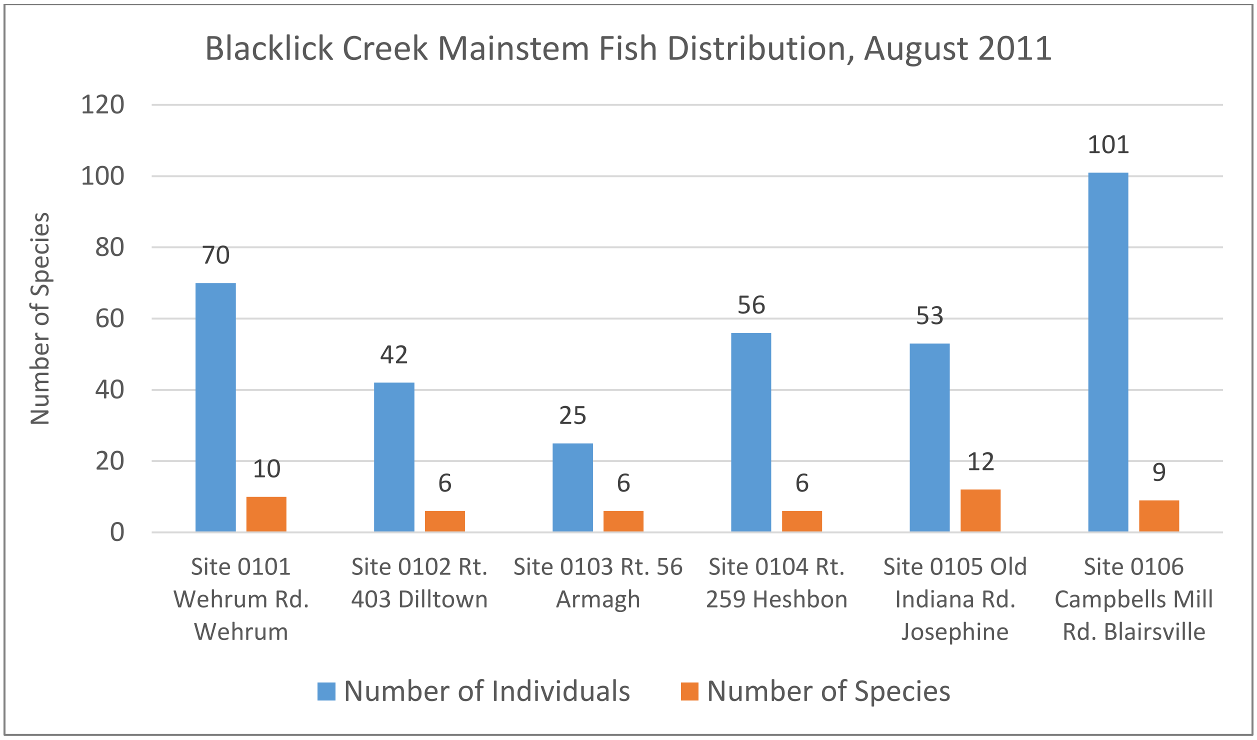


Figure 132 – Graph showing the number of individual fish and the number of fish species collected during fish surveys of Blacklick Creek, 2011

PFBC Fish Survey Results from Blacklick Creek at Campbells Mill, August 2011						
	8/22/2011	8/22/2011	8/23/2011	8/23/2011	8/24/2011	8/24/2011
	RM 30.32	RM 25.39	RM 21.28	RM 17.78	RM 11.13	RM 6.21
Common Name	**Site 0101**	**Site 0102**	**Site 0103**	**Site 0104**	**Site 0105**	**Site 0106**
Blacknose Dace	36		6	2	1	
Blackside Darter	1	4			2	
Bluegill		9			11	10
Bluntnose Minnow	9	12			8	18
Central Stoneroller			1		1	5
Common Shiner	2			16		
Creek Chub	3		14	34	9	
Fantail Darter						4
Greenside Darter						13
Green Sunfish					1	
Johnny Darter	6	13	1			
Logperch	1				5	
Northern Hogsucker			1	1		20
Rainbow Darter					4	24
Rock Bass	1	2			7	5
Smallmouth Bass				1	2	2
Striped Shiner	5		2	2		
White Sucker	6	2				
Yellow Bullhead					2	
Total Catch:	**70**	**42**	**25**	**56**	**53**	**101**
Total Species:	**10**	**6**	**6**	**6**	**12**	**9**

Table 20

The fish surveys completed on the mainstem sites of Blacklick Creek indicate a depressed fish community. The PFBC notes that while there are a few desirable fish species for anglers such as bluegill and smallmouth bass, the size of the fish would disappoint most anglers. Blacklick Creek is a large stream and should harbor a riverine fish species complement similar to the Conemaugh River. However, the fish diversity is severely depressed especially when compared to other recovering large streams in the Kiski Basin such as the Conemaugh and Stonycreek Rivers.

The PFBC's Site 0101 is downstream of the confluence of the North and South Branches of Blacklick Creek in Vintondale, but above the Wehrum Discharge. Overall, the North Branch does not have that bad of water quality. Site 0102 is in Dilltown, downstream of the Wehrum Discharge, which explains the loss of fish diversity and numbers at this site. Numerous mine discharges and seeps further degrade Blacklick Creek near the Route 56 crossing. By the Route

259 crossing in Heshbon, the number of fish in Blacklick Creek increases, likely from dilution provided by higher quality streams such as Brush Creek. Further downstream in Josephine, Blacklick Creek continues its recovery, probably from AMD remediation efforts along its Laurel Run tributary. The most downstream site, 0106, is downstream of the confluence of Blacklick Creek and Two Lick Creek, which provides better quality water to Blacklick; however, embeddedness from decades of metal loading and poor habitat, particularly a bedrock bottom, depress fish diversity at this site. The PFBC gave all the surveyed sites a rating of sub-optimal for habitat for all sites except 0102, which received a marginal rating. PFBC notes that many stretches of Blacklick Creek have the desired mix of riffles, runs, and pools, but metal precipitation limits macroinvertebrates and hence, a food source for fish.

In 2015, CAL U and CVC surveyed Site 0106 and found it to be relatively unchanged since the PFBC's survey in 2011, as Table 21 shows. The lack of individuals in the 2015 sampling can be attributed to the length of stream sampled; in 2011, 200 meters were surveyed while in 2015, 100 meters were. Fish species are composed primarily of pollution tolerant taxa.

Fish Survey Results from Blacklick Creek at Campbells Mill		
	8/24/2011	9/17/2015
Survey Length	*200 m*	*100 m*
Common Name	**PFBC**	**Cal U/CVC**
Banded Darter		12
Bluegill	10	
Bluntnose Minnow	18	
Central Stoneroller	5	10
Fantail Darter	4	3
Greenside Darter	13	1
Largemouth Bass		2
Logperch		2
Northern Hogsucker	20	3
Rainbow Darter	24	9
Rock Bass	5	2
Rosyface Shiner		8
Smallmouth Bass	2	
TOTAL INDIVIDUALS	**101**	**52**
TOTAL SPECIES	**9**	**10**

Table 21

The historical and current industrial and mining practices are the primary pollution sources in the Blacklick Creek watershed. Other pollutants, such as organic loading and sedimentation, could also be secondary factors for the depressed biological communities.

Back to Table of Contents

Select Blacklick Creek Tributaries

The tributaries of Blacklick Creek are diverse in biology and pollution impacts. Some smaller tributaries in the watershed harbor wild brook and wild brown trout populations, while other small tributaries are decimated by mine drainage. As part of its Unassessed Waters Initiative, the PFBC surveyed 94 sites on 89 tributaries in the Blacklick Creek watershed between 2011 and 2016. The goal of the Unassessed Waters program is to locate previously unidentified wild trout populations. If a waterway meets criteria, it can be added to the state's Wild Trout Waters list. The PFBC's effort in the Blacklick Creek watershed resulted in the addition of 18 new streams to the PFBC's list of Stream Sections that Support Natural Reproduction of Trout (Smith). These 18 streams are highlighted in red in the following list. The streams in blue were already on the Wild Trout list, but were unassessed. Wild trout were present in the streams listed in black, but their low numbers did not meet criteria, so further study is needed to determine if they could be added to the Wild Trout list. As of July 2017, the PFBC was considering the stream listed in green, an unnamed tributary to North Branch Blacklick Creek at River Mile 5.24, for Wild Trout designation, but it did not meet criteria based on the PFBC's 2014 and 2015 surveys, so it may be removed from consideration. Streams are listed according to the species of wild trout found during these more recent surveys.

Wild brook trout

1. Downey Run
2. Hill Creek
3. Little Elk Creek
4. Simmons Run
5. South Branch Brush Creek – on the Wild Trout list, but did not meet criteria in 2014, so it needs to be resurveyed to determine if it should remain on the list.
6. Spruce Hollow Run
7. UNT to Blacklick Creek (RM 31.89)
8. UNT to Little Yellow Creek (RM 5.84)
9. UNT to North Branch Blacklick Creek (RM 5.24)
10. UNT to Stewart Run (RM 2.43)
11. UNT to Williams Run (RM 0.53)
12. Walker Run
13. Williams Run – Section 2
14. Wolf Run

Wild brown trout

1. Leonard Run
2. Mardis Run
3. Penn Run
4. Rock Run – on the Wild Trout list, but did not meet criteria in 2013, so needs resurveyed.
5. South Branch Two Lick Creek – Section 3
6. UNT to South Branch Two Lick Creek (RM 1.27)
7. UNT to Yellow Creek (RM 13.96)
8. UNT to Yellow Creek (RM 15.76)
9. UNT to Yellow Creek (RM 17.82)
10. UNT to Yellow Creek (RM 18.07)

Wild brook and wild brown trout

1. Stewart Run
2. UNT to Carney Run (RM 1.01)
3. UNT to South Branch Blacklick Creek (RM 9.39)
4. UNT to South Branch Blacklick Creek (RM 10.50)

No fish were found in the following streams during the Unassessed Waters Initiative due to poor water quality or seasonal dryness:

1. Aulds Run
2. Bracken Run
3. Coal Pit Run
4. UNT to Aulds Run (RM 0.11)
5. UNT to Blacklick Creek (RM 11.75)
6. UNT to Blacklick Creek (RM 13.87)
7. UNT to Blacklick Creek (RM 21.19)
8. UNT to Blacklick Creek (RM 21.44)
9. UNT to Blacklick Creek (RM 24.89)
10. UNT to Elk Creek (RM 0.90)
11. UNT to Elk Creek (RM 6.36)
12. UNT to South Branch Blacklick Creek (RM 2.22)
13. UNT to Tearing Run (RM 0.72)
14. UNT (RM 0.58) to UNT to Elk Creek (RM 6.36)
15. Tearing Run.

The PFBC also noted that it captured the Least Brook Lamprey, a PA Candidate Species, in UNT to Little Yellow Creek (RM 0.85), UNT to Yellow Creek Lake (RM 10.84), and Muddy Run. It also found fallfish, which are not native to the Ohio River watershed, in Stewart Run.

While some sampled streams support viable wild trout populations, others harbored no wild trout and/or pollution tolerant species. Although many small streams were assessed in recent years, many yet remain to be surveyed.

North Branch Blacklick Creek

The North and South Branches Blacklick Creek come together near the Eliza Furnace in Vintondale to form the mainstem of Blacklick Creek. The PA Fish and Boat Commission surveyed a site on the North Branch near Adams Crossing in 1977, 1987, and 2003. These samplings only recorded the species richness of the site; therefore, the total number of individuals collected is not available. This site (Site 44547) exhibited depressed species richness in 1977 with only eight species, including brown trout, present. Species richness increased to 11 species in 1987 (Site 44548) and included brown bullhead and brown trout. In the 2003 sampling (Site 44549), the species richness further increased to 18 species, including six gamefish species: black crappie, bluegill, hatchery brown trout, hatchery rainbow trout, largemouth bass, and pumpkinseed. Although the headwaters of the North Branch Blacklick Creek contain wild trout populations, as indicated by other PFBC surveys, this site had no record of a wild trout population in 2003.

This site should be resurveyed to evaluate for potential reclamation efforts to assess if a wild trout population could be restored to the entire length of the North Branch Blacklick Creek. Chemical data also need to be analyzed to support this.

South Branch Blacklick Creek

In 2015, the Cambria County Conservation District contracted the Conemaugh Valley Conservancy to collect and identify macroinvertebrates from three sites on the South Branch Blacklick Creek, adjacent to and downstream of the AMD&Art treatment system in Vintondale to evaluate the existing macroinvertebrate community prior to anticipated in-stream habitat improvement work. The PA Fish and Boat Commission completed a design that would re-establish the meandering channel during low flows and add fish habitat structures in the Vintondale Flood Protection Project. All of the macroinvertebrates collected were pollution tolerant. Low diversity and low numbers of individuals reflect the effects of AMD on this section of stream. While the habitat work has not yet been funded, remediation of the AMD is essential to increasing the diversity and abundance of macroinvertebrates. Once the mine drainage is remediated, the habitat enhancements will allow for diverse biological recolonization of this reach of stream.

Figure 133 – The South Branch Blacklick Creek adjacent the AMD&Art treatment system

Back to Table of Contents

Further upstream on the South Branch Blacklick Creek, in Nanty Glo, a similar fish habitat and streambed project was completed in the summer of 2017 within the Nanty Glo Flood Protection Project. The Cambria County Conservation District utilized Growing Greener grant funds and community support to deepen the streambed and add meanders to reduce sediment deposited in the stream and improve trout habitat. PFBC-designed fish habitat structures were also added. Local sportsmen created the West Branch Fishing Club to stock the stream and encourage fishing in town (Griffith).

Two Lick Creek

Two Lick Creek, the largest tributary of Blacklick Creek, has a history of mining and industrial impacts, but it also has one of intensive reclamation efforts. Two Lick Creek is the most heavily surveyed area of the Blacklick Creek watershed. Due to the efforts of volunteers, sportsmen's groups, and others, this waterway has received attention and funding for large reclamation efforts. In 2007, the Ken Sink chapter of Trout Unlimited published a coldwater heritage conservation plan for Two Lick Creek. Two Lick Creek is alkaline by nature, but there are several acidic and alkaline mine discharges that historically embedded the substrate of the stream with metals. The embeddedness greatly reduces the viability of trout spawning success.

The following sites on the mainstem of Two Lick Creek have three or more historical data sets that document gamefish populations and recovery.

- **Site 1**: South Branch of Two Lick Creek at Wandin Road (SR1014), downstream of confluence with Whitaker Run (Lat: 40.67361, Long: -78.9378)
- **Site 2**: Two Lick Creek at Route 954 (Lat: 40.59139, Long: -79.14)
- **Site 3**: Two Lick Creek at Old Route 119 (Lat: 40.562778, Long: -79.165278).

Site 1: South Branch of Two Lick Creek

Figure 134 illustrates the progression through time of wild trout population numbers in the most upstream site, Site 1, based on PA Fish and Boat Commission data (Sites 25158-25161).

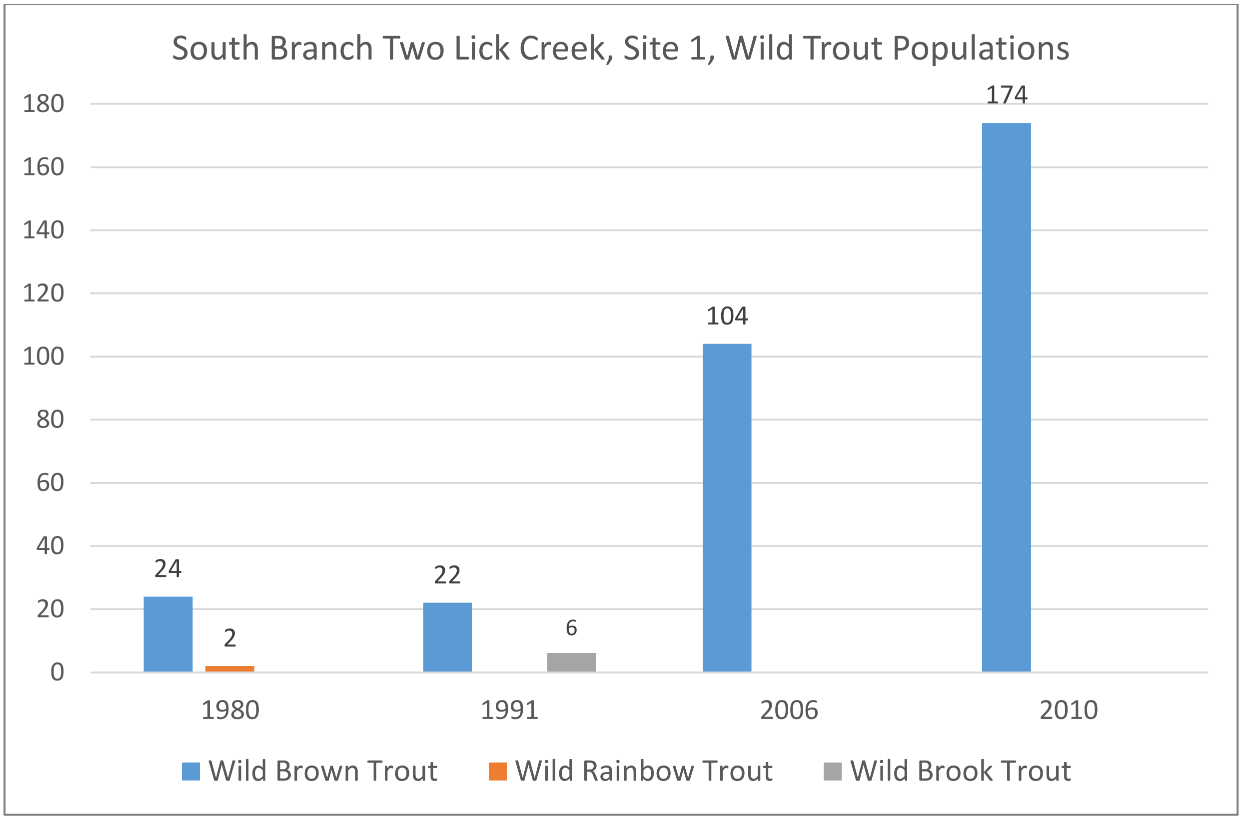
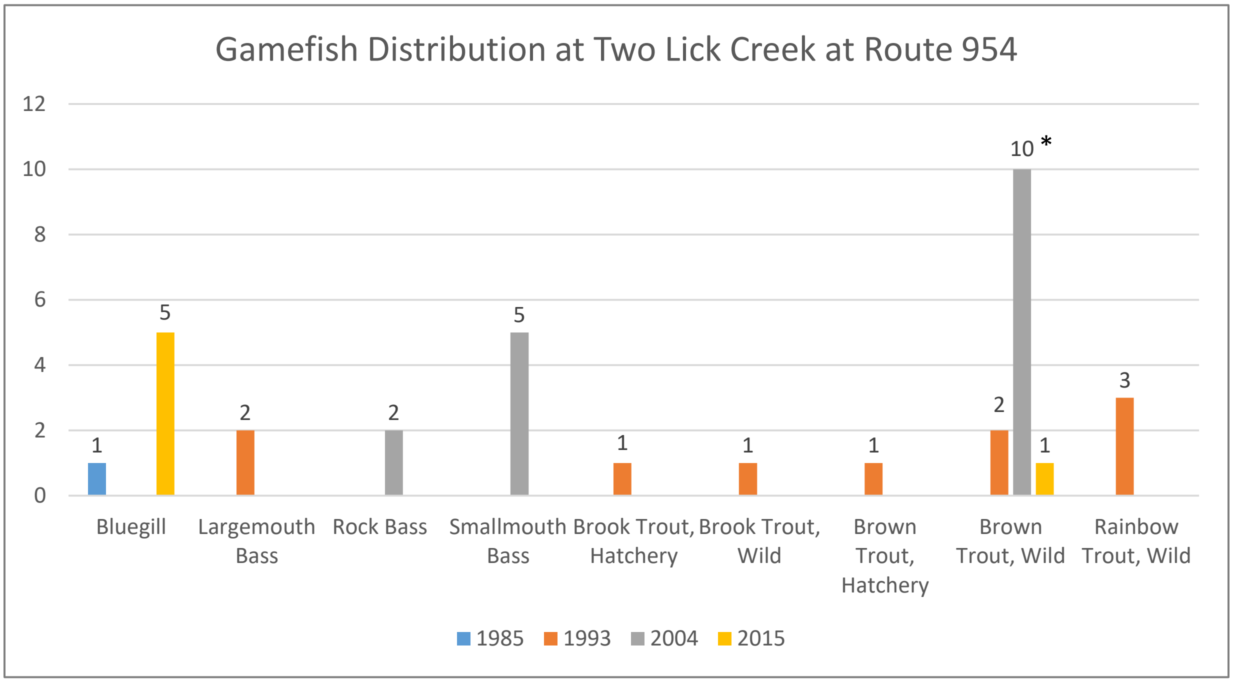


Figure 134 – Wild trout populations over time in the South Branch Two Lick Creek

The preceding graph clearly shows that this area on the South Branch of Two Lick Creek has contained viable wild trout populations since 1980. With reclamation efforts, decreases in industrial activity, and more consistent coldwater temperatures, the wild trout population has increased drastically since 1980. Prior to 2006, the wild brown trout population outcompeted the wild brook and wild rainbow trout to the point that, after 2006, the wild trout population consisted of only wild brown trout. The alkaline water and good habitat allow for a large wild trout population to thrive in this area of the South Branch Two Lick Creek. Two hatchery rainbow trout and 36 hatchery brown trout were noted in the 2006 survey, while in 2010, 38 hatchery brown trout were captured.

Site 2: Two Lick Creek at Route 954

The number of gamefish found in Two Lick Creek at Route 954 during PA Fish and Boat Commission surveys between 1985 and 2004 (Sites 17711-17713) and a Conemaugh Valley Conservancy survey in 2015 is illustrated in Figure 135 (Depew).



** The number of wild brown trout collected in 2004 numbered 156, but for display purposes, was capped at 10.*

Figure 135 – Graph of gamefish collected during surveys of Two Lick Creek at Route 954

This section of Two Lick Creek is supplied by coldwater releases from the Two Lick Reservoir. In 1985, bluegill were the only gamefish found in this section of stream. By 1993, other gamefish, including stocked trout, were present in this area. Wild trout of all three species were also collected in 1993, indicating that stable temperatures were being maintained and pollution impacts had been mitigated. Between 1993 and 2004, the wild brown trout population exploded, out-competing the other trout species in this section of the stream. No hatchery trout were captured in 2004. In 2015, the Conemaugh Valley Conservancy surveyed a 100-meter reach at this location, which is half of what the PFBC usually surveys. CVC collected five bluegill, one wild brown trout that measured 110 mm, and 11 other non-gamefish species. The trout populations in this area of the stream can be very transient depending on water levels and temperature, and this site naturally has very limited habitat due to its large bedrock bottom. For future evaluation, a site with proper habitat should be established in this section to assess the effect of habitat on residency and movement of the fish population.

Site 3: Two Lick Creek at Old Route 119

Figure 136 displays the gamefish distribution for Site 3 - Two Lick Creek at Old Route 119 (Sites 45269-45271).

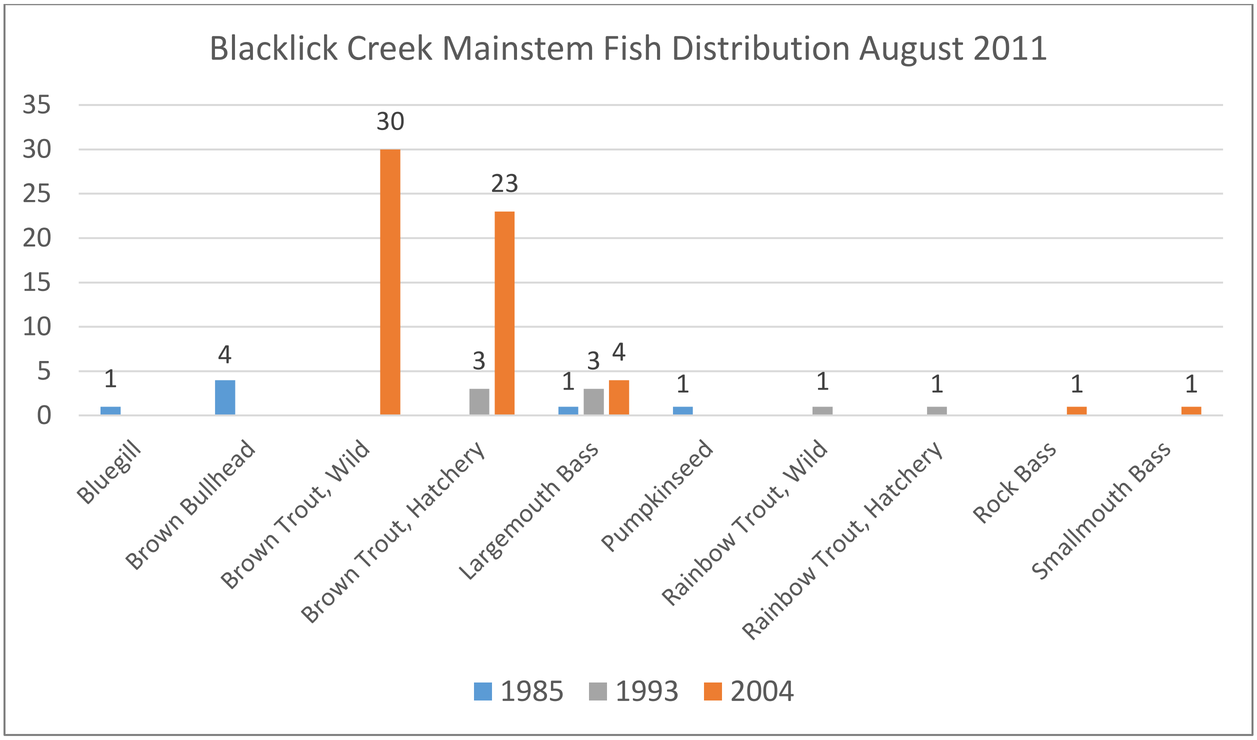


Figure 136 – Gamefish distribution over time in Two Lick Creek at Old Route 119

Site 3 is the most downstream site for which three or more historical data sets exist on Two Lick Creek. In 1985 and even 1993, gamefish populations were small due to inconsistent temperatures and industrial impacts. In 1993, hatchery brown trout and hatchery and wild rainbow trout were present. In 2004, both hatchery and wild brown trout were abundant in this section. The brown trout were the dominant gamefish species in 2004 likely due to consistent coldwater and pollution abatement.

Two Lick Creek has a legacy of water impacts from mining, urbanization, coal cleaning plants and electrical power plants, but due to reclamation efforts and environmental regulations, this stream harbors a robust wild trout population. Future efforts should focus on assessing wild trout populations in tributaries that the PFBC did not survey as part of their Unassessed Waters Initiative within the Two Lick Creek watershed. The current sites should also be monitored on a regular basis to document the wild trout population.

Back to Table of Contents

Yellow Creek

Yellow Creek is the largest tributary of Two Lick Creek. Yellow Creek consists of two separate sections divided by Yellow Creek Lake, a large impoundment within Yellow Creek State Park. The section upstream of the lake is predominantly coldwater habitat. The fish community consists primarily of wild and hatchery trout. The section downstream of the lake supports a predominantly warm water community. The reservoir is created by a spillway release dam that discharges warm, variable water flow from the surface of the lake. Downstream of the dam, the fish community consists of a warm water assemblage including bluegill, large and smallmouth bass, rock bass, and yellow perch.

Figure 137 – A close-up of the armoring in Yellow Creek below the treatment systems

Downstream of the area where the dam release mixes and becomes more stable, multiple mine drainages enter Yellow Creek. Several treatment systems have been installed in this area, but they do not capture and treat all of the inputs. This allows the bottom of the stream to become embedded in iron and aluminum oxides and for the pH to fluctuate. In 2015, the Conemaugh Valley Conservancy surveyed the fish community in the area downstream of the treatment systems' effluents and mine discharges. The community was more diverse than expected with seven species collected in a 100-meter reach, but the number of individuals collected, 50, was only 16% of that collected upstream, as shown in Table 22. The depression of the diversity and individuals is a product of the fluctuating chemistry and the metal embedding. Treatment systems must be built in this section that can capture all of the mine drainage and reduce the iron discharge and coal refuse into Yellow Creek.

Yellow Creek Fish Survey Results Above and Below the Yellow Creek AMD Treatment Systems, October 2015			
Common Name	***Scientific Name***	**Quantity Above**	**Quantity Below**
Central Stoneroller	*Campostoma anomalum*	23	
Creek Chub	*Semotilus atromaculatus*		3
Common Shiner	*Luxilus cornutus*	10	
Emerald Shiner	*Notropis atherinoides*	3	1
Fantail Darter	*Etheostoma flabellare*	9	
Greenside Darter	*Etheostoma blennioides*	4	1
Mottled Sculpin	*Cottus bairdii*	33	5
Northern Hogsucker	*Hypentelium nigricans*	14	7
River Chub	*Nocomis micropogon*	190	31
Rock Bass	*Ambloplites rupestris*		2
Slimy Sculpin	*Cottus cognatus*	22	
Smallmouth Bass	*Micropterus dolomieu*	5	
	Species Total	**10**	**7**
	Total Individuals	**313**	**50**

Table 22

Back to Table of Contents

Conclusions

The mainstem of Blacklick Creek is the most unassessed Management Unit in the Kiski-Conemaugh River Basin. Millions of dollars have been spent on mine drainage treatment systems throughout this watershed, but baseline data exist for only a few treatment areas. There are still areas in the Blacklick Creek watershed where no biological data have been collected, which is a major impediment to the assessment of mitigation strategies. The PFBC has determined that wild trout populations are present in some small tributaries of Blacklick Creek, while others are devoid of resident fish species, yet many streams remain unassessed.

The Yellow Creek watershed harbors wild trout populations in its headwaters, but loses these downstream of Yellow Creek Lake due to thermal stress, while the warm water community in the downstream reaches of Yellow Creek is impaired by several large mine drainages that are not fully captured by existing treatment systems. The reach of stream where the treatment systems occur is another under-studied area in the Blacklick Creek watershed.

The Two Lick Creek watershed has received the most attention in this Management Unit. Due to coldwater releases from the Two Lick Reservoir and the efforts of state agencies and volunteers, Two Lick Creek and its tributaries contain large, sustainable wild trout populations.

As throughout the Kiski Basin, the Blacklick Creek watershed suffers from many mine discharges and industrial impacts and while the mainstem of Blacklick Creek is not biologically dead, its biological integrity is low. The confluence of Two Lick Creek and Blacklick Creek buffers the acidic impacts of the upper reaches of Blacklick Creek before it enters the Conemaugh River. The alkaline water of Two Lick Creek prevents Blacklick Creek from impairing the biological communities of the Conemaugh River. While much pollution abatement work has been completed within the watershed, much more is needed to restore biological integrity to this Management Unit.

The mainstem of Blacklick Creek and its tributaries, with the exception of Two Lick Creek, need to be analyzed thoroughly to assess treatment system efficacy, wild trout populations, industrial impacts, and future treatment locations. Since there are only sparse baseline data for most of the watershed, data gaps should be filled. A new assessment of Blacklick Creek from its origins to its confluence with Two Lick Creek needs to be completed to plan for future abatement projects and the recovery of the watershed.

Back to Table of Contents

Conemaugh River Management Unit

Location

The mainstem of the Conemaugh River Management Unit is 295.2 square-miles with portions lying within Cambria, Indiana, and Westmoreland Counties, and it is the fourth largest sub-watershed within the Kiski-Conemaugh River Basin. Pennsylvania's *State Water Plan* identifies the Conemaugh River watershed as Watershed 18D, together with the Blacklick Creek watershed. Aultmans Run, McGee Run, and Tubmill Creek are the sub-watersheds within the Conemaugh mainstem watershed that are larger than 25 square-miles, as shown in Figure 138.

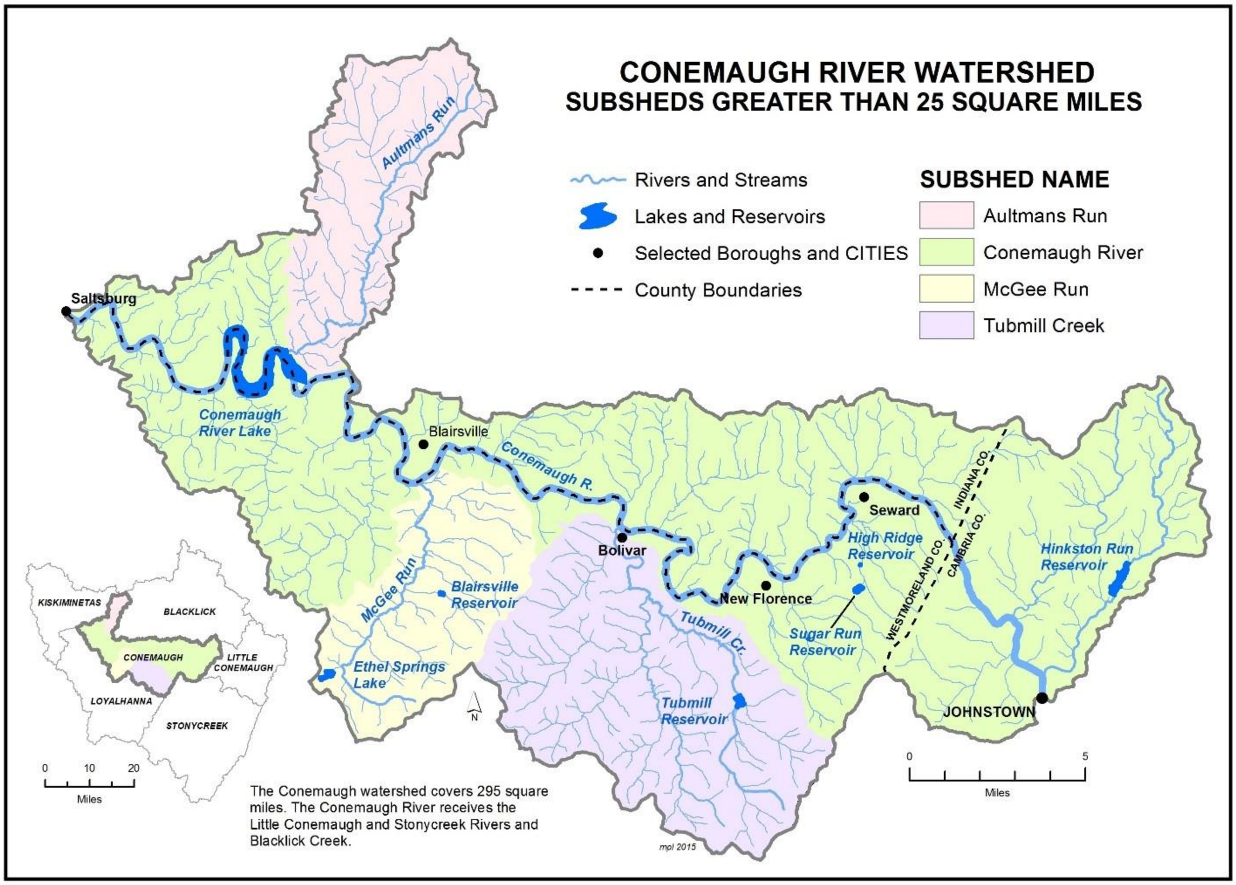


Figure 138 – The Conemaugh River watershed and primary sub-watersheds

Land Cover

As throughout the entire Kiski-Conemaugh River Basin, land cover patterns have changed little in this Management Unit. The greatest change was in a loss of forest (0.7%) followed by an increase in developed lands (0.6%).

Land Cover Percentage in the Conemaugh River Watershed, 1992 – 2011					
	1992	**2001**	**2006**	**2011**	**% Change**
Forest	73.8	73.7	73.5	73.1	- 0.7
Agriculture	15.8	15.1	15.2	15.3	- 0.5
Grass/Shrub	None	None	0.0	0.2	+ 0.2
Developed	8.8	9.3	9.4	9.4	+ 0.6
Mining/Barren	0.5	0.5	0.6	0.6	+ 0.1
Water	1.1	1.3	1.2	1.3	+ 0.2
Wetlands	0.0	0.0	0.1	0.1	+ 0.1

Table 23

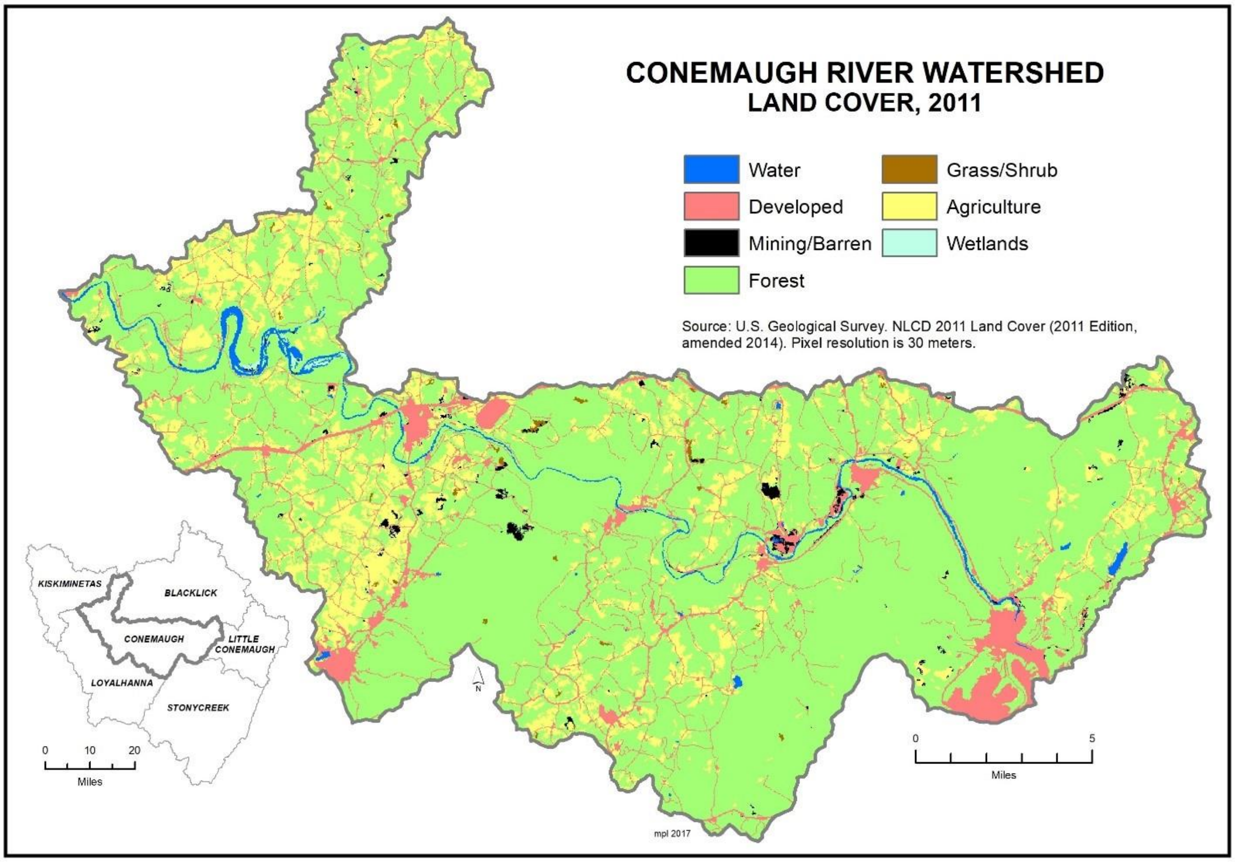


Figure 139 – Land cover of the Conemaugh River watershed in 2011

Exceptional Value and High Quality Streams

As shown in Figure 140, there are a few Exceptional Value waterways in the Conemaugh River Management Unit, including:

- Baldwin Creek
- Trout Run from its source to the Blairsville Reservoir
- Tubmill Creek from its headwaters to the Tubmill Reservoir and some of its tributaries like Lick Run

Designated as High Quality Coldwater Fisheries are:

- Baldwin Creek (the lower half)
- Clark Run
- Findley Run
- Laurel Run
- Poplar Run
- Shannon Run
- Shirey Run
- Spruce Run

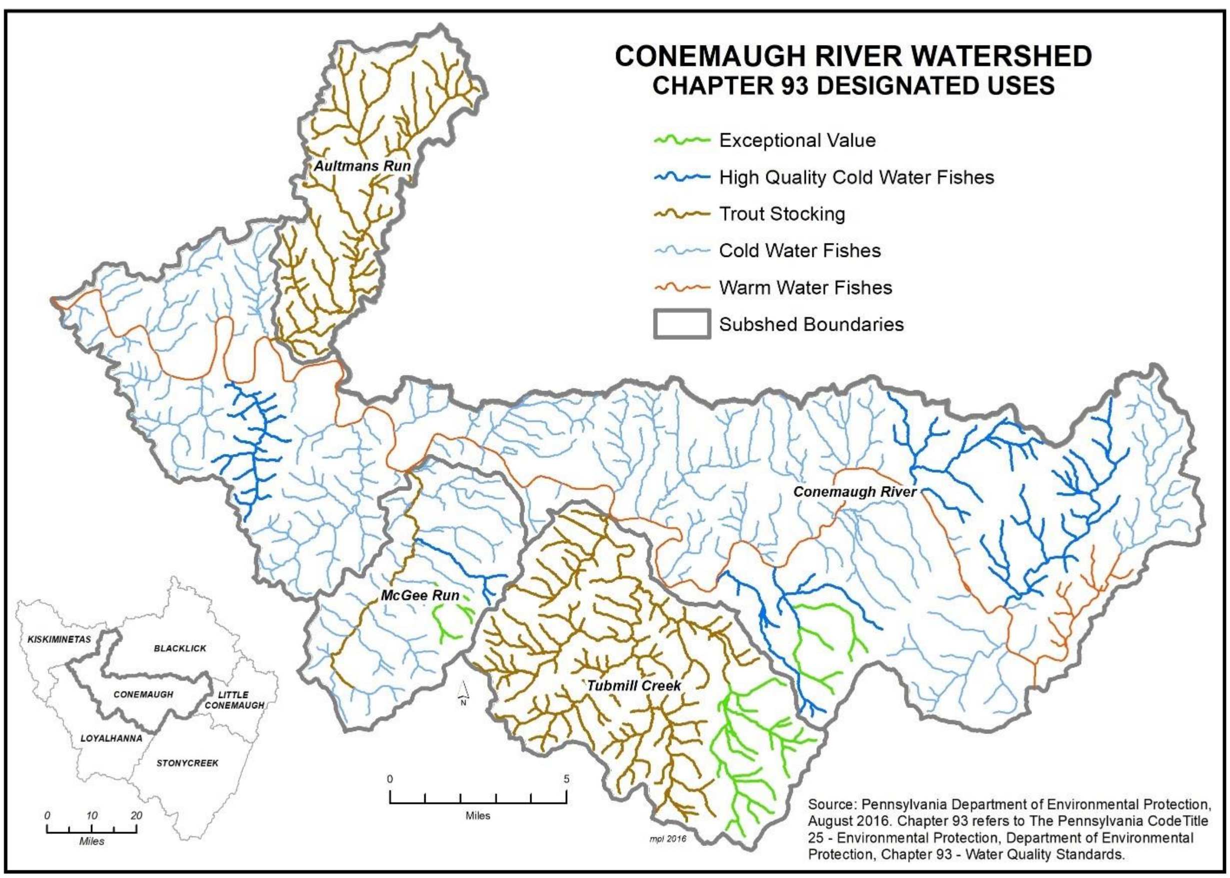


Figure 140 – Designated uses of waterways in the Conemaugh River watershed

Abandoned Mine Drainage

With steep topography and a large portion of the watershed protected by state lands, far less streams in the eastern half of the Conemaugh River watershed are impaired, though mine drainage does degrade some stream segments, as shown in Figure 141. In the western part of the watershed, agriculture is the primary source of pollution, except in the Aultmans Run sub-watershed, which is heavily impaired by mine drainage.

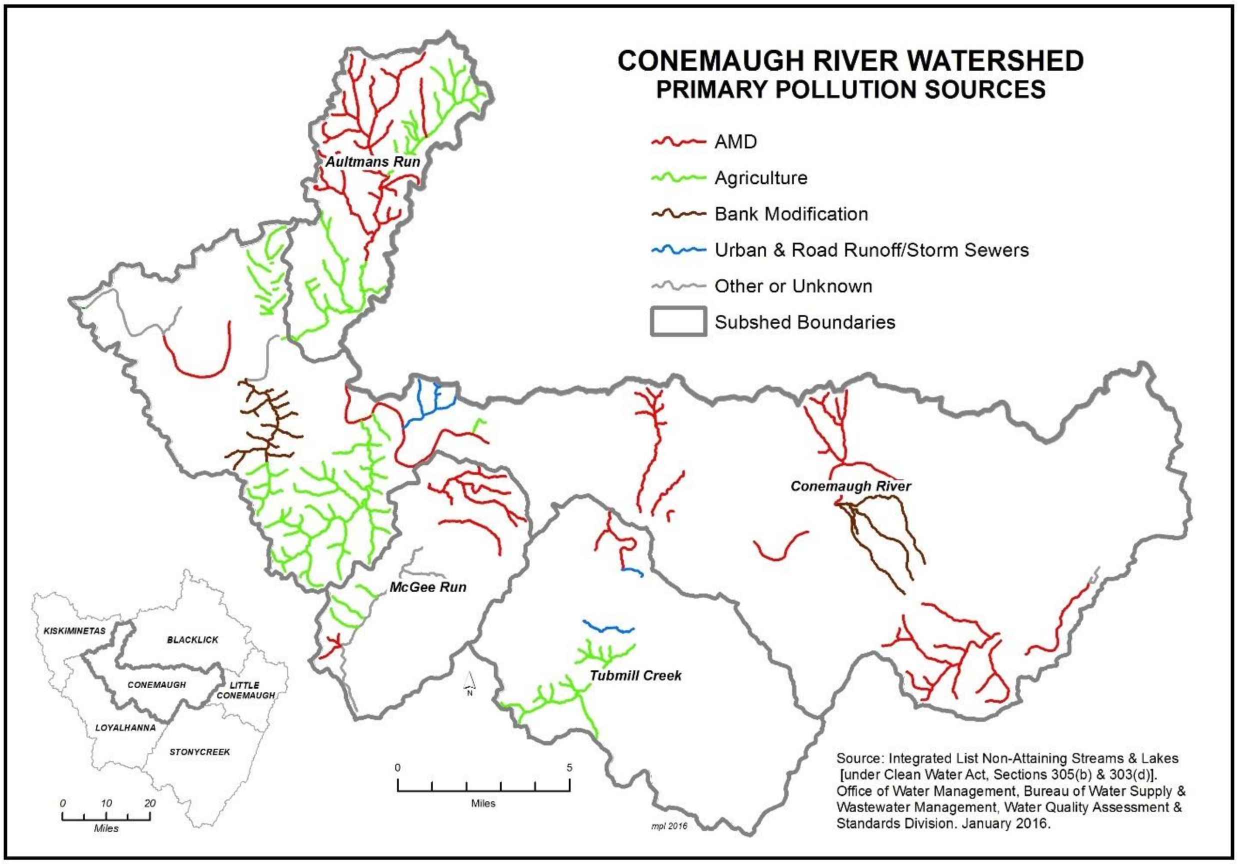


Figure 141 – Waterways on the Integrated List of Non-Attaining Streams and Lakes

Aultmans Run

In March 2016, the Aultman Watershed Association for Restoring the Environment (AWARE) and Stream Restoration, Inc. (SRI) published the *Aultmans Run Watershed AMD Assessment & Implementation Plan*. Collaborators since AWARE was formed in 2000, these organizations have led several assessments, including the initial study in 2003, of this sub-watershed and implemented three restoration projects: SR286, Neal Run, and Reeds Run.

As shown in Figure 141, Aultmans Run is impaired for siltation from agriculture from its headwaters to its confluence with Reeds Run. This siltation is readily observable. In 2015 and 2016, the Conemaugh Valley Conservancy attempted fish surveys on Aultmans Run above and below the SR286 treatment system effluent, but the cloudiness of the stream negated those efforts. A macroinvertebrate survey completed by CVC in April 2015 shows that macroinvertebrate diversity increased downstream of the SR286 system. The SR286 discharge (DEP SIS 60201) is a high-flow, alkaline discharge with an average of 16.4 mg/L of Total Iron. The primary treatment component of the SR286 AMD treatment system is an aerobic wetland that retains, on average, 60% of the iron.

Reeds Run is a tributary to Aultmans Run. From 2007-2011, the PA DEP's Bureau of Abandoned Mine Reclamation assisted with a reclamation project in the upper section of Reeds Run. Restoration efforts at this site included the removal of coal refuse that was burned at the Seward Generation Station and the mixing of Mineral CSA, a finely ground, engineered Calcium Silicate Aggregate made by Harsco Minerals. Mineral CSA is an alkaline material recycled from slag that is a byproduct of stainless steel production, with the remaining refuse. It also included the design and construction of open limestone channels to facilitate iron precipitation at a low pH.

Figure 142 – Aluminum oxide is very apparent in Neal Run

Neal Run, a tributary of Reeds Run, is severely impaired by AMD. The 2016 Assessment identifies the D2 discharge as the worst in the Aultmans Run watershed (AWARE and SRI 15). Neal Run's water quality is the result of a large coal refuse pile in McIntyre, PA. While D2's average flow is only 4.3 gallons per minute, its pH is 3.1 and it has, by far, the highest acidity of all the Aultmans Run watershed discharges – 6,605 mg/L. The 2016 Assessment indicates that this discharge contributes 57.4% of the acidity and 64.3% of the total metals loading to the watershed. The D2 discharge is partially treated at the Neal Run AMD treatment system; however, the effluent of this system still discharges water with an average pH of 2.7 and a conductivity of 2,500 to over 4,000 uS/cm. Of the 260+ sites the CVC's Kiski-Conemaugh Stream Team samples, the effluent of this system is the only one to make the field meter go "tilt." Despite this poor water quality, fish have been observed in the lower portion of Neal Run for the first time in decades. CVC netted five creek chubs in a 100-meter section of Neal Run downstream of the treatment system during its 2015 survey. Upstream, CVC captured 30 individuals of six fish species including creek chubs, green sunfish, largemouth bass (40-50 mm in size), redside dace, silverjaw minnows, and white suckers. Unfortunately, the macroinvertebrate community downstream is severely lacking. In April 2015, the CVC collected two individuals representing two species at the downstream location, whereas upstream, 125 individuals representing 17 species were collected.

In 2016, AWARE and SRI received Growing Greener funds that will allow for the construction of a 650-ton limestone only, auto-flushing Vertical Flow Pond to generate alkalinity and remove metals. A quarter-acre settling pond will help retain metals during operation and flushing of the system.

AMD treatment should focus on removing metals, particularly aluminum, so that it does not become soluble, and thus lethal, at high pH.

AMD Treatment Systems

There are only four AMD treatment systems in this Management Unit and three of them are in the Aultmans Run watershed. The SR286 and Neal Run treatment systems were discussed in the previous section.

The Reeds Run treatment system is a wetland that helps treat remnants of the RD0-D1 discharge originating from a coal refuse pile that was reclaimed with Mineral CSA. Some iron still embeds Reeds Run downstream of this site, but a lack of habitat is also a problem. In 2015, the Conemaugh Valley Conservancy captured 107 individuals of seven fish species in a 100-meter section upstream of this system, while downstream it captured 32 individuals of six species in a 50-meter section. Because the streambed was very soft and muddy, it was not safe to do a comparable 100-meter section.

Constructed in 1997, the Gray Run treatment system consists of a vertical flow reactor, settling pond, and open limestone channel to treat a small (6-21 GPM) discharge. Little data exist for this site. Only two known data sets exist and those were obtained during the state's "Snapshot" of passive AMD treatment systems in 2009 and 2010. The system appears to be removing 74% of the discharge's acidity, Total Iron, and Total Aluminum.

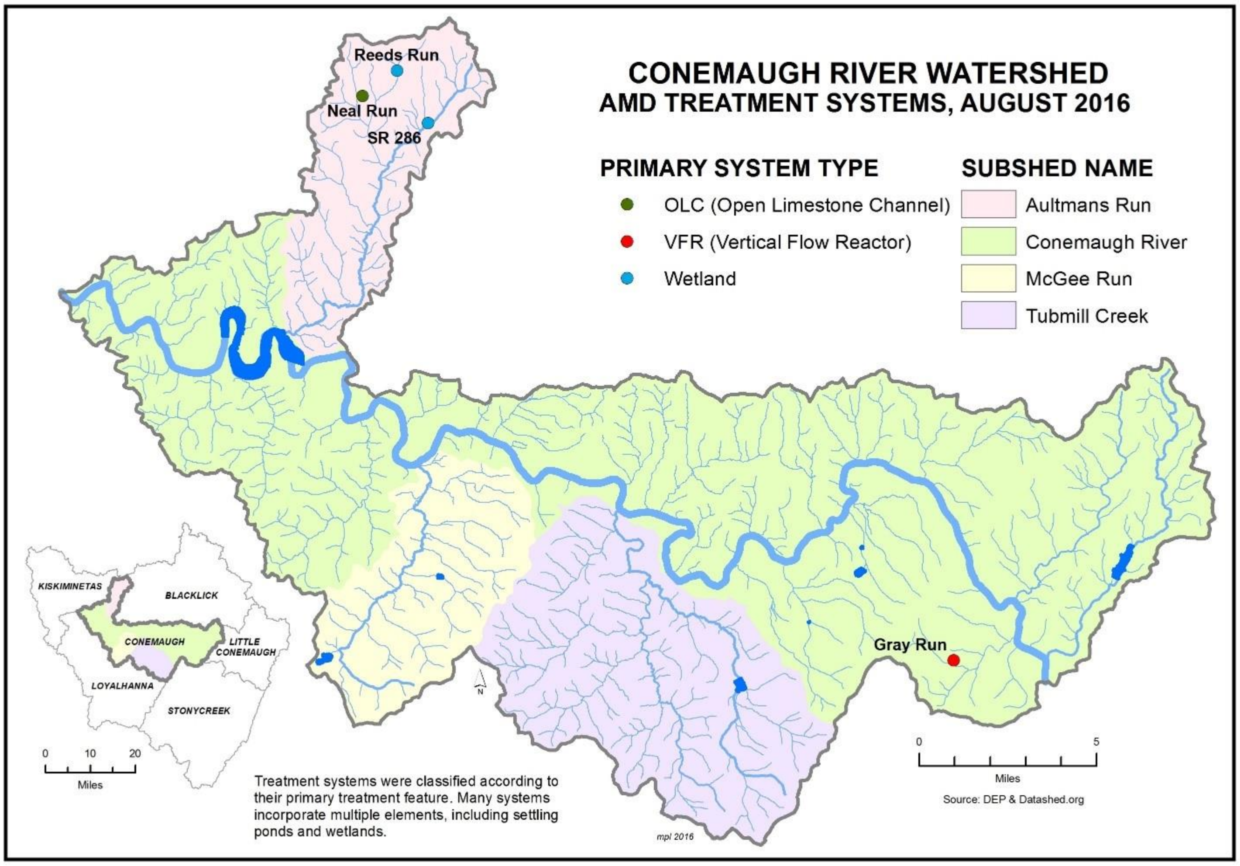


Figure 143 – Map of the passive AMD treatment systems in the Conemaugh River watershed

Water Quality

A historical water quality monitoring point, the USGS gaging station on the Conemaugh River at Tunnelton, was selected to display selected parameters over time as it was the most downstream site with the most data for comparison. This site is DEP SIS 13554 and is located at the Tunnelton Road (SR3003) Bridge over the Conemaugh River, about 5.5 miles upstream of the Conemaugh River's mouth and confluence with Loyalhanna Creek.

As shown in Figure 144, the pH of the Conemaugh River at Tunnelton has been circum-neutral for many years and is now consistently above a pH of 7.

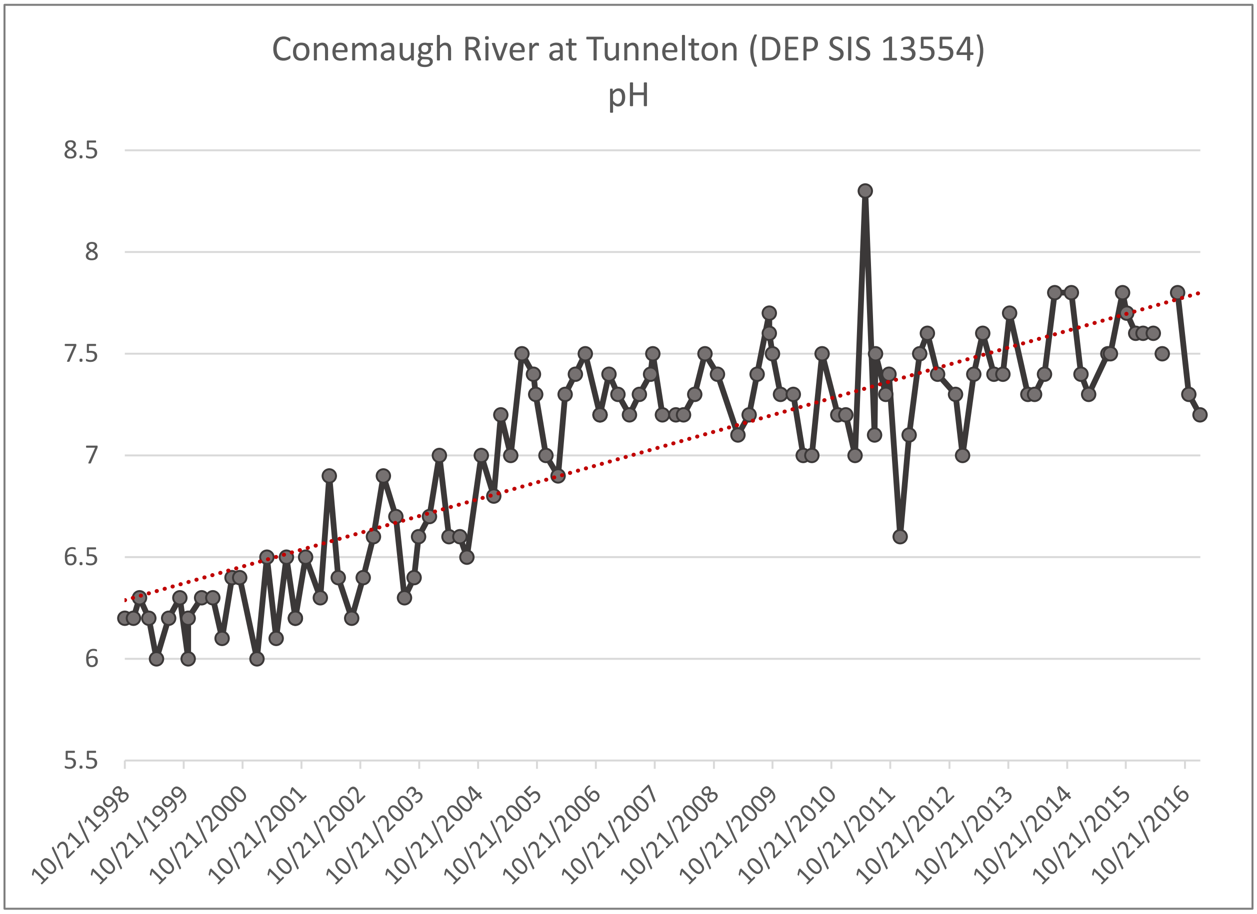


Figure 144 – Graph depicting the pH of the Conemaugh River at Tunnelton, 1998 – 2016. Most aquatic life needs a pH of 5 – 8 to survive

Total acidity data do not exist for this monitoring point, but, since at least 1998, the Conemaugh River in Tunnelton has had alkalinity, as shown in Figure 145. As mentioned in a previous section, PA Code requires an alkalinity of 20 mg/L or more, unless natural conditions are less. Around 2008, the Conemaugh River consistently met that criteria due to reclamation efforts upstream.

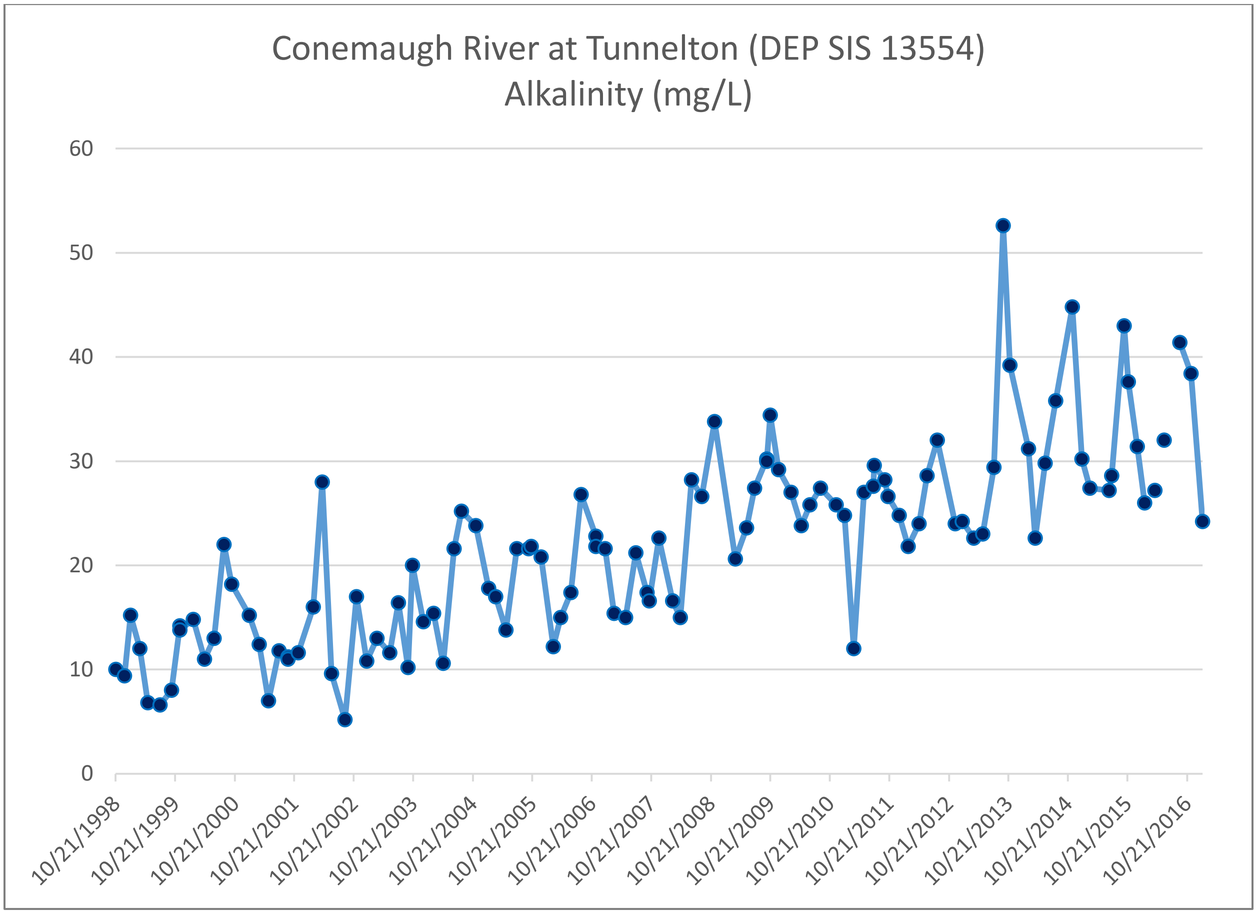


Figure 145 – Graph depicting Alkalinity levels of the Conemaugh River at Tunnelton, 1998 – 2016. Alkalinity levels of 20 mg/L or more are preferred

Concentrations of aluminum, iron, and manganese – the metals most commonly associated with abandoned mine drainage – have remained rather consistent since 1998. Manganese levels have decreased, but iron and aluminum have trended slightly upwards as shown in Figure 146. Winter and spring flows elevate metal concentrations from high mine pools and the flushing of deposits in stream beds.

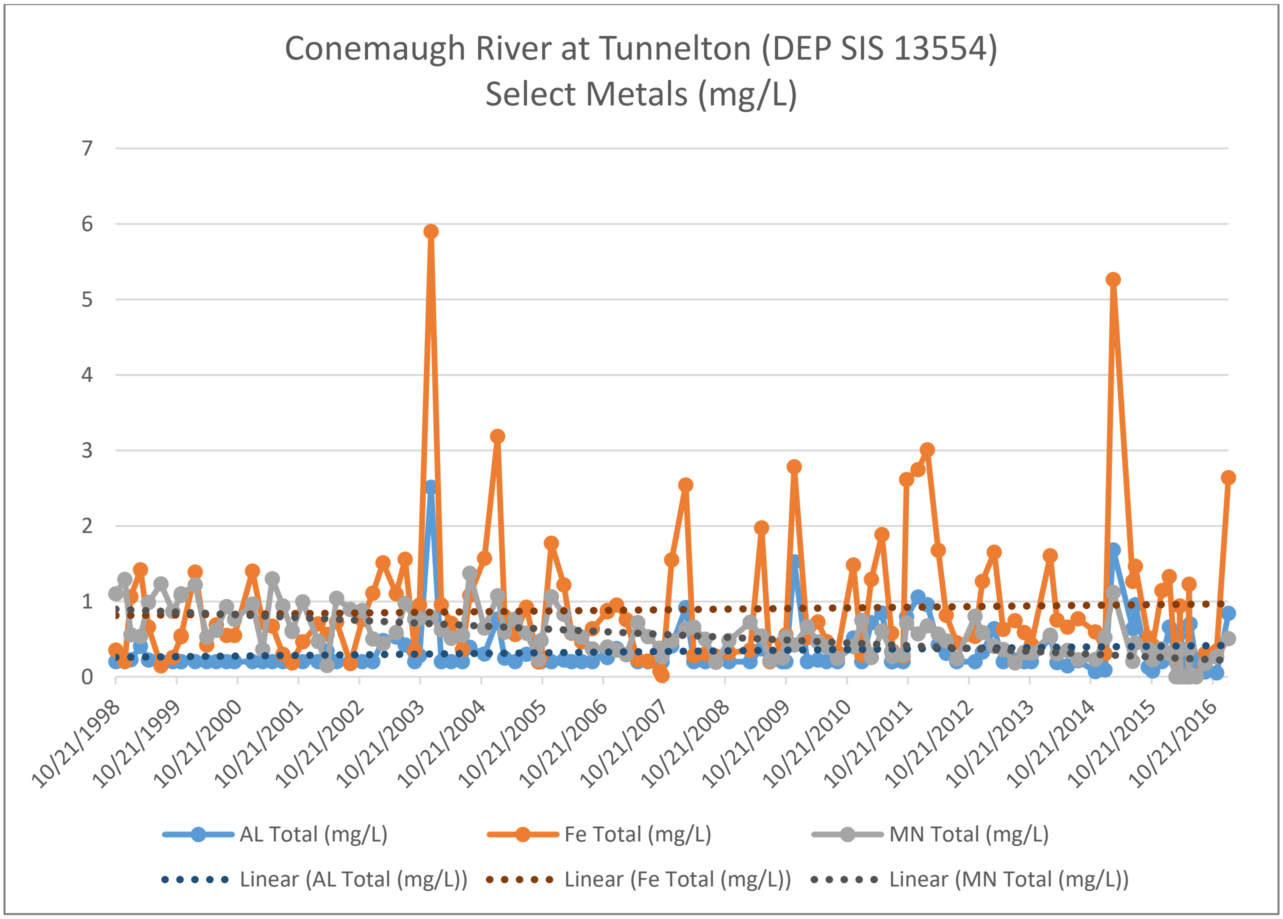


Figure 146 – Graph depicting the metal concentrations in the Conemaugh River at Tunnelton, 1998 – 2016. Aluminum levels should be less than 0.750 mg/L, Total Iron less than 1.5 mg/L, and Manganese less than 1.0 mg/L, according to criteria set forth in the Kiski-Conemaugh TMDL

Back to Table of Contents

Biological Evaluation

The Conemaugh River is formed in the City of Johnstown by the confluence of the Little Conemaugh and Stonycreek Rivers. The Conemaugh River is a fifth-order tributary of the Kiskiminetas River. Historically, the biological integrity of the mainstem of the Conemaugh River was severely impacted. Past fish sampling sites in this watershed collected few species, most of which were pollution tolerant. Macroinvertebrate data in this watershed are also very limited.

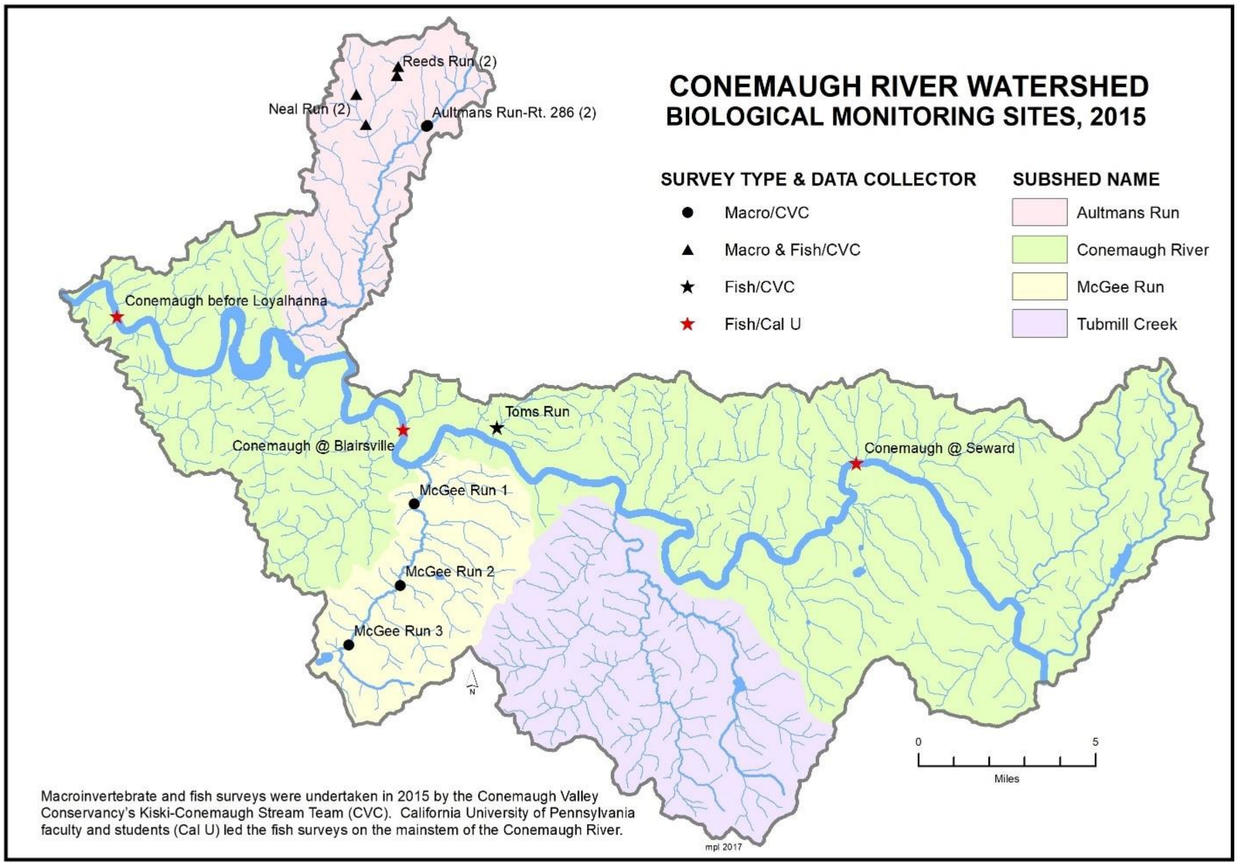


Figure 147 – Map of key biological monitoring sites, Conemaugh River watershed

Conemaugh River Mainstem Biological Comparisons

In 2015, CVC and CAL U completed three fish surveys at historical sites on the mainstem of the Conemaugh River:

- Site 1 – Conemaugh River @ Seward
- Site 2 – Conemaugh River @ Blairsville
- Site 3 – Conemaugh River @ White

Due to the size of the Conemaugh River, fish sampling with wadeable gear was only possible in a few areas of the river and even then, there were a few pockets that couldn't be surveyed, so it is possible that even more fish species reside in these areas than what were collected. Anecdotal information from anglers supports that inference.

Site 1: Conemaugh River at Seward

This site is located approximately 8.5 miles downstream of the confluence of the Stonycreek and Little Conemaugh Rivers in Johnstown, which, historically, had a strong steel industry and robust coal mining. Site 1 is stationed in the town of Seward. In 1997, PFBC sampled this area (Site 29461) and collected 147 individuals of six fish species and one gamefish species (brown trout) in a 200-meter reach. In 2015, CAL U and CVC collected 81 individuals of nine fish species, including two gamefish species (rock bass and smallmouth bass) in a 100-meter reach. Though the PFBC surveyed twice the length of river as CAL U and CVC and collected more individuals, the community was composed of pollution tolerant fish species in 1997. In 2015, the fish community had shifted to a more pollution intolerant community, thus depicting its recovery. In fact, as described in the Executive Summary and on page 213, according to a metric known as the Jaccard Coeficcient of Community Similarity, this site exhibited the greatest community shift of the three sites surveyed on the Conemaugh River mainstem in 2015. This community shift is still occurring and more pollution abatement efforts will only accelerate its recovery.

Fish Survey Results from the Conemaugh River in Seward		
	9/17/1997	9/17/2015
Survey Length	*200 m*	*100 m*
Common Name	**PFBC**	**Cal U/CVC**
Banded Darter		30
Blacknose Dace	30	2
Blackside Darter		2
Brown Trout	8	
Central Stoneroller	1	
Creek Chub	69	
Fantail Darter		6
Johnny Darter		7
Longnose Dace		29
Mottled Sculpin	4	
Northern Hogsucker		2
Rock Bass		1
Smallmouth Bass		2
White Sucker	35	
TOTAL INDIVIDUALS	**147**	**81**
TOTAL SPECIES	**6**	**9**

Table 24

Site 2: Conemaugh River at Blairsville

Site 2 is located in Blairsville, Indiana County, PA. The site is approximately 14 miles downstream of Site 1. For decades, coal mining dominated the area between Sites 1 and 2. This reach also had multiple industrial facilities operating and discharging into the river. Importantly, this area's industry and mining have lessened since the 1980s giving the Conemaugh River a long area of recovery before more major impacts occur. In 1997, PFBC sampled this site (Site 2425) and collected 14 fish species, including 7 gamefish species, and 273 individuals. Most of the fish collected in this sampling were facultative or tolerant to pollution. As in Site 1, Site 2's community is undergoing a shift from pollution tolerant species to pollution intolerant species, as seen in the 2015 sampling performed by CAL U and CVC. The 2015 sampling collected 16 fish species, including 6 gamefish species, and 92 individuals in half the distance of the 1997 survey. This site is continuing to recover and could be tracked by the recovery of Site 1; as Site 1 improves, Site 2 should also continue to improve.

Fish Survey Results from the Conemaugh River in Blairsville		
	9/19/1997	9/17/2015
Survey Length	*200 m*	*100 m*
Common Name	**PFBC**	**Cal U/CVC**
Banded Darter		17
Bluegill	91	13
Bluntnose Minnow	34	6
Brown Bullhead	2	
Creek Chub	51	2
Fantail Darter		1
Greenside Darter		5
Green Sunfish	3	5
Johnny Darter	20	
Largemouth Bass	1	
Logperch		22
Mottled Sculpin	2	1
Northern Hogsucker		5
Pumpkinseed	43	
Rainbow Darter	1	7
River Chub		1
Rock Bass	2	4
Pumpkinseed		1
Silverjaw Minnow	16	
Smallmouth Bass		1
White Sucker	2	
Yellow Bullhead	5	1
TOTAL INDIVIDUALS	**273**	**92**
TOTAL SPECIES	**14**	**16**

Table 25

Site 3: Conemaugh River at White

Site 3 is located in the town of White, approximately 16 miles downstream of Site 2. This site is about 13 miles downstream of the confluence of Blacklick Creek, the Conemaugh's most polluted tributary. Much of the acidic impacts of Blacklick Creek are neutralized by Two Lick Creek, to the point that the Conemaugh River can sustain the inflow of Blacklick Creek. Abatement efforts in the Blacklick Creek watershed and along the Conemaugh River in this section have allowed the fish community to recover from eight species, including four gamefish, and 41 individuals collected in a 200-meter reach by PFBC in 1997 to 13 fish species, including four gamefish, and 85 individuals in a 100-meter reach as collected in 2015 by CAL U and CVC. The recovery in this area is remarkable, not only for the number of species present, but also due to the presence of sensitive riverine fish species such as the streamline chub and the big eye chub. These species can only live in the cleanest of large rivers and indicates the migratory input from the Kiskiminetas and Allegheny Rivers. There is still room for this site to improve. The Kiski and Allegheny Rivers' diversity shows the positive potential of this site, given additional, future abatement projects.

Fish Survey Results from the Conemaugh River in White		
	9/19/1997	9/17/2015
Survey Length	*200 m*	*100 m*
Common Name	**PFBC**	**Cal U/CVC**
Banded Darter		6
Bigeye Chub		2
Bluegill	11	7
Bluntnose Minnow		14
Central Stoneroller	4	
Creek Chub	1	
Largemouth Bass		1
Mimic Shiner		35
Northern Hogsucker		3
Rainbow Darter		2
River Chub	1	
Rock Bass		3
Rosyface Shiner	2	
Spotfin Shiner		1
Streamline Chub		1
Smallmouth Bass	20	3
Variegate Darter		7
Yellow Perch	1	
Yellow Bullhead	1	
TOTAL INDIVIDUALS	**41**	**85**
TOTAL SPECIES	**8**	**13**

Table 26

The following figure displays the number of fish species found during the PA Fish and Boat Commission's 1997 surveys versus the California University of Pennsylvania and Conemaugh Valley Conservancy's surveys in 2015. While the modest increase in species collected in 2015 may not seem impressive, it is important to remember that these fish are composed of species more sensitive to pollution than those species found in 1997.

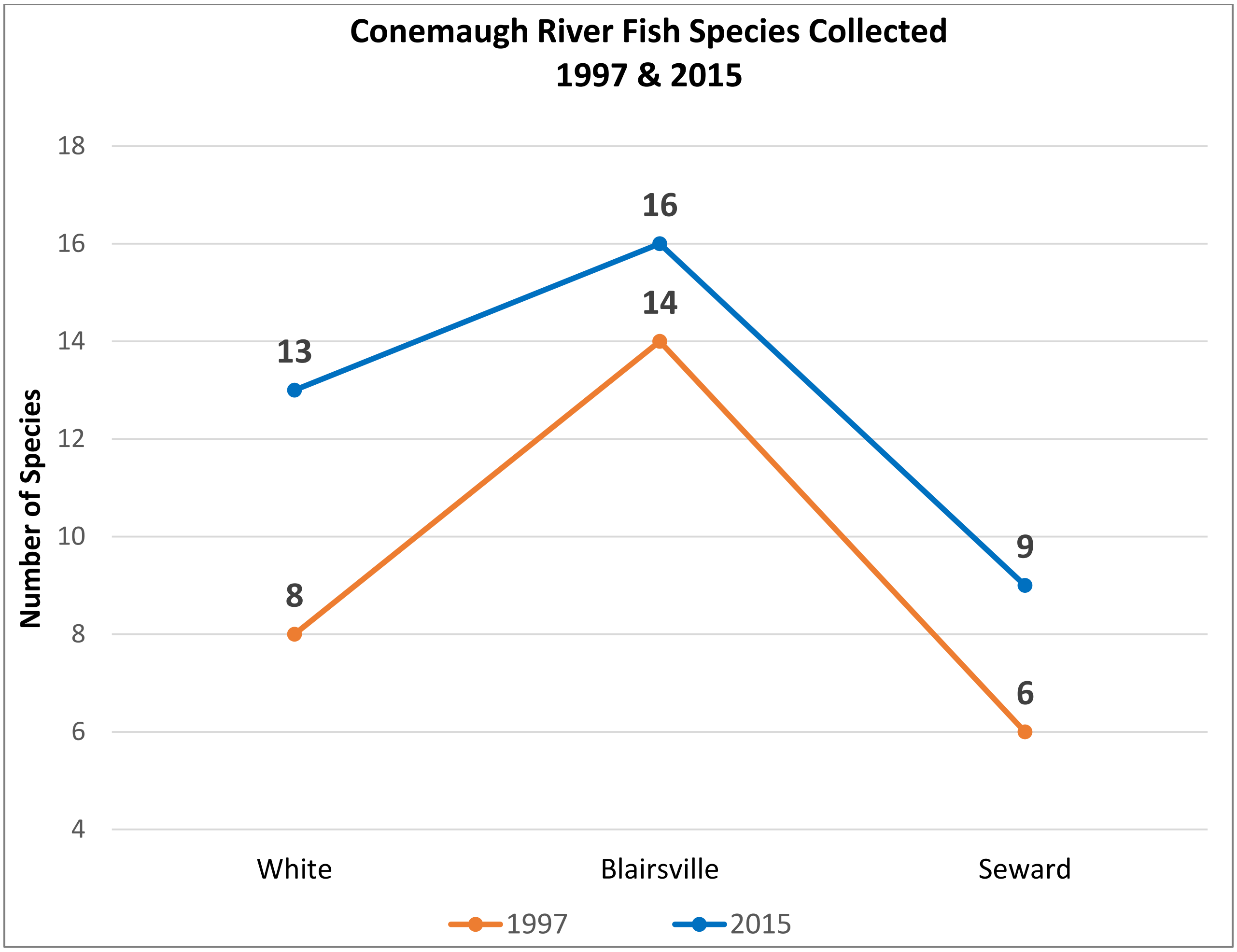


Figure 148 – Graph showing the number of fish species collected during fish surveys of the Conemaugh River completed in 1997 and 2015

Jaccard Coefficient of Community Similarity (JCCS)

The JCCS is a measurement, on a scale of zero to one, of how similar a site is in biological composition to another site or to itself over time (Barbour et al.). The closer the score of the JCCS is to one, the more similar the community structure is to the compared site. For the Conemaugh River sites, a JCCS was run comparing each site to itself over time to assess the community change. A site with a score <0.5 is indicative of a community shift.

The results of the JCCS completed for the Conemaugh River sites are located in Figure 149. All sites scored less than 0.5 and show that the community structure has completely shifted. The community shifts in the Conemaugh River mainstem were caused when preferred, pollution sensitive species recovered after pollution impacts were abated. Site 2 at Blairsville exhibits the least shift, but its community is only composed of 42% of the past pollution tolerant community, indicating that the majority of the previous community has been out competed by pollution sensitive species. This recovery is remarkable, but there is still work to do since the Conemaugh River has much more potential.

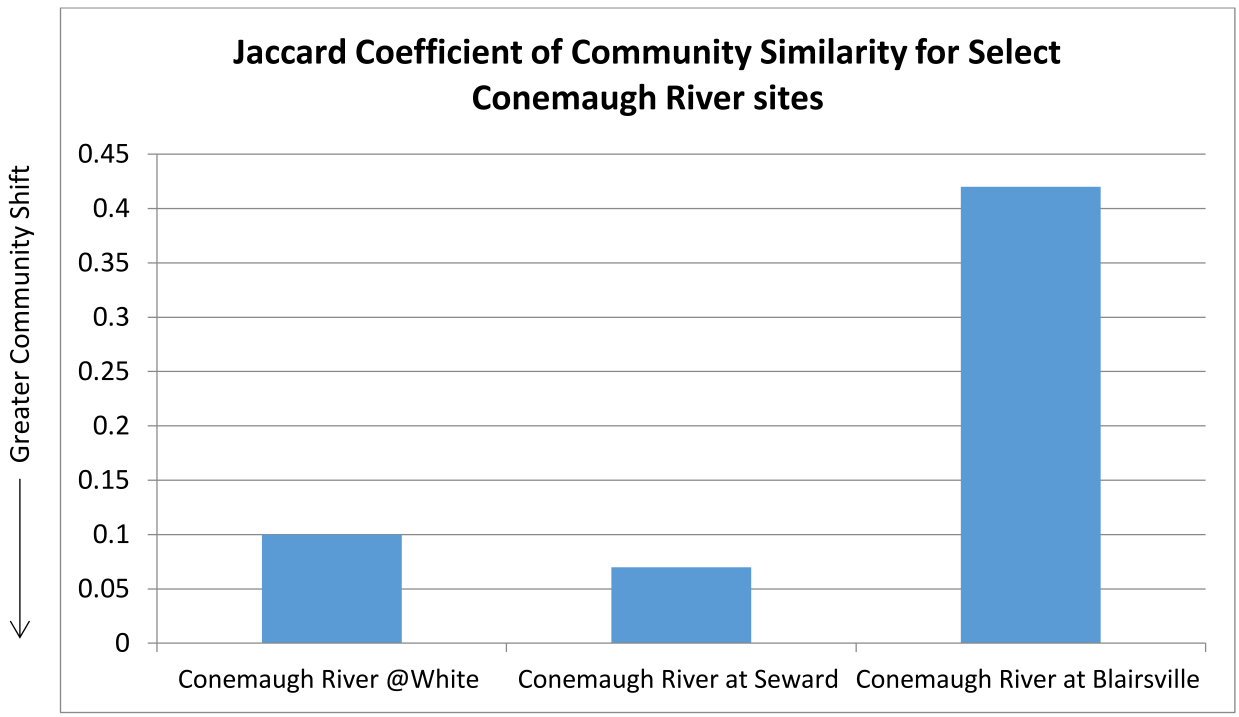


Figure 149 – JCCS scores of three sites on the Conemaugh River

Back to Table of Contents

Select Conemaugh River Tributaries

McGee Run and Tubmill Creek are tributaries to the Conemaugh River in which significant restoration and conservation work has been completed. The following summarizes some of that work.

McGee Run

Streams within the McGee Run sub-watershed are impaired by sedimentation and nutrients. As in other locations throughout the Kiski Basin, the development of unconventional, shale gas wells is a concern. In its *Conservation Improvements in the McGee Run Watershed* 2016 publication, the Westmoreland Conservation District states that this watershed has the highest concentration of Marcellus Shale gas wells in Westmoreland County and, "so is most impacted by drilling" (2).

The Westmoreland Conservation District (WCD) and its partners have implemented several projects in the McGee Run watershed to improve stream habitat and water quality. These projects, which improved nine miles of stream, included work to decrease sedimentation and erosion along Millwood Road, stormwater management at the Derry Community Pool, agricultural improvements on two farms, and forest stewardship on a private woodlot.

In 2014, prior to the installation of WCD's BMPs, the Conemaugh Valley Conservancy completed three fish surveys along McGee Run at sites at which data loggers had been placed. Initial data indicated that McGee Run suffers from chronic, high chlorides. Chlorides measured in the field at low flows in the headwater portion of McGee Run ranged from 45 mg/L to 80 mg/L. Laboratory samples indicated low flow chlorides were 85 mg/L. The chloride diluted as sampling moved downstream. Large spikes in conductivity indicated that chlorides pulsed with water level. The most downstream station exhibited a dense biological flocculent during warm months. Although the diversity of the fish community improved in the downstream sites, with the majority of gamefish being transplants from ponds, the macroinvertebrate community was poor throughout the stream.

Figure 150 – Chelsea Walker, WCD Watershed Specialist, obtains a water sample from McGee Run

In the summer of 2015, the WCD and CVC tracked the source of the chlorides and flocculent. It seems that the concrete channelization of McGee Run in Derry spreads and slows the flow in low water periods, making the water column very shallow. The heating of the shallow water from the exposure to sunlight increases natural biological processes in the stream, which depletes the oxygen and elevates the pH creating an anoxic condition below the channelization. Not until McGee Run flows through riffles and a forested area does it recover. The chlorides can be attributed to these biological processes and chronic chloride drainage from salt-saturated soils due to winter road treatment. The source of the chlorides must be abated to restore McGee Run to its full potential.

Tubmill Creek

The Commonwealth classifies Tubmill Creek as an Exceptional Value stream from its headwaters to the Tubmill Reservoir. This section of Tubmill is privately owned, as is the reservoir, which is owned by High Ridge Water Authority, and boasts some of the best wild rainbow and brook trout populations in the region. Below the reservoir, Tubmill Creek is considered a trout-stocked fishery due to warmer temperatures, poor agricultural practices, and some AMD seeps that degrade water quality. Shale gas extraction is also a concern. Still, sections contain diverse and abundant aquatic life, including Eastern Hellbenders and many warm water, pollution sensitive species, such as brook lamprey.

Figure 151 – Hellbender. Photo courtesy NPR (Harris)

The Western Pennsylvania Conservancy deems Tubmill Creek one of its four priority watersheds in the Laurel Highlands and invests significant resources into protecting, restoring, and conserving it. The Tubmill Trout Club is another organization working to improve the water quality, trout habitat and sport of trout fishing throughout the Tubmill Creek watershed. A priority for this stream would be to re-designate more sections of Tubmill Creek as High Quality or Exceptional Value to protect it from uncontrolled resource extraction.

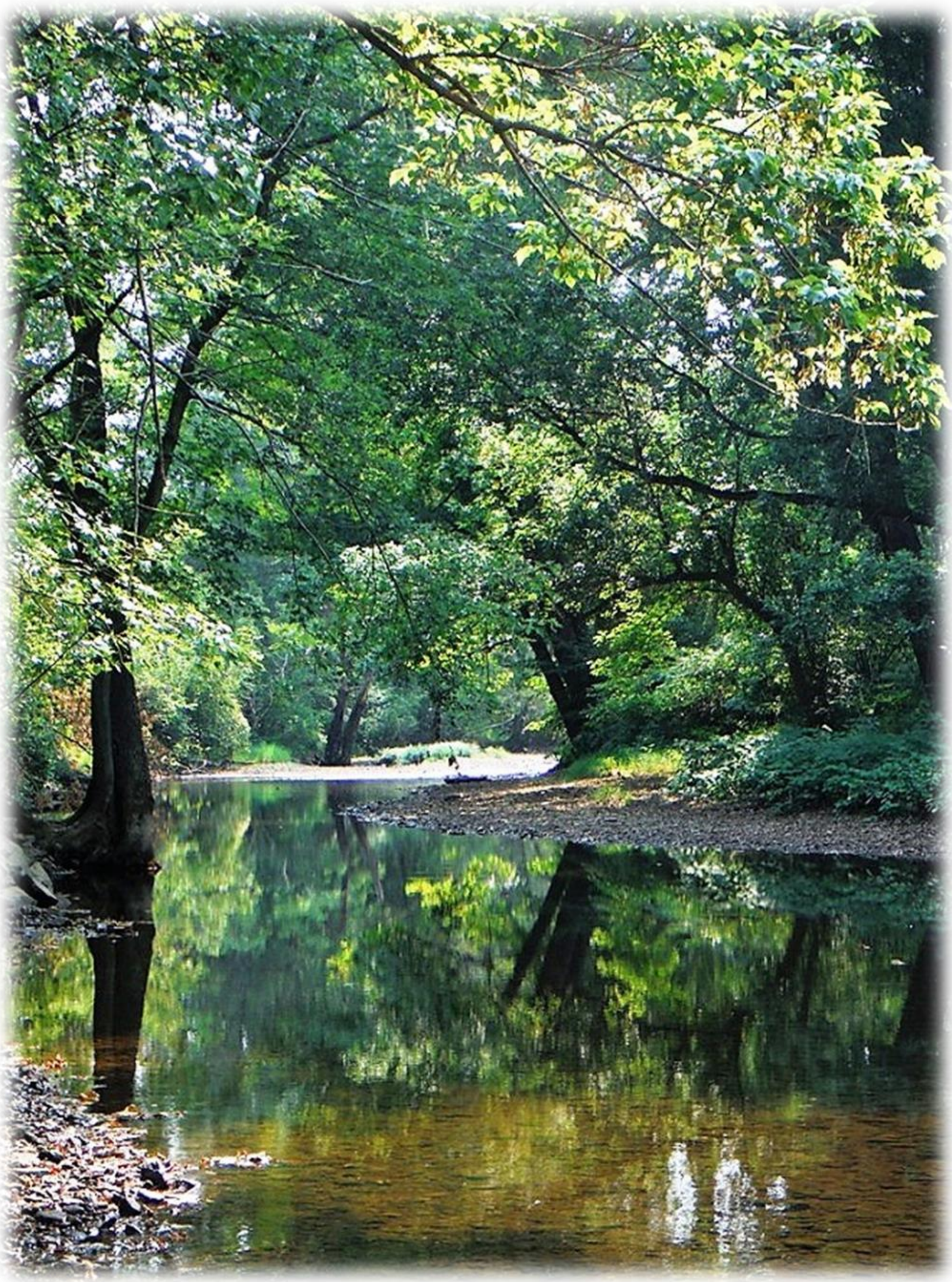
Back to Table of Contents

Conclusions

There are many tributaries of the Conemaugh River that contain wild trout populations and several that are severely impacted by mine drainage, development, and organic loading. There is a lack of comparable and baseline data, especially biological data, for this watershed particularly at sites around reclamation projects. CVC acquired biological data above and below the Neal Run and Reeds Run AMD treatment systems and attempted to get them from the SR286 system, but still, biological data are missing for it and the Gray Run AMD treatment system. Further evaluation of treatment system efficacy is needed in this Management Unit to ensure that the Conemaugh River does not regress from its current biological integrity and also to promote even more improvement in water quality. The decrease in the coal mining industry and associated, unregulated discharges is very evident in this sub-watershed. This decrease, laws and regulations, and upstream restoration efforts are the main reasons for the improvement of the Conemaugh River.

Back to Table of Contents

Loyalhanna Creek Management Unit



Location

Encompassing 298.7 square-miles, the Loyalhanna Creek watershed is the third largest sub-watershed in the Kiski-Conemaugh River Basin. Besides the mainstem of Loyalhanna Creek, only Fourmile Run and Mill Creek have sub-watersheds, within the Loyalhanna drainage, greater than 25 square-miles.

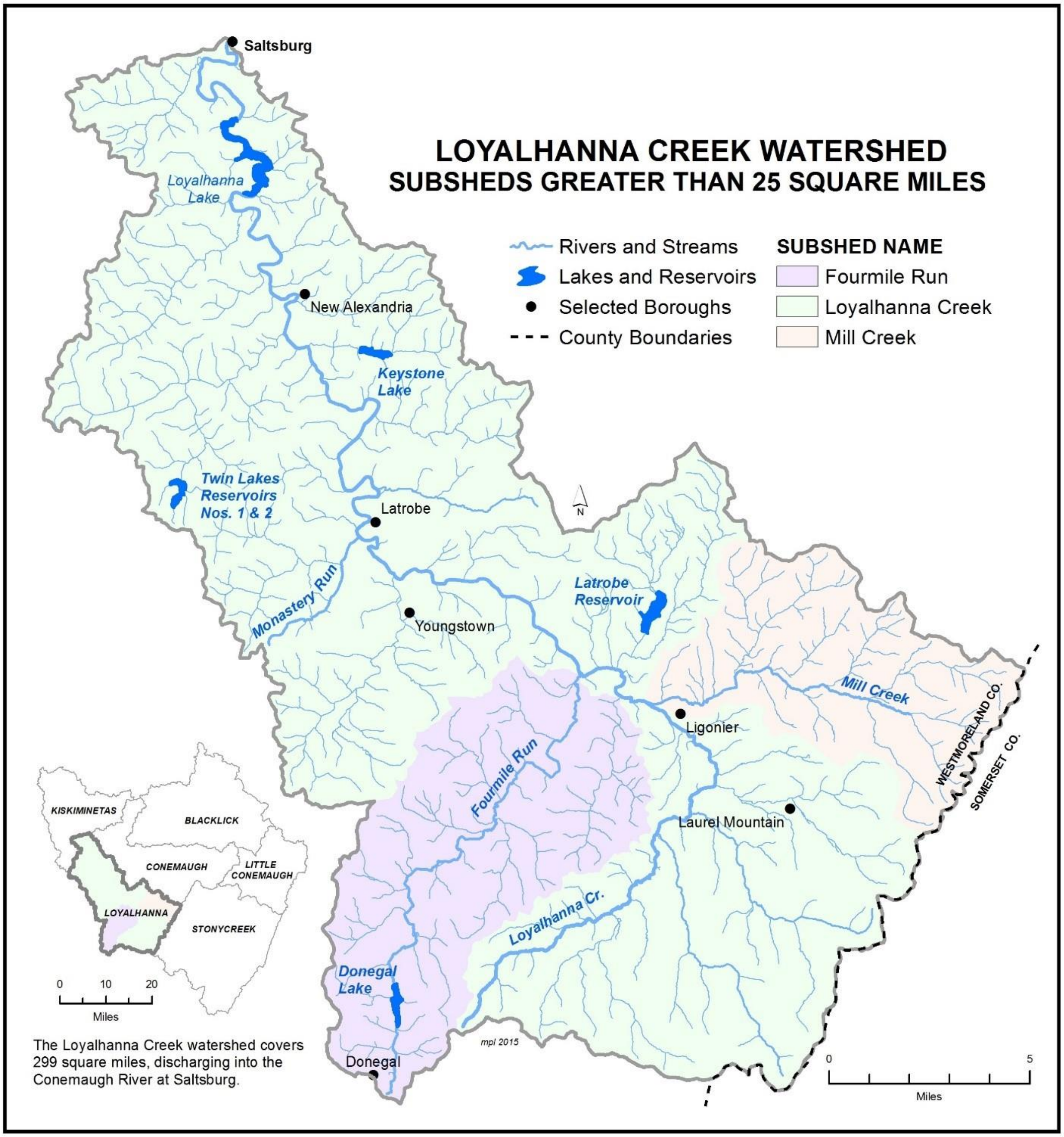


Figure 152 – The Loyalhanna Creek watershed and primary sub-watersheds

Land Cover

As seen throughout the Kiski Basin, land cover changed little in the Loyalhanna Creek Management Unit between 1992 and 2011. The largest changes occurred in the 0.9% loss of forests and the 0.8% increase in developed lands as shown in Table 27.

Land Cover Percentage in the Loyalhanna Creek Watershed, 1992 – 2011					
	1992	**2001**	**2006**	**2011**	**% Change**
Forest	68.5	58.3	68.0	67.6	- 0.9
Agriculture	19.6	19.6	19.3	19.3	- 0.3
Grass/Shrub	None	None	0.0	0.2	+ 0.2
Developed	11.3	11.5	11.8	12.1	+ 0.8
Mining/Barren	0.2	0.2	0.3	0.3	+ 0.1
Water	0.5	0.5	0.4	0.5	0
Wetlands	0.0	0.0	0.0	0.0	0

Table 27

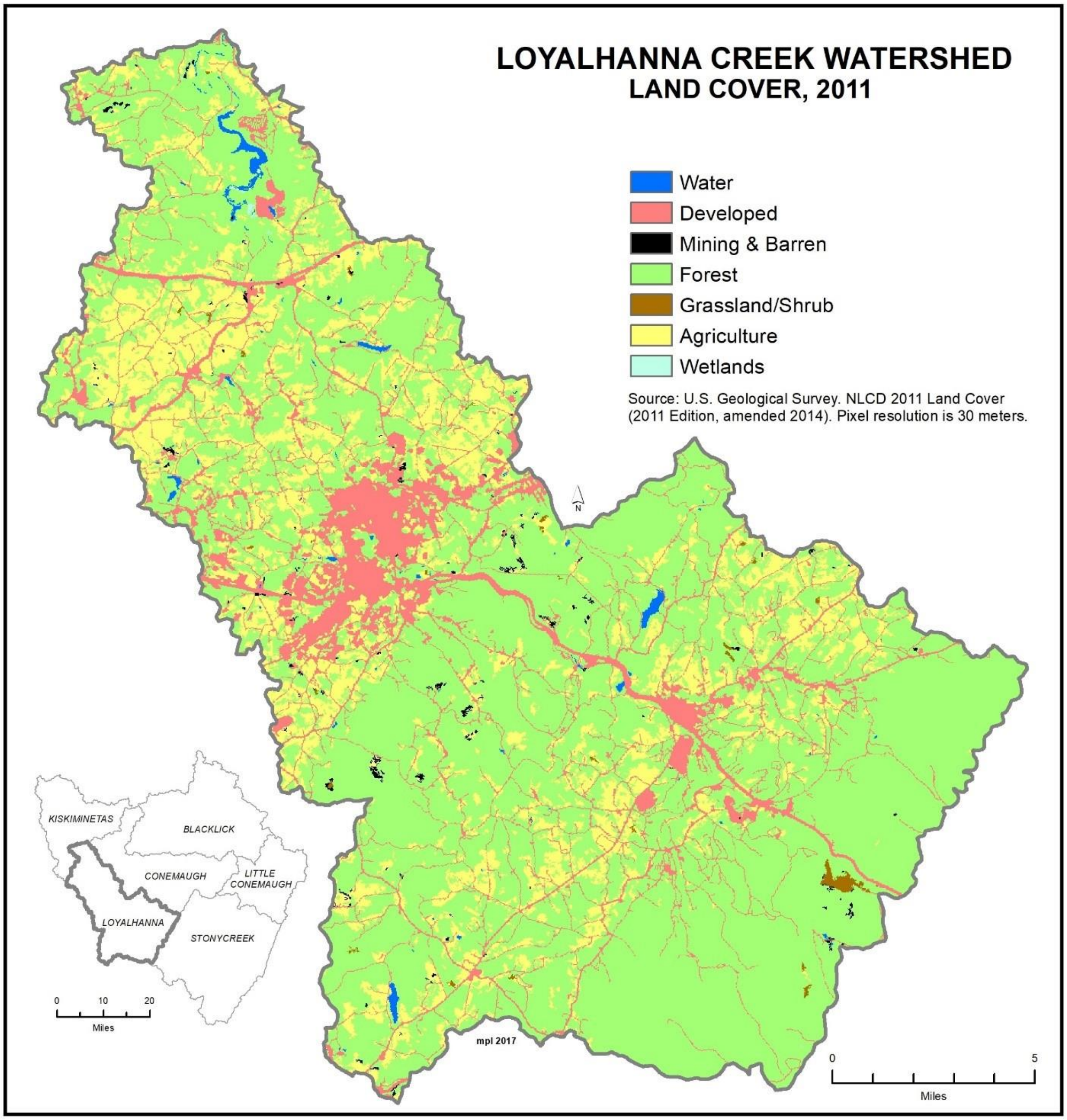


Figure 153 – Land cover of the Loyalhanna Creek watershed in 2011

Back to Table of Contents

Exceptional Value and High Quality Streams

The Loyalhanna Creek watershed contains the only High-Quality Warm Water Fishery (HQ-WWF) in the Kiski-Conemaugh River Basin and that is Serviceberry Run near the mouth of Loyalhanna Creek.

The following is a list of named streams that are fully or partially classified as Exceptional Value or High Quality by the PA Code Chapter 93, which are displayed in Figure 154.

Exceptional Value:

- Furnace Run (a tributary of McLaughlintown Run)
- Middle Fork Mill Creek
- Powdermill Run
- South Fork Mill Creek

High Quality Coldwater Fishery:

- Coalpit Run
- Indian Camp Run
- Laughlintown Run
- Loyalhanna Creek
- Miller Run
- North Fork Mill Creek

High Quality Warm Water Fishery:

- Serviceberry Run

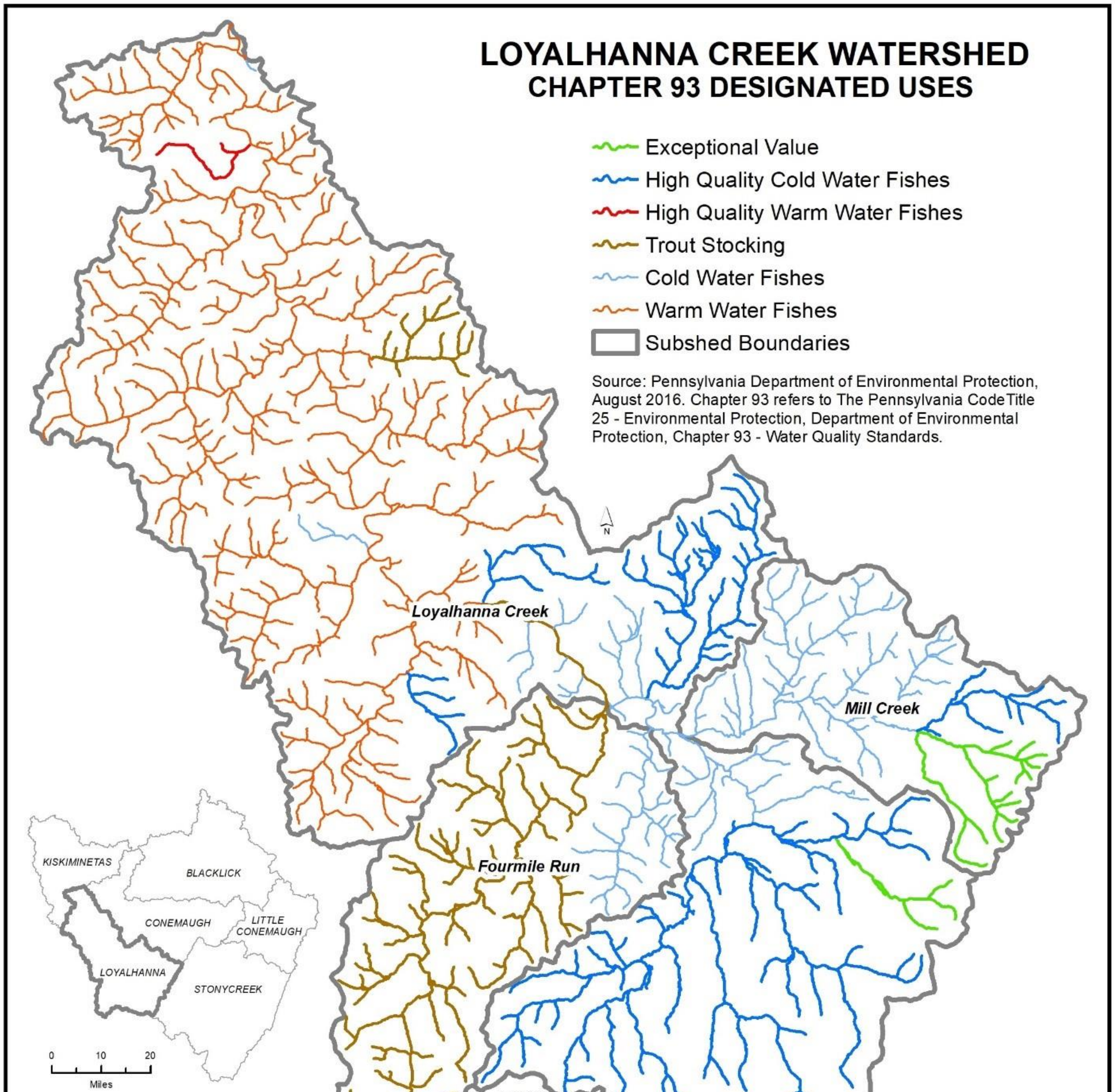


Figure 154 – Designated uses of waterways in the Loyalhanna Creek watershed

Abandoned Mine Drainage and Water Quality

Loyalhanna Creek, a fifth-order stream, originates in the Laurel Highlands near the town of Stahlstown, PA, and joins the Conemaugh River at the town of Saltsburg to form the Kiskiminetas River. The Loyalhanna Creek watershed is the least degraded Management Unit in the Kiski-Conemaugh River Basin largely due to its geology and lack of resource extraction in its headwaters. Mine drainage impacts begin around Latrobe and affect the remainder of the watershed; however, the Loyalhanna Creek watershed has the least toxic mine drainage impacts in the Kiski Basin.

Some tributaries of the Loyalhanna contain acidic mine drainage from a few abandoned mines. The most common acidification to the headwaters of the Loyalhanna is acid deposition. Episodic acidification has been documented in a number of headwater streams of low buffering capacity here, particularly during spring snow-melt and resulting high flows. Fortunately, the Loyalhanna mainstem is naturally alkaline due to limestone geology; therefore, it is less sensitive to the impacts of both mine drainage and acid deposition.

As the Loyalhanna flows downstream through the borough of Ligonier, its gradient decreases and its width increases. This low gradient and the development of roadways and homes have increased streambank erosion along Loyalhanna Creek from Ligonier to the city of Latrobe. Habitat and stabilization structures have been installed in this section for several years by the Loyalhanna Watershed Association (LWA), which is based in Ligonier. Formed in 1971, LWA is the oldest active watershed group in the Kiskiminetas River Basin and is responsible for many habitat improvements and water quality monitoring in the Loyalhanna Creek watershed.

In Latrobe, Loyalhanna Creek receives the first of many alkaline mine drainage inputs. One of the larger inputs of alkaline mine water is the Monastery Run discharge, located on land owned by St. Vincent College. This discharge is treated via aerobic wetlands and settling ponds.

Figure 155 – Crabtree discharge

Further downstream, the largest abandoned mine discharge in the Loyalhanna watershed, the Crabtree Discharge, flows into Crabtree Creek and into Loyalhanna Creek just south of New Alexandria. The Crabtree Discharge is alkaline, but contributes 2.4 million pounds per year of iron oxide to the watershed (LWA 4). In 2014, the LWA received a PA DEP Growing Greener grant to complete a feasibility study to determine how best to remediate the Crabtree Discharge (Napsha).

The study should be finished by December 2017. Susan Huba, Executive Director of the LWA, said, "We [LWA] are finalizing the study with two potential treatment scenarios – one is a passive system that would be located on property controlled by the Army Corps; the other is an active hydrogen peroxide system that would be constructed closer to the discharge location. Both are estimated to have capital costs around $14 million, with O&M costs ranging from $100,000/year for passive and ~ $500,000/year for active."

Downstream of Latrobe, where Loyalhanna Creek becomes a large, wide riverine environment, other streams impacted by AMD flow into Loyalhanna Creek, such as Saxman Run, Union Run, and Getty Run. Union Run and Getty Run contribute acidic mine water with Getty Run discoloring the Loyalhanna Creek near its confluence with the Conemaugh River. The U.S. Army Corps of Engineers' Loyalhanna Lake induces metal precipitation so Loyalhanna Creek downstream of the dam often looks better than the section above Loyalhanna Lake. Even the DEP's Integrated List of Non-Attaining Streams and Lakes lists the section below Loyalhanna Lake as impaired by "Other or Unknown" sources, as shown in Figure 156, not by AMD. Because Loyalhanna Lake slows down the flow of Loyalhanna Creek, sedimentation builds in the Lake (Wright 3-9).

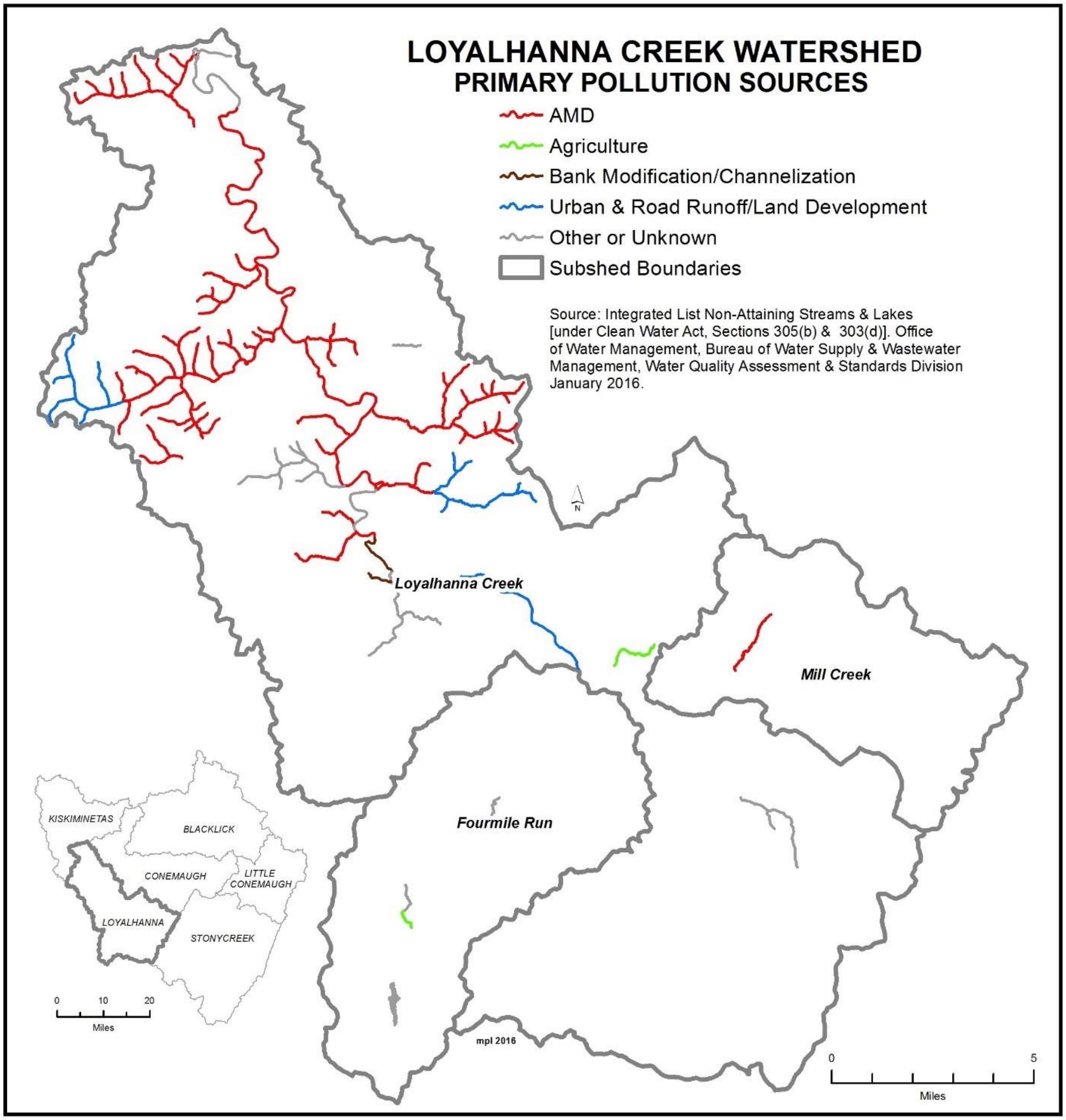


Figure 156 – Waterways on the Integrated List of Non-Attaining Streams and Lakes

Unfortunately, CVC was unable to locate any biological data and very little chemical data from this point downstream to the Loyalhanna's confluence with the Conemaugh River. The water quality of this portion of the mainstem is not well documented, but inference can be made that mining impacts are largely alkaline due to the copious amounts of iron precipitate on the stream bottom and to the minimal biological impacts observed in the Kiskiminetas River below Loyalhanna Creek.

Back to Table of Contents

AMD Treatment Systems

There are seven AMD treatment systems in the Loyalhanna Creek watershed, as shown in Figure 157.

The Laurel Run AMD Treatment System is notable as Laurel Run is a headwater tributary to Loyalhanna Creek located within the Carnegie Museum of Natural History's Powdermill Nature Reserve. The Reserve installed a Successive Alkaline Producing (SAP) system to treat a hot, acidic mine discharge that had completely acidified Laurel Run beyond the tolerance of any fish. CAL U sampled the system's progression from installation to the mid-2000s. Data collected indicated that the system had reoccurring problems with hot seeps. Throughout its life, the system has been retrofitted and updated. PFBC sampled Laurel Run in 2013 and found stable populations of wild brown and brook trout indicating that the system is working and restoring the wild trout populations to Laurel Run.

Information on other treatment sytems may be found on page 310.

As mentioned in other sections, Stream Restoration, Inc. (SRI) recently evaluated all of the passive treatment systems throughout the Kiski Basin. SRI's findings may be found on the Datashed website.

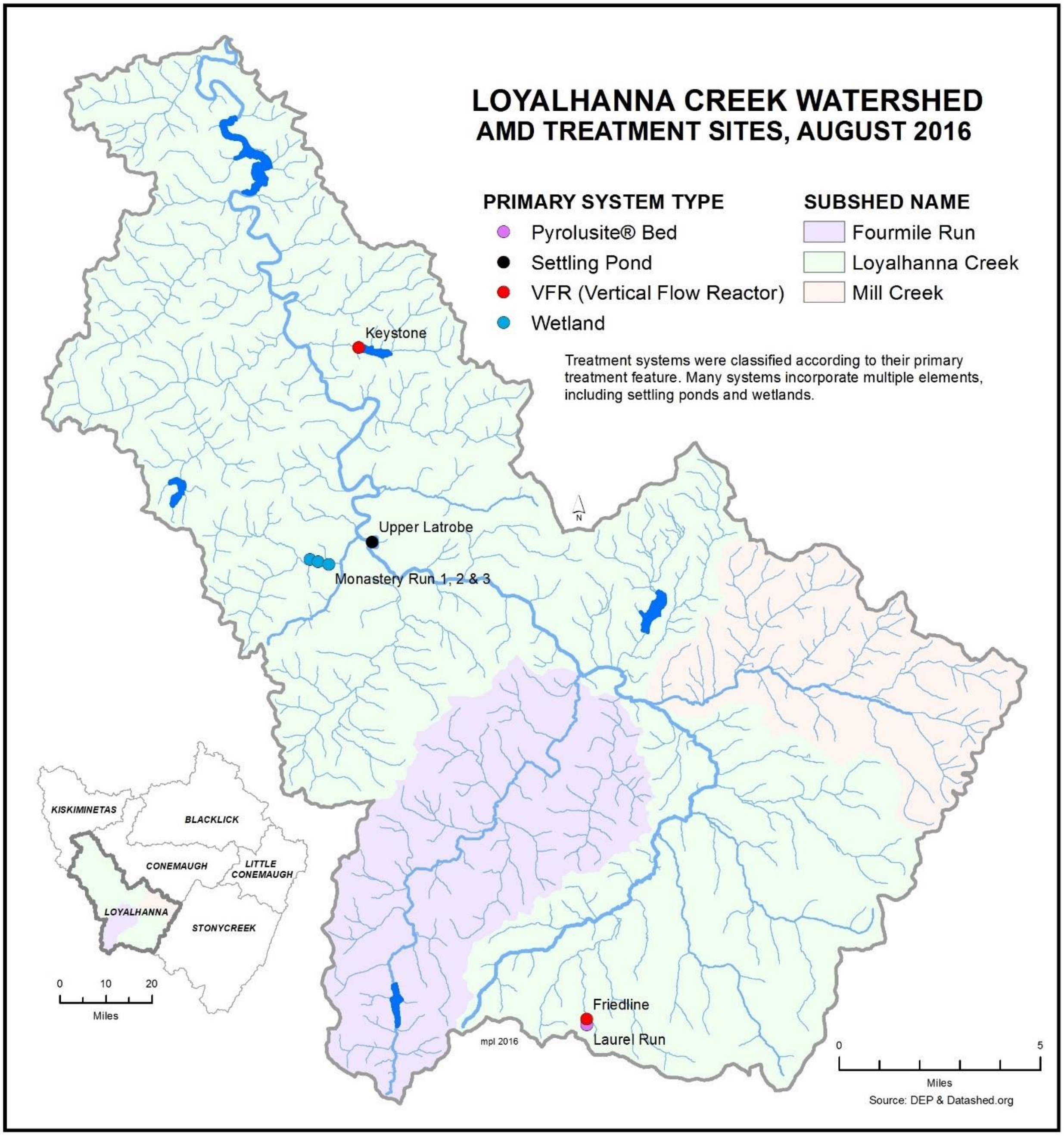


Figure 157 – Map of the passive AMD treatment systems in the Loyalhanna Creek watershed

Biological Evaluation

Loyalhanna Creek Mainstem Biological Comparisons

Four sites on the Loyalhanna Creek mainstem were surveyed by CVC and LWA or CVC and CAL U in 2015 and compared to PFBC data. These sites were:

- Site 1: Loyalhanna Creek @ Seaton Road
- Site 2: Loyalhanna Creek in Ligonier
- Site 3: Loyalhanna Creek @ Route 982 Bridge
- Site 4: Loyalhanna Creek @ Cardinal Park

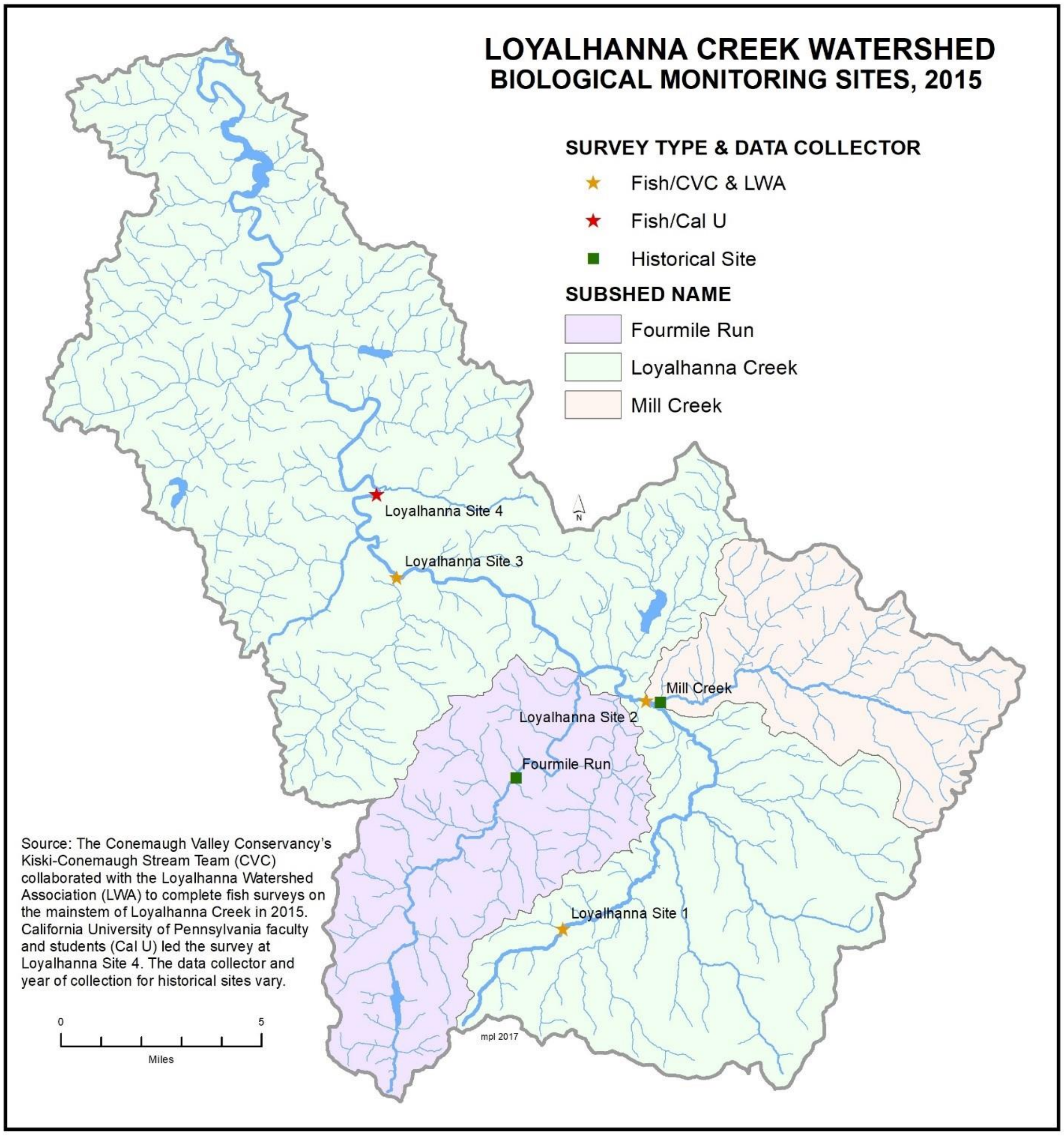


Figure 158 – Key biological monitoring sites, Loyalhanna Creek watershed

Site 1: Loyalhanna Creek at Seaton Road

Loyalhanna Creek is a second-order stream at this site, which is located near the town of Rector, PA. A PFBC survey in 2000 (Site 18525) and a CVC survey in 2015 documented the presence of a viable wild brown trout population. The stream is very small here with water levels, at the time of the 2015 survey, almost nonexistent upstream of the site. Mostly shallow pools and runs with low flow velocities comprised the site. Over the two miles downstream of this site, three larger tributaries confluence with Loyalhanna Creek to sustain flows and more than triple its volume. The water quality of Site 1 has remained good, as indicated by the self-sustaining population of wild brown trout that have been present for over 15 years. The alkalinity of this section is 84 mg/L, which allows for the buffering of acid deposition.

Figure 159 – Headwaters of Loyalhanna Creek at Seaton Road

Site 2: Loyalhanna Creek in Ligonier

This low-gradient, wide site is located in the borough of Ligonier, PA. The LWA has done extensive bank stabilization and habitat enhancement projects here to mitigate erosion and sedimentation. PFBC surveyed this site (Site 39673) in 2000 and collected 20 fish species, six of which were gamefish. CVC collected 23 species, six of which were gamefish in its 2015 sampling. Golden redhorse, silverjaw minnow, fathead minnow, bluntnose minnow, hatchery rainbow trout, and smallmouth bass were collected in 2000, but missing in 2015. Blacknose dace, emerald shiner, green sunfish, Johnny darter, lamprey larvae, redear sunfish, river chub, tessellated darter, and variegate darter were missing in 2000, but collected in 2015. Lampreys are indicative of good water quality.

The PFBC survey was completed before habitat enhancement structures were installed in this area. From 2011 to 2014, LWA installed log veins in this section to restore habitat that had been lost to erosion. The habitat structures have improved the available habitat as evidenced by the increase in species collected. Both surveys collected holdover hatchery trout, indicating that this section of stream remains cold enough to support a year-round put-and-take fishery.

Site 3: Loyalhanna Creek at Route 982 Bridge

Site 3 is located near the City of Latrobe, PA where the Loyalhanna Creek mainstem is very wide and very low gradient. This site has historically supported abundant and diverse biological communities. In 2009, PFBC (Site 15121) collected 22 species of fish. Fish, such as redhorse that are indicators of good water quality, were collected in this sample, as was a diverse darter community. In 2015, CVC surveyed this site and collected 23 species of fish. The distribution of species was not identical to the 2009 sampling, but pollution intolerant species, such as redhorse, still remained in the site. The different taxa that were collected in each survey likely still exist is this section of stream, which would make this section one of the most biologically diverse areas in the Kiskiminetas River Basin. Hatchery rainbow trout were also collected in both surveys, indicating that a stocked trout population could hold over in this area throughout the year.

Figure 160 – A black redhorse found in Loyalhanna Creek at Route 982. Photo by Steve Grodis

Figure 161 – Loyalhanna Creek at State Route 982

Site 4: Loyalhanna Creek at Cardinal Park

Site 4 is located downstream of Route 981 in Latrobe, PA. In June 2009, the PFBC surveyed Loyalhanna Creek (Site 24386) near the intersection of Water and Thompson Streets, about 50 meters downstream of the railroad tracks west of the Route 981 bridge, and collected 29 species, including trout and bass. In August 2015, CAL U and CVC surveyed Loyalhanna Creek adjacent Cardinal Park, about one river mile downstream of the PFBC's site, and found 19 species, including bass, but no trout.

Back to Table of Contents

Select Loyalhanna Creek Tributaries or Lakes

There are many small, high-gradient headwater streams in the Loyalhanna Creek watershed. Many of these tributaries contain wild trout populations. Some of these tributaries are alkaline, while some are influenced by non-alkaline geology making them susceptible to acid deposition. Acid input into Loyalhanna Creek is quickly neutralized by the mainstem's robust alkalinity. Organic loading from agriculture and development is occurring in areas throughout the watershed. The small streams in the Latrobe area are influenced by alkaline mine drainage and urban development, which decreases the available habitat.

Mill Creek and Fourmile Run

These are the two largest tributaries to Loyalhanna Creek. PFBC has sampled multiple sites from the 1980s to present day throughout Fourmile Run. The data acquired from Fourmile Run indicate that fish populations have remained stable throughout the last 35 years. PFBC completed surveys of Mill Creek near the intersection of Macartney Lane and State Route 711 in 1986, 2003, and 2009 (Sites 11921-11923) that showed a stable fish community, able to sustain stocked trout. Both of these streams have areas of degraded habitat due to development and erosion, but LWA has installed habitat rehabilitation projects within these areas. The upper reaches of these streams contain viable populations of wild trout.

Donegal Lake

Donegal Lake, which is owned by the Commonwealth and managed by the PA Fish and Boat Commission, is a popular destination for anglers. The PA Department of Environmental Protection deemed its dam unsafe and so, in 2016, the PFBC began to draw the water levels down and lifted size and creel limits in preparation for rebuilding the dam. According to the PFBC, "The estimated $5 million construction project is expected to start in late spring or early summer 2017 and last through 2018. The 90-acre lake is expected to be refilled and open for public use again in spring 2019. Stocked trout angling should also return to Donegal Lake in 2019."

Conclusions

The upper reaches of Loyalhanna Creek from its headwaters to Latrobe have historically possessed good water quality, but small tributaries in this section have suffered and are still suffering from acid deposition due to their low buffering capacity. The acidification of these tributaries has little effect on the Loyalhanna Creek mainstem due to its high buffering capacity. The largest impact in this area of the watershed is the loss of physical habitat due to development and erosion. These impacts can reduce the biodiversity within the mainstem and larger tributaries. The upper reaches of Loyalhanna Creek are characterized by healthy fish communities, even wild trout. Downstream of Latrobe, Loyalhanna Creek receives multiple alkaline mine discharges that turn the stream orange all the way to its confluence with the Kiskiminetas River. Though Monastery Run and other projects have been established to remove the iron, there are more discharges that require treatment.

No biological data exist in Loyalhanna Creek downstream of Latrobe, but observations of this reach indicate that many alkaline mine drainages exist. There is also a lack of tributary biodata in this area, which makes the assessment of mine drainage issues difficult. It is assumed that the drainages in this area are alkaline due to the minimal biological impacts that are seen on the Kiskiminetas River downstream of its Loyalhanna Creek confluence. Overall, Loyalhanna Creek is the most biologically diverse Management Unit in the Kiski-Conemaugh River Basin.

The headwaters of Loyalhanna Creek should be re-evaluated to determine the impact of acid deposition and climate change to wild trout. Where acid deposition persists, projects should be established to restore wild trout due to this watershed's high percentage of wild trout streams. Organic loading should also be investigated throughout the entire watershed, given the passage of time since the *Loyalhanna Creek Watershed Assessment and Restoration Plan* was published. The lower half of Loyalhanna Creek needs to be fully evaluated to determine the most effective means of removing iron. Biological data need to be collected from the tributaries and the mainstem in this section to determine the impacts that water quality and iron embeddedness are having on the stream ecosystem. Collaborations with LWA should continue habitat rehabilitation and monitoring efforts.

Back to Table of Contents

Kiskiminetas River Management Unit

Location

The mainstem of the Kiskiminetas River, encompassing 216.6 square-miles, is the fifth largest Management Unit within the Kiski-Conemaugh River Basin. Besides the mainstem of the Kiski River, only Blackleggs Creek and Beaver Run have sub-watersheds larger than 25 square-miles.

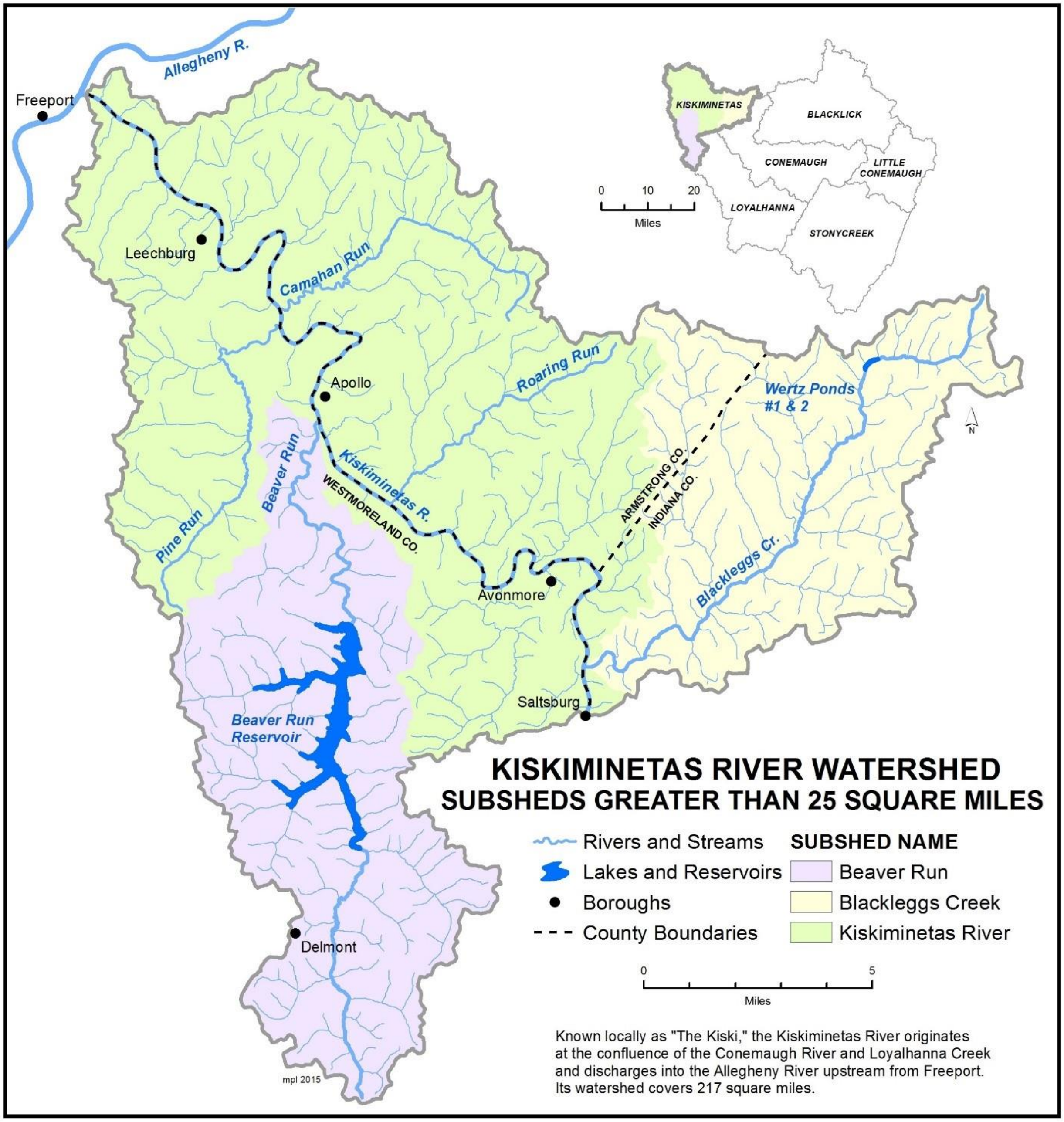


Figure 162 – The Kiskiminetas River mainstem watershed and primary sub-watersheds

Land Cover

Land cover in the Kiskiminetas River Management Unit follows the trend of the whole KC Basin, with forest constituting the largest land cover, followed by agriculture. Compared to other Management Units, land cover changed the least in the Kiski.

Land Cover Percentage in the Kiskiminetas River Watershed, 1992 – 2011					
	1992	**2001**	**2006**	**2011**	**% Change**
Forest	66.0	66.2	65.9	65.5	- 0.5
Agriculture	19.3	18.8	18.9	18.9	- 0.4
Grass/Shrub	None	0.0	0.1	0.2	+ 0.2
Developed	12.8	13.0	13.1	13.4	+ 0.6
Mining/Barren	0.3	0.4	0.4	0.4	+ 0.1
Water	1.6	1.7	1.7	1.7	+ 0.1
Wetlands	None	0.0	0.0	0.0	0

Table 28

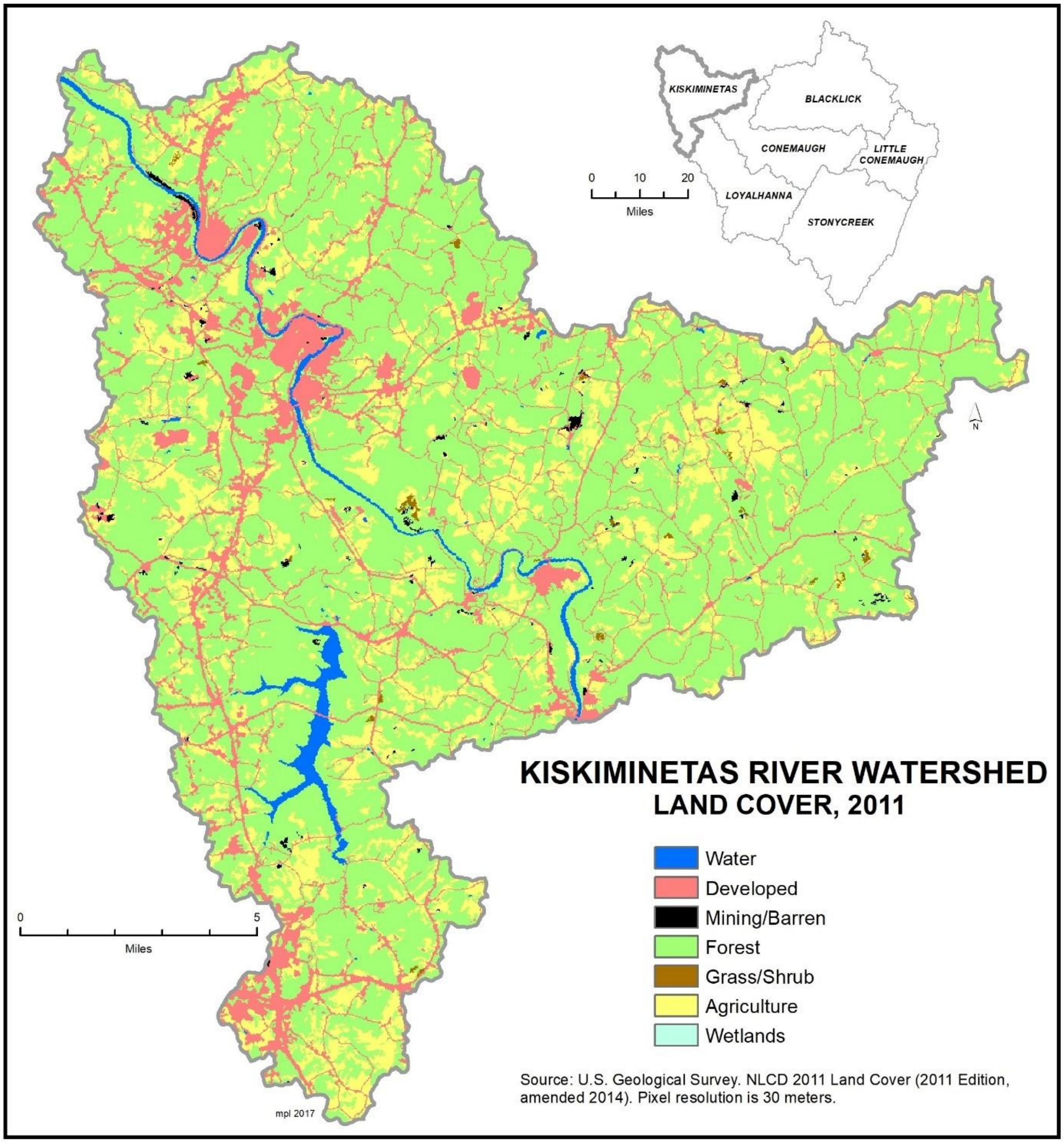


Figure 163 – Land cover of the Kiskiminetas River mainstem watershed in 2011

Exceptional Value and High Quality Streams

The Kiskiminetas River is a major riverine ecosystem with extensive, warm water pools throughout its length. Only one High Quality Coldwater Fishery exists in this Management Unit: Beaver Run. This tributary feeds the Beaver Run Reservoir, a drinking water supply owned and operated by the Municipal Authority of Westmoreland County.

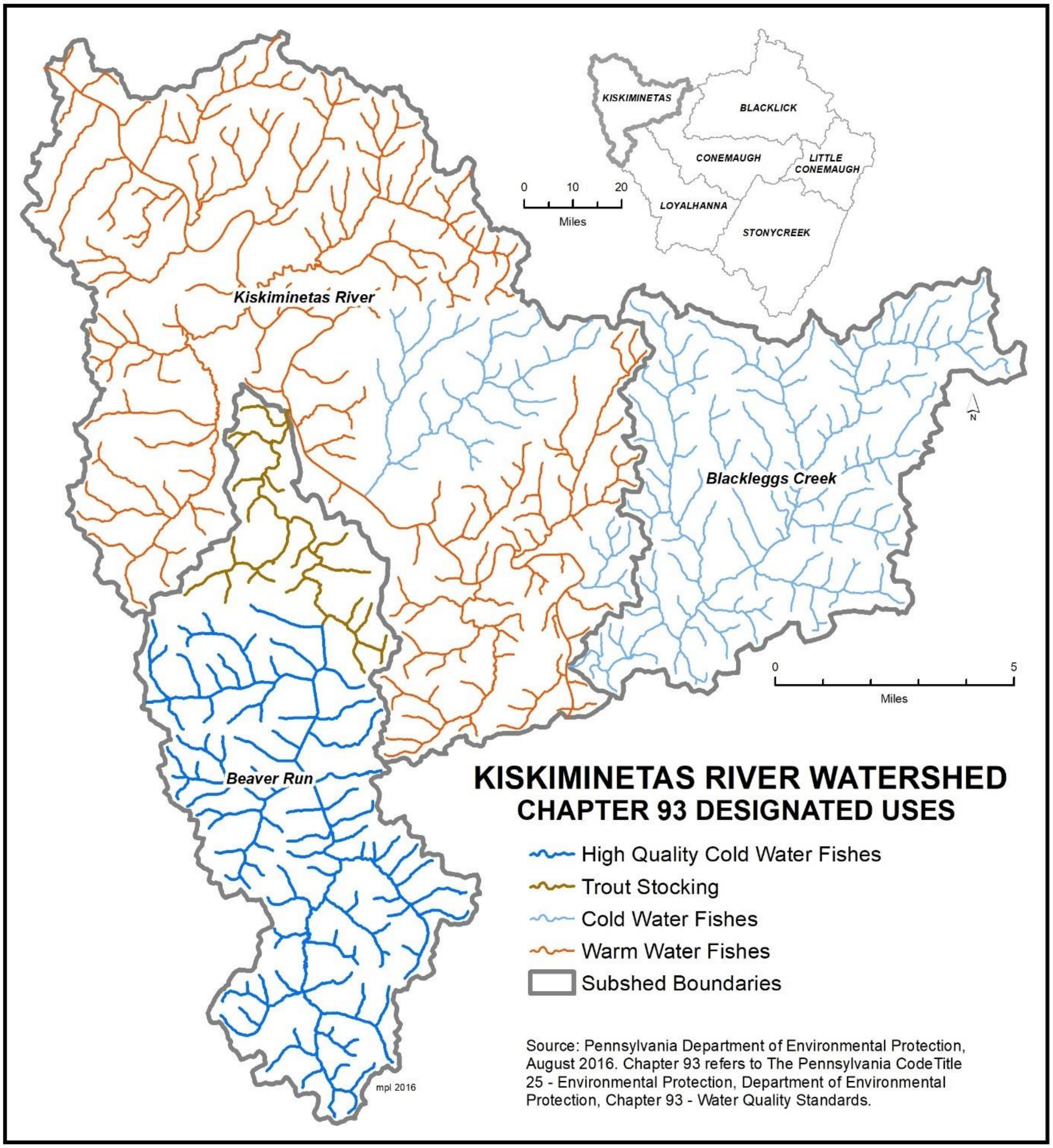


Figure 164 – Designated uses of waterways in the Kiskiminetas River mainstem watershed

Abandoned Mine Drainage

After decades of unabated inputs, abandoned mine drainage remains the primary source of pollution within the Kiskiminetas River mainstem. Upstream influences as well as numerous discharges in the Blackleggs Creek watershed also contribute to the impairment of the Kiskiminetas River.

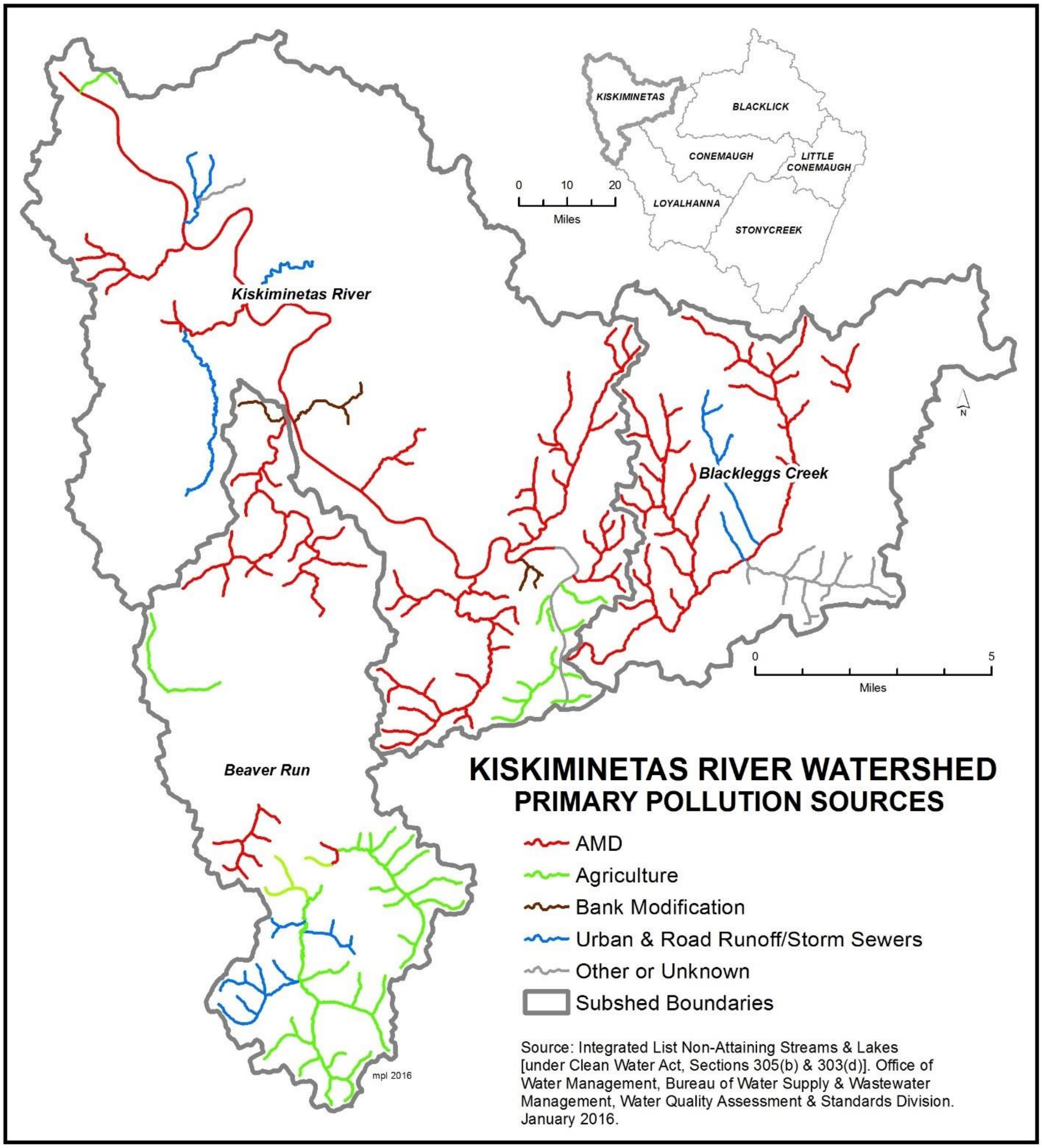


Figure 165 – Waterways on the Integrated List of Non-Attaining Streams and Lakes

Back to Table of Contents

AMD Treatment Systems

As shown in Figure 168, there are six AMD treatment systems in the Blackleggs Creek watershed. Millions of dollars have been invested by federal and state governments, private foundations, and local organizations in an effort to remediate the 50+ Abandoned Mine Discharges in the Blackleggs Creek watershed. Unfortunately, due to the high flows and elevated metal concentrations of the discharges entering these systems, poor system design, and their insufficient capacity, treatment is inconsistent. Further study is needed to determine exactly how the hydrology of this watershed and the water quality of treated and untreated discharges affect the mainstem of Blackleggs Creek. More on Blackleggs Creek may be found in the Biological Evaluation section on page 250.

Figure 166 – Booker AMD Treatment System

The Booker AMD treatment system along Carnahan Run, a tributary to the Kiski River, removes 80% of the Total Iron emanating from this alkaline discharge through a series of three settling ponds and wetlands. Fish surveys completed by CVC in 2015 above and below the effluent of this treatment system revealed nearly identical fish communities. Despite a major AMD discharge below the Booker treatment system on a rock cliff face, an established water monitoring point on Carnahan Run (DEP SIS 71498) a little over a mile downstream of the Booker treatment system and close to the mouth shows Total Iron and Total Aluminum levels at or near non-detect levels, except in April 2011. A water sample collected on April 10, 2011 measured Total Iron of 69 mg/L and Total Aluminum of 175 mg/L. According to the Live Science website, the Ohio Valley was the region with its wettest April on record, which could account for these exceptionally high readings; mine pools were elevated and in contact with geologic strata that typically do not influence to water quality.

The Jamison AMD treatment system along Wolford Run, another tributary to the Kiski, was built in 1994 as part of a project that reclaimed about 30 acres of coal refuse and used an anoxic limestone drain (ALD) and a settling pond to treat a borehole discharge (Datashed). Very little data exist for this site; water quality reports on Datashed show that the system is non-functional. In June 2015, the Conemaugh Valley Conservancy collected macroinvertebrates from Wolford Run and found nine individuals representing five taxa above the treatment system's effluent and four individuals representing three taxa below it. All were pollution tolerant taxa.

Figure 167 – The Kiski River, downstream of its confluence with Wolford Run

As in other Management Units, Stream Restoration, Inc. (SRI) has evaluated these and other systems in the Kiski Basin. SRI's findings may be found on the Datashed website.

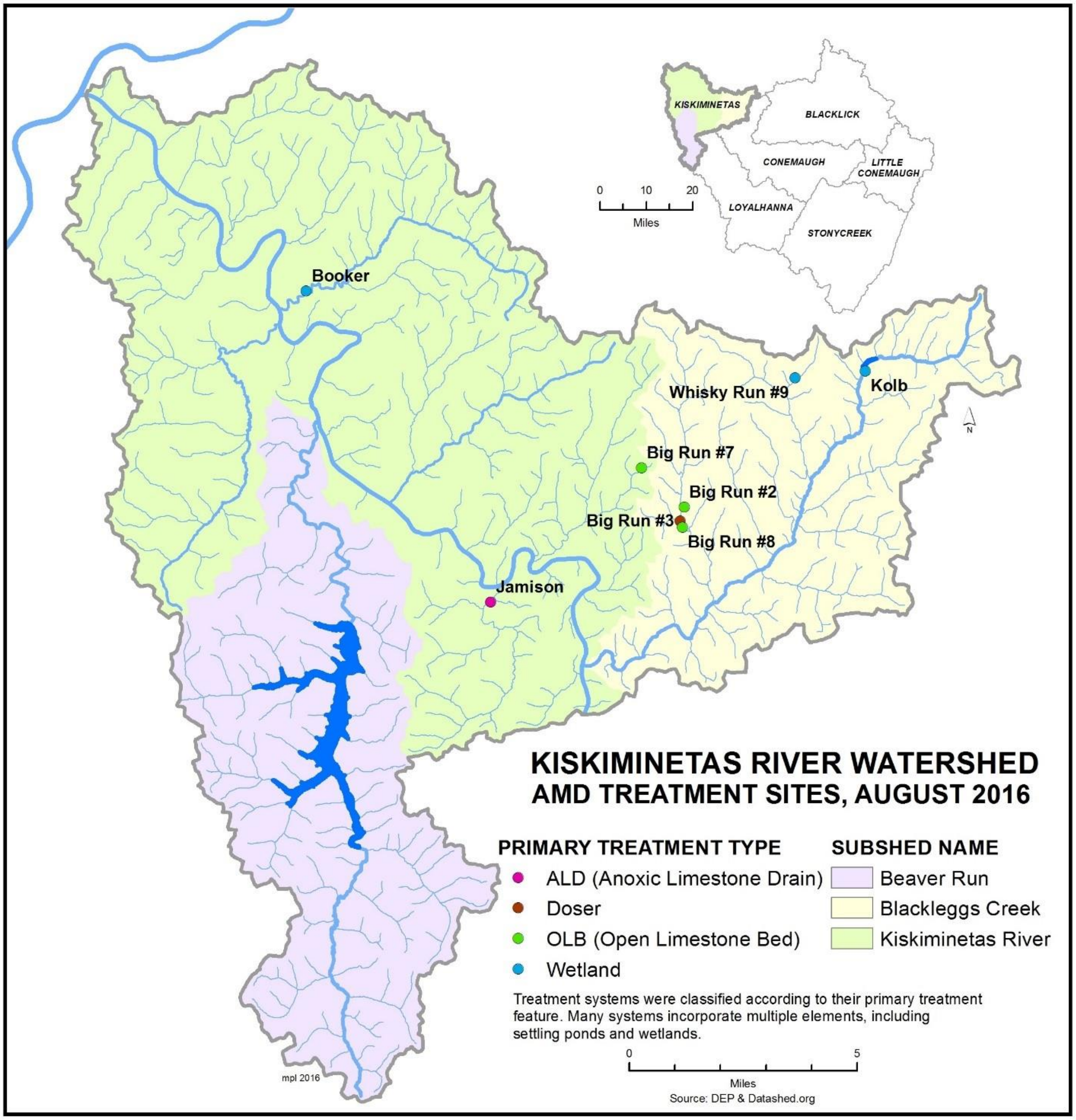


Figure 168 – Map of the AMD treatment systems in the Kiskiminetas River mainstem watershed

Back to Table of Contents

Nuclear Waste

In the 1960s and 70s, the Nuclear Materials and Equipment Corporation (NUMEC) and later its successors, the Atlantic Richfield Company and Babcock & Wilcox, operated a uranium processing plant in Apollo. Radioactive material generated by it and a plutonium processing facility in the village of Kiskimere in Parks Township, Armstrong County, were deposited in a nuclear waste dump adjacent the plutonium plant. The Army Corps of Engineers refers to the latter as the Shallow Land Disposal Area, while most locals call it the "Old NUMEC site." The Nuclear Regulatory Commission oversaw the demolition of the plutonium plant in the early 2000s; however, the 44-acre waste site remained (Thomas). In 2011, citizens requested the EPA test well water for contamination, and the Army Corps of Engineers was to excavate the site and send the contaminated dirt and debris to Utah (Thomas). The Army Corps stopped their work in 2012 because they uncovered more "complex materials" that could include plutonium and uranium than anticipated. The area was fenced off and armed guards brought in before reclamation efforts continued.

In 2014, the Trib Total Media reported that the "U.S. Environmental Protection Agency did not find any radiological or chemical contamination from the nuclear waste dump in Parks Township in the sediment of the Kiski River or water in abandoned coal mines under the dump." The news article stated that the Army Corps would continue its 10-year remediation project that could cost up to $500 million (Richert). In June 2017, the Trib Total Media reported that the Army Corps of Engineers will not release an inventory of its finds until the project is complete in 2031 due to national security reasons (Thomas).

Back to Table of Contents

Biological Evaluation

The Kiskiminetas River confluences with the Allegheny River near the towns of Schenley and Freeport, PA. The Kiski River and its watershed have a long history of industrial impacts particularly from coal mining, steel production, and urban development. Agriculture and industrial waste facilities occur frequently in the Kiski Basin, contributing organic loading to the Kiskiminetas River watershed.

Prior to 1980, the coal industry was at its peak of production within the Kiski-Conemaugh River Basin with many surface and deep mines supplying steel mills, power plants, and homes. The resulting untreated mine drainages rendered the river lifeless. During the 1980s, the coal and steel industry in the Basin decreased, laws and regulations took effect, and land reclamation projects began. In the 1990s, steel production was gone from the Basin, along with many other industrial production facilities, and the coal industry had decreased drastically due to the absence of the steel industry. The decline of the industrial base led to a decrease of toxic discharges throughout the Basin.

In 1999, when the original *Kiski-Conemaugh River Basin Conservation Plan* was completed, the Kiski River was no longer dead, but it was far from a viable, diverse fishery. While the industrial legacy of the Basin had disappeared, the scars left behind from over a century of uncontrolled industrial development had rendered the majority of the Basin's waters biologically and chemically impaired. Even though the disappearance of many industrial discharges brought life back to the Kiskiminetas River, its future was uncertain.

Fortunately, in the 2000s, land and water reclamation efforts spanned the Basin. Many watershed groups had been formed and money for these reclamation projects was being spent at a rapid rate in the Basin. The results were a dramatic increase in biodiversity and water quality and growth in a recreational market that was non-existent prior to these efforts.

Figure 169 – The influent of the Big Run #2 AMD treatment system forms arches

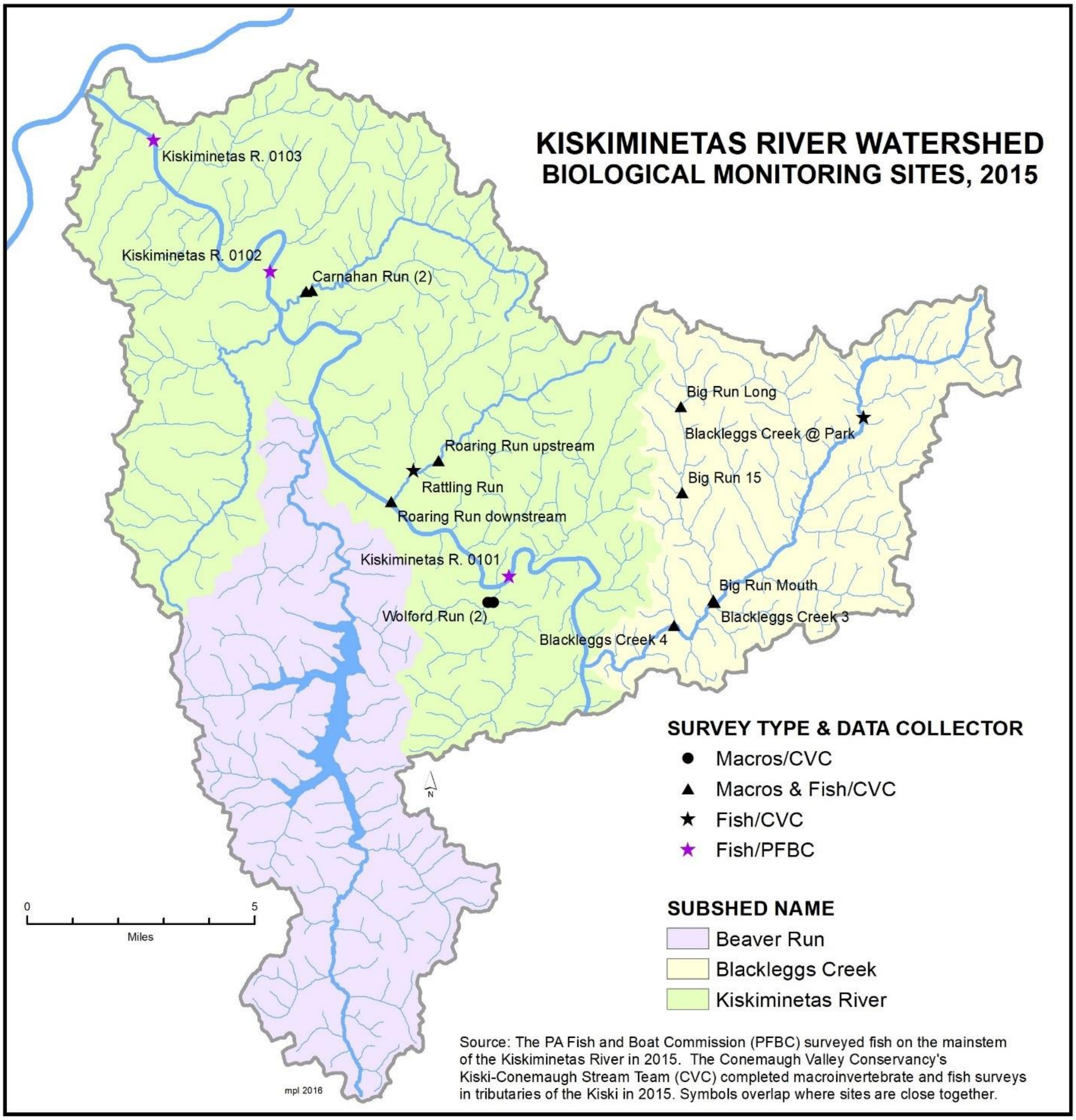


Figure 170 – Key biological monitoring sites, Kiskiminetas River mainstem watershed

Back to Table of Contents

Kiskiminetas River Mainstem Biological Comparisons

Near Schenley, PA, the Kiskiminetas (Kiski) River joins the Allegheny River. The Kiski is a large fifth-order tributary of the Allegheny and, as shown in Figure 5, its watershed encompasses 16% of the Allegheny River watershed. The Kiski watershed's history of mining and industrial pollutants left the river biologically dead. In 1980, a survey by the former Department of Environmental Resources documented the presence of one frog. The river was so degraded by pollution from its industrial legacy that no viable biological community existed before 1980.

In 1990, PFBC sampled the Kiskiminetas River for the first time in ten years. PFBC sampled two sites: PFBC 0102 (RM 7.89 to 8.55) near Hyde Park and PFBC 0103 (RM 0.23 to 3.69) near the Kiski's mouth. PFBC sampled these sites again in 2000 and 2015. The results of these samplings are shown in Figure 171, which displays the number of fish species collected during the surveys. Table 29 shows the number of individual fish collected at Site 0103.

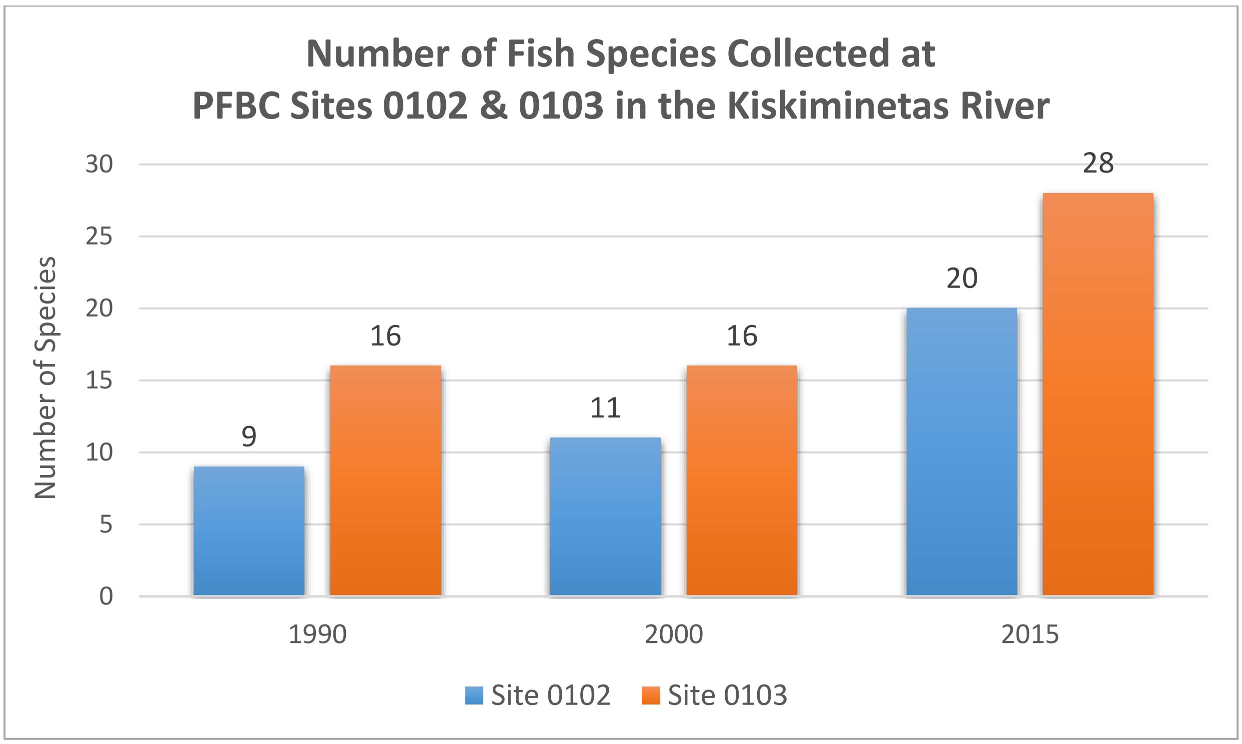


Figure 171 – Number of fish species collected during surveys on the Kiskiminetas River

As Figure 171 depicts, the Kiskiminetas River has undergone a remarkable biological recovery. This river, prior to 1980, was biologically dead and considered lost; now it contains some of the most sensitive fish species in the Allegheny River drainage. Today, the Kiskiminetas River has populations of quillback, smallmouth buffalo, several species of redhorse, and other gamefish.

In 1990, 37% of the fish species captured were piscivores – fish that eat other fish. In 2000, that number jumped to 65%, largely due to the dramatic increase in the smallmouth bass population, despite what the PFBC called a “slight increase” in water quality. In 2015, 26% of the fish species were piscivores, an expected decrease as the fish community diversified. In 2015, the largest percentage of fish (62%) were invertivores, up from 19% in 2000. Invertivores are fish that feed on macroinvertebrates, which increased due to improving water quality (Lorson).

Since the original 1999 Plan, the river has improved almost two-fold biologically and has become a recreational fishing and paddling destination. Additionally, the Allegheny River is the sourcewater of drinking water for at least 500,000 people in the City of Pittsburgh. This river is certainly the “Cinderella” story of Pennsylvania and future improvements completed upstream will only enhance the Kiski’s recovery.

Back to Table of Contents

Kiskiminetas River Fish Survey Results by PFBC at PFBC Site 0103 – near the Kiski's Mouth			
	RM 0.23 - 4.71	**RM 0.23-3.69**	**RM 0.23-3.69**
	1990	**2000**	**2015**
Common Name			
Black Redhorse			47
Bluegill	6	7	19
Bluntnose Minnow			2
Brook Silverside			1
Channel Catfish	8	1	12
Channel Shiner			1
Common Carp	5	4	8
Emerald Shiner	6		48
Flathead Catfish		1	5
Freshwater Drum	1	2	14
Gizzard Shad		11	
Golden Redhorse	11	19	73
Greenside Darter			2
Largemouth Bass	2		
Logperch			16
Longhead Darter			4
Mimic Shiner			4
Mooneye			1
Pumpkinseed	1		1
Quillback	4	1	1
River Carpsucker			4
River Redhorse		3	1
Rock Bass	1	8	22
Sand Shiner	13		
Sauger	4	3	6
Silver Redhorse			19
Smallmouth Bass	25	91	62
Smallmouth Buffalo		6	
Smallmouth Redhorse		2	5
Spotfin Shiner			2
Spotted Bass	1	1	1
Walleye	2	1	3
Yellow Perch	4		
TOTAL INDIVIDUALS	**94**	**161**	**384**
TOTAL SPECIES	**16**	**16**	**28**

Table 29

Select Kiskiminetas River Tributaries

Blackleggs Creek

Blackleggs Creek, a third-order tributary of the Kiskiminetas River located in Saltsburg, PA, has a long history of very intensive coal mining throughout its watershed that continues to present day.

There are three major areas of mine drainage in the watershed: the Kolb discharge on upper Blackleggs Creek, Whisky Run, and Big Run. While these three areas have never totally decimated life in Blackleggs Creek, they have combined to severely degrade resident biological communities. Fish populations are transients from the headwaters downstream and from the Kiskiminetas River upstream, as well as stocked trout.

The DEP, PFBC, and CVC have evaluated remediation efforts by the Blackleggs Creek Watershed Association, which has utilized large investments in treatment by OSMRE, DEP, FPW, Norfolk Southern Railroad, and the surrounding community.

A treatment system was established in 2001 at the Kolb discharge site to reduce the amount of iron that was entering the mainstem of Blackleggs Creek. This alkaline effluent is the most upstream discharge in the watershed.

A treatment system for the Whisky Run #9 discharge was built in 2016 and was only fully operational for a few months in 2017 before it was deactivated to allow for the establishment of wetland vegetation. The Whisky Run #9 discharge is alkaline and contains toxic levels of aluminum that inhibits the biological diversity in the mainstem of Blackleggs Creek.

The Big Run AMD Treatment Complex was designed to remediate a series of large, hot acid discharges that result from mining of the Pittsburgh coal and that contain very high concentrations of aluminum. The Big Run systems have been undergoing construction and rehabilitation since 2004 in an attempt to stabilize the chemistry of the hydraulically unstable discharges within the Big Run watershed.

The results of the treatments are an unstable, fluctuating biological community with great potential for recovery. Two historical sites have been used on Blackleggs Creek to evaluate the progression of the treatment systems: Blackleggs 3 and Blackleggs 4. These sites were surveyed annually for four years (2014 - 2017) by CVC to help the watershed association satisfy permit requirements. In 2015 and 2016, CVC surveyed a site upstream of all of the discharges in the Blackleggs Creek watershed to document the resident fish communities. This site is Blackleggs Creek at the Blackleggs Creek Memorial Park. Additionally, three monitoring sites have been established on Big Run to evaluate the efficacy of the treatment systems in the Big Run watershed. These sites are Big Run at Long Road in the headwaters, Big Run 15 at what is locally called “Cabbagehead,” which is above the Speranza property and acidic discharges, and Big Run Mouth, which is just above its confluence with Blackleggs Creek.

Figure 172 – The confluence of Big Run and Blackleggs Creek

Blackleggs Creek at Blackleggs Memorial Park

This site is located at a local community park that is maintained by the Blackleggs Creek Watershed Association (BCWA), upstream of the Kolb discharge. This section of Blackleggs Creek has had habitat enhancement structures installed throughout the site to promote cover for trout that BCWA stocks and to enhance angling opprotunities for children.

The fish diversity has remained consistent here, as shown in Figure 173. Hatchery trout were captured in four of the five surveys completed by either PFBC or CVC between 2008 and 2016 indicating that the water stays cool enough to hold trout year round. Creek chubs, white suckers, and bluntnose minnows were common species collected. In 2015, five freshwater drum were netted. Freshwater drum, which are sometimes called sheepshead, are riverine fish that are generally bottom feeders that prefer clear water. These drums migrated from the Kiskiminetas River, into Blackleggs Creek, over nine miles upstream to Blackleggs Creek Memorial Park.

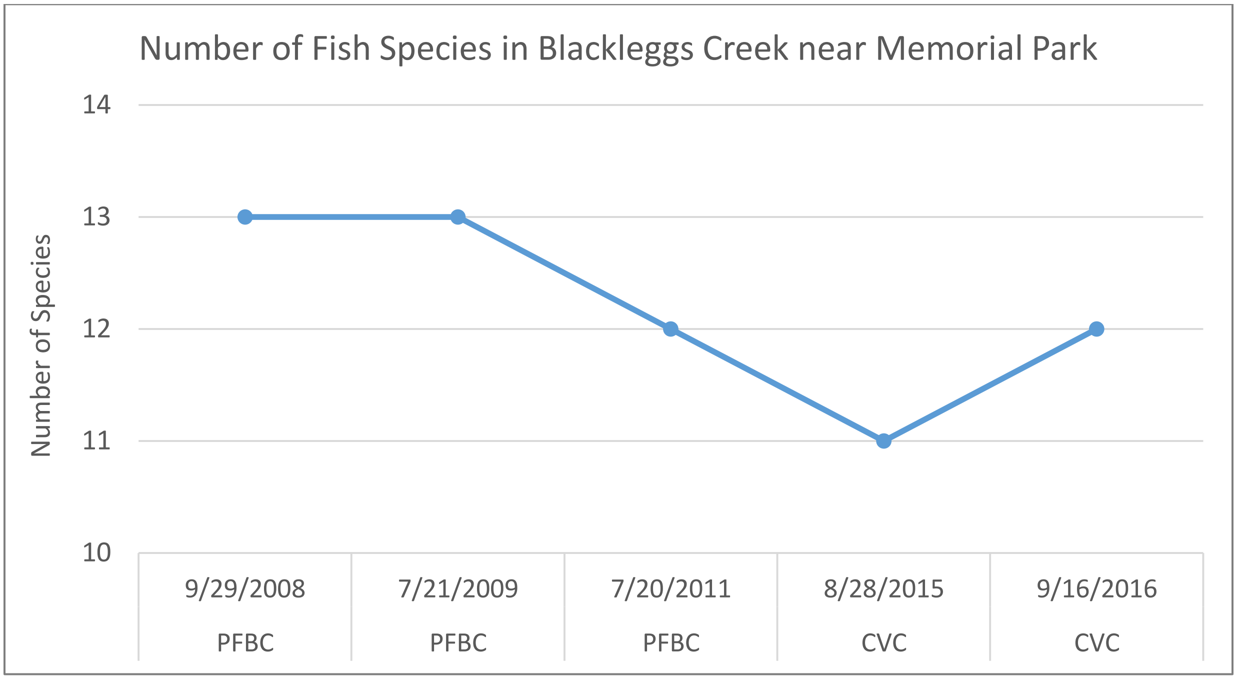


Figure 173 – Number of fish species collected over time during surveys of Blackleggs Creek near Blackleggs Creek Memorial Park

Blackleggs 3

This site is located on the mainstem of Blackleggs Creek, upstream of its confluence with Big Run and downstream of the Kolb and Whisky Run discharges. CVC surveyed macroinvertebrates and fish at this site annually from 2014 - 2017. The number of fish species collected here has remained the same; however, the number of individual fish collected has varied with the highest number documented in 2016. The macroinvertebrate community began to shift to more sensitive taxa in 2016, presumably as a result of more consistent mine drainage treatment and more stable water chemistry.

Figure 174 – CVC completes a fish survey on Blackleggs Creek above Big Run (BL3)

Blackleggs 4

This site is located on the mainstem of Blackleggs Creek, downstream of its confluence with Big Run. Since at least 2001, this site has exhibited a very depressed fish community and a very pollution tolerant macroinvertebrate assemblage. In 2016, the fish community rebounded to the highest diversity and total number of individuals yet collected here, but fell again in 2017, likely due to inconsistent treatment at the Big Run AMD Treatment Complex.

The Big Run AMD treatment systems have been malfunctioning intermittently for years. The pH of the water from Big Run flowing into Blackleggs Creek must be kept at a level allowing for the pH of Blackleggs to range between a 6.8 and 7.5 ensuring the high levels of aluminum stay suspended and non-toxic to aquatic life. During the fish survey of 2016, the community supported its most diverse and pollution-sensitive assemblage at a pH of 7.09.

Back to Table of Contents

Big Run

Above the treatment complex, Big Run can be characterized as a warm water, low gradient, low order stream. The fish and macroinvertebrate communities reflect mild organic loading and low physical habitat quality due to the stream's natural low gradient and high susceptibility to erosion. The biological communities located in the two most upstream sites (BRLONG and BR15) are typical for such stream conditions. The site located at the mouth of Big Run is located below the mine drainage impacts. There is no resident fish community and the macroinvertebrate community here is extremely depressed due to the large chemical fluctuations of the treatment systems.

The data for the last four years of biological sampling of Blackleggs Creek and Big Run are located in Figures 175 – 177.

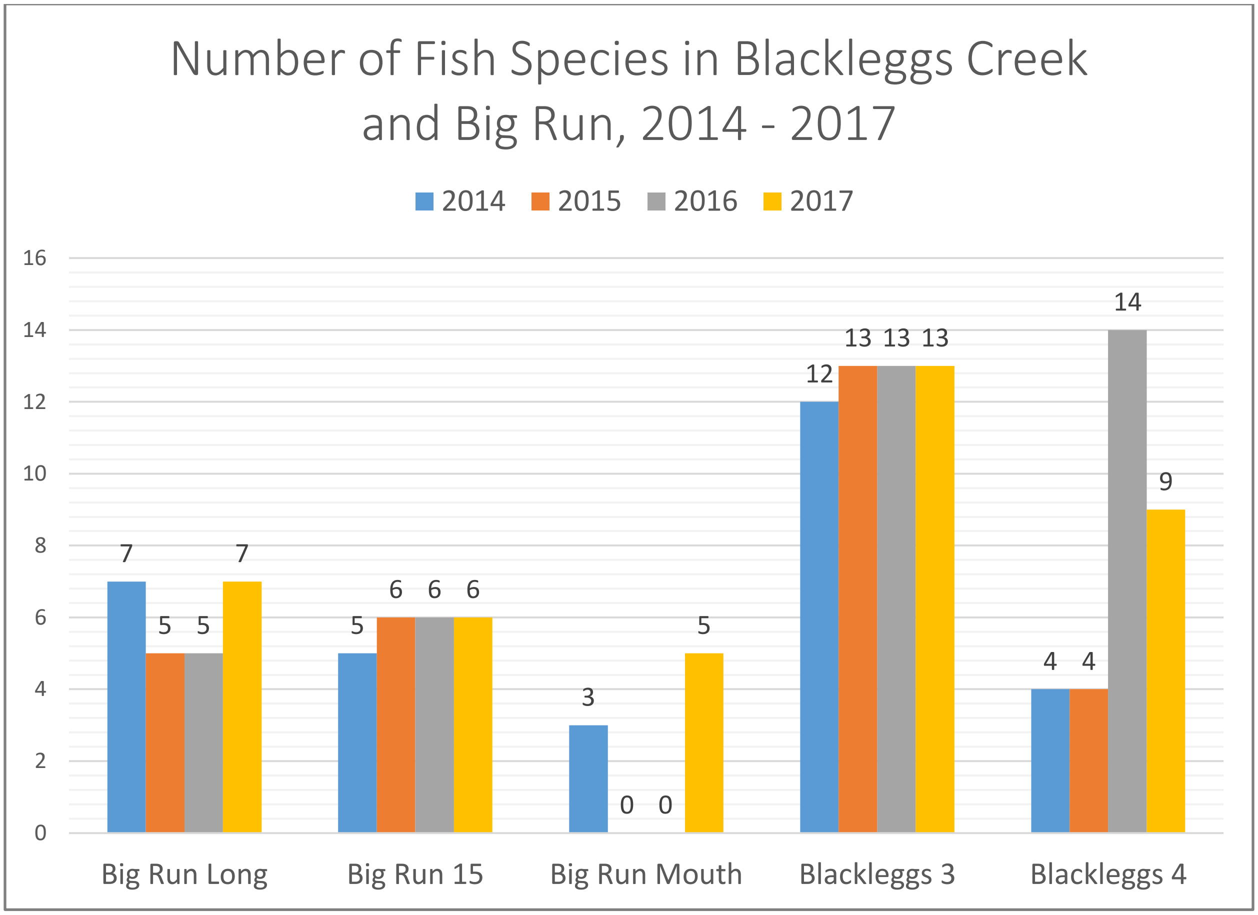


Figure 175 – Number of fish species collected from two sites on Blackleggs Creek and three sites on Big Run, 2014-2017

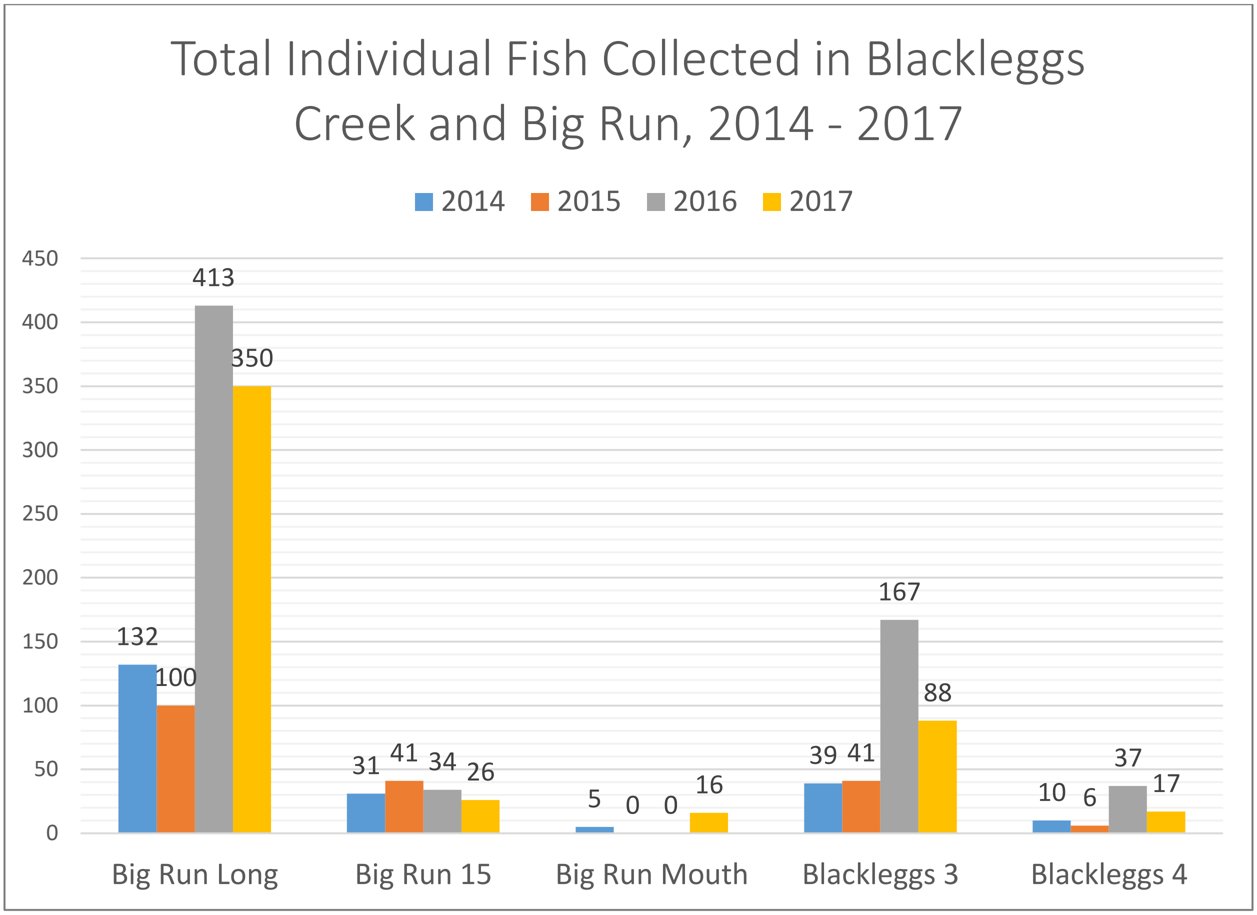


Figure 176 – Number of individual fish collected from two sites on Blackleggs Creek and three sites on Big Run, 2014-2017

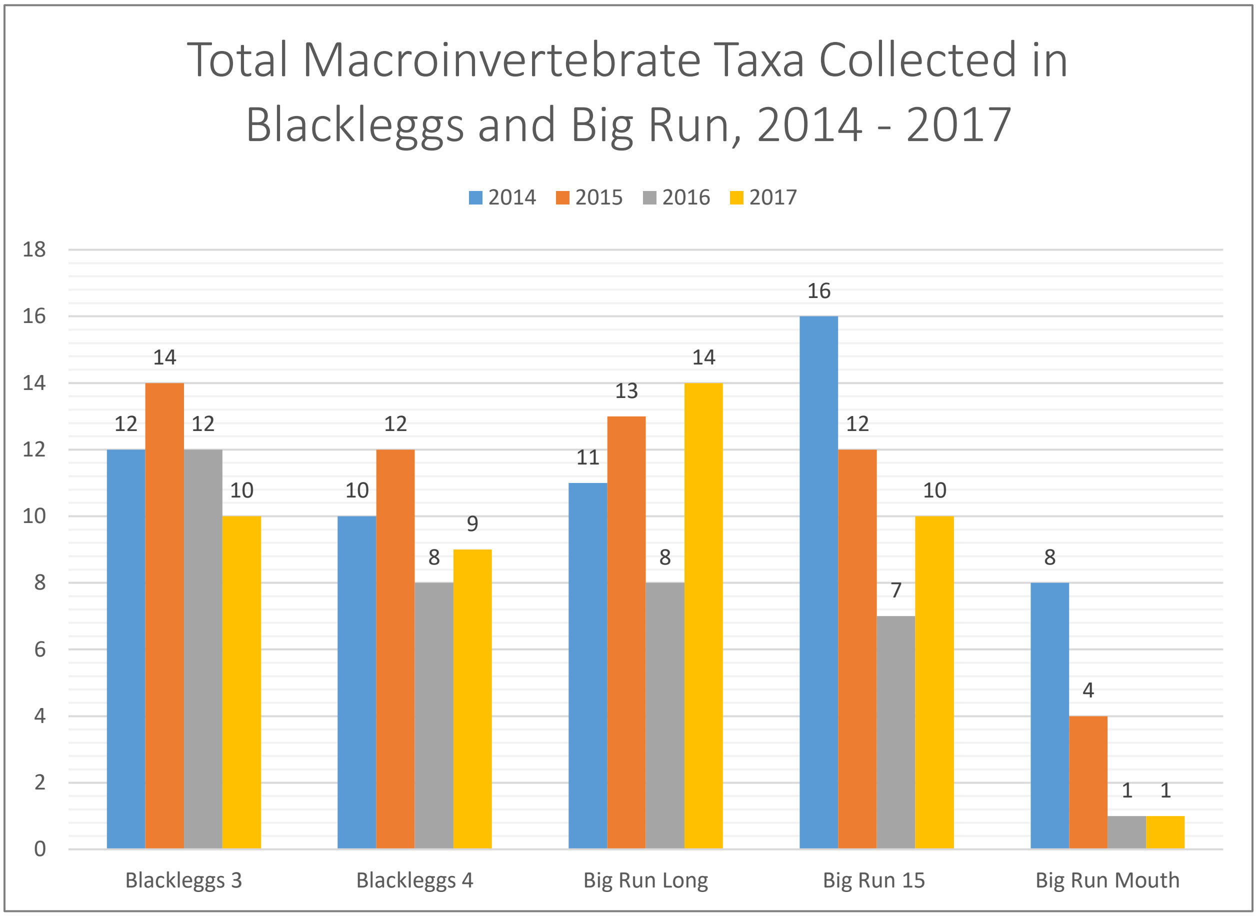


Figure 177 – Number of macroinvertebrate taxa collected from two sites on Blackleggs Creek and three sites on Big Run, 2014-2017

The biological communities in the mainstem of Blackleggs Creek are a reflection of the toxicity of the aluminum that emanates from the Big Run and Whisky Run discharges. In 2014, both survey sites on the mainstem of Blackleggs contained depressed aquatic communities, but both sites possessed high pH (> 8.2). This high pH allows aluminum to become toxic to aquatic life. The geology of the area, the Kolb discharge, and the large amounts of hydrated lime used at the Big Run #3 AMD treatment system, often raises the pH of the mainstem of Blackleggs Creek to the point that aluminum from the Big Run and Whisky Run discharges re-dissolves and becomes toxic.

In 2016, the Whisky Run #9 AMD treatment system was on-line, but not fully operational; and the limestone silo at Big Run #3 was turned off. These conditions allowed the pH of the mainstem to remain at a level that would minimize aluminum toxicity. The mainstem possessed enough buffering capacity to neutralize the Big Run discharges and still maintain a pH suitable for detoxifying aluminum. The result was the most robust and diverse fish community collected in Blackleggs Site 4.

Back to Table of Contents

Roaring Run

Roaring Run, a second-order tributary of the Kiskiminetas River located in Apollo, PA, has two geomorphological sections. The upper section is characterized by a low-gradient, bedrock bottom, while the lower portion exhibits high-gradient, freestone composition. Mining activity historically occurred in the watershed and several untreated discharges enter Roaring Run. Rattling Run, a tributary of Roaring Run, is severely impacted in its headwaters by riparian buffer loss and organic loading due to agriculture.

Roaring Run Upstream

The upstream section of Roaring Run consists mainly of weathered shale and large deposits of pyritic shales that create acidic runoff when exposed to air. This section has naturally limited habitat due to its geology and low gradient. The abundance of these pyritic shale deposits can contribute sulfates, iron and aluminum to the water. The pH of this section has been recorded at 7.95, just below 8.0 where aluminum becomes more toxic. The fish and macroinvertebrate communities in this section were sampled by CVC in 2015. The fish community, dominated by pollution-tolerant taxa, consisted of 100 individuals representing four species. The macroinvertebrate community was more diverse consisting of 90 individuals representing 16 taxa in the spring and 21 individuals representing seven taxa in the fall.

Figure 178 – Roaring Run

Roaring Run Downstream

The downstream site on Roaring Run is located approximately 200 meters from its confluence with the Kiskiminetas River. This stream here is high gradient with the streambed composed of large rock. Upstream of this site, two mine drainages and Rattling Run enter Roaring Run. CVC sampled macroinvertebrates here in 2012 and 2015 and fish here 2014 and 2015. The macroinvertebrate and fish communities fluctuated in this area. As shown in Table 30, in the fall of 2012, the macroinvertebrate community contained six taxa and 14 individuals, while macroinvertebrates collected in fall 2015 contained 14 taxa and 44 individuals. In 2014, CVC collected 12 fish species and 45 individuals, while in 2015, 18 species and 566 individuals were collected, as shown in Table 31. Most species were members of the minnow family. The pH in this site has been recorded at greater than 8.2 with high concentrations of sulfates and aluminum.

Roaring Run Downstream Site Macroinvertebrate Survey Results		
	Macroinvertebrate Taxa	Macroinvertebrate Individuals
2012	6	14
2015	14	44

Table 30

Roaring Run Downstream Site Fish Survey Results		
	Fish Taxa	Fish Individuals
2014	12	45
2015	18	566

Table 31

Rattling Run

Rattling Run is the largest tributary to Roaring Run, joining it midways between the upstream and downstream survey sites. Rattling Run has historically been impacted by riparian buffer loss and agricultural organic loading. According to David Beale, Armstrong Conservation District's former Watershed Specialist, Rattling Run is also impaired by road salts (Rupert). CVC sampled its fish and macroinvertebrate communities in 2015. The depressed fish community was represented by 119 individuals representing five species, which were dominated by pollution-tolerant taxa. The macroinvertebrate community was diverse consisting of 172 individuals representing 14 taxa. The Armstrong Conservation District and the Roaring Run Watershed Association have secured permission to restore the habitat and riparian buffer of a portion of the upstream section of Rattling Run.

Elder Run

Elder Run flows into the Kiskiminetas River upstream of Leechburg. It suffers from suburbanization, including urban runoff and unstable streambanks (Rupert).

Guffy Run

According to David Beale, Guffy Run is an AMD-impaired tributary to the Kiskiminetas River that has a high iron load, but insufficient space to treat the sources. It enters the Kiski River downstream of Leechburg.

Pine Run

Pine Run is a tributary to the Kiskiminetas River that lies within Westmoreland County. Two alkaline abandoned mine discharges flowed into Pine Run until 2006/2007 when the PA DEP's Bureau of Abandoned Mine Reclamation collected and piped the combined flows to within 200 feet of Pine Run's confluence with the Kiski River. Plans to potentially treat these discharges at an unused sewage treatment plant owned by the Kiski Valley Water Pollution Control Authority had to be shelved as the aeration tanks at the plant are no longer available. On behalf of the Kiskiminetas Watershed Association, the Westmoreland Conservation District is seeking funds to complete a design-only phase for treatment of these two diverted discharges.

Back to Table of Contents

Conclusions

The immense improvement of the Kiskiminetas River offers proof that upstream water quality and land reclamation efforts driven by volunteer and regulatory action are a powerful force in environmental restoration. The growing diversity of fish species, the increase in outdoor recreation businesses focused on the rivers, and the public awareness and implementation of healthy environmental stewardship shine a light on the importance of and potential of the Kiski Basin's waterways.

Since high pH is the limiting factor in the Blackleggs Creek mainstem, management of tributary watersheds must balance mine drainage treatment between sufficient neutralization and aluminum toxicity. Future treatment systems and upgrades need to analyze the "pin ball" effect of dealing with high pH to stabilize and recover the fish and macroinvertebrate communities of Blackleggs Creek.

The upper section of Roaring Run has many outcroppings of pyritic shales that can supply metals to the alkaline water, and it has too little habitat to support a diverse biological community. There are two acidic mine drainages high in aluminum that enter the Roaring Run between the upper and lower sites. These and the mine drainages in the lower section of Roaring Run should be analyzed to assess the feasibility of lowering aluminum concentrations before entering Roaring Run. Lowering the aluminum concentrations would presumably benefit fish and macroinvertebrates downstream. Currently, the downstream site on Roaring Run fluctuates in chemistry and biology, and the episodically high sulfates and aluminum drive fish communities from the lower reaches of Roaring Run into the Kiskiminetas River, though the pH and alkalinity of Rattling Run can help buffer these events. The pH of the downstream site has been recorded at more than 8.29, which allows aluminum to become toxic to aquatic life. The fish community is transient between Roaring Run and the Kiski River, moving in response to adverse chemical conditions.

The Roaring Run and Kiskiminetas Watershed Associations are active groups that maintain and build trail systems in and around the watershed. Both groups undertake habitat restoration and litter cleanup projects in their watersheds. These efforts should continue.

Back to Table of Contents

1999 Recommendations Status Report

The *Kiski-Conemaugh River Basin Conservation Plan* published in 1999 listed over 120 action items for the whole basin and major sub-basins/Management Units. It identified potential groups to serve as leaders or management agents for the items, as well as funding options, priority level, and a timetable for implementing and accomplishing the recommendations.

The following is a status report for those action items. The description and priority assigned to each recommendation in 1999 is given.

Figure 179 – The Kiski River as seen from the Roaring Run Trail

Basin-Wide Programs

Land Resources

1. **Vegetative Stream Buffering Program**
   Priority 1
   Institute a program to buffer basin streams with vegetative filter strips, operating through the county conservation districts, local and regional planning commissions and municipalities. Particular focus should be placed on riparian forest buffers. Identify areas in the KC-Alliance GIS and develop programs to maintain these areas.

Science and education have shown the importance of a robust, healthy, diverse, vegetated riparian buffer zone. County conservation districts, watershed organizations, and others promote the establishment of riparian buffers and often seek funds to implement these projects. The U.S. Department of Agriculture Farm Service Agency oversees the Conservation Reserve Enhancement Program (CREP) that is an agreement between federal and state governments that seek to remove private, environmentally sensitive land from production to conserve plant species. Land owners, who voluntarily participate, are paid an annual rental rate to halt farming or ranching with agreements that last 10-15 years.

The Pennsylvania Department of Conservation and Natural Resources (DCNR) has a Riparian Forest Buffer Grant Program that, "provides reimbursable grants to organizations to establish riparian forest buffers." While this grant program supports traditional forest buffer projects, it encourages the "multifunctional buffer concept" that might get more landowners to develop and maintain forested riparian buffers. Since the Commonwealth of Pennsylvania has a goal to install 95,000 more acres of forested riparian buffers by 2025, non-traditional buffer designs and use must be considered. The multifunctional buffer concept would allow landowners to harvest select products from the buffer such as nuts, berries, woody florals, forbs, and potentially woody biomass, but not from within 15 feet of the waterway. There would also be some restrictions on the use of herbicides and on how products are harvested, depending on the distance from the streambank.

Figure 180 – Trout lilies can be found streamside

2. River Keepers Program

Priority 1

Institute a Rivers Keepers Program similar to PennDOT's Adopt-a-Highway Program and use local groups to carry it out.

A River Keepers program functioned primarily through SCRIP from 1993 through the early 2000s. From 1994 to 1997, volunteers collected water quality data that were sent to the Cambria and Somerset Conservation Districts. In 1997, the Alliance for Aquatic Resources Monitoring at Dickinson College compiled the data. The Kiski-Conemaugh Stream Team formed in 1998/1999 to establish a volunteer corps that would collect water samples from Abandoned Mine Discharges (AMD) and streams impacted by AMD to characterize and acquire data necessary for remediation. The Kiski-Conemaugh Stream Team is now a program of the Conemaugh Valley Conservancy and oversees a corps of over four dozen volunteers who currently collect samples from 20 AMD, 45 AMD treatment systems, and over 100 stream or river sites throughout the Basin. Samples are analyzed by the PA Department of Environmental Protection's Bureau of Laboratories with results stored in the DEP's Sampling Information System (SIS) and shared with interested parties. AMD treatment system data are also available on Datashed. Governmental agencies, county conservation districts, watershed organizations, and others use the data to evaluate existing AMD systems, design new systems, justify the need for operation and maintenance funds, and educate the public about the health of regional waterways. The Loyalhanna Watershed Association has a similar program in its watershed. The Wells Creek Watershed Association has volunteers who collect samples from their AMD treatment systems that are analyzed by a private laboratory. Nature Abounds oversees the Senior Environmental Corps (SEC) in Pennsylvania. It has a well-established volunteer monitoring program in Indiana County and is developing others in Cambria, Somerset, and Westmoreland Counties. Nature Abounds maintains a database with SEC data that are available to the public and that connects with other databases including the EPA's Water Quality Exchange (formerly known as STORET) database.

Figure 181 – Craig Rosage and Andy Schrock fix water samples collected from the Swallow Farm AMD treatment system

Several organizations informally adopt a waterway through annual litter cleanups that are part of the Great American Cleanup of PA, Ohio River Sweep, and International Coastal Cleanup. Paddle Without Pollution is an organization based in Pittsburgh that uses kayaks, canoes, and stand-up paddleboards to remove litter and tires from waterways. It has completed cleanups along the Kiskiminetas River.

3. **Land Use Planning**
   Priority 1
   Promote a land-use planning program for critical areas: steep slopes, wetlands and floodplains. Provide GIS mapping of critical areas.

The PA DEP has an online mapping program called eMapPA on which floodplains, wetlands, and other features may be identified, and all counties in the Kiski Basin have Natural Heritage Inventories that highlight critical areas. Further, at least 55 municipalities have implemented zoning ordinances, many of which are mindful of sensitive areas.

4. **Roads / River Access**
   Priority 2
   Prepare a road network/river access map using GIS; determine conditions of roads near streams, and adequacy of access; assess need and suitability for dry hydrant locations; begin program of obtaining public access; identify problem areas and bring to attention of appropriate agencies.

The development of water trails for the Kiski-Conemaugh Rivers and Loyalhanna Creek have helped identify river access points, but public access is still lacking throughout the watershed. Watershed organizations have established a few access points and boat launches. For example, the Roaring Run Watershed Association maintains a river access point at their Roaring Run Trailhead parking lot in Apollo, the Conemaugh Valley Conservancy built an access at the end of the Conemaugh Gap in Seward, and the Benscreek Canoe Club improved access to the Stonycreek River in Foustwell; however, signage and publication of these points is deficient. Formal groups like the Allegheny Ridge Corporation's Pittsburgh-to-Harrisburg Main Line Canal Greenway™ and informal groups such as the Johnstown Vision 2025 Rivers Capture Team are working to improve and market access points.

Figure 182 – River access sign

For several years, the Kiski Basin Initiative (KBI) operated through the Conemaugh Valley Conservancy and utilized primarily U.S. Forest Service funds to help communities install dry hydrants, preserve wetlands, plant trees, conduct environmental education, and more. KBI dissolved around 2006.

5. **Hazardous Waste Program**
   Priority 3
   Monitor runoff from waste sites and discharges through River Keepers Program; monitor proposals for new or expanded facilities.

The monitoring of hazardous waste sites is the responsibility of state agencies like the DEP.

6. **Viewshed Protection**
   Priority 2
   Develop program to identify significant viewsheds within the basin, compile inventory, and work with county and local planners to preserve scenic qualities.

An inventory of significant viewsheds does not exist, though many national and state parks and local conservancies recognize the need to preserve viewsheds, which can be done through the acquisition and restrictive use of land. For example, in 2008, the National Park Service (NPS) acquired 57 acres around the Flight 93 National Memorial Park to, "protect the viewshed and surrounding area to the south of the memorial and impact site."

7. **Sustainable Forestry Initiative**
   Priority 2
   Develop a timber operator certification program to be implemented in all basin counties that do not have existing programs, implement though county conservation districts. Develop landowner information program on sustainable use, stewardship, and timber operator certification.

Established in 1995, the Pennsylvania Sustainable Forestry Initiative (SFI) provides an independent forest certification program to train loggers, forest landowners, resource managers, and others on best management practices and to serve as a forum for those interested in sustainable forestry. Numerous consulting foresters and loggers are available throughout the area. Further, the Pennsylvania Tree Farm Program provides advice through the PA Forestry Association, while the U.S. Department of Agriculture has the Environmental Quality Incentives Program (EQIP) that pays landowners an incentive based on the acreage for forest management plans (Piper).

8. **Green Golf Course Initiative**
   Priority 3
   Promote participation in Audubon International's Green Golf Course Certification Program.

This initiative was not developed. The Audubon has since renamed the program to the "Audubon Cooperative Sanctuary Program for Golf." Golf courses interested in the program must pay an annual membership fee to receive a Site Assessment and Environmental Planning Form and other educational information to help facilities develop a plan to manage their properties with protection of their environmental assets in mind. Telecommunication support is available to members, and site visits are available on a fee-for-service basis. Correspondence with Audubon International indicates that the Cherry Wood Golf Course and Willowbrook Country Club in Apollo both were previous members of the program, but their memberships have lapsed. The Laurel Valley Golf Club in Ligonier is working towards certification (Donadio).

Back to Table of Contents

Water Resources

9. Watershed Characterization Model
Priority 1
Prepare a watershed characterization model for the basin, by watershed.

A watershed model was cooperatively developed by Environmental Information Services (EIS) and West Virginia University Spatial Analytics Lab for the 1999 Kiski Plan (McCombie).

10. Mine Drainage Re-Evaluation Program
Priority 1
Have the *Cooperative Mine Drainage Survey*, *Kiskiminetas River Basin* (EPA, 1972) updated to reflect current conditions in the basin, covering areas other than the SCRIP area which has already been studied.

This recommendation was not implemented.

11. Non-Point Source Pollution Control
Priority 2
Develop a Demonstration Project in the SCRIP area, using the edicts in the SCRIP's 1994 non-source pollution study; expand these applications throughout the basin; employ a full-time technician to carry out the program.

Non-point Source (NPS) pollution control has been adopted by all watershed associations, county conservation districts, and state agencies especially since the EPA began drawing attention and funding toward them in the early 2000s.

12. Stormwater Control
Priority 3
Have a Stormwater Control Plan prepared for the basin.

Federal and state agencies now have laws mandating permits and plans to help control stormwater. An outcome of the federal Clean Water Act of 1972 was the EPA overseeing the National Pollutant Discharge Elimination System (NPDES) permit program that regulates point sources that discharge into waterways. The DEP administers the Municipal Separate Storm Sewer Systems (MS4) Program to minimize stormwater runoff's impact on the landscape. Counties review erosion and sedimentation control plans for new developments and projects.

Pennsylvania's Storm Water Management Act (Act 167) of 1978 requires counties to prepare and adopt watershed based stormwater management plans and for municipalities to create and implement ordinances that adhere to the management plans. In 2009-2010, all 36 municipalities that lie within the Stonycreek River watershed in Cambria and Somerset Counties adopted the *Stonycreek River Watershed Act 167 Stormwater Management Plan* that was prepared by the Cambria County Conservation District.

13. Flood Problem Identification

Priority 2

Identify flood problem areas and possible solutions in each watershed.

The development of stormwater management plans, the implementation of best management practices, and education are helping to stem flooding; however, heavy rain events still cause flooding throughout the watershed. Procurement of MS4s within the watershed will help, as will supporting and enhancing other stormwater control features like the development and use of pervious, porous surfaces.

Figure 183 – Stormwater created a stream in a parking lot at Indiana University of Pennsylvania and caused flash flooding during a deadly storm on June 22, 2017

14. Sewage Evaluation

Priority 2

Prepare a basin-wide evaluation of on-lot and municipal sewage problems in the basin, using the knowledge of individual watershed members, and turn this data over to the DEP for Act 537 enforcement.

A basin-wide evaluation was not completed, but on a smaller scale, municipalities have recognized sewage problems and have begun to address them. Under the direction of the EPA, the PA DEP requires municipalities to have a comprehensive plan that provides for the resolution of existing sewage disposal problems, the sewage disposal needs of new development, and future sewage disposal needs of the municipality, in accordance with the Pennsylvania Sewage Facilities Act, Act 537.

Many municipalities throughout the Kiski Basin are working to separate stormwater runoff from their sewage systems and eliminate combined sewer overflows by 2022.

Back to Table of Contents

Biological Resources

15. Alkalinity Program

Priority 2

Devise a limestone sand additive program for alkalinity addition at selected locations in the basin, in high value watersheds currently affected by acid rain or AMD.

This program has been implemented with a great deal of success throughout the Basin, though consistent application is key, and there is great potential to refine and expand this restoration effort.

Figure 184 – Tom Clark directs DCNR as limestone sand is placed in Babcock Creek

16. Use of Limestone in Construction Program

Priority 2

Have county and subdivision ordinances revised to maximize the use of limestone in devices in contact with water, where appropriate.

Most design specs require the use of suitable material such as clean backfill. The use of limestone is not required and not all streams need the additional alkalinity. Use of limestone should be considered on a case by case situation.

17. Biological Monitoring

Priority 2

Organize and implement a comprehensive water sampling program.

Figure 185 – CVC's Amanda Barnhart collects macroinvertebrates from Hypocrite Creek

An extensive water sampling program for chemical parameters has been established as stated in Action Item #2; however, a biological monitoring program has not been as robust, though organizations like the Conemaugh Valley Conservancy, Loyalhanna Watershed Association, PA Fish and Boat Commission, and Western Pennsylvania Conservancy are continually adding biological monitoring points to acquire baseline and project-oriented data.

State agencies conduct biological assessments as time and resources permit and often focus on specific projects. Conservation organizations and universities may conduct their own assessments, but they are not always accepted for use by the state. Varying monitoring protocols also make data comparisons difficult.

18. Fishery Management

Priority 3

Identify recovering streams and coordinate efforts to restore fishery resources.

State agencies, county conservation districts, watershed organizations, Trout Unlimited chapters, municipalities, private landowners, and more collaborate on developing and protecting fisheries. Since several headwater streams, tributaries, and rivers within the Kiski Basin have changed from net acidic to net alkaline water, more waterways now support an increasingly diverse fish community and are advertised as fishable, sometimes even trout-stocked waters.

19. Fishery Management

Priority 2

Organize and implement programs to preserve and enhance existing fishery resources. Promote public access and develop fishing guides.

The PA Fish and Boat Commission has printed fishing guides available for each region, while its website has interactive, informative maps. The Mountain Laurel Chapter of Trout Unlimited developed the *Guide to Fishing the Stonycreek River* and SCRIP prepared the *Fisheries of the Stonycreek and Upper Conemaugh Basin, a Guide to Fishing the Stonycreek, Little Conemaugh and Tributaries in the Upper Conemaugh Basin*.

20. Habitats Management

Priority 2

Encourage development of Natural Heritage Inventories and provide data as needed; encourage proper management of Yellow Creek State Park IBA (Important Bird Area).

Each of the five counties in the Kiski-Conemaugh River Basin have a Natural Heritage Inventory, which may be found online.

Regarding the Yellow Creek State Park IBA, Yellow Creek State Park has been managing many areas of Yellow Creek to support it as an IBA. Yellow Creek State Park Manager, James Tweardy, said, "This has included reduction in grass mowing to allow native, non-woody species to grow. We have also stopped managing our large fields by clearing them every three years. Instead, we eliminate invasive woody species and then follow up with spot treatments rather than large scale clearing. We make sure to take these steps after the nesting season has ended. We have also started using prescribed burns for the same purpose. We also continuously plant native tree and shrub species, giving special attention to riparian buffers. Every spring, the Todd Bird Club volunteers to clean out and repair wood duck boxed throughout the park, and they built and erected a purple martin box."

21. Habitats Management

Priority 3

Organize large forest tract educational program; address concept wetlands issues.

As stated in #7 – Sustainable Forestry Initiative, there are many foresters available for consultation. Some conservation districts have a forester on staff, while state agencies and other organizations like the Westmoreland Woodlands Improvement Association serve as additional, educational resources.

It is unknown what "concept wetlands" are.

22. Habitats Management

Priority 2

Address knotweed control issues.

As detailed in the Invasive Species section, Japanese knotweed (*Fallopia japonica*) and Giant knotweed (*Polygonum sachalinensis*) are non-native, invasive plants that favor stream/river banks and disturbed lands. Controlling knotweed is difficult, labor intensive, and potentially expensive if contracting a certified herbicide applicator. Several demonstration sites were created in the Kiski Basin by Natural Biodiversity, but most were not maintained or planted with native species to shade out the knotweed and so knotweed persists.

23. Species of Concern Program

Priority 3

Develop and implement surveys to determine existence of aquatic and riparian species; participate in development of management plans.

As stated in #16 – Biological Monitoring, several organizations complete riparian and aquatic surveys that are for assessment, inventory, or projects. Every county in the Kiski Basin has a Natural Heritage Inventory that documents known populations of sensitive and endangered species and other important natural resources. The Pennsylvania Natural Heritage Program manages the Pennsylvania Conservation Explorer that was formerly known as the PNDI – Pennsylvania Natural Diversity Index, which allows anyone to screen their land of interest for potential impacts to protected and sensitive land, water, and animals. The Coldwater Heritage Partnership provides funds to create and implement Coldwater Conservation Plans that focus on coldwater streams. Coldwater Conservation Plans exist for the following watersheds in the Kiski Basin and may be downloaded from the Coldwater Heritage Partnership's website:

- Beaverdam Run, Somerset County
- Clear Shade Creek and Piney and Cub Runs, Somerset County
- Little Paint Creek, Cambria and Somerset Counties
- Loyalhanna Creek, Westmoreland County
- Mill Creek, Westmoreland County
- North Fork of Bens Creek, Cambria and Somerset Counties
- South Fork Little Conemaugh River, Cambria County
- Tubmill Creek, Westmoreland County
- Two Lick Creek, Indiana County.

*Figures 186 and 187 – Yellow fringed orchid (*Platanthera ciliaris*) and purple fringeless orchid (*Platanthera peramoena*), photographed in Somerset County, are considered threatened in Pennsylvania, according to the USDA Natural Resources Conservation Service's Plants Database*

Back to Table of Contents

Recreational Resources

24. Trail Development

Priority 1 for streamside trails, 2 for others
Adopt the proposals for further basin trail development and linkage, as identified in the report *Heritage Trails, Strengthening a Regional Community* for execution in this plan. Priority is given to riverside trails, as follows:

- **Portage Trail, links with Main Line Trail** – Formerly known as the Allegheny-Portage Trail, it is now called the Six-to-Ten Trail. It is nine miles of crushed stone, grass, and dirt between the Allegheny Portage Railroad and the National Park boundary.
- **Cambria and Indiana Trail, Ebensburg to White Mill** – Eight miles of this connection from White Mill to North Street in Cardiff were completed in September 2017. There are 7.5 miles to go before the C&I Trail connects to the current Ghost Town Trail in Revloc.
- **Ghost Town Trail Extensions, Dilltown to Blacklick; Colver to Revloc; Revloc to Ebensburg** – Completed.
- **Cambria Heights to Hinckston Dam** – It seems Cambria "Heights" was a typo in the 1999 Plan and should read "Cambria City to Hinckston Run Dam." The Honan Trail is in place here.
- **Rexis Branch Extension, US 422 to Manver Station** – Incomplete.
- **Clymer Trail, Dixonville to Clymer** – A ¼ mile asphalt trail extends from the Clymer ballfield to 10th Street.
- **Vision Trail, Manver Station to Indiana and Heilwood** – This is not likely to happen as the property was sold off and there are numerous reversions to the land.
- **Creekside Extension, Creekside to Indiana** – It is in use as an active railroad line to haul coal to the Homer City Generating Station.
- **Indiana-Homer City** – These towns are connected via the Hoodlebug Trail.
- **Route 119 Greenway, Homer City to Blairsville** – These towns are connected via the Hoodlebug Trail, which extends to the northern side of Route 22. An extension over Route 22 and into Blairsville Borough is planned for 2018-2019.
- **Yellow Creek Trail, Homer City to Yellow Creek** – This was not pursued as a project.
- **10 Mile Trail, Jacksonville to Jackson Mine** – This is still an abandoned railroad and receives a great deal of ATV use.
- **Shelocta to Clarksville Rail Trail, Shelocta to Clarksville** – This is now used to haul coal to the Keystone Generating Station near Shelocta.
- **Jenner-Lincoln Trail, Enoch to Ferrellton** – Incomplete.
- **Quemahoning Trail, Boswell to US 219** – An unofficial, unimproved walking trail traversing the abandoned B&O rail line that extends from the north end of Boswell to Green Bridge Road near Route 219.

- **Davidonville Streetcar Trail, Jerome to Kelso** – This is likely an old streetcar line along the Stonycreek River from either Davidsville or Hollsopple, along the Stonycreek River to Carpenter's Park and eventually Tire Hill (Kelso). Parts of this trail are envisioned as part of the 9/11 Memorial Trail.
- **Loyalhanna Trail Extension, Saltsburg to Latrobe** – The Trail was stalled for years because the original plan recommended a bridge crossing Loyalhanna Creek near New Alexandria that was unaffordable. A new plan proposed a route from Latrobe to New Alexandria that stayed on the stream's north side to avoid needing that bridge. A section of the trail is being developed from Keystone State Park to New Alexandria. It would be built on top of sewer lines being built from the park to the treatment plant in New Alexandria, with an extension to a community park and boat access area on U.S. Army Corps of Engineers' property. Derry Township has submitted grant applications for this (Clemenson).
- **Saltsburg to Trafford Rail Trail** – The Westmoreland Heritage Trail currently extends to Delmont. An extension to Trafford is acquired and planned for construction by 2018.
- **Roaring Run Trail** – Five miles of a crushed stone trail parallels the Kiskiminetas River between Canal Road in Apollo and High Street in Edmon.
- **Conemaugh Dam Trail** – The West Penn Trail encompasses 15 miles from just west of Blairsville, over the Conemaugh River Lake, past the Conemaugh Dam, to just north of Saltsburg.
- **Loyalhanna Nature Trail** – Completed as a one-mile trail between Loyalhanna Creek and Millcreek. Identify areas suitable for designation as water trails.

Several rail trails, county, and game lands allow horseback riding. Equestrians should check with individual trails to see where horses are permitted. For example, horses are permitted on sections of the West Penn Trail, but not permitted on any sections owned by the U.S. Army Corps of Engineers. Equestrians are also encouraged to ride in the grassy area beside rail-trails rather than on any limestone dust surfaces. For more information on trail riding, contact the Pennsylvania Equine Council.

The Kiski-Conemaugh Rivers and Loyalhanna Creek have been designated as water trails. See pages 94–96 for more information.

25. Conemaugh River Greenway / Kiski-Conemaugh Greenway

Priority 1

Extending from Cresson to Freeport, this 89-mile long corridor is a spineline for connecting area trails in the basin and should be promoted in every possible way. The K-C Alliance should complete the *Kiski Conemaugh Greenway Feasibility Study* and work with DCNR and other interested parties to implement the greenway study's recommendations.

The *Kiski Conemaugh Greenway Feasibility Study* was completed in 1999 by the Conemaugh Valley Conservancy.

26. Johnstown Urban Greenway

Priority 1

Implement construction of the 15.1 mile section of the Conemaugh River Greenway that has been planned.

The Conemaugh Valley Conservancy is currently exploring the feasibility of a Conemaugh Gap Trail, which would complement this Greenway.

27. Mainline Trail / Path of the Flood Trail

Priority 1

Follow the 10 strategies in the *Mainline Trail/Path of the Flood Trail Feasibility Study* to develop these trails.

Please see #13 under Stonycreek and Little Conemaugh Rivers watersheds on page 290.

28. Conemaugh River Gorge, Packsaddle Gap, Loyalhanna Gorge

Priority 1

Form a Committee to study and protect these unique resources; develop a protection plan and implement plan.

Laurel Ridge State Park and the Gallitzin State Forest surround the Conemaugh River Gorge. State Gamelands No. 153 protect the northern side of Packsaddle Gap and a portion of its southern side. Loyalhanna Gorge is protected by the Westmoreland County Bureau of Parks and Recreation with a conservation easement from the Western Pennsylvania Conservancy.

Back to Table of Contents

Historic / Archaeologic Resources

29. Pennsylvania Main Line Canal

Priority 1

Develop a program to acquire and protect important elements of the canal in the 89-miles of the Conemaugh River Greenway / Kiski-Conemaugh Greenway, particularly around Blairsville (Lock 5).

Although acquisition of the entire 89-mile Kiski-Conemaugh corridor is not realistic, access to the Pittsburgh-to-Harrisburg Main Line Canal Greenway, canal remnants, and related features has increased greatly due to the dedicated work of dozens of partners. The Kiski-Conemaugh Water Trail map and guide, updated by the Greenway in 2011, lists the following sites where canal remnants are viewable:

- Packsaddle Gap – between Robinson and Blairsville, Lock #5 and two miles of revetment wall are visible. Additional locks are also visible throughout Packsaddle Gap, but are generally overgrown with knotweed and difficult to locate. The remnants are only viewable from the river.
- West Penn Trail – the Blackleggs Creek Aqueduct is viewable from the Maguire Bridge on the Kiski section of the West Penn Trail.
- Roaring Run Trail – A revetment wall and portions of a towpath bridge support are viewable just north of the Edmon trail head. Guard Lock #2 is easily seen along the section of trail closer to Apollo (Hawkins).

30. Heritage Areas

Priority 2

Assist, promote and publicize the efforts of the Heritage Commission to carry out the *Action Plan, America's Industrial Heritage Project* in the basin.

The Southwest Heritage Preservation Commission operated Westsylvania from 1998 – 2006 and focused on implementing projects that promoted and preserved this region's heritage.

Figure 188 – The Stone Bridge in Johnstown, PA, survived the Flood of 1889 and is lit with adjustable LED lights for different colors and intensities

31. Allegheny Ridge Heritage Park

Priority 2

Assist, promote and publicize the efforts to preserve the heritage areas identified in the Plan for the Allegheny Ridge.

Urban Partners of Philadelphia, PA prepared a Management Action Plan for Allegheny Ridge Corporation that helped develop anticipated visitation and ticketing policy for the Allegheny Ridge Heritage Park, which is, "located in Blair, Cambria and Somerset counties and contains numerous natural and built resources – such as the Horseshoe Curve, the Portage Railroad, the Inclined Plane, the Johnstown Flood Museum and National Memorial, the Cambria Iron Works and the Alleghany Ridge itself – which document the region's rich industrial and cultural heritage."

Allegheny Ridge Heritage Area adopted the Pittsburgh-to-Harrisburg Main Line Canal Greenway™ as its signature initiative in 1994 as part of the Heritage Area's Management Action Plan. The Greenway is a 320-mile corridor of hub communities and heritage sites linked by land and water trails, following the path of the historic Main Line Canal. The Greenway works to promote sustainability by connecting elements of recreation, environmental stewardship, heritage interpretation, and community revitalization. Dozens of partners have built trails, river access points, and other resources that increase access to and promote the heritage resources within the corridor. The Greenway has complemented that work by developing addition resources, including:

- Heritage Tour Guides for Blairsville and Saltsburg – featuring historic buildings, community development heritage, nearby river and trail access.
- Kiski-Conemaugh Water Trail Map and Guide – including heritage points of interest and river town inset maps.
- Kiski-Conemaugh Water Trail Interactive and Mobile Map – includes dozens of historic photos provided by local historical societies which also direct users to hours and location of local house museums.
- Main Line Canal Greenway Marketing Collateral – templates for brochures and interpretive signage to provide a cohesive look and feel for river towns in the corridor. Products developed with these templates include:
    - West Penn Trail brochure
    - Roaring Run Recreation Area brochure
    - Saltsburg Heritage Tour Guide
    - Interpretive signs in Johnstown, Blairsville, Saltsburg, Avonmore, Apollo, Vandergrift, Leechburg, Freeport
    - River town maps in Saltsburg, Avonmore, Vandergrift, Leechburg, and Freeport (Hawkins).

Figure 189 – An interpretive panel in East Vandergrift.
Photo courtesy the Pittsburgh-to-Harrisburg Main Line Canal Greenway™

32. Historic Sites

Priority 3

Promote and assist historic preservation throughout the basin, according to the listing of National Register potentially eligible structures and other structures of potential historic interest listed in Appendix B (of the 1999 plan).

In the 1999 Plan, 112 properties, from the Women's Christian Temperance Union in Armstrong County to the Vandergrift Historic District in Westmoreland County, were listed in a table of properties on or eligible for the National Register of Historic Places, but their status was not indicated. It is safe to assume that these sites remain on or have been formally added to the register.

Educational Resources

33. Newsletter and News Articles

Priority 2

Generate a periodic newsletter, with sections dedicated to each Watershed Group, covering timely events in the watershed; provide news releases to area newspapers on newsworthy events in the basin.

Many watershed organizations have and continue to create and disseminate newsletters, although, in many cases, electronic newsletters have replaced printed versions and are emailed to contacts, while events are often posted on social media.

Local newspapers cover watershed news and events.

To celebrate the selection of the Kiski-Conemaugh Rivers as Pennsylvania's River of 2000, a 16-page supplement was inserted into over 15 newspapers in the Kiski Basin. This "River Revival" publication outlined the history of the watershed, the struggles it faced, the successes it had with AMD remediation to date, and River of the Year festivals and events.

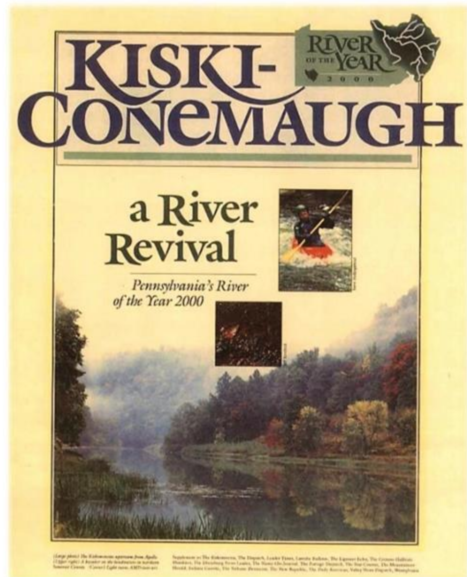


Figure 190 – The River Revival publication

34. Classroom Education

Priority 2

Encourage school districts to incorporate discussion of AMD and other water quality issues in their curriculum.

Environment and Ecology is now a state Academic Standard that requires the incorporation of these topics in school curriculum, from pre-K through 12th grade. Many schools collaborate with watershed organizations, conservation districts, and state agencies to connect students to their local watershed and to discuss local watershed issues.

Figure 191 – Kiski Area Upper Elementary School students release brook trout fingerlings raised through Trout in the Classroom

35. Website Development

Priority 3

Expand K-C Alliance website to incorporate a comprehensive guide to the basin's river-related recreational and educational features. Publicize at local businesses and attractions as well as regional and state tourism publications. Develop use of the website for educational purposes.

The K-C Alliance website has not been active for years; however, many conservation organizations maintain their own websites. Additionally, social media outlets like Facebook, Instagram, and Twitter are newer and more popular ways to communicate noteworthy news and to publicize events and outings. There is a plethora of information on the Internet for those who wish to find it. Additionally, the Laurel Highlands Visitor's Bureau and local chambers of commerce embrace and promote the natural resources of the region.

36. Household Hazardous Waste Education

Priority 3

Expand public education on household hazardous waste use and disposal.

In general, public awareness of the hazards of many household items has grown. Recycling facilities periodically hold recycling days specifically for household hazardous waste. The DEP maintains a list of permanent collection programs by county.

37. Tourism / Marketing

Priority 2

Evaluate the use of hiking / biking trails, historic sites, recreational sites, and tourism on the economy of the basin. Use information for promotional purposes and to establish the worth of pollution abatement programs.

There have been several economic studies to capture the value of eco-tourism, which stems from improved natural resources, though none have focused specifically on the Kiski Basin. Besides the obvious environmental impacts, land and water conservation enhances property values, reduces local taxes, improves the quality of life which attracts businesses and employees, and creates jobs. The Trust for Public Land published *Pennsylvania's Return on Investment in the Keystone Recreation, Park, and Conservation Fund* and found, "that every $1 invested in land conservation returned $7 in natural goods and services to the Pennsylvania economy." The Pennsylvania Land Trust Association has a list of broader economic studies and benefits on its website. The federal *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for Pennsylvania* found, "that 4.6 million Pennsylvania residents and nonresidents 16 years old and older fished, hunted, or wildlife watched in Pennsylvania" (U.S. Department of the Interior et al. 5). These three groups of people spent over $2.7 billion in Pennsylvania with 89% of those dollars spent by Pennsylvania residents (U.S. Department of the Interior et al. 13). Undoubtedly, cleaner waterways and greener landscapes contribute to the Commonwealth's economy.

In 2017, the Laurel Highlands Landscape Conservation Initiative, through Saltlick Township, Fayette County, received a DCNR grant to create an Economic Impact Study on Water that will focus on the Kiski-Conemaugh and Youghiogheny River Basins. Key-Log Economics, LLC of Charlottesville, Virginia, was selected as the consulting firm to complete this project, the results of which may be used for promotion and support of pollution abatement projects.

38. Tourism / Marketing

Priority 3

Develop small-business resource center to be housed at K-C Alliance to assist in water and recreation-related business plan development. This effort will utilize the GIS database created for the plan.

The K-C Alliance did not create a small-business resource center; however, there is a Small Business Development Center at Clarion University, which serves Armstrong County; Indiana University of Pennsylvania that serves Indiana County; Saint Francis University, which serves Cambria and Somerset Counties; and Saint Vincent College, which serves Westmoreland County (PA Small Business Development Center).

39. Tourism / Marketing

Priority 3

Organize annual symposium on river-related issues such as ecotourism, AMD treatment technologies, recent scientific research on ecosystem recovery in the basin, etc.

Many professionals and volunteers from the Kiski Basin participate in the annual Pennsylvania Abandoned Mine Reclamation Conference and several often give presentations on their work in the Basin. In 2016, this conference was held at the Indiana University of Pennsylvania.

Figure 192 – AMR Conference logo

40. Tourism / Marketing

Priority 2

Organize an annual series of boating/biking/hiking events to focus on particular locations or issues.

Numerous events invite participants to enjoy the natural resources of the Kiski Basin. As examples, since 2000, the Conemaugh Valley Conservancy has organized the annual Stony-Kiski-Conemaugh Rivers Sojourn every June. This four-day paddling event starts in Johnstown and ends in Apollo. Each year, a new theme connects the days. Since 2014, the Loyalhanna Watershed Association has coordinated the annual Loyalhanna Sojourn, which invites participants to paddle nine miles of Loyalhanna Creek from Latrobe to New Alexandria, on the last Saturday of May. Also in May, the Stonycreek Rendezvous offers hundreds of boaters from over a dozen states a chance to play in the whitewater rapids of the Stonycreek River and its tributaries. The Roaring Run Watershed Association hosts an annual "Earth Day Dash" and "Race to the Moon" 5K run/walk, as well as a mountain bike race called the "Roaring Run Rumble," and the Conemaugh Valley Conservancy holds the West Penn Trail Triathlon every October. These events serve as fundraisers for the groups.

Figure 193 – Participants navigate a mountain bike trail during the Roaring Run Rumble event. Photo by TJ Bellotti

41. Plan Update

Priority 1

Update Rivers Conservation Plan in five-year intervals.

Because the state wanted to develop more river conservation plans throughout Pennsylvania, funding for updates was not readily available, certainly not on five-year intervals. In 2013, the Conemaugh Valley Conservancy, in cooperation with the Cambria County Conservation and Recreation Authority, received a PA Department of Conservation and Natural Resources Community Conservation Partnerships Program (C2P2) grant to update this plan.

Stonycreek and Little Conemaugh Rivers Watersheds

Land Resources

1. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the watershed including:

    a. **Vegetative Stream Buffering***
    b. **River Keepers***
    c. **Land Use Planning***
    d. **River Access***
    e. **Hazardous Waste***
    f. **Viewshed Protection***
    g. **Sustainable Forestry Initiative***
    h. **Green Golf Course Initiative***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

Water Resources

2. **Basin-Wide Programs --** Participate in Basin-Wide Action Plan programs including:

   a. **Watershed Characterization Model** - completed
   b. **Stormwater Control** – see #12 under Basin-Wide Action Summary on page 266
   c. **Sewage Problem Evaluation, particularly Jennerstown area** – see #14 under Basin-Wide Action Summary on page 268. The Jenner Area Joint Sewer Authority represents Jenner Township, Jennerstown Borough, and Boswell Borough. In the 1970s, the Authority oversaw the installation of sanitary sewer lines in Jennerstown Borough, the Village of Jenners, Ferrellton, and Jenner Crossroads and a portion of Boswell, as well as the construction of four pumping stations and the main sewage treatment plant. Since then, "the system has grown to include most of Boswell Borough, the Village of Acosta, Gray, sections of Laurel Mountain Village, and additional portions of Jenner Township not included in the original construction."
   d. **Flood Problem Identification** – see #13 under Basin-Wide Action Summary on page 267

3. **Mine Drainage**
   Priority 1
   Complete planning and implement abatement programs for the 10 projects on the Little Conemaugh and Stonycreek River for which planning or implementation has begun.

These 10 projects were not defined in the 1999 *Kiski-Conemaugh River Basin Conservation Plan* and so their status is unknown.

4. **Mine Drainage**
   Priority 2
   Prioritize and address other projects as defined in the *Effects of Coal-Mine Discharges on the Quality of the Stonycreek River and its Tributaries, Somerset and Cambria Counties, Pennsylvania* as time and money become available.

In the referenced document, the U.S. Geological Survey identified 270 mine discharges in the Stonycreek River watershed, acquired water chemistry data in the early 1990s, and assigned a prioritization index to all the discharges. Numerous projects have addressed several, but certainly not all of these discharges. The top 10 are listed in Table 32 (USGS 78).

Figure 194 – Thurman Korns explains the Moore No. 7 treatment system

Top 10 Mine Discharges Recommended for Treatment According to the USGS' *Effects of Coal-Mine Discharges on the Quality of the Stonycreek River and its Tributaries, Somerset and Cambria Counties, Pennsylvania*				
Site #	**Latitude**	**Longitude**	**Common Name**	**Status**
16	40° 06' 26.4" N	-78° 48' 16.3" W	Reitz #4	The DEP is currently studying this for potential treatment.
19	40° 06' 48.1" N	-78° 48' 47.3" W	Loyalhanna	The DEP is currently studying this for potential treatment.
81	40° 14' 28.8" N	-78° 50' 49.6" W	Likely MPC-D19 in the Paint Creek Watershed.	Untreated.
95	40° 13' 11.6" N	-78° 53' 32.9" W	Unknown. In the Stonycreek mainstem watershed along Route 601, near Seanor.	Unknown.
4	40° 07' 49.4" N	-78° 55' 22.1" W	Oven Run F	Treatment system constructed in 2000.
125	40° 14' 49.7" N	-78° 46' 13.5" W	Likely UPC-D13 or D14 on Cooney Brothers property near Mine 42.	Actively treated by Cooney.
22	40° 02' 08.3" N	-78° 59' 27.8" W	Moore No. 7	Treatment system constructed in 2004.
3	40° 06' 48.0" N	-78° 55' 22.1" W	Oven Run D	Treatment system constructed in 1995.
110	40° 18' 48.2" N	-78° 52' 24.5" W	Solomon Run	Untreated.
208	40° 05' 24.7" N	-79° 04' 51.4" W	USGS 208	Untreated.

Table 32

5. **Non-Point Source Pollution**
   Priority 1
   Develop a demonstration Project according to the edicts in the report *Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds*; hire a technician to carry out the program in the eight high priority watersheds, then throughout the watershed.

The Cambria County Conservation District, Somerset Conservation District, and USDA's NRCS's Technical and Field Offices implemented recommendations of this report, which was completed by John Dryzal in 1994. Upon receipt of an EPA 319 grant, agricultural non-point source demonstration projects, such as cattle alleyways and vegetated waterway diversions, were developed. John Dryzal, who currently serves at the Cambria County Conservation District Manager, said that as a result of this work the Cambria County Conservation District, "started its No-till drill rental program which expanded and continues today" and that when funds became available through the State Conservation Commission, the District created a full-time "Ag Tech" position in 2000 that the District still employs. According to Len Lichvar, who is the Somerset Conservation District Manager, "As an outgrowth of that effort and to continue the NPS abatement, the Stonycreek Geographic Priority Area project was created. This led to implementation of manure storages and grazing systems on a dozen farms stretching from Berlin to Jerome in the Stonycreek watershed from the late 1990's through the early 2000's."

6. Flood Prevention

Priority 2

Develop a flood prevention program for Riverside and Ferndale.

The status of this recommendation is unknown.

Back to Table of Contents

Biological Resources

7. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the watershed including:

   a. **Alkalinity addition program** (use limestone sand additive to streams in high value watersheds) – This program has been implemented in the Stonycreek and Little Conemaugh Rivers watersheds with modest success. For example, the Shade Creek Watershed Association developed a limestone sanding project in the mid-2000s for tributaries to upper Dark Shade Creek. Because of this work, the PA Fish and Boat Commission was able to relocate native brook trout from nearby waters into Shingle Run in 2008; however, Panther and Snoden Runs have not responded to limestone application, largely because of inconsistent dosing. There is great potential to refine and expand this restoration effort.

   b. **Limestone construction standard** (add a standard in subdivision controls to use limestone in devices in contact with water) – Please see #16 under Basin-Wide Action Summary on page 269

   c. **Water Quality / Biological Monitoring** – Please see #2 and #17 under Basin-Wide Action Summary

   d. **Fishery Management Program**, particularly address public access and resources at lakes including Beaver Run Dam, Wilmore Dam, North Fork Dam, Dalton Run Reservoir, Quemahoning Reservoir, Hinckston Run Dam, Saltlick Dam

      i. **Beaverdam Run Reservoir** is owned by Highland Sewer and Water Authority, and it has been open to the public since July 2000 when the Beaverdam Conservation Group (volunteers) constructed the parking lot and boat areas. No gas-powered motors or boats over 17 feet are permitted and neither are swimming or ice fishing. The PA Fish and Boat Commission recommended the reservoir be limed in 2000 because of natural acidity and infertility due to the geology and soils of the area. Utilizing Growing Greener grants, the Cambria County Conservation District and Beaverdam Conservation Group worked to implement a lake management plan and add lime to the reservoir and Big Cedar Run, the main tributary to the reservoir in 2004-2005. Post-liming results showed a substantial increase in pH and the fertility of the lake, but no further liming has occurred, so the current state of the Beaverdam Run Reservoir is unknown. Funds and personnel to maintain the liming are limiting factors.

      ii. **Wilmore Dam** is owned by the Cambria Somerset Authority (CSA) and serves as a public and industrial water supply, hence no gasoline motors are permitted. Many other recreational opportunities abound at Wilmore Dam, including fishing, mountain biking, and hiking. CSA has been working with county conservation districts and the PA Fish and Boat Commission's Cooperative Fish Habitat Management Program to improve the fish community at its reservoirs.

iii. **North Fork Dam** is owned and operated by the Greater Johnstown Water Authority and is closed to public recreation.
iv. **Dalton Run Reservoir** is also owned and operated by the Greater Johnstown Water Authority and is closed to public recreation.
v. **Quemahoning Reservoir** is also owned by the CSA and has similar restrictions to Wilmore and Hinckston Run Dams, but offers more recreation including swimming and camping.
vi. **Hinckston Run Dam** is also owned by the CSA. Please see Wilmore Dam for more information.
vii. **Saltlick Dam** is owned and operated by the Greater Johnstown Water Authority and is closed to public recreation.

Figure 195 – An 18-inch brown trout from the Que Tailwater

e. **Important Habitats Program** (assist development and implementation of Natural Heritage Inventories and educational programs) – Both Cambria and Somerset Counties have a Natural Heritage Inventory and various state, county, and local organizations promote the conservation and preservation of important habitats.
f. **Species of Concern Program** (assist survey and management, possibly through River Keepers Program) – Please see #23 under Basin-Wide Action Summary on page 271.

8. Franklin Riverwall

Priority 2

Investigate feasibility of replacing Franklin riverwall with limestone-based retaining structures.

Please see the section on Floodplains on page 63.

Recreational Resources

9. Scenic Rivers

Priority 1

Submit the Stonycreek Gorge and Canyon areas for inclusion in the Wild and Scenic Rivers Program. Develop plans to protect scenic features of these areas.

To be designated a Wild and Scenic River, a waterway must meet several requirements at the federal and state levels or be deemed one by Congress after a study to determine its eligibility and suitability. This recommendation has not been implemented, nor are there firm plans to protect the hillsides of the Stonycreek Gorge and Canyon.

10. Trail Development

Priority 2

Aid the further development of potential trails as identified in *Heritage Trails, Strengthening a Regional Community*, particularly Portage Trail, Links with Main Line Trail; Jenner-Lincoln Trail, Enoch to Ferrellton; Quemahoning Trail, Boswell to US 219. Identify areas suitable for designation as Water Trails. Investigate suitability of trails for horseback use.

Please see #24 – Trail Development under the Basin-Wide Action Summary on page 273.

11. Conemaugh River Greenway/Kiski Conemaugh Greenway

Priority 1

Participate in preparation of the Feasibility Study for the Kiski-Conemaugh Greenway. Work with interested parties to implement recommendations.

As stated in #25 under Basin-Wide Action, the Conemaugh Valley Conservancy completed this study in 1999 and several organizations continue to implement its recommendations.

12. Johnstown Urban Greenway

Priority 1

Implement construction of the 15.1-mile section of the Conemaugh River Greenway that has been planned.

As stated in #26 under the Basin-Wide Action Summary, the Conemaugh Valley Conservancy is currently exploring the feasibility of a Conemaugh Gap Trail, which would complement this Greenway.

13. Mainline Trail/Path of the Flood Trail and Linkages

Priority 1

Aid the development of the trails, following the 10 strategies in the feasibility study for these trails.

The Cambria County Conservation and Recreation Authority (CCCRA) and its partners, including Cambria County and PennDOT District 9, have followed the strategies outlines in the 1999 *Mainline Trail Path of the Flood Feasibility Study* as funds have permitted. The Path of the Flood trail winds its way along the Little Conemaugh River from Ehrenfeld to the Johnstown Flood Museum 11 miles downstream, and the Conemaugh Valley Conservancy is working on an extension in the Woodvale section of Johnstown. The National Park Service maintains about 2.3 miles of this trail as it is the only way to and from the historic Staple Bend Tunnel. Several municipalities support work on and around the trail and collaborate with CCCRA and its partners who are continually seeking ways to extend the trail and connect with others in the region. The Path of the Flood is promoted and recognized on several trail websites, such as the Trans Allegheny Trails and TrailLink by Rails-to-Trails Conservancy. It is designated as a National Recreation Trail in the National Trails System.

14. Stonycreek River Canyon Whitewater Park

Priority 1

Develop the Stonycreek River Canyon Whitewater Park, including river and land trail and facilities.

Dedicated on June 5, 2008, Whitewater Park is the first set of recreational rapids built on a river in Pennsylvania. Whitewater Park is accessible and adjacent to Greenhouse Park in Conemaugh Township, Somerset County. In 2017, the Stonycreek Quemahoning Initiative and its partners enhanced a water feature in Whitewater Park and constructed restroom facilities at Greenhouse Park to compliment the pavilions, changing stations, playground, and trail.

Figure 196 – White Water Park experiences high flows and ice in the winter of 2015

Historic / Archeologic Resources

15. Pennsylvania Main Line Canal

Priority 2

Assist in developing a program to acquire and protect important elements of the canal in the 89 miles of the Conemaugh River Greenway/Kiski-Conemaugh Greenway.

Please see #29 under the Basin-Wide Action Summary on page 276.

16. Heritage Areas

Priority 2

Assist, promote and publicize the efforts of the Heritage Commission to carry out the *Action Plan, America's Industrial Heritage Project* in the watershed.

Please see #30 under the Basin-Wide Action Summary.

17. Allegheny Ridge Heritage Park

Priority 2

Assist, promote and publicize the efforts to preserve the areas identified in *The Plan for the Allegheny Ridge* in the watershed.

Please see #31 under the Basin-Wide Action Summary.

18. Historic Sites

Priority 3

Promote and assist historic preservation in the watershed, according to the listing of National Register potentially eligible structures and other structures of potential historic interest listed in Appendix B (of the 1999 Plan). Investigate promotion of Scalp Level area as historic site and for opportunity to focus on history and environmental education.

The Stonycreek Quemahoning Initiative, Johnstown Area Heritage Association, and others promote the works of the Scalp Level Artists as well as 19th century folk art created in the region such as Swank pottery and Soap Hollow Furniture; however, designation of Scalp Level as a historic site or place of historical and educational learning has not been heavily explored. The Mine 40 Overlook in Scalp Level (Figure 198) offers interpretive panels and views of this coal patch community.

Figures 197 and 198 – Mine 40 homes and overlook

Educational Resources

19. **Basin-Wide Programs** – Participate in Basin-Wide Action Plan Programs including:

   a. **Newsletter and News Articles** – Please see #33 under Basin-Wide Action on page 279.
   b. **Classroom Education***
   c. **K-C Website***
   d. **Household Hazardous Waste***
   e. **Recreation Use***
   f. **Small Business Resource Center***
   g. **Annual Symposium***
   h. **Annual Events***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

20. Outdoor Education Center

Priority 2

Investigate establishment of an educational center at Flint Run, Hughes Borehole or another site.

Disaster's Edge Environmental Education Center was built in 1995 at the 1889 Park in St. Michael, PA. This facility is managed and operated by the Cambria County Conservation District, which offers programs for schools, scout groups, the general public and more.

Funds are being sought to develop and construct the Nathan's Divide Watershed Education Center in Ebensburg, PA. Located near the Eastern Continental Divide, the Center will seek to promote water stewardship through education.

Back to Table of Contents

Blacklick Creek Watershed

Land Resources

1. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the Blacklick Creek watershed including:

   a. **Vegetative Stream Buffering***
   b. **River Keepers Program***
   c. **Land Use Planning***
   d. **River Access***
   e. **Hazardous Waste***
   f. **Viewshed Protection***
   g. **Sustainable Forestry Initiative***
   h. **Green Golf Course Initiative***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

Back to Table of Contents

Water Resources

2. **Basin-Wide Programs --** Participate in Basin-Wide Action Plan programs along the Conemaugh Mainstem including:

   a. **Watershed Characterization Model** – completed
   b. **Stormwater Control** – see #12 under Basin-Wide Action Summary on page 266
   c. **Sewage Problem Evaluation, particularly North Branch of Two Lick Creek, Nanty Glo and Blacklick Valley Sewage Project** – see #14 under Basin-Wide Action Summary on page 268
   d. **Flood Problem Identification** – see #13 under Basin-Wide Action Summary on page 267

3. **Basin-Wide Mine Drainage Re-Evaluation Program**
   Priority 1
   Have the *Cooperative Mine Drainage Survey, Kiskiminetas River Basin* (EPA, 1972) updated to reflect current conditions in the basin, and covering the Blacklick Creek watershed, as needed.

In 2005, the Blacklick Creek Watershed Association contracted L. Robert Kimball and Associates to complete an assessment of the AMD in the Blacklick Creek watershed.

4. **Yellow Creek Restoration Plan**
   Priority 1
   Continue to develop and implement Yellow Creek Restoration Plan.

This plan included five phases that would restore the last 3.5 miles of Yellow Creek. The Blacklick Creek Watershed Association built Abandoned Mine Drainage Treatment Systems 1A and 1B in 1998 and 1999, respectively, as Phase I. Phase II included the construction of systems 2A, 2B, and 2C between 2002 and 2003. Phase III was a geologic investigation of the Sipos Mine along Route 954, but a passive treatment system was never built. Phase IV was the Lucerne 1 & 3 portal, which is still often under water and emits an intermittent discharge that the BCWA proposed to treat passively. Phase V involved the drilling of a borehole along Route 119 that discharges into a wetland (BCWA) (Remy).

5. **Upper Two Lick Creek**
   Priority 1
   Continue to develop and implement remediation projects on Upper Two Lick Creek.

The Blacklick Creek Watershed Association spearheaded projects that led to the construction of the Richards 1, 2A and 2B and the Penn Hills 1, 2A and 2B Treatment Systems near Clymer.

Figure 199 – The Penn Hills treatment system overlooks the Two Lick Creek Reservoir

6. **Webster Mine Discharge**
   Priority 1
   Plan and construct the Webster Mine Discharge passive treatment plant; have Revloc, Loraine, and Bethlehem Mine's 31 dumps removed.

The U.S. Army Corps of Engineers oversaw the development, design, and construction of the Webster Mine AMD passive treatment system in 2004; however, the system is not currently functioning as designed largely due to the system's failure in December 2006 (Hedin). The DEP is trying to negotiate a contract with a private, active treatment plant operator so that the Webster Mine Discharge could be treated at this site (Remy).

The Revloc coal refuse pile was reclaimed and work continues to re-mine and reclaim the Loraine and Mine 31 coal refuse piles.

7. **AMD&Art Remediation Park**
   Priority 1
   Construct the AMD&Art Vintondale Remediation Park treatment system, recreation grounds, interpretive structures and habitat improvement.

The AMD&Art AMD treatment system was constructed in 2004, but it was undersized and poorly constructed and does not effectively treat this discharge. The system was built along the heavily utilized Ghost Town Trail and does incorporate educational signage. The Blacklick Creek Watershed Association is working to restore a mosaic of the town that was damaged by Pennsylvania's weather. Vintondale Borough maintains soccer fields near the system. Nearby the DEP is working to build an active treatment system for the Wehrum discharge. It is believed that drawing down the mine pool for this project will eliminate the AMD&Art discharge at which point the system could be razed and restored for other use.

8. **Non-Point Source Pollution**
   Priority 2
   Promote development of a demonstration project and prepare a program for the Blacklick Creek Watershed (see *Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds*).

As shown in Recommendation #5 under Stonycreek/Little Conemaugh River on page 286, controlling non-point source pollution is a goal of numerous state, county, and local agencies. The Cambria and Indiana County Conservation Districts employ a full-time Agricultural Conservation Specialist to address non-point source pollution.

9. **Flood Prevention**
   Priority 2
   Address flooding problems in Yellow Creek (upstream of SR422) and Two Lick Creek (in Clymer Borough) and locations in Brush Creek for flood control.

These flooding problems need defined more, as the Indiana County Conservation District (ICCD) is not familiar with flooding concerns in the upper Yellow Creek area except for a roadway or two and it is not aware of any flooding concerns in the Brush Creek area. Clymer does see occasional flooding. The ICCD notes that the biggest concern for flooding in the Blacklick Creek watershed is in Indiana Borough because of Marsh Run and in Blairsville/Burrell Township (Cotchen).

Back to Table of Contents

Biological Resources

10. **Basin-Wide Programs --** Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the watershed including:

    a. **Alkalinity Addition Program** (use limestone sand additive to streams in high value watersheds, where appropriate) – As previously stated, the use of limestone sand has been used with success and there is great potential to refine and expand this restoration effort.

    b. **Limestone Construction Standard** (add a standard in subdivision controls to use limestone in devices in contact with water) – Please see #16 under Basin-Wide Action Summary on page 269.

    c. **Water Quality / Biological Monitoring** – Please see #2 and #17 under Basin-Wide Action Summary.

    d. **Fishery Management Program**, particularly focusing recovering streams such as South Branch Blacklick Creek – The Blacklick Creek watershed is part of the PA Fish and Boat Commission's Southwest Region, which manages the fisheries of the area.

    e. **Important Habitats Program** (assist development and implementation of Natural Heritage Inventories, educational programs, and IBA) – Please see #20 under Basin-Wide Action on page 270.

    f. **Species of Concern Program** (assist survey and management, possibly through River Keepers Program) – Please see #23 under Basin-Wide Action Summary on page 271.

Recreational Resources

11. Trail Development

Priority 2

Aid the further development of potential trails as identified in *Heritage Trails, Strengthening a Regional Community*, including trails outlined in #24 under Basin-Wide Action. Identify areas suitable for designation as water trails. Investigate suitability of trails for horseback use.

Please see #24 – Trail Development under the Basin-Wide Action Summary on page 273 and the Water Trails section on page 94.

12. Ghost Town Trail System

Priority 1

Implement construction of trail extensions from Dilltown to Blacklick and other areas, Rexis Branch Extension, the Cambria and Indiana Trail, and other linkages as noted previously.

Please see #24 – Trail Development under the Basin-Wide Action Summary on page 273.

13. Blacklick Creek Gorge

Priority 1

Form a committee to study and protect this area, develop a protection plan and implement plan.

This gorge extends from Heshbon to Josephine and cuts through the beginning of Chestnut Ridge. There are no known efforts underway to study or protect this area.

14. Duman Lake Park

Priority 1

Construct sewage treatment system, encourage weekday use, construct RV pads and tent camping area, construct facilities and implement education program, complete handicapped access trail.

Duman Lake Park is owned and operated by Cambria County. It is 71 acres of wooded and open space and offers camping, a picnic area, a playground, numerous pavilions, and fields and trails for exploring. The nature trail is handicapped accessible. Users may rent sports equipment for use on the volleyball and basketball courts, baseball field, or horseshoe pits. The park is adjacent 19-acre Duman Lake, which is owned by the PA Fish and Boat Commission and open for fishing and kayaking. While the park is officially open from May 15 through September 15, guests may use the park during daylight hours year round (Cambria County, PA).

Historic / Archeologic Resources

15. Heritage Areas
Priority 2
Assist, promote and publicize the efforts of the Heritage Commission to carry out the *Action Plan, America's Industrial Heritage Project* in the watershed.

Please see #30 under the Basin-Wide Action Summary.

16. Historic Sites
Priority 3
Promote and assist historic preservation in the watershed, according to the listing of National Register potentially eligible structures and other structures of potential historic interest listed in Appendix B (of the 1999 Plan).

Please see #32 under Basin-Wide Action Summary.

17. Eliza Furnace
Priority 1
Develop and implement preservation and interpretive programs in accordance with the Master Plan for the Eliza Furnace Historic Site.

According to the Indiana County Parks and Trails' website, the Eliza Furnace operated in the 1840s and is now a National Register site. Remarkably well preserved, it can be viewed from the Ghost Town Trail in Vintondale. The Eliza Furnace is on a two-acre parcel of land that is leased to Indiana County from the Cambria County Historical Society.

Educational Resources

18. **Basin-Wide Programs** – Participate in Basin-Wide Action Plan Programs including:

a. **Newsletter and News Articles***
b. **Classroom Education***
c. **K-C Website***
d. **Household Hazardous Waste***
e. **Recreation Use***
f. **Small Business Resource Center***
g. **Annual Symposium***
h. **Annual Events***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

Land Resources

1. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the watershed including:

    a. **Vegetative Stream Buffering***
    b. **River Keepers***
    c. **Land Use Controls***
    d. **River Access***
    e. **Hazardous Waste***
    f. **Viewshed Protection***
    g. **Sustainable Forestry Initiative***
    h. **Green Golf Course Initiative***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

Back to Table of Contents

Water Resources

2. **Basin-Wide Programs** -- Participate in Basin-Wide Action Plan programs along the Conemaugh Mainstem including:

   a. **Watershed Characterization Model** - completed
   b. **Stormwater Control** – see #12 under Basin-Wide Action Summary on page 266
   c. **Sewage Problem Evaluation, throughout the Mainstem watershed, and particularly Brenheiser area** – see #14 under Basin-Wide Action Summary on page 268
   d. **Flood Problem Identification** – see #13 under Basin-Wide Action Summary on page 267

3. **Mine Drainage Re-Evaluation Program**
   Priority 1
   Have the *Cooperative Mine Drainage Survey, Kiskiminetas River Basin* (EPA, 1972) updated to reflect current conditions in the basin, and covering the Conemaugh Mainstem; If funding is present, address the six-priority discharges in the EPA study.

This recommendation was not implemented.

4. **Non-Point Source Pollution**
   Priority 3
   Promote development of a demonstration Project according to the edicts in the report *Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds*; prepare a similar program for the Conemaugh Mainstem watershed.

See #5 under Stonycreek/Little Conemaugh River on page 286. All conservation districts within the Basin work with the state and local authorities to address non-point source pollution.

5. **Non-Point Source Pollution**
   Priority 1
   Conduct an assessment of effects of inappropriate timbering on Blackleggs Creek. Work with landowners to promote responsible timbering and forestry practices.

Unaware of an assessment. Landowners can consult service foresters to ensure best management of their timber stands.

6. **Non-Point Source Pollution**
   Priority 2
   Conduct an assessment of siltation problems at Buttermilk Falls Natural Area and identify solutions.

The Indiana County Parks and Trails, which owns the Buttermilk Falls Natural Area, is not aware of a siltation assessment and commented that siltation is not so much of an issue as agricultural runoff. Cattle are often in Hires Run, the stream the feeds Buttermilk Falls, above the falls, so excessive nutrients and bacteria are a concern, especially given the number of people who recreate at the falls and the diverse amphibian community that can be found here. Ed Patterson, Director of Indiana County Parks and Trails, said Buttermilk Falls is a site for Seal, Wehrle's, and the Valley & Ridge Salamanders, which are all species of concern in Pennsylvania. Previous efforts to install streambank fencing failed due to a lack of landowner permission (Patterson).

Figure 200 – Buttermilk Falls in winter

Figure 201 – Behind the frozen Buttermilk Falls

7. **Flood Control Facilities**
   Priority 3
   A cooperative program with the U.S. ACOE is needed to better regulate the water level in the Conemaugh Dam and the Conemaugh and Kiski Rivers: Prepare a petition to that effect.

River outfitters in the western half of the Kiski Basin routinely check with the U.S. Army Corps of Engineers' Pittsburgh office, which controls releases from the Conemaugh Dam, to coordinate the releases for the weekends when possible (Hawkins).

Back to Table of Contents

Biological Resources

8. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the Conemaugh Mainstem watershed including:

   a. **Alkalinity Addition Program** (use limestone sand additive to streams in high value watersheds, where appropriate) – As previously stated, the use of limestone sand has been used with success and there is great potential to refine and expand this restoration effort.

   b. **Limestone Construction Standard** (add a standard in subdivision controls to use limestone in devices in contact with water) – Please see #16 under Basin-Wide Action Summary on page 269.

   c. **Water Quality / Biological Monitoring** – Please see #2 and #17 under Basin-Wide Action Summary.

   d. **Fishery Management Program** – The Conemaugh mainstem is part of the PA Fish and Boat Commission's Southwest Region, which manages the fisheries of the area.

   e. **Important Habitats Program** (assist development and implementation of Natural Heritage Inventories and educational programs) – All the counties within the Kiski Basin have a Natural Heritage Inventory and various state, county, and local organizations promote the conservation and preservation of important habitats.

   f. **Species of Concern Program** (assist survey and management, possibly through River Keepers Program) – Please see #23 under Basin-Wide Action Summary on page 271.

Back to Table of Contents

Recreational Resources

9. Trail Development

Priority 2

Aid the further development of potential trails as identified in *Heritage Trails, Strengthening a Regional Community* in the Conemaugh mainstem watershed. Identify areas suitable for designation as Water Trails. Investigate suitability of trails for horseback use.

Please see #24 – Trail Development under the Basin-Wide Action Summary on page 273 and the Water Trails section on page 94.

10. Conemaugh River Greenway/Kiski Conemaugh Greenway

Priority 1

Participate in preparation of the Feasibility Study for the Kiski-Conemaugh Greenway. Work with interested parties to implement recommendations.

As stated in #25 under Basin-Wide Action, the Conemaugh Valley Conservancy completed this study in 1999 and several organizations continue to implement its recommendations.

11. Conemaugh Dam Trail

Priority 1

Aid the development of the 3.28-mile trail from Blairsville to Bow Ridge.

The Conemaugh Valley Conservancy completed this section, which includes a switchback to Conemaugh River Lake.

12. Cambria Iron Works Trail

Priority 1

Aid the development of proposed trail at the Cambria Iron Works site in Johnstown: Environmental Assessment is needed.

According to Richard Burkert, President of the Johnstown Area Heritage Association, "The Cambria Ironworks Trail came out of JAHA's planning and was developed by the Johnstown Redevelopment Authority and the U.S. Army Corps of Engineers. The final piece was the creation of a new section of the pedestrian bridge to replace the piece that had been washed out during the 1977 Flood. The environmental assessment was, I believe, performed by the Corps."

13. Johnstown Urban Greenway

Priority 1

Aid implementation of construction of the 15.1-mile section of the Conemaugh River Greenway that has been planned.

The Conemaugh Valley Conservancy completed a feasibility study on developing a trail through the 7-mile Conemaugh Gap and has since acquired property at the Route 56 entrance to Johnstown from the Conemaugh Gap. CVC did considerable work with partners to demolish a dilapidated building at the site, mitigate invasive plant species, and create a "gateway park." CVC built portions of a trail from the West End of Johnstown to the Conemaugh Gap Gateway Park. Trail development from the gateway park through the Conemaugh Gap to Seward is on hold due to objections from the Laurel Ridge State Park.

14. Conemaugh River Gorge, Packsaddle Gap

Priority 1

Form a Committee to study and protect these unique resources; develop a protection plan and implement it.

Please see #28 under Basin-Wide Action on page 275.

15. Allegheny Ridge Heritage Park

Priority 2

Assist, promote and publicize the efforts to preserve the areas identified in *The Plan for the Allegheny Ridge* in the watershed.

Please see #31 under the Basin-Wide Action Summary.

Historic / Archaeologic Resources

16. Pennsylvania Main Line Canal

Priority 1

Assist in developing a program to acquire and protect important elements of the canal in the 89-miles of the Conemaugh River Greenway / Kiski-Conemaugh Greenway, particularly around Blairsville (Lock 5); develop Saltsburg's historic theme as the location to tell the story of the Main Line Canal.

Please see #29 under Basin-Wide Action on page 276.

17. Heritage Areas

Priority 2

Assist, promote and publicize the efforts of the Heritage Commission to carry out the *Action Plan, America's Industrial Heritage Project* in the watershed.

Please see #30 under Basin-Wide Action.

18. Basin-Wide Historic Sites

Priority 3

Promote and assist historic preservation in the Conemaugh Mainstem Watershed, according to the listing of National Register potentially eligible structures and other structures of potential historic interest listed in Appendix B (of the 1999 Plan).

Please see #32 under Basin-Wide Action.

Educational Resources

21. **Basin-Wide Programs** – Participate in Basin-Wide Action Plan Programs including:

    a. **Newsletter and News Articles** – Please see #33 under Basin-Wide Action on page 279.
    b. **Classroom Education***
    c. **K-C Website***
    d. **Household Hazardous Waste***
    e. **Recreation Use***
    f. **Small Business Resource Center***
    g. **Annual Symposium***
    h. **Annual Events***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

20. **River Recovery Educational Program**

    Priority 2

    Establish an interpretive program at Conemaugh River Lake to focus on river recovery. Investigate feasibility of locating a River Restoration Educational Center at Conemaugh Dam, and develop facility if appropriate.

There are an information center and interpretive trail at the Conemaugh River Lake; however, more information on the river's revival over the last two decades could be shared.

Loyalhanna Creek Watershed

Land Resources

1. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the Loyalhanna Creek watershed including:

   a. **Vegetative Stream Buffering***
   b. **River Keepers Program***
   c. **Land Use Planning***
   d. **River Access***
   e. **Hazardous Waste***
   f. **Viewshed Protection***
   g. **Sustainable Forestry Initiative***
   h. **Green Golf Course Initiative***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

Water Resources

2. **Basin-Wide Programs** -- Participate in Basin-Wide Action Plan programs including:

   a. Watershed Characterization Model - completed
   b. Stormwater Control – see #12 under Basin-Wide Action Summary on page 266
   c. Sewage Problem Evaluation, particularly Darlington area – see #14 under Basin-Wide Action Summary on page 268. Darlington received municipal sewage in 2015-2016. The Municipal Authority of Westmoreland County manages a sewage treatment facility along Route 30 East below Longbridge (Huba).
   d. Flood Problem Identification – see #13 under Basin-Wide Action Summary on page 267

3. Basin-Wide Mine Drainage Re-Evaluation Program
Priority 1
Have the *Cooperative Mine Drainage Survey, Kiskiminetas River Basin* (EPA, 1972) updated to reflect current conditions in the basin, and covering the Loyalhanna Creek watershed, as needed.

The U.S. Army Corps of Engineers completed a field survey of the Loyalhanna Creek watershed in 2002 (Wright 2-79).

4. Monastery Run and LCMDC Projects
Priority 1
Complete the Monastery Run mine drainage remediation project, under the direction of the Loyalhanna Creek Mine Drainage Coalition (LCMDC), then plan and address the following discharges: Crabtree, Saxman, Keystone, Unity, Friedline Mine and Adelphoi Village.

The **Monastery Run** AMD treatment system was constructed in 1997/1998. St. Vincent College completes general maintenance, minor repairs, and monitors water quality, while the DEP is responsible for major repairs. It is also used by the college for environmental education.

In 2014, the Loyalhanna Watershed Association (LWA) was awarded a $101,156 Growing Greener grant from the DEP to complete an assessment of the **Crabtree** mine discharge and determine how best to treat this alkaline discharge – the largest discharge in the Loyalhanna watershed. Please see page 223 for more information on the Crabtree discharge.

There are several abandoned mine discharges along **Saxman Run**. According to the *Loyalhanna Creek Watershed Assessment and Restoration Plan* of 2005, the Upper Saxman discharge contributes about 2,000 gallons per minute and the Lower Saxman discharge adds 1800 gallons per minute of alkaline mine water to Saxman Run. A portion of the Lower Saxman discharge was treated at a small, pilot treatment system at the Latrobe sewage treatment plant (Wright 2-81, A-17) in cooperation with Saint Vincent College, but it was taken offline in 2011. LWA and its partners completed a pilot hydroelectric project here in 2010, but due to system flooding, it is offline, so there are currently no treatment systems for either discharge (Huba).

Figure 202 – Students tour the AMD treatment system at Keystone State Park

A passive treatment system was built in 2001 and 2004 at Keystone State Park to treat the Salem No. 2 acid mine discharge. Due to diminishing function, this system was redesigned with the new system built in 2017 courtesy the DEP, which used some of its set-aside funds. It is working well (Huba, Stephen).

The Upper Latrobe AMD Treatment System was completed in 2010 by LWA with funding provided by a $500,000 Growing Greener grant. A previous study involved determining the connectivity of four discharges in the City of Latrobe: the Unity Discharge, Ridilla Discharge, Adelphoi Village Pipe, and Adelphoi Borehole. After it was found that the discharges stem from the same mine pool, the treatment system concept was developed to be constructed on a LWA parcel with a potential to seal off the discharges once flows were reduced. The project involved drilling a borehole into the mine pool below a 30-acre parcel owned by LWA, central to the locations of the discharges. The system currently treats 500 GPM of AMD, and the Ridilla Discharge has been sealed.

The two discharges behind the Adelphoi Village – Adelphoi Borehole and Adelphoi Pipe – are alkaline and remain untreated. During a flood several years ago, the Adelphoi Borehole partially filled in with gravel and now discharges at a lower rate. Around 2009, despite investigative efforts, the mine opening for the Adelphoi Pipe Discharge could not be found. Due to expansion of Adelphoi Village and the construction of a new building near this discharge, access for sampling it is now limited, although recent flow rates have indicated a reduction in volume (Huba).

The Unity discharge is only 500 feet from the Adelphoi discharges and is also an alkaline discharge that remains untreated, due to its location and seasonal flow (Wright 2-9) (Huba).

In 1997, LWA oversaw the construction of the Friedline Mine AMD Treatment System, which was built to remediate this acidic discharge flowing into Laurel Run. In 2004, the DEP added a steel slag bed to compliment the vertical flow reactors (Datashed). The DEP's Bureau of Abandoned Mine Reclamation is considering a complete rehabilitation of this system.

5. **Non-Point Source Pollution**
   Priority 3
   Promote development of a demonstration project according to the edicts in the report *Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds*; prepare a similar program for the Loyalhanna Creek Watershed.

As shown in Recommendation #5 under Stonycreek/Little Conemaugh River on page 286, controlling non-point source pollution is a goal of numerous state, county, and local agencies. The Westmoreland Conservation District employs several people who collectively address non-point source pollution.

Figure 203 – Nutrient runoff from farm fields is a form of non-point source pollution

6. **Flood Prevention**
   Priority 2
   Develop a flood control program along Mill Creek near the end of Avenue A in Latrobe, from the first Ward in Latrobe to Kingston, and in Unity Township.

There are no flood control projects along Mill Creek, nor are there any in Latrobe (Huba).

Biological Resources

7. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the watershed including:

    a. **Alkalinity Addition Program** (use limestone sand additive to streams in high value watersheds, where appropriate) – As previously stated, the use of limestone sand has been used with success and there is great potential to refine and expand this restoration effort.
    b. **Limestone Construction Standard** (add a standard in subdivision controls to use limestone in devices in contact with water) – Please see #16 under Basin-Wide Action Summary on page 269.
    c. **Water Quality / Biological Monitoring** – Please see #2 and #17 under Basin-Wide Action Summary.
    d. **Fishery Management Program**, particularly recovering streams – The Loyalhanna Creek watershed is part of the PA Fish and Boat Commission's Southwest Region, which manages the fisheries of the area.
    e. **Important Habitats Program** (encourage implementation of Westmoreland County Natural Heritage Inventory) – Please see #20 under Basin-Wide Action on page 270.
    f. **Species of Concern Program** (assist survey and management, possibly through River Keepers Program) – Please see #23 under Basin-Wide Action Summary on page 271.

Recreational Resources

8. Trail Development
Priority 2
Aid the further development of potential trails as identified in *Heritage Trails, Strengthening a Regional Community*, including trails outlined in #24 under Basin-Wide Action. Identify areas suitable for designation as water trails. Investigate suitability of trails for horseback use.

Please see the Trails section under Cultural Resources beginning on page 90, as well as #24 – Trail Development under the Basin-Wide Action Summary on page 273, and the Water Trails section on page 94.

9. Loyalhanna Gorge Protection
Priority 3
Develop a program to protect land in the Loyalhanna Gorge.

Please see #28 under Basin-Wide Action Summary on page 275.

Historic / Archeologic Resources

10. Heritage Areas

Priority 2

Assist, promote and publicize the efforts of the Heritage Commission to carry out the *Action Plan, America's Industrial Heritage Project* in the watershed.

Please see #30 under the Basin-Wide Action Summary.

11. Historic Sites

Priority 3

Promote and assist historic preservation in the watershed, according to the listing of National Register potentially eligible structures and other structures of potential historic interest listed in Appendix B (of the 1999 Plan).

Please see #32 under Basin-Wide Action.

Figure 204 – A historical marker in Latrobe marks where the first documented Banana Split was created and sold

Back to Table of Contents

Educational Resources

12. **Basin-Wide Programs** – Participate in Basin-Wide Action Plan Programs including:

    a. **Newsletter and News Articles***
    b. **Classroom Education** – Please see #34 under Basin-Wide Action Summary. Additionally, the Loyalhanna Watershed Association manages the Nimick Family Education Center at the Watershed Farm in Ligonier at which environmental education programs may be held.
    c. **K-C Website***
    d. **Household Hazardous Waste***
    e. **Recreation Use***
    f. **Small Business Resource Center***
    g. **Annual Symposium***
    h. **Annual Events***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

13. Forest Management in Headwater Areas

Priority 2

Develop and carry out a forest management program, particularly for headwater stream protection.

As stated in #7 – Sustainable Forestry Initiative – under Basin-Wide Action Summary, there are many foresters available for consultation. Also, the Westmoreland Conservation District has a forester on staff, while state agencies and other organizations like the Westmoreland Woodlands Improvement Association serve as additional, educational resources.

Kiskiminetas River Watershed

Land Resources

1. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the watershed including:

   a. **Vegetative Stream Buffering***
   b. **River Keepers Program***
   c. **Land Use Planning***
   d. **River Access***
   e. **Hazardous Waste***
   f. **Viewshed Protection***
   g. **Sustainable Forestry Initiative***
   h. **Green Golf Course Initiative***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

Back to Table of Contents

Water Resources

2. **Basin-Wide Programs** -- Participate in Basin-Wide Action Plan programs including:

   a. Watershed Characterization Model - completed
   b. Stormwater Control – see #12 under Basin-Wide Action Summary on page 266
   c. Sewage Problem Evaluation – see #14 under Basin-Wide Action Summary on page 268
   d. Flood Problem Identification – see #13 under Basin-Wide Action Summary on page 267

3. Basin-Wide Mine Drainage Re-Evaluation Program
Priority 1
Have the *Cooperative Mine Drainage Survey, Kiskiminetas River Basin* (EPA, 1972) updated to reflect current conditions in the basin, and covering the Kiski Mainstem watershed, as needed.

This recommendation was not implemented.

4. Trux Discharge
Priority 1
Plan abatement of the Trux Mine Discharge near Apollo.

The Trux discharge is an acidic discharge that flows under the Roaring Run Trail and into the Kiski River. Some metals do precipitate in a settling basin, but the discharge still causes an orange plume in the river. Space is limited to build a treatment system here.

Figure 205 – The Trux discharge enters the Kiski River

5. **Non-Point Source Pollution**
   Priority 3
   Promote development of a demonstration project according to the edicts in the report *Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds*; prepare a similar program for the Kiski Mainstem Watershed.

As shown in Recommendation #5 under Stonycreek/Little Conemaugh River on page 286, controlling non-point source pollution is a goal of numerous state, county, and local agencies. The Armstrong Conservation District employs staff who collectively address non-point source pollution.

6. **Tire Dump**
   Priority 1
   Evaluate river pollution problem at a tire dump near Avonmore. Refer complaint to DEP and PFBC for action if appropriate.

The Roaring Run Watershed Association (RRWA) and Kiskiminetas Watershed Association (KWA) have aggressively tackled many illegal dumps along roadways, streams, and the Kiski River. RRWA and KWA hold annual litter cleanups in conjunction with Keep PA Beautiful, Ohio

River Sweep, International Coastal Cleanup, and Paddle Without Pollution. Partnering with Bridgestone Tires' Tires4Ward program, volunteers removed over 800 tires from the Kiski River in Avonmore in 2015 and in 2016, they removed over 300 tires from the same location. Another 50 tires were removed in 2017.

Figure 206 – A freshwater mussel is discovered in the Kiski River in Avonmore, during the RRWA's 2016 tire cleanup. Photo by Chelsea Walker

7. **Kiski River Water Level**
   Priority 3
   Coordinate with the U.S. Army Corps of Engineers to stabilize the water level in the Kiski River, using upstream flood control facilities.

There has been no known action on this recommendation.

Back to Table of Contents

Biological Resources

8. **Basin-Wide Programs** -- Aid or carry out elements of the Basin-Wide Action Plan (as defined in the plan) that are located in the watershed including:

   a. **Alkalinity Addition Program** (use limestone sand additive to streams in high value watersheds, where appropriate) – As previously stated, the use of limestone sand has been used with success and there is great potential to refine and expand this restoration effort.

   b. **Limestone Construction Standard** (add a standard in subdivision controls to use limestone in devices in contact with water) – Please see #16 under Basin-Wide Action Summary on page 269.

   c. **Water Quality / Biological Monitoring** – Please see #2 and #17 under Basin-Wide Action Summary.

   d. **Fishery Management Program**, including increased public access to Kiski River – The Kiski mainstem watershed is part of the PA Fish and Boat Commission's Southwest Region, which manages the fisheries of the area. The following public accesses are along the Kiski River. The number denotes the approximate river miles the access is from the mouth of the Kiski River at Freeport/Schenley:

      - #22 Avonmore Carry-In Canoe Access
      - #15 Roaring Run River Access with Ramp and Parking
      - #12 East Vandergrift Carry-In Canoe Access
      - #11 North Vandergrift River Access with Ramp and Parking
      - #6 Hyde Park River Access with Ramp and Parking
      - #5 Leechburg River Access with Ramp and Parking

      The Rivers Edge Canoe and Kayak has a private river access (#7), which boaters may use for a small parking/launch fee.

   e. **Important Habitats Program** (assist development and implementation of Natural Heritage Inventories and educational programs) – Please see #20 under Basin-Wide Action Summary on page 270.

   f. **Species of Concern Program** (assist survey and management, possibly through River Keepers Program) – Please see #23 under Basin-Wide Action Summary on page 271.

Back to Table of Contents

Recreational Resources

9. Trail Development

Priority 2

Aid the further development of potential trails as identified in *Heritage Trails, Strengthening a Regional Community*, particularly the following in the watershed: Saltsburg to Trafford Rail Trail; Investigate possible trails along the West Penn trolley trace and Apollo to Leechburg; Further development of the Roaring Run Trail; Identify areas suitable for designation as water trails. Investigate suitability of trails for horseback use.

Please see the Trails section under Cultural Resources beginning on page 90 as well as #24 – Trail Development under the Basin-Wide Action Summary on page 273 and the Water Trails section on page 94.

10. Conemaugh River Greenway/Kiski-Conemaugh Greenway

Priority 1

Participate in preparation of the Feasibility Study for the Kiski-Conemaugh Greenway. Work with interested parties to implement its recommendations.

As stated in #25 under Basin-Wide Action Summary, the Conemaugh Valley Conservancy completed this study in 1999 and several organizations continue to implement its recommendations.

11. Kiskiminetas River Hillsides

Priority 1

Form a committee to study and protect area; develop a protection plan and implement for river hillside viewsheds, particularly in the areas between Edmon and Cherry Lane and Salina to mouth of Beaver Run.

RRWA owns 650 acres of land along the Kiskiminetas River between Apollo and Edmon and seeks to conserve it for recreational use.

Back to Table of Contents

Historic / Archaeologic Resources

12. Pennsylvania Main Line Canal

Priority 1

Develop a program to acquire and protect important elements of the canal in the watershed; develop Saltsburg's historic theme as the location to tell the story of the Main Line Canal.

Please see #29 under Basin-Wide Action Summary on page 276.

13. Heritage Areas

Priority 2

Assist, promote and publicize the efforts of the Heritage Commission to carry out the *Action Plan, America's Industrial Heritage Project* in the watershed.

Please see #30 under Basin-Wide Action Summary on page 30.

14. Basin-Wide Historic Sites

Priority 3

Promote and assist historic preservation in the Conemaugh Mainstem Watershed, according to the listing of National Register potentially eligible structures and other structures of potential historic interest listed in Appendix B (of the 1999 Plan).

Please see #32 under Basin-Wide Action Summary on page 278.

Educational Resources

15. **Basin-Wide Programs** – Participate in Basin-Wide Action Plan Programs including:

    a. **Newsletter and News Articles***
    b. **Classroom Education***
    c. **K-C Website***
    d. **Household Hazardous Waste***
    e. **Recreation Use***
    f. **Small Business Resource Center***
    g. **Annual Symposium***
    h. **Annual Events***

* For all, please see the Basin-Wide Action Summary beginning on page 262.

16. Kiski Fishing Tournament

Priority 1

Continue to operate an annual Kiski River Fishing Tournament. Publicize in local and regional venues.

The Roaring Run Watershed Association organized an annual fishing tournament on the Kiski River, adjacent their property, from 1993 until 2015. This event was successful; however, the number of volunteers to organize the event dwindled and the point of the tournament was to showcase the comeback of the Kiskiminetas River, which was accomplished. The RRWA continues to stock trout in Roaring Run for recreation.

Management

17. Kiskiminetas River Watershed Organization

Priority 1

Establish an organization with the entire mainstem of the Kiskiminetas River as its focus.

The Kiskiminetas Watershed Association (KWA) was formed in 2001 and is a 501(c)3 non-profit organization dedicated to the conservation and rehabilitation of natural and historical resources, environmental education, and recreation. Volunteers serve on KWA's Board of Directors.

2017 Recommendations

Basin-Wide

Water

1. Evaluate aluminum and alkalinity loading throughout the Basin.
2. Take care to ensure pH levels do not exceed 8 so that in-stream aluminum does not dissolve and become toxic to aquatic life on the basic end of the pH scale.
3. Improve sewage collection and treatment; eliminate Combined Sewer Overflows.
4. Continue to survey unassessed waters to document wild trout populations and, when appropriate, petition the state to add these stream segments to the Wild Trout Waters list and/or re-designate the waterway for added protection.
5. Building upon the wild trout waters assessment, identify sites at which limestone sand could be applied to improve water quality and restore wild trout populations particularly in headwater streams. Develop specific protocols for limestone sanding in the Basin and establish a trust fund that would cover annual costs of this low cost and low maintenance treatment method.
6. Pursue re-designating appropriate stream segments as HQ or EV as defined by the PA Code Chapter 93.
7. Pursue de-listing streams from the Integrated Water Quality Report (303(d) list).
8. Review the recommendations for rehabilitate existing AMD treatment systems as outlined in the *Kiski-Conemaugh Basin Treatment System O&M Assessment Report* and implement recommendations after consulting experts in a number of fields and evaluating the biological communities upstream and downstream of the treatment system effluent.
9. Lessen the thermal impacts water impoundments and urban sprawl have on streams, particularly to restore and expand habitat for Pennsylvania's state fish, the brook trout.
10. Monitor for potential impacts from the shale gas industry.
11. Be mindful of shale gas wastewater treatment and discharges into water sources.
12. Expand the Data Logger Program to monitor more discharges and unassessed waters and to acquire pre and post restoration data.
13. Protect and conserve drinking water and ground water sources.
14. Develop and implement recommendations of stormwater management plans.
15. Survey and document freshwater mussels to determine the extent of their populations throughout the watershed.
16. Complete more frequent biological surveys on the mainstems of the Kiskiminetas and Conemaugh Rivers, as well as their large tributaries, and make these data readily available to the public.
17. Complete a River Recovery Connectivity Study that would assess if isolated populations in smaller watersheds are the source of select species or if their origins are from the Allegheny River. The end product would be an assessment of the recovery time, distance, and effort of fish species re-entering a recovered riverine system.

Land

18. Work to install Best Management Practices at agricultural operations to lessen the amount of nutrient run-off and sedimentation.
19. Work to control and eradicate invasive species, especially Japanese knotweed and tree-of-heaven.
20. Promote the use of native plant species in home and commercial landscaping and projects.
21. Monitor land use changes and work to eliminate loss of forested lands and wetlands while protecting existing tracts.
22. Expand and protect forested and vegetated riparian buffers in as many locations as possible.
23. Continue removing and reclaiming coal refuse piles, particularly those adjacent streams.
24. Preserve the landscapes surrounding existing HQ and EV waterways.
25. Work to conserve lands and develop brownfields.
26. Continue efforts to improve dirt and gravel roads to decrease sedimentation to waterways.
27. Lessen impervious surfaces by promoting the use of eco-friendly alternatives.
28. Continue removing illegal dumps, recycling tires and other recyclables, and completing litter cleanups.
29. Encourage law enforcement to issue littering fines when appropriate.
30. Increase wildlife habitat, especially for Threatened and Endangered Species and Species of Concern.
31. Protect the Important Bird Areas, Important Mammal Areas, Biological Diversity Areas, and Landscape Conservation Areas outlined in county Natural Heritage Inventories.
32. Ensure preservation of outstanding or unique features as listed on page 22.

Policy

33. Promote the findings outlined in this document as well as the work of watershed organizations, conservation districts, and others.
34. Connect the Kiskiminetas River Basin to Pittsburgh and its communities as they benefit from restoration and preservation work completed here.
35. Support legislation that backs environmental restoration and protection projects.
36. Develop a Swimmable Waters program, similar to the Mountain Watershed Association's.
37. Develop a Geographic Information System, similar to the Susquehanna River Basin Commission's Mapping Applications, that conveys stream classifications, designations, and quality to more easily identify where contradictory information lies so groups may address it.
38. Establish a Brook Trout Recovery Fund that would be used to cover limestone dosing, recovery evaluation, and assessments of wild trout streams throughout the Basin.
39. Retrofit existing USGS stream gages with probes to measure, record, and display additional parameters including water temperature and conductivity.
40. Support community revitalization projects, especially those that connect residents and guests to natural resources.
41. Have municipalities develop and enact zoning ordinances that protect environmentally-sensitive areas and lessen the strain on resources.
42. Request the government create a law that makes balloon releases illegal.
43. Lessen emissions that contribute to poor air quality.
44. Support initiatives that develop hydroelectric and solar energy.

Recreation

45. Increase recreational opportunities on land and water to promote entrepreneurship, eco-tourism, healthy lifestyles, and connection to watershed organizations.
46. Enhance the walkability of river towns and access to public transportation. A share-the-road from Leechburg to Apollo was specifically requested.
47. Improve communication of the state of the rivers including their quality and potential sources of contamination so recreational users may make informed decisions as to whether or not they wish to recreate in a particular waterway.
48. Improve accessibility to streams and rivers and market those access points.
49. Add public canoe/kayak launches at more regular intervals along the mainstems and tie into and enhance existing accesses.
50. Determine if water intakes could be installed at dams to provide free-flowing, safe access for recreation, while still meeting industrial supply needs.
51. Maintain existing trails and expand to connect to other trails as funds, topography, and landowners permit. Specific linkages suggested include:
    a. Edmon to Avonmore
    b. Avonmore to Saltsburg
    c. Blairsville to Blacklick
    d. Leechburg to Schenley

Outreach

52. Continue education efforts to ensure youth comprehend what the state of our watersheds were before regulations and reclamation work improved streams.
53. Encourage volunteerism, particularly through active service on a watershed organization's board of directors.
54. Educate the public to lessen the transport and spread of invasive species and diseases like White-nose syndrome and Chronic Wasting Disease.
55. Market the abundant resources available throughout the Kiski-Conemaugh River Basin and the works of conservation partners.
56. Update this Kiski-Conemaugh River Basin Conservation Plan in 10-15 years.

Back to Table of Contents

Stonycreek

1. Implement and maintain stream buffers along the headwaters of the Stonycreek River from its origin in Berlin downstream to Shanksville.
2. Evaluate and eliminate sedimentation and organic loading in the Stonycreek River, particularly upstream of the Glessner Covered Bridge.
3. Continue to assess the macroinvertebrate community in the Stonycreek at Kantner to track the recovery of this community.
4. Monitor, maintain, and rehabilitate the Oven Run AMD treatment systems that are currently working (System D, E, and F) and sustaining the Stonycreek River to ensure the Stonycreek does not revert to its former, degraded status.
5. Carefully consider the value of rehabilitating Oven Run AMD treatment systems A and B as the water quality of Oven Run above and below these systems are similar, indicating the systems are not greatly impacting the stream.
6. Monitor and maintain the AMD treatment systems functioning in the Wells Creek watershed.
7. Improve physical habitat in Rhodes Creek.
8. Complete a biological and chemical assessment of Glades Creek to determine how agricultural Best Management Practices installed to date are affecting the stream and if more are necessary.
9. Monitor Beaverdam Creek's biological communities to ensure preservation of existing species, especially if new mining operations begin.
10. Maintain the Quemahoning Creek Coldwater Conservation Release from the Quemahoning Reservoir.
11. Work to remove more iron precipitate from Quemahoning Creek to increase the diversity of macroinvertebrates and potentially support more, natural fish reproduction.
12. Continue adding habitat structures to the Quemahoning Reservoir and Quemahoning Tail Water and promote the Tail Water as a destination fishery.
13. Monitor the Stonycreek River in Benson/Hollsopple to determine how the Quemahoning Coldwater Conservation Release is affecting the river.
14. Promote additional angling opportunities from the Quemahoning Tailwater downstream to the confluence of the Stonycreek River with Shade Creek through enhanced trout stockings and marketing if PFBC redesignates this section as a trout stream.
15. Update Shade Creek Watershed Association's limestone sanding project in the headwaters of Dark Shade Creek to ensure more consistent lime application.
16. Support the PA DEP's effort to design and construct an active treatment system to remediate the "Big 4" Abandoned Mine Discharges in Central City, PA.
17. Continue reclamation efforts in the Paint Creek watershed.
18. Improve habitat and cover throughout the river walls in Johnstown.
19. Develop an official Water Trail Map and Guide for the Stonycreek River.
20. Maintain open communications with the U.S. Army Corps of Engineers as they complete a study of the hydrology of the watershed and its impact on the river walls.

Back to Table of Contents

Little Conemaugh

1. Support the PA DEP's effort to design and construct an active treatment system to remediate several large Abandoned Mine Discharges in the Portage and Wilmore areas.
2. Conduct a more complete assessment of the headwaters of the Little Conemaugh River near to determine what areas need improved.
3. Complete a fish survey of the Little Conemaugh at Sportsman's Road near Jamestown to assess trout populations since the area was last surveyed in 1999.
4. Evaluate several large AMD in the headwates of the South Fork Branch of the Little Conemaugh River near Beaverdale and formulate a plan to actively treat them.
5. Maintain open communications with the U.S. Army Corps of Engineers as they complete a study of the hydrology of the watershed and its impact on the river walls.
6. Improve fish habitat and cover throughout the river walls in Johnstown.

Back to Table of Contents

Blacklick

1. Assess Coal Pit Run to determine why there are no fish in this stream.
2. Work to keep metal precipitates out of South Branch Two Lick Creek, particularly from the Diamondville discharge, to encourage greater fish diversity.
3. Remove and reclaim the coal refuse pile adjacent the South Branch Blacklick Creek that is easily viewable from the Ghost Town Trail near the AMD&Art AMD treatment system.
4. Revisit the top priority discharges listed in the 2005 *Blacklick Creek Watershed Assessment / Restoration Plan* to determine the discharges' current impact on the receiving streams and if treatment is feasible.
5. Support the PA DEP's effort to design and construct an active treatment system to remediate the Wehrum discharge and several other nearby discharges near Vintondale.
6. Monitor the mainstem of Blacklick Creek to track the impact of restoration efforts and to fill data gaps.
7. Complete assessments and acquire baseline data for unassessed or under-assessed waterways throughout the watershed.
8. Survey fish populations in North Branch Blacklick Creek at Adams Crossing to determine if pollution impacts exist and evaluate habitat and water quality throughout this stream to see if the wild trout fishery in the headwaters could be extended.
9. Improve fish habitat below the Two Lick Reservoir and monitor water temperatures and fish populations.
10. Improve the treatment offered by the Yellow Creek AMD treatment systems to retain more metals and decrease embedding in Yellow Creek.
11. Complete a streambank improvement project and riparian buffer planting adjacent the large coal refuse pile along Yellow Creek.
12. While a Qualified Hydrologic Unit Plan is in place for Upper Blacklick Creek, one needs completed in partnership with the PA DEP for the rest of the watershed. The Blacklick Creek Watershed is spearheading this effort.
13. Develop an official Water Trail Map and Guide for Blacklick Creek.
14. Add parking and improve access to the Buena Vista Furnace.

Back to Table of Contents

Conemaugh

1. Investigate and remediate the sources of siltation in Aultmans Run.
2. Improve stream habitat in Reeds Run below the Reeds Run AMD treatment system.
3. Improve the Neal Run AMD treatment system to support a diverse fish community in Neal Run.
4. Acquire more consistent and recent data on the Gray Run AMD treatment system to evaluate its efficacy.
5. Monitor the mainstem of the Conemaugh River to track the impact of restoration efforts and to fill data gaps.
6. Re-designate more sections of Tubmill Creek as High Quality or Exceptional Value to protect it from uncontrolled resource extraction.
7. Protect the Buttermilk Falls Natural Area.
8. Add more public river accesses/boat launches, perhaps every five miles from the Conemaugh Dam to the mouth of the Kiskiminetas River.

Back to Table of Contents

Loyalhanna

1. Work to conserve cropland and pastures and monitor the addition of developed lands.
2. Complete a biological and chemical assessment of Loyalhanna Creek from Latrobe to its mouth and monitor this section to track the impact of restoration efforts as well as Loyalhanna Creek's contribution to the Kiskiminetas River and to fill data gaps.
3. Determine the Crabtree discharge's impact on Loyalhanna Creek and carefully review the feasibility study for this site.
4. Monitor and maintain existing AMD treatment systems.
5. Continue to install fish habitat structures throughout the watershed.
6. Complete projects to buffer acid deposition where necessary.

Back to Table of Contents

Kiskiminetas

1. Work to limit expansion of developed lands.
2. Complete an assessment of the pH, alkalinity, and aluminum loading in the Blackleggs Creek watershed to determine how existing treatment systems, in their various states of function, affect the water quality and thus biological communities of Blackleggs Creek.
3. Assess Wolford Run to determine the best way forward with remediation efforts.
4. Monitor the chemistry and biological communities of the Kiskiminetas River to track the impact of restoration efforts.
5. Complete riparian buffer work in the Rattling Run watershed.
6. Determine the effect of pyritic shales and aluminum discharges on Roaring Run.
7. Assess the mine discharges along Roaring Run to see if aluminum concentrations could be lowered before they flow into Roaring Run.
8. Complete the cleanup of the shallow trenches at the Shallow Land Disposal Area (the old NUMEC site) in Kiskimere.
9. Add more bank stabilization along Carnahan Run and its tributaries.
10. Complete a Feasibility Study and design for the Pine Run discharges that could be treated on land owned by the Kiski Valley Water Pollution Control Authority.
11. Remove and reclaim the Guffy Run coal refuse pile.
12. Add stormwater controls to curb flooding from Sugar Run.
13. Ensure no pollution from the North Apollo Auto Wrecking scrap yard is impacting the Kiski River.
14. Survey and document freshwater mussels, particularly near Avonmore, to determine the extent of their populations throughout the watershed.

Back to Table of Contents

Conservation District and Watershed Association Highlights

In 2015, CVC met with representatives of five county conservation districts, 12 watershed associations, three conservancies, and two conservation organizations operating within the Kiski-Conemaugh River Basin to highlight their accomplishments and concerns. Summaries of these interviews are on the following pages.

Armstrong Conservation District
October 11, 2015
David Beale, David Rupert

The Armstrong Conservation District (ACD) was established in 1963 to protect and restore degraded watersheds, promote sustainable farms and healthy forests, and to grow vibrant and sustainable communities. In the Kiski-Conemaugh River Basin, ACD works within the Kiskiminetas River mainstem and its northern tributaries. The board of directors approve policies, budgets, and projects that guide seven employees, whose primary areas of focus are erosion and sedimentation control, dirt and gravel road improvements, resource conservation, agricultural technical assistance and preservation, environmental education, and administrative support.

Through its Agricultural Lands Protection Program, the District reviews Nutrient Management Plans and Agricultural Erosion Sedimentation Control Plans and completes fieldwork to help conserve agricultural lands. Staff also have coordinated the Armstrong County Animal Response Team, which responds to emergencies and disasters involving animals when the event is beyond the capabilities of local shelters, organizations, or individuals. The District coordinates the county Envirothon and manages an annual tree and seedling sale. It hosts numerous workshops to educate farmers, municipal officials, and others on a variety of conservation topics and programs.

The ACD administers the Dirt, Gravel, and Low Volume Roads Program in the county. Staff work with applicants to develop plans for projects to address non-point source pollution and complete inspections of funded projects. In the Kiski Basin, the District has worked on 27 Dirt and Gravel and one Low Volume Road projects, among others.

As a Level III District, the ACD reviews erosion and sedimentation plans, inspects earth disturbance sites, investigates complaints, and, when necessary, takes enforcement action as it administers the PA Clean Streams Law and Chapter 102 – Erosion and Sediment Pollution Control – Program.

The District provides assistance to watershed organizations working within the county to remediate Abandoned Mine Discharges, reclaim former strip mines and coal refuse piles, control invasive plant species, and more.

Every year, the ACD hosts a Legislative Breakfast and a tour to update local elected officials about the District's work, accomplishments, and challenges. It also promotes partners' efforts to cleanup illegal dump sites, remove tires from waterways, and pickup roadside litter.

In 2016, ACD's AmeriCorps members developed the W.A.T.E.R. GeoTrail, a geo-caching network that will guide participants to natural resource restoration and watershed conservation projects.

In 2017, the ACD utilized Colcom Foundation and EQT Corporation funds to develop the H_2Oh! On the Go! Mobile Environmental Display, a traveling exhibit consisting of a trailer and compressed natural gas vehicle that will help educate the public and promote awareness of our limited natural resources. The Mobile Display offers ten interactive displays that focus on water education and conservation.

Key project partners include, but are not limited to:

- Armstrong County Commissioners
- Armstrong County Tourist Bureau
- Arrowhead Chapter of Trout Unlimited
- Crooked Creek Environmental Learning Center
- Kiski-Conemaugh Stream Team
- Kiskiminetas Watershed Association
- PA Department of Environmental Protection
- Roaring Run Watershed Association

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, ACD reported the following problems and issues within their watershed:

a. **Land Resources** – controlling invasive plant species, particularly tree-of-heaven and Japanese knotweed; educating landowners and supporting forest stewardship and best land use practices; adding streambank fencing and riparian buffers.
b. **Water Resources** – reclamation of coal refuse piles; sufficient, economical treatment technology for discharges with space limitations; funds to operate, maintain, or rehabilitate existing systems; limiting road salts' impact on waterways.
c. **Biological** – assessments of aquatic communities pre/post restoration projects; more frequent fish surveys on the Kiskiminetas River; survey of freshwater mussels in the Kiski and its tributaries.
d. **Recreational** – improving public access to the river with additional public boat launches from the Conemaugh Dam to the Kiski's mouth.
e. **Historic/Archeologic** – preservation and awareness of historical features like the PA Main Line Canal remnants along the Roaring Run Trail.
f. **Education** – engagement of youth in watershed projects.

In the future, the ACD plans to continue its programs and projects in the Kiski Basin.

The ACD maintains a website and a Facebook page to communicate its news and events. Its board of directors meet once a month, and the current board chairman is Spurgeon Shilling. Dave Rupert is the District Manager. Contact information may be found Appendix 2.

Back to Table of Contents

Aultman Watershed Association for Restoring the Environment
March 17, 2015
Chris Schaney, Carol Cummins, Ken Marshall, Beth Marshall, Brian Okey, Paul Calvetti

The Aultman Watershed Association for Restoring the Environment (AWARE) established in 2000 and is an active organization. At its inception, AWARE had approximately 50 members, and now it has about 35 dues-paying members and around 12 active volunteers. AWARE works in the 28 square-mile Aultmans Run watershed in Indiana County and restoring the water quality of Aultmans Run is its primary focus.

An initial watershed assessment was completed by Stream Restoration, Inc. (SRI) in 2003. In 2016, SRI and AWARE published the *Aultmans Run Watershed AMD Assessment & Implementation Plan*.

AWARE lists the publications of the aforementioned documents and the development of three mine drainage projects as its biggest accomplishments. The group has worked closely with SRI to complete these projects, which include the SR286 AMD Treatment System, a coal refuse reclamation and wetland construction along Reeds Run, and the removal of the Neal Run coal refuse pile. AWARE also completes an annual roadside litter cleanup.

Key project partners and funders include, but are not limited to:

- Amerikohl Mining, Inc.
- Cambria County Conservation District
- Indiana County Conservation District
- Indiana University of Pennsylvania
- Kiski-Conemaugh Stream Team
- PA Department of Environmental Protection
- PA Senior Environment Corps
- Robindale Energy Services
- Stream Restoration, Inc.

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, BCWA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – large coal refuse piles; stringent coal ash regulations make small projects not feasible; Japanese knotweed.
b. **Water Resources** – adequate sewage treatment needed.
c. **Biological** – more monitoring of aquatic communities.
d. **Recreational** – trail development.
e. **Historic/Archeologic** – secure public ownership to conserve an old lime kiln and gristmill.
f. **Education** – promote efforts to garner support and membership through social media and printed newsletters.

AWARE was asked what future projects the organization would like to undertake and any obstacles that impede these projects. The following is its list:

- Complete Phase II of the Neal Run Restoration Project, which includes the installation of vertical flow and settling ponds.
- Construct a treatment system to remediate four AMD in a tributary to Reeds Run known locally as Golden Pheasant Run.
- Construct a treatment system for the "Foot Run" discharges that flow into Aultmans Run in the lower end of the watershed.
- Design and build a vertical flow pond and wetland to treat the Coal Run discharge, though its proximity to a highwall, coal refuse piles, and an active mine may make this difficult.
- Develop the Aultmans Run Road Trail.
- Support regular flows from the Conemaugh Dam to help regulate stream levels and temperatures to support conservation efforts.

AWARE does not have paid staff, nor does it have a website or a Facebook page; however, the group meets once a month and welcomes new volunteers and members. The current organization president is Chris Schaney. Contact information can be found Appendix 2.

Back to Table of Contents

Blackleggs Creek Trout Nursery and Watershed Association
March 3, 2015
Art Grguric, Carl Durand

Blackleggs Creek Trout Nursery and Watershed Association (BCWA) established in 1985 and is an active organization. At its inception, BCWA had approximately 12 members and while it currently has over 300 dues-paying members, it only has a handful of active volunteers. BCWA works along Blackleggs Creek, which lies primarily within Indiana County. Its primary objective is to address mine water discharge, water quality improvement, and habitat improvement to reestablish trout and other fish populations, while it operates as a trout cooperative in partnership with the PA Fish and Boat Commission.

The first watershed-wide sampling occurred with the 1974 Scarlift Program, and data gathering and several subsequent assessments have occurred. The Western Pennsylvania Conservancy completed a comprehensive watershed study of Blackleggs Creek in 2005 and identified 52 discharges in the watershed. Of these discharges, six major ones were identified as high priority and have been the focus of BCWA and their state and local partners. Since its formation, BCWA has achieved many accomplishments:

- Secured donations from R&P Coal Company to build, maintain, and manage the Blackleggs Creek Trout Cooperative in partnership with the PA Fish and Boat Commission. Over 12,000 trout are released into Blackleggs Creek and neighboring watersheds a year.
- Construct and expand the Kolb AMD treatment system near the headwaters of Blackleggs Creek.
- Contract Skelly and Loy to design and oversee construction of the Big Run AMD Treatment Complex to treat five large, acidic mine discharges entering Big Run.
- Construct and maintain the Blackleggs Creek Memorial Park, which encompasses a portion of Blackleggs Creek.
- Host the Blackleggs Wild Game Breakfast on the opening day of trout season.
- Support a Trout in the Classroom project at Saltsburg Middle-High School.

Key project partners and funders include, but are not limited to:

- Foundation for Pennsylvania Watersheds
- Kiski-Conemaugh Stream Team
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- Rosebud Mining Company
- R&P Coal Company
- U.S. Office of Surface Mining Reclamation and Enforcement
- Western Pennsylvania Coalition for Abandoned Mine Drainage
- Western Pennsylvania Conservancy

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, BCWA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – poor timber practices; municipalities sometimes use inappropriate fill on roadways.
b. **Water Resources** – sewage treatment; operation and maintenance (O&M) of existing AMD treatment systems; securing funds for additional restoration work.
c. **Biological** – none noted.
d. **Recreational** – maintaining open space and public access to streams.
e. **Historic/Archeologic** – none noted.
f. **Education** – engaging youth in fish management and conservation efforts.

BCWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. Its list includes:

- Securing funds to improve and maintain existing AMD treatment systems.
- Educating the board of directors and members about the watershed, AMD treatment system needs, and the work accomplished to date so they may understand that BCWA is about more than raising trout.
- Attracting members and volunteers to help with the fish cooperative nursery.

Currently, BCWA does not have paid staff. A website and Facebook page do exist to solicit volunteers and promote the organization. BCWA meets once a month and welcomes new volunteers and members. The current BCWA president is Timothy Steffish and its Watershed Manager is Art Grguric. Contact information can be found Appendix 2.

Back to Table of Contents

Blacklick Creek Watershed Association
March 11, 2015
Janis Long, Dennis Remy, JoAnne Ferraro

The Blacklick Creek Watershed Association (BCWA) established in 1993 and is an active organization. At its inception, BCWA had approximately 50 members, including 29 lifetime members, and now it has about 35 dues-paying members and around 12 active volunteers. The BCWA works throughout the Blacklick Creek watershed in Cambria and Indiana Counties. Their primary areas of focus are Abandoned Mine Drainage treatment and watershed restoration.

In 2005, L. Robert Kimball and Associates published the *Blacklick Creek Watershed Assessment / Restoration Plan* while in 2007, the *Two Lick Creek Coldwater Conservation Plan* was published. A restoration plan for the South Branch of Blacklick Creek was published in 2000.

The BCWA lists its development of thirteen AMD treatment systems as its biggest accomplishments. The group is working with the Cambria County Conservation District to manage storm and floodwaters in the Nanty Glo area.

Key project partners and funders include, but are not limited to:

- Cambria County Conservation District
- Evergreen Conservancy
- Indiana County Conservation District
- Indiana University of Pennsylvania
- Ken Sink Trout Unlimited
- Kiski-Conemaugh Stream Team
- PA Department of Environmental Protection
- PA Senior Environment Corps
- Stream Restoration, Inc.

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, BCWA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – large coal refuse piles.
b. **Water Resources** – operation and maintenance of existing AMD treatment systems; need for an active treatment system to address the Wehrum, Red Mill, Three Sisters, and Vintondale abandoned mine discharges; more sewage treatment facilities.
c. **Biological** – more monitoring of aquatic communities in reclaimed and unassessed waters.
d. **Recreational** – the Homer City Generating Station limits access to Two Lick Creek expanding trail connections; designate Two Lick Creek and Blacklick Creek as Water Trails.
e. **Historic/Archeologic** – improve access to Buena Vista Furnace.
f. **Education** – attracting new members and volunteers.

BCWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. The following is its list:

- Complete macroinvertebrate surveys near the mouth of Laurel Run and on Blacklick Creek before its confluence with Two Lick Creek.
- Maintain and enhance existing AMD treatment systems.
- Support the active treatment of the Wehrum discharge.
- Work with Hedin Environmental to produce a Qualified Hydrologic Unit Plan for Yellow Creek and Two Lick Creek.
- Update the Blacklick Creek Watershed Assessment and Restoration Plan.

The BCWA does not have paid staff, but it does maintain a website and a Facebook page to share information. The group meets once a month and welcomes new volunteers and members. The current organization president is Janis Long. Contact information can be found Appendix 2.

Back to Table of Contents

Cambria County Conservation District
March 17, 2015
Robb Piper, Jackie Ritko

The Cambria County Conservation District (CCCD) was created in 1950 to educate and assist the public through programs, projects and leadership in the stewardship of natural resources to sustain and enhance the quality of life. It operates throughout Cambria County.

The CCCD has implemented hundreds of projects over the last six decades. More recent projects in the Kiski-Conemaugh River Basin include its service on the Little Conemaugh River Technical Advisory Committee, which is overseeing the development of an active AMD treatment system that would remediate several large discharges near Portage, and dirt and gravel road improvements throughout the watershed. It raised funds for and manages a Trailer and Tools for Conservation Project that is a 7' x 16' box trailer filled with gas-powered and hand tools that conservation organizations may borrow to implement projects, thereby saving thousands of dollars on equipment. In partnership with the PA Fish and Boat Commission, Cambria Somerset Authority, and others, the CCCD has installed fish habitat structures at Hinckston and Wilmore Reservoirs. The CCCD hosts numerous workshops to educate farmers, municipal officials, teachers, and more on a variety of conservation topics, and it assists with appliance and tire collections as part of its annual litter cleanups. It coordinates an annual Legislative Breakfast to bring together staff, board members, legislators, and partners to share and discuss information. Staff participate in the Envirothon and engage local schools in the PA Association of Conservation District's annual Poster Contest. The District manages the Disaster's Edge Environmental Education Center located at the 1889 Park in St. Michael. Hundreds of school students participate in education programs offered at the Edge every year. In 2017, the CCCD held its 45th annual tree and plant sale as a fundraiser and community resource. Also in 2017, the CCCD received a grant from the Community Foundation for the Alleghenies' 2016 Class of Youth Philanthropy Interns that allowed the District to purchase three paddleboards and 15 kayaks to introduce people to the sport and lead environmental interpretive programs.

Key project partners and funders include, but are not limited to:

- Cambria County Commissioners
- Coal Miners Memorial and Museum
- Foundation for Pennsylvania Watersheds
- PA Association of Conservation Districts
- PA Department of Environmental Protection
- Stonycreek Conemaugh River Improvement Project

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, CCCD reported the following problems and issues within their watershed:

a. **Land Resources** – reclamation of coal refuse piles; installation and maintenance of vegetated riparian buffers; engaging more farms to create grazing and erosion control plans and to implement BMPs; controlling invasive plant species.

b. **Water Resources** – treatment technologies and funds to remediate large AMD; separating stormwater from sewage collection systems; developing a Senior Environmental Corps in the county.
c. **Biological** – biological assessments of the mainstem and pre/post restoration projects.
d. **Recreational** – increasing trail connectivity; promoting outdoor recreation especially at Hinckston and Wilmore Reservoirs; developing a water trail and more public access along the Little Conemaugh River.
e. **Historic/Archeologic** – preservation of the Chapin Arch; documentation of oral stories and experiences of the senior generation.
f. **Education** – public support of environmentally-sound legislation; increase website and social media presence.

The CCCD said, in the future, it would like to see treatment of the Super 7 AMD and removal of coal refuse piles, consistent operation and maintenance of existing AMD treatment systems, streambank and fish habitat work particularly on the South Branch Blacklick Creek, and continuation of its responsibilities and services.

The CCCD has a staff of eight full-time and one part-time employees, including one AmeriCorps member. It hosts interns too. It has a website and Facebook page. The District Manager is John Dryzal. Contact information can be found Appendix 2.

Back to Table of Contents

Conemaugh Valley Conservancy, Inc.
April 3, 2017
Michael Burk, Melissa Reckner, Laura Hawkins

The Conemaugh Valley Conservancy (CVC) established in 1994 and is an active organization. It is unknown how many members CVC had at its inception, but, in 2017, it had 67 dues-paying members and over 160 active volunteers when factoring those involved with its Kiski-Conemaugh Stream Team and West Penn Trail Council. CVC works primarily within the 1,888 square-mile Kiski-Conemaugh River Basin, which encompasses portions of Armstrong, Cambria, Indiana, Somerset, and Westmoreland Counties. Its mission is to conserve and preserve natural, cultural, and historic resources and promote prudent land-use practices by restoring and enhancing land and water-based natural resources and engaging citizens in low-impact, outdoor recreation.

CVC notes the construction and maintenance of the 16-mile West Penn Trail, management of the Kiski-Conemaugh Stream Team, formation of the Stonycreek-Quemahoning Initiative, and organization of the annual Stony-Kiski-Conemaugh River Sojourn as its greatest accomplishments.

Key project partners and funders include, but are not limited to:

- Allegheny Ridge Corporation – Pittsburgh-to-Harrisburg Main Line Canal Greenway™
- Armstrong Conservation District
- Aultman Run Watershed for Restoring the Environment
- Benscreek Canoe Club
- Blackleggs Creek Watershed Association
- Blacklick Creek Watershed Association
- Blairsville Community Development Authority
- Cambria County Conservation and Recreation Authority
- Cambria County Conservation District
- Colcom Foundation
- Community Foundation for the Alleghenies
- Foundation for Pennsylvania Watersheds
- Kiskiminetas Watershed Association
- Lift Johnstown
- Indiana County Conservation District
- Indiana County Parks and Trails
- Paint Creek Regional Watershed Association
- Poconos Northeast Resource, Conservation and Development Council
- PA Department of Conservation and Natural Resources
- PA Department of Environmental Protection
- PA Department of Transportation
- Roaring Run Watershed Association
- Shade Creek Watershed Association
- Somerset Conservation District
- Stonycreek Conemaugh River Improvement Project

- Kitty Tuscano and Nature's Way Market
- Westmoreland Conservation District

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, CVC reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – large coal refuse piles still pollute the landscape and waterways.
b. **Water Resources** – funds and/or technology are still lacking for large AMD, particularly those within confined spaces; raw sewage and Combined Sewer Overflows are a concern, particularly for recreational users.
c. **Biological** – surveying large rivers and documenting and publicizing the effects of restoration efforts.
d. **Recreational** – completing trail connections; enhancing existing and adding new, public river access points; maintaining existing trails; engaging recreational enthusiasts as dues-paying members in conservation organizations.
e. **Historic/Archeologic** – none reported.
f. **Education** – informing the public of restoration work, accomplishments to date, and the fact that the rivers are useable.

CVC was asked what future projects the organization would like to undertake and any obstacles that impede these projects. It noted the following:

- Implementation of recommendations made in this document.
- Connecting the West Penn Trail with the Roaring Run Trail.
- Maintaining its existing programs and engaging its board in organizational development.

CVC has one full-time employee, who serves as the director of the CVC's Kiski-Conemaugh Stream Team, and four part-time employees. It maintains a website and Facebook page. The board of directors meet every other month and participate in committee meetings. It welcomes new volunteers and members. The current organization president is Michael Burk. Contact information can be found Appendix 2.

Back to Table of Contents

Evergreen Conservancy
April 28, 2015
Cindy Rogers, John Dudash, JoAnne Ferraro

The Evergreen Conservancy was created in 2004 as an incorporated 501(c)3 organization with the mission to advance the preservation, protection, and stewardship of natural, cultural, and historical resources in and around Indiana County through AMD treatment, water monitoring and testing, environmental education, and community support. At its inception, the Conservancy had about a dozen members, and now it has approximately 80 with around half serving as active volunteers. It is an active organization working within the Crooked Creek, Blackleggs Creek, Blacklick Creek, Little Mahoning Creek, Yellow Creek, and other watersheds.

The Conservancy coordinates semi-annual trail cleanups and provides volunteers for various community events and projects. It hosts an annual membership potluck picnic and conducts numerous environmental programs every year.

The Conservancy cites maintaining its county-wide water monitoring program, winning a Western Pennsylvania Environmental Award, establishing a telemetry water monitoring project in partnership with the Indiana County Emergency Management, operating the Tanoma AMD treatment system (outside the KC River Basin), creating an outdoor classroom and renewable energy demonstration project at Tanoma, and conducting environmental education programs as its biggest accomplishments. It also created an eco-tour with the goal of making citizens more aware of environmentally significant sites in the county in relation to best management practices in land use, water use, renewable energy, habitat and healthy living. The first phase of the eco-tour is a 20 site geocache trail and will later include other possibilities such as videos, self-guided tours or a bus tour to see more of the sites.

Key project partners and funders include, but are not limited to:

- Aultman Watershed Association for Restoring the Environment
- Blackleggs Creek Watershed Association
- Blacklick Creek Watershed Association
- Homer City Borough
- Indiana County Conservation District
- Indiana County Emergency Management
- Indiana University of Pennsylvania
- Ken Sink Trout Unlimited
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- PA Game Commission
- PA Senior Environment Corps
- U.S. Army Corps of Engineers
- Western Pennsylvania Conservancy
- Yellow Creek State Park

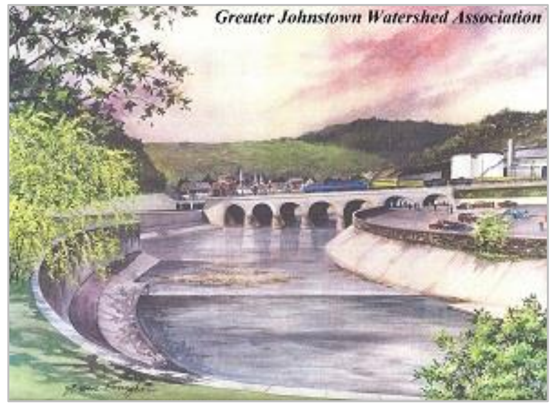
In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, the Conservancy reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – preservation of some areas.
b. **Water Resources** – untreated AMD.
c. **Biological** – delisting more stream segments from the impaired waters list.
d. **Recreational** – E. Coli bacteria in streams.
e. **Historic/Archeologic** – none noted.
f. **Education** – getting kids, our future stewards, outside to appreciate and learn about the environment.

In the future, the Conservancy hopes to find the time and people necessary to address other Abandoned Mine Discharges, sustain its water monitoring efforts by maintaining its volunteer base, and continue environmental education.

The Conservancy does not have paid staff, instead relying on its volunteer corps. It does have a website, Twitter account, and a Facebook page to communicate its news and events. The group meets every other month with committees meeting the opposite months. It welcomes new volunteers and members. The current organization president is Cindy Rogers. Contact information can be found Appendix 2.

Back to Table of Contents



Greater Johnstown Watershed Association
March 19, 2015
Mark Lazzari

The Greater Johnstown Watershed Association (GJWSA) was established in June 1982 and has had periods of activity over the years. Currently, the GJWSA is not an active organization. In 2015, the GJWSA had about 35 members, 10 of whom were active volunteers. GJWSA focused its work on the urban areas around the City of Johnstown. Its primary focus areas were improving water quality and educating residents about watershed topics. GJWSA often participated in a litter cleanup and beautification projects in downtown Johnstown.

GJWSA listed the feasibility study of the Incline Plane discharge for potential treatment and use in a city-wide geothermal project as its biggest accomplishment. GJWSA owns the land on which the Rock Tunnel AMD Treatment System lies. This system is removing hundreds of tons of iron from the South Fork Bens Creek a year. It also considered the feasibility of treating the Solomon Run AMD, but the costs would be high, space was limited, and it's not the worst discharge in the area.

Key project partners included, but were not limited to:

- Kiski-Conemaugh Stream Team
- Pennsylvania Environmental Council
- Somerset Conservation District

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, GJWSA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – none noted.
b. **Water Resources** – remediating the Incline Plane discharge; eliminating Combined Sewage Overflows.
c. **Biological** – none noted.
d. **Recreational** – none noted.
e. **Historic/Archeologic** – none noted.
f. **Education** – connecting inner city youth to the outdoors.

GJWSA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. A representative responded that treatment of the Incline Plane discharge is a priority, as is connecting inner city youth to the outdoors.

The GJWSA is currently defunct.

Back to Table of Contents

Indiana County Conservation District
March 11, 2015
Adam Cotchen, Brooke Esarey

The Blacklick Soil Conservation District was organized on July 2, 1934 and became official on September 7, 1939. It was the first conservation district to be organized in Pennsylvania and included several townships in the county. The Indiana County Conservation District (ICCD) was organized on a county-wide basis on March 7, 1947. In the Kiski-Conemaugh River Basin, the ICCD works within the Blacklick Creek and Conemaugh River watersheds. A board of directors oversee five employees, who work to enact the ICCD's mission of promoting sustainable agriculture and communities while protecting and wisely using the natural resources of Indiana County.

The ICCD helps to administer the National Pollutant Discharge and Elimination System (NPDES) and Chapter 105 Dam Safety and Encroachment Act's Water Obstruction and Encroachment programs in Indiana County by reviewing, issuing, and inspecting projects or complaints concerning erosion and sedimentation. It is also delegated to administer the Nutrient Management/Manure Management Program and to provide technical assistance to the agriculture community.

Utilizing the influx of funds from the Dirt, Gravel, and Low Volume Roads Program, the ICCD works with many municipalities to minimize roadway impacts on streams while decreasing long-term maintenance costs. Some roadways on which improvements have been made in the Kiski-Conemaugh River Basin include Old Mill Road in Buffington Township, Bells Mills Road in Burrell Township, Fabin Road in Center Township, and Ferrier Run Road in White Township.

Preserving farmland is another key issue for the ICCD, which administers the Indiana County Farmland Easement Program that allows conservation easements to be purchased in agricultural zones that aligns with the County's Comprehensive Land Use Plan.

The District coordinates numerous workshops to educate farmers, municipal officials, landowners, and more on a variety of conservation topics including the Conservation Reserve Enhancement Program (CREP). Staff lead students who participate in the Envirothon and Jr. Envirothon and provide additional environmental education in partnership with organizations like Yellow Creek State Park, Evergreen Conservancy, and the Kiski-Conemaugh Stream Team.

In partnership with local watershed organizations or conservancies, the ICCD hosts an AmeriCorps VISTA – Volunteer In Service to America, who is often a young, college graduate who literally gets his or her feet wet as they receive on-the-job training to implement stream assessments, monitoring projects, environmental education, community service, and more.

The ICCD also provides technical assistance to watershed associations and helps to maintain the Lucerne 3A AMD treatment system at the Waterworks Conservation Area along Two Lick Creek. In 2016, the ICCD completed a fish habitat improvement project in Two Lick Creek in partnership with the PA Department of Transportation's District 10. Log vanes, J-hooks, and stone deflectors protect the streambanks from erosion while providing fish habitat. Similar work was completed in 2013 along Brush Creek.

The ICCD is collaborating with the Indiana County Commissioners and the Indiana County Development Corporation to develop a new office building at the Windy Ridge Business and Technology Park in White Township. This building will utilize green technology and serve as an environmental education center, demonstration site for sustainable development, office space for ICCD, and a community room for similar organizations and partners.

Key project partners and funders include, but are not limited to:

- Aultman Watershed Association for Restoring the Environment
- Blackleggs Creek Watershed Association
- Blacklick Creek Watershed Association
- Evergreen Conservancy
- Indiana County Commissioners
- Indiana County Emergency Management
- Indiana County Parks and Trails
- Indiana University of Pennsylvania
- Ken Sink Trout Unlimited
- Kiski-Conemaugh Stream Team
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- PA Game Commission
- PA Senior Environment Corps
- U.S. Department of Agriculture's Natural Resources Conservation Service
- Western Pennsylvania Conservancy
- Yellow Creek State Park

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, the ICCD reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – preservation of farmland; control of invasive plant species; removal and reclamation of coal refuse piles.
b. **Water Resources** – sufficient funds and technology to treat large-volume AMD or maintain, operate, and rehabilitate existing AMD treatment systems.
c. **Biological** – delisting more stream segments from the impaired waters list.
d. **Recreational** – more public access to streams and rivers.
e. **Historic/Archeologic** – none noted.
f. **Education** – engaging youth in conservation work.

The ICCD maintains a website and a Facebook page and issues an annual report to share its news and events. Its board of directors meet once a month. The 2017 board chairman is Richard Stumpf and the District Manager is Adam Cotchen. Contact information may be found Appendix 2.

Back to Table of Contents

Kiskiminetas Watershed Association
Interview Date: Not recorded
Genay Hess

K.W.A.
Kiski Watershed Association

The Kiskiminetas Watershed Association (KWA) was established in 2001 and remains an active organization. The KWA has an active board and between seven to ten active volunteers. The KWA works in the Kiskiminetas River watershed, which includes the tributaries of Beaver Run, Pine Run, and Wolford Run. Its primary areas of focus include: water quality monitoring and pollution source identification; river and riparian corridor litter clean-up; trout stocking; and AMD treatment program development.

The KWA has not completed a comprehensive watershed assessment; however, since its inception, the KWA has accomplished several projects and goals. Most notably, it has addressed abandoned mine discharges (AMD) in the Kiskiminetas River watershed, including the design and construction of the Booker AMD treatment system near the village of Kiskimere in 2008 that removes 80% of the iron emanating from this discharge and the collection and diversion of two discharges near the mouth of Pine Run. The Pine Run project was completed in 2007 in partnership with DEP’s Bureau of Abandoned Mine Reclamation, resulting in the restoration of 2,000 feet of Pine Run, but these discharges remained untreated. In 2016, on behalf of the KWA, the Westmoreland Conservation District (WCD) submitted a Growing Greener grant application to complete a design-only phase for treatment of these two diverted discharges, but it was not awarded. The KWA had also partnered with Hedin Environmental, the PA DEP, and the Westmoreland Conservation District to investigate the chemistry, geology, and hydrology of the Tinsmill borehole on Wolford Run, a tributary of the Kiskiminetas River near Avonmore. The partnership had received a Growing Greener grant in 2009 to recommend improved treatment scenarios. The project included researching the borehole and the origins of the AMD.

For the last 15 years, the KWA has been stocking adult-sized rainbow and brown trout into the Kiskiminetas River to promote and highlight the resurgence of the river.

Key project partners and funders include, but are not limited to:

- Armstrong Conservation District
- Kiski Valley Water Pollution Control Authority
- Pennsylvania Department of Environmental Protection
- Westmoreland Conservation District
- Western Pennsylvania Conservancy's Dominion Watershed Mini Grants Program

In response to the *Kiski-Conemaugh River Basin Conservation Plan’s* Action Plan Recommendation categories, KWA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – erosion and sediment control; waste sites; wetland fills; and utility line construction.
b. **Water Resources** – AMD treatment; stormwater management; streambank erosion; proximity of Beaver Run Reservoir to Marcellus Shale drilling.

c. **Biological** – erosion and sedimentation from construction; AMD impacts; stormwater/ combined sewer systems.
d. **Recreational** – Steel City, formerly a raceway, is currently and will be in the future, the location of "Mud Races" and will likely cause sedimentation in the stream on-site.
e. **Historic/Archeologic** – continued AMD clean-up.
f. **Education** – municipalities are not aware of minimum size thresholds for permits and plans pertaining to Chapter 102 Erosion and Sediment Control; municipalities and property owners have an issue accepting problems caused by stormwater.

KWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. The project identified as the highest priority was expanding and improving the Pine Run AMD Treatment through a partnership with the Kiski Valley Water Pollution Control Authority (KVWPCA), whose board of directors gave approval to WCD to pursue funds to complete a design for treatment here.

KWA does not have paid staff. While it does not have a website, it does have a Facebook page. The KWA board of directors meet once a month and welcomes new volunteers and members. Genay Hess is the president of the KWA. Contact information may be found Appendix 2.

Back to Table of Contents

Little Conemaugh Watershed Association
March 17, 2015
Robb Piper, Jackie Ritko

The Little Conemaugh Watershed Association (LCWA) established in the year 2002 with the mission to promote stewardship within the watershed through environmental education, community outreach and stream restoration. The LCWA operated primarily through the Cambria County Conservation District as its watershed lies within Cambria County.

For several years, the LCWA coordinated an annual road-side litter cleanup along Route 869 between St. Michael and Beaverdale. It also worked with the Beaverdale Sportsmen's Club, Dunlo Rod and Gun Club, PA Fish and Boat Commission, and PA Department of Environmental Protection to add limestone to headwater streams. In 2003, it completed a Coldwater Conservation Plan for the South Fork Little Conemaugh River.

Key project partners included:

- Beaverdale Sportsmen's Club
- Cambria County Conservation District
- Dunlo Rod and Gun Club
- Forest Hills Middle School
- Highland Sewer and Water Authority
- Kiski-Conemaugh Stream Team
- Natural Biodiversity
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- Southern Alleghenies Conservancy
- Stonycreek Conemaugh River Improvement Project

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, LCWA reported the following problems and issues within their watershed:

a. **Land Resources** – need for more vegetated riparian buffers; preserving farms; controlling invasive plant species; reclamation of coal refuse piles.
b. **Water Resources** – treatment technologies and funds to remediate large AMD.
c. **Biological** – biological assessments of the mainstem.
d. **Recreational** – increasing trail connectivity; promoting outdoor recreation especially at Hinckston and Wilmore Reservoirs.
e. **Historic/Archeologic** – none noted.
f. **Education** – more engagement of youth in restoration work.

The LCWA said in the future it would like to see treatment of the Super 7 AMD and removal of coal refuse piles.

The LCWA is currently defunct.

Back to Table of Contents

Loyalhanna Watershed Association
March 26, 2015
Susan Huba

An idea generated by five individuals established the framework for the Loyalhanna Watershed Association (LWA), which formed in 1971 and is the longest serving watershed group in the Kiski-Conemaugh River Basin. At its inception, LWA had 15 members. In 1999, it had about 300. Now it has over 1500. It has a core volunteer base of 40 people, though up to 400 help with LWA's watershed-wide litter cleanup. LWA works within the Loyalhanna Creek watershed in Westmoreland County. Its primary areas of focus are water quality improvement and protection, land and riparian corridor conservation, environmental education for students of all ages and backgrounds, and community outreach. LWA emphasizes constructive methods to influence policies and actions by local government, industry, developers and others who may affect natural resources. Annual events include a Low Country Boil and an Art Auction.

In 2006, the *Loyalhanna Creek Watershed Assessment and Restoration Plan* was completed by LWA and an Advisory Committee. LWA has achieved several accomplishments of note including significant AMD remediation in the middle watershed and improved water quality in the headwaters due to stream restoration projects, sewage treatment, and land protection efforts. LWA is also moving towards self-sustainability. In June 2016, LWA opened their new office and education facility at the Watershed Farm in Ligonier. This project preserves 123-acres of open space that is currently supporting a cattle grazing operation and the Nimick Family Education Center that is available for meetings, education programs, and events.

Key project partners and funders include, but are not limited to:

- PA Department of Community Economic Development
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- Private Foundations
- U.S. Department of Agriculture's Natural Resource Conservation Service
- U.S. Office of Surface Mining and Reclamation
- Western PA Conservancy
- Westmoreland Conservation District

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, LWA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – establish zoning or ordinances that promote headwater protection.
b. **Water Resources** – continue addressing sewage treatment needs; tackle large AMD remediation projects, like the Crabtree Discharge.
c. **Biological** – none noted.
d. **Recreational** – Extension of the Loyalhanna Trail from Latrobe to New Alexandria is not feasible due to a necessary crossing of Loyalhanna Creek, proximity to ACOE abutments, and maintenance issues; however, a section linking New Alexandria to Keystone State Park is under development.

e. **Historic/Archeologic** – none noted.
f. **Education** – promote conservation.

LWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. LWA responded that it would like to continue moving downstream, following priority projects outlined in the 2006 assessment, and to explore the feasibility of completing some complicated projects. Additionally, it would like to explore the removal of the Kingston Dam on Loyalhanna Creek and complete fish habitat work on Fourmile Run.

At this time, LWA has three paid full-time staff. LWA has a website, a Facebook page, and an Instagram account for communicating upcoming projects and events. Its executive committee meets monthly and the full board meets quarterly. LWA welcomes new volunteers and members. The current organization president is William “Wink” Knowles and Susan Huba is LWA’s Executive Director. Contact information can be found Appendix 2.

Back to Table of Contents

Paint Creek Regional Watershed Association
March 19, 2015 and April 3, 2017
Melissa Reckner, Richard Wargo, Thomas Clark

The Paint Creek Regional Watershed Association (PCRWA) was established in 2000 and remains an active organization. At its inception, PCRWA had approximately 80 members, but membership waned. In 2014, the PCRWA worked to reinvigorate its membership and it currently has about 40 dues-paying members. A seven member board of directors help oversee the organization and there are about four active members. PCRWA focuses on the 38 square-mile Paint Creek watershed in Cambria and Somerset Counties. Its primary focus is water quality improvement.

The *Paint Creek Restoration Plan* was completed in 2005 and serves as a guiding document in this watershed's restoration. Around 2006, the PCRWA utilized a PA Department of Environmental Protection Growing Greener grant to explore the possibility of treating the Jandy Discharge, which emanates near the Mine 40 coal refuse piles along Little Paint Creek, but the state did not support the preferred treatment method and the project was tabled.

The PCRWA notes that its recent accomplishments have been completed in partnership with the Conemaugh Valley Conservancy's Kiski-Conemaugh Stream Team, which has secured funding and managed several projects in the watershed. In 2010, the Kiski-Conemaugh Stream Team and PCRWA began an annual litter cleanup along State Route 160, Berwick Road, and Little Paint Creek in Cambria County. Over the last seven years, over 600 tires and at least eight tons of trash have been removed from this watershed. From 2009 – 2012, three open limestone beds were constructed to treat AMD along Weaver Run, a headwater stream. Initial treatment allowed brook trout to be stocked in Weaver Run in 2014 for the first time in over 80 years; however, the largest treatment bed needs reworked to accommodate high flows. The Kiski-Conemaugh Stream Team published the *Little Paint Creek Coldwater Conservation Plan* in 2011, and in 2014, a study began to see if it is feasible to treat the Red Eyes discharges along Babcock Creek in the Gallitzin State Forest. In 2015, the PCRWA won a Western Pennsylvania Environmental Award.

Key project partners and funders include, but are not limited to:

- ♦ Berwind-White Coal Mining Company
- ♦ Kiski-Conemaugh Stream Team
- ♦ Mountain Laurel Trout Unlimited
- ♦ PA DEP Growing Greener
- ♦ Thomas Clark
- ♦ Windber Sportsmen's Association

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, PCRWA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – removal and reclamation of massive coal refuse piles; illegal dumping and littering.

b. **Water Resources** – adequate treatment of active and abandoned mine discharges and more sewage treatment throughout the watershed.
c. **Biological** – monitoring macroinvertebrates and fish populations in restored streams.
d. **Recreational** – development of the Scalp Level Trolley Trail along Paint Creek; improved access to Little Paint Creek and Paint Creek, which is a Class V whitewater stream.
e. **Historic/Archeologic** – none noted.
f. **Education** – engaging more members of the community.

PCRWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. Its list included:

- Rehabilitation of the Weaver Run D10 AMD treatment system, though funds and space may limit options.
- Primary treatment of the Red Eyes discharges, evaluation, and then construction of a more traditional AMD treatment system.
- Consistent and sufficient treatment of Cooney Mine discharges. For years, the DEP has been overseeing the establishment of a trust for all of Cooney's discharges.
- Securing funds to consistently apply limestone sand along the headwaters of Babcock Creek.
- Engaging more members and volunteers in watershed restoration efforts.

Currently, the PCRWA does not have paid staff, nor does it maintain any social media or web presence. PCRWA usually meets once a month and welcomes new volunteers and members. The current organization president is Richard Wargo. Contact information may be found Appendix 2.

Back to Table of Contents

PA Senior Environment Corps of Indiana County through Nature Abounds
April 28, 2015
John Dudash, JoAnne Ferraro

The Pennsylvania Senior Environment Corps (SEC) established in Indiana County in 1997 and is an active organization that engages volunteers over the age of 55 in its work. At its inception, this chapter of the SEC had approximately 20 members, and now it has about the same. Many of its volunteers are active with other groups to help form strong partnerships. SEC works throughout Indiana County and improving water quality is its primary focus.

SEC cites its ability to lend project volunteers to help get things done and the formation of the Evergreen Conservancy as its biggest accomplishments.

SEC volunteers work throughout the county to monitor bacteria levels, chemical parameters, and biological communities. They also participate in road-side litter cleanups and environmental education events for local schools.

Key project partners and funders include:

- Aultman Watershed Association for Restoring the Environment
- Blacklick Creek Watershed Association
- Indiana County Conservation District
- Indiana University of Pennsylvania
- Ken Sink Trout Unlimited
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- Nature Abounds

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, SEC reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – controlling invasive plants like Japanese knotweed; determining recommended plants for riparian buffer zones.
b. **Water Resources** – funds to operate and maintain existing AMD and to address remaining discharges and refuse piles; implementing stormwater management projects.
c. **Biological** – completing streambank stabilization projects; limiting sedimentation in streams.
d. **Recreational** – none noted.
e. **Historic/Archeologic** – acquire land and potentially restore the Graceton Coke Ovens that were covered during surface mining at the site along Route 119 near the Hoodlebug Trail.
f. **Education** – none noted.

SEC was asked what future projects the organization would like to undertake and any obstacles that impede these projects. Preserving old coke ovens, uploading water trail information into the

PA SEC database, and improving access to Two Lick Creek around the Homer City Generating Station were noted.

SEC is a program of Nature Abounds, which is based in Dubois, PA. SEC does not have paid staff, nor does it have a website or a Facebook page; however, the group meets once a month and welcomes new volunteers and members. The current organization president is John Dudash. Contact information can be found Appendix 2.

Roaring Run Watershed Association
March 3, 2015
B. J. Bellotti and John Linkes

The Roaring Run Watershed Association (RRWA) established in 1982 and is an active, 501(c)3 organization. At its inception, RRWA had approximately 12 members. It currently has over 300 dues-paying members and a corps of about 20 active volunteers. RRWA focuses its efforts on Roaring Run, a tributary of the Kiskiminetas River. It is a broad reaching organization whose mission is, "to conserve and protect the Roaring Run watershed and to provide recreational opportunities for all." Its primary areas of focus are water quality, recreation and trail development, outreach, and education. Several annual events showcase its trails and connect the greater community to Roaring Run. Annual races include the Earth Day Dash in April, the Roaring Run Rumble in May, and the Race to the Moon in July.

RRWA has achieved several accomplishments of note. With a guiding statement of "Conserve, Protect and Enjoy," RRWA has acquired 653 acres of land that is open for public use year-round. One of the RRWA's larger undertakings was to address the Trux AMD that emanated from a 175-acre refuse pile that was reclaimed with fly ash from a cogeneration plant that contributed alkaline surface runoff into Roaring Run. This was a 10-15 year project totaling 2,500,000 tons of refuse removed.

RRWA has developed several trails in Edmond, North Furnace, and Apollo, amounting to over 16 miles of hiking and mountain biking trails. The Roaring Run Trail is a rails-to-trails recreation trail that starts at Canal Road. It consists of four miles of crushed limestone and an additional mile that is a steeper, tar and chip surface ending in the Village of Edmond. The Rock Furnace Trail is a scenic, hilly 1.5-mile trail located near the confluence of Roaring Run and the Kiskiminetas River and boasts natural beauty, historic landmarks, and a 72-foot suspension bridge. In addition to trail development, twelve acres of trees were planted around Brownstown Furnace. A boat ramp constructed in 2011 provides public access to the Kiskiminetas River. The group also installed two rain gardens, each 750 square feet. The Roaring Run Fishing Derby was held annually for 20 years to showcase the recovering fish community.

Key project partners and funders include, but are not limited to:

- Acadia Foundation
- Allegheny Ridge Heritage Foundation
- Armstrong Conservation District
- Bridgestone Tires
- Heritage Foundation
- Laurel Foundation
- Keep Pennsylvania Beautiful
- Kiski-Conemaugh Stream Team
- PA Fish and Boat Commission
- Peoples Gas
- Rivers of Steel
- Sprout Fund

- ♦ Western Pennsylvania Conservancy

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, RRWA reported the following problems and issues within their watershed:

a. **Land Resources** – need and desire to increase habitat improvement, particularly with hemlock and ash species.
b. **Water Resources** – PennDOT, boroughs and the ACOE are addressing flood control issues within the Kiskiminetas River watershed.
c. **Biological** – actively spraying or otherwise controlling Ailanthus and knotweed but needs long-term management; possibly continue fish stocking and derby event.
d. **Recreational** – Increased connectivity to eliminate some trail fragmentation; improve trail, especially areas that experience seasonal wash-outs.
e. **Historic/Archeologic** – add interpretive signs at the old Furnace and other features on site.
f. **Education** – more education and engagement of youth in restoration and recreation work.

The RRWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. High on their priority list is increasing trail network connectivity, particularly by connecting with the Main Line Canal Greenway and Butler-Freeport Trail. The association would also like to someday complete the two mile "missing link" between the end of the Roaring Run Trail in Edmon and the West Penn Trail, a Conemaugh Valley Conservancy project, creating a trail system from Apollo to Ebensburg. Education and outreach is also an important future initiative for RRWA, with visions of a nature center to host workshops and programs, increased public education projects, and more interpretive signage. The RRWA would like to see a watershed study specific to Roaring Run conducted. The group would also like to increase its partnerships with universities and schools, particularly to assist with water quality and biological monitoring and other programs.

To-date, RRWA does not have paid staff. It has a website and a Facebook page. The board of directors meet every other month and welcome new volunteers and members. The current RRWA president is Ken Kaminski. Contact information may be found Appendix 2.

Back to Table of Contents

Shade Creek Watershed Association
March 18, 2015
Larry Hutchinson

The Shade Creek Watershed Association (SCWA) established in 1999 and worked closely with the Dark Shade Brownfields Project, which is now defunct. At its inception, SCWA had 35 members, but now it has about 10. It has a core volunteer group of about three people, though 12-15 helped with its limestone dosing days. SCWA works within the 34 square mile Shade Creek Watershed in Somerset County. Its primary areas of focus are improving the water quality of all streams within its watershed and educating youth, particularly through support of a Trout in the Classroom (TIC) project at Shade-Central City High School.

SCWA feels its biggest accomplishments have been bringing a brook trout population back to Shingle Run and overseeing the construction of the Reitz #1 AMD treatment system, which has removed a lot of acidity and iron from Laurel Run. In fact, trout raised through the aforementioned TIC project are now released here with students then participating in a series of Outdoor Discovery Workshops at this site. Saint Francis University's Environmental Engineering Department also completed some maintenance and design work at this system in 2017. SCWA has secured funds to construct an AMD treatment system in 2017-2018 on State Gamelands 228 near Gahagen.

Key project partners and funders include, but are not limited to:

- Kiski-Conemaugh Stream Team
- PA Department of Environmental Protection
- PA Game Commission
- Saint Francis University
- Somerset Conservation District
- Stonycreek Conemaugh River Improvement Project
- U.S. Office of Surface Mining Reclamation and Enforcement

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, SCWA reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – threat of windmills on forested ridgetops and along the Allegheny Front, which is a significant avian migratory path.
b. **Water Resources** – economically treating the Big 4 AMD that render Dark Shade Creek lifeless and contributes high acidity and metal loadings to Shade Creek.
c. **Biological** – securing personnel who can complete macroinvertebrate and fish surveys to document restoration effectiveness.
d. **Recreational** – creating parking and improving access to Shade Creek for kayakers.
e. **Historic/Archeologic** – increasing accessibility to the Shade Furnace.
f. **Education** – engaging youth in watershed work.

SCWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. SCWA responded that it would like to connect with the school to utilize students for watershed work, possibly create a business plan in partnership with the University of Pittsburgh at Johnstown, plan an Oktoberfest as a fundraiser, continue its presence at Heritage Days, and see that the Big 4 AMD are treated.

At this time, SCWA has no paid staff. SCWA has a website and a Facebook page. Its board of directors meet monthly. As with other organizations, SCWA welcomes new volunteers and members. The current organization president is Larry Hutchinson. Contact information may be found Appendix 2.

Back to Table of Contents

Somerset Conservation District
March 12, 2015
Len Lichvar, Greg Shustrick

The Somerset Conservation District (SCD) was established in 1957. In the Kiski-Conemaugh River Basin, SCD works within the Stonycreek River watershed. A board of directors approve policies and budgets that guide seven employees, whose primary areas of focus are watershed restoration, environmental education, agricultural technical assistance, erosion and sedimentation control, dirt and gravel road improvements, farmland preservation, and administrative support. The SCD is also home to the PA Association of Conservation District's Technical Assistance Group (TAG) that consists of two technicians and a professional engineer.

In 2007, the SCD completed a reassessment of the Stonycreek River watershed, which provided a lot of comparable data for this Management Unit of the Kiski-Conemaugh River Basin. The *Stonycreek River Watershed Reassessment*, much like this document, sought to gauge the effectiveness of restoration efforts and highlight remaining needs. The work also provided data for the *Somerset County Benthic Entomological Survey*, which can be used as a baseline for additional monitoring as it used quantitative data collection and evaluation methods that could be easily replicated. Both documents may be downloaded from the SCD's website.

Because of action taken by the District Board in the 1990s, the SCD is legally bound to maintain several AMD treatment systems in the Stonycreek River watershed and is currently rehabilitating four of the Oven Run AMD treatment systems. In 2014, the SCD oversaw a major reworking of the Rock Tunnel AMD treatment system along the South Fork Bens Creek to remove more iron precipitate from this alkaline discharge.

In 2014, the SCD published the *North Fork of Bens Creek Coldwater Conservation Plan*. In its headwaters, the North Fork Bens Creek is classified by the PA DEP as an Exceptional Value stream, while its lower reaches are classed as a High-Quality Coldwater Fishery. This document identified sedimentation, nutrient loading, thermal pollution, and the loss of riparian canopy cover as the greatest threats to this exceptional watershed. SCD works with the Mountain Laurel chapter of Trout Unlimited to enhance fish habitat in Bens Creek.

In the Quemahoning Creek sub-watershed, empowered in part by the Quemahoning Trust Fund, the SCD is working to improve fish habitat in the Quemahoning Creek tailwater fishery and to enhance the Jenner AMD treatment system. It also worked to mandate the conservation release from the Quemahoning Reservoir, and, in 2006, initiated the on-going Quemahoning Reservoir Fish Habitat project.

In 2010, under the guidance of its former Aquatic Biologist, Eric Null, the SCD developed the Water Quality Monitoring Joint Venture, which continues today and has expanded across the state. This water monitoring program uses in-stream data loggers to continuously monitor a stream's water level, temperature and conductivity (see page 105). The SCD also has a groundwater monitoring program in partnership with the Somerset County Drought Task Force and USGS.

As part of its efforts to educate about and implement stormwater management practices, the SCD has led rain barrel workshops and helped build a rain garden at its office.

Key project partners include, but are not limited to:

- Cambria Somerset Authority
- County watershed associations
- Foundation for PA Watersheds
- Jenner Rod and Gun Club
- Kiski-Conemaugh Stream Team
- Mountain Laurel Trout Unlimited
- PA Association of Conservation Districts
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- PA Game Commission
- Somerset County Conservancy
- Somerset County Farm Bureau
- Somerset County Sportsmen's League
- Stonycreek Conemaugh River Improvement Project
- U.S. Department of Agriculture's Natural Resource Conservation Service
- U.S. Office of Surface Mining Reclamation and Enforcement

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, SCD reported the following problems and issues within their watershed:

a. **Land Resources** – maintaining viewsheds and riparian buffers; controlling invasive plant species.
b. **Water Resources** – additional AMD treatment systems needed; funds to sustain and rehabilitate existing systems.
c. **Biological** – assessments, particularly pre/post restoration projects.
d. **Recreational** – improving public access to fisheries.
e. **Historic/Archeologic** – none noted.
f. **Education** – promote economic value of natural resource conservation and preservation; continue sponsoring the Somerset County Envirothon and coordinating other youth and adult environmental education programs.

The SCD lists the following as future projects: ongoing operation and maintenance of AMD treatment systems; fish habitat work in select streams; removal of a small dam on the South Fork Bens Creek; treatment of the Big 4 AMD in Central City; expansion of its dirt and gravel roads program; decreasing erosion and sedimentation; implementing agricultural technical assistance programs; abating AMD on Lamberts Run; installing riparian buffers and streambank fencing; continuing watershed assessments; and securing more viewshed easements and public access.

The SCD maintains a website and a Facebook page and publishes an annual report to convey news and information about its projects. Its board of directors meet once a month, and the 2017 board chairman is Jack Tressler. Len Lichvar is the District Manager. Contact information may be found Appendix 2.

Back to Table of Contents

Somerset County Conservancy
March 12, 2015
Jim Moses, Lester Brunell, Kathryn Randall

Somerset County Conservancy (SCC) established in 1994 and is an active organization. At its inception, SCC had approximately 15 members and now it has approximately 185 active members, as well as an engaged volunteer base. In the Kiski-Conemaugh River Basin, SCC works within the Stonycreek River watershed. Its primary areas of focus are land conservation, water quality and advocacy, offering, "stewardship, education, and advice for the preservation and enhancement of natural, scenic, agricultural, historic, and open space land." SCC produces a semi-annual newsletter, organizes an annual member's picnic at Kimberly Run, and hosts an annual meeting and election banquet.

SCC did not conduct a comprehensive watershed study of the Stonycreek River; however, it was involved in the creation of *The Southern Alleghenies Greenways and Open Space Network Plan*. This plan was completed in May 2007, identifying Preservation Corridors and Recreational Corridors. SCC has achieved several accomplishments of note including land acquisition along Oven Run. To date, 437 acres of land have been acquired for land and water restoration and conservation. A total of five passive abandoned mine drainage (AMD) treatment systems have been constructed by the Somerset County Conservancy:

1. Boswell (Mallards Rest)
2. Lamberts Run
3. Oven Run B (Mount View)
4. Oven Run D
5. Oven Run F

Operation and maintenance for most of these systems primarily falls on the Somerset Conservation District, while the Kiski-Conemaugh Stream Team completes quarterly water sampling.

The SCC oversaw the installation of an interpretive trail along the Oven Run D treatment system, which schools and the general public can tour at no cost. It has also been instrumental in the creation of the Somerset Lake Action Committee, which is developing the area around Somerset Lake as the county's first park: Somerset Lake Nature Park. As of 2017, a 1.3 mile trail has been marked and cleared around Somerset Lake and there are plans to develop restrooms and trails with interpretive signs around the Mallards Rest treatment system.

In addition to water quality improvement, land conservation and biological monitoring are important to the SCC, which hopes to identify and protect threatened and endangered species and designate vernal pools as important habitat areas.

Key project partners include, but are not limited to:

- Friends of Flight 93
- Kiski-Conemaugh Stream Team
- PA Department of Environmental Protection

- PA Fish and Boat Commission
- PA Game Commission
- Somerset Conservation District
- Stonycreek Conemaugh River Improvement Project
- Wells Creek Watershed Association

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, SCC reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – need a proactive, not a reactive approach in determining problem areas and solutions.
b. **Water Resources** – sufficient funds to operate, maintain, and rehabilitate existing systems; treatment of remaining AMD; promotion of vernal pool delineation.
c. **Biological** – promote and support endangered species research, including the Appalachian Bat Count, and protection of these species.
d. **Recreational** – funds to develop and maintain the Somerset Lake trails and existing trails; support proposed trails such as the September 11th National Memorial Trail.
e. **Historic/Archeologic** – promote national parks and trails.
f. **Education** – increase educational activities at Oven Run AMD treatment systems; develop student scholarships.

The SCC specifically noted developing a student scholarship fund for local graduating seniors going into environmental fields and increasing education at its treatment systems as priorities, in addition to continuing its current works. SCC would also like to focus on rehabilitating the headwaters of the Stonycreek River through additional passive AMD systems.

At this time, the SCC does not have paid staff, although a summer intern is shared with the Somerset Conservation District. The SCC maintains a website and a Facebook page and publishes a newsletter for sharing information. SCC meets once a month and welcomes new volunteers and members. The current organization president is James Moses. Contact information can be found Appendix 2.

Back to Table of Contents

Stonycreek-Conemaugh River Improvement Project
March 12, 2015
Len Lichvar, Melissa Reckner

The Stonycreek-Conemaugh River Improvement Project (SCRIP) established in 1991 at the request of the late U.S. Congressman John Murtha in cooperation with the Cambria County and Somerset Conservation Districts. SCRIP was formed to address water quality concerns in the Upper Conemaugh River Basin, so it focuses on the watersheds of the Stonycreek and Little Conemaugh Rivers. It is unknown how many members SCRIP had at its inception, but it currently has 62 dues-paying members and an active board of directors. SCRIP is primarily a coalition organization, bringing together watershed associations, nonprofit organizations, local agencies, municipalities, private businesses, sportsmen and engaged citizens to focus on improving the Stonycreek and Little Conemaugh Rivers. Its primary areas of focus are improving water quality through abandoned mine treatment (AMD), restoring aquatic habitat and stream structure, and increasing recreation opportunities and environmental education. SCRIP serves as a resource for assistance completing projects and making use of the rivers.

A detailed timeline of projects and accomplishments by SCRIP and its partners may be downloaded from SCRIP's website.

Key project partners include, but are not limited to:

- Cambria County Conservation District
- Cambria Somerset Authority
- Community Foundation for the Alleghenies
- Kiski-Conemaugh Stream Team
- Mountain Laurel Trout Unlimited
- Paint Creek Regional Watershed Association
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- Saint Francis University
- Shade Creek Watershed Association
- Somerset Conservation District
- Somerset County Conservancy
- Southern Alleghenies Conservancy
- Wells Creek Watershed Association

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, SCRIP reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – additional forested riparian buffers; controlling and eradicating invasive plant species like Japanese knotweed.
b. **Water Resources** – sufficient funds to ensure continued maintenance and operation of existing AMD treatment systems; sedimentation; thermal pollution from impoundments.

c. **Biological** – assessments pre/post restoration projects.
d. **Recreational** – public access to rivers and streams.
e. **Historic/Archeologic** – none reported.
f. **Education** – public knowledge of restoration accomplishments; engaging legislators in support of conservation-friendly legislation.

Moving forward, SCRIP would like to continue focusing its work on watershed restoration, particularly in the headwaters as that will benefit water quality downstream. SCRIP will remain engaged in community events and continue collaborating with the PA Fish and Boat Commission to host either an Intro to Fishing or an Intro to Kayaking course each summer.

SCRIP does not have paid staff, but it maintains a website and a Facebook page and publishes a quarterly newsletter. SCRIP is overseen by a 16-member board of directors and regular meetings occur every other month that are also attended by partner organizations. SCRIP welcomes new volunteers and members. The current organization chairman is Len Lichvar. Contact information can be found Appendix 2.

Back to Table of Contents

Trout Run Watershed Association
April 1, 2015
Dennis Beck

Trout Run Watershed Association (TRWA) established in the year 2000 and is an active organization. At its inception, TRWA had approximately 10 members, and it currently has approximately 15 active members and 20-25 active volunteers. TRWA works along Trout Run in the Little Conemaugh River watershed. Its primary area of focus is to improve water quality and habitat within Trout Run in order to restore trout and trout fishing to Trout Run. Annual and recent events include:

- Earth Day Events: working with 300+ school students for stream and road-side cleanups and trout stocking; students also help collect water samples.
- Recurring Environmental Education: working with staff and students from Portage Schools, St. Francis University and Mount Aloysius College.

CTE Design Group completed a comprehensive watershed study of Trout Run in 2000. Since then, following the completion of the *Kiski-Conemaugh River Basin Conservation Plan*, TRWA has achieved several accomplishments of note. An important achievement was becoming incorporated as a 501(c)3 nonprofit organization in 2008, enabling the organization to apply for federal, state and private funding to achieve projects and initiatives. TRWA installed the Puritan AMD treatment system in 2012 to treat a major discharge into Trout Run and will be expanding the system courtesy a Growing Greener grant secured by TRWA, Stream Restoration, Inc., and Saint Francis University. Also, TRWA has provided environmental education and outreach experiences for primary to university-aged school students since the organization was founded.

Key project partners and funders include, but are not limited to:

- Mount Aloysius College’s Microbiology Department
- PA Department of Environmental Protection
- Portage Ambulance Association
- Portage Area School District
- Portage Borough
- Portage Fire Company
- Portage Township
- Portage Water Authority
- Pro Disposal
- Saint Francis University’s Environmental Engineering Department
- Stream Restoration, Inc.
- Traditional Anglers of PA

In response to the *Kiski-Conemaugh River Basin Conservation Plan’s* Action Plan Recommendation categories, TRWA reported the following problems and issues within their watershed:

a. **Land Resources** – removal of coal refuse piles.
b. **Water Resources** – continued water quality improvement.

c. **Biological** – none noted.
d. **Recreational** – none noted.
e. **Historic/Archeologic** – none noted.
f. **Education** – continued environmental education and outreach to engage youth.

TRWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. The project of highest priority would be a bypass treatment system and limestone dosing on small seeps in the headwaters of Trout Run.

TRWA does not have paid staff, nor does it have a website or a Facebook page. TRWA does not regularly meet, but welcomes new volunteers and members. The current organization president is Dennis Beck. Contact information can be found Appendix 2.

Back to Table of Contents

Wells Creek Watershed Association
March 12, 2015
Jeff Shaffer and John Pile

Wells Creek Watershed Association (WCWA) established in 1999 and is an active organization. At its inception, WCWA had four core members and currently it has approximately over 200 dues-paying members. Active volunteers include the nine board members and up to 30 members depending on the event and the organization's needs. WCWA works within 18 square miles of Wells Creek, a nine-mile-long tributary of the Stonycreek River in Somerset County. The primary mission of WCWA is to improve the water quality and habitat of Wells Creek and downstream waterways. WCWA hosts several annual events, including a burger and corn roast picnic meeting along the Stonycreek. The group organizes a member work day followed by an Annual General Membership meeting, typically the third Saturday in September. A Super Bowl Grilled Chicken fundraiser has become both a successful fundraiser and community event.

A comprehensive watershed study of Wells Creek has not been completed, but the WCWA has achieved several accomplishments of note. WCWA's first major project was to construct weirs for water quality monitoring, followed by an AMD passive treatment system at Pleasant Hill, called Onstead, which is a vertical flow pond that treats mine water from the Big 7 mine. Through Growing Greener funds, WCWA also constructed two AMD passive treatment systems near Adams Station, PA, called Adams #6 and Adams #7. Treatment systems received major maintenance in 2014 and are flushed at least every quarter. Members and volunteers assist the organization with quarterly water quality sampling, analysis, operations, maintenance and fish stocking. Trout are stocked annually. Approximately 500 trout were released the first year, 2003. In 2015, 2000 trout were released into Wells Creek. WCWA has joined with Kimberly Run Natural Area, public land owned by the Somerset County Conservancy, to promote natural resource conservation. Most recently, Wells Creek Watershed Association worked with Listie Volunteer Fire Company on the Beeghly site coal refuse removal, bank stabilization and parking lot. Work has also included bank stabilization and a picnic area at the Steinkirchner site.

The WCWA has collaborated with over 50 partners since its inception in 1999. More recent partners include:

- B & B Contractors
- Butterbaugh Family
- Chuckwagon Restaurant
- C.W. Handyman
- Earthtech, Inc.
- Fitzie's Pub
- Friedens Lutheran Church
- Friedens VFC
- Geochemical Testing
- Highway Marking
- Jenner Rod and Gun Club
- Land of Lakes Corp.
- Listie Economy Store

- Listie VFC
- Pat McClemens
- Adam and Kayla Miller
- Moore Brothers
- Mostoller Carwash
- Harvey Mull
- James Onstead
- PA DEP
- Pepsi Cola Corp.
- Salisbury Sportmen (Don Anderson)
- Scott Steinkirchner
- Skeria Family
- Somerset Fraternal Order of Eagles
- Somerset Township Supervisors
- Stoy Excavating
- Stoystown Lions Club
- W.W. Friedline

Key funders and financial contributors include the following:

- Foundation for Pennsylvania Watersheds
- Office of Surface Mining Reclamation and Enforcement
- PA DEP's Growing Greener

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, WCWA reported the following problems and issues within their watershed as outlined:

a. **Land Resources** – stream and bank cleanup; address unproductive agricultural land issues, such as erosion, sediment and invasive species.
b. **Water Resources** – continue to monitor and improve water quality.
c. **Biological** – continue monitoring fish populations and community structure.
d. **Recreational** – none noted.
e. **Historic/Archeologic** – none noted.
f. **Education** – sufficient database to make water quality data available and understandable to the public.

WCWA was asked what future projects the organization would like to undertake and any obstacles that impede these projects. Among the highest projects on WCWA's wish list is remediation of the Beeghly mine discharge, which is located upstream of Listie. The second priority project is treatment of the Ritter Mine Discharges near the village of Coleman. Future needs also include stream bank stabilization, erosion and sediment control, stream cleanup and curbing public littering and dumping.

To-date, WCWA does not have paid staff. A website and Facebook page do not exist. WCWA does regularly meet and welcomes new volunteers and members. The current organization president is Jeff Shaffer. Contact information can be found Appendix 2.

Back to Table of Contents

Westmoreland Conservation District
March 3, 2015
Rob Cronauer, Chelsea Walker

The Westmoreland Conservation District (WCD) was established in 1949 to address farm pollution around Beaver Run. Its priorities have expanded considerably since then. In the Kiski-Conemaugh River Basin, the WCD works within the Conemaugh, Kiskiminetas, and Loyalhanna watersheds. A board of directors oversee 18 employees, whose primary areas of focus are watershed restoration, environmental education, agricultural technical assistance, erosion and sedimentation control, dirt and gravel road improvements, farmland preservation, forest stewardship, and administrative support. In 2012, the WCD won a Western Pennsylvania Environmental Award.

Some recent WCD projects in the Kiski-Conemaugh River Basin include a significant increase in the number of dirt, gravel, and low volume roads that the District has been able to improve due to a huge increase of funds from the State Conservation Commission-administered Dirt, Gravel, and Low Volume Road Program. For example, since 2014, the District has addressed issues along Fire Tower Road in Derry, private roads around the Beaver Run Reservoir, Coal Hollow Road in Bell Township; Lasko Road and Weimer Nursery Road in Loyalhanna Township; and other roadways. In 2009, the District helped to restore surface flow and daylight Stoney Run, a stream on the Lydick Farm, while in 2010, it led a project to remove a dam in West Leechburg. It has implemented many Best Management Practices and developed Nutrient Management Plans on several farms. The WCD is seeking funds for an AMD remediation project that would treat two discharges along Pine Run. It also coordinates several workshops to educate farmers, engineers, municipal officials, and more on a variety of conservation topics.

The WCD recognizes collaboration is key to getting projects done and focuses on building strong partnerships. Key project partners and funders include, but are not limited to:

- Kiskiminetas Watershed Association
- Loyalhanna Watershed Association
- McKenna Foundation
- PA Association of Conservation Districts
- PA Department of Environmental Protection
- PA Fish and Boat Commission
- Richard King Mellon Foundation
- Western Pennsylvania Coalition for Abandoned Mine Reclamation
- Westmoreland County Commissioners

In response to the *Kiski-Conemaugh River Basin Conservation Plan's* Action Plan Recommendation categories, WCD reported the following problems and issues within their watershed as outlined below:

a. **Land Resources** – more vegetative stream buffers needed; improved river public access; coal refuse pile removal and reclamation; halt forest fragmentation.
b. **Water Resources** – AMD remains; stormwater controls; lessening road salts impact on streams; development of shale gas wells, particularly near drinking water sources.

c. **Biological** – additional surveys of sensitive or endangered species like the Hellbender and Indiana bat.
d. **Recreational** – continued development and maintenance of area heritage trails; utilize Beaver Run Reservoir as a public recreation destination.
e. **Historic/Archeologic** – preserve Compass Inn.
f. **Education** – none noted.

Besides continuing its current works, the WCD specifically noted the following as future projects: implementing more stormwater best management practices; treating the Crabtree Abandoned Mine Discharge in the Loyalhanna Creek watershed; and addressing the Pine Run AMD in the Kiskiminetas River watershed.

The WCD maintains a website and a Facebook page to communicate its news and events. Its board of directors meet once a month and the current board president is Ron Rohall. Greg Phillips is the District Manager. Contact information can be found Appendix 2.

Back to Table of Contents

Public Comment

Conemaugh Valley Conservancy staff presented preliminary findings of this document at several meetings in 2016 and 2017 to garner public comment. More than 250 people attended these meetings. Oral and written comments were welcomed. The following is a list of these presentations and written comments received.

Conemaugh Valley Conservancy's Annual Meeting
May 11, 2016
Pine Ridge Lodge, Blairsville, PA

1. Are any AMD treatment sites planned for the Josephine area of the Blacklick Creek?
2. I remember going to the Muddy Run area of Blacklick Creek 20 years ago and the river was stained with iron oxide and dead. Last time I was there, I saw a whole school of perch.
3. Do you have an involvement in developing TMDLs for the Conemaugh? I am interested in any info regarding data and WLA for MS4 permittees within the watershed as I manage the MS4 permit for Derry Boro / McGee Run. Thanks for all your work.
4. Thank you for <u>all</u> the excellent work you and your team do!
5. Great to see the amount of work done and the number of species than have returned. The river is alive again.
6. Excellent work, Melissa! Your presentation was extremely interesting, and I feel much more informed because of it. Thank you. Great job! Your work is inspiring to me!
7. Do you monitor the sex of the fish as a measure of the effects of endocrine disruptors in the water? Awesome job and very extensive research.
8. Very informative presentation on what is happening to our water quality of the Kiski-Conemaugh watershed. This makes me proud to be a supporter of the Stream Team.
9. Would like more info on sedimentation on Stonycreek.
10. Can we organize/communicate with DEP to get baseline readings/macroinvertebrates study below Shade Creek at low flow (or whatever DEP requires)?
11. We're seeing bald eagles, herons, and beaver every time we paddle now.
12. "One-two punch" of Shade Creek – good example. Good graphs – easy to follow, understand. Very professionally done.
13. River life returning. Seeing more birds of prey, ospreys, and bald eagles.
14. Good to see streams improving. We need to get citizens informed.
15. Siltation is a big problem.
16. What is in the discharge into St. Clair Run (or Grey Run) along St. Clair Road in Johnstown? It looks really bad.
17. Nice job, Missy!
18. Great presentation. Is AMD pre-treatment decreasing? Are stormwater management plans helping the local rivers; especially in Johnstown? And we can see improvement by noting more osprey, eagles, herons, and other river associated creatures.
19. Is there data that shows the impacts in rivers downstream from the Kiski-Conemaugh that shows testimony to our efforts in the headwaters?
20. Really nice maps.

Stony-Kiski-Conemaugh River Sojourn
June 3, 2016
Conemaugh River Lake Dam, Saltsburg, PA

1. Keep up good work. Rivers coming back. Saw bald eagle on Conemaugh River one mile upstream of Robinson. Don't let river quality return to past ills.
2. You have done a great job. Keep up the good work!! I never thought I could fish in the Conemaugh but now I can. As growing up around the river, I never get orange from the river now.
3. I loved seeing the common merganser and great blue herons on the Conemaugh River. It is a good sign of the river's improved health.
4. The Japanese knotweed is worrisome to me. I would like to see restoration work on the riparian zone.
5. How about some signage explaining the orange spots, what is being done, $ invested, future projects…send donations to…sign kiosks at out-ins explaining projects and investments.
6. Nice to see cleaner water to allow increase in water rec. Would like to see better put in / take areas for kayak/canoe and markings for these areas.
7. I lived on the North Branch Blacklick. It used to be orange juice, now it is an approved trout stream. Keep up the good work!

Pennsylvania Abandoned Mine Reclamation Conference
June 23, 2016
Indiana University of Pennsylvania, Indiana, PA

Cambria County Conservation and Recreation Authority Board Meeting
October 21, 2016
Young Peoples Community Center, Ebensburg, PA

1. TMDL standards for treating are not economically feasible.
2. Riparian buffers are important. Look at the fires in the west. Trees provide thermal protection for trout.
3. The Ghost Town Trail was selected as one of the Top 9 Hiking Trails in the U.S. in 2016.

Benscreek Canoe Club's Christmas Party
December 3, 2016
The Crow's Nest, Tire Hill, PA

Ken Sink Trout Unlimited Meeting
January 8, 2017
Indiana VFW Country Club, Indiana, PA

1. Good, informative presentation.
2. I fished the Conemaugh River near Blairsville last summer (2016) and was pleased to catch 11 nice smallmouth bass. Looking forward to exploring more stretches. Thanks.
3. Very informative. Professional.
4. Now that our waterways are much improved, why not provide some decent canoe/kayak access points for the public to enjoy your great work. Super presentation! Thanks for coming.

Pennsylvania Department of Conservation and Natural Resources' Brown Bag Luncheon
January 18, 2017
Harrisburg, PA

Blackleggs Creek Watershed Association's Annual Meeting
March 12, 2017
Saltsburg Sportsmen's Club, Saltsburg, PA

Back to Table of Contents

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Back to Table of Contents

Appendix

Back to Table of Contents

Appendix 1

As described on pages 46 and 47, the Foundation for Pennsylvania Watersheds (FPW) was chosen as the benefactor of $3.5 million as a result of a 2011 settlement reached with Gen-On, the owner of a coal-fired generating station that was sued for polluting the Conemaugh River. The following is a list of grants awarded from FPW (FPW, Diehl).

Grantee:	American Rivers
Grantee City, State:	Washington, DC
Project Title:	Dam Removal Study
Application Submitted:	October 2011
Funded Amount:	$40,000
Total Project Cost:	$95,500
Project Completed:	April 2012
Accomplishments:	Evaluation of potential projects and outreach for selection of dam removal and river restoration projects.

Grantee:	Armstrong Conservation District
Grantee City, State:	Kittanning, PA
Project Title:	ARRI Mined Land Reforestation Project
Application Submitted:	October 2011
Funded Amount:	$23,000
Total Project Cost:	$45,000
Project Completed:	2014
Accomplishments:	Planted trees on ~12 acres of former strip mine.

Grantee:	Audubon PA
Grantee City, State:	Audubon, PA
Project Title:	Watershed Assessment
Application Submitted:	October 2011
Funded Amount:	$30,000
Total Project Cost:	$72,000
Project Completed:	April 2012
Accomplishments:	Examine and assess distribution of Louisiana waterthrush, golden-winged warbler, and cerulean warbler (bio-indicator species); ID projects within Kittanning Run; develop BMPs for landowners; create landowner contact and registry program.

Grantee:	Blackleggs Creek Watershed Association
Grantee City, State:	Clarksburg, PA
Project Title:	Big Run #3
Application Submitted:	March 2011
Funded Amount:	$55,000
Total Project Cost:	$486,176
Project Completed:	September 2012
Accomplishments:	Construction of Big Run Phase IV (#3) Restoration System.

Grantee:	Blackleggs Creek Watershed Association
Grantee City, State:	Clarksburg, PA
Project Title:	Big Run #3
Application Submitted:	January 2012
Funded Amount:	$50,000
Total Project Cost:	$317,000
Project Completed:	Ongoing
Accomplishments:	Modify the Whisky Run #9 AMD treatment system.

Grantee:	Cambria County Conservation District
Grantee City, State:	Ebensburg, PA
Project Title:	N. Branch Little Conemaugh Access and Stabilization
Application Submitted:	August 2012
Funded Amount:	$58,000
Total Project Cost:	$76,038
Project Completed:	2014
Accomplishments:	Restore six stream sites (1,389 feet) within the North Branch Little Conemaugh Watershed.

Grantee:	Conemaugh Valley Conservancy, Inc.
Grantee City, State:	Johnstown, PA
Project Title:	Water Monitoring
Application Submitted:	February 2012
Funded Amount:	$9,500
Total Project Cost:	$204,596
Project Completed:	August 2012
Accomplishments:	Water quality monitoring & technical assistance program throughout KC Basin, including routine monitoring of over three dozen AMD treatment systems.

Grantee:	Evergreen Conservancy
Grantee City, State:	Indiana, PA
Project Title:	Conemaugh River Monitoring for Clean Streams
Application Submitted:	May 2012
Funded Amount:	$39,000
Total Project Cost:	$44,000
Project Completed:	Unknown
Accomplishments:	Installation of four, cellular, real-time data loggers in Indiana County in partnership with the Indiana 9-1-1 Dispatch Center.

Grantee:	Indiana County Conservation District
Grantee City, State:	Indiana, PA
Project Title:	Southwest Project Grass Grazing Conference
Application Submitted:	December 2011
Funded Amount:	$2,000
Total Project Cost:	$15,000
Project Completed:	October 2012
Accomplishments:	Conference targeting livestock producers that utilize or are interested in utilizing and intensive pasture rotation system.

Grantee:	Indiana County Conservation District
Grantee City, State:	Indiana, PA
Project Title:	Southwest Project Grass Grazing Conference 2012
Application Submitted:	December 2011
Funded Amount:	$2,000
Total Project Cost:	$15,000
Project Completed:	April 2012
Accomplishments:	Conference for livestock producers that may utilize intensive pasture rotation system.

Grantee:	Natural Biodiversity
Grantee City, State:	Johnstown, PA
Project Title:	Riparian Buffers
Application Submitted:	Unknown
Funded Amount:	$23,000
Total Project Cost:	$36,600
Project Completed:	December 2013
Accomplishments:	Comprehensive demonstration site targeting water quality improvement through riparian forest restoration and knotweed removal along the Stonycreek River and Jim Mayer Riverwalk Trail.

Grantee:	Pennsylvania Environmental Council
Grantee City, State:	Harrisburg, PA
Project Title:	Inclined Plane Discharge / Geothermal
Application Submitted:	October 2011
Funded Amount:	$50,000
Total Project Cost:	$140,000
Project Completed:	July 2013
Accomplishments:	Assess potential uses of this AMD in an energy delivery system, provide preliminary design for central plan and distribution system, market analysis of potential energy users, and economic assessment.

Grantee:	Shade Creek Watershed Association
Grantee City, State:	Central City, PA
Project Title:	AMD Impaired Tributaries of Shade Creek
Application Submitted:	October 2013
Funded Amount:	$15,000
Total Project Cost:	$456,098
Project Completed:	Ongoing
Accomplishments:	Install limestone beds and repair treatment systems to restore 4.6 miles of Coal Run.

Grantee:	Somerset Conservation District
Grantee City, State:	Somerset, PA
Project Title:	Quemahoning Creek Tail Water Enhancement Project
Application Submitted:	September 2012
Funded Amount:	$58,000
Total Project Cost:	$77,203
Project Completed:	Unknown
Accomplishments:	Restore water quantity, quality and aquatic diversity within the last 1.3 miles of Quemahoning Creek.

Grantee:	Southern Alleghenies Conservancy
Grantee City, State:	Huntington, PA
Project Title:	N. Branch Little Conemaugh Stabilization and Accessibility
Application Submitted:	August 2012
Funded Amount:	$45,000
Total Project Cost:	$103,361
Project Completed:	2014
Accomplishments:	Dirt and gravel road improvements to 4,300 feet of Patrick Road access to Wilmore Dam and 561 feet of stream side buffers to reduce 335 tons of sediment.

Grantee:	St. Francis University
Grantee City, State:	Loretto, PA
Project Title:	Technical Assistance for Nonpoint Source Pollution
Application Submitted:	Unknown
Funded Amount:	$56,000
Total Project Cost:	$629,200
Project Completed:	Unknown
Accomplishments:	Provide expert technical assistance and manpower to non-profit organizations within the KC Basin via professor-student teams.

Grantee:	St. Francis University
Grantee City, State:	Loretto, PA
Project Title:	Watershed Restoration Amplification Program
Application Submitted:	Unknown
Funded Amount:	$56,000
Total Project Cost:	$135,000
Project Completed:	Unknown
Accomplishments:	Provide expert technical assistance and manpower to non-profit organizations within the KC Basin via professor-student teams.

Grantee:	St. Francis University
Grantee City, State:	Loretto, PA
Project Title:	Watershed Restoration Amplification Program – year 2
Application Submitted:	November 2012
Funded Amount:	$56,000
Total Project Cost:	$629,200
Project Completed:	December 2014
Accomplishments:	Provide expert technical assistance and manpower to non-profit organizations within the KC Basin via professor-student teams.

Grantee:	St. Francis University
Grantee City, State:	Loretto, PA
Project Title:	Watershed Restoration Amplification Program – year 3
Application Submitted:	December 2014
Funded Amount:	$36,000
Total Project Cost:	$629,200
Project Completed:	Unknown
Accomplishments:	Provide expert technical assistance and manpower to non-profit organizations within the KC Basin via professor-student teams.

Grantee:	Stream Restoration Inc.
Grantee City, State:	Mars, PA
Project Title:	Aultman Run Watershed Assessment for AMD
Application Submitted:	February 2012
Funded Amount:	$25,000
Total Project Cost:	$63,115
Project Completed:	March 2016
Accomplishments:	Watershed assessment to continue restoration efforts.

Grantee:	Stream Restoration Inc.
Grantee City, State:	Mars, PA
Project Title:	Kiski-Conemaugh AMD System Operation and Maintenance
Application Submitted:	March 2012
Funded Amount:	$60,000
Total Project Cost:	$85,175
Project Completed:	August 2012
Accomplishments:	Evaluate AMD systems function and address O&M issues.

Grantee:	The American Chestnut Foundation
Grantee City, State:	Asheville, NC
Project Title:	Ehrenfeld Reclamation
Application Submitted:	Unknown
Funded Amount:	$40,000
Total Project Cost:	$600,000
Project Completed:	Unknown
Accomplishments:	Reclamation at the Ehrenfeld Refuse site.

Grantee:	The American Chestnut Foundation
Grantee City, State:	Asheville, NC
Project Title:	Flight 93 Memorial Landscape
Application Submitted:	March 2012
Funded Amount:	$40,000
Total Project Cost:	$70,750
Project Completed:	June 2013
Accomplishments:	Plant 235 potentially blight-resistant American Chestnut trees at the Flight 93 Memorial.

Grantee:	Trust for Tomorrow
Grantee City, State:	Fairfield, NC
Project Title:	Wetland Preservation and Nonpoint Source Pollution Mitigation
Application Submitted:	Unknown
Funded Amount:	$60,000
Total Project Cost:	$180,000
Project Completed:	Unknown
Accomplishments:	Outreach, education, and technical assistance to private landowners with the Stonycreek and Little Conemaugh Rivers watersheds to support the implementation of wetland restoration to reduce NPS pollution.

Grantee:	Western Pennsylvania Conservancy
Grantee City, State:	Pittsburgh, PA
Project Title:	Hirsch Road Dirt and Gravel Roads Project
Application Submitted:	August 2012
Funded Amount:	$7,000
Total Project Cost:	$20,000
Project Completed:	November 2013
Accomplishments:	Repair and restoration of ~4000 feet of rural highway within the Tubmill Creek watershed.

Grantee:	Western Pennsylvania Conservancy
Grantee City, State:	Pittsburgh, PA
Project Title:	Kiski-Conemaugh Restoration and Preservation
Application Submitted:	March 2012
Funded Amount:	$60,000
Total Project Cost:	$241,759
Project Completed:	August 2012
Accomplishments:	Address 5,600 feet of dirt and gravel roads in Ligonier Township; complete wild trout assessment in unassessed waters; identify future dirt and gravel road projects within KC Basin.

Grantee:	Western Pennsylvania Conservancy
Grantee City, State:	Pittsburgh, PA
Project Title:	Native Brook Trout Surveys and Dirt and Gravel Road Restoration in the Tubmill Creek Watershed
Application Submitted:	January 2012
Funded Amount:	$25,000
Total Project Cost:	$116,000
Project Completed:	Unknown
Accomplishments:	Surveyed 33 stream segments for PFBC's Unassessed Waters Initiative and improved 1200 feet of dirt and gravel roads.

Back to Table of Contents

Appendix 2

The following is contact information, as of December 2017, for leaders of key conservation organizations working in the Kiski-Conemaugh River Basin. Websites and social media links may be found through an Internet search.

Armstrong Conservation District
Spurgeon Shilling, Chairman
David Rupert, District Manager
124 Armsdale Road, Suite B2
Kittanning, PA 16201
drrupert@co.armstrong.pa.us
724-548-3425

Arrowhead Chapter of Trout Unlimited
Jeff Wasson, President
11511 State Route 85
Kittanning, PA 16201
jeffreywasson@gmail.com
724-664-0216

Aultman Watershed Association for Restoring the Environment
Christopher Schaney, Ph.D., President
IUP Geography and Regional Planning Department
Humanities and Social Sciences, Room 413K
981 Grant Street
Indiana, PA 15705
cshaney@iup.edu
724-357-2250

Blackleggs Creek Trout Nursery and Watershed Association
Tim Steffish, President
Art Grguric, Watershed Manager
P.O. Box 59
Clarksburg, PA 15725
agrguric50@gmail.com
724-972-8675

Blacklick Creek Watershed Association
Janis Long, President
297 Sarah Street
Homer City, PA 15748
bcwapa@gmail.com
724-349-9474

Cambria County Conservation District
Dennis Beck, Chairman
John Dryzal, District Manager
401 Candlelight Drive, Suite 229
Ebensburg, PA 15931
dryzal@co.cambria.pa.us
814-472-2120

Conemaugh Valley Conservancy
Michael Burk, President
Melissa Reckner, Kiski-Conemaugh Stream Team Director
P.O. Box 218
Johnstown, PA 15907
cvconserv@gmail.com
814-444-2669

Evergreen Conservancy
Cindy Rogers, President
P.O. Box 783
Indiana, PA 15701
evergreenconservancy@gmail.com
724-471-6020

Forbes Trail Chapter of Trout Unlimited
Monty Murty, President
P.O. Box 55
Laughlintown, PA 15655
mmurty@verizon.net
724-238-7860

Indiana County Conservation District
Richard Stumpf, Chairman
Adam Cotchen, District Manager
625 Kolter Drive, Suite 8
Indiana, PA 15701
a.cotchen@iccdpa.org
724-471-4751

Ken Sink Chapter of Trout Unlimited
Roger Phillips, President
206 Fourth Street
Saltsburg, PA 15681
rphillips32@yahoo.com
724-639-9715

Kiskiminetas Watershed Association
Genay Hess, President
P.O. Box 83
Leechburg, PA 15656
genayhess@gmail.com
724-567-7243

Loyalhanna Watershed Association
William "Wink" Knowles, Chairman
Susan Huba, Executive Director
6 Old Lincoln Highway West
Ligonier, PA 15658
susan@loyalwater.com
724-238-7560

Mountain Laurel Chapter of Trout Unlimited
Randy Buchanan, President
1745 Regal Drive
Johnstown, PA 15904
prbfish4fun@aol.com
814-467-4034

Paint Creek Regional Watershed Association
Richard Wargo, President
514 Shady Lane
Windber, PA 15963
814-525-0844

Pennsylvania Senior Environment Corps of Indiana County
John Dudash, President
Oak Place Community Center at Aging Services
1055 Oak Street
Indiana, PA 15701
jdudash3@verizon.net
724-479-8919

Roaring Run Watershed Association
Ken Kaminski, President
P.O. Box 333
Apollo, PA 15613
roaringrun@gmail.com
724-681-6317

Shade Creek Watershed Association
Larry Hutchinson, President
314 Central Avenue
Central City, PA 15926
shadecreekwa@yahoo.com
814-444-2996

Somerset Conservation District
Jack Tressler, Chairman
Len Lichvar, District Manager
6024 Glades Pike, Suite 103
Somerset, PA 15501
somersetcd@wpia.net
814-445-4652 x5

Somerset County Conservancy
James Moses, President
P.O. Box 241
Somerset, PA 15501
mail@somersetconservancy.org

Stonycreek Conemaugh River Improvement Project
Len Lichvar, Chairman
P.O. Box 164
Windber, PA 15963
info@scripPA.org
814-445-4652 x136

Trout Run Watershed Association
Dennis Beck, President
161 Hemlock Drive
Portage, PA 15946
bikerbeck@comcast.net
814-243-3845

Wells Creek Watershed Association
Jeff Shaffer, President
P.O. Box 39
Friedens, PA 15541
814-483-6422

Western Pennsylvania Conservancy
Watershed Conservation Program
Jenifer Christman, Associate Vice President
1067 Philadelphia Street, Suite 101
Indiana, PA 15701
water@paconserve.org
724-471-7202

Western Pennsylvania Coalition for Abandoned Mine Reclamation

Andy McAllister, Regional Coordinator
P.O. Box 295
Luxor, PA 15622
andy@wpcamr.org
717-497-3415

Westmoreland Conservation District

Ron Rohall, Chairman
Greg Phillips, District Manager
J. Roy Houston Conservation Center
218 Donohoe Road
Greensburg, PA 15601
greg@wcdpa.com
724-837-5271

Back to Table of Contents

Appendix 3

The following describes the health impacts, according to the Centers for Disease Control and Prevention, of select metals.

Selenium can bioacculumlate within the ecosystem and can negatively impact faunal reproduction. In humans, excessive selenium exposure can cause hair loss, nail brittleness, numbness in fingers or toes, and respiratory problems (Agency for Toxic Substances and Disease Registry). If inhaled or swallowed over a long period of time, manganese might affect the nervous system, cause cramping or weakness in the legs, increase irritability, affect speech, cause shaking in the arms or legs, or result in pneumonia-like symptoms (CDC).

High levels of **aluminum** exposure can affect the nervous system. The scientific community is still undecided as to whether or not aluminum causes Alzheimer's disease (Agency for Toxic Substances and Disease Registry).

In the air, **boron** might cause irritation of the nose, throat, and eyes, while ingestion of large amounts of boron in a short period of time could impair digestive system, kidney, and brain function. Most of the boron leaves the body in urine (Agency for Toxic Substances and Disease Registry).

The Occupational Safety and Health Administration (OSHA) states that inhaled **iron oxide** is not a carcinogen. There is some debate yet on iron oxide fumes or dust's impact on a person, but it is a suspected causative agent for pneumoconiosis – occupational lung disease. If not properly metabolized, ingested iron could lead to hemochromatosis, more commonly known as "iron overload," implicated in organ, particularly liver, dysfunction (CDC).

Back to Table of Contents

Appendix 4

The following are the results of fish surveys completed for this project or associated projects by the Conemaugh Valley Conservancy and/or the California University of Pennsylvania.

Stonycreek River Watershed				
		Coal Run Above System	**Coal Run Below System**	**Lamberts Run Below Systems**
		7/10/2015	7/10/2015	8/7/2015
Species	**Common Name**			
Semotilus atromaculatus	Creek Chub			42
	Species total:	**0**	**0**	**1**
	Total fish:	**0**	**0**	**42**
	Latitude	40.052521	40.053028	40.072
	Longitude	-78.79578	-78.79578	-78.9019
	Stream Length (m)	50	50	100
	Time (sec.)	113	142	1932
	Average Stream Width (m)	1.2	1.2	5.1
	pH	3.35	3.87	7.97
	Conductivity (uS/cm)	382	317	1883
	TDS (mg/L)	191	151	938
	Temp (°C)	16	16.8	18.4
	Alkalinity (mg/L)	0	0	204

Stonycreek River Watershed			
		Laurel Run Downstream of Reitz #1 System	Panther Run Below SGL Road
		7/24/2015	7/10/2015
Species	**Common Name**		
Ameiurus melas	Black Bullhead	1	
Rhinichthys atratulus	Blacknose Dace	3	
Salvelinus fontinalis	Brook Trout, Hatchery	2	
Semotilus atromaculatus	Creek Chub	35	
Oncorhynchus mykiss	Rainbow Trout, Hatchery	1	
Catostomus commersonii	White Sucker	9	
	Species total:	**6**	**0**
	Total fish:	**51**	**0**
	Latitude	40.11647	40.072619
	Longitude	-78.80653	-78.79868
	Stream Length (m)	100	50
	Time (sec.)	1444	274
	Average Stream Width (m)	5.88	4.5
	pH	6.6	3.97
	Conductivity (uS/cm)	83	34
	TDS (mg/L)	40	17
	Temp (°C)	16.1	14.9
	Alkalinity (mg/L)		2

Stonycreek River Watershed

Species	Common Name	Quemahoning Creek at Coldwater Release	Quemahoning Creek Below Dam	Quemahoning Creek at Plank Road	Quemahoning Creek at Mouth
		9/18/2015	9/18/2015	9/18/2015	9/18/2015
Etheostoma zonale	Banded Darter			1	2
Rhinichthys atratulus	Blacknose Dace				1
Percina maculata	Blackside Darter				2
Lepomis macrochirus	Bluegill	7		16	29
Pimephales notatus	Bluntnose Minnow				1
Salvelinus fontinalis	Brook Trout, Hatchery	1			
Salmo trutta	Brown Trout, Hatchery	14	3	2	
Campostoma anomalum	Central Stoneroller			1	
Semotilus atromaculatus	Creek Chub			3	43
Semotilus corporalis	Fallfish			1	
Etheostoma flabellare	Fantail Darter			1	5
Etheostoma blennioides	Greenside Darter			3	3
Etheostoma nigrum	Johnny Darter				2
Miropterus salmoides	Largemouth Bass				4
Notropis volucellus	Mimic Shiner			7	10
Cottus bairdii	Mottled Sculpin			3	
Hypentelium nigricans	Northern Hogsucker	1	4	13	2
Lepomis gibbosus	Pumpkinseed			9	4
Oncorhynchus mykiss	Rainbow Trout, Hatchery	18	3		
Lepomis microlophus	Redear Sunfish	1			
Ambloplites rupestris	Rock Bass	8	3		
Notropis rubellus	Rosyface Shiner			2	19
Micropterus dolomieu	Smallmouth Bass	9	1	2	13
Sander vitreus	Walleye	4			
Catostomus commersonii	White Sucker		9	23	36
Ameiurus natalis	Yellow Bullhead			1	
Perca flavescens	Yellow Perch		2	4	16
	Species total:	**9**	**7**	**17**	**17**
	Total fish:	**63**	**25**	**92**	**192**
	Latitude	40.183725	40.186075	40.193292	40.197644
	Longitude	-78.94408	-78.9442	-78.93811	-78.93571
	Stream Length (m)	131	137	100	100
	Time (sec.)		1260 & 802	4924 & 1171	2928 & 1095
	Average Stream Width (m)			13.5	19.2
	pH	7.17	7.11	8.02	6.78
	Conductivity (uS/cm)	249	247	271	247
	TDS (mg/L)	123	123	136	121
	Temp (°C)	20.8	21.2	11.7	13.5
	Alkalinity (mg/L)	36	36	36	56

Stonycreek River Watershed					
		Shingle Run Mouth	South Fork Bens Creek Above Lion Mining	South Fork Bens Creek Above Rock Tunnel	South Fork Bens Creek Far Below Rock Tunnel
		7/10/2015	9/11/2015	9/11/2015	9/11/2015
Species	**Common Name**				
Rhinichthys atratulus	Blacknose Dace		15	33	17
Salvelinus fontinalis	Brook Trout, Hatchery			1	1
Salvelinus fontinalis	Brook Trout, Wild		2		
Salmo trutta	Brown Trout, Hatchery		10	1	22
Salmo trutta	Brown Trout, Wild		10	8	
Semotilus atromaculatus	Creek Chub			2	
Etheostoma nigrum	Johnny Darter			1	
Rhinichthys atratulus	Longnose Dace		2	10	
Cottus bairdii	Mottled Sculpin		51	33	7
Oncorhynchus mykiss	Rainbow Trout, Hatchery		1		
Catostomus commersonii	White Sucker		6	10	10
	Species total:	**0**	**8**	**9**	**5**
	Total fish:	**0**	**97**	**99**	**57**
	Latitude	40.090053	40.219222	40.223358	40.228919
	Longitude	-78.79385	-79.02994	-78.99079	-78.98284
	Stream Length (m)	50	102	100	123
	Time (sec.)	273	1398	1653	1470
	Average Stream Width (m)	3.4	3.1	6	5.7
	pH	4.88	8.01	7.89	7.29
	Conductivity (uS/cm)	19	110	612	922
	TDS (mg/L)	9	55	305	456
	Temp (°C)	15.7	16.4	16.4	16.8
	Alkalinity (mg/L)	12	56	220	248

Back to Table of Contents

Stonycreek River Watershed

Species	Common Name	Stonycreek at Glessners Covered Bridge	Stonycreek at Hollsopple	Stonycreek at Krings	Wells Creek near Mouth
		8/7/2015	8/5/2015	8/5/2015	8/7/2015
Etheostoma zonale	Banded Darter	6	12	16	
Rhinichthys atratulus	Blacknose Dace		24		54
Lepomis macrochirus	Bluegill	1	2		
Pimephales notatus	Bluntnose Minnow			4	
Salvelinus fontinalis	Brook Trout, Hatchery				1
Salmo trutta	Brown Trout, Hatchery	7			1
Salmo trutta	Brown Trout, Wild				1
Campostoma anomalum	Central Stoneroller		47	2	
Semotilus atromaculatus	Creek Chub	3	4	5	7
Semotilus corporalis	Fallfish	1			5
Etheostoma flabellare	Fantail Darter	10	35	40	
Etheostoma blennioides	Greenside Darter	14	14	3	
Etheostoma nigrum	Johnny Darter		3		
Rhinichthys atratulus	Longnose Dace			295	
Noturus insignis	Margined Madtom		3		
Cottus bairdii	Mottled Sculpin	21	10	1	53
Hypentelium nigricans	Northern Hogsucker	18	7	1	1
Lepomis gibbosus	Pumpkinseed				1
Oncorhynchus mykiss	Rainbow Trout, Hatchery	5	2		7
Ambloplites rupestris	Rock Bass	2	9		
Percina peltata	Shield Darter	1			
Cottus cognatus	Slimy Sculpin				11
Micropterus dolomieu	Smallmouth Bass	3	21	5	
Catostomus commersonii	White Sucker	10	25	2	24
	Species total:	**14**	**15**	**11**	**12**
	Total fish:	**102**	**218**	**374**	**166**
	Latitude	40.02631	40.20968	40.27526	40.07025
	Longitude	-78.9211	-78.9279	-78.9038	-78.945
	Stream Length (m)	100	100	100	106
	Time (sec.)	2158			1451
	Average Stream Width (m)	16.86			7.8
	pH	7.8	7.08	7.77	7.67
	Conductivity (uS/cm)	863	664	586	588
	TDS (mg/L)	431	337	293	295
	Temp (°C)	17.7	22.1	21.2	16.2
	Alkalinity (mg/L)	160	88		60

Little Conemaugh River Watershed				
		Little Conemaugh in Lilly	Little Conemaugh at Mineral Point	Little Conemaugh Site 11 in Johnstown
		7/24/2015	9/24/2015	9/24/2015
Species	**Common Name**			
Rhinichthys atratulus	Blacknose Dace	137	262	23
Pimephales notatus	Bluntnose Minnow		1	
Salvelinus fontinalis	Brook Trout, Hatchery	1		
Semotilus atromaculatus	Creek Chub	35	33	
Etheostoma flabellare	Fantail Darter		6	
Etheostoma nigrum	Johnny Darter	1	31	
Rhinichthys atratulus	Longnose Dace	14	19	7
Cottus bairdii	Mottled Sculpin	11		
Oncorhynchus mykiss	Rainbow Trout, Hatchery	2		
Etheostoma olmstedi	Tesselated Darter	1		
Catostomus commersonii	White Sucker	14	5	1
	Species total:	**9**	**7**	**3**
	Total fish:	**216**	**357**	**31**
	Latitude	40.42675	40.379513	40.330965
	Longitude	-78.62203	-78.83672	-78.90499
	Stream Length (m)	100	100	100
	Time (sec.)	1616		
	Average Stream Width (m)	4.4		
	pH	7.46	6.98	6.68
	Conductivity (uS/cm)	464	902	877
	TDS (mg/L)	231	451	437
	Temp (°C)	17.3	15.4	15.4
	Alkalinity (mg/L)	124	76	44

Little Conemaugh River Watershed			
		Trout Run Upstream of System	Trout Run Downstream of System
		7/24/2015	7/24/2015
Species	**Common Name**		
Rhinichthys atratulus	Blacknose Dace	1	
Salvelinus fontinalis	Brook Trout, Wild	19	
Oncorhynchus mykiss	Rainbow Trout, Hatchery	1	
	Species total:	**3**	**0**
	Total fish:	**21**	**0**
	Latitude	40.367036	40.379722
	Longitude	-78.64483	-78.665222
	Stream Length (m)	100	50
	Time (sec.)		232
	Average Stream Width (m)	4.1	
	pH	6.49	5.04
	Conductivity (uS/cm)	239	386
	TDS (mg/L)	119	192
	Temp (°C)	15.4	13.3
	Alkalinity (mg/L)	16	10

Back to Table of Contents

Blacklick Creek Watershed				
		Blacklick Creek at Campbells Mill Road	Coal Pit Run Above Systems	Coal Pit Run Below Systems
		8/4/2015	7/17/2015	7/17/2015
Species	**Common Name**			
Etheostoma zonale	Banded Darter	12		
Campostoma anomalum	Central Stoneroller	10		
Semotilus atromaculatus	Creek Chub			
Etheostoma flabellare	Fantail Darter	3		
Etheostoma blennioides	Greenside Darter	1		
Miropterus salmoides	Largemouth Bass	2		
Percina caprodes	Logperch	2		
Hypentelium nigricans	Northern Hogsucker	3		
Etheostoma caeruleum	Rainbow Darter	9		
Ambloplites rupestris	Rock Bass	2		
Notropis rubellus	Rosyface Shiner	8		
	Species total:	**10**	**0**	**0**
	Total fish:	**52**	**0**	**0**
	Latitude	40.47073	40.498472	40.497322
	Longitude	-79.2257	-78.83344	-78.83674
	Stream Length (m)	100	50	50
	Time (sec.)		107	135
	Average Stream Width (m)			
	pH	6.34	6.55	6.43
	Conductivity (uS/cm)	974	186	278
	TDS (mg/L)	486	93	138
	Temp (°C)	23.8	16.6	16.6
	Alkalinity (mg/L)	24	52	44

Blacklick Creek Watershed				
		Laurel Run Above #1 System	Laurel Run Above #2 System	Laurel Run Mouth
		7/17/2015	6/12/2015	7/17/2015
Species	**Common Name**			
Semotilus atromaculatus	Creek Chub		9	15
	Species total:	**0**	**1**	**1**
	Total fish:	**0**	**9**	**15**
	Latitude	40.509694	40.495917	40.485056
	Longitude	-79.11225	-79.12061	-79.15286
	Stream Length (m)	50	100	100
	Time (sec.)	306	520	1202
	Average Stream Width (m)	2.76	3.16	6.02
	pH	5.83	6.8	6.39
	Conductivity (uS/cm)	54	602	344
	TDS (mg/L)	27	299	172
	Temp (°C)	15.8	20.9	15.2
	Alkalinity (mg/L)	16	108	36

Blacklick Creek Watershed					
		Two Lick at Route 954	South Branch Two Lick Below Richards	Yellow Creek at Route 954 Above Systems	Yellow Creek Below Systems
		10/2/2015	10/2/2015	10/2/2015	10/2/2015
Species	**Common Name**				
Etheostoma zonale	Banded Darter	2	9		
Campostoma anomalum	Central Stoneroller	4	2	23	
Semotilus atromaculatus	Creek Chub	23	1		3
Etheostoma flabellare	Fantail Darter		7	9	
Etheostoma blennioides	Greenside Darter		7	4	1
Hypentelium nigricans	Northern Hogsucker	3	17	14	7
Etheostoma caeruleum	Rainbow Darter		4		
Ambloplites rupestris	Rock Bass				2
	Species total:	**4**	**7**	**4**	**4**
	Total fish:	**32**	**47**	**50**	**13**
	Latitude	40.5914	40.663712	40.569199	40.559082
	Longitude	-79.13867	-78.97968	-79.12716	-79.13066
	Stream Length (m)	100	100	108	100
	Time (sec.)	1264		2100	927
	Average Stream Width (m)	15	10.7	14.6	10.2
	pH	7.83	7.79	8.06	7.69
	Conductivity (uS/cm)	287	481	262	524
	TDS (mg/L)	143	240	130	262
	Temp (°C)	13.8	12.4	14.5	13.7
	Alkalinity (mg/L)	60	124	48	40

Back to Table of Contents

Conemaugh River Watershed				
		Conemaugh River in Seward	Conemaugh River in Blairsville	Conemaugh River in White
		9/17/2015	9/17/2015	9/17/2015
Species	**Common Name**			
Etheostoma zonale	Banded Darter	30	17	6
Hybopsis amblops	Bigeye Chub			2
Rhinichthys atratulus	Blacknose Dace	2		
Percina maculata	Blackside Darter	2		
Lepomis macrochirus	Bluegill		13	7
Pimephales notatus	Bluntnose Minnow		6	14
Semotilus atromaculatus	Creek Chub		2	
Etheostoma flabellare	Fantail Darter	6	1	
Lepomis cyanellus	Green Sunfish		5	
Etheostoma blennioides	Greenside Darter		5	
Etheostoma nigrum	Johnny Darter	7		
Miropterus salmoides	Largemouth Bass			1
Percina caprodes	Logperch		22	
Rhinichthys atratulus	Longnose Dace	29		
Notropis volucellus	Mimic Shiner			35
Cottus bairdii	Mottled Sculpin		1	
Hypentelium nigricans	Northern Hogsucker	2	5	3
Lepomis gibbosus	Pumpkinseed		1	
Etheostoma caeruleum	Rainbow Darter		7	2
Nocomis micropogon	River Chub		1	
Ambloplites rupestris	Rock Bass	1	4	3
Micropterus dolomieu	Smallmouth Bass	2	1	3
Cyprinella spiloptera	Spotfin Shiner			1
Erimystax dissimilis	Streamline Chub			1
Etheostoma variatum	Variegate Darter			7
Ameiurus natalis	Yellow Bullhead		1	
	Species total:	**9**	**16**	**13**
	Total fish:	**81**	**92**	**85**
	Latitude	40.419509	40.430933	40.475498
	Longitude	-79.02656	-79.26976	-79.42438
	Stream Length (m)	100	100	100
	Time (sec.)			
	Average Stream Width (m)			
	pH	6.9	6.95	7.16
	Conductivity (uS/cm)	819	875	829
	TDS (mg/L)	412	437	414
	Temp (°C)	19.7	18.6	20.1
	Alkalinity (mg/L)	62	80	60

Conemaugh River Watershed			
		Neal Run Above System	**Neal Run Below System**
		7/3/2015	7/3/2015
Species	**Common Name**		
Semotilus atromaculatus	Creek Chub	7	5
Lepomis cyanellus	Green Sunfish	7	
Miropterus salmoides	Largemouth Bass	3	
Clinostomus elongatus	Redside Dace	2	
Notropis buccatus	Silverjaw Minnow	1	
Catostomus commersonii	White Sucker	10	
	Species total:	**6**	**1**
	Total fish:	**30**	**5**
	Latitude	40.56787	40.55561
	Longitude	-79.2977	-79.2923
	Stream Length (m)	100	100
	Time (sec.)		625
	Average Stream Width (m)	2.5	3.5
	pH	6.57	6.79
	Conductivity (uS/cm)	279	297
	TDS (mg/L)	131	145
	Temp (°C)	17.3	17
	Alkalinity (mg/L)	60	40

Conemaugh River Watershed				
		Reeds Run Above System	Reeds Run Below System	Toms Run
		7/3/2015	7/3/2015	6/12/2015
Species	**Common Name**			
Rhinichthys atratulus	Blacknose Dace			28
Lepomis macrochirus	Bluegill		4	
Salmo trutta	Brown Trout, Hatchery	1		
Campostoma anomalum	Central Stoneroller			10
Luxilus cornutus	Common Shiner	4		
Semotilus atromaculatus	Creek Chub	86	12	52
Etheostoma flabellare	Fantail Darter			3
Etheostoma blennioides	Greenside Darter			4
Etheostoma nigrum	Johnny Darter	3	6	
Percina caprodes	Logperch	5	1	
Cottus bairdii	Mottled Sculpin			10
Hypentelium nigricans	Northern Hogsucker			4
Lepomis gibbosus	Pumpkinseed	3	7	
Etheostoma caeruleum	Rainbow Darter			13
Cottus cognatus	Slimy Sculpin			4
Catostomus commersonii	White Sucker	5	2	1
	Species total:	**7**	**6**	**10**
	Total fish:	**107**	**32**	**129**
	Latitude	40.57959	40.57579	40.432372
	Longitude	-79.2755	-79.2761	-79.21945
	Stream Length (m)	100	50	111
	Time (sec.)	1251	502	1223
	Average Stream Width (m)	1.9	3	4
	pH	6.88	6.8	7.14
	Conductivity (uS/cm)	135	166	312
	TDS (mg/L)	66	82	155
	Temp (°C)	17.5	19.6	23.7
	Alkalinity (mg/L)	40	40	60

Back to Table of Contents

Loyalhanna Creek Watershed					
		Loyalhanna at Seaton Road	Loyalhanna in Ligonier	Loyalhanna at 982	Loyalhanna at Cardinal Park
		9/4/2015	9/4/2015	9/4/2015	8/5/2015
Species	**Common Name**				
	Ammocoetes (Lamprey Larvae)		21		
Etheostoma zonale	Banded Darter				6
Moxostoma duquesnei	Black Redhorse			4	
Rhinichthys atratulus	Blacknose Dace	72	1	7	
Lepomis macrochirus	Bluegill		4		14
Pimephales notatus	Bluntnose Minnow			12	2
Ameiurus nebulosus	Brown Bullhead				1
Salmo trutta	Brown Trout, Hatchery		11		
Salmo trutta	Brown Trout, Wild	9			
Campostoma anomalum	Central Stoneroller		3	54	18
Luxilus cornutus	Common Shiner		1	5	
Semotilus atromaculatus	Creek Chub	47	6	2	1
Notropis atherinoides	Emerald Shiner		11	24	
Etheostoma flabellare	Fantail Darter	1	10	15	5
Lepomis cyanellus	Green Sunfish		40		8
Etheostoma blennioides	Greenside Darter		15	69	10
Etheostoma nigrum	Johnny Darter		7	2	15
Miropterus salmoides	Largemouth Bass				3
Rhinichthys atratulus	Longnose Dace			3	
Notropis volucellus	Mimic Shiner				2
Cottus bairdii	Mottled Sculpin	2	5	2	1
Hypentelium nigricans	Northern Hogsucker	4	18	55	6
Lepomis gibbosus	Pumpkinseed		1		
Etheostoma caeruleum	Rainbow Darter	1	1	40	16
Oncorhynchus mykiss	Rainbow Trout, Hatchery			1	
Lepomis microlophus	Redear Sunfish		1		
Nocomis micropogon	River Chub		18	8	
Ambloplites rupestris	Rock Bass		3	4	
Notropis rubellus	Rosyface Shiner		1	12	3
Percina peltata	Shield Darter			1	
Micropterus dolomieu	Smallmouth Bass			1	5
Etheostoma olmstedi	Tesselated Darter		3	9	
Etheostoma variatum	Variegate Darter		5	41	
Catostomus commersonii	White Sucker	1	16	7	51
Perca flavescens	Yellow Perch				1
	Species total:	**8**	**23**	**23**	**19**
	Total fish:	**137**	**202**	**378**	**168**

Loyalhanna Creek Watershed Continued				
	Loyalhanna at Seaton Road	**Loyalhanna in Ligonier**	**Loyalhanna at 982**	**Loyalhanna at Cardinal Park**
	9/4/2015	9/4/2015	9/4/2015	8/5/2015
Latitude	40.165972	40.249011	40.292206	40.322167
Longitude	-79.291253	-79.253761	-79.372231	-79.382336
Stream Length (m)	105	111	102	100
Time (sec.)	912	1761 & 2409	1713 & 1107	
Average Stream Width (m)	3	12.3	23.76	
pH	7.56	7.6	7.08	7.7
Conductivity (uS/cm)	170	207	361	444
TDS (mg/L)	83	102	180	221
Temp (°C)	20.1	22.3	24.1	24.4
Alkalinity (mg/L)	84	67	116	

Back to Table of Contents

Kiskiminetas River Watershed					
		Big Run at Long Road (BRLONG)	Big Run at Long Road (BRLONG)	Big Run at Long Road (BRLONG)	Big Run at Long Road (BRLONG)
		8/22/2014	8/28/2015	9/16/2016	10/5/2017
Species	**Common Name**				
Rhinichthys atratulus	Blacknose Dace	31	13	143	119
Lepomis macrochirus	Bluegill				1
Semotilus atromaculatus	Creek Chub	73	44	149	182
Etheostoma flabellare	Fantail Darter	4	5	9	11
Etheostoma nigrum	Johnny Darter	17	7	24	18
Miropterus salmoides	Largemouth Bass	2			
Hypentelium nigricans	Northern Hogsucker				11
Catostomus commersonii	White Sucker	4	31	88	8
Ameiurus natalis	Yellow Bullhead	1			
	Species total:	**7**	**5**	**5**	**7**
	Total fish:	**132**	**100**	**413**	**350**
	Latitude	40.583472	40.583472	40.583472	40.583472
	Longitude	-79.415889	-79.41589	-79.41589	-79.415889
	Stream Length (m)	100	100	100	100
	Time (sec.)	1405	1740	2089	2003
	Average Stream Width (m)	3.1	1.7	2.66	2.86
	pH	8.26		7.56	7.94
	Conductivity (uS/cm)	388		493	991
	TDS (mg/L)	194		245	494
	Temp (°C)	20.2		22.2	15.8
	Alkalinity (mg/L)	96		92	184

Kiskiminetas River Watershed					
		Big Run Above Speranza (BR15)	Big Run Above Speranza (BR15)	Big Run Above Speranza (BR15)	Big Run Above Speranza (BR15)
		8/22/2014	8/28/2015	9/16/2016	10/5/2017
Species	**Common Name**				
Rhinichthys atratulus	Blacknose Dace				2
Lepomis macrochirus	Bluegill			2	3
Campostoma anomalum	Central Stoneroller	1			7
Semotilus atromaculatus	Creek Chub	15	17	13	7
Etheostoma flabellare	Fantail Darter	9	10	7	1
Etheostoma nigrum	Johnny Darter		2	1	
Miropterus salmoides	Largemouth Bass		3		
Lepomis gibbosus	Pumpkinseed			3	
Catostomus commersonii	White Sucker	4	8	8	6
Ameiurus natalis	Yellow Bullhead	2	1		
	Species total:	**5**	**6**	**6**	**6**
	Total fish:	**31**	**41**	**34**	**26**
	Latitude	40.556159	40.556159	40.556159	40.556159
	Longitude	-79.414842	-79.414842	-79.414842	-79.414842
	Stream Length (m)	100	100	100	100
	Time (sec.)	1220	838	906	1397
	Average Stream Width (m)	3.32	3.5	4.22	3.34
	pH	8.15		7.54	8.02
	Conductivity (uS/cm)	702		1154	1711
	TDS (mg/L)	354		578	850
	Temp (°C)	22.7		25.4	17.7
	Alkalinity (mg/L)	104		136	164

Kiskiminetas River Watershed					
		Big Run Mouth (BRM)	Big Run Mouth (BRM)	Big Run Mouth (BRM)	Big Run Mouth (BRM)
		8/22/2014	8/28/2015	9/16/2016	9/26/2017
Species	**Common Name**				
Rhinichthys atratulus	Blacknose Dace				5
Pimephales notatus	Bluntnose Minnow				2
Semotilus atromaculatus	Creek Chub				6
Etheostoma flabellare	Fantail Darter	2			
Etheostoma caeruleum	Rainbow Darter	2			
Notropis rubellus	Rosyface Shiner				1
Catostomus commersonii	White Sucker	1			2
	Species total:	**3**	**0**	**0**	**5**
	Total fish:	**5**	**0**	**0**	**16**
	Latitude	40.522151	40.522151	40.522151	40.522151
	Longitude	-79.401149	-79.40115	-79.40115	-79.401149
	Stream Length (m)	96	96	100	100
	Time (sec.)	1180		296	1104
	Average Stream Width (m)	5.36		4.56	5.46
	pH	8.01		5.04	6.94
	Conductivity (uS/cm)	871		1096	1164
	TDS (mg/L)	436		544	581
	Temp (°C)	17.2		15.5	20.9
	Alkalinity (mg/L)	56		8	12

Kiskiminetas River Watershed					
		Blackleggs Above Big Run (BL3)	Blackleggs Above Big Run (BL3)	Blackleggs Above Big Run (BL3)	Blackleggs Above Big Run (BL3)
		8/22/2014	8/28/2015	9/16/2016	10/5/2017
Species	**Common Name**				
Rhinichthys atratulus	Blacknose Dace	1	2		7
Notropis heterolepis	Blacknose Shiner	5	4	5	
Lepomis macrochirus	Bluegill	1	1		17
Pimephales notatus	Bluntnose Minnow	1	1	25	5
Campostoma anomalum	Central Stoneroller	2	5	14	1
Cyprinus carpio	Common Carp	1	3		
Semotilus atromaculatus	Creek Chub	1	2	11	25
Notropis atherinoides	Emerald Shiner			6	5
Etheostoma flabellare	Fantail Darter	10	3	6	7
Aplodinotus grunniens	Freshwater Drum		1	1	
Etheostoma blennioides	Greenside Darter	5	3	16	1
Etheostoma nigrum	Johnny Darter		3		2
Miropterus salmoides	Largemouth Bass				1
Cottus bairdii	Mottled Sculpin				1
Hypentelium nigricans	Northern Hogsucker		9	15	7
Etheostoma caeruleum	Rainbow Darter	1		6	
Notropis rubellus	Rosyface Shiner	1		4	
Etheostoma variatum	Variegate Darter			3	
Catostomus commersonii	White Sucker	10	4	55	9
	Species total:	**12**	**13**	**13**	**13**
	Total fish:	**39**	**41**	**167**	**88**
	Latitude	40.521384	40.521384	40.521384	40.521384
	Longitude	-79.40055	-79.40056	-79.40056	-79.40056
	Stream Length (m)	100	100	100	100
	Time (sec.)		935	1078	1610
	Average Stream Width (m)	10.12	8.26	7.08	7
	pH	8.31		7.9	7.88
	Conductivity (uS/cm)	570		993	1164
	TDS (mg/L)	285		496	582
	Temp (°C)	19.5		17.5	16.1
	Alkalinity (mg/L)	98		142	172

Kiskiminetas River Watershed					
		Blackleggs Below Big Run (BL4)	**Blackleggs Below Big Run (BL4)**	**Blackleggs Below Big Run (BL4)**	**Blackleggs Below Big Run (BL4)**
		8/22/2014	8/28/2015	9/16/2016	10/5/2017
Species	**Common Name**				
Etheostoma zonale	Banded Darter				2
Moxostoma duquesnei	Black Redhorse			1	
Rhinichthys atratulus	Blacknose Dace			1	
Notropis heterolepis	Blacknose Shiner			6	
Pimephales notatus	Bluntnose Minnow			2	
Campostoma anomalum	Central Stoneroller			1	
Semotilus atromaculatus	Creek Chub			2	1
Notropis atherinoides	Emerald Shiner			7	
Etheostoma flabellare	Fantail Darter		1		1
Etheostoma blennioides	Greenside Darter	2	2	3	6
Etheostoma nigrum	Johnny Darter	1			
Miropterus salmoides	Largemouth Bass			1	
Hypentelium nigricans	Northern Hogsucker		2	1	1
Etheostoma caeruleum	Rainbow Darter	6		2	2
Oncorhynchus mykiss	Rainbow Trout, Hatchery				1
Notropis rubellus	Rosyface Shiner			2	
Cottus cognatus	Slimy Sculpin			1	
Etheostoma variatum	Variegate Darter		1		2
Catostomus commersonii	White Sucker	1		7	1
	Species total:	**4**	**4**	**14**	**9**
	Total fish:	**10**	**6**	**37**	**17**
	Latitude	40.513848	40.513848	40.513848	40.513848
	Longitude	-79.417244	-79.41724	-79.41724	-79.417244
	Stream Length (m)	100	100	101	100
	Time (sec.)	1443	734 & 988	906	1269
	Average Stream Width (m)	13.06	13.7	11.84	10.16
	pH	8.36		7.09	7.86
	Conductivity (uS/cm)	669		1020	1141
	TDS (mg/L)	332		512	573
	Temp (°C)	19.5		15.2	15.8
	Alkalinity (mg/L)	100		52	72

Kiskiminetas River Watershed			
		Blackleggs Creek at Memorial Park	Blackleggs Creek at Memorial Park
		8/28/2015	9/16/2016
Species	**Common Name**		
Rhinichthys atratulus	Blacknose Dace		3
Notropis heterolepis	Blacknose Shiner		1
Lepomis macrochirus	Bluegill		2
Pimephales notatus	Bluntnose Minnow	14	41
Salmo trutta	Brown Trout, Hatchery	7	3
Campostoma anomalum	Central Stoneroller	8	6
Semotilus atromaculatus	Creek Chub	52	55
Etheostoma flabellare	Fantail Darter	1	
Aplodinotus grunniens	Freshwater Drum	5	
Etheostoma nigrum	Johnny Darter		6
Micropterus salmoides	Largemouth Bass	2	
Cottus bairdii	Mottled Sculpin	2	3
Clinostomus elongatus	Redside Dace	3	7
Notropis rubellus	Rosyface Shiner	1	30
Catostomus commersonii	White Sucker	20	71
	Species total:	**11**	**12**
	Total fish:	**115**	**228**
	Latitude	40.581043	40.581043
	Longitude	-79.33956	-79.33956
	Stream Length (m)	100	100
	Time (sec.)	1422	1157
	Average Stream Width (m)	4.78	4.06
	pH		6.72
	Conductivity (uS/cm)		311
	TDS (mg/L)		154
	Temp (°C)		16.9
	Alkalinity (mg/L)		104

Kiskiminetas River Watershed			
		Carnahan Run Below System	Carnahan Run Above System
		10/10/2015	10/10/2015
Species	**Common Name**		
Etheostoma zonale	Banded Darter	11	6
Rhinichthys atratulus	Blacknose Dace	94	53
Pimephales notatus	Bluntnose Minnow	1	40
Campostoma anomalum	Central Stoneroller	209	182
Semotilus atromaculatus	Creek Chub	51	63
Notropis atherinoides	Emerald Shiner		5
Etheostoma flabellare	Fantail Darter	27	36
Etheostoma blennioides	Greenside Darter	4	5
Etheostoma nigrum	Johnny Darter	8	22
Cottus bairdii	Mottled Sculpin	34	26
Hypentelium nigricans	Northern Hogsucker	11	3
Lepomis gibbosus	Pumpkinseed		2
Etheostoma caeruleum	Rainbow Darter	17	12
Clinostomus elongatus	Redside Dace		1
Notropis rubellus	Rosyface Shiner	1	19
Notropis buccatus	Silverjaw Minnow	1	
Etheostoma olmstedi	Tesselated Darter	1	2
Catostomus commersonii	White Sucker	5	54
	Species total:	**15**	**17**
	Total fish:	**475**	**531**
	Latitude	40.618111	40.61844
	Longitude	-79.573056	-79.570603
	Stream Length (m)	100	100
	Time (sec.)	1129	1174
	Average Stream Width (m)	6.2	20.5
	pH	7.75	7.86
	Conductivity (uS/cm)	315	242
	TDS (mg/L)	158	120
	Temp (°C)	14.7	14.1
	Alkalinity (mg/L)	80	76

Kiskiminetas River Watershed				
		Marshall Run Above Nursery	Marshall Run Above Nursery	Marshall Run near Mouth
		8/26/2016	9/26/2017	8/26/2016
Species	**Common Name**			
Rhinichthys atratulus	Blacknose Dace	31	34	18
Pimephales notatus	Bluntnose Minnow			1
Campostoma anomalum	Central Stoneroller			5
Semotilus atromaculatus	Creek Chub	58	89	49
Notropis atherinoides	Emerald Shiner			2
Etheostoma flabellare	Fantail Darter	2	6	3
Etheostoma blennioides	Greenside Darter		2	1
Etheostoma nigrum	Johnny Darter	2	1	12
Rhinichthys atratulus	Longnose Dace		3	
Cottus bairdii	Mottled Sculpin	1	12	16
Clinostomus elongatus	Redside Dace			11
Catostomus commersonii	White Sucker	12	24	22
	Species total:	**6**	**8**	**11**
	Total fish:	**106**	**171**	**140**
	Latitude	40.525444	40.525444	40.529667
	Longitude	-79.356722	-79.356722	-79.379944
	Stream Length (m)	100	100	100
	Time (sec.)	809	2009	1200
	Average Stream Width (m)	2.08	2.48	3.52
	pH	7.45	8.47	7.09
	Conductivity (uS/cm)	675	931	584
	TDS (mg/L)	337	464	292
	Temp (°C)	21.8	21.9	22.5
	Alkalinity (mg/L)	180	230	140

Kiskiminetas River Watershed					
		Rattling Run at RRWA Boundary Edge	**Roaring Run Upstream**	**Roaring Run Downstream**	**Roaring Run Downstream**
		10/10/2015	10/10/2015	8/9/2014	10/10/2015
Species	**Common Name**				
Etheostoma zonale	Banded Darter				12
Rhinichthys atratulus	Blacknose Dace	32	29		
Pimephales notatus	Bluntnose Minnow			5	16
Salmo trutta	Brown Trout, Hatchery			2	1
Campostoma anomalum	Central Stoneroller			1	17
Luxilus cornutus	Common Shiner				43
Semotilus atromaculatus	Creek Chub	74	67	4	4
Notropis atherinoides	Emerald Shiner			2	203
Etheostoma flabellare	Fantail Darter		1		
Lepomis cyanellus	Green Sunfish				1
Etheostoma blennioides	Greenside Darter			2	7
Notropis chalybaeus	Iron Color Shiner				5
Etheostoma nigrum	Johnny Darter	1		5	1
Hypentelium nigricans	Northern Hogsucker			7	19
Etheostoma caeruleum	Rainbow Darter			13	5
Clinostomus elongatus	Redside Dace	3			
Nocomis micropogon	River Chub				1
Notropis rubellus	Rosyface Shiner			2	223
Etheostoma olmstedi	Tesselated Darter				1
Etheostoma variatum	Variegate Darter			1	6
Catostomus commersonii	White Sucker	9	3		1
Ameiurus natalis	Yellow Bullhead			1	
	Species total:	**5**	**4**	**12**	**18**
	Total fish:	**119**	**100**	**45**	**566**

Kiskiminetas River Watershed Continued				
	Rattling Run at RRWA Boundary Edge	Roaring Run Upstream	Roaring Run Downstream	Roaring Run Downstream
	10/10/2015	10/10/2015	8/9/2014	10/10/2015
Latitude	40.561694	40.551666	40.564992	40.564992
Longitude	-79.526917	-79.535984	-79.51657	-79.51657
Stream Length (m)	100	100	100	100
Time (sec.)	1224	1163	1576	2065
Average Stream Width (m)	25.2	8.3	7.68	5
pH	7.92	7.95	8.3	8.29
Conductivity (uS/cm)	433	803	531	633
TDS (mg/L)	217	401	264	316
Temp (°C)	13.3	14.6	18.2	13.2
Alkalinity (mg/L)	64	116	68	80

Back to Table of Contents

Appendix 5

The following are the results of macroinvertebrate surveys completed for this project or associated projects by the Conemaugh Valley Conservancy.

Stonycreek River Watershed					
			Weaver Run Above treatment systems at Old Rail line	**Weaver Run Below treatment systems**	**Weaver Run at Green Bridge/Hayes Street**
Order	**Family**	**Genus**			
Plecoptera	Capniidae	*Capnia*	27		1
Trichoptera	Hydropsychidae	*Diplectrona*		1	7
	Limnephilidae	*Pycnopsyche*			1
Diptera	Chironomidae		1		
	Tabanidae	*Tabanus*			1
	Tipulidae	*Tipula*			1
Isopoda	Asellidae	*Caecidotea*			1
Megaloptera	Corydalidae	*Nigronia*		1	
		TOTAL INDIVIDUALS	**28**	**2**	**12**
		TAXA RICHNESS	**2**	**2**	**6**
		Date	3/24/2015	3/24/2015	3/24/2015
		Latitude	40.210129	40.214491	40.219879
		Longitude	-78.826895	-78.825349	-78.825936

Back to Table of Contents

Blacklick Creek Watershed					
			South Branch Blacklick Creek Above AMD&Art	South Branch Blacklick Creek Below AMD&Art	South Branch Blacklick Creek Near Mouth
Order	**Family**	**Genus**			
Trichoptera	Hydropsychidae	*Cheumatopsyche*		22	
		Hydropsyche	4	35	15
	Philopotamidae	*Chimarra*		1	
	Psychomyiidae	*Psychomyia*		1	
Diptera	Chironomidae		1		
		TOTAL INDIVIDUALS	**5**	**59**	**15**
		TAXA RICHNESS	**2**	**4**	**1**
		Date	10/22/2015	10/22/2015	10/22/2015
		Latitude	40.479456	40.480509	40.483463
		Longitude	-78.912081	-78.914859	-78.92347

Blacklick Creek Watershed				
			Yellow Creek Above Systems at Rt. 954	**Yellow Creek Below Systems**
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae	*Baetis*	1	
	Heptageniidae	*McCafferitum*	12	
	Isonychiidae	*Isonychia*	23	
Trichoptera	Hydropsychidae	*Ceratopsyche*	37	1
		Cheumatopsyche	18	
	Philopotamidae	*Chimarra*	25	
Basommatophora	Ancylidae	*Ferrissia*	3	
Bivalvia	Sphaeriidae	*Sphaerium*	1	
Coleoptera	Elmidae	*Optioservus*		1
Decapoda	Cambaridae	*Cambarus*	1	
Diptera	Chironomidae		2	2
	Tipulidae	*Antocha*	2	
Hirudinea			1	
Megaloptera	Corydalidae	*Corydalus*	2	
		Nigronia	3	
Oligochaeta			1	1
		TOTAL INDIVIDUALS	**132**	**5**
		TAXA RICHNESS	**15**	**4**
		Date	10/23/2015	10/23/2015
		Latitude	40.569199	40.559082
		Longitude	-79.127159	-79.130661

Back to Table of Contents

Conemaugh River Watershed				
			Aultmans Run Above System	Aultmans Run Below System
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae	*Baetis*	3	1
	Heptageniidae	*Epeorus*	1	
		McCafferitum		5
Plecoptera	Capniidae	*Capnia*		1
	Nemouridae	*Amphinemura*	1	
Trichoptera	Hydropsychidae	*Cheumatopsyche*	25	3
		Diplectrona		4
		Hydropsyche	4	5
	Philopotamidae	*Chimarra*	25	3
Coleoptera	Elmidae	*Microcylloepus*		14
		Optioservus	34	44
		Stenelmis	17	4
Decapoda	Cambaridae	*Cambarus*		3
Diptera	Chironomidae		69	29
	Simuliidae	*Prosimulium*	13	5
	Tabanidae	*Chrysops*	1	1
	Tipulidae	*Tipula*	12	4
Oligochaeta				4
		TOTAL INDIVIDUALS	**205**	**130**
		TAXA RICHNESS	**12**	**16**
		Date	4/15/2015	4/15/2015
		Latitude	40.555721	40.555367
		Longitude	-79.259109	-79.259796

Conemaugh River Watershed					
			McGee Run Above Sewage Treatment Plant	**McGee Run at Crematorium**	**McGee Run at Lift Station**
Order	**Family**	**Genus**			
Ephemeroptera	Baetidae	*Acentrella*	6	8	
		Baetis	1		
	Heptageniidae	*McCafferitum*	1	1	1
	Isonychiidae	*Isonychia*			1
Plecoptera	Nemouridae	*Amphinemura*	1		
Trichoptera	Hydropsychidae	*Ceratopsyche*	9	66	144
		Cheumatopsyche	1	22	27
	Philopotamidae	*Chimarra*	1		
Amphipoda	Gammaridae	*Gammarus*	2		
Basommatophora	Ancylidae	*Ferrissia*		2	
	Planorbidae	*Planorbella*		1	
Coleoptera	Elmidae	*Optioservus*		30	
		Stenelmis	10	63	2
	Psephenidae	*Psephenus*		5	
Diptera	Chironomidae		4	43	1
	Simuliidae	*Simulium*		1	
	Tabanidae	*Chrysops*		1	
	Tipulidae	*Antocha*			3
		Tipula			1
Hirudinea			1	1	
Odonata	Aeshnidae	*Boyeria*		2	
	Calopterygidae	*Calopteryx*	1		
		Hetaerina		1	
Oligochaeta				3	
		TOTAL INDIVIDUALS	**38**	**250**	**180**
		TAXA RICHNESS	**12**	**16**	**8**
		Date	9/11/2014	9/11/2014	9/11/2014
		Latitude	40.342694	40.367278	40.400694
		Longitude	-79.297361	-79.270361	-79.263444

Back to Table of Contents

Kiskiminetas River Watershed				
			Carnahan Run Above Booker	Carnahan Run Below Booker
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae	*Acentrella*	16	13
		Baetis	8	35
	Heptageniidae	*McCafferitum*	2	1
	Isonychiidae	*Isonychia*	1	9
	Leptophlebiidae	*Habrophlebiodes*	1	2
Plecoptera	Capniidae	*Capnia*	2	4
	Nemouridae	*Amphinemura*	2	
	Perlidae	*Acroneuria*	1	
Trichoptera	Hydropsychidae	*Cheumatopsyche*	2	6
		Hydropsyche	5	12
	Philopotamidae	*Dolophilodes*	37	10
	Polycentropodidae	*Cyrnellus*	1	
	Uenoidae	*Neophylax*	2	
Coleoptera	Elmidae	*Microcylloepus*	14	16
	Psephenidae	*Ectopria*	1	
Decapoda	Cambaridae	*Cambarus*	1	
Diptera	Athericidae	*Atherix*		2
	Chironomidae		11	63
	Limoniidae	*Hexatoma*	1	
	Simuliidae	*Simulium*	5	22
	Tipulidae	*Antocha*		2
		Tipula		1
Megaloptera	Corydalidae	*Nigronia*	1	1
		TOTAL INDIVIDUALS	**114**	**199**
		TAXA RICHNESS	**20**	**16**
		Date	6/4/2015	6/4/2015
		Latitude	40.61844	40.618111
		Longitude	-79.570603	-79.573056

Kiskiminetas River Watershed						
			Big Run at Long Road	**Big Run at Long Road**	**Big Run at Long Road**	**Big Run at Long Road**
Order	**Family**	**Genus**				
Ephemeroptera	Caenidae	*Caenis*				1
	Ephemerellidae					2
	Ephemeridae	*Ephemera*		1		3
	Heptageniidae	*McCafferitum*		3	1	
		Stenonema				1
Plecoptera	Nemouridae	*Amphinemura*				1
		Nemoura		1		
Trichoptera	Hydropsychidae	*Cheumatopsyche*	12		4	
		Hydropsyche	2	23	16	8
	Limnephilidae	*Hydatopphylax*	3			
		Pycnopsyche				2
	Rhyacophilidae	*Rhyacophila*				1
	Uenoidae	*Neophylax*		11		
Basommatophora	Lymnaeidae					1
Coleoptera	Elmidae	*Dubiraphia*	1			
		Macronychus				20
		Microcylloepus		16		
		Optioservus	10	5		
Decapoda	Cambaridae	*Cambarus*			2	
Diptera	Chironomidae		63	11	8	101
	Empididae	*Hemerodromia*		3		
	Tabanidae	*Chrysops*			1	
		Tabanus	1			
	Tipulidae	*Antocha*	8	16	3	1
		Hexatoma	1			
		Tipula	11	1	3	2
Megaloptera	Corydalidae	*Nigronia*	2	2		
Odonata	Gomphidae	*Stylogomphus*				1
Oligochaeta				1		
		TOTAL INDIVIDUALS	**114**	**94**	**38**	**145**
		TAXA RICHNESS	**11**	**13**	**8**	**14**
		Date	4/7/2014	4/15/2015	4/27/2016	4/25/2017
		Latitude	40.58433	40.58433	40.58433	40.58433
		Longitude	-79.41561	-79.41561	-79.41561	-79.41561

Kiskiminetas River Watershed						
			Big Run 15	**Big Run 15**	**Big Run 15**	**Big Run 15**
Order	**Family**	**Genus**				
Amphipoda	Gammaridae	*Gammarus*	1			
Ephemeroptera	Baetidae	*Acentrella*		3		
		Baetis	1			
Plecoptera	Nemouridae	*Amphinemura*				7
Trichoptera	Hydropsychidae	*Cheumatopsyche*	61	1		
		Hydropsyche	82	32	4	149
	Limnephilidae	*Hydatophylax*	1			
	Philopotamidae	*Chimarra*	27	24		9
	Psychomyiidae	*Psychomyia*	5	3		
	Uenoidae	*Neophylax*	2			
Basommatophora	Planorbidae					1
		Planorbella			1	
Coleoptera	Elmidae	*Macronychus*				160
		Microcylloepus	64	75	5	
		Optioservus	32	150	14	
		Stenelmis		4		
Decapoda	Cambarridae	*Cambarrus*	2			
Diptera	Chironomidae		78	5	16	55
	Limoniidae	*Hexatoma*	9		4	21
	Simuliidae	*Prosimula*	3			
	Tabanidae	*Chrysops*		4		
	Tipulidae	*Antocha*		5		1
		Tipula	1		2	1
Odonata	Calopterygidae	*Hetaerina*		1		
	Lestidae	*Lestes*	1			
Veneroida	Sphaeriidae					1
		TOTAL INDIVIDUALS	**370**	**307**	**46**	**405**
		TAXA RICHNESS	**16**	**12**	**7**	**10**
		Date	4/7/2014	4/15/2015	4/27/2016	4/25/2017
		Latitude	40.55625	40.55625	40.55625	40.55625
		Longitude	-79.41508	-79.41508	-79.41508	-79.41508

Kiskiminetas River Watershed						
			Big Run Mouth	**Big Run Mouth**	**Big Run Mouth**	**Big Run Mouth**
Order	**Family**	**Genus**				
Plecoptera	Chloroperlidae	*Suwallia*	1			
Trichoptera	Hydropsychidae	*Cheumatopsyche*	4	4		2
		Hydropsyche	1	3	7	
Diptera	Chironomidae			1		
	Limoniidae	*Hexatoma*		1		
	Tipulidae	*Tipula*	1			
Megaloptera	Corydalidae	*Chauliodes*	1			
		TOTAL INDIVIDUALS	**8**	**9**	**7**	**2**
		TAXA RICHNESS	**5**	**4**	**1**	**1**
		Date	4/7/2014	4/15/2015	4/27/2016	4/25/2017
		Latitude	40.522111	40.522111	40.522111	40.522111
		Longitude	-79.40113	-79.40113	-79.40113	-79.40113

Kiskiminetas River Watershed						
			Blackleggs Creek Above Big Run (BL3)	Blackleggs Creek Above Big Run (BL3)	Blackleggs Creek Above Big Run (BL3)	Blackleggs Creek Above Big Run (BL3)
Order	**Family**	**Genus**				
Ephemeroptera	Baetidae					1
		Baetis	10	4		
	Ephemerellidae	*Ephemerella*	37	8	1	
		Stenonema				3
	Heptageniidae	*Maccaffertium*	1			
Plecoptera	Chloroperlidae	*Haploperla*			2	
	Nemouridae	*Amphinemura*				1
Trichoptera	Hydropsychidae	*Cheumatopspsyche*	44			
		Hydropsyche	69	152	161	36
	Limnephilidae	*Hydatophylax*		1		
	Philopotamidae	*Chimarra*	8	2	14	10
	Uenoidae	*Neophylax*	22	16	2	
Coleoptera	Elmidae	*Macronychus*				21
		Microcylloepus	1	4		
		Optioservus		5	7	
	Psephenidae	*Psephenus*				1
Decapoda	Cambaridae	*Cambarus*		2		
Diptera	Athericidae	*Atherix*			1	
	Chironomidae		55	6	58	34
	Limoniidae	*Pseudolimnophila*		1		
	Simuliidae	*Simulium*	5		2	
	Tipulidae	*Antocha*		1	7	2
		Tipula	2	1	2	1
Isopoda	Asellidae	*Caecidotea*		1	2	
Megaloptera	Corydalidae	*Nigronia*	1			
		TOTAL INDIVIDUALS	**255**	**204**	**259**	**110**
		TAXA RICHNESS	**12**	**14**	**12**	**10**
		Date	4/7/2014	4/15/2015	4/27/2016	4/25/2017
		Latitude	40.521417	40.521417	40.521417	40.521417
		Longitude	-79.40022	-79.40022	-79.40022	-79.40022

Kiskiminetas River Watershed						
			Blackleggs Creek Below Big Run (BL4)	**Blackleggs Creek Below Big Run (BL4)**	**Blackleggs Creek Below Big Run (BL4)**	**Blackleggs Creek Below Big Run (BL4)**
Order	**Family**	**Genus**				
Ephemeroptera	Baetidae	*Baetis*	3			
	Caenidae	*Caenis*				1
	Ephemerellidae	*Ephemerella*	1	2	2	
	Heptageniidae	*Stenonema*				1
Plecoptera	Capniidae	*Capnia*			1	
	Chloroperlidae	*Suwallia*	1			
		Utaperla		1		
	Nemouridae	*Amphinemura*				1
	Perlodidae	*Isoperla*			1	
Trichoptera	Hydropsychidae	*Cheumatopsyche*	6	6	5	
		Hydropsyche		86	38	1
	Limnephilidae	*Hydatophylax*		1		
	Philopotamidae	*Chimarra*			1	
	Uenoidae	*Neophylax*		4		
Coleoptera	Elmidae	*Dubiraphia*	1			
		Macronychus				2
		Optioservus	3	3	1	
	Psephenidae	*Ectopria*		1		
		Psephenus		1		
Decapoda	Cambaridae	*Cambarus*	1			1
Diptera	Chironomidae		4	3	7	4
	Tipulidae	*Tipula*	1	1		
Isopoda	Asellidae	*Caecidotea*		1		
Odonata	Gomphidae	*Lanthus*	1			
Megaloptera	Corydalidae	*Nigronia*				1
	Sialidae	*Sialis*				1
		TOTAL INDIVIDUALS	**22**	**110**	**56**	**13**
		TAXA RICHNESS	**10**	**12**	**8**	**9**
		Date	4/7/2014	4/15/2015	4/27/2016	4/25/2017
		Latitude	40.513889	40.513889	40.513889	40.513889
		Longitude	-79.41716	-79.41716	-79.41716	-79.41716

Kiskiminetas River Watershed				
			Marshall Run Above Trout Nursery	Marshall Run Above Trout Nursery
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae			1
		Baetis	7	
	Ephemerellidae	*Ephemerella*	87	65
		Eurylophella		3
	Heptageniidae	*Epeorus*	7	
		McCafferitum	3	
		Stenonema		4
Plecoptera	Capniidae	*Capnia*	1	
	Chloroperlidae	*Sweltsa*	1	
	Leuctridae	*Leuctra*		1
	Nemouridae	*Amphinemura*	34	4
	Perlidae	*Acroneuria*	4	1
	Perlodidae	*Clioperla*	2	
Trichoptera	Hydropsychidae	*Cheumatopsyche*	31	2
		Hydropsyche	62	6
	Philopotamidae	*Chimarra*	12	
	Polycentropodidae			7
		Cyrnellus	1	
	Psychomyiidae	*Lype*	7	
Coleoptera	Elmidae	*Macronychus*		36
		Microcylloepus	4	
		Optioservus	1	
		Stenelmis	2	
	Psephenidae	*Ectopria*	1	
Decapoda	Cambaridae	*Cambarus*	5	2
Diptera	Chironomidae		13	51
	Limnophila	*Limnophila*		11
	Limoniidae	*Hexatoma*	2	
	Muscidae			1
	Simuliidae	*Simulium*	9	
	Tipulidae	*Tipula*	4	
Megaloptera	Corydalidae	*Nigronia*	13	1
Odonata	Gomphidae	*Stylogomphus*		3
Oligochaeta			1	
		TOTAL INDIVIDUALS	**314**	**199**
		TAXA RICHNESS	**25**	**17**
		Date	4/27/2016	4/25/2017
		Latitude	40.52544	40.52544
		Longitude	-79.356722	-79.356722

Kiskiminetas River Watershed				
			Neal Run Upstream	**Neal Run Downstream**
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae	*Baetis*	2	
	Ephemerellidae	*Ephemerella*	4	
	Heptageniidae	*McCafferitum*	1	
	Isonychiidae	*Isonychia*	1	
	Leptophlebiidae	*Paraleptophlebia*	5	
Plecoptera	Chloroperlidae	*Suwallia*		1
	Nemouridae	*Amphinemura*	8	
		Nemoura	10	
Trichoptera	Hydropsychidae	*Cheumatopsyche*	5	
		Hydropsyche	4	
	Philopotamidae	*Chimarra*	1	
	Uenoidae	*Neophylax*	2	
Coleoptera	Elmidae	*Optioservus*	30	1
	Psephenidae	*Psephenus*	1	
Decapoda	Cambaridae	*Cambarus*	3	
Diptera	Chironomidae		36	
	Simuliidae	*Simulium*	9	
	Tipulidae	*Tipula*	3	
		TOTAL INDIVIDUALS	**125**	**2**
		TAXA RICHNESS	**17**	**2**
		Date	4/27/2015	4/27/2015
		Latitude	40.567869	40.555611
		Longitude	-79.297661	-79.292269

Kiskiminetas River Watershed				
			Reeds Run Above System	**Reeds Run Below System**
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae	*Acentrella*		2
		Baetis	7	
	Heptageniidae	*Epeorus*	12	
		McCafferitum	2	1
	Isonychiidae	*Isonychia*	1	
	Leptophlebiidae	*Paraleptophlebia*	7	
Plecoptera	Chloroperlidae	*Alloperla*		1
	Leuctridae	*Leuctra*	4	
	Nemouridae	*Amphinemura*	4	
	Perlidae	*Acroneuria*	4	
	Perlodidae	*Isoperla*	1	
Trichoptera	Apataniidae	*Apatania*		1
	Hydropsychidae	*Cheumatopsyche*	4	
	Odontoceridae	*Marilia*	3	
	Philopotamidae	*Chimarra*	6	
	Uenoidae	*Neophylax*	5	
Coleoptera	Elmidae	*Microcylloepus*	5	
		Optioservus	13	3
	Psephenidae	*Ectopria*	1	
		Psephenus	1	
Decapoda	Cambaridae	*Cambarus*	2	
Diptera	Athericidae	*Atherix*	1	
	Chironomidae		3	4
	Limoniidae	*Hexatoma*	6	
		Pseudolimnophila	4	
	Tipulidae	*Tipula*	3	
Megaloptera	Corydalidae	*Nigronia*	1	
Odonata	Gomphidae	*Lanthus*	3	
		TOTAL INDIVIDUALS	**103**	**12**
		TAXA RICHNESS	**25**	**6**
		Date	4/27/2015	4/27/2015
		Latitude	40.579589	40.575789
		Longitude	-79.275497	-79.276108

Kiskiminetas River Watershed				
			Roaring Run Upstream	Roaring Run Upstream
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae	*Baetis*	9	
	Ephemerellidae	*Ephemerella*	5	1
Plecoptera	Capniidae	*Capnia*	4	
	Nemouridae	*Amphinemura*	1	
Trichoptera	Hydropsychidae	*Ceratopsyche*		8
		Cheumatopsyche	3	
		Hydropsyche	5	
	Odontoceridae	*Marilia*	1	
	Philopotamidae	*Chimarra*	4	4
	Psychomyiidae	*Lype*		1
Basommatophora	Ancylidae	*Ferrissia*	1	
Coleoptera	Elmidae	*Microcylloepus*	24	
	Psephenidae	*Psephenus*	7	
Diptera	Chironomidae		19	5
	Dolichopodidae		2	
	Tipulidae	*Antocha*	2	
		Tipula	1	
Megaloptera	Corydalidae	*Nigronia*	2	1
Odonata	Gomphidae	*Stylogomphus*		1
		TOTAL INDIVIDUALS	**90**	**21**
		TAXA RICHNESS	**16**	**7**
		Date	4/24/2015	10/10/2015
		Latitude	40.564992	40.564992
		Longitude	-79.51657	-79.51657

Kiskiminetas River Watershed					
			Roaring Run Downstream	Roaring Run Downstream	Roaring Run Downstream
Order	**Family**	**Genus**			
Ephemeroptera	Baetidae	*Baetis*		1	1
	Ephemerellidae	*Ephemerella*			1
	Heptageniidae	*McCafferitum*		1	
Plecoptera	Chloroperlidae	*Alloperla*		6	
		Suwallia			1
	Perlidae	*Acroneuria*			5
Trichoptera	Hydropsychidae	*Ceratopsyche*			12
		Cheumatopsyche	4	2	7
		Hydropsyche		8	
	Philopotamidae	*Chimarra*			2
	Psychomyiidae	*Lype*	1		
Basommatophora	Ancylidae	*Ferrissia*			3
Coleoptera	Elmidae	*Microcylloepus*	2	4	4
		Optioservus	4	2	
	Psephenidae	*Ectopria*		1	
		Psephenus		1	
Diptera	Chironomidae		2	12	4
	Empididae	*Hemerodromia*		1	
	Tipulidae	*Antocha*			1
		Tipula	1	4	
Hirudinea					1
Megaloptera	Corydalidae	*Nigronia*			1
Oligochaeta				4	1
		TOTAL INDIVIDUALS	**14**	**47**	**44**
		TAXA RICHNESS	**6**	**13**	**14**
		Date	10/11/2012	4/24/2015	10/10/2015
		Latitude	40.551666	40.551666	40.551666
		Longitude	-79.535984	-79.535984	-79.535984

Kiskiminetas River Watershed				
			Wolford Run Above System	**Wolford Run Below System**
Order	**Family**	**Genus**		
Ephemeroptera	Baetidae	*Acentrella*		2
Trichoptera	Hydropsychidae	*Cheumatopsyche*	1	1
		Diplectrona		1
	Polycentropodidae	*Neureclipsis*	1	
Coleoptera	Elmidae	*Microcylloepus*	3	
Diptera	Chironomidae		3	
	Simuliidae	*Simulium*	1	
		TOTAL INDIVIDUALS	**9**	**4**
		TAXA RICHNESS	**5**	**3**
		Date	6/4/2015	6/4/2015
		Latitude	40.520182	40.520158
		Longitude	-79.494967	-79.492682

Back to Table of Contents

Appendix 6

Hot Acidity Explained

The following is an explanation of hot acidity provided by Richard Beam, Professional Geologist Manager, PA Department of Environmental Protection.

Acidity is a measurement of the amount of hydrogen ions that will be released during treatment, however, acidity is pH dependent. The acidity released when pH 3 mine drainage is adjusted to 7 is less then when adjusted to pH 9. So, acidity measurements are often reported along with a pH endpoint. Even though acidity titrations are performed using sodium hydroxide (NaOH), acidity measurements are commonly expressed as calcium carbonate equivalents (mg/L as $CaCO_3$). Theoretically, an acidity of 100 mg/L (to pH 8.3) as $CaCO_3$ indicates that the raw water pH would increase to 8.3 if 100 mg of pure $CaCO_3$ (calcite/limestone) was added to 1 Liter of water.

A laboratory Hot Acidity titration procedure is governed by Standard Methods 2310. A hot acidity titration is the most commonly used method to determine the pH and metal acidity of mine drainage. It is important to note that a hot acidity titration only measures pH, aluminum, iron, and manganese-based acidity and does not consider CO_2 acidity. In fact, the method specifically prevents appreciable amount of CO_2 acidity from being measured.

The first step in a hot acidity titration is to perform an alkalinity titration, if the water has measurable alkalinity. Acid is added to the raw water until a pH of 4.3 is achieved. The pH 4.3 endpoint is the point which bicarbonate is converted to carbonic acid. The amount of acid added to decrease the pH to 4.3 is directly proportional to the amount of alkalinity that was neutralized. The amount of acid consumed is recorded as alkalinity in terms of mg/L as $CaCO_3$. The next step involves adding a few drops of hydrogen peroxide (H_2O_2) and boiling the sample. The addition of hydrogen peroxide forces the oxidization of ferrous iron to ferric iron and subsequent precipitation as Ferric Hydroxide ($Fe(OH)_3$). The combination of adding H_2O_2 and boiling causes manganese oxidization and precipitation. The boiling also causes any CO_2 dissolved into the water to be exsolved to the atmosphere to prevent the titration from measuring CO_2-based acidity. After the sample is boiled and cooled, the water is titrated with NaOH to pH 8.3. The titration endpoint of pH 8.3 relates to the CO_2 system and represents the point at which carbonic acid is converted to bicarbonate. The amount of NaOH added is directly proportional to the amount of pH and metal acidity in the water. The hot acidity measurement is then calculated by subtracting the alkalinity value from the acidity value. Hot Acidity = Acidity – Alkalinity. So, hot acidity is a net result that considers alkalinity.

Back to Table of Contents

Appendix 7

Tips on Locating AMD Treatment Systems and Improving Their Efficiency

by Eric Null

Edited by Melissa Reckner

Since the original *Kiski-Conemaugh River Basin Conservation Plan* was published in 1999, conservatively, over $30 million dollars have been spent in the Kiski Basin on AMD treatment systems. In the late 1990s, the concepts of treatment system location and efficiency, as well as sustainable maintenance needs, were not fully understood due to the technology available. From 2005 until the present, new technology and methods for treatment and evaluation of efficacy have been developed, but the practices of the past still linger as the standard way of developing, evaluating, and maintaining treatment systems.

This section will provide a model for evaluating the location of future treatment systems and evaluating and improving the efficacy of existing treatment systems. There will be no reference to the types of systems to be used since technology, system options, and understanding are continually evolving. Rather, this section will discuss water chemistry, biological evaluation, and what is needed to remove toxic parameters. Most importantly, it can be used as a guide to evaluate if a treatment system is even relevant in an area.

Treatment History

In the 1990s, money for pollution abatement was much more available, and the science behind abatement was just being practiced. This era of treatment could be called the "Era of Money and Learning." This era was more focused on *if* we could treat the discharge, rather than *should* we treat it, resulting in many treatment systems that did not function due to highly polluted water, poor siting of systems, or insufficient contact/retention times. It was trying to treat the untreatable. This was the era of learning, so mistakes were made but allowed for future systems to operate more efficiently.

These early systems often used large tracks of land and were built sturdy enough and large enough to allow heavy machinery access to the site. The options for treatment systems were limited by the capacity of water sample collection through grab samples, the limitations of mapping software, and the understanding and modeling of hydraulic interactions. Biological monitoring was not used extensively during this period to evaluate pre and post stream conditions, as water chemistry was the main evaluation method. The resulting systems lend themselves to easier operation and maintenance due to the scale of the systems, but also to more failures due to errors in chemistry collection and site location. The systems that worked in this era are still operating today, but many never worked properly.

From 2000 to 2008, treatment system technology evolved drastically. New system designs had evolved that allowed treatment with lower head pressures, increased contact time with less space, and more accurate siting of installations. Better water quality monitoring equipment and the advancement of ArcGIS and HEC-RAS (Hydrologic Engineering Center River Analysis System) software programs allowed for more precise siting of hydraulics and monitoring.

While engineering software had upgraded significantly, money for systems was starting to decrease, though funding was still readily available. The school of thought of the 1990s-era still remained, only, the number of systems increased. Many systems were constructed in this time and old systems were retrofitted, but many were not fully evaluated, certainly not pre and post construction. In assessing data gaps for this plan, several discharges and receiving streams lacked sufficient water chemistry data, and many systems had no biological monitoring data before and/or after the treatment systems were installed. The results of this time period were the construction of many new systems that did not function due to inadequate data analysis before installation and to the poor location of the systems.

This era did begin the understanding of the relevance of biological monitoring of treated streams. Greater comprehension of the economic value of clean water occurred due to the increase in fishable and recreational waters in the Kiski Basin. Biological baseline data were being collected on the older systems to gauge operation and maintenance requirements. Assessments, such as the *Stonycreek River Watershed Reassessment* and Pennsylvania Coldwater Heritage Partnership projects had been funded. These projects allowed for the collection of much needed baseline data throughout select watersheds. Unfortunately, some new systems and their watersheds were lacking sufficient pre and post chemical and biological monitoring needed to evaluate the systems, which again, left some of these new systems prone to failure, just while the efficacy of older systems was beginning to be understood.

From 2008 to present, the available equipment, the design of treatment systems, and assessment and monitoring methodologies made huge advancements. Continuous water quality monitors are now available at relatively low costs, which allows for pre-assessment of chemistry and discharge flow rates to determine treatment system sizes and types. GPS and GIS software are pinpoint accurate allowing land area assessments to be completed with less time in the field. The available software and understanding of hydraulic interactions of deep mines and water tables have been revolutionized with accurate ground penetrating radar and software programs. Unfortunately, even though the technology and knowledge exist to perfect treatment systems, the money to assess, monitor and build systems has become very scarce, often taking multiple major funding sources to design and build a proper treatment system. Competition for funding has increased to the point that partial funding or no funding has become common. With the scarcity of funds, the utilization of the present technology and monitoring has been abandoned in some areas due to insufficient funds. This has caused the ways of the past - improper assessment, design, and siting - to continue.

In 2008, the Kiski Basin, as well as most of Pennsylvania, underwent an industrial resource revolution with shale gas development. Agencies and foundations were aware that proper baseline data in much of the Basin, where shale gas development would occur, did not exist.

Money became available for baseline biological and chemical monitoring to assess possible effects of the gas industry. This assessment money, along with more state efforts (biological and chemical sampling, Unassessed Waters Program), supported the acquisition of large-scale baseline data sets. These data yielded results that allowed groups and agencies to see the historical industrial, agricultural, and cultural pollution effects within the Kiski-Conemaugh River Basin. The data also made the evaluation of treatment systems possible by way of shale gas development occurring in some of the heavily mined areas. The tools, data, and methodologies now exist to design and locate new treatment systems in areas where maximum recovery will happen and to assess old treatment systems for operation and maintenance, retrofitting, or abandonment, based on biological and chemical assessment. The hurdles now are convincing groups to abandon the practices of the last 25+ years and changing the practice of designing and building treatment systems to match the technology and data that are available today.

Common Mistakes in Treatment System Building

The most common mistakes in building new treatment systems have manifested themselves more today than before due to the lack of funding available for such abatement problems. The common mistakes are listed below. These five mistakes can be easily solved if patience is maintained.

1. Inadequate pre-assessment of the site
2. Inadequate funding of a proper treatment system
3. Improper treatment system design
4. Non-realistic operation and maintenance expectations
5. No post biological monitoring of the system

Inadequate Pre-assessment of the Site

Every bad decision starts with a good idea and mine drainage treatment systems are no exception. Too often, when choosing a treatment site, all that is observed is the fairytale end result: the reclamation of a stream. This hopeful observance leads us to choose sites with little or no measurable outcomes due to the hope that we will abate drainage. With today's technology, there are no excuses to locate a treatment system in an area where very measureable results cannot be achieved. Using geographical, hydrological, and water quality software and instruments, we can assess the viability of the proposed location of a treatment system with very little field time and labor costs. In the past, treatment systems were placed in high profile areas - places where agencies and/or groups wanted to see remediation. Drainages were assessed and systems built, but then systems failed or did not perform enough to abate the drainage year-round. If seasonal, long-term chemical AND biological data were collected and evaluated at the discharges AND at the receiving streams, then designers would know if the drainage abatement would recover a large section of stream. This is a common occurrence in the Kiski Basin: treatment systems were installed using minimal data and either could not combat the extent of the drainage or did not influence the receiving waters due to larger "stream killing" drainages being present.

Gathering proper pre-assessment data is crucial to the success of a system. Collecting baseline chemical and biological data from the raw discharge and receiving waters can determine if a proposed system's impacts can restore the receiving water or if the receiving water or raw discharge will still be toxic, even after a system is installed. Flow rates of discharges are the most important data that can be gathered from a discharge. Long-term data logging measurements should be used year-round to capture many high flow events. Treatment systems are utilizing average or a percent-over-average flow to design a treatment system. This causes the system to fail or to be destroyed in high flow events. The several thousand dollar investment in pre-assessment data will ensure that the several hundred thousand dollar investment in a treatment system is used wisely.

Inadequate Funding of a Proper Treatment System

With funding for mine drainage abatement becoming more competitive and scarce, full, one-source funding of a well-designed treatment system is not common. Groups that do not receive full funding for the proper system may opt to decrease the system size or change the system to a cheaper design. This change inevitably will result in a partially functioning or completely failing system. Systems should be designed first, with cost second. If the proper system costs $500K, $300K will not treat the discharge. In AMD treatment, it's all or nothing.

Improper Treatment System Design

A common cause of improper treatment system design is the aforementioned lack of funding for the proper system. Another is the realistic concept of the severity of the discharge. Today's technological advancements in treatment system design are able to treat worse discharges with smaller areas than in the past. This does not mean that all systems are small. Not all systems can be passive, while not all can be active. For example, you cannot treat a large 1000 GPM hot acidic discharge with a limestone doser effectively, since the doser will periodically empty, and, once empty, the discharge returns to its prior, untreated toxic levels, unless you bury a long reach of the stream bed in limestone dust, and this would not be practical. Also, you would not try to treat an impacted, second-order stream with a treatment system when the cause of the impacts is a point source discharge. You would also not treat a non-point source impact with a point source treatment system, e.g. a SAP system. Treatment system designs should be vetted through multiple sources and professions to narrow the system to the most effective and practical to install, operate, and maintain. Average flows should never be considered as a design criteria for maximum treatment. High flows should base the design so that the system works effectively in all water levels. The size and location of the discharge should be evaluated very closely. For example, you would not construct a system that required over 20,000 cubic yards (over 1,110 triaxle loads) of material to be moved via a long forest road. The cost of excavation, road building, road bonding, and the impact to the forest would be greater than resulting treatment of the discharge. Discharges requiring large excavation should be studied very carefully. If the scale is too large to treat conventionally, a large active system may be needed, or, perhaps patience is needed while waiting on a new treatment technology to be developed.

Non-realistic Operation and Maintenance Expectations

Many treatment systems work great initially but fail due to the inability to maintain the system because of either poor design for maintenance or a lack of funding. Having a realistic concept of O&M cost of the proposed treatment system should be the first cost assessed. The most common mistake is assessing the upfront cost of the system and attaining the money needed only to find out after the system is built that the maintenance is overwhelming, expensive, or impossible. For example, sometimes systems are not designed to support the heavy machinery necessary to clean the system or to allow for frequent flushing and retention of system clogging, life inhibiting metals. Passive systems should be built so equipment large enough to maintain the system (i.e. clean or turn stone) can be operated within the system without damaging the system. Passive systems usually do not need to be cleaned often, but when maintenance is required, the cost of maintenance must be low and achievable to ensure that the system does not fail and the receiving waters are not lost. $50K for O&M of a passive system is not sustainable unless ear-marked money has already been received so work may immediately begin to not compromise restored life in the receiving stream.

Active systems require constant maintenance and incur continuous costs. If these systems are not maintained, the receiving waters will immediately revert back to the original polluted state and destroy any recovery of life in the receiving stream. Lime dosers, slurry tanks, and hydroxide tanks need to be filled and checked regularly, in all weather conditions, to ensure that any electrical or hydraulically-driven mechanisms are working properly. If these systems have even a small malfunction, then raw, polluted water will be discharged into the receiving stream. Elaborate active systems are very effective at treating large hot discharges, but require full-time monitoring and maintenance that only governmental level staff or private industry can afford to maintain. A watershed association or local governmental entity need to be aware that active systems in remote locations will also need to be regularly maintained; therefore, special, expensive equipment will be needed to access these remote locations in the winter and wet periods of the year. The cost of maintenance for active systems should be calculated and evaluated before the system is ever proposed to funders to ensure that adequate labor and money are available to sustain the system.

All systems' O&M costs need to be evaluated before seeking funding for the systems construction. The question of, "Can we get enough money when we need it to maintain the system?" should be asked before any construction money is sought. If the answer to this question is, "No," then an alternative system that will operate correctly and require less funding to sustain O&M should be assessed.

No Post Biological Monitoring of the System

Throughout the composition of this document, a neglectful trend in treatment systems was noticed. Many treatment systems in the Kiski Basin had very little or no biological monitoring within the receiving waters to assess treatment efficacy. Chemical data on treatment systems and receiving waters exist, but long-term episodic monitoring of receiving waters is rare. When a treatment system is installed, biological assessment upstream of the untreated water and downstream of the mixing zone of the treatment effluent should be completed within the first year of the system being online and at least every other year afterward until biological integrity is restored.

Some of the systems that were biologically assessed for this document marked the first time biological assessment was completed on these systems since their installation. Too many of these systems had not improved the biological integrity of the receiving waters or had failed due to poor design or a lack of maintenance. The culprit for many systems is their inability to handle large flow events, while other systems failed gradually due to poor O&M. The biological communities will show the recovery or degradation of the system due to their sensitivity to pollution. The biological community's recovery can indicate the success of a system and its degradation can indicate when O&M is needed.

Water chemistry has been sampled throughout the history of treatment systems in the Kiski Basin, but not enough of the sampling has focused on episodic events such as extreme high and extreme low flows. One degrading event can render the stream's biological community severely impaired, if not dead. Grab sampling has been effective, but relies on people's ability to be in the field at the time of an episode, which may occur at night or during a dangerous flow period when it's not safe to be out. With today's continuous water quality monitoring technology being more affordable and user-friendly, there is now the ability to monitor long periods of time within the stream. Long-term, continuous monitoring equipment should be initially deployed to assess a treatment system's efficacy and then subsequently deployed when a possible problem with the system is detected through biological or chemical sampling. Utilizing proper biological and long-term continuous monitoring for chemical parameters can track a treatment system's success and also pinpoint when and what type of O&M will be needed to the system long before the system completely fails.

General Guide for Prioritizing Treatment System Locations

The location where a treatment system is built has been governed by many factors in the past 20 years, including the pollution source, access, profile, cost, and area available. The factors that historically were less considered were biological recovery potential, feasibility of proposed treatment (construction and O&M), area of recovery potential, and economic gain of recovery effort. Due to advancements in technology and greater biological knowledge, we can better model and predict the potential of our treatment efforts more precisely. Even using the best technology requires a good base to build a system. The following are general guidelines to use to achieve the maximum efficiency and recovery per dollar spent on treatment.

Start from the Top

Begin evaluating for potential new treatment systems in the headwater tributaries of a watershed. These impacted small streams are usually cheaper and easier to remediate than the larger streams. Often, mildly polluted, small streams are overlooked in order to install treatment on larger discharges. If the small streams are remediated, then the cost of larger treatment systems for larger discharges may decrease, since the smaller upstream systems allow for some pre-treatment before the larger discharge enters the stream. This treatment can lessen your cost of the larger system. Common sense will indicate that if a stream is dead in its headwaters and dead in its larger water from multiple discharges, then treating a discharge in the middle first will not achieve much since it will have to combat the upstream and downstream discharges to recover any area of stream. The headwaters are also where the most miles of stream can be recovered due to the small size of the waterway. Everything that helps the headwaters will help the entire stream. The headwater sections are also the beginning of a healthy food web for the entire stream. Impacted headwaters may reduce the amount of Coarse Particulate Organic Matter (CPOM) being deposited into the higher order receiving water, which can decrease the amount of available food in the watershed's aquatic food web.

Assess Whether the Discharge is a River Killer

When a discharge is found that appears to need treatment, assessment must be performed to determine if the discharge is actually impacting the receiving waters. There are examples of systems in the Kiski Basin that were built on discharges that did not noticeability impact the biological integrity or water quality of the receiving water. Some discharges may look bad at their source, but may not impact the biota of the stream. Biological assessment is needed upstream and downstream of the discharge to determine if the discharge impacts the receiving waters. If a discharge has not impacted the biological community severely, then it is time to move on and find a discharge that has large negative impacts on its receiving waters.

Feet = Debt, Miles = Economic Prosperity

Treatment systems should not be installed in areas where stream recovery is minimal. A system that only recovers yards of drainage is a debt sink. Treatment systems should be constructed where the maximum number of stream miles can be recovered and sustained. One mile of fishery can be worth over $250,000 for the economy per year. If three miles of fishery can be recovered and sustained for $400,000, then it is a wise economic investment for the community.

Don't Treat What You Can't Afford to Sustain

Large robust treatment systems are eye catching and have potential to recover miles of stream. They are also very expensive to maintain. When treatment is proposed, the first cost that should be determined is O&M. If sustainable funding is not available to operate and maintain the system, then the system should not be built. There will always be new technology developed that can treat the discharge cheaper and more effectively in the future. The only thing worse than a river killing discharge is investing in a treatment system and recovering the river only to allow the system to fail due to excessive maintenance costs and for the stream to die once again.

Just Because You Can Doesn't Mean You Should

Just because you have acquired money to build a treatment system does not mean you should build it. If the design is unsustainable, too small, or the wrong type of system that should be built, then it is better to give the funding back. If funding is used on a lost cause due to design flaws or that the system installed will not recover any significant stream miles, then, by spending that money, you are taking a fishery and water source from someone that does have the proper site and design. This reinforces that designs must be vetted by multiple experts in multiple fields of study and that proper assessments must be performed on a proposed treatment site before applying for construction funding. Experts like engineers, biologists, hydrologists, and geologists should be consulted on any treatment design. You would not take a mechanics diagnosis about your health, so why should you take an engineer's evaluation on biology?

Lost Causes are for Losers; Leave Emotion at Home and Bring Common Sense to the Field

It is human nature to not want to quit and let emotion guide us. People are pre-programmed to trudge forward to try and accomplish a goal, while emotionally blocking that some tasks are insurmountable. Mine drainage treatment systems are the same. Those of us working in this field have strong emotional attachment to certain waterways. This attachment can lead us on a crusade that ends in failure. Too often groups want to tackle huge discharges that require immense amounts of money for construction and O&M. These giant discharges may not even respond to the treatment that is proposed, while upstream, or not far away from that monster discharge, lie many discharges that can be easily treated and recover miles of stream. Sinking all of your resources into a system that is not sustainable is wasteful and not logical when many watersheds have abundant discharges that can be treated sustainably and recover just as many stream miles. In this field, individuals must be in to win and winners do not shoot from half court in the first period; they slam dunk the ball all game long. Look for the causes and crusades that can be won and be patient with the ones that cannot be won at this time, for in the future, technology will evolve that will allow for the treatment of the lost causes of today.

Biology Matters

The most important part and result of treatment efforts is the recovery of the biological communities of the stream. The living organisms within a body of water tell us its pollution history and its success in recovery. Water chemistry grab sampling is a great way to measure efficacy of a treatment system at a specific point in time, but the biology must live in the stream 24/7; therefore, any short comings in the treatment system will be seen directly in the biological community. It's not hard to treat and purify a glass of water; it is very hard to treat a discharge that can range from 100 GPM to 1000 GPM. The only goal that should be set to assess treatment success is the recovery of life, since without its recovery, our use of the water is impaired.

Back to Table of Contents

Appendix 8

According to the Pennsylvania Natural Heritage Program (PNHP) website, the PNHP, "inventories and maintains a list of all plant and wildlife species, plant communities, and geologic features in the Commonwealth of Pennsylvania for which there is conservation concern. The PNHP inventories include Rare, Threatened, and Endangered species, as well as species with unique or specific habitat needs or declining populations."

The following table represents the list of species or communities inventoried by the PNHP in the Kiskiminetas and Conemaugh River watersheds and is up to date as of July 2017.

The following are available definitions of the ranks and codes used by PNHP.

Federal Status

LE - Listed Endangered - A species which is in danger of extinction throughout all or a significant portion of its range.

LT - Listed Threatened - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

State Status

DL - Delisted - Species which were once listed but are now cited for delisting.

N - No current legal status exists, but is under study for future listing.

PC - Animals that could become endangered or threatened in the future. All of these are uncommon, have restricted distribution or are at risk because of certain aspects of their biology.

PE - Pennsylvania Endangered - Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania if the deleterious factors affecting them continue to operate.

PR - Pennsylvania Rare - Species which are uncommon in Pennsylvania.

PT - Pennsylvania Threatened - Species which may become endangered throughout most or all of their natural range within Pennsylvania if critical habitat is not maintained or if the species is greatly exploited by man.

PV - Pennsylvania Vulnerable - Species which are in danger of population decline within Pennsylvania because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.

PX - Pennsylvania Extirpated - Species believed to be extinct within Pennsylvania that may or may not exist outside Pennsylvania.

TU - Tentatively Undetermined - Species believed to be in danger of population decline, which cannot presently be included within another classification due to taxanomic uncertainties, limited evidence within historical records, or insufficient data.

Pennsylvania Biological Survey (PBS) Status

CA - Candidate at Risk - Species that although relatively abundant now are particularly vulnerable to certain types of exploitation or environmental modification.

CP - Candidate Proposed - Species comprising taxa for which the PBS currently has substantial information on hand to support the biological appropriateness of proposing to list as Endangered or Threatened.

CR - Candidate Rare - Species which exist only in one of a few restricted geographic areas or habitats within Pennsylvania, or they occur in low numbers over a relatively broad area of the Commonwealth.

CU - Condition Undetermined - Species for which there is insufficient data available to provide an adequate basis for their assignment to other classes or categories.

N - No current legal status, but is under study for future listing.

PE - Pennsylvania Endangered - Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania if the deleterious factors affecting them continue to operate.

PR - Pennsylvania Rare - Plant species which are uncommon within this Commonwealth. All species of the native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included.

PT - Pennsylvania Threatened - Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the species are abated.

PV - Pennsylvania Vulnerable - Species which are in danger of population decline within Pennsylvania because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.

PX - Pennsylvania Extirpated - Species that have disappeared from Pennsylvania since 1600 but still exist elsewhere.

SP - Special Populations - An informal code for when a species is being looked at more closely by some botanists but no formal proposal for status change has been made, or for a species has been "downgraded" but on which botanists still wish to keep an eye.

TU - Tentatively Undetermined - Refers to a classification of plant species which are believed to be in danger of population decline, but which cannot presently be included with another classification due to taxonomic uncertainties, limited evidence within historical records, or insufficient data.

W - Watch - A plant species that botanists have deemed worthy of looking more closely at but have not made a formal designation at this time, or for plants that have been downgraded but botionists still wish to draw attention to for a time. Often interchangeable with the use of "SP" on the PNHP site (Bowen).

The following table is color coded to indicate in which watershed the species is listed.

Conemaugh River Watershed
Kiskiminetas River Watershed
Both the Conemaugh and Kiskiminetas River Watersheds

Scientific Name	Common Name	Federal Status	State Status	PBS Status	G Rank	S Rank
Houstonia serpyllifolia	Creeping Bluets		N	PE	G4?	S1
Astragalus canadensis	Canadian Milkvetch		N	PE	G5	S1
Salix caroliniana	Carolina Willow		N	PE	G5	S1
Veratrum virginicum	Virginia Bunchflower		N	PE	G5	S1
Myotis sodalis	Indiana Bat	LE	PE	PE	G2	S1
Pycnanthemum torrei	Torrey's Mountain-mint		PE	PE	G2	S1
Polemonium vanbruntiae	Jacob's-ladder		PE	PE	G3G4	S1
Cymophyllus fraserianus	Fraser's Sedge		PE	PE	G4	S1
Listera smallii	Kidney-leaved Twayblade		PE	PE	G4	S1
Populus balsamifera	Balsam Poplar		PE	PE	G5	S1
Glyceria obtusa	Blunt Manna-grass		PE	PE	G5	S1
Carex aurea	Golden-fruited Sedge		PE	PE	G5	S1
Cryptotis parva	North American Least Shrew		PE	PE	G5	S1
Eleocharis tuberculosa	Long-tubercled Spike-rush		PX	PE	G5	S1
Parthenium integrifolium	American Fever-few		TU	PE	G5	S1
Meehania cordata	Heartleaf Meehania		TU	PE	G5	S1
Spiranthes tuberosa	Little Ladies'-tresses		TU	PE	G5	S1
Hypericum drummondii	Nits-and-lice		TU	PE	G5	S1
Amelanchier humilis	Serviceberry		TU	PE	G5	S1
Ribes lacustre	Swamp Currant		TU	PE	G5	S1
Arabis hirsuta	Western Hairy Rock-cress		TU	PE	G5	S1
Rosa virginiana	Virginia Rose		TU	TU	G5	S1
Myotis septentrionalis	Northern Long-eared Bat	LT		CR	G4	S1
Caecidotea franzi	Franz's Cave Isopod				G2G4	S1
Caecidotea kenki	An Isopod				G3	S1
Stylurus scudderi	Zebra Clubtail				G4	S1
Lasionycteris noctivagans	Silver-haired Bat			CR	G5	S1
Myotis lucifugus	Little Brown Bat				G5	S1
Bat Hibernaculum	Winter Bat Colony				GNR	S1

Scientific Name	Common Name	Federal Status	State Status	PBS Status	G Rank	S Rank
Ixobrychus exilis	Least Bittern		PE	PE	G5	S1B
Bartramia longicauda	Upland Sandpiper		PE	PE	G5	S1B
Asio flammeus	Short-eared Owl		PE	PE	G5	S1B,S3N
Stellaria borealis	Mountain Starwort		N	PT	G5	S1S2
Filipendula rubra	Queen-of-the-prairie		TU	TU	G4G5	S1S2
Paronychia fastigiata var. nuttallii	Forked-chickweed		TU	PE	G5T3T5	S1S2
Viburnum trilobum	Highbush-cranberry		TU	PT	G5T5	S1S2
Calopteryx angustipennis	Appalachian Jewelwing				G4	S1S2
Gomphus descriptus	Harpoon Clubtail				G4	S1S2
Anax longipes	Comet Darner				G5	S1S2
Cypripedium parviflorum var. parviflorum	Southern Small Yellow Lady's-slipper			PV	G5T3T5	S1S2
Juniperus communis var. depressa	Dwarf Juniper			PE	G5T5	S1S2
Isoetes valida	Quillwort		N	PR	G4?	S1S3
Solidago uliginosa	Bog Goldenrod		N	PT	G4G5	S2
Lathyrus venosus	Veiny Pea		N	PE	G5	S2
Baptisia australis	Blue False-indigo		N	PT	G5	S2
Eurybia radula	Rough-leaved Aster		N	PT	G5	S2
Goodyera repens	Lesser Rattlesnake-plantain		N	PX	G5	S2
Liatris scariosa	Round-head Gayfeather		N	PT	G5?	S2
Pleurobema clava	Clubshell	LE	PE	PE	G1G2	S2
Thalictrum coriaceum	Thick-leaved Meadow-rue		PE	PT	G4	S2
Muhlenbergia uniflora	Fall Dropseed Muhly		PE	PT	G5	S2
Passiflora lutea	Passion-flower		PE	PT	G5	S2
Solidago roanensis	Tennessee Golden-rod		PR	PT	G4G5	S2
Myotis leibii	Eastern Small-footed Bat		PT	PT	G3	S2
Neotoma magister	Allegheny Woodrat		PT	PT	G3G4	S2
Euphorbia polygonifolia	Small Sea-side Spurge		PT	PT	G5?	S2
Sorex palustris punctulatus	West Virginia Water Shrew		PT	PT	G5T3	S2
Cuscuta cephalanthi	Button-bush Dodder		TU	PT	G5	S2
Trillium flexipes	Declined Trillium		TU	PT	G5	S2
Platanthera peramoena	Purple-fringeless Orchid		TU	PT	G5	S2

Scientific Name	Common Name	Federal Status	State Status	PBS Status	G Rank	S Rank
Castilleja coccinea	Scarlet Indian-paintbrush		TU	PT	G5	S2
Platanthera ciliaris	Yellow-fringed Orchid		TU	PT	G5	S2
Gomphus abbreviatus	Spine-crowned Clubtail				G3G4	S2
Gomphus rogersi	Sable Clubtail				G4	S2
Somatochlora elongata	Ski-tailed Emerald				G5	S2
Trillium x 1	Reserved for Trillium erectum x flexipes			PT	GNA	S2
Spiza americana	Dickcissel		PE	PE	G5	S2B
Asio otus	Long-eared Owl		PT	PT	G5	S2B,S2 S3N
Circus cyaneus	Northern Harrier		PT	PT	G5	S2B,S4 N
Prunus alleghaniensis	Alleghany Plum		N	PT	G4	S2S3
Pieris virginiensis	West Virginia White				G3?	S2S3
Cryptobranchus alleganiensis alleganiensis	Eastern Hellbender				G3G4T 3T4	S2S3
Stygobromus allegheniensis	Allegheny Cave Amphipod				G5	S2S3
Antennaria virginica	Shale Barren Pussytoes		N	PR	G4	S3
Ranunculus ambigens			N	TU	G4	S3
Ranunculus ambigens			N	TU	G4	S3
Smallanthus uvedalia	Leaf-cup		N	PR	G4G5	S3
Ageratina aromatica	Small White-snakeroot		N	PR	G5	S3
Rudbeckia fulgida	Eastern Coneflower		N	PT	G5	S3
Chionanthus virginicus	Fringe-tree		N	PT	G5	S3
Prenanthes serpentaria	Lion's-foot		N	PT	G5	S3
Spiranthes lucida	Shining Ladies'-tresses		N	PT	G5	S3
Juncus debilis	Weak Rush		N	PT	G5	S3
Penstemon laevigatus	Beard-tongue		N	TU	G5	S3
Elymus trachycaulus	Slender Wheatgrass		N	TU	G5	S3
Trillium nivale	Snow Trillium		PR	PR	G4	S3
Pyrularia pubera	Buffalo-nut		PR	PR	G5	S3
Lupinus perennis	Lupine		PR	PR	G5	S3
Actaea podocarpa	Mountain Bugbane		PT	PR	G4	S3
Hypericum densiflorum	Bushy St. John's-wort		PT	PR	G5	S3
Andropogon glomeratus	Bushy Bluestem		TU	PR	G5	S3
Uvularia pudica	Mountain Bellwort		TU	PR	G5	S3
Oxypolis rigidior	Stiff Cowbane		TU	PR	G5	S3
Cotton-grass Poor Fen	Cotton-grass Poor Fen				G3	S3

Scientific Name	Common Name	Federal Status	State Status	PBS Status	G Rank	S Rank
Tachopteryx thoreyi	Gray Petaltail				G4	S3
Hesperia leonardus	Leonard's Skipper				G4	S3
Lanthus parvulus	Northern Pygmy Clubtail				G4	S3
Necturus maculosus	Mudpuppy				G5	S3
Boyeria grafiana	Ocellated Darner				G5	S3
Alder - ninebark wetland	Alder - ninebark wetland				GNR	S3
Hemlock Palustrine Forest	Hemlock Palustrine Forest				GNR	S3
High-gradient clearwater creek	High-gradient Clearwater Creek				GNR	S3
Sphagnum - Beak-rush Peatland	Sphagnum - Beak-rush Peatland				GNR	S3
Haliaeetus leucocephalus	Bald Eagle		DL	PT	G5	S3B
Pandion haliaetus	Osprey		PT	PT	G5	S3B
Gallinula galeata	Common Gallinule			CA	G5	S3B
Porzana carolina	Sora			CR	G5	S3B
Rallus limicola	Virginia Rail				G5	S3B
Crotalus horridus	Timber Rattlesnake		PC	DL	G4	S3S4
Viola appalachiensis	Appalachian Blue Violet		PT	PR	G4	S3S4
Glyptemys insculpta	Wood Turtle				G3	S3S4
Lampsilis fasciola	Wavy-rayed Lampmussel			N	G5	S3S4
Sympetrum semicinctum	Band-winged Meadowhawk				G5	S3S4
Agkistrodon contortrix	Copperhead				G5	S3S4
Anaxyrus fowleri	Fowler's Toad				G5	S3S4
Regina septemvittata	Queen Snake				G5	S3S4
Chlosyne nycteis	Silvery Checkerspot				G5	S3S4
Sympetrum obtrusum	White-faced Meadowhawk				G5	S3S4
Ardea herodias	Great Blue Heron				G5	S3S4B, S4N
Juglans cinerea	Butternut		N	SP	G4	S4
Stenanthium gramineum	Featherbells		N	W	G4G5	S4
Conoclinium coelestinum	Mistflower		N	SP	G5	S4
Helianthus microcephalus	Small Wood Sunflower		N	SP	G5	S4
Cuscuta pentagona	Field Dodder		N	W	G5	S4
Culaea inconstans	Brook Stickleback		PC	CP	G5	S4
Lampetra aepyptera	Least Brook Lamprey		PC	CR	G5	S4

Scientific Name	Common Name	Federal Status	State Status	PBS Status	G Rank	S Rank
Prenanthes crepidinea	Crepis Rattlesnake-root		PE	SP	G4	S4
Orontium aquaticum	Golden Club		PR	SP	G5	S4
Najas gracillima	Bushy Naiad		PT	SP	G5?	S4
Panax quinquefolius	Wild Ginseng		PV	PV	G3G4	S4
Hydrastis canadensis	Golden-seal		PV	PV	G4	S4
Ophioglossum vulgatum	Adder's Tongue		PX	SP	G5	S4
Saxifraga micranthidifolia	Lettuce Saxifrage		TU	SP	G5	S4
Salix petiolaris	Meadow Willow		TU	SP	G5	S4
Tradescantia ohiensis	Ohio Spiderwort		TU	SP	G5	S4
Sorex dispar	Long-tailed Shrew				G4	S4
Sorex dispar	Long-tailed Shrew				G4	S4
Carex conjuncta				SP	G4G5	S4
Liochlorophis vernalis	Smooth Green Snake				G5	S4
Asclepias purpurascens				SP	G5?	S4
Black cherry - northern hardwood forest	Black cherry - northern hardwood forest				GNR	S4
Hemlock - tuliptree - birch forest	Hemlock - tuliptree - birch forest				GNR	S4
Sugar maple - basswood	Sugar maple - basswood				GNR	S4
Tuliptree- beech - maple forest	Tuliptree- beech - maple forest				GNR	S4
Mustela nivalis	Least Weasel			CU	G5	S5
Hemlock (white pine) - northern hardwood forest	Hemlock (white pine) - northern hardwood forest				GNR	S5
Clonophis kirtlandii	Kirtland's Snake		PE	PE	G2	SH
Chenopodium capitatum	Strawberry Goosefoot		TU	PE	G5	SH
Viola tripartita	Three-parted Violet		TU	PX	G5	SH
Drainage patterns	Drainage Patterns				GNR	SNR
Erosional remnant	Erosional Remnant				GNR	SNR
Waterfalls and Rapids	Waterfalls and Rapids				GNR	SNR
Citheronia regalis	Regal Moth				G4G5	SU
Rhododendron calendulaceum	Flame Azalea		PX	PX	G5	SX
Polyodon spathula	Paddlefish			PX	G4	SX

Back to Table of Contents

Appendix 9

Kiski-Conemaugh River Basin Passive AMD Treatment Systems
December 2017

Stonycreek River Watershed

1. Adams #6
2. Boswell
3. Cottagetown
4. Flight 93 Lamberts Run
5. Heinemyer
6. Jenner
7. Lamberts Run
8. Lion Mining
9. Moore No. 7
10. Onstead
11. Oven Run Site A
12. Oven Run Site B
13. Oven Run Site D
14. Oven Run Site E
15. Oven Run Site F
16. Reitz #1
17. Reitz #3 Ditch
18. Rock Tunnel
19. Shingle Run
20. Swallow Farm
21. Weaver Run D8A
22. Weaver Run D8B
23. Weaver Run D10

Blacklick Creek Watershed

1. AMD&Art
2. Coal Pit A
3. Coal Pit B
4. Laurel Run #1
5. Laurel Run #2
6. Lucerne 3A
7. Penn Hills 2A
8. Penn Hills 2B
9. Penn Hills 2C
10. Richards 1
11. Richards 2A
12. Richards 2B
13. Tide
14. Webster
15. Yellow Creek 1-A
16. Yellow Creek 1-B
17. Yellow Creek 2-A
18. Yellow Creek 2-B
19. Yellow Creek 2-C

Little Conemaugh River Watershed

1. Beaverdale #1
2. Beaverdale #2
3. Beaverdale #3
4. Brence's Pond
5. Puritan
6. Saltlick Run

Conemaugh River Watershed

1. Gray Run
2. Neal Run
3. Reeds Run
4. SR286

Loyalhanna Creek Watershed

1. Friedline
2. Keystone
3. Laurel Run
4. Monastery Run #1
5. Monastery Run #2
6. Monastery Run #3
7. Upper Latrobe

Kiskiminetas River Watershed

1. Big Run #2
2. Big Run #3
3. Big Run #7
4. Big Run #8
5. Booker
6. Kolb
7. Whisky Run #9
8. Wolford Run

Back to Table of Contents

Appendix 10

Ammocoete
(Lamprey larvae)

Brown bullhead

John Ferraro holding a freshwater drum

Johnny darter

Berkebile Run Brook Trout

Brown trout snacking

Melissa Reckner, Eric Null, and John Linkes survey McGee Run
Photo by Chelsea Walker

Brook trout

Brook trout

Mallard

Loyalhanna Discharge

Dr. William Kimmel and Cal U students survey the Conemaugh River in Seward

Damselfly

Caddisfly cases cover a rock

Orb spider

A stonefly nymph that just passed from one instar to the next, hence the white coloration

Awesome patchwork on this caddisfly larva case

South Fork Bens Creek


Carnahan Run


KC Sojourners


Shade
Creek

Great blue heron


Wild Geranium


Trillium


Cardinal Flower


Fringed Polygala

Pheasant

Ruffed grouse

Buck

Autumn Splendor

Steve Grodis, right, helps Josh Penatzer with a fish survey

Melissa Reckner smiles with Art Grguric, who was named 2014 Man of the Year by Pennsylvania Outdoor News. Photo by Tracy Richards

Charlie Moyer tests a water sample

Dave Beale, left, and Eric Null
install a data logger on Hulings Run

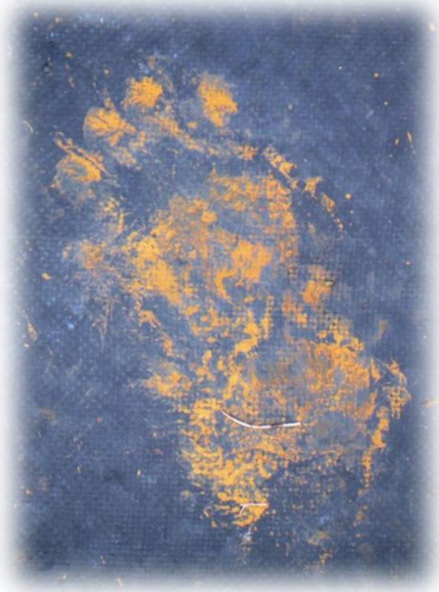
Larry Hutchinson tests a
water sample

Melissa Reckner, right, surprised Chelsea Walker with the Armstrong Conservation District's 2017 Outstanding Watershed Individual Award. Photo courtesy ACD

Melissa Reckner and Eric Null, center, accept the PA Governor's Award for the Kiski-Conemaugh Stream Team from Davitt Woodwell, left, and John Quigley, right. Photo courtesy Pennsylvania Environmental Council

John and Sue Linkes pose with a 2016 River Heroes Award presented to John by the River Network

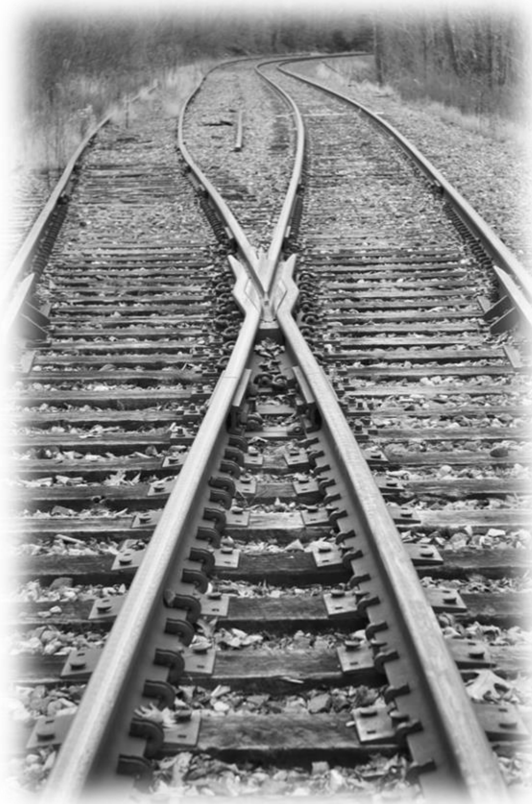
Beaverdam Run, Somerset County



Bear tracks in iron oxide

Beech trees

Sample bottles prepped.
Photo by Charlie Moyer



Snapping turtle


Kiski Basin Sunset


Good night!