

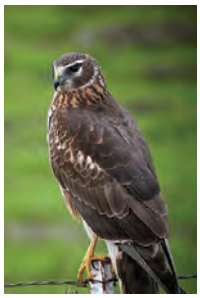


Mahoning River Watershed Conservation Plan

June 2013

Lawrence County, Pennsylvania

Photograph by Tim Lyons

Mahoning River Watershed Conservation Plan

April 2013

Prepared for:

Mahoning River Watershed Community

Prepared by:

Lawrence County Planning Department

&

LAWRENCE COUNTY CONSERVATION DISTRICT

Lawrence County Government Center
430 Court Street
New Castle, PA 16101

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- Lawrence County Planning Department
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- Lawrence County Historical Society
- Lawrence County Cooperative Extension
- Lawrence County Commissioners
- Lawrence County Economic Development Corporation

- Pennsylvania Department of Conservation & Natural Resources
- Pennsylvania Department of Environmental Protection
- Pennsylvania Fish & Boat Commission
- Pennsylvania Game Commission
- United States Department of Agriculture Natural Resources Conservation Service
- Western Pennsylvania Conservancy

- Bessemer Borough
- City of New Castle
- Mahoning Township
- North Beaver Township
- Pulaski Township
- Taylor Township
- Union Township

- Mahoning River Watershed Conservation Planning Committee
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  - Megan Gahring
  - Robin Kirkwood
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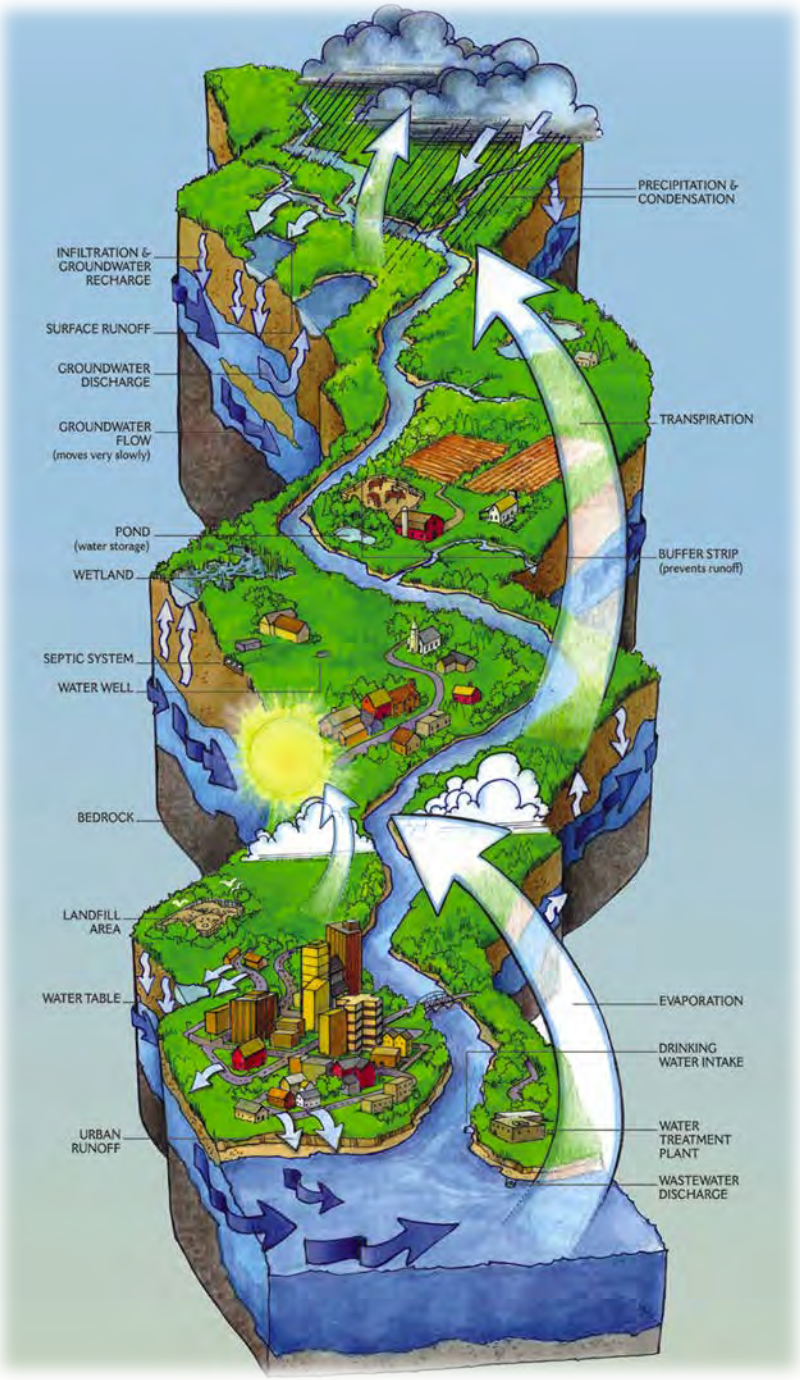
ACRONYMS

AMD	Abandoned Mine Drainage
ASA	Agricultural Security Area
ATV	All-Terrain Vehicle
BDA	Biological Diversity Area
BMP	Best Management Practices
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CREP	Conservation Reserve Enhancement Program
CSO	Combined Sewer Overflow
CWF	Cold Water Fishery
DCNR	Pennsylvania Department of Conservation and Natural Resources
DEP	Pennsylvania Department of Environmental Protection
E&S	Erosion and Sedimentation
KARE	Keystone Aquatic Resource Education
LCA	Landscape Conservation Areas
LWV	League of Women Voters
MIB	Methylisoborneol
MSA	Mahoning Sportsmen's Association
NEEAC	National Environmental Education Advisory Council
NFIP	National Floodplain Insurance Program
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	Natural Resource Conservation Service
OhioEPA	Ohio Environmental Protection Agency
OSM	United States Department of Interior Office of Surface Mining
PABS	Pennsylvania Biological Survey
PCB	Polychlorinated biphenyl
PDE	Pennsylvania Department of Education
PEACCE	Pennsylvania's Environmental Agricultural Conservation Certificate of Excellence
PENNVEST	Pennsylvania Infrastructure Investment Authority
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
PHMC	Pennsylvania Historic Museum Commission
PNHP	Pennsylvania Natural Heritage Program
RCRA	Resource Conservation and Recovery Act
RUS	Rural Utility Service
SEO	Sewage Enforcement Officer

SSWAP	Statewide Surface Water Assessment Program
TMDL	Total Maximum Daily Load
US EPA	United States Environmental Protection Agency
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Service
WNV	West Nile Virus
WPCAMR	Western Pennsylvania Coalition for Abandoned Mine
WWF	Warm Water Fishery

WATERSHED DEFINITION

A watershed can be defined as the area of land that drains to a particular point along a stream. Each stream has its own watershed. Land use is the key element affecting this area of land. The boundary of a watershed is defined by the highest elevation surrounding the stream. A drop of water falling outside of the boundary will drain to another watershed.



Courtesy of Conservation Ontario

EXECUTIVE SUMMARY

Project Background

Located in northwestern Pennsylvania and northeastern Ohio, the Mahoning River joins the Shenango River in Lawrence County, Pennsylvania to form the Beaver River. It is rich in natural and recreational resources. The watershed suffers from erosion and sedimentation, nutrient loading, inadequate septic and sewage systems, mine drainage, and pollution issues from past industries.

In 2007, Lawrence County's regional advisor at DCNR approached the County to apply for funding to complete a conservation plan for the Mahoning River watershed. After adoption of the Mahoning River Watershed Conservation Plan (herein referred to as watershed conservation plan), all of the watersheds in Lawrence County will have conservation plans.

In 2008, Lawrence County received a grant from the Pennsylvania Department of Conservation and Natural Resources (DCNR) to partially fund the watershed conservation plan. Lawrence County also applied for a grant from the Pennsylvania Department of Environmental Protection, but did not receive funding. As a result, Lawrence County and the Lawrence County Conservation District decided to write the watershed conservation plan so that all watersheds in the county would have a plan.

The Pennsylvania Rivers Conservation Program operates through PA DCNR's Community Conservation Partnership Program. The program aids groups in accomplishing their local initiatives through planning, implementation, acquisition, and development activities. As a part of the program, PA DCNR has established the Pennsylvania Rivers Registry to validate the local initiative to complete approved Watershed Conservation Plans. The registry serves to promote public awareness of completed plans while fostering support for future projects that will enhance the overall quality of the watershed. With the completion of this plan, the Mahoning River watershed will be placed on the Pennsylvania Rivers Registry at http://www.dcnr.state.pa.us/brc/rivers/riversconservation/registry/. A complete copy of the Mahoning River Watershed Conservation Plan can be accessed at http://www.co.lawrence.pa.us

Purpose

The purpose of this study is to document current conditions and identify additional initiatives aimed at improving the livability and attractiveness of the region. The watershed community was involved in developing a vision for the watershed through public meetings, interviews, and surveys. Stakeholders identified important issues and resources needing restoration, protection, conservation, and/or preservation. The goal of this plan was to develop a strategy to make the vision for the watershed a reality. Practical solutions and action steps were suggested, and resources were identified to support implementation. This plan can be used to assist groups and citizens working and/or living within the watershed with obtaining resources to fulfill the vision set forth for the area. This watershed conservation plan should be used in planning for long-term growth.

One objective of the plan is to restore and enhance the watershed's natural resources and regional assets. This can be achieved by implementing solutions and action plans identified in this plan and by working with a variety of organizations. Another objective is to increase environmental education within the watershed. Many residents and stakeholders are still unaware of basic watershed functions and the interaction between human activities and natural processes. Educational programs are needed to inform youth, residents, and stakeholders about environmental issues within the watershed. Actively involving stakeholders increases the pride they have for their community and their willingness to become further involved with conservation efforts.

Planning Process

The Watershed Conservation Plan process was initiated in July of 2009 when the scope of work was given approval. A set of three public meetings took place over three years. The first public meeting was December 3, 2009 at the Mahoning Sportsmen's Club. The second was December 14, 2010 at the Mohawk School District. The third public meeting was on November 8, 2012 at the Mahoning Township Building.

Municipal officials were encouraged to participate in the planning process. Invitations for each of the public meetings were sent along with invitations to be a part of the Advisory Council. Surveys for municipal officials to gather information about the watershed were also sent.

Stakeholders were given the opportunity to review the plan and provide comments. Public comments were collected for 30 days and incorporated into the final plan.

Implementation

Any citizen, group, or agency interested in improving the quality of life within the Mahoning River watershed should use the Mahoning River Watershed Conservation Plan. This document should serve as a reference and educational tool to promote the conservation of natural resources, monitor and improve water quality, and advocate sound community-planning practices.

Implementation of this plan is the responsibility of the entire watershed community and depends upon cooperation and collaboration among many different organizations. Although the Mahoning River Watchers and WPC will likely spearhead many of the projects throughout the watershed, numerous partnerships are needed for success. Partnering among organizations is invaluable in implementing and completing projects.

Involvement of local municipal officials in watershed efforts is a critical program component. Decisions that affect the overall quality of the watershed, such as establishing zoning ordinances, development, stormwater management, and sewage treatment begin at the local level. Municipal cooperation and collaboration on any community project provides the essential local connectivity for success. Many of the management recommendations involve changes in regulations and ordinances, which require the cooperation of local government officials.

Chapter Summaries

Project Area Characteristics

The Mahoning River watershed drains 1,138 square miles in northwestern Pennsylvania and Northeastern Ohio. Of the 1,138 miles, 1,083 square miles or 95% lies within the State of Ohio. The Mahoning River is approximately 108 miles long. It begins near Winona in Columbiana County, Ohio and ends at its confluence with the Shenango River to form the Beaver River. Due to its size, and in order to better study the resources available, the watershed has been divided into 5 subwatersheds: Coffee Run, Hickory Creek, Hickory Run, Mahoning River, and Marshall Run.

Glaciers had a profound effect on the topography of the watershed. The entire Mahoning River watershed is situated within the Appalachian Plateau Province and Northwestern Glaciated Plateau Section.

Winters are cold and snowy in the watershed. It is also frequently cold, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm and very warm with occasional very hot days. Rainfall is evenly distributed throughout the year. The total annual precipitation in Lawrence County is 38 inches. Of this, 22 inches, or 60 percent, usually falls in April through September, which includes the growing season for most crops. The average growing season is 119 days based on temperatures higher than 32 degrees.

The entire Western Pennsylvania region including the Mahoning River Watershed is located in the Chesapeake Bay Airshed. The use of an airshed model is used to estimate atmospheric deposition. The Mahoning River Watershed is in the area designated as the Upper Beaver Valley Air Basin. This area has regulations designated to lower the air quality pollution. These regulate open burning and industry that has emissions which release contaminates.

Health care and social assistance, manufacturing, and retail trade are the major employment industries within the watershed. Lawrence County has a total civilian labor force of almost 44,000 workers according to the Pennsylvania Department of Labor and Industry. The current unemployment rate in the County is 8.0% compared to the state average of 7.9%.

School-aged children in Lawrence County that are in the Mahoning River watershed are served by one of four major school districts: Mohawk Area School District, Wilmington Area School District, New Castle Area School District, and Union Area School District. There are also several private schools located in Lawrence County; however none are in the watershed.

Land Resources

Most of the underlying bedrock in the Mahoning River watershed was formed during the Mississippian Period that occurred 310 to 350 million years ago. The climate during this period of time had more rainfall and the seasons were less distinct. Heavy sedimentation occurred in Western Pennsylvania.

Glaciers had a profound impact on the formation of the soils of the Mahoning River Basin. Most of the soils in the project area are not old by comparison to surrounding soil sedimentations. A few are considered young by comparison. There are several agricultural security areas in the project area to protect the valuable prime agricultural locations.

A majority of the municipalities in the watershed utilize comprehensive plans, subdivision regulations, zoning ordinances, or any combination thereof. These land-use regulation control powers are granted to them by legislature in the Pennsylvania Municipalities Planning Code. These powers are granted in order to control unwanted land uses from occurring in the municipalities and to facilitate municipal goals and objectives towards growth and sustainability.

Floodplain and stormwater management ordinances and regulations are also present in the watershed. All of the municipalities not only in the project area, but also in the entire county have adopted stormwater ordinances. All of the municipalities in the project area have floodplain regulations as well.

There are four identified remote areas in the project area where illegal dumping is taking place according to a 2008 PA CleanWays survey of Lawrence County roads, including one of the largest dump sites in the county. The remoteness of areas in the watershed is a major contributing factor to the amount of illegal dumping taking place.

Lawrence County administers a recycling drop-off program to ensure that all residents have access o recycling. There are 15 sites in the County program, including three in the watershed. The County also has five Pennsylvania Act 101 recycling programs for:

1. The City of New Castle
2. Ellwood City Borough
3. Neshannock Township
4. Shenango Township
5. Union Township

There are several critical areas in the watershed. Those critical areas are in a floodplain or have wetlands, steep slopes, natural areas, or mine subsidence/abandoned mines on them. Many communities with zoning regulations limit development in these areas through the use of “conservation zoning districts.”

Water Resources

The Mahoning River travels 12 miles in Pennsylvania before meeting the Shenango River and forming the Beaver River southwest of the City of New Castle. From there, the Beaver River continues south into Beaver County where it flows into the Ohio River at Rochester. The Ohio River travels through six states before emptying into the Mississippi River in Illinois. The Mississippi River ultimately empties into the Gulf of Mexico. The Ohio River is the largest tributary by volume of the Mississippi River.

The three major tributaries to the Mahoning River in Pennsylvania are Coffee Run, Marshall Run, and Hickory Run. Hickory run is the largest of the three, having a drainage area of 21.2 square miles. Second is Coffee Run, with a drainage area of 8.7 square miles. Third is Marshall Run, with a drainage area of 2.4 square miles.

Riparian areas are vital to a healthy ecosystem. These areas and streams are co-dependent on one another. A stream is only as healthy as the area it flows through, and riparian areas receive sediment and nutrients from the stream flowing down river. This area provides streambank stabilization, wildlife habitat, an aquatic food source, and a filter for sediment and pollution.

Numerous swamps and wetlands exist within the project area and are even more prevalent in the post-glaciated areas in the northwestern sections of the region, including the Mahoning River watershed. These areas are seasonally wet, contain water-tolerant soils, and support a variety of water-loving plant species. Wetlands provide a unique habitat to several species of plants and animals.

There are several regulations to maintain water quality in the watershed. Those being the Clean Water Act, Pennsylvania Sewage Facilities Act, Nutrient Management Programs, Abandoned Mine Drainage – Surface Mining Control and Reclamation Act, and Act 167 Stormwater Management. These regulations help to maintain and improve the water quality in the watershed and county.

Several water quality issues are present in the project area. The biggest of these is non-point source pollution. Non-point source pollutants typically have no readily visible source and often require detailed analysis and research to discern the source. Several acts and regulations previously mentioned target these issues, and with this plan further efforts will be undertaken to mitigate the effects of these causes. Nutrient loading from agricultural areas, abandoned mine drainage, industrial development, road maintenance and vehicles, urban runoff, forestry practices, and sewage/wastewater contamination are all examples of non-point source pollution that are adversely affecting the Mahoning River watershed. Other issues affecting water quality include development practices, river engineering, PCBs, and oil and gas drilling.

In order to deal with pollution issues in the watershed, the plan proposes a set of Best Management Practices (BMPs) to deal with the issues. Best Management Practices are techniques, processes, activities, or structures used to reduce the pollutant content of a stormwater discharge. Practices should always be looked at for potential pollution reduction and best-cost alternatives.

Biological Resources

The diversity of our biological resources provides benefits within our ecosystems, ranging from increased variety in food to newfound discoveries in medicine. Biodiversity helps us stabilize our ecosystems. Preserving and enhancing the biodiversity of the Mahoning River watershed is an important goal of the Mahoning River Watershed Conservation Plan.

The best way to preserve the wildlife and diversity currently in the Mahoning River watershed is to preserve the natural environment that currently exists. The wetlands, swamps, and forests in the watershed are vital in fostering the wildlife currently in the watershed. Another important factor in sustaining wildlife diversity is fending off invasive species in the watershed. There are several types of invasive plants and animals in the watershed that target and harm habitats in the watershed. Invasive plants are weed pests that grow aggressively, dominating and limiting the natural growth of plants in the watershed. Invasive animals are very similar, and do irreparable harm to the environment. A few types of invasive plants and animals in the watershed include Japanese Barberries, Japanese Knotweed, and Asian Longhorn Beetles.

There are several areas in the county that are of special conservation concern due to their biological importance. One area of special importance in the watershed is the Edinburg Swamp Biological Diversity Area. It consists of vegetated floodplains along the Mahoning River area. It contains large amounts of water willows, which constantly need wet environments in order to thrive, and hydrologic alteration of the wetland would change the structure of the community and allow other species adapted to less wet conditions to invade. A buffer around wetlands in the watershed would greatly improve the function of the wetlands and help to reduce nutrients inputs into the river.

It is recommended that several programs and policies are developed in order to better protect important biological areas in the watershed. Suggestions range from programs through which landowners can obtain conservation easements from to the establishment of private backyard conservation areas to serve as wildlife habitats.

Cultural Resources

The Mahoning River Watershed has several different kinds of amenities available to citizens of the watershed. Common recreational activities in the watershed range from fishing, boating, and bicycling to hunting, camping and canoeing.

The main sites for the recreational activities that are available in the watershed are parks and sportsmen's clubs. Several municipal and community parks exist within the watershed. Bessemer Lake Park is stocked with trout, and offers great recreational activities. It has a launch ramp and a parking area.

Trails are abundant and very important to the Mahoning River watershed. Stavich Bike Trail, which is approximately 10.5 miles, extends from Union Township to Struthers, Ohio is located in the watershed. The trail follows old trolley tracks that parallel old train tracks. In addition to serving as a major recreational source to county residents, it also serves as a possible link in the future to an ambitious trail system in Eastern Ohio that would eventually link Cleveland, Ohio to Washington, D.C.

Hunting is possible in the Mahoning River watershed at the Mahoning Sportsmen's Association and is permitted on private land, with landowner permission. In addition, there are hundreds of thousands of acres of farmland open to hunting through cooperative farmland and safety zone programs in Mercer, Lawrence and Crawford counties. The Mahoning Sportsmen's Association currently has roughly 2,000 members and owns approximately 700 acres of land. It provides professional trap houses, a rifle range, an archery course, and much more.

The Mahoning River watershed is developing into an area used steadily for boating recreation. Canoeing and kayaking are among the favorite types of boating on the river, while boating is common on Bessemer Lake. The Mahoning River Water Trail is offers several canoe and kayak access points in the western part of Lawrence County.

The region is also fortunate to have a variety of organizations and agencies to provide environmental education services to youth and adult members of the community. Organizations such as Mahoning River Watchers, Pennsylvania Fish and Boat Commission, Pennsylvania Game Commission, county conservation districts, and cooperative extension offices provide resources and programs to educate and help landowners within the Mahoning River watershed.

The well-documented history of the region is remarkable and details early settlers, agricultural and industrial movements, transportation innovations (including railroads and canals), postal delivery, and flood control. In addition, there are several sites within the watershed that are listed on the National Register of Historical Places.

Issues and Concerns

Several methods were used to identify the issues and concerns of watershed stakeholders. Public meeting workshops, public and municipal surveys, and stakeholder interviews were used to gather information from watershed residents. A variety of issues were brought up, including the following:

- Water quality and quantity
- Erosion and sedimentation
- Waste cleanup
- Public awareness and education
- Recreation
- Historic preservation
- Smart growth and planning
- Protecting of biodiversity

One method for compiling issues and concerns was the use of public and municipal surveys. These surveys were used to determine how watershed stakeholders and municipal officials perceive the watershed. Complete survey results can be found in the Issues and Concerns chapter of the full report.

Another method of obtaining issues and concerns was interviewing local watershed residents identified by the steering committee. Complete results of these interviews can be found in the Issues and Concerns chapter of the full report.

Management Recommendations

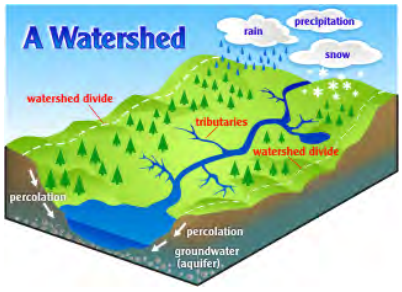
This section of the plan provides a matrix of the various issues identified in each of the subject areas. The recommendations were compiled from the municipal and public meetings, and individual comments. The matrix of recommendations includes the following: issues, recommended approaches, potential partners, potential funding sources, and priority ratings. Issues refer to a concern, situation, project, or idea deemed important by watershed stakeholders. The recommended approach is the action step, or objective necessary to address the issue. Potential partners are groups with the resources best suited to assist in meeting the objectives. Potential funding sources identify avenues to finance identified projects. The priority ranking was determined by public comment and response and input from the advisory committee, and was based on need, feasibility, and probability of funding.

Management recommendations are suggestions to improve the quality of life within the watershed. It is important to note that these suggestions are non-regulatory in nature and are to be used only as a guide. No limitation to the number or types of issues, actions, approaches, partners, or funding opportunities should be assumed due to ever-changing circumstances. Creativity is encouraged.

CHAPTER 1: PROJECT AREA CHARACTERISTICS

Project Area

The headwaters of the Mahoning River watershed originate in the State of Ohio and flow southeast into the State of Pennsylvania and Lawrence County for a length of 108 miles. In Ohio, the watershed occupies eight counties, six major tributaries, five large reservoirs, and three state parks. Of the 1,138 square mile drainage area of the Mahoning River watershed, 1,083 square miles or 95% lies within the State of Ohio. The River starts at an elevation of 1,197 feet in Columbiana County, Ohio and drops to 795 feet to its confluence with the Shenango River in Lawrence County.



What is a Watershed?
A watershed is an area of land that drains rainwater and melting snow to a larger body of water.

The project area for the Mahoning River Watershed Conservation Plan will focus on the portion of the watershed and lands situated in Pennsylvania. At times however, the Watershed Conservation Plan will inherently need to discuss upstream activities in the portion of the watershed located in Ohio, which have impacts to the Mahoning River further downstream in Pennsylvania.

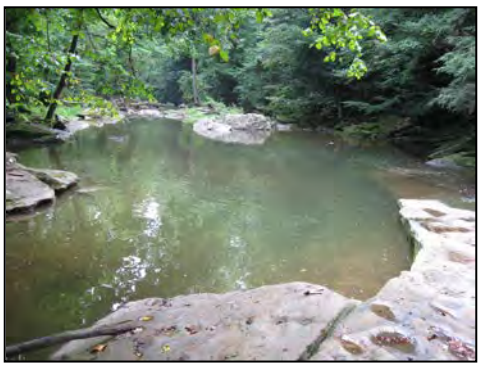
The entire Mahoning River watershed and drainage area within Pennsylvania encompasses 55 square miles and six municipalities including Mahoning Township, North Beaver Township, Bessemer Borough, Union Township, City of New Castle, and Taylor Township. The River flows approximately 11 miles through Pennsylvania to its confluence with the Shenango River just southwest of New Castle. The three major tributaries to the Mahoning River are Coffee Run, Marshall Run, and Hickory Run.

Major Tributaries

Coffee Run and Marshall Run flow into the Mahoning River just beyond the state line in Mahoning Township, and Hickory Creek flows into the Mahoning immediately prior to the River merging with the Shenango River to form the Beaver River. Several unnamed tributaries feed the Mahoning River and its major tributaries as it flows through the western portion of Lawrence County.

Coffee Run is the first major tributary to flow into the Mahoning River in Pennsylvania. The headwaters originate at King's Lake in Mahoning County, Ohio, and the stream flows south from Pulaski Township to Mahoning Township where it meets the Mahoning River. The watershed has a drainage area of 8.67 square miles located in Lawrence County, Pennsylvania.

Marshall Run parallels Coffee Run, slightly to the east, and also flows south from Pulaski Township to Mahoning Township. The watershed has a slightly smaller drainage area of 2.44 square miles, entirely within Lawrence County, Pennsylvania.



Hickory Run downstream from Cleland Mill Road. This area commonly called "Flat Rock" is a popular fishing location.

The third major tributary to the Mahoning River is Hickory Run. This watershed encompasses a small southeast portion of Mahoning Township, much of North Beaver Township, and all of Bessemer Borough. The headwaters of Hickory Run and Hickory Creek, a small tributary to Hickory Run, originate in heavily strip-mined lands near the Ohio border. The stream parallels the Mahoning River to the south, flowing in a southeasterly direction.

Hickory Run flows into the Mahoning River only 150 linear feet before the Mahoning and Shenango Rivers converge to form the Beaver River. The drainage area within the Hickory Run watershed encompass 27 square miles with 20.56 square miles in Lawrence County, Pennsylvania and represent 37.4% of the Mahoning River watershed in Pennsylvania.

Topography

Glaciers advanced into northwestern Pennsylvania as many as seven times in the last 2 million years. Most recently, glaciers came into northwestern Pennsylvania about 15,000 to 20,000 years ago during the "Wisconsinan" glaciation and had a profound effect on the topography of the land and the Mahoning River watershed. As the glaciers advanced into northwestern Pennsylvania from Canada, hilltops were eroded and valleys were filled in with sediment and rocks. The appearance of the landscape changed considerably creating an area with lower relief and new drainage patterns creating features such as swamps, bogs, and small lakes.

A physiographic province is a region that contains similar topography and has been shaped by geologic history. Characterized by elevation, relief, and geologic structure, each Physiographic Province can be subdivided into Sections based on the distribution patterns of historic rock formations, deformation, erosion, specific landforms, and other geologic features (Radford University, 2005). The entire Mahoning River watershed is situated within the Appalachian Plateau Province and Northwestern Glaciated Plateau Section.

Diagram 1-1. Physiographic Provinces of Pennsylvania

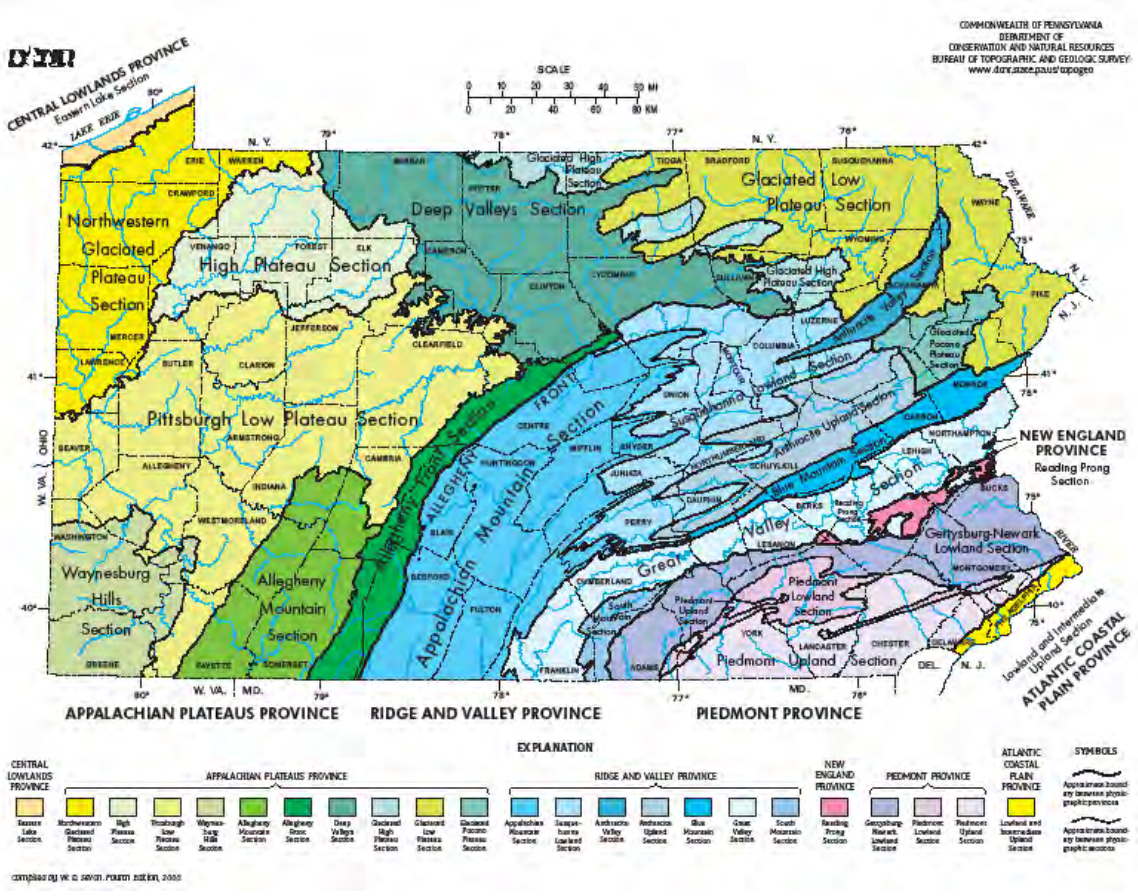


Figure 1-1
Mahoning River Watershed
Lawrence County, Pennsylvania

Legend

- Major Streams
- Bodies of Water
- Minor Streams
- Unamed Streams
- Limited Access Highways
- Major Roads
- Local Roads
- Stavich Bike Trail
- Tax Parcels
- Cities and Boroughs
- Township Boundaries
- Watershed
- Small Watersheds

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD 422 MCBRIDE RD HILLSVILLE RD Marshall Run BAIRD RD COFFEE RUN MARSHALL RUN ERSKINE QUARRY RD JACOBSON RD AMBROSIA RD 551 GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR EDINBURG RD MAHONING RIVER 224 MAHONING TWP E RIVER RD Shenango River Robinson Mahoning River W MAIN ST MAHONING RIVER North Edinburg FORDING RD 224 Hillsville STATE LINE RD W STATE ST Edinburg arkstown E MAIN ST UNION TWP W WASHINGTON ST 376 CHURCHILL RD MOHAWK SCHOOL RD ERIE ST Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MAHONING RIVER MILLER RD EDINBURG RD COVERT RD HOFFMASTER RD KILDOO RD NEW CASTLE CITY Hickory Creek N MAIN ST HICKORY CREEK W POLAND RD E POLAND RD MOHAWK SCHOOL RD 317 422 SMALLS FERRY RD BESSEMER BOR BREWSTER RD MOUNT JACKSON RD TAYLOR TWP NORTH BEAVER TWP 108 S MAIN ST HICKORY RUN Hickory Run CLELAND MILL RD SUNNYSIDE RD CRUM RD Mount Jackson WAMPUM RD COLUMBIANA RD COLUMBIANA RD VANCE RD MOUNT JACKSON RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD 18 Beaver River KYLE RD PADEN RD 108 551 376 GILMORE RD GILMORE RD MOUNT AIR RD Sugar Creek MCKIM RD NEW RD Edwards Run

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.

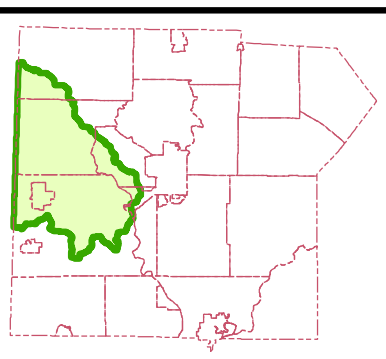


Figure 1-2
Mahoning River Sub-Watersheds
Lawrence County, Pennsylvania

Municipal Boundaries
Tax Parcels
Watershed
Stavich Bike Trail
Bodies of Water
Named Streams
Unnamed Streams
Limited Access Highways
Major Roads
Local Roads
Coffee Run
Hickory Creek
Hickory Run
Mahoning River
Marshall Run

Prepared by the
Lawrence County Planning Commission
February 2013
Jason Shallcross

N W E S

0 0.375 0.75 1.5 2.25 3 Miles

COFFEE RUN
MARSHALL RUN
MAHONING RIVER
HICKORY CREEK
HICKORY RUN
PULASKI TWP
MAHONING TWP
UNION TWP
BESSEMER BOR
NORTH BEAVER TWP
TAYLOR TWP
NEW CASTLE CITY

Property lines as depicted on this map
are for visual reference only and are
not to be utilized in lieu of an actual survey.

Figure 1-3
Development Constraints

Legend

- Oil and Gas Well Locations
- Road Centerlines
- Major Streams
- Minor Streams
- Unamed Streams
- Natural Heritage Inventory
- Abandoned Mine Land Inventory
- Municipalities

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lakes
- Riverine
- Floodplains

Percent Slope

- Below 15%
- 15% - 24%
- 25% - 39%
- Above 40%
- Watershed

Prepared by the
Lawrence County Planning Commission
February 2013
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD 422 MCBRIDE RD HILLSVILLE RD Marshall Run BAIRD RD ERSKINE QUARRY RD JACOBSON RD AMBROSIA RD 551 GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR EDINBURG RD 224 MAHONING TWP E RIVER RD Mahoning River Robinson W MAIN ST Hillsville North Edinburg Shenango River STATE LINE RD W STATE ST Edinburg FORDING RD Parkstown 224 UNION TWP W WASHINGTON ST E MAIN ST CHURCH HILL RD MOHAWK SCHOOL RD ERIE ST 376 Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MILLER RD EDINBURG RD COVERT RD KILDOO RD NEW CASTLE CITY HOFFMASTER RD Hickory Creek N MAIN ST W POLAND RD E POLAND RD 317 MOHAWK SCHOOL RD BESSEMER BOR SMALLS FERRY RD BREWSTER RD MOUNT JACKSON RD NORTH BEAVER TWP 108 TAYLOR TWP Mill Run Mount Jackson CLELAND MILL RD SUNNYSIDE RD CRUM RD S MAIN ST COLUMBIANA RD WAMPUM RD COLUMBIANA RD MOUNT JACKSON RD VANCE RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD 18 KYLE RD PADEN RD 108 551 376 Beaver River GILMORE RD GILMORE RD MOUNT AIR RD Sugar Creek MCKIM RD NEW RD Edwards Run

Figure 1-4
Topography

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Major Streams
- Minor Streams
- Unamed Streams
- Municipalities
- Watershed

Elevation

High : 1340.91

Low : 748.31

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD 422 MCBRIDE RD HILLSVILLE RD Marshall Run BAIRD RD ERSKINE QUARRY RD AMBROSIA RD 551 JACOBSON RD GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR EDINBURG RD 224 MAHONING TWP E RIVER RD Mahoning River Robinson W MAIN ST Hillsville STATE LINE RD W STATE ST North Edinburg Edinburg FORDING RD Parkstown 224 UNION TWP W WASHINGTON ST E MAIN ST CHURCHILL RD MOHAWK SCHOOL RD ERIE ST 376 Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MILLER RD EDINBURG RD COVERT RD KILDOO RD NEW CASTLE CITY Hickory Creek N MAIN ST HOFFMASTER RD MOHAWK SCHOOL RD W POLAND RD E POLAND RD 317 SMALLS FERRY RD BREWSTER RD MOUNT JACKSON RD BESSEMER BOR NORTH BEAVER TWP 108 TAYLOR TWP S MAIN ST CLELAND MILL RD SUNNYSIDE RD WAMPUM RD CRUM RD COLUMBIANA RD Hickory Run Mount Jackson COLUMBIANA RD MOUNT JACKSON RD VANCE RD MCCURLEY RD MOUNT AIR RD REED RD 18 WESTFIELD RD PADEN RD KYLE RD 108 551 376 GILMORE RD GILMORE RD MOUNT AIR RD Beaver River Shenango River Sugar Creek MCKIM RD NEW RD Edwards Run

Appalachian Plateau Province

The Appalachian Plateau Province is the largest physiographic province in Pennsylvania. About 300 million years ago, layers of sand, silt, and lime sediment were laid down on this part of North America in freshwater, inland seas. Organic material accumulated and the area was subsequently raised from sea level to its present elevation. Over time, the extreme pressure and weight of overlying sediment consolidated these layers into sandstone, siltstone, shale, limestone, and coal. Millions of years later, uplifting, subsiding, geologic erosion, and stream cutting changed the nearly level surface of the plateau to highly dissected, rolling, and hilly relief. (Soil Survey of Beaver and Lawrence Counties, Pennsylvania)

Northwest Glaciated Plateau Section

Approximately 75,000 to 23,000 years ago, several major glaciers covered this area of land. These glaciers modified the surface features of the land. The dominant topographic form of the Northwest Glaciated Plateau Section consists of broad, rounded uplands and deep, steep-sided, linear valleys partly filled with glacial deposits. Underlying rock types include shale, siltstone, and sandstone. Streams follow a dendritic or branching drainage pattern. The average minimum and maximum elevations in this region are 900 and 2,200 feet, respectively (DCNR, Bureau of Topographic and Geologic Survey).

Climate

Winters are cold and snowy in the watershed. It is also frequently cold, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm and very warm with occasional very hot days. Rainfall is evenly distributed throughout the year. Normal annual precipitation is adequate for all crops, although summer temperature and growing season length, particularly at higher elevations, may be inadequate.

The average growing season is 119 days based on temperatures higher than 32 degrees with the last anticipated frost on May 16th and frost-free until October 6th. July has the most growing degree-days with 632 GDD.

In the winter the average temperature is 30 degrees F, and the average daily minimum temperature is 21 degrees. The lowest temperature on record for New Castle was –29 degrees in 1930 (The Weather Channel). The average summer temperature is 85 degrees. The highest recorded temperature for New Castle was 101 degrees in 1936 (The Weather Channel).

The total annual precipitation is 38 inches. Of this, 22 inches, or 60 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 17 inches. The heaviest 1-day rainfall during the period of record was 8.0 inches at New Castle on September 9, 2004. (National Climate Data Center 2004) Thunderstorms occur about 36 days each year, and occur in summer. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys. The month of June has the greatest average precipitation of 4.30 inches (The Weather Channel 2009).

Average seasonal snowfall is 38 inches. The greatest snow amount for one day event was 21.3 inches (National Climate Data Center 2009). On an average 24 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year. The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in winter. (Soil Survey of Beaver and Lawrence Counties, Pennsylvania)

Air Quality

Each year, nearly 200 million tons of toxic emissions pollute the air in the U.S., making air pollution the nation's largest environmental risk (PA Department of Environmental Protection, 2003). Any substance in the air that causes damage to life, ecosystems, or property is an air pollutant. Natural and synthetic processes can lead to air pollution. Over 90 percent of the pollutants originate from industry, power plants, vehicles, and other human influences. In 1970, the Clean Air Act was passed, setting a national goal to have clean and healthy air for everyone. The act was amended in 1977, and again in 1990.

Diagram 1-2. Chesapeake Bay Airshed

Airborne pollutants can travel very long distances. They can fall to the ground in raindrops, fog and dew, dust, or simply due to gravity. Identifying sources of airborne pollutants to a body of water can be complicated. Pollutants can enter waterways through direct deposition (falling directly into waterways) or through indirect deposition (falling onto land and being washed into waterbodies as runoff). Researchers developed the concept of airsheds to assist in the study of atmospheric deposition, which is the process of airborne pollutants falling to the ground (U.S. Environmental Protection Agency (EPA), 2003).

Airsheds are geographic areas responsible for emitting 75 percent of the air pollution reaching a body of water. Different pollutants have different airsheds because of their varying behaviors in the atmosphere. Airsheds are determined using mathematical models of atmospheric deposition, as opposed to watersheds, which utilize physical features of the landscape (EPA, 2003).

The Chesapeake Bay Airshed covers the entire Western Pennsylvania region including the Mahoning River Watershed. The use of an airshed model is used to estimate atmospheric deposition in the Chesapeake Bay Watershed.

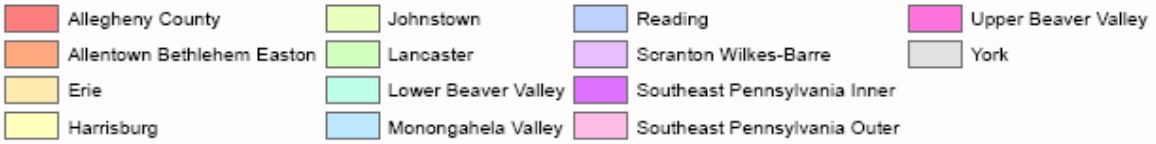
Atmospheric Deposition

Atmospheric deposition is the process of airborne pollutants falling to the ground. There are two types of atmospheric deposition: dry and wet. Dry deposition refers to gases and particles that fall to the earth. They deposit on buildings, cars, homes, trees, etc. where these particles can be washed away as runoff during storm events.

Rain, fog, and snow are examples of wet deposition. One type of wet deposition is acid rain, which typically occurs when nitrous oxides and sulfur dioxide react in the atmosphere with water, oxygen, and other chemicals to form various acidic compounds.

Atmospheric deposition can affect the water quality in lakes and streams; terrestrial and aquatic wildlife; forests; human health;

Diagram 1-3. Air Basins in Western Pennsylvania



visibility; and materials, such as automobiles, statues, and buildings. More information about the effects of acid precipitation is located in the Water Resources chapter.

The Mahoning River Watershed in Pennsylvania is in the area designated as the Upper Beaver Valley Air Basin. This area has regulations designated to lower the air quality pollution. These regulate open burning and industry that has emissions which release contaminates.

Critical Pollutants

Six critical pollutants have been identified nationally as affecting air quality. They include carbon monoxide, lead, nitrogen oxides, ozone, particular matter, and sulfur dioxide.

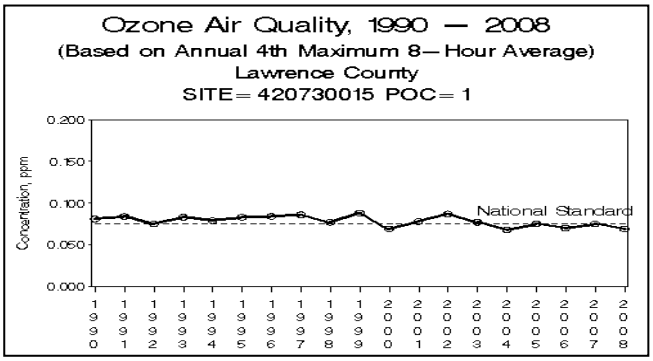
Critical Pollutants identified as a problem in the Mahoning River Watershed are Ground Level Ozone and Particular Matter specifically Particulate Matter 2.5 ($PM_{2.5}$) (US EPA 2008). Additionally these pollutants have been identified by the USDA-NRCS (US Department of Agriculture Natural Resource Conservation Service) as a problem and have proposed funding for agriculture to assist with reduction on agricultural operations in Lawrence County.

Ozone

Ozone is a colorless, odorless gas that forms in the atmosphere. Depending on where it is located in the atmosphere, it can be beneficial or harmful. When located in the upper atmospheric layer, it is called the ozone layer and it filters the sun's harmful ultraviolet rays. When it is located in the lowest atmosphere it is called ground-level ozone. Ground-level ozone is a secondary pollutant - a pollutant that is formed in the atmosphere instead of being directly emitted from a specific source. It forms when NO_X combines and reacts with volatile organic compounds in the presence of sunlight and warm temperatures (DEP 5). Ozone, and the pollutants that cause it, can be transported from hundreds of miles away.

When inhaled, ozone reacts with tissues in our lungs making breathing difficult. People with asthma and lung disease are most seriously impacted, but even healthy individuals are at risk with prolonged exposure.

Diagram 1-4. Ozone Air Quality, 1990 – 2008



(Image courtesy of US EPA, 2008)

Particulate Matter

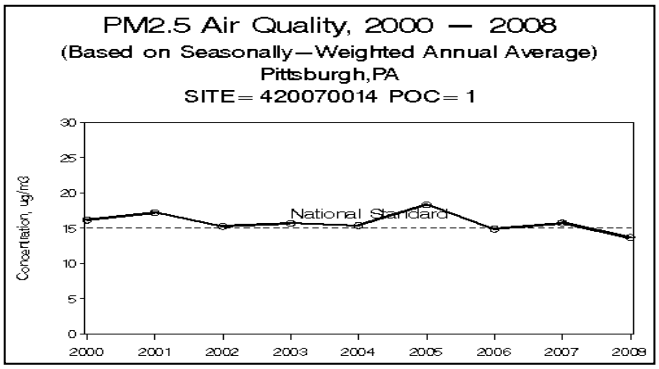
Particulates are tiny particles of liquid or solid suspended in this case the air. These particles can consist of dust, metal, or other materials that float in the air. A mixture of these particles is known as particular matter. These particles travel into the lungs and become trapped. They can cause respiratory ailments and can carry cancer-causing chemicals, producing greater health problems (DEP 5).

Total suspended particulates vary in size up to 45 micrometers in diameter. They can remain suspended in the air for a few seconds or up to several months (DEP 5). There are no federal or state air-quality standards for total suspended particulates.

Particular matter 10 (PM_{10}) is a solid matter or liquid droplets from smoke, dust, fly ash, or condensing vapors that can be suspended in air for long periods. They are less than 10 micrometers in diameter.

Particular matter 2.5 ($PM_{2.5}$) are fine particles with diameters less than 2.5 micrometers. They can accumulate in the respiratory system and are associated with numerous adverse health effects, especially among children, the elderly, and individuals with asthma or cardiopulmonary disease (DEP [5]).

Diagram 1-5. PM (Particulate Matter) 2.5 Air Quality, 2000 – 2008



(Image courtesy of US EPA, 2008)

Impacts of Air Pollution

Air pollution not only affects the quality of the air, but he economy, health, and environment. It contributes to land and water pollution by altering the chemical makeup of streams and soils. It can lead to impairment or destruction of habitats (through the loss of trees, plants, and animals), decreasing property values and incomes, and increasing medical expenses and employee absenteeism (Kling & Wuebbles, 2003).

Socio-Economic Profile

Demographics and Population Patterns

An understanding of population dynamics is an important aspect of the watershed conservation plan process. By understanding such factors as population change and age/sex characteristics, and household composition, a community or County can forecast a number of different future trends that ultimately impact future land uses and regulations, infrastructure development, school facility and recreation needs.

Since 1960, Lawrence County's population has declined by significant loss between 1980 and 1990, during which period, the County lost nearly ten percent (10%) of its 1980 population. In the 1980's Western Pennsylvania suffered a widespread population loss caused by out-migration related to the collapse of the steel manufacturing industry. During this time there was double-digit unemployment, plant closings and other problems, which drove workers and their families to the Sun Belt by the thousands. Lawrence County was among the counties that felt this loss. The population of Lawrence County decreased by 10,904 people from 1980-1990, a trend, which began after 1960 (Lawrence County Comprehensive Plan, 2004).

This same population trend can be assumed in the Mahoning River watershed. During the most recent U.S. Census in 2010, the watershed's approximate population was 10,902, which represents a 4.7% decrease from the 2000 census approximate population of 11,436.

Lawrence County is a member of the Southwestern Pennsylvania Commission (SPC), the metropolitan planning organization for the Pittsburgh Region consisting of ten counties: Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Lawrence, Washington and Westmoreland; and the City of Pittsburgh. SPC is responsible for developing the Long Range Forecast as well as a host of other transportation, economic development, and planning activities.

Population projections from the Southwest Pennsylvania Commission's Long Range Forecast (adopted on June 28, 2007) indicate a continued, steady decline in population for all municipalities in the Mahoning River watershed through 2030. With fewer residents projected, tax revenues to support municipal services will consequently decline. In rural areas, communities will need to seek ways to share resources with neighboring municipalities for service delivery. Where similar demographics occur, joint municipal facilities planning and the implementation of intergovernmental agreements can provide revenue sharing options.

In Lawrence County, the total of racial minorities (Black, Asian and Hispanic) is 6.2 percent of the total population for the County.

The County's population tends to be fairly similar, in age, to the Commonwealth of Pennsylvania. Lawrence County's median age in 2000 and in 2010 was slightly higher than the Commonwealth's median age.

Table 1-1. Median Age per Census Year

	2000	2010
Lawrence County	40.5	43.6
State of Pennsylvania	38	40

Table 1-2. 2010 Population, Median Age, and Race by Municipality			
Municipality	**2010 Population**	**Median Age**	**Race (% Caucasian)**
Bessemer Borough	1,111	43.2	98.3
Mahoning Township	3,083	44.8	98.9
New Castle City	23,273	40.8	83.2
North Beaver Township	4,121	44.8	99.0
Pulaski Township	3,452	42.4	98.5
Taylor Township	1,052	52.1	98.3
Union Township	5,190	46.8	92.1

Transportation

The primary method of transportation throughout the watershed is through roadways and vehicular traffic. One Interstate highway, two United States routes, three major state routes, and numerous municipal and private roads are located within the watershed. In addition, there are four (2 active and 2 inactive) railroads and one airport in the project area.

The major transportation artery situated in the Mahoning River watershed is Interstate 376 which travels north and south through the downstream portion of the watershed and project area. The Interstate, a limited access highway or expressway, is located entirely within Pennsylvania with the west end at Interstate 80 and the east end at Interstate 76.

Several other major roadways traverse through the Mahoning River watershed in Lawrence County. US 422 and US 224 travel northwest from the City of New Castle into Ohio. US 422 intersects with Interstate 376 just west of New Castle and traverses through the watershed in Union and Pulaski Townships. US 224 also enters the watershed in Union Township and crosses the Mahoning River while paralleling the River west through Mahoning Township and into Ohio. PA 551 travels north and south throughout the watershed and merges with US 224 for a short distance while crossing the Mahoning River. The Village of Edinburg is located along 551 just south of this intersection and the Mahoning River. PA 551 also intersects another state road, PA 108, at the Village of Mount Jackson in North Beaver Township. The two roads merge for a short distance then separate where PA 108 continues westward into Ohio and PA 551 continues south leaving the watershed. PA 317 begins just north of Mount Jackson and travels west through the Borough of Bessemer, crossing Hickory Run twice, before entering Ohio. In Bessemer, PA 317 or Poland Avenue serves as the community's main street, downtown district. PA 18 travels through a small portion of the watershed in North Beaver and Taylor Townships. The state roadway crosses both Hickory Run and Mahoning River in its short distance through the watershed.

The majority of all the municipal owned and maintained roadways within the watershed function to distribute traffic from residential areas and communities to larger roadways carrying higher traffic volumes to employment sites or other destinations.

Traffic data provided by PennDOT indicates that US 224/PA 551 carries the highest volume of traffic within the watershed with an AADT of 9,471 between the intersections of US 224 and PA 551 north and south of the Mahoning River in Mahoning Township.

40 PA DOT bridges and 17 county/municipal bridges exist in the watershed.

Lawrence County's Long Range Transportation Improvement Plan is an inventory of roadway improvements, bridge projects and other transportation enhancement projects to be funded. Through 2040, three projects are slated within the Mahoning River watershed.

The New Castle Municipal Airport in Union Township lies just within the Mahoning River watershed boundary. The airport is a three hundred and fifty (350) acres facility and handles business, recreational travelers, and daily commuters at a rate of more than thirty thousand (30,000) passengers a year. The airport can accommodate prop-driven cargo planes as well as small corporate and private jets.

At 54,445 operations annually, or an average of 150 operations a day, the Airport is one of the busiest general aviation airports in Pennsylvania. User fees support the operation and it is estimated that approximately 3.4 million dollars in primary and secondary economic benefits accrue to Lawrence County (Multi-Municipal Comprehensive Plan for Union, Mahoning, and Pulaski Township, 2007). The facility is considered a regional asset and consideration is being made to expand utilization of the airport to commerce and light industrial uses.

Rail lines that exist in the Mahoning River watershed concentrate along River corridor between Ohio and the City of New Castle. The main rail carriers are CSX and Norfolk-Southern, which link with the Buffalo/Pittsburgh Railroad, a regional short-line carrier between New Castle and Buffalo, New York. ISS rail transports more than two hundred (200) carloads of products and commodities from the New Castle area every month. Products include extruded and molded plastic parts, semi-finished and coil steel and clay building bricks. Commodities include scrap iron and scrap steel.

Bicycle, pedestrian/hiking, and off-road transportation will be discussed in the Cultural Resources Chapter of this Plan.

Education

Public Schools

School-aged children in the Mahoning River watershed are served by one of four major school districts, although the majority of the watershed occupies the Mohawk Area School District. Only two public school buildings, that are operated and maintained by the four school districts, are physically located in the watershed. Butler County Community College operates BC3 at Lawrence Crossing located in the watershed.

Mohawk Area School District

The Mohawk Area School District is the largest school district, in terms of area, in Lawrence County. During the 2000-2001 school year, this district ranked fourth (4th) in the County for total enrollment with 2,069 students, 29.5 percent of whom were considered to be from low-income families (Lawrence County Comprehensive Plan, 2004). The current enrollment for the school district for the 2011-2012 school year is 1,499 students, which represents an 28% decrease from 2001 (PA Department of Education).

The Mohawk Area School District maintains two facilities; the Elementary School and the Junior/Senior High School, located just east of Bessemer Borough in North Beaver Township are within the watershed. The Junior/Senior High School recently completed a $25 million dollar renovation of the building and surrounding property. A nature trail and recently constructed wetland located on the property serve as an outdoor classroom for environmental education opportunities.

Table 1-3. Students by School for the Mohawk Area School District in 2011-2012

School	Students
Mohawk Elementary	782
Mohawk Junior/Senior High	717
Total Enrollment	**1,499**

Wilmington Area School District

The Wilmington area school district includes Pulaski Township and the northern portions of Coffee Run and Marshall Run watersheds. Wilmington Area school district has an enrollment of 1,623 students in the 2000-2001 school year, with 20.9% from low-income families (Lawrence County Comprehensive Plan, 2004). The current enrollment shows a 18% decrease in students since 2001. None of Wilmington Area School District facilities are located within the watershed. The Junior/Senior High School recently completed a $17.8 million dollar renovation of the building and surrounding property.

Table 1-4. Students by School for the Wilmington Area School District in 2011-2012	
School	**Students**
New Wilmington Elementary	352
Pulaski Elementary	110
Wilmington Area Middle	420
Wilmington Area High	454
Total Enrollment	**1,336**

New Castle Area School District

The New Castle Area School District is the largest district, in terms of student enrollment, in Lawrence County, however represents one of the smallest districts represented in the Mahoning River watershed. The District maintains seven (7) different school facilities, with none existing in the watershed boundaries. The total 2000-2001 enrollment numbered 3,896 students with 52.7 percent of the students from low-income families (Lawrence County Comprehensive Plan, 2004). The School District serves the City of New Castle and Taylor Township, of which only a small portion of the municipalities are located within the Mahoning River watershed. Current enrollment represents a 18% decrease in students since 2001. The district is in the process of completing a $22.9 million dollar renovation of Harry W. Lockley School.

Table 1-5. Students by School for the New Castle Area School District in 2011-2012	
School	**Students**
Croton Pre-Kindergarten	115
Harry W. Lockley Kindergarten Center	301
John F. Kennedy Primary	249
Thaddeus Stevens Primary	274
West Side Primary	229
George Washington Intermediate	720
New Castle Junior/Senior High	1,319
Total Enrollment	**3,207**

Union Area School District

The Union Area School District is the smallest of the school districts in Lawrence County. The District serves school-aged children from Union Township and the Village of Edinburg in Mahoning Township. The district's enrollment during the 2000-2001 school year totaled 817 students with 38.6 percent being from low-income families (Lawrence County Comprehensive Plan, 2004). The current enrollment for the school district is has not changed since 2001.

Table 1-6. Students by School for the Union Area School District in 2011-2012	
School	**Students**
Union Memorial Elementary	325
Union Area Middle	256
Union Area High	236
Total Enrollment	**817**

Private Schools

There are several private schools located within Lawrence County; however none are located within the watershed.

Butler County Community College

Butler County Community College operates BC3 at Lawrence Crossing in Union Township in the Mahoning River Watershed. The campus was opened in 2008 and has a current enrollment of 788 students. They offer eleven programs of study to earn 2-year associate degrees and have program partnerships with several regional 4-year colleges and universities for continued education.

Villa Maria Community Center

The Villa Maria Community Center is located in Pulaski Township within the Coffee Run Watershed. It is operated by the Sisters of the Humility of Mary. The facility is located on 726 acres that includes farmlands, an organic garden, wetlands, a bird sanctuary, and nature trails. They offer several educational programs for children and adults including;

- LEAP (Leadership, Education, Arts, and Play for ages 9 – 11)
- FBEE (Farm-Based Environmental Programs for grades K – 10th)
- GROW Summer Day Camp (Gardening, Responsibility, Once Weekly for grades 1st – 3rd)
- Retreats and Outreach Programs for children and adults

Economy and Employment

Labor Force

Lawrence County has a total civilian labor force of 43,700 according the PA Department of Labor and Industry (February 2013). The current unemployment rate in the County is 8.0% compared to the state average of 7.9%. The per capita income in the County is $33,475 and the median family income is $53,800.

The total number of Employer Units with Lawrence County is 2,216 employing 29,096 workers. The top five industries in the County are: Health Care and Social Assistance, Manufacturing, Retail Trade, Local Government, and Accommodation and Food Services. (PA Department of Labor and Industry)

87.5% of persons age 25+ are a high school graduate or higher within Lawrence County, which is comparable to the State average of 87.9%. However, only 19.0% of persons age 25+, as compared to 26.7% in Pennsylvania, have a Bachelor's degree or higher within the County. (US Census Bureau)

Diagram 1-6. NAICS Industry Sector by Employment in Lawrence County

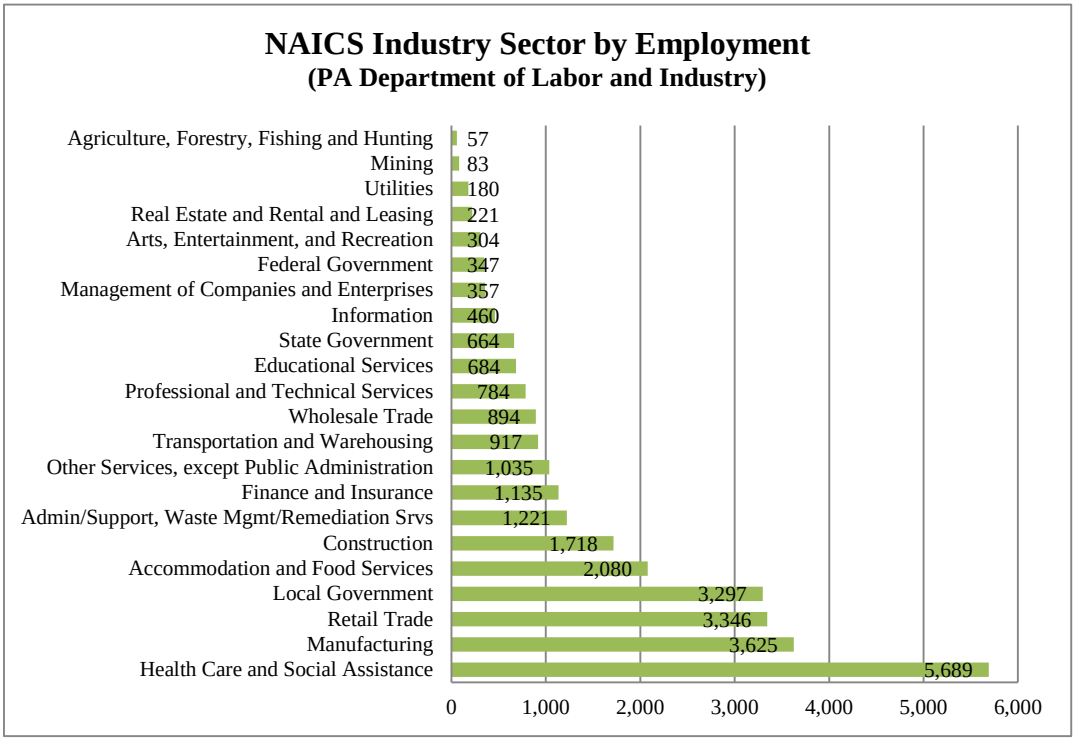


Diagram 1-7. Travel Time to Work in Lawrence County

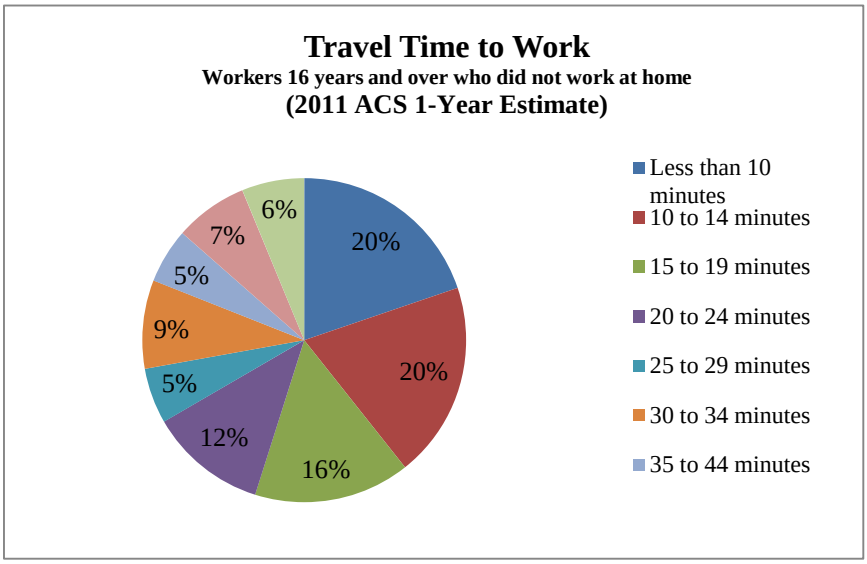


Diagram 1-8. Place of Work for Residents of Lawrence County

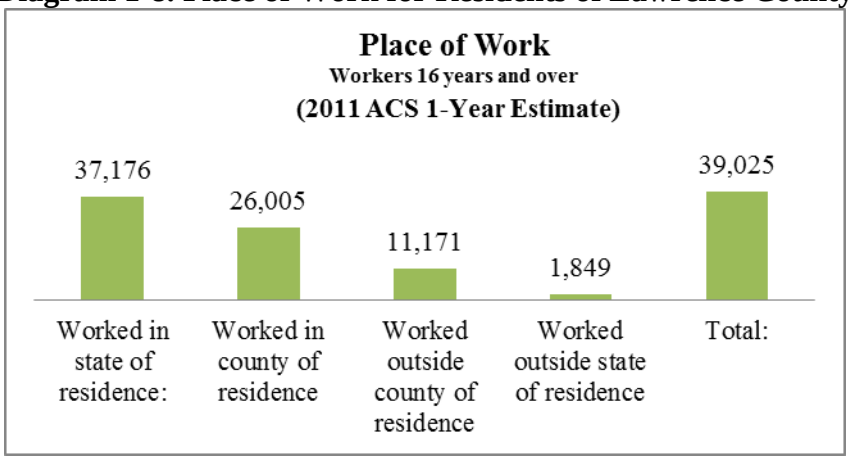


Table 1-7. Top 15 Employers in Lawrence County

Rank	Employer
1.	Jameson Memorial Hospital
2.	State Government
3.	Liberty Mutual Insurance Co.
4.	The Tamarkin Company
5.	New Castle Area School District
6.	Westminster College
7.	Wal-Mart Associates Inc.
8.	County of Lawrence
9.	Ellwood City Hospital
10.	Federal Government
11.	Cennial Co. Inc.
12.	Sanitors Services Inc.
13.	Ellwood City Area School District
14.	Dairy Farmers of America Inc.
15.	Ellwood City Forge Company

Management Recommendations

Land Use Planning and Regulation

- Alter perceptions of zoning by building partnerships and educating residents about the value of zoning.
- Designate growth and conservation areas based upon data analysis from the County and Municipal Comprehensive Plans.
- Develop individual or joint municipal comprehensive plans.
- Encourage municipalities to utilize regulation control powers available to them, including zoning, to preserve and improve quality of life for watershed residents.
- Enforce existing land use ordinances.
- Implement smart growth practices when developing residential and commercial areas.
- Protect critical and environmentally sensitive areas with land-use regulations.

Economics

- Attract new businesses to the region with incentives and tax breaks.
- Create tax incentives for private landowners who implement conservation practices.
- Offer incentives to help keep young adults in the area.
- Promote redevelopment of abandoned industrial sites through the Brownfields program, incentives, tax breaks, or other efforts.
- Utilize available nature-based tourism opportunities to increase revenue.
- Encourage the establishment of value added agriculture processing to provide income opportunities for small agricultural producers.

Education

- Conduct workshops, seminars, and demonstrations for decision makers, including developers and government leaders, emphasizing best management practices.
- Identify additional local, state, federal, and private funding for environmental education.
- Increase municipal awareness and cooperation for preserving, protecting, and restoring the natural resources of the watershed.
- Provide public education and awareness programs about the economic benefits and importance of watershed protection.

Other

- Establish more collaboration amongst environmental groups, including the development and support for more groups.
- Establish memorandums of understanding between municipalities, and public entities to utilize equipment to clean up after local disasters such as flooding, and tornados.
- Conduct workshops and programs to educate the agricultural community about best management practices and new technologies and programs available.

Figure 1-5
Land Use Regulations

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Major Streams
- Minor Streams
- Unamed Streams

General Zoning Districts

- Agricultural and Conservation
- Residential
- Commercial
- Industrial
- Mixed Use

- Municipalities
- Watershed
- Tax Parcels

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.

Figure 1-6
Land Use and Land Cover

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Major Streams
- Minor Streams
- Unamed Streams
- Municipalities
- Tax Parcels
- Watershed

Land Cover

- Residential
- Commercial
- Industrial
- Transportation
- Other Urban or Built-up Land
- Cropland Pasture
- Herbaceous Rangeland
- Mixed Forest
- Streams
- Reservoirs
- Strip Mines Quarries
- Transitional Areas
- Mixed Barren Land

Prepared by the
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0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD MCBRIDE RD HILLSVILLE RD BAIRD RD Marshall Run ERSKINE QUARRY RD AMBROSIA RD 551 JACOBSON RD GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR EDINBURG RD MAHONING TWP E RIVER RD Mahoning River North Edinburg Shenango River 224 Robinson W MAIN ST Hillsville STATE LINE RD W STATE ST FORDING RD Parkstown Edinburg UNION TWP W WASHINGTON ST E MAIN ST CHURCHILL RD MOHAWK SCHOOL RD ERIE ST 376 Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MILLER RD EDINBURG RD COVERT RD KILDOO RD Hickory Creek HOFFMASTER RD N MAIN ST NEW CASTLE CITY W POLAND RD E POLAND RD 317 SMALLS FERRY RD BREWSTER RD MOUNT JACKSON RD BESSEMER BOR NORTH BEAVER TWP 108 TAYLOR TWP CRUM RD S MAIN ST Mount Jackson SUNNYSIDE RD GLELAND MILL RD WAMPUM RD COLUMBIANA RD MOUNT JACKSON RD VANCE RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD 18 KYLE RD PADEN RD Beaver River GILMORE RD MCKIM RD NEW RD Sugar Creek Edwards Run

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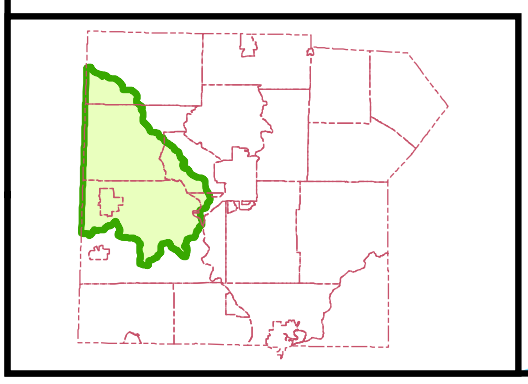

Figure 1-7
Infrastructure

Legend

- Major Streams
- Bodies of Water
- Minor Streams
- Unamed Streams
- Limited Access Highways
- Major Roads
- Local Roads
- Tax Parcels
- Watershed
- Public Water Service Area
- Sanitary Sewer Service Area
- Proposed Sanitary Sewer Service Area

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

PULASKI TWP
MAHONING TWP
NORTH BEAVER TWP
UNION TWP
TAYLOR TWP
BESSEMER BOR
NEW CASTLE CITY
Villa Maria
Robinson
Hillsville
Edinburg
North Edinburg
Coverts
Mount Jackson
Harlansburg
Shenango River
Mahoning River
Coffee Run
Hickory Creek
Marshall Run
Hickory Run
Sugar Creek
Beaver River
Edwards Run
STATE LINE RD
S STATE LINE RD
VILLA MARIA RD
EVERGREEN RD
COFFEE RUN RD
AMBROSIA RD
MCBRIDE RD
HILLSVILLE RD
BAIRD RD
ERSKINE QUARRY RD
JACOBSON RD
GRAHAM RD
SKYHILL RD
N EDINBURG RD
HARBOR EDINBURG RD
E RIVER RD
W MAIN ST
W STATE ST
E MAIN ST
FORDING RD
W WASHINGTON ST
WINTER RD
CHURCHILL RD
MOHAWK SCHOOL RD
ERIE ST
MCCLELLAND RD
EDINBURG RD
KILDOO RD
COVERT RD
MILLER RD
HOFFMASTER RD
N MAIN ST
S MAIN ST
W POLAND RD
E POLAND RD
SMALLS FERRY RD
BREWSTER RD
MOUNT JACKSON RD
CRUM RD
COLUMBIANA RD
MCCURLEY RD
WESTFIELD RD
MOUNT AIR RD
REED RD
PADEN RD
KYLE RD
GILMORE RD
CLELAND MILL RD
SUNNYSIDE RD
VANCE RD
WAMPUM RD
MCKIM RD
NEW RD
108
551
224
422
208
317
376
18

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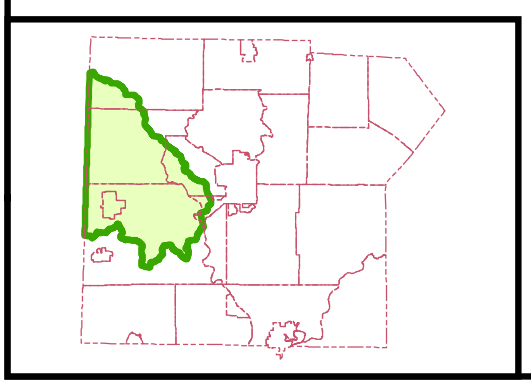

Figure 1-8
Community Facilities

Legend

- Municipalities
- Watershed
- Tax Parcels
- Limited Access Highways
- Major Roads
- Local Roads
- Police Department
- Fire Department
- Medical Facility
- Municipal Facility
- School
- Major Streams
- Minor Streams
- Unamed Streams
- Stavich Bike Trail
- Parks and Recreation Facility

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD MCBRIDE RD HILLSVILLE RD BAIRD RD Marshall Run Mahoning Twp V F D Station No. 3 ERSKINE QUARRY RD JACOBSON RD GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR EDINBURG RD 551 422 Shenango River 224 MAHONING TWP E RIVER RD Mahoning River Robinson W MAIN ST Hillsville Mahoning Twp Park W STATE ST Mahoning Twp Municipal Building and Community Center STATE LINE RD E MAIN ST CHURCHILL RD North Edinburg Edinburg Mahoning Twp V F D Station No. 1 FORDING RD Parkstown BC3 @ Lawrence Crossing 224 UNION TWP W WASHINGTON ST 376 Coverts WINTER RD W WASHINGTON ST MILLER RD MOHAWK SCHOOL RD ERIE ST MCCLELLAND RD EDINBURG RD COVERT RD KILDOO RD NEW CASTLE CITY HOFFMASTER RD Mohawk Area School District Elementary, Junior and Senior High Schools MOHAWK SCHOOL RD E POLAND RD Jameson Health Systems Mohawk Bessemer Lake Park Hickory Creek Pennsylvania Fish Commission Lake Bessemer Boro V F D W POLAND RD The "CYO" Field Bessemer Elementary School Bessemer Boro Municipal Building and Police Department The "Pump House" N MAIN ST 317 BESSEMER BOR SMALLS FERRY RD BREWSTER RD North Beaver Twp Park NORTH BEAVER TWP Mt Jackson Elementary School North Beaver Twp Municipal Building and Police Department Mount Jackson North Beaver Twp V F D Hickory Run MOUNT JACKSON RD 108 MOUNT JACKSON RD TAYLOR TWP Clayton St Playground 422 CLELAND MILL RD SUNNYSIDE RD WAMPUM RD VANCE RD 18 Beaver River CRUM RD S MAIN ST COLUMBIANA RD COLUMBIANA RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD PADEN RD KYLE RD GILMORE RD GILMORE RD MOUNT AIR RD MCKIM RD NEW RD Sugar Creek Edwards Run 108 551 376

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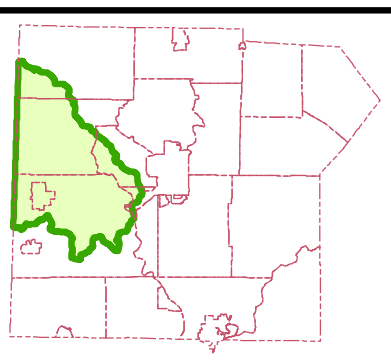

Figure 1-9
Educational Facilities

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Major Streams
- Minor Streams
- Unamed Streams
- Watershed
- Municipalities
- Tax Parcels
- School

School Districts

- Mohawk Area School District
- New Castle Area School District
- Union Area School District
- Wilmington Area School District

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

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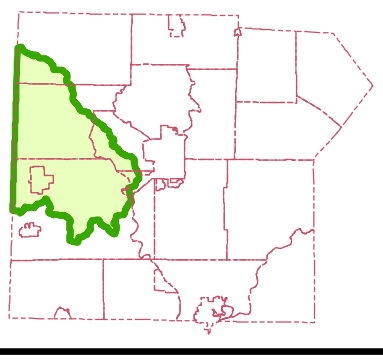

Mohawk Area School District
Elementary, Junior and Senior
High Schools

BC3 @ Lawrence Crossing

PULASKI TWP
MAHONING TWP
UNION TWP
NEW CASTLE CITY
BESSEMER BOR
NORTH BEAVER TWP
TAYLOR TWP

Villa Maria
Robinson
Hillsville
North Edinburg
Edinburg
Parkstown
Coverts
Mount Jackson

Mahoning River
Shenango River
Beaver River
Coffee Run
Marshall Run
Hickory Creek
Hickory Run
Sugar Creek
Edwards Run

208 422 224 551 376 317 108 18

S STATE LINE RD
VILLA MARIA RD
EVERGREEN RD
COFFEE RUN RD
AMBROSIA RD
MCBRIDE RD
HILLSVILLE RD
BAIRD RD
ERSKINE QUARRY RD
JACOBSON RD
GRAHAM RD
SKYHILL RD
N EDINBURG RD
HARBOR EDINBURG RD
E RIVER RD
W MAIN ST
STATE LINE RD
W STATE ST
E MAIN ST
CHURCHILL RD
MOHAWK SCHOOL RD
ERIE ST
MCCLELLAND RD
EDINBURG RD
HOFFMASTER RD
KILDOO RD
COVERT RD
FORDING RD
W WASHINGTON ST
WINTER RD
MILLER RD
N MAIN ST
W POLAND RD
E POLAND RD
SMALLS FERRY RD
BREWSTER RD
MOUNT JACKSON RD
CLELAND MILL RD
SUNNYSIDE RD
WAMPUM RD
VANCE RD
CRUM RD
S MAIN ST
COLUMBIANA RD
MCCURLEY RD
WESTFIELD RD
MOUNT AIR RD
REED RD
PADEN RD
KYLE RD
GILMORE RD
MCKIM RD
NEW RD

Figure 1-10
Transportation

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Airport
- PA Bike Route V
- ActiveRailroads
- InactiveRailroads
- Cities and Boroughs
- Townships
- Watershed
- Major Streams
- Minor Streams
- Unamed Streams

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

PULASKI TWP
MAHONING TWP
UNION TWP
NORTH BEAVER TWP
BESSEMER BOR
NEW CASTLE CITY
TAYLOR TWP
Villa Maria
Robinson
Hillsville
North Edinburg
Edinburg
Parkstown
Coverts
Mount Jackson
208
422
224
551
376
317
108
18
Coffee Run
Mahoning River
Shenango River
Hickory Creek
Hickory Run
Sugar Creek
Beaver River
Edwards Run
Marshall Run
Penn-Ohio Railway
Conrail - Youngstown Line
CSX - Main Line
Conrail
Pittsburgh & Lake Erie
S STATE LINE RD
STATE LINE RD
VILLA MARIA RD
EVERGREEN RD
COFFEE RUN RD
AMBROSIA RD
MCBRIDE RD
HILLSVILLE RD
BAIRD RD
ERSKINE QUARRY RD
JACOBSON RD
GRAHAM RD
SKYHILL RD
N EDINBURG RD
HARBOR EDINBURG RD
E RIVER RD
W MAIN ST
W STATE ST
E MAIN ST
CHURCHILL RD
FORDING RD
W WASHINGTON ST
WINTER RD
MILLER RD
MCCLELLAND RD
MOHAWK SCHOOL RD
ERIE ST
EDINBURG RD
COVERT RD
KILDOO RD
HOFFMASTER RD
N MAIN ST
S MAIN ST
W POLAND RD
E POLAND RD
SMALLS FERRY RD
BREWSTER RD
CLELAND MILL RD
MOUNT JACKSON RD
SUNNYSIDE RD
WAMPUM RD
VANCE RD
CRUM RD
COLUMBIANA RD
MCCURLEY RD
WESTFIELD RD
MOUNT AIR RD
REED RD
PADEN RD
KYLE RD
GILMORE RD
MCKIM RD
NEW RD

Figure 1-11
Watershed Population by Census Block Group 2000

Legend

- Interstate
- US Route
- State Route
- Mahoning River Watershed
- County Boundary

Total Population

- 1 - 1000
- 1001 - 1500
- 1501 - 2000
- 2001 - 4000
- More than 4000

0 2.5 5 10 15 Miles

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

Figure 1-12
Development Pressure by Census Block Group 2000

Legend

- Interstate
- US Route
- State Route
- Mahoning River Watershed
- County Boundary

Population Density (Persons/Square Mile)

- 1 - 1000
- 1001 - 3000
- 3001 - 6000
- 6001 - 10000
- More than 10000

0 2.5 5 10 15 Miles

CUYAHOGA
GEAUGA
SUMMIT
PORTAGE
TRUMBULL
ASHTABULA
CRAWFORD
MERCER
MAHONING
STARK
LAWRENCE
BUTLER
BEAVER
COLUMBIANA

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CHAPTER 2: LAND RESOURCES

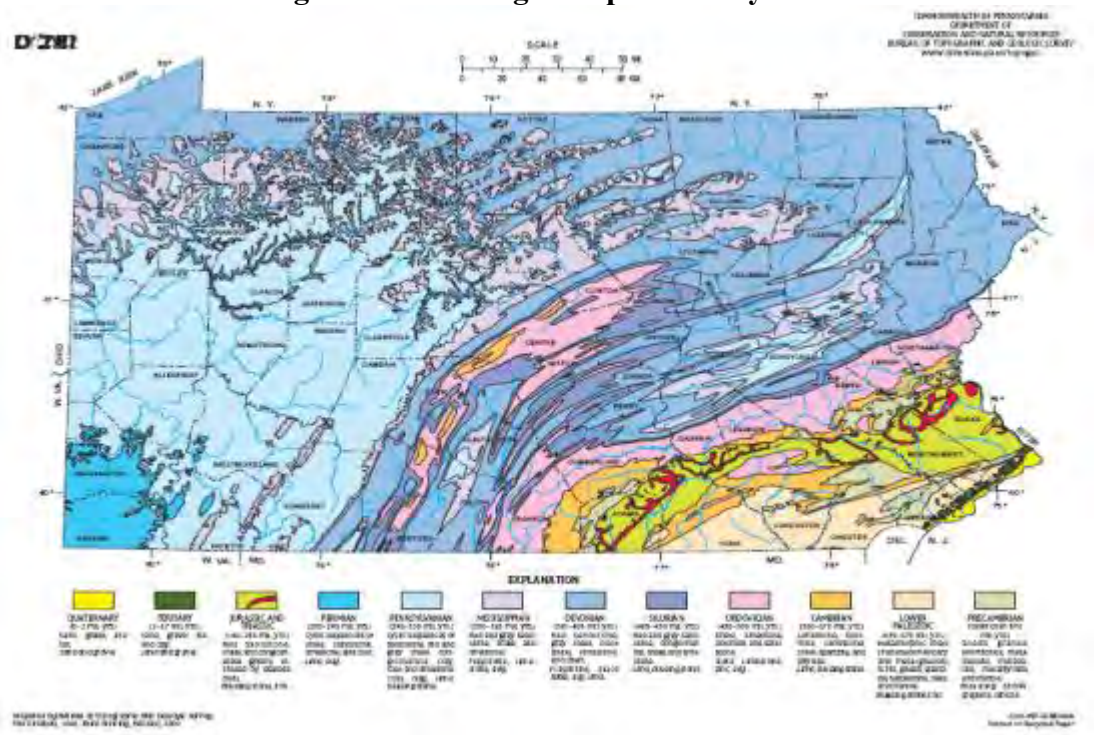
Geology

Geology is the science of the earth, its history, and its natural processes and products. An important part of geology is the study of how earth's materials, structures, process, and organisms have changed over time. Geological investigations of an area can yield insights into the land's history, composition, structure, and natural resources.

All scientific evidence indicates that the earth is about 4.5 billion years old. Geologists separate this time into intervals or periods conveniently referred to by name, rather than by the range of years represented. Within each period, different types of bedrock are formed resulting from natural events that occurred during that period of earth's history. The underlying bedrock is divided into groups depending on the age, composition, and way in which the rock was formed.

Most of the underlying bedrock in the Mahoning River watershed was formed during the *Mississippian Period* that occurred 310 to 350 million years ago. The climate during this period of time had more rainfall and the seasons were less distinct. Deposition of sediments in the plains that occupied northwestern Pennsylvania continued until the near end of the period. The fine-grained sediments were turned red by oxidation of iron, perhaps because of a return to seasonal climate. In the Mahoning River watershed, the bedrock formed during this period lies in the Mahoning River valley.

Diagram 2-1. Geologic Map of Pennsylvania



Shenango Formation – This formation contains light-gray sandstone and some beds of medium-gray shale and siltstone. The upper third of the formation is more shaly and contains a few marine fossils.

Primary Rock Type = sandstone
Secondary Rock Type = shale
Tertiary Rock Type = siltstone

The *Pennsylvanian Period* began after the Mississippian, approximately 290 to 330 million years ago. This was the last time that marine waters occupied Pennsylvania. Large swamps and lush fern and tree forests emerged and vegetation was abundant. The continuous supply of woody debris and vegetation to the swamps formed a thick mass of peat. As sediments compacted the layer of peat and concentrated the carbon, the peat turned into coal. The vast quantity of coal in Pennsylvania was formed during this period. All the other areas outside of the Mahoning River valley were formed during the Pennsylvania Period.

Pottsville Formation – This formation contains predominately gray sandstone and conglomerate. Also contains thin beds of shale, clay, limestone, and coal. Thin marine limestones may be present.

Primary Rock Type = sandstone
Secondary Rock Type = conglomerate
Tertiary Rock Type = shale, siltstone, clay, limestone, coal

Allegheny Formation – This formation contains cyclic sequences of sandstone, shale, limestone, clay, and coal. Valuable clay deposits and Vanport limestone are included. Commercially valuable Freeport, Kittanning, and Brookville-Clarion coals are present.

Primary Rock Type = sandstone
Secondary Rock Type = shale
Tertiary Rock Type = limestone, clay, coal

Lawrence County is one of the most important limestone producing areas in Pennsylvania. The Mahoning River watershed is underlain by the generally flat-lying Vanport Limestone, a high-calcium limestone, less than 100 feet below the surface of the land. The nature of the Vanport limestone's uniformity, thickness and ease with which it can be mined makes this watershed a target for mineral extraction. Within the watershed, limestone is mined in Bessemer and Hillsville and is used mainly for the production of cement.

Most of the watershed is underlain by highly volatile, bituminous coal that has been deep mined in past years. Current coal extractions are accomplished by strip mining. Abandoned mine lands in the watershed are discussed under Hazardous Areas.

Figure 2-1
Surface Geology

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Watershed
- Allegheny Formation
- Glenshaw Formation
- Pottsville Formation
- Shenango Formation

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

PULASKI TWP
Villa Maria
MAHONING TWP
Robinson
Hillsville
Edinburg
North Edinburg
Parkstown
UNION TWP
Coverts
NEW CASTLE CITY
BESSEMER BOR
NORTH BEAVER TWP
Mount Jackson
TAYLOR TWP

Coffee Run
Mahoning River
Shenango River
Hickory Creek
Hickory Run
Sugar Creek
Edwards Run
Beaver River
Marshall Run

208 422 224 551 317 108 376 18

S STATE LINE RD
VILLA MARIA RD
EVERGREEN RD
COFFEE RUN RD
AMBROSIA RD
MCBRIDE RD
HILLSVILLE RD
BAIRD RD
ERSKINE QUARRY RD
JACOBSON RD
GRAHAM RD
SKYHILL RD
N EDINBURG RD
HARBOR EDINBURG RD
E RIVER RD
FORDING RD
STATE LINE RD
W MAIN ST
W STATE ST
E MAIN ST
CHURCHILL RD
MOHAWK SCHOOL RD
ERIE ST
MCCLELLAND RD
EDINBURG RD
W WASHINGTON ST
WINTER RD
MILLER RD
COVERT RD
KILDOO RD
HOFFMASTER RD
N MAIN ST
W POLAND RD
E POLAND RD
SMALLS FERRY RD
BREWSTER RD
MOUNT JACKSON RD
S MAIN ST
CRUM RD
COLUMBIANA RD
MCCURLEY RD
WESTFIELD RD
MOUNT AIR RD
REED RD
PADEN RD
KYLE RD
GILMORE RD
CLELAND MILL RD
SUNNYSIDE RD
WAMPUM RD
VANCE RD
MCKIM RD
NEW RD

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Soil Characteristics

Glaciers had a profound impact on the formation of the soils of the Mahoning River Basin. Soils within the watershed are silt loam and gravelly loam in texture. In many cases seasonably high water tables and restrictive layers that create challenges to construction and agriculture are present in the soils. Most of the soils in the project area are middle aged and a few that are considered to be in the younger age category.

Soil Associations

Ravenna-Canfield-Frenchtown association:

Nearly level to moderately steep, deep, moderately well drained to poorly drained soils; formed in glacial till.

Canfield –Ravenna- Loudonville association:

Nearly level to very steep, moderately steep and deep, well drained to somewhat poorly drained soils; formed in glacial till.

Conotton-Chilli-Holly association:

Nearly Level to very steep, deep, somewhat excessively drained, well drained, and poorly drained soils; formed in glacial outwash and alluvium.

Udothents-Canfield-Ravenna association:

Nearly level to very steep, deep, excessively drained to somewhat poorly drained soils; formed in material from strip mines and in glacial till.

Prime Farmland Soils

By definition, prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. (USDA)

Table 2-1. Prime Farmland Soils in the Watershed	
CdB	Canfield silt loam, 3 to 8 percent slopes
ChB	Chilli silt loam, 3 to 8 percent slopes
Cg	Chargrin silt loam
CoB	Conotton silt loam, 3 to 8 percent slopes
Lb	Lobdell silt loam
LoB	Loudonville gravelly silt loam, 3 to 8 percent
RaA	Ravenna silt loam, 0 to 3 percent slopes
RaB	Ravennal silt loam, 3 to 8 percent slopes
WoB	Wooster gravelly silt loam, 3 to 8 percent

Hydric Soils

The definition of a hydric soil is a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. (USDA)

Table 2-2. Hydric Soils in the Watershed	
CA	Canadice Silt Loam
FNA	Frenchtown Silt Loam 3 to 8 percent slope
FNB	Frenchtown Silt Loam 8 to 15 percent slope
HO	Holly Silt Loam
REB	Rexford Silt Loam, 3 to 8 percent slope
SN	Sloan Silt Loam

Agricultural Preservation Areas

Agricultural Security Areas

Cooperative agreements between the municipalities and individual landowners to limit the impacts to agriculture by not passing nuisance ordinances which restrict normal farming operations and place limitations on the ability of government to condemn farm land in the agricultural security area. These areas must be a minimum of 250 acres in size.

Eligibility Requirements

- Noncontiguous farm parcels must be at least 10 acres in size. The farm tracts needed to create a new 250 acre or larger agricultural security area do not have to be under the same ownership or even be located in the same municipality. The Agricultural Area Security Law (Act 43 of 1981) allows for the creation of joint municipality agricultural security areas.
- The property should be viable agricultural land. Cropland, pasture, and woodland can all be included in an agricultural security area.
- At least 50% of the land should be in Soil Capability Classes I-IV, as defined by the county soil survey.
- The property must be zoned to permit agricultural uses.

Within the Mahoning River Watershed, there are two townships that have agricultural security areas (ASA). These townships are Pulaski and North Beaver Townships.

Within these ASA's there is one farm that is in the Agricultural Land Preservation Easements Program.

Agricultural Land Preservation Easement

An agricultural conservation easement is an interest in land, less than fee simple, which represents the right to prevent development or improvement of a parcel for any purpose other than agricultural production.

A farmland owner may grant the agricultural conservation easement to the Commonwealth of Pennsylvania, a county agricultural land preservation program, a local government unit or a local land trust. Easements can be sold or donated. After an easement is sold or donated, the conservation easement restrictions are recorded in the recorder of deeds office in the county where the easement is located.

Commonwealth Eligibility Requirements

- Be located in an agricultural security area consisting of 500 acres or more.
- Be contiguous acreage of at least 50 acres in size unless the tract is at least 10 acres in size and is either used for a crop unique to the area or is contiguous to a property previously preserved with an agricultural conservation easement.
- Have at least 50% of the soils on the property in soil capability classes I-IV (as defined by the local Soil Survey) and be available for agricultural production.
- Contain the greater of 50% or 10 acres of harvested cropland, pasture or grazing land.

County Farmland Preservation Programs

Lawrence County Agricultural Conservation Easement Purchase Program

Eligibility Requirements

- Easements on the entire tax parcel or deeded area must be offered.
- The tract must produce $25,000 or more in agricultural income.
- There is a $1,250 per acre cap.
- All easements are purchased in perpetuity, in accordance with ACT 43.

Please contact the Lawrence County Ag Conservation Easement Program for more information on scoring and funding availability.

Figure 2-2
Agricultural Soils

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Watershed
- All Areas are Prime Farmland
- Farmland of Statewide Importance
- Not Prime Farmland

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD 422 AMBROSIA RD MCBRIDE RD PULASKI-ESTY RD BAIRD RD ERSKINE QUARRY RD AMBROSIA RD 551 JACOBSON RD GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR-EDINBURG RD MAHONING TWP E RIVER RD Shenango River 224 Robinson Mahoning River W MAIN ST North Edinburg Hillsville FORDING RD Parkstown STATE LINE RD W STATE ST Edinburg UNION TWP W WASHINGTON ST E MAIN ST 376 CHURCHILL RD MOHAWK SCHOOL RD ERIE ST Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MILLER RD EDINBURG RD COVERT RD KILDOO RD NEW CASTLE CITY Hickory Creek N MAIN ST HOFFMASTER RD W POLAND RD E POLAND RD MOHAWK SCHOOL RD 317 422 SMALLS FERRY RD BESSEMER BOR BREWSTER RD MOUNT JACKSON RD NORTH BEAVER TWP 108 TAYLOR TWP S MAIN ST Mount Jackson CLELAND MILL RD SUNNYSIDE RD GRUM RD COLUMBIANA RD MAHONING RIVER WAMPUM RD COLUMBIANA RD MOUNT JACKSON RD VANCE RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD 18 KYLE RD Beaver River 108 551 376 PADEN RD GILMORE RD GILMORE RD MOUNT AIR RD Sugar Creek MCKIM RD NEW RD Edwards Run

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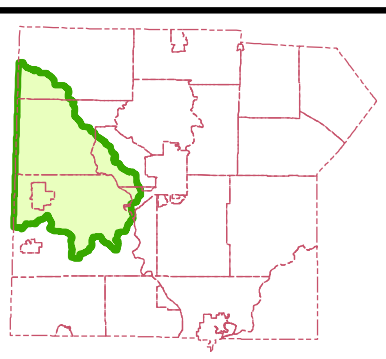

Figure 2-3
Agricultural Preservation Areas

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Watershed
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Agricultural Preservation Areas
- Agricultural Security Areas

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Lawrence County Planning Commission
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Allen Miller

0 0.5 1 2 3 Miles

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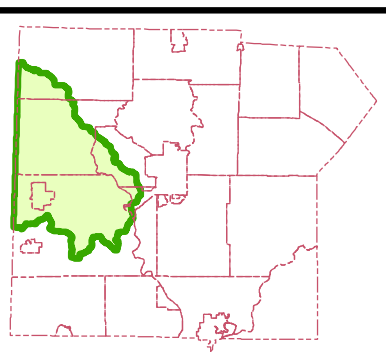
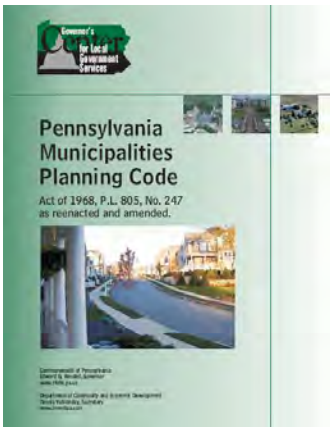


Land Use

A majority of the municipalities in the watershed are utilizing most of the land-use regulation control powers granted to them by the state legislature in the Pennsylvania Municipalities Planning Code. Granted land-use regulation control powers include comprehensive planning, subdivision regulation, and zoning. Unwanted land uses may result from uncontrolled industrial, commercial, or residential development.

Comprehensive Plans

Comprehensive plans developed by municipalities serve as a guide to direct land use development and what action should be taken to ensure appropriate development that municipality. This plan assists with defining the resource in the municipality and how to take action to ensure undesirable land uses are not implemented through uncontrolled development. Comprehensive plans have no regulatory authority and should be implemented through development ordinances and municipal regulations. Pennsylvania requires county comprehensive plans must be reviewed and updated every 10 years.



Five (5) out of the seven (7) municipalities in the watershed have individual Comprehensive Plans. Mahoning and Union Townships have a joint municipal Comprehensive plan that they completed and adopted.

Subdivision Regulations

Subdivision regulations limit the number of times that a parcel can be split into two or more smaller parcels; and therefore, represent an important tool in controlling sprawl. Subdivision regulations can ensure that new developments do not overburden local roads, facilities, and services; new roads and infrastructure are integrated with existing and planned roads and facilities; and provide adequate provisions for stormwater management, erosion control, water, wastewater, and traffic access (Vermont Conservation Education Fund, 2002).

All seven municipalities in the Mahoning River watershed have Subdivision Ordinances enacted.

Zoning Ordinances

The intent of zoning ordinances is to allow property owners the reasonable use of their property insofar as the use is not detrimental to abutting properties or to the neighborhood.

The purpose of zoning as defined by Pennsylvania Municipal Planning Code:

> *"The provisions of zoning ordinances shall be designed:*
>
> *(1) To promote, protect and facilitate any or all of the following: the public health, safety, morals, and the general welfare; coordinated and practical community development and proper density of population; emergency management preparedness and operations, airports, and national defense facilities, the provisions of adequate light and air, access to incident solar energy, police protection, vehicle parking and loading space, transportation, water, sewerage, schools, recreational facilities, public grounds, the provision of a safe, reliable and adequate water supply for domestic, commercial, agricultural or industrial use, and other public requirements; as well as preservation of the natural, scenic and historic values in the environment and preservation of forests, wetlands, aquifers and floodplains.*
>
> *(2) To prevent one or more of the following: overcrowding of land, blight, danger and congestion in travel and transportation, loss of health, life or property from fire, flood, panic or other dangers.*

(3) To preserve prime agriculture and farmland considering topography, soil type and classification, and present use.

(4) To provide for the use of land within the municipality for residential housing of various dwelling types encompassing all basic forms of housing, including single-family and two-family dwellings, and a reasonable range of multifamily dwellings in various arrangements, mobile homes and mobile home parks, provided, however, that no zoning ordinance shall be deemed invalid for the failure to provide for any other specific dwelling type.

(5) To accommodate reasonable overall community growth, including population and employment growth, and opportunities for development of a variety of residential dwelling types and nonresidential uses."

(Pennsylvania Municipal Planning Code)

Municipalities without zoning ordinances are susceptible to unwanted and undesirable land uses that could degrade the quality of life of their residents. All of the municipalities in the watershed have Zoning Ordinances.

Table 2-3. Land Use Type by Subwatershed

Land-Use Type	Coffee Run Subwatershed		Hickory Creek Subwatershed		Hickory Run Subwatershed		Mahoning River Subwatershed		Marshall Run Subwatershed		Mahoning River Watershed	
	Square Miles	% of Land Area	Square Miles	% of Land Area	Square Miles	% of Land Area	Square Miles	% of Land Area	Square Miles	% of Land Area	Square Miles	% of Land Area
Agriculture	**3.36**	**38.89%**	**0.23**	**37.10%**	**10.29**	**50.15%**	**6.99**	**30.75%**	**1.27**	**52.05%**	**22.14**	**40.29%**
Cropland/Pasture	2.83	32.75%	0.05	8.06%	7.98	38.89%	4.92	21.65%	0.66	27.05%	16.44	29.92%
Herbaceous Rangeland	0.53	6.13%	0.18	29.03%	2.31	11.26%	2.07	9.11%	0.61	25.00%	5.70	10.37%
Mixed Forest	**3.81**	**44.10%**	**0.14**	**22.58%**	**6.67**	**32.50%**	**10.14**	**44.61%**	**0.92**	**37.70%**	**21.68**	**39.45%**
Water	**0.07**	**0.81%**	**0.10**	**16.13%**	**0.70**	**3.41%**	**0.61**	**2.68%**	**0.01**	**0.41%**	**1.49**	**2.71%**
Streams	0.01	0.12%	0.00	0.00%	0.00	0.00%	0.35	1.54%	0.00	0.00%	0.36	0.66%
Reservoirs	0.06	0.69%	0.10	16.13%	0.70	3.41%	0.26	1.14%	0.01	0.41%	1.13	2.06%
Development	**1.36**	**15.74%**	**0.15**	**24.19%**	**2.71**	**13.21%**	**4.41**	**19.40%**	**0.20**	**8.20%**	**8.83**	**16.07%**
Residential	1.13	13.08%	0.14	22.58%	2.33	11.35%	3.12	13.73%	0.18	7.38%	6.90	12.56%
Commercial	0.12	1.39%	0.01	1.61%	0.11	0.54%	0.14	0.62%	0.01	0.41%	0.39	0.71%
Industrial	0.00	0.00%	0.00	0.00%	0.09	0.44%	0.11	0.48%	0.00	0.00%	0.20	0.36%
Transportation	0.01	0.12%	0.00	0.00%	0.04	0.19%	0.69	3.04%	0.01	0.41%	0.75	1.36%
Other Urban or Build-up Land	0.10	1.16%	0.00	0.00%	0.14	0.68%	0.35	1.54%	0.00	0.00%	0.59	1.07%
Barren	**0.04**	**0.46%**	**0.00**	**0.00%**	**0.15**	**0.73%**	**0.58**	**2.55%**	**0.04**	**1.64%**	**0.81**	**1.47%**
Strip Mines/Quarries	0.00	0.00%	0.00	0.00%	0.13	0.63%	0.16	0.70%	0.00	0.00%	0.29	0.53%
Transitional Areas	0.02	0.23%	0.00	0.00%	0.02	0.10%	0.09	0.40%	0.04	1.64%	0.17	0.31%
Mixed Barren Land	0.02	0.23%	0.00	0.00%	0.00	0.00%	0.33	1.45%	0.00	0.00%	0.35	0.64%
Total	**8.64**	**100.00%**	**0.62**	**100.00%**	**20.52**	**100.00%**	**22.73**	**100.00%**	**2.44**	**100.00%**	**54.95**	**100.00%**

Floodplain Regulations

The Pennsylvania Floodplain Management Act, or Act 166 signed into law on October 4, 1978 requires compliance with a federal program (National Flood Insurance Program - NFIP). This act requires municipalities identified as having an area or areas subject to flooding participate in the NFIP. The municipalities with these areas must also enact floodplain management regulations to comply with the minimum standards of the NFIP and also regulations set forth by the act. These regulations include standards for special permit activities (i.e. nursing homes, hospitals, jails) and development involving

Figure 2-4
Land Use and Land Cover

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Major Streams
- Minor Streams
- Unamed Streams
- Municipalities
- Tax Parcels
- Watershed

Land Cover

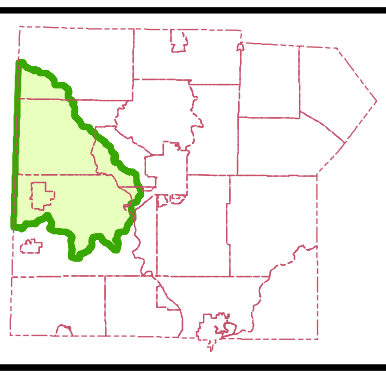
- Residential
- Commercial
- Industrial
- Transportation
- Other Urban or Built-up Land
- Cropland Pasture
- Herbaceous Rangeland
- Mixed Forest
- Streams
- Reservoirs
- Strip Mines Quarries
- Transitional Areas
- Mixed Barren Land

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.



hazardous materials and substances which are dangerous to human life. Municipalities are not prohibited from requiring more restrictive floodplain management regulations.

Act 167 – Stormwater Management Ordinances

The purpose of The Pennsylvania Stormwater Management Act of 1978, or Act 167, is to encourage planning and management of stormwater runoff in each watershed which is consistent with sound water and land us practices. It helps authorize a comprehensive program of stormwater management designated to preserve and restore the flood carrying capacity of Commonwealth streams; to preserve the maximum extent practicable natural stormwater runoff regimes and natural courses, current and cross-section of water of the Commonwealth; and to protect and conserve ground waters and ground-water recharge areas. Finally, it is to encourage administration and management of strormwater consistent to the preservation of natural, economic, scenic, aesthetic, recreational and historic values of the environment.

The Lawrence County Commissioners created and adopted an Act 167 Stormwater Management Plan in June of 2010. Six months after approval from the Department of Environmental Protection all twenty-seven municipalities were required to adopt the model ordinance. To date, all twenty seven municipalities have adopted the model ordinance.

Table 2-4. Municipal Land Use Regulations in the Watershed

Municipality	Comprehensive Plan	Zoning Ordinance	Subdivision Ordinance	Floodplain Regulation	Stormwater Ordinance
Bessemer Borough	No	Yes	Yes	Yes	Yes
Mahoning Township	Yes	Yes	Yes	Yes	Yes
North Beaver Township	Yes	Yes	Yes	Yes	Yes
New Castle City	Yes	Yes	Yes	Yes	Yes
Pulaski Township	Yes	Yes	Yes	Yes	Yes
Taylor Township	No	Yes	Yes	Yes	Yes
Union Township	Yes	Yes	Yes	Yes	Yes

Hazardous Areas

Hazardous areas are areas that have or could have potentially hazardous materials or conditions. Hazardous areas include Superfund sites, hazardous waste haulers and storage facilities, illegal dumpsites, auto salvage yards, landfills, brownfield sites, and abandoned mines.

Comprehensive Environmental Response Compensation and Liability Act

The Comprehensive Environmental Response Compensation and Liability Act (CERCLA), commonly known as Superfund, was enacted in 1980 to provide broad federal authority to respond directly to releases of hazardous substances that may endanger public health or the environment [U.S. Environmental Protection Agency (U.S. EPA), 2004]. By creating a tax on the chemical and petroleum industries, a trust fund was established to provide for cleanup where no responsible party could be identified. In 1986, the Superfund Amendments and Reauthorization Act (SARA) amended CERCLA.

Short-term and long-term action responses were identified in the law. Short-term removals require prompt response for releases or threatened releases. Long-term responses permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These can be conducted only at sites listed on U.S. EPA's National Priorities List (NPL).

Resource Conservation and Recovery Act

The **Resource Conservation and Recovery Act (RCRA)**, a federal statute, regulates the transportation, handling, storage and disposal of solid and hazardous materials. Regulatory responsibilities, include obtaining permits, identifying and listing hazardous waste, adhering to proper procedures when transporting or disposing of waste, developing risk management plans, and maintaining records, may be controlled by federal facilities (U.S. EPA, 2002). Requirements for underground storage tanks, including cove tank design, operation, cleanup, and closure, are also contained in RCRA. There are no areas in the Mahoning River Watershed.

Illegal Dumpsites

In remote areas, streambeds, hillsides, back roads, and old coal mines are often inundated with old tires, appliances, and other items that people no longer want. These illegal dumps grow with continued use over time and can cause a variety of economic and health impacts. Currently, it is the responsibility of the municipalities to address illegal dumping within their borders. This includes enforcement/compliance and cleanups. According to a 2008 PA CleanWays survey of Lawrence County roads, there are at least four illegal dump sites in the watershed. This includes one of the largest sites in Lawrence County, located off Erskine Quarry Road in Mahoning Township. The Erskine Quarry Road site contains a variety of waste types including approximately 100 appliances, several hundred tires, and dozens of televisions, electronics, furniture, and mattresses. All of the sites contained household hazardous wastes.

Because many areas of the watershed are remote and isolated, the watershed is frequently victimized by isolated instances of illegally dumped trash. This includes everything from small loads of yard waste to dump truck loads of construction/demolition wastes.

Keep Pennsylvania Beautiful chapters and affiliates throughout the state work to clean up and prevent illegal dumping through action and education. Local businesses, organizations, or clubs often "adopt" rural roadways, trails and/or waterways to help curtail illegal dumping. These volunteers pick up trash in their adopted area two to three times a year, similar to the Adopt a Highway program run by Pennsylvania Department of Transportation.

The Mahoning River Watershed is served by Tri-County Cleanways Counties, a local affiliate of PA CleanWays. Since 1993, the organization has conducted 64 illegal dump cleanups, removing 378 tons of trash, 160 tons of metals, and 7,418 tires from the environment.

Auto Salvage Yards

Auto Salvage Yards are also commonly referred to as junkyards or wrecking yards, and serve as locations for decommissioned and wrecked vehicles that are usable for parts and materials. Environmental impacts of auto salvage yards are related to fluids that result from salvage yard operations, including crankcase oil, hydraulic oil, brake fluid, oil recovered from steam cleaning, gasoline, antifreeze, transmission fluid, window cleaner, and wastewater recovered from steam cleaning. In addition, tires and lead/acid batteries must be managed in compliance with DEP and EPA regulations.

Recycling

Recycling starts with community collection of approved materials, which generally include glass, plastic, paper, and metal materials. Community collection may be done through curbside collection, drop off centers, or The buy-back centers. After sorting, recyclable materials are sold and purchased in the same manner as any other commodity. Materials recovery facilities buy the materials and remanufacture the recyclables into new products.

The benefits from recycling are numerous and can have a positive impact on a community. Recycling materials keeps them out of municipal landfills, and therefore reduces. Recycling also reduces the amount of raw materials required to produce products, which reduces the need for resource extraction activities, reduces emissions, and saves a significant amount of energy in the process. Recycling programs create numerous jobs. In Pennsylvania alone the recycling industry accounts for 52,316 jobs and annual receipts of almost $21,000,000. (NERC, 2009)

Pennsylvania Act 101, the Municipal Waste Planning, Recycling, and Waste Reduction Act of 1988, mandates curbside recycling for municipalities with populations of at least 5,000 or a population density of at least 300 persons per square mile, by September 1991. Additionally, each County is responsible for developing its own municipal waste management plan and updating their plans every ten years. (DEP, 2006c)

There are five Act 101 mandated recycling programs in Lawrence County: the City of New Castle, Ellwood City Borough, and Neshannock, Shenango, and Union Townships. Additionally, New Wilmington Borough voluntarily established a mandatory curbside recycling program. Outside of these municipalities, rural residents who are customers of Tri-County Industries and Valley Refuse can recycle curbside.

Lawrence County administers a recycling drop-off program to ensure that all residents have access to recycling. There are 15 sites in the County program, more commonly known as the "Big Blue Bin Program", including three sites that directly serve residents living in the watershed.

Additionally, Mahoning Township offers a similar program. Township residents can take their recyclables to containers at the township building.

Brownfields

According to U.S. EPA, "brownfields are real estate property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressure off of undeveloped, open land, while improving and protecting the environment (U.S. EPA, 2006b)"

To address brownfields issues in Pennsylvania, DEP has created a Brownfields Action Team (BAT). BAT was formed to streamline the revitalization of Brownfield sites and enhance the interaction between the local community and DEP. Responsibilities of the team include expediting permits, coordinating funding, and help obtaining liability protection for sites.

DEP also developed a joint program with U.S. EPA called the "One Cleanup Program" in 2004. The purpose of the program is to ensure that brownfields recovered under Pennsylvania brownfields program also satisfy requirements under federal regulations. According to DEP, there are no brownfields in the Mahoning River Watershed.

Critical Areas

Critical areas are those considered to have constraints that limit development and other various activities. These areas include those with physiographic characteristics that discourage development, such as wetlands, floodplains, and steep slopes. Natural areas with environmental resources that should be preserved and managed for conservation purposes are also included in this section.

Floodplains

A floodplain is an area of land adjacent to a river or stream that experiences occasional or periodic flooding. It includes the *floodway*, which consists of the stream channel and adjacent areas that carry flood flows, and the *flood fringe*, which are areas covered by the flood, but which do not experience a strong current.

Floodplains are formed by the deposition of sediment during flood events. They serve as a place for rivers or streams to deposit sediments and lower the velocity of floodwaters as they spread out across the floodplain. The meandering or eroding of streambanks also deposit sediment downstream and contributes to floodplain formation. Floodplains also support particularly rich ecosystems, diverse in both plant and animal species, and are critical areas to the waterway.

Historically, many towns and villages were built on floodplains despite the susceptibility to flooding. Advantages to this were access to readily available water, fertile land for farming, and river transportation.

The National Flood Insurance Program now regulates development in mapped floodplains based on the 1% chance. The Federal Emergency Management Agency provides Flood Insurance Rate Maps (FIRM) which delineates floodplain hazard areas and risk zones for communities. These maps are used by municipalities to administer floodplain management regulations, mitigate flood damage, and limit development. Lending institutions also use the FIRM's to locate properties and buildings that require flood insurance.

Mapped floodplains in the Mahoning River watershed exist along the Mahoning River, Coffee Run, Hickory Creek, and Hickory Run.

Wetlands

Wetlands are "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions," as defined by the United States Army Corps of Engineers (USACE 2002). Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands are identified and their boundaries are delineated according to hydrology, soil type, and vegetation.

Long regarded as wastelands, wetlands are now recognized as important features in the landscape that provide numerous beneficial services for people, fish, and wildlife. Wetlands are valuable because they clean water, recharge water supplies, reduce flood risks, and provide fish and wildlife habitat. In addition, wetlands provide recreational opportunities, aesthetic benefits, sites for research and education, and commercial fishery benefits. These functions or services of wetlands have real economic value to communities and can be expressed by tourist dollars, revenue generated, reduced water treatment costs, or flood damages mitigated.

Wetlands are protected through federal and state agency programs. In most instances permitting of some degree is necessary to develop areas where wetlands are present. In Lawrence County, the Department of Environmental Protection is delegated this authority through the use of PASPGP-3 which is a federal Clean Water Act Section 404 authorization in conjunction with Chapter 105 obstruction and encroachment permitting. The type of authorization required is dictated by numerous factors including the watershed where the impacts will occur, the degree of impact, and the size of the disturbance. Generally, regulatory agencies focus on a three tier approach with respect to development in critical wetland areas. First, avoidance of impacts is encouraged. Avoidance may necessitate redesign, or relocation of components

within a proposed development. Secondly, if impacts to the wetlands cannot be avoided it is recommended that the impacts be minimized the maximum extent possible. Lastly, if development within a wetland is authorized it is usually accompanied by required mitigation.

Steep Slopes

Areas with slopes in excess of twenty-five percent (25%) have generally been categorized as prohibitive or restrictive to development. Usually several environmentally significant features are evident where steep slopes exist, including floodplains in valley floors, geologic formations, and wetlands adjacent to stream channels. Many communities with zoning regulations limit development in these areas through the use of "conservation zoning districts" or "steep slope overlay zones" which effectively reduce development options to minimal impact land uses such as parks and agricultural operations.

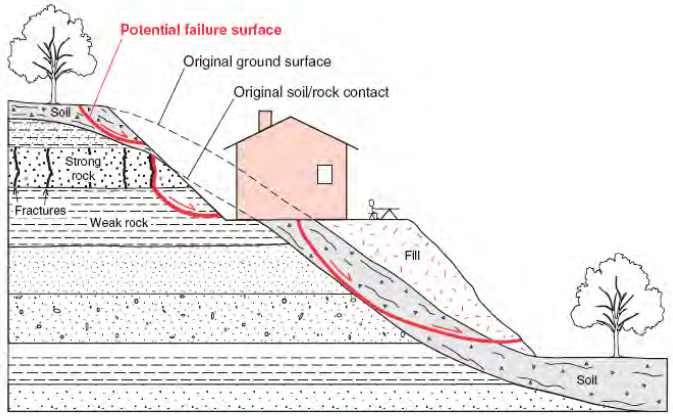


Diagram 2-2. Steep Slopes
Image from the DCNR publication *Landslides in PA*.

Steep slopes can also be prone to landslides. Landsliding is a natural geologic process involving the movement of earth materials down a slope. It not only helps shape the landscape but is also a significant geologic hazard. In the Mahoning River watershed and Northwest Glaciated Plateau Section, the probability of landslides is generally low. Steep slopes having thin soil are prone to rockslides in this area.

Natural Areas

Habitats are natural environments in which plants and animals reside. Healthy habitats are important to maintaining a diversity of biological resources. In 2003, the Western Pennsylvania Conservancy completed a Natural Heritage Inventory (NHI) of Lawrence County that identified environmentally sensitive and ecologically important areas. These Biologically Diverse Areas (BDA's) contain potential habitats for plant and animal species of concern or significant natural communities that warrant preservation.

The Pennsylvania Department of Conservation and Natural Resources (DCNR) maintains the Pennsylvania Natural Diversity Inventory (PNDI) database that maintains records of species and communities of special concern throughout the state. The PNDI database is a compilation of the individual county NHI's completed and plant and animal species of concern that were identified. During permit reviews by the State for construction activities, a PNDI review of the site is sometimes required prior to development. If a disturbance is proposed in an area identified in the PNDI database, special consideration is taken by the State to minimize environmental impacts to the natural communities that exist.

Four NHI sites exist in the Mahoning River watershed. The Slope City Slopes BDA and Quaker Falls BDA are both situated along the Mahoning River Valley in Mahoning Township. These two BDA's are significant because of their mature, vegetated stream corridors and geologic structure. These natural areas are surrounded by mining and industrial land uses that should be buffered to minimize any impacts to the natural communities that exist.

The Edinburg Swamp BDA straddles Mahoning and Union Townships just downstream of Edinburg along the Mahoning River. The Edinburg Swamp is a wooded floodplain along the river situated between an active railroad. This water willow shrub wetland is a rare sight of a vegetated floodplain along the Mahoning River.

Mine Subsidence and Abandoned Mines

Mine subsidence is the movement of ground surfaces as a result of the collapse or failure of underground mine workings and extraction of coal. After coal is removed from the ground, over time the roof of the mine begins to collapse. The sagging of rocks layers may propagate to the surface of the land. This can be devastating to buildings and structures, and also alters groundwater and surface water flows. Significant coal reserves in the Mahoning River watershed and history of mining activities makes this watershed susceptible to subsidence. Abandoned coal mines are a significant hazard in Western, PA. In 1968, Pennsylvania passed the Land and Water Conservation and Reclamation Act, the first act to address abandoned mine reclamation. This act spurred Operation Scarlift, which was instituted to clean up the damage caused by abandoned mines.

Management Recommendations

Agricultural Lands

- Enroll agricultural landowners in the Conservation Reserve Enhancement Program (CREP), a voluntary program, to take marginal farmland out of production for wildlife habitat, or other similar programs.
- Identify additional local, state, and federal funding for the implementation of agricultural best management practices.
- Promote and implement conservation practices such as cover crops and crop residue, contour strips, grassed waterways, and minimal pesticide/herbicide use.
- Promote and utilize farmland preservation programs to sustain agricultural base and rural heritage.
- Protect active farmlands to retain their agricultural uses by designating them as agricultural security areas, purchasing conservation easements, or assisting in the multi-generation transfer of ownership.
- Encourage agricultural landowners to install stream fencing and spring development.

Erosion and Sedimentation

- Establish land-use planning and zoning to limit development in floodplains and other critical areas subject to erosion and sedimentation problems.
- Include sound geologic investigation and best management practices during maintenance and construction of roadways.
- Utilize best management practices to control erosion and sedimentation in agriculture, forestry, development, and mining industries.

Forestry

- Host workshops and/or programs promoting sustainable forestland management for loggers, landowners, and municipal officials.
- Educate forestland owners by providing them with accurate information regarding sound silviculture practices, forest management plan development, and insect and disease problems that can affect forest health.
- Encourage the development and use of Forest Stewardship Plans or forest management plans and participation in the PA Forest Stewardship and/or the Tree Farm Program.
- Encourage timber harvesters to use techniques based upon forest type and size under the direction of a professional forester.
- Promote tree plantings and sustainable harvesting.
- Support laws and regulations to maintain whitetail deer populations at levels that will ensure healthy forests, productive agricultural lands, and healthy deer populations.

Waste Disposal

- Educate citizens about the economic and environmental impacts of illegal dumping.
- Partner with local landowners, businesses, and community groups to sponsor community cleanups to remove trash along roadways, streambanks, and at dumpsites.
- Identify additional local, state, and federal funding to address the waste disposal needs of the area.
- Conduct an inventory and develop a remediation plan for illegal dumpsites within the watershed.
- Educate citizens about traditional and innovative ways to reduce, reuse, recycle, and properly dispose of household hazardous waste by providing public service announcements, recycling workshops, and other education and outreach programs.
- Provide convenient and affordable alternative disposal options, such as offering special collection days and drop-off locations for appliances and household hazardous wastes.

Riparian Corridors

- Educate landowners along waterways about the value of riparian buffers.
- Establish and protect riparian buffers along streams using smart growth practices as identified in the project area characteristics chapter.
- Continue streambank restoration and riparian buffer initiatives on agricultural lands to minimize nutrients and sediments entering the waterways.

Development and Redevelopment

- Establish a planned approach to growth; revitalize existing structures before developing new lands.
- Promote the inclusion or preservation of open space in community development programs.
- Establish more greenways and forestlands that are available for public use.
- Protect natural areas by converting them into parks, purchasing conservation easements, or utilizing other conservation methods.
- Promote redevelopment of abandoned industrial sites through the Brownfields program, incentives, tax breaks, or other efforts.

Other

- Conduct outreach campaigns to educate watershed residents about the land uses in their communities.
- Educate the public to utilize practices such as “Leave no trace” on public lands and private lands open to public use.

Figure 2-5
Coal Mining Operations

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Watershed

Coal Mining Operations

- Active
- Inactive
- Coal Mined Areas

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.

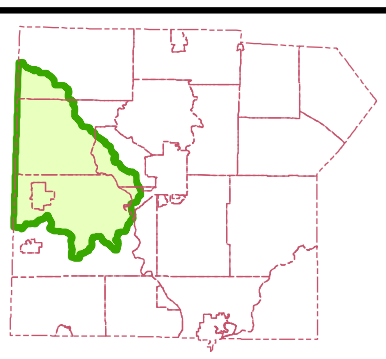


Figure 2-6
Environmentally Sensitive Areas

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Watershed
- Natural Heritage Inventory
- Wetlands
- Areas of > 25% Slope
- Floodplains

Prepared by the
Lawrence County Planning Commission
February 2013
Allen Miller

0 0.5 1 2 3 Miles

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Figure 2-7
Soil Limitations

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Watershed
- All Hydric Soils
- Partially Hydric Soils
- Not Hydric Soils

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0 0.5 1 2 3 Miles

N W E S

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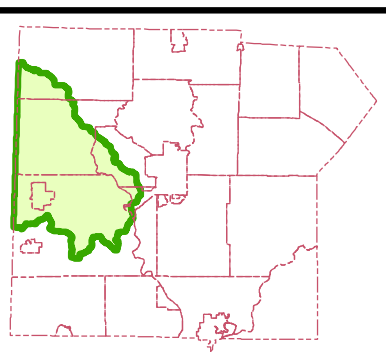

Figure 2-8
General Soils

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Watershed
- Ravenna-Morristown-Canfield
- Red Hook-Holly-Chenango-Cambridge
- Wooster-Ravenna-Frenchtown-Chili-Canfield

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February 2010
Allen Miller

0 0.5 1 2 3 Miles

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.

Figure 2-9
Oil and Gas Wells

Legend

- Municipalities
- Watershed
- Tax Parcels
- Limited Access Highways
- Major Roads
- Local Roads
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Oil and Gas Fields

Oil and Gas Wells

- Proposed
- Inactive
- Abandoned
- Unconventional

Prepared by the
Lawrence County Planning Commission
February 2013
Allen Miller

0 0.5 1 2 3 Miles

N W E S

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Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.

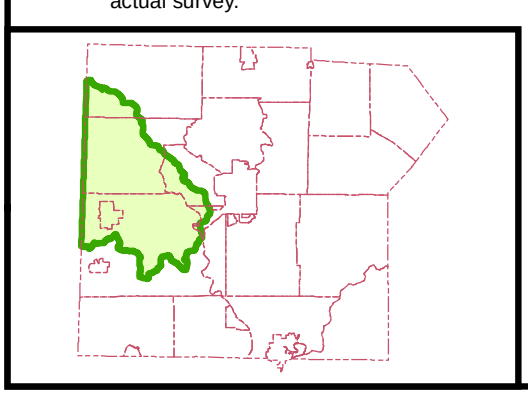

Figure 2-10
Hazardous Areas

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Water Bodies
- Watershed
- PA Cleanways Illegal Dump Surveys
- Land Recycling Cleanup Locations
- Lawrence County Recycling Dump Sites

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD 422 MCBRIDE RD HILLSVILLE RD Marshall Run BAIRD RD ERSKINE QUARRY RD AMBROSIA RD 551 JACOBSON RD GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR EDINBURG RD Shenango River 224 MAHONING TWP E RIVER RD Mahoning River Robinson W MAIN ST North Edinburg Hillsville FORDING RD Parkstown 224 STATE LINE RD W STATE ST Edinburg UNION TWP W WASHINGTON ST E MAIN ST 376 CHURCHILL RD MOHAWK SCHOOL RD ERIE ST Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MILLER RD EDINBURG RD COVERT RD HOFFMASTER RD KILDOO RD NEW CASTLE CITY Hickory Creek N MAIN ST W POLAND RD E POLAND RD MOHAWK SCHOOL RD 317 SMALLS FERRY RD BREWSTER RD BESSEMER BOR NORTH BEAVER TWP MOUNT JACKSON RD 108 TAYLOR TWP CRUM RD S MAIN ST Hickory Run Mount Jackson CLELAND MILL RD SUNNYSIDE RD COLUMBIANA RD WAMPUM RD COLUMBIANA RD VANCE RD 18 MCCURLEY RD MOUNT JACKSON RD Beaver River WESTFIELD RD MOUNT AIR RD REED RD KYLE RD 108 551 PADEN RD 376 GILMORE RD GILMORE RD MOUNT AIR RD Sugar Creek MCKIM RD NEW RD Edwards Run

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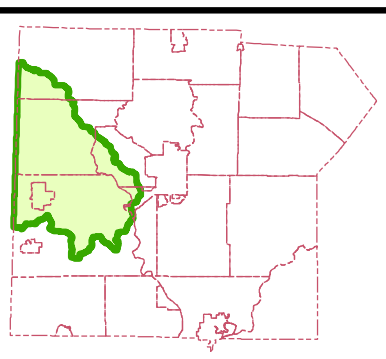


Figure 2-11
Zoning Districts

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Municipalities
- Tax Parcels
- Major Streams
- Minor Streams
- Unamed Streams
- Watershed

Prepared by the
Lawrence County Planning Commission
February 2010
Allen Miller

0 0.5 1 2 3 Miles

Pulaski
- Agricultural District
- Institutional District
- Residential District
- Village
- Mixed Use Highway

Mahoning
- Conservation
- Residential
- Village 1
- Village 2
- Mixed Use Highway
- Industrial
- Industrial Park

Union
- R1 - Agricultural/Residential
- R2 - General Residential
- R3 - Multi-Family Residential
- CC - Central Commercial
- LI - Light Industrial
- AP - Airport District

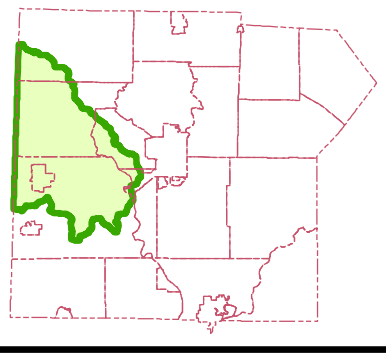
New Castle
- R-1 Low Density Residential District
- R-2 Medium Density Residential District
- C-1 General Business District
- M-1 Light Industrial District
- M-2 Heavy Industrial District
- M-2A Heavy Industrial District

Bessemer
- Residential
- Commercial
- Industrial

Taylor
- R-3 Rural Residential

North Beaver
- A Agricultural Conservation
- R1 Rural Residential
- R2 Suburban Residential
- R3 General Residential
- C1 General Commercial
- C2 Highway Commercial
- I Industrial

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.



CHAPTER 3: WATER RESOURCES

Resources

A watershed is a basin-like landform defined by high points and ridge lines that descend into lower elevations and stream valleys. A watershed carries water "shed" from the land after rain falls and snow melts. Drop by drop, water is channeled into soil, groundwater, creeks, and streams, making its way to larger rivers, and eventually the sea. Water is a universal solvent capable of dissolving and transporting many chemicals. What we put on the ground – lawn chemicals, agricultural fertilizers, salt on roads in winter, oils from exhaust on highways – affects water quality downstream. We remove vegetation from the watershed; we remove nature's mechanisms for storing and cleaning water. Asphalt surfaces, rooftops, roads, and parking lots keep water from reaching soils. Rain is piped away before soils can retain it, increasing the likelihood of flooding and erosion. Land development and stormwater management practices can be adapted to have fewer negative impacts on environmentally sensitive areas if the characteristics of natural systems are considered.

The pollutants that come from runoff contribute to non-point source pollution, the leading cause of water quality impairments in Pennsylvania. Non-point source pollution comes from many diffuse sources and is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into streams, lakes, rivers, wetlands, and underground sources of drinking water.

All the factors that go into making a stream, as well as the diversity of in-stream habitats, are extremely complex and interconnected. Factors affecting a stream's composition include: precipitation (seasonal variations), topography (determines stream gradient), geologic substrate (from which minerals are leached), land uses (determine sediment and contaminant loading of surface runoff and groundwater), soil and bedrock types (determine groundwater availability), sunlight or shade (affect temperature and algae growth), and riparian vegetation (for shade, nutrient source, insect habitat, and more). In addition, streams widen and their volumes increase as tributaries and other streams join them. The Mahoning River watershed has been shaped by glaciation, resulting in a dendritic drainage pattern and a significant number of lakes (reservoirs), ponds, and wetlands that now characterize the landscape.

Only 30 to 40 percent of the rain or snow that reaches the ground goes directly to streams. Most of it, surprisingly, is taken up and used internally by plants. Some water infiltrates soils and moves below the surface as groundwater, feeding plants and replenishing aquifers. Water exposed to the air evaporates from streams, rivers, wetlands, and plants. It returns to the atmosphere to fall again as precipitation. This "water cycle" cools the planet, cleans the air, and sustains life.

In Pennsylvania, we are fortunate to have an abundance of water. Pennsylvania is second only to Alaska in its abundance of running waters. Specifically, Pennsylvania is estimated to have the following:

- about 83,000 miles of rivers and streams
- nearly 4000 lakes, reservoirs, and ponds
- about 80 trillion gallons of groundwater
- over 404,000 acres of wetlands
- 56 miles of cost along the Delaware Estuary and 64 miles along Lake Erie (all the Great Lakes combined constitute 96 percent of the country's fresh surface water and 20 percent worldwide).

Despite the overall abundance of water, it is a finite resource and clean water is not always sufficiently available in areas where it may be needed. Through wise planning and proper management, however, water resources can be a renewable resource. Adequate water supplies being available to protect public health and natural resources, and sustain economic development and agriculture depend on water conservation and sound water management strategies (Pennsylvania Water Atlas of the State Water Plan).

Drainage

The Mahoning River travels 12 miles in Pennsylvania before meeting the Shenango River and forming the Beaver River southwest of the City of New Castle. From there, the Beaver River continues south into Beaver County where it flows into the Ohio River at Rochester. The Ohio River travels through six states before emptying into the Mississippi River in Illinois. The Mississippi River ultimately empties into the Gulf of Mexico. The Ohio River is the largest tributary by volume of the Mississippi River.

Watershed Address

The United States Geological Survey (USGS) has developed a system in order to better catalog and describe the location of surface water resources in the United States. This system establishes a watershed address that consists of an eight digit number, or Hydrologic Unit Code (HUC) and a name. Hydrologic units are watershed boundaries organized in a nested hierarchy by size. Major watersheds in the U.S. are described as on of twenty-one Water Resource Regions by the USGS. Pennsylvania is drained by three of these regions: Great Lakes, Ohio, and Mid-Atlantic.

The Mahoning River watershed's HUC code is 05030103. The following is a breakdown and description of the watershed address:

Table 3-1. Watershed Address Breakdown

Name	Unit	Code
Ohio	Region	05
Upper Ohio	Subregion	0503
Upper Ohio-Beaver	Accounting Unit	050301
Mahoning	Cataloging Unit	05030103

Major Tributaries

Tributaries are streams that flow to larger streams or other bodies of water. There are three major tributaries to the Mahoning River: Coffee Run, Marshall Run, and Hickory Run.

Coffee Run

Coffee Run drains 8.7 square miles in Pennsylvania. The watershed originates at King's Lake in Mahoning County, Ohio. Coffee Run is a warm water fishery. Land uses are rural in nature with agriculture, woodlands, single-family dwellings and some strip mines representing the dominating land use.

Marshall Run

Marshall Run has a drainage area of 2.4 square miles entirely within Lawrence County. Like Coffee Run, Marshall Run is a warm water fishery. The dominating land use in the watershed is agriculture with rural croplands, pasturelands, and some woodlands. A few residential developments and strip mine quarries exist in the upper portion of the watershed.

Hickory Run

Hickory Run is another major tributary which drains 21.2 square miles in PA, with its headwaters originating in heavily strip-mined lands near the Ohio border in Bessemer. Land uses are similar to Coffee Run with an increasing number of single-family dwellings in past years. Historically, the Bessemer Cement Company contributed heavy siltation in the stream but a 1977 survey showed that this problem had abated (Billingsley and Johns 1997).

Hickory Run and Lake Bessemer are Trout Stocked Fisheries and are stocked annually with trout by the PA Fish and Boat Commission.

Table 3-2. River and Stream Drainage

River and Stream	Drainage Area in PA (square miles)	Stream Designation
Mahoning River	22.7	WWF
Coffee Run	8.7	WWF
Marshall Run	2.4	WWF
Hickory Run	21.2	TSF
Total	55.0 (1,138 sq. mi. total drainage area including OH)	

In contrast to the Ohio portion of the Mahoning River corridor where the watershed is highly urbanized and historically intensely industrialized, the PA portion of the Mahoning River was and continues to be primarily rural. The riparian corridor is mostly intact and aesthetically appealing. There are a few urban areas including the City of New Castle, Hillsville and Edinburg. Land uses include rail and highway transportation corridors, a rails-to-trails recreational corridor, agriculture and mining.

Important Components of Watersheds

Hydrologic Cycle

The hydrologic cycle, or the Water Cycle, is the movement of water between land and air, and consists of five basic processes:

- Condensation
- Precipitation
- Infiltration
- Runoff
- Evaporation and Transpiration.

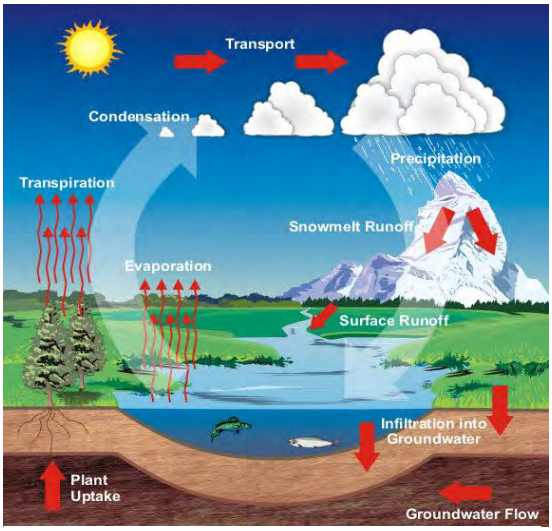


Diagram 3-1. "The Hydrologic Cycle" (National Weather Service)

Through these five processes and the sun's energy, the Water Cycle continuously recycles the earth's valuable water supply. This cycle helps us better understand the components of water resources within our watershed.

Condensation occurs when cooler temperatures in the atmosphere cause water vapor to condense and cling on to fine particles in the air. When enough vapors attach themselves to tiny pieces of dust, pollen or pollutants, it forms a cloud.

As the air gets more and more moist, the droplets that form the clouds grow larger and larger. Eventually, these droplets fall from the sky as ***precipitation.*** Precipitation can be in the form of rain, snow, sleet, or hail depending on the atmospheric conditions such as temperature.

Once precipitation reaches the ground, several things can happen. If the water is absorbed into the ground through a process called ***infiltration***, the water will slowly replenish groundwater supplies, can be absorbed by the roots of trees and vegetation, and can support stream flow and surface water resources.

If precipitation occurs faster than the water can infiltrate, the water will shed off the land as ***runoff*** into a nearby stream, lake, or river. This can be witnessed during heavy rainfall events and snow melt when developed land with impervious surfaces incapable of infiltrating water consequently become flooded, and rivers and streams overflow their banks.

Simultaneously, energy from the sun in the form of light and heat cause water to evaporate directly from the surface of oceans, rivers, and lakes. This process of ***evaporation*** turns water from a liquid form to a gas or vapor. Another form of evaporation that contributes to the water cycle is called ***transpiration***. This water vapor is given off through the pores of plants. When warm air currents rising from the earth's surface lift the water vapor from plants and water up into the atmosphere, the process of condensation occurs; and the cycle continues.

Groundwater

Groundwater is a hidden yet essential part of the hydrologic cycle. In fact, in PA, groundwater is about 30 times more abundant that all surface water combined. As precipitation falls, some water seeps through pores and cracks in the soil into the unsaturated zone – an area where pores are filled with a mix of air and water. If enough infiltrates, water descends to the saturated zone where pores (open spaces) are filled with only water. This infiltration process is known as groundwater recharge and takes place from November to May.

> ***DID YOU KNOW?***
> *PA has the second largest number of domestic wells in the nation.*

Groundwater supplies wells, streams, and reservoirs for which we depend for drinking water, industries and other necessities of life. Groundwater moves with the forces of gravity. It may move through the earth until it emerges at the surface as a discharge (springs or seeps) or is stored within areas of rock and soil, called aquifers. Groundwater discharge is a major contributor to surface waters. The average percentage of stream flow from groundwater (base flow of a stream) is around 65 percent. Therefore, stream flow and surface water availability is strongly dependent on the quantity of groundwater.

The majority of the watershed obtains their drinking private water supplies. Only approximately 8 square miles of the Mahoning River watershed are situated within a public water service area. Bessemer Borough's public drinking water is supplied through groundwater wells. Mahoning Township residents are serviced by Pennsylvania American and Ohio American Water, but the majority of Mahoning Township residents have on-lot water wells.

Surface Water

Surface water, as the name implies, is all water stored and flowing above the surface of the ground. Streams, rivers, lakes, reservoirs, and ponds are all examples of surface water. Because surface water is in constant interaction with groundwater, it is influenced by the quality of the groundwater, as well as inputs from land-use practices associated with farming, forestry, mining, and other activities.

The Mahoning River is approximately 108 miles long, stretching from just south of Alliance, Ohio to the Shenango River in New Castle. The City of New Castle and Union Township are serviced through Pennsylvania American Water from an intake along the Shenango River.

Floodplains

The importance of keeping a stream connected to its floodplain cannot be overstated. Floodplains provide numerous benefits to streams and watersheds by allowing the following:

- the gradual retention and release of groundwater, stormwater flows, and flood waters
- the infiltration and filtering of surface water and groundwater
- sediment deposition, and
- production of food sources, cover, and thermal protection for organisms living in riparian and floodplain areas.

By allowing high flows to escape the channel into the floodplain and spread out across a wider area, the hydraulic energy is released in a more dispersed fashion. This prevents the scour and erosion of streambanks, bank instability, and sediment loading to the stream. Floodplain alterations, such as the removal of vegetation or encroachment by buildings and development, interrupt the natural relationship between a stream and its adjacent floodplain. Floodplains play a very important role in limiting degradation of water quality and biological resources, as well as protecting those living downstream and streamside.

Hazards from flooding water occur along the Mahoning River, chiefly between the rail lines paralleling both the north and south sides of the river.

Riparian Areas

Riparian areas, or streamside areas, are the link between land and water, and are vital to a healthy stream ecosystem. A stream is only as healthy as the land it flows through. In return, the land area adjacent to the stream, known as the riparian zone, derives nourishment from the stream's water. They are connected and depend on each other for their well-being. The waterway and its riparian area are a complete ecosystem and should be managed as a whole.

A riparian buffer is an area of vegetation that is maintained along the shore of a water body to protect stream channels and banks. Having a vegetated buffer zone between the waterway and other land uses has many benefits. Root systems help to keep stream banks stabilized, reducing the amount of silt that enters the stream. Shading from the tree canopy helps keep water temperatures cooler, which is necessary for the

survival of many aquatic organisms. There is a direct increase in food, cover, and nesting habitat for a variety of terrestrial wildlife species. Woody debris and leaf litter, which end up in the stream, are a necessary element in a healthy aquatic ecosystem's "food chain." Many aquatic invertebrates use these materials as habitat and as a food source. The aquatic invertebrates in turn create an ample forage base for fish. Larger trees absorb excess nutrients through their root systems, changing them into plant tissue, while some nutrients are broken down by organisms in the soil and leaf letter. Sediment can also be filtered out by thick, understory vegetation. A buffer of large shrubs and trees helps to slow flood waters while deflecting or catching debris, thus protecting fences and other property (Pennsylvania Fish and Boat Commission).

Diagram 3-2. Functions of Streamside Forests
Source: Department of Environmental Protection

In Pennsylvania, the USDA Forest Service estimates that over one-third of the streams and rivers have had their riparian areas converted or degraded.

Wetlands

Wetlands are transitional zones between terrestrial and aquatic systems, where the land is covered by shallow water or the water table is at or near the surface of the ground. Land in these areas is seasonally wet, contains water-tolerant soils and supports a variety of water-loving plant species. Wetlands can be meadows, bogs, or peatlands and are important interfaces between surface water and groundwater.

The U.S. Fish and Wildlife Service provides information on the nation's wetlands and deepwater habitats – including location, type, and status – through the National Wetlands Inventory (NWI). The NWI classifieds inland waters according to the amount and type of vegetation present:

- Open water (rivers and lakes)
- Emergent/herbaceous (marshes, wet meadows and fens)
- Scrub-shrub (swamps and bogs)
- Forested (swamps and bogs).

Numerous swamps and wetlands exist within the region and are even more prevalent in the post-glaciated areas in the northwestern sections of the region, including the Mahoning River watershed.

Wetlands provide unique habitat to many species of plants and animals, and they also serve as natural filters to surface and groundwater supplies. Many wetlands in the region including bogs and swamps have the ability to eliminate contaminants such as nitrates and phosphates as water flows through the wetland. The vegetation present in the wetland utilizes the excess waste, eliminating it form water and reducing negative impacts to the environment. Wetlands also have the excellent ability to remove sediment from surface runoff. The vegetation plays a large role in reducing sediment as the sediment particles are captured and slowly removed as the water progresses through the wetland.

In the Mahoning River corridor, riverine wooded and emergent wetlands that are influenced by river hydrology occur adjacent to the river channel. Major emergent wetlands are located closest to the river channel, primarily in gently sloped, depositional areas, and on islands. Groundwater-fed wetlands also occur throughout the riparian corridor. Human activities have eliminated wetlands along several stretches of the river.

Dams and Obstructions

Ten low-head dams are located in the Mahoning River in Ohio. These dams influence the hydraulics of the river by creating long pools upstream of each dam and a turbulent tailwater directly downstream. A largely breached dam exists along the river near Edinburg. Remnants of the abutments and rubble remain.

Watershed Protection

Clean Water Act

In the 1970's, Pennsylvania became a national leader by adopting strict water quality regulations to protect water resources. PA has maintained its leadership by enforcing more stringent regulations than those set forth in the Federal Clean Water Act.

Pennsylvania Water Use Designations
Chapter 93.3 of the Pennsylvania Code defines the Commonwealth's protected water uses. The definition of each use, as set forth in the PA Code is listed below.

> "*Pennsylvania's public natural resources are the common property of all people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people."*
>
> ***The Constitution of the Commonwealth of Pennsylvania, Article I, Section 27***

Aquatic Life

Cold Water Fisheries (CWF) are waters suitable for maintenance or propagation, or both, of fish species including the family Salmonidae and additional flora and fauna, which are indigenous to a cold water habitat.
Warm Water Fisheries (WWF) are waters suitable for maintenance or propagation of fish species and additional flora and fauna, which are indigenous to a warm water habitat.
Trout Stocked Fisheries (TSF) are waters suitable for maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.
Migratory Fisheries (MF) are waters suitable for passage, maintenance, and propagation of anadromous and catadromous fishes and other fishes, which ascend to flowing waters to complete their life cycle.

The Mahoning River is classified as a Warm Water Fishery (WWF). The Mahoning River flows through Pennsylvania sandstone and has a river bottom of gravel, sand, and silt with a noticeable absence of rubble or larger stones (Western Pennsylvania Conservancy). Construction of dams along the Beaver River, receiving stream of the Mahoning, reduced the fish of the Mahoning to those that are non-migratory.

Water Supply

Potable Water Supply (PWS) is used by the public as defined by the Federal Safe Drinking Water Act, or by other water users that require a permit from the Department under the Pennsylvania Safe Drinking Water Act, or the act of June 24, 1939, after conventional treatment, for drinking, culinary, and other domestic purposes, such as inclusion into foods, either directly or indirectly.

Industrial Water Supply (IWS) is used by industry for inclusions into nonfood products, processing and cooling.
Livestock Water Supply (LWS) is used by livestock and poultry for drinking and cleansing.
Wildlife Water Supply (LWS) is used for waterfowl habitat and for drinking and cleansing by wildlife.
Irrigation (IRS) is used to supplement precipitation for crop production, maintenance of golf courses and athletic fields and other commercial horticultural activities.

Recreation and Fish Consumption

Boating (B) is use of the water for power boating, sail boating, canoeing, and rowing for recreational purposes when surface water flow or impoundment conditions allow.
Fishing (F) is use of the water for the legal taking of fish, for recreation or consumption.
Water Contact Sports (WC) is for use of the water for swimming and related activities.
Esthetics (E) is for use of the water as an esthetic setting to recreational pursuits.

Special Protection

High Quality Waters (HQ) and ***Exceptional Value Waters (EV)*** are for waters that meet multiple conditions with regards to long-term water quality and biological qualifiers.

Other

Navigation (N) is use of the water for the commercial transfer of persons, animals, and goods.

The Mahoning River is classified as a Warm Water Fishery (WWF). It flows through Pennsylvania sandstone over a river bottom of gravel, sand, and silt with a noticeable absence of rubble and larger stones (Western Pennsylvania Conservancy). With the construction of dams along the Beaver River, the receiving stream of the Mahoning River, migratory fish populations have been reduced to the Mahoning River. However, within the Mahoning River Watershed, some areas, such as Hickory Run and Bessemer Lake are designated Trout Stocked Fisheries (TSF). The Fish and Boat commission stocks both of these areas on multiple occasions, every year, placing Brown and Rainbow Trout in Hickory Run and Rainbow Trout in Bessemer Lake.

Impaired Water Bodies

The PA DEP, under Section 303(d) of the federal Clean Water Act, implements a program that assesses the water quality of state waters and identifies waterbodies that do not meet the standards for their designated uses. These designated uses – including aquatic life, recreation, and drinking water – are characterized by the in-stream levels of parameters (e.g., dissolved oxygen, pH, metals, siltation, etc.). If a waterbody does not meet the standards for its designated use, it is identified as "impaired" on the Pennsylvania Integrated Water Quality Monitoring and Assessment Report. This report also identifies the cause of the impairment, which may be one or more point sources (like industrial or sewage discharges) or non-point sources (like acid mine discharge or agricultural runoff).

Once impaired waters and their reasons for impairment are established, the state determines what conditions are necessary to return the water to the quality that meets its designated uses. DEP and the United States Environmental Protection Agency (US EPA) work in conjunction with other organizations, such as Pennsylvania State University, to develop a Total Maximum Daily Load (TMDL) for each impaired waterbody. A TMDL defines the allowable pollutant loads a waterbody can receive from point and non-point sources and still be able to maintain its designated water quality standards.

The integrated water quality report summarizes this data by using a five-part categorization of waters based upon their use attainment status. The below table describes each category.

Table 3-3. Categorization of Waters Based Upon their use Attainment Status

Category	Description
Category 1	Waters attaining all designated uses.
Category 2	Waters where some, but not all, designated uses are met. Attainment status of the remaining designated uses is unknown because data are insufficient to categorize a water body consistent with the state's listing methodology.
Category 3	Waters for which there are insufficient or no data and information to determine, consistent with the state's listing methodology, if designated uses are met.
Category 4	Waters impaired for one or more designated use but not needing a TMDL. States may place these waters in one of the following three subcategories: Category 4A: TMDL is approved. Category 4B: Expected to meet all designated uses within a reasonable timeframe (three years). Category 4C: Not impaired by a pollutant.
Category 5	Waters impaired for one or more designated uses by any pollutant. Category five includes waters shown to be impaired as the result of biological assessments used to evaluate aquatic life use even if the specific pollutant is not known unless the state can demonstrate that non-pollutant stressors cause the impairment or that no pollutant(s) causes or contribute to the impairment. Category five constitutes the Section 303(d) list that EPA will approve or disapprove under the CWA.

It is important to note that the same stream can be separated into segments, therefore appearing on more than one list if the attainment status changes as the water flows downstream.

The impaired waters map shows the location of impaired streams in the Mahoning River watershed. A majority of the streams in the Mahoning River Watershed are experience at least one kind of impairment. The most common causes of impairment are abandoned mine drainage, road runoff, and urban runoff/storm sewer siltation issues.

According to the 2012 PA Integrated Water Quality Monitoring and Assessment Report, the main tributaries within the Mahoning River Watershed are located on either List 2 or List 5. All three main tributaries, Coffee Run, Hickory Run, and Marshall Run, and the Mahoning River, were found on List 2. However, Hickory Run and the Mahoning River were also found on List 5 due to designated use pollution sources such as abandoned mine drainage, agriculture, urban runoff/ storm sewers, and road runoff. The Mahoning River had pollutants such as metals, siltation, nutrients, and polychlorinated biphenyls (PCBs), along with a few unknown causes. Certain portions of Hickory Run contain pollutants such as metals, siltation, and nutrients. Because of some of these impairments and their locations in regards to the waterways uses, the PA Fish and Boat Commission have placed carp and channel catfish living in the Mahoning River Watershed on the 2013 Fish Consumption Advisory. Carp is advised at no more than 6 meals per year and the channel catfish is not supposed to be consumed.

National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System is a permitting process to reduce water pollution in water of the United States. The NPDES permit program is authorized b the Federal "Clean Water Act" enacted in 1944, expanded in 1972 to include the NPDES permit program and amended in 1977. This Act made it necessary for permits to be obtained where point source discharges would be made into waters of the United States. The Environmental Protection Agency (EPA) oversees the NPDES Program and delegates authority to states with approved programs.

NPDES Permits

Pennsylvania has an EPA approved NPDES Program to issue permits for the following activities:

Types of General Permits:

PAG – 02 Stormwater Discharges Associated with Construction Activities
PAG – 03 Discharge of Stormwater Associated with Industrial Activities
PAG – 04 Single Residence Sewage Treatment Plant
PAG – 05 Discharges from Gasoline Contaminated Ground Water Remediation System
PAG – 06 We Weather Overflow Discharge from Combined Sewer Systems
PAG – 10 Discharge Resulting from Hydrostatic Testing of Tanks & Pipelines
PAG – 12 Concentrated Animal Feeding Operations
PAG – 13 Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)

Types of Individual Permits:

- Concentrated Animal Feeding Operations
- Stormwater Discharges Associated with Construction Activities

Erosion and Sedimentation Control Regulations

Sediment is the number one pollution in our nation's streams and rivers. Runoff from farmers and construction sites are a main source for sediment runoff in Pennsylvania. Sediment pollution is covered under the Pennsylvania Clean Streams Law and regulated under Pennsylvania Code Title 25 Environmental Protection, Chapter 102- Erosion and Sedimentation Control.

Scope and Purpose:

1. "This chapter requires persons proposing or conducting earth disturbance activities to develop, implement and maintain Best Management Practices (BMPs) to minimize the potential for accelerated erosion and sedimentation."

2. "The BMPs shall be undertaken to protect, maintain, reclaim and restore water quality and the existing and designated used of waters of this commonwealth."

Under Chapter 102 of Pennsylvania Code the following activities are regulated:

1. 102.4 (a) – Agricultural Plowing and tilling including heavy use areas.
2. 102.4 (b) – Earth Disturbances other than Agricultural plowing and tilling

Both types of earth disturbance activities require various erosion and sediment controls to minimize the potential pollution to water of the United States. One such example includes the NPDES permitting program. This program made it necessary for permits to be obtained where point source discharges would be made into waters of the United States. In Pennsylvania, the Environmental Protection Agency has given the state the right to require permits for the following activities:

Erosion and Sediment Control Permits are required for the following activities:

1. Timber harvest with earth disturbance of 25 acres or more.
2. Road Maintenance with earth disturbance of 25 acres or more.

Pennsylvania Sewage Facilities Act

Residential sewage and wastewater are treated and disposed of by various methods, ranging from large municipality owned sewage treatment plants to community or individual on-lot disposal systems, also called septic systems. Malfunctioning sewage disposal systems, regardless of type, pose a serious threat to public health and the environment. They can pollute public and private drinking water sources, often by discharging directly to ground and surface waters. Raw sewage can expose humans and animals to various bacteria, viruses, and parasites. However, repairs to sewage systems can often lead to financial hardships for affected municipalities or homeowners.

In response to malfunctioning sewage systems in the state, the Pennsylvania Sewage Facilities Act, Act 537, was enacted in 1966 to correct existing sewage disposal problems and prevent future problems. The Act requires proper planning, design, and permitting for on-lot disposal systems. Most residential systems in the state, however, were built before the Act and are in need of repair. On-lot systems that are not properly functioning channel nitrogen-laden water back into the groundwater, possibly contaminating drinking water supplies (Launch 1996).

Major Provisions of Act 537:

- All municipalities must develop and implement an official sewage plan that addresses their present and future sewage disposal needs. These plans are modified as new land development projects are proposed or whenever a municipality's sewage disposal system needs upgraded. PA DEP reviews and approves the official plans and any subsequent revisions.
- Local agencies are required to employ both primary and alternate Sewage Enforcement Officers (SEO). After successfully completing training and being certified by a state board, a SEO works

for the local agency and is responsible for implementing the daily operation of that agency's permitting program. SEOs are not PA DEP employees.
- Local agencies, through their SEO, approve or deny permits for construction of on-lot sewage disposal systems prior to system installation.
- PA DEP provides grants and reimbursements (funded by annual legislative appropriations) to municipalities and local agencies for costs associated with the Act 537 planning and permitting programs.
- An Environmental Quality Board must adopt regulations establishing standards for sewage disposal facilities. These regulations apply throughout the commonwealth.
- A sewage Advisory Committee (SAC) reviews existing and proposed rules, regulations, standards, and procedures and then advises the Secretary of PA DEP. This advisory committee is comprised of members representing many sectors of the regulated community.

Municipalities are required to develop and implement comprehensive official sewage plans that address existing sewage disposal needs or problems; account for future land development; and provide for future sewage disposal needs of the entire municipality. Official plans contain comprehensive information such as:

- Population figures and projections;
- Drinking water supplies;
- Waterways, soil types, and geologic features;
- Sanitary survey results;
- Location, type, and operational status of existing sewage facilities;
- Local zoning and land use designations;
- Estimates of the future sewage disposal needs;
- Identification of potential problem-solving alternatives;
- Cost estimates necessary to carry out those alternatives; and
- The selection of appropriate problem solving alternative.

Nutrient Management Program

The Pennsylvania Nutrient Management Act (Act 6) passed into legislation in 1993 and sign into law by the government took effect in 1997. This action by the Pennsylvania Legislature set guidelines for managing nutrients on high-density livestock farms for the next 12 years. In 2005, the State Conservation Commission finished revisions to these regulations and new legislation was passed regulating high density animal operations under Act 38. Regulation changes included managing odor on farming operations and the inclusion of equine operations that met the high density livestock farm criteria.

A high – density livestock operation or Concentrated Animal Operation (CAO) as defined in Act 38 are defined as agricultural operations where the animal density of all livestock on the farm exceeds two animal equivalent units (AEUs) per acre on an annualized basis.

With 14,169 acres (over 40% of the total land use) of the watershed is in agricultural use and nutrient management is an important program to be implemented on CAO operations within the watershed. These operations are required to implement nutrient management plans and in cases where an existing CAO or CAFO (Federal Regulations) is building new animal housing facility or manure storage facility, an odor management plan must be developed. Livestock operations that do not meet the CAO definition are also encouraged to develop nutrient management plans. Approved and fully implemented nutrient management plans give these farms limited liability against complaints. Currently, the Mahoning River Watershed has two nutrient management plans developed and approved under Act 38 requirements.

Table 3-4. Nutrient Management Plans Approved Under Act 38			
Operator	**Receiving Stream**	**Special Protection Waters**	**Planned Acres**
Sisters of the Humility of Mary	Coffee Run	WWF	268.00
Valley View Downs and Casino	Marshall Run	WWF	250.00
Total Watershed Acres			518.00

The Sisters of the Humility of Mary in addition to having a Volunteer Nutrient Management Plan developed for the Villa Maria Farm have completed the Pennsylvania's Environmental Agricultural Conservation Certificate of Excellence (PEACCE) certification program. This certification program looks at all aspect of a farming operation including environmental awareness, Nutrient and soil Conservation planning, pesticide usage, water quality protection and animal and livestock health and facilities

Abandoned Mine Drainage – Surface Mining Control and Reclamation Act

Abandoned mine drainage (AMD) is a term for polluted groundwater discharge that emanates from former underground or surface mines, for which no legally responsible entity exists. AMD is the number one source of impairment in Pennsylvania streams (PA DEP 2004d). The water quality of AMD is typically degraded by the increase of dissolved metals and decrease of pH, a measure of hydrogen ions in a solution. The rate of AMD production and the chemical characteristics of the AMD are dependent on factors such as the mine hydrology, the relative abundance of acid-forming and alkaline materials, and the physical characteristics of the spoil (waste/byproducts of mining) within the mine site (Rose and Cravotta 1998).

AMD is formed through a series of chemical reactions. During the coal mining process, sulfides in the bedrock are exposed to oxygen. When oxygen comes into contact with these often acid bearing rocks containing pyrite, a series of chemical reactions produce iron hydroxide and sulfuric acid. Acidic water can appear clean and clear while being severely impaired and toxic to aquatic organisms and plant life.

If a mine discharge containing high metals and acidity is exposed to oxygen and/or alkalinity, the dissolved iron hydroxide will settle out of solution leaving a red iron coating, or "yellow boy," within the stream and on the stream bottom. Two other metals commonly precipitate in the stream and follow the same process. These metals are aluminum, which leaves a grayish-white coating, and manganese, which leaves a black coating on the stream bottom.

ACT 167 Stormwater Management Planning

Act 167, also known as the Pennsylvania Stormwater Management Act, was passed in 1978. Under Act 167, counties in the Commonwealth were to develop comprehensive stormwater management plans for each watershed within the county. The planning process is done with input from a Watershed Advisory Committee (WPAC) and once approved by the Department of Environmental Protection (DEP), municipalities are required to implement the plan through local ordinances.

The purpose of the Act 167 Stormwater Management for Lawrence County is to:

1. Encourage planning and management of storm water runoff in each watershed which is consistent with sound water and land use practices.

2. Authorize a comprehensive program of storm water management designated to preserve and restore the flood carrying capacity of Commonwealth streams; to preserve to the maximum extent predictable natural storm water runoff regimes and natural course, current and cross-section of water of the Commonwealth; and to protect and conserve ground waters and ground-water recharge areas.

3. Encourage local administration and management of storm water consistent with the Commonwealth's duty as trustee of natural resources and the people's constitutional right to the preservation of natural, economic, scenic, aesthetic, recreational and historic values of the environment.

The Countywide Plan prepared for Lawrence County applies to all areas located within the boundaries of Lawrence County, as well as all designated watersheds within the County. The plan is designed to assist in the County in achieving the effective and efficient storm water management of all major watersheds within Lawrence County and provide a single technical source for storm water management across Lawrence County.

The need for this plan was to assist in the achievement of Lawrence County's goal to create an overall stormwater management plan document, as well as to achieve compliance with the Pennsylvania Stormwater Management Act of 1978 (Act167). One of the County goals in the preparation of this plan was to produce a countywide model ordinance that serves as a means of effectively implementing the results of the plan and providing measures that address technical, legal, and governmental issues, as well as achieving additional County-wide objectives.

Objectives for the Lawrence County Act 167 Plan had to be changed after the Department of Environmental Protection had to make cuts to the program. The Final plan objectives are based on the reduced fund available as well as the accelerated plan deadline. The final plan objectives include the following:

1. Encourage planning and management of storm water runoff in each watershed that is consistent with sound water and land use practices (Act 167, Section 3).

2. Establish a comprehensive program of storm water management policy to help preserve and restore stream flood carrying capacity, to help preserve as much as possible the natural storm water runoff regimes and natural course, current and cross-sections of waters of the Commonwealth; and to protect and conserve ground waters and ground-water recharge areas (Act 167, Section 3).

3. Establish local administration and management of storm water (Act 167, Section 3).

4. Prepare detailed hydrologic analyses of the following watersheds in order to evaluate more comprehensive approaches to storm water management controls (as outlined in Table 3-5).

Table 3-5. Hydrologic Analyses of Watersheds

Watershed	Rationale	Focus of Modeling Effort
Beaver/Mahoning River	Stream corridor flooding/obstruction(s), development pressure	Coffee Run sub watershed
	Development Pressure	Marshall Run sub watershed

The Lawrence County Commissioners adopted the Lawrence County Act 167 Plan in June of 2010 and forwarded it on to DEP to approve. DEP gave final approval of the plan in September of 2010. In accordance with Section 11.(b) of the Pennsylvania Stormwater Management Act of 1978 the following was required:

> *"Within six months of following adoption and approval of the watershed storm water plan, each municipality shall adopt or amend, and shall implement such ordinances and regulations, including zoning, subdivision and development, building code, and erosion and sedimentation ordinances, as necessary to regulate development within the municipality in a manner consistent with the applicable watershed storm water plan and the provisions of this act."*

To date, all 27 municipalities in Lawrence County have adopted the model storm water ordinance.

Water Quality Issues

Beginning in 1880, pollution problems started to plague the Mahoning River and continue today with compounds bound or trapped to sediments on the bottom of the river. From around 1900 until the mid-1970's, the Mahoning River supported one of the most intensely industrialized steel-producing regions in the world. Steel mills and electrical conductor plants in Youngstown, Ohio used the water in their cooling and production processes, and then released the water back into the river (Mahoning River Consortium 2001). These industrial effluents included pickling liquors, electroplating discharges, coke quench water, and cutting and lubricating oils. These compounds collected in the river sediment and raised the temperature of the water. "More than 70,000 pounds of oil and grease were released daily into the river" (Kuehner 2000).

The sediments of the Mahoning River are contaminated with high levels of chromium, copper, iron, manganese, nickel, lead, zinc and mercury (Billingsley and Johns 2000). Polynuclear aromatic hydrocarbons (PAH's) are also a problem in the river and do not readily biodegrade. They remain suspended in sediments long after the cessation of the primary source of pollution.

Strip-mining occurred along tributaries to the Mahoning River from 1900 to 1950 which added siltation to the River. Construction of dams in the headwaters helped to remediate the problem of siltation and abandoned mine drainage somewhat by settling out the metals and nutrients in the water.

Recently described as "one of the most polluted of any stream or river in Ohio" (Ohio EPA 1994) the most polluted stretch lies just downstream of Youngstown, Ohio. Dilution of the polynuclear aromatic hydrocarbons (PAH's) and other organic compounds makes the PA section a little less polluted but the sediment still remains more contaminated than that found in Presque Isle Bay of Lake Erie (Lawrence County NHI 2003). Overall, the Mahoning River has been designated within the top five most polluted rivers in the United States by the United States Army Corp of Engineers.

Efforts to nurse the river back to some level of health are currently being explored. In 1999 a study by the Army Corps of Engineers recommended a cleanup of more than one million tons of material from the Ohio portion of the river (Schnaars 1999). A similar study was completed for the PA part of the river the same year (USACOE 1999.) The goal is to "remediate the Mahoning River within the study area to restore the aquatic ecosystem to the biotic integrity existing in a model reach of Hickory Creek" (USACOE 1999). This will involve dredging to remove the polluted sediment from the river bottom. During this time, the dredging process was estimated to take about 12 years and $113 million dollar to complete (Siff 2000). The effort is currently stalled due to lack of funding and the belief that the overall benefit in cleaning up the river outweighs the financial cost of the project, as determined by the first phase of the Army Corps of Engineer's project.

Most recently, an effort to acquire funding has been made by members of the Trumbull Canoe Trails Paddling Club and Friends of the Mahoning River. They are planning to resurface a dock near the B&O Station in Youngstown, Ohio to make it useable for recreational goers. In addition to these plans, Lowellville has applied for a grant to remove or modify their dam along the river and complete 2.3 miles of dredging upstream of the dam. They have applied for 2.3 million dollars to complete this project.

Point vs. Non-Point Source Pollution

To effectively regulate and ultimately mitigate the mass load of pollutants entering streams, pollutant sources are classified into two main categories: point and non-point source pollution. Point source discharges are regulated under the National Pollutant Discharge Elimination System (NPDES) permit, established by Section 404 of the Clean Water Act of 1972. Point source pollutants can be easily traced to their source, such as discharges from industrial or municipal facilities. Non-point source pollutants, sometimes called "runoff pollution," typically have no readily visible source and often require detailed analysis and research to discern the source. Common sources of non-point pollution are abandoned mines, agriculture, urban runoff, construction activities, malfunctioning on-lot sewage systems, and forestry runoff.

PA DEP's plan for achieving comprehensive assessment of its surface waters includes the Statewide Surface Water Assessment Program (SSWAP) to evaluate all unassessed free-flowing streams using a field-level biological assessment. A major purpose of the SSWAP Program is to delineate areas with water quality impairment and determine the type of pollution responsible. Information from this program, along with data from intensive surveys and other sources, is considered in the development of the Section 303 (d) list of waters that may trigger the development of TMDLs, which are discussed in the 'Pennsylvania Impaired Waters' section below.

Pennsylvania's Impaired Waters

Water in which the delicate balance has been upset is called "impaired." In Pennsylvania, two major kinds of pollution impair our waters: agriculture runoff and abandoned mine drainage. These pollution sources put excess nutrients, siltation, and metals into our waterways.

Acid Mine Drainage (AMD)

Drainage from coal mines is often referred to as "acid mine drainage," although a large portion of mine drainage is actually "alkaline." Acidic water has a pH of less than 5.0 while alkaline water has a pH of greater than or equal to 6.0. Acid mine drainage (AMD) is formed from the weathering of pyrite, a mineral containing iron and sulfur. The weathering products are acid, sulfate and iron. Alkaline mine drainage occurs when AMD is neutralized by calcite or dolomite present in surrounding rock or fill materials. If not neutralized, the acid can attack other minerals and leach metals such as manganese, aluminum and zinc.

The formation of AMD is primarily a function of the geology, hydrology, and mining technology employed for the mine site. AMD is formed by a series of complex geochemical and microbial reactions that occur when water comes in contact with pyrite (iron disulfide materials) in coal, refuse or the overburden of a mine operation. The resulting water is usually high in acidity and dissolved metals. The metals stay dissolved in solution until the pH is raised or exposed to oxygen and precipitation occurs. The dissolved iron hydroxide will settle out of solution leaving a red iron coating, or "yellow boy", within the stream and on the stream bottom. Aluminum precipitates a grayish-white coating and manganese leaves a black coating. Neutralization with limestone addition and bioremediation are some solutions to alleviate these symptoms but the problem still persists.

Both surface and subsurface coal mining can create problems for local water supplies. The open pit mines, large refuse piles of surface mine waste, and the large underground chambers of subsurface mining contribute to acid mine drainage. Certain types of mining also have the ability to greatly alter groundwater flow.

It took less than a century for the mining industry to leave its scar upon the streams of Pennsylvania, with no one entity responsible for the necessary environmental cleanup. Therefore, "In 1977, Congress passed the Surface Mining Control and Reclamation Act (SMCRA), establishing laws and taxes which require present-day coal mine operators to take responsibility for the reclamation and restoration of the land that they temporarily disturb while mining coal. Because of SMCRA and other incentives, modern-day coal operators now play an important role in maintaining our environment." ("The Problem." - WPCAMR)

While present day mining is regulated by SMCRA, those mines abandoned previous to 1977, with no responsible entity, are still causing pollution today. Therefore, the cleanup of these areas is dependent on local organizations and communities. In Western Pennsylvania, mitigation of AMD affected streams is aided by an organization known as WPCAMR, Western Pennsylvania Coalition for Abandoned Mine Reclamation. WPCAMR is a clearing house of information on AMD and provides partnerships with local organizations, such as Conservation Districts, to aid in finding funding for AMD treatment projects.

Sediment

Silt that settles to the stream bottom is known as sediment. Fish find some of the food they require on stream bottoms. An increase in a waterway's amount of sediment can kill invertebrates by suffocating them. Sediment can also smother fish eggs and alter natural repopulation patterns. It can also fill in the living spaces and destroy habitat.

Nutrients

Although nitrogen and phosphorus are found naturally in healthy aquatic ecosystems, excessive amounts of these nutrients can be harmful to the environment. Runoff from fertilizers, manure, or failing septic systems containing high levels of these nutrients lead to waters with low oxygen levels, decreased water clarity, and algal blooms that can be fatal to fish populations. Excessive nutrients can also lead to unpleasant tastes and odors in drinking water.

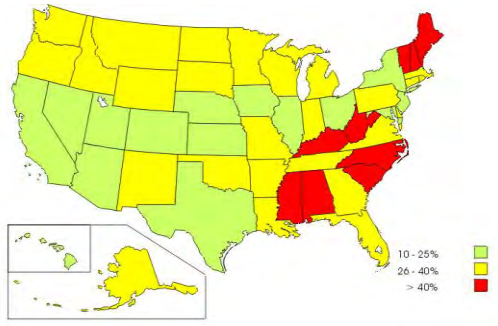


Diagram 3-3: Percentage of Residents Using Onsite Wastewater Systems. (U.S. Census Bureau 1990)

Industrial

Factories, industrial operations, and manufacturing operations may release chemicals into the environment. These chemicals are then absorbed into the environment and transported throughout the watershed when it rains, spreading pollution.

Conservation Planning

Conservation planning identifies practices that can reverse damage to existing resources. The goal of conservation planning is to achieve sound use and management of soil, water, air, plant, and animal resources to prevent their degradation, assure their sustained use and productivity, and comply with regulatory requirements while considering economic and social needs. Conservation planning is beneficial to multiple generations, providing not simply a quick fix to an existing problem, but also by providing an opportunity for education and long term management improvements. Good conservation planning also includes a vision for the future of the natural resources as well.

Conservation planning:

- Identifies immediate or potential resource problems that could hurt your production.
- Helps you comply with environmental regulations.
- Helps you qualify for various USDA conservation programs.
- Adapts to your changing operational goals.
- Establishes a reasonable schedule for you to apply needed conservation practices.
- Can save you time, labor, and energy.
- Saves you money over the long term as your land becomes more productive.
- Facilitates the protection, conservation, and enhancement of existing natural resources.
- Is a crucial element of sustainable development.
- Helps landowners, communities, and planners work together to identify their resources and accomplish multiple objectives that are best for the land, water, and people.

At the request of a client, Certified Conservation Planners, with the Natural Resources Conservation Service (NRCS), local Conservation District, or other public or private consulting service or organization, can provide planning assistance to help a client identify options that provide the greatest conservation benefit while meeting production goals.

Water Quality Issue Causes

Agriculture

Agriculture runoff occurs when runoff from rain or melting snow carries soil, pesticides, and fertilizers from fields into nearby waters. When soil is carried into a stream or river, it can suspend in the water to make it cloudy, or it settles to the bottom as silt. Silt in the water can damage some fish's gills and make breathing difficult. Cloudy water also absorbs more sunlight than clear water. This may raise water temperature. A temperature that's too high can stress or kill aquatic organisms. It may also account of the reason why some fish have left a community where they lived for years.

Nutrients like nitrogen and phosphorus also enter our waters from farms. Manure and other fertilizers are used to increase crop production. When these nutrients reach streams and rivers, they have the same effect on aquatic plants. Aquatic plant and algae growth can reach nuisance levels. Decomposing plants also consume dissolved oxygen. When less oxygen and warmer temperatures combine, things change. Fish species and populations move, die and the aquatic community ultimately is changed by pollution.

Livestock can also affect aquatic communities. Stream banks erode where livestock enter the water to drink or cross to reach other pastures. This increases the amount of silt. Manure is also deposited directly into the stream. The effects of livestock include increased plant growth, decreasing dissolved oxygen (as manure breaks down) and eliminating important stream-bottom habitat.

To protect their crops, farmers use pesticides to remove pests. Pesticides are designed to kill insects and are poisonous to aquatic life when they enter a waterway. In high concentrations pesticides can kill all aquatic life in a community. In low concentrations they can alter food chains by killing or injuring the most sensitive organisms.

The majority land use in the Mahoning River watershed is Agriculture and Conservation, with roughly 75% of the watershed being zoned as such.

Stormwater

The water that runs off the land into surface waters of the Commonwealth during and immediately following a rainfall or snow/ice melt events is referred to as stormwater. Stormwater runoff from developed areas in PA is the third leading cause of stream impairment. Pollution can result from suburban development and impervious surface expansion, resulting in potential runoff of petroleum products, nutrients, etc. The most effective way to reduce the number of stormwater runoff problems, and their negative impacts, is to reduce the amount of runoff generated. A combination of source reduction measures through non-structural BMPs and water quality treatment through use of structural BMPs is the proposed water control strategy of the Plan. Reducing the amount of runoff to be treated is the preferred strategy to meet this goal. Treating the runoff that cannot be eliminated is the secondary strategy for attaining the water quality standards. By directing runoff through one or more BMPs, runoff will receive some treatment for water quality, thereby reducing the adverse impact of contaminants on the receiving body of water.

Stormwater runoff occurs as a result of impervious cover, which is material that covers the land that water cannot penetrate. Examples of impervious cover include roads, parking lots, buildings, sidewalks, and driveways. In a forested or vegetated area, rain soaks into the ground and is either taken up by tree roots, moves down through the soil and into the groundwater, or runs off the land. When rain falls on impervious cover, it cannot soak into the ground and instead becomes storm water runoff. When it rains on impervious cover, storm water runoff is increased by sixteen (16) times, as compared to a vegetated or forested area.

The amount of impervious cover in a watershed influences dry and wet weather stream flow, channel shape and size, water quality, and plant and animal habitat. Most streams receive their base flow from groundwater. Impervious surfaces block water from contributing to groundwater, and lower stream flows can occur during dry weather. In addition, during rain events water runs off impervious surfaces, enters the

storm drain system, and many times is directed straight to the stream. This large amount of storm water runoff into the stream system can cause more frequent flooding, and higher level flooding. Increased flooding also results in accelerated stream bank erosion, enlarged channel width, sedimentation on the stream bottom making the stream shallower, and straightening of the stream channel. When it rains, pollutants that have built up on impervious surfaces are washed into the stream. Examples of such pollutants include bacteria, nutrients, pesticides, oil and grease, and heavy metals. Impervious cover also changes the natural stream environment resulting in the stream habitat being smothered by sediment deposits, reduction in habitat variety, loss of stream buffer, and the effects on wildlife, such as waterfowl, aquatic insects, amphibians, and fish.

As the amount of impervious cover in a watershed increases, the number and diversity of aquatic species decreases. Watersheds having ten (10) percent or less impervious cover are considered sensitive, meaning that they contain healthy streams with good water quality that support diverse aquatic life. These streams are very vulnerable to development and require a great level of protection, including land conservation. Few streams within the Mahoning River watershed meet these requirements.

Watersheds having ten (10) to twenty-five (25) percent impervious cover are considered impacted. These streams are typically suburban streams that can support a fairly diverse aquatic life population. Streambank erosion is noticeable and the water quality is dependent upon watershed protection techniques employed by the local communities. These streams require extensive protection, including stormwater management. Few streams within the Mahoning River watershed are considered impacted.

Damaged streams are found in those watersheds containing twenty-five (25) to sixty (60) percent impervious cover. The stream channels are highly eroded and water quality is poor. These streams support very few aquatic species, and human use of the streams is limited by health concerns. Careful restoration and stewardship can improve water and habitat quality. Those streams found around residential and commercial areas of the watershed would be considered damaged. However, many of these streams within the Mahoning River watershed still possess a significant amount of biodiversity and immediate restoration could prevent them from becoming severely damaged.

Severely damaged streams are found in those watersheds containing over sixty (60) percent impervious cover. Typically, these channels are highly modified and have few natural features. Water quality is poor and aquatic life is limited. These streams do not support many human uses, including fishing. Not much can be done for aquatic habitat, but pollution prevention can help improve water quality delivered downstream. Within the Mahoning River watershed, severely damaged streams would include those with then most industrialized areas in the City of New Castle.

In areas of the watershed that are urbanized, such as areas of Union Township and the City of New Castle, combined sanitary sewers are responsible for numerous raw sewage discharges to local streams during significant precipitation events. Combined sanitary storm sewers are those that carry both sanitary wastewater and storm water. In such systems, both sanitary wastewater and storm water is transported to a facility for treatment. When it rains, the volume of storm water and wastewater may be allowed to overflow untreated into the nearest stream or river. This is often referred to as a combined sewage overflow (CSO). In addition, even when the capacity of the treatment plant is not exceeded, stormwater is being treated unnecessarily, leading to additional operation and maintenance costs.

Urban Runoff/Storm Sewers

Stormwater runoff from developed areas in PA is the third leading cause of stream impairment. Pollution can result from suburban development and impervious surface expansion, resulting in potential runoff of petroleum products, nutrients, etc.

Increased stormwater also destabilizes stream banks, disperses litter and topsoil, distributes unnaturally warm water from developed surfaces into streams, and reduces groundwater recharge.

Development Practices

Where development occurs and how developments are planned and built have very significant consequences to natural resources and the environment. Habitat can be lost or fragmented as important areas are converted from forests, grasslands, or wetlands to residential, commercial or industrial uses. The functioning of natural systems can also be disrupted.

With natural features and natural drainage patterns, most of the rainfall in a watershed will seep into the ground, replenishing the ground water table. With large expanses of impervious surfaces, instead of infiltrating into the ground, storm water runs across the ground and discharges in a very short time into streams and rivers. This increases peak flow amounts and peak flow velocities. These high flows degrade the stream channel, scour the stream bottom and erode the stream banks, and degrade water quality – sediments and other pollutants picked up as the storm water runs across the ground are delivered directly to the stream. The result is the water becomes increasingly polluted, and the health of aquatic communities declines ("Green Landscaping: Greenacres." EPA).

By giving careful consideration to where development occurs, city and county officials and developers can plan projects that will protect sensitive areas and direct growth and development to areas best suited for industrial, commercial, and residential uses. Property owners and developers can also help protect natural resources by giving sensible consideration to how developments are planned and built.

River Engineering

River engineering is the process of planned human intervention in the course, characteristics or flow of a river with the intention of producing some defined benefit. People have intervened in the natural course and behavior of rivers since before recorded history in order to manage water resources, to protect against flooding, or to make passage along or across rivers easier. Changing the flow of a river can affect the natural habitats and deposition of soil as water moves downstream. Affecting silt and nutrient deposition through the construction of dams has occurred in the past on the Mahoning River in Pennsylvania and dams are still present on the Mahoning River in Ohio.

Sewage/Wastewater Contamination

During the 19th century, raw sewage went directly into the Mahoning River. In the 20th century, raw sewage from households and businesses continued to go into the river untreated until 1965 (when a sewage treatment plant was built). Currently, the New Castle Sanitation Authority's wastewater treatment plant discharges into the Mahoning River just before its confluence with the Shenango River to form the Beaver River. Until the mid-1960s, there were virtually no requirements to stop pollution and therefore, none on the Mahoning River. There were no sewage treatment plants for the major towns along the river until 1965, so raw sewage from over 600,000 Mahoning Valley residents flowed freely into the river, along with 7,000 gallons of industrial oil, etc. If all of the contaminated sediment in the Mahoning River was put into boxcars, it would form a train 38 miles long.

Within the Mahoning River Watershed, there are three sewage treatment facilities, two currently operating and one under construction. Union township has a Sewer and Disposal Facility located on Davies Avenue. Lastly, Mahoning Township is currently building a sanitary sewer system, utilizing various funding sources to complete the project. Currently, the project is in phase II, which includes installing sewer lines in North Edinburg, along State Route 551 to the site of the proposed Valley View Downs racetrack/casino, construction of a pump station to serve Edinburg and North Edinburg and completing sewer line installation in Edinburg and side streets in Hillsville. It also includes a contract for electricity to power the pump station – all slated for completion in the spring of 2013.

Industrial Operations and PCBs

During the 1800s industrial waste also went directly into the Mahoning River. During the 20th century, the steel mills became a mammoth industry along the river banks, pouring tons of oil, grease, heavy metals, and toxins into the river.

Polychlorinated biphenyls (PCBs) were widely used as dielectric and coolant fluids in transformers, capacitors, and electric motors. Due to PCBs' environmental toxicity and classification as a persistent organic pollutant, PCB production was banned by the United States Congress in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001. According to the U.S. Environmental Protection Agency (EPA), PCBs have been shown to cause cancer in animals, and there is also evidence that they can cause cancer in humans. A number of peer-reviewed health studies have shown a causal link between exposure to PCBs and non-Hodgkin Lymphoma, a frequently fatal form of cancer.

A statistic from the Environmental Protection Agency (EPA) reveals how much pollution our river was enduring: In 1977, when all nine major steel mills were running, the following toxins were being poured into the river:

- 400,000 pounds per day of suspended solids
- 70,000 pounds per day of oil and grease
- 9,000 pounds per day of ammonia-nitrogen
- 800 pounds per day of zinc
- 600 pounds per day of phenolics
- 500 pounds per day of cyanide

The list of contaminants in the Mahoning River includes heavy metals (mercury, lead, zinc, copper, cadmium, silver and iron), grease, oil, organic compounds, PCBs and PAHs, pesticides, other organic toxins and carcinogens. Many of those substances were flushed downstream to the Beaver, Ohio and Mississippi Rivers , and possibly to the Gulf of Mexico . Some of those toxins settled in the sediment at the bottom of the river, and especially at the 10 "lowhead dams" that the steel industries built on the river to create larger "pools" of water to draw from. The water was drawn from the river and used to cool the hot machinery and steel, and then was poured back into the river at over 100 degrees Fahrenheit. The industrial practice of pouring hot toxic water, oil and grease into the river changed dramatically when most of the steel mills shut down in the late 1970s. The Ohio Department of Health issued an advisory against contact with the sediment in the Mahoning River ("The Mahoning River Education Project.").

Since the late 1970s and the reduction of operating facilities within the Industrial Corridor, the contaminants have settled out of the water and into the sediment. The United States Government has since made the United States Army Corps of Engineers responsible for the cleanup of the contamination. As mentioned previously, the cost of the river restoration has led to a stalemate in the actual restoration project.

Mine Drainage

Abandoned mine drainage is an issue in the Mahoning River Watershed. Ohio and Pennsylvania have thousands of wells through which non-hazardous fluid is injected into or above an underground source of drinking water. These materials include motor vehicle waste disposal wells, large capacity cesspools, and industrial/commercial waste disposal wells/septic systems. These wells pose a serious threat to ground water quality.

Another type of well that is polluting groundwater in the Mahoning River Watershed are abandoned oil wells. Abandoned oil wells have caused several tributaries to the Mahoning River to be classified as impaired streams by the Pennsylvania Department of Environmental Protection. These old, abandoned wells are sometimes not found until a leak takes place and is reported by local civilians. Finding and plugging these wells is an ongoing occurrence across the state of Pennsylvania.

Forestry Practices

Nearly 60 percent of the 28 million acres within the Pennsylvania borders is covered with forests. Forests provide benefits we simply cannot live without. Forests protect soils from erosion, provide high-quality water (Pennsylvania has 25,000 miles of forested waterways), and improve air quality. (For every ton of new wood that grows, about 1.47 tons of carbon dioxide is removed from the air, and 1.07 tons of life-giving oxygen is produced.) The diversity of plants and animals that inhabit our forest lands across the

state represent a wealth of cultural, medicinal, and environmental resources that we are just beginning to discover. The health of our forests is a prime indicator of the health of our total environment (Chunko 1996).

Forestry is commonplace in Pennsylvania, and can be sustainable when the Pennsylvania Department of Conservation and Natural Resources' (DCNR's) Best Management Practices (BMPs) are followed. Forestry has its pluses and minuses from an environmental, economic, and aesthetic perspective, and impact can be minimized through responsible, sustainable forestry.

However, not all forestry operations have been environmentally friendly. Clear cutting forests and using herbicides to prepare a site in order to control competing vegetation results in increased levels of nitrogen in watersheds. Fertilization results in losses of nitrogen and phosphorus.

Road Maintenance and Vehicles

Road maintenance and Vehicles are large polluters to the environment, and these pollutants all flow into the Mahoning River when it rains or during snow melt. The Mahoning River Watershed has several state roads and Interstate 376 in it as well. All of which are major sites of pollution.

Sedimentation, changes in biological activity in streams and on their banks, uncontrolled construction activities, and spills of chemicals and pollutants can all have adverse effects on roadside water quality. Chronic pollution of surface runoff from exhaust emissions, pavement and tire wear, petroleum product drippage, and corrosion of metals may be issues on some very busy roads. Where oil or lignin is applied to gravel roads to keep dust down, the likelihood of contamination is quite high. Seasonal pollution issues arise during salting of roads for winter maintenance and during periods of low stream flow ("Resources" *Roads & Highway).*

Oil and Gas Drilling

Oil and gas drilling has been rapidly expanding over the past decade in Pennsylvania, and the drilling continues to work its way farther west into Lawrence County. Stormwater runoff from construction activities, pollution from pits, hydraulic fracturing, and the use and disposal of Coalbed Methane (CBM) produced water are all water quality concerns.

Pollution from stormwater is an issue with all types of development from urban to rural areas. Regulation of stormwater discharges from oil and gas exploration, production, processing, and treatment activities has been particularly controversial in the last few years.

Pits are dug to hold fluids and solids during well development and to dispose of waste from production. Pits may be lines or unlined and their contents may be disposed of in many ways. Best management practices are essential for limiting pit pollution of both surface and groundwater.

Coalbed Methane (CBM) is a form of natural gas that is trapped within coal seams. CBM is produced and transported with much the same process and equipment as methane from a regular gas field. The major difference is that wells are drilled into the coal seam to first remove water. As the water is removed and water pressure in the seam decreases, the gas is released from the coal and flows through fractures in the coal to the well. The quality of CBM produced water varies widely. The spent fluid comes back laden with a brine containing elements that have been locked beneath the Earth for hundreds of millions of years dating back to the Paleozoic era. With elements like barium and radium in the fluid, potential uses and disposal methods of CBM produced water is a concern (Water Quality).

Best Management Practices

Water Pollution can have a devastating impact on a watershed. These pollutants can degrade the quality of water and uses of this water by humans and animal species that inhabit the watershed. A best management practice (BMP) is implemented to eliminate or reduce the effects of pollutants on the water resources in the watershed. BMPs are producers and/or facilities used to control water pollution. They collect, filter, or eliminate the impacts from an activity.

Practices should always be looked at for potential pollution reduction and best-cost alternatives. By looking at the best-cost alternative, economic strains on the area can be reduced. When considering BMPs for a specific project, look for new and innovative practices, as these are continually being tested and looked at to benefit the water resources as well as the practicality of a project. The Chart below gives examples of Best Management Practices that can be used to treat specific pollutants in the watershed. Additionally, refer to appendix 3-1 for a brief description of the BMP.

What are BMPs?

Best Management Practices (BMPs) are techniques, processes, activities, or structures used to reduce the pollutant content of a stormwater discharge. These controls are used for a given set of conditions to manage the quantity, and improve the quality, of stormwater runoff in the most cost-effective manner (U.S. EPA).

BMPs are important because they are the preferred strategy to achieve the goals of the County-Wide Act 167 Plan. Appropriate use of BMPs in key locations can reduce the amount of runoff generated from a development and provide water quality treatment for runoff that cannot be eliminated. Educated application of BMPs can actually reduce the overall cost of a project and increase the environmental benefits obtained from stormwater management facilities.

Table 3-6. Water Quality Impairments					
Best Management Practices					
	Nutrients	**Sediment**	**Acid Mine Drainage**	**Flow Modification**	**PCBs**
Agriculture					
Cover Cropping	X	X			
Filter Areas	X	X			
Grass Filter Strips	X	X			
Grassed Waterways	X	X		X	
Heavy Use Area Protection	X	X		X	
No-till Planting	X	X			
Reduced Tillage	X	X			
Roof Runoff Management				X	
Streambank Fencing	X	X		X	
Strip Cropping	X	X			
Waste Treatment Systems	X				
Water Control Structures				X	
Riparian Buffer Planting	X	X		X	
Urban Runoff/Storm Sewers					
Hydrodynamic Devices	X	X		X	X
Vegetated Roof	X	X		X	
Water Quality Devices	X	X		X	X
Development Practices					
Disconnection of Impervious Areas	X			X	
Bio Retention	X	X		X	
Constructed Wetland	X	X		X	
Infiltration Devices	X	X		X	
Pervious Pavement				X	
Stormwater Detention				X	
Sewage/Wastewater Systems					
Commercial Water Conservation				X	
Household Water Conservation				X	
Scheduled On-lot Tank Pumping	X				
Stormwater Disconnection				X	

Table 3-6 (Cont'd). Water Quality Impairments					
Best Management Practices					
	Nutrients	**Sediment**	**Acid Mine Drainage**	**Flow Modification**	**PCBs**
Industrial Operations					
Beneficial Reuse of Water				X	
Contaminant Collection and Treatment	X	X			
Spill Prevention and Control Planning	X	X			
Stormwater Management				X	
Abandoned Mine Drainage					
Aeration and Settling Ponds		X	X		
Diversion Ditches		X	X	X	
Erosion Control and Slope Stabilization	X	X	X	X	
Passive Treatment Facilities		X	X		
Re-vegetation	X	X	X	X	
Stream Diversion		X	X	X	
Forestry					
E&S Control Practices	X	X			
Invasive Species Control					
Sustainable Timber Harvest	X	X		X	
Sustainable Woodlot Management Plan	X	X		X	
Road Maintenance					
Grade Breaks	X	X		X	
Inlet Protection		X		X	
Outlet Protection		X		X	
Slope Protection		X		X	
Streambank protection		X		X	
Water Control Structures		X		X	
Oil and Gas Drilling					
Abandon Well Plugging			X	X	
Beneficial Drilling Water Reuse			X		
E&S Control Practices	X	X	X	X	

Pennsylvania State Water Plan

The Pennsylvania Water Resources Planning Act (Act 220 of 2002) requires the PA DEP to produce and regularly update a current State Water Plan that includes information on the quality of the state's water resources and quantifies the amount of water that is:

1) Available in Pennsylvania
2) Used by various sectors
3) Needed to meet the current and projected demands.

An up-to-date State Water Plan is an essential tool for water resource managers, helping them to make informed decisions based upon the availability of adequate water quantity and quality. Public water suppliers and hydropower facilities, as well as all users of at least 10,000 gallons of water per day are required to register and report their usage to DEP. The Plan also allows for the identification of Critical Water Planning Areas and outlines a procedure for creating specific critical area resource plans.

The Act established a Statewide Committee and six Regional Water Resource Committees that are charged with guiding the DEP through development of the State Water Plan. The Mahoning River watershed and all of Western Pennsylvania is guided by the Ohio Regional Water Resource Committee. Regional priorities for the Ohio River Basin are:

- Reclaim water resource impaired by abandoned mines
- Identify water resources needed to promote and facilitate economic development and provide job opportunities, while maintaining watershed integrity and recreational benefits.

Sixty percent (60%) of the Ohio River Basins Water Use is used by utility and thermoelectric (power generating) facilities, 22 percent (22%) by industry, and 15 percent (15%) by public water suppliers within the region. Agriculture, commercial, and mining each account for less than one percent (1%) of water use (Pennsylvania Water Atlas of the State Water Plan).

There are no Critical Water Planning Areas identified in the Mahoning River watershed.

Management Recommendations

Water Conservation

- Establish guidelines that require installation of low-flow devices for all new construction.
- Promote and establish a program for retrofitting homes and businesses for water conservation practices through tax breaks and rebates.
- Launch a watershed-wide water conservation program to educate the public about the value of reducing water consumption and utilizing water conservation products and techniques.

Wetlands

- Encourage interstate collaboration on standardizing methods used to delineate and identify wetlands.
- Protect wetland habitats for their many uses and benefits.
- Update wetland maps and assess wetlands within the watershed for the purpose of prioritizing future conservation projects.
- Expand outreach to municipal and county officials for planning and implementation of future wetland mitigation and the establishment of new wetlands.
- Inventory and monitor wetland plants and animals; take action when and where necessary to eradicate any invasive species.
- Educate landowners about the importance of wetlands for habitat and water quality.
- Encourage state acquisition of important wetlands for protection of groundwater recharge areas.
- Enhance/promote programs that restore wetlands to agriculture areas of limited value.

Floodplains

- Update municipal floodplain ordinances and strengthen the enforcement of them.
- Conduct a detailed flood-prone area assessment, and update floodplain maps.
- Develop educational programs about flood prevention and recovery.
- Acquire properties that are frequently impacted by serious flooding and convert them to public open space such as a park or ball field.
- Encourage non-structural approaches to floodplain management.
- Establish adequate vegetation and floodplain integrity to limit degradation of water quality and biological resources.

Riparian Areas

- Protect and enhance existing riparian buffers to achieve maximum protection of water resources.
- Establish riparian buffers along all types of waterways.
- Educate all watershed stakeholders about the importance of riparian corridors.

Water Pollution

- Educate homeowners about the significance of water use designations and ways to minimize non-point source pollution.
- Develop and implement education workshops and/or outreach programs about point source pollution, how to report point source violations, and how to research permit information.
- Encourage the transfer of permit violation fees to a local organization for water quality improvements within the watershed.
- Work with DEP and OhioEPA to develop TMDLs on all impaired streams.
- Implement TMDLs that have been developed.
- Encourage the establishment and maintenance of wetlands and riparian vegetation as cost-effective means of non-point source pollution reduction.

Stormwater

- Increase local, state, and federal funding for adequate stormwater management facilities.
- Work with PENNVEST to address current drainage issues.
- Continue educational outreach with municipal and county officials about planning for future stormwater BMP implementation.
- Employ watershed protection and stormwater management techniques in stormwater-impacted watersheds.
- Inventory individual watersheds to determine percent impervious cover and stormwater impacts.
- Protect those watersheds with 10 percent or less impervious cover.
- Employ restoration efforts in those watersheds considered damaged from stormwater runoff to improve water and habitat quality.
- Employ pollution prevention techniques in those (urbanized) watersheds containing over 60 percent impervious cover.

Erosion and Sedimentation

- Implement streamside stabilization improvement projects using bioremediation techniques.
- Promote tax incentives and cost-share programs for sreambank fencing, barnyard stabilization, and other BMPs.
- Continue the support of, and municipal participation in, the Dirt and Gravel Roads Program to reduce erosion and sedimentation.
- Reduce erosion and sedimentation by incorporating BMPs in all Earth-moving activities, including logging and deforestation, construction and development, and natural resource extraction.

Sewage

- Upgrade sanitary sewer systems to eliminate CSOs.
- Work with local sewage enforcement officers, PA DEP, and municipalities to regularly update and enforce Act 537 Sewage Plans.
- Provide programs for homeowners about maintenance and repair of on-lot sewage systems.
- Perform a watershed-wide assessment of on-lot and municipal sewage systems to identify raw sewage discharges, combined sewage overflows, and sanitary sewage overflows.

Agriculture

- Encourage farmers to take advantage of current cost-share programs to implement BMPs.
- Encourage farmers to have nutrient management plans developed to boost productivity and protect water resources.

Monitoring

- Host workshops or trainings about stream monitoring for adult and student volunteers.
- Conduct sub-basin watershed assessments and develop restoration plans.
- Conduct seasonal chemical, biological, and visual assessments for at least one year to provide background data for prioritization of future projects.
- Increase local and state funding to continue watershed monitoring efforts currently being conducted, in particular for the RPI and local educational institutions.

Source Water

- Develop a locally based program for disseminating information about protecting private well supplies to homeowners.
- Educate homeowners about the effects on groundwater caused by the overuse of fertilizer, pesticide, and herbicide.
- Educate community residents about potential threats to the public water supply.
- Partner with water suppliers to identify the source of the taste and odor issues of public drinking water.

- Promote groundwater quality awareness when conducting education and outreach programs for the watershed.
- Develop Source Water Protection Plans for all public water supplies.

Other

- Study and monitor the effects of gas well drilling on surface and groundwater to determine its impact on water quality; work to minimize those impacts.

Figure 3-1
PA Department of Environmental Protection
Chapter 93 Streams Designated Use

Legend

Designated Use
- TSF(Trout Stocked Fishery)
- WWF(Warm Water Fishes)

Watershed Designated Use
- TSF (Trout Stocked Fishery)
- WWF (Warm Water Fishery)

- Limited Access Highways
- Major Roads
- Road Centerlines
- Major Streams
- Minor Streams
- Municipalities
- Tax Parcels

Prepared by the
Lawrence County Planning Commission
April 2013
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE R Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD 422 MCBRIDE RD HILLSVILLE RD BAIRD RD Marshall Run COFFEE RUN MARSHALL RUN ERSKINE QUARRY RD JACOBSON RD 551 GRAHAM RD SKYHILL RD MEDINBURG RD HARBOR EDINBURG RD MAHONING RIVER MAHONING TWP 224 E RIVER RD Mahoning River Robinson W MAIN ST MAHONING RIVER North Edinburg Shenango River Hillsville FORDING RD Parkstown 224 STATE LINE RD W STATE ST Edinburg E MAIN ST UNION TWP W WASHINGTON ST CHURCHILL RD MOHAWK SCHOOL RD ERIE ST 376 Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MAHONING RIVER MILLER RD EDINBURG RD COVERT RD HOFFMASTER RD KILDOO RD NEW CASTLE CITY Hickory Creek N MAIN ST HICKORY CREEK W POLAND RD E POLAND RD 317 SMALLS FERRY RD MOHAWK SCHOOL RD BESSEMER BOR BREWSTER RD MOUNT JACKSON RD TAYLOR TWP 422 S MAIN ST HICKORY RUN NORTH BEAVER TWP 108 CLELAND MILL RD CRUM RD Hickory Run Mount Jackson SUNNYSIDE RD WAMPUM RD COLUMBIANA RD COLUMBIANA RD MOUNT JACKSON RD VANCE RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD 18 KYLE RD 108 551 376 PADEN RD Beaver River GILMORE RD GILMORE RD MOUNT AIR RD Sugar Creek MCKIM RD NEW RD Edwards Run

Figure 3-2
PA Department of Environmental Protection
Impaired Streams

Legend

Cause

- Abandoned Mine Drainage - Metals
- Agriculture - Nutrients
- Road Runoff - Siltation
- Urban Runoff/Storm Sewers - Siltation
- Source Unknown - Cause Unknown

- Major Streams
- Minor Streams
- Unamed Streams
- Water Features
- Watershed

Prepared by the
Lawrence County Planning Commission
April 2013
Allen Miller

0 0.5 1 2 3 Miles

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Figure 3-3
PA Fish and Boat Commission
Trout Stocked Waters

Legend

- Limited Access Highways
- Major Roads
- Road Centerlines
- Major Streams
- Water Features
- Minor Streams
- Unamed Streams
- Municipalities
- Tax Parcels
- Watershed
- Approved Trout Waters
- Approved Trout Waterbodies

Prepared by the
Lawrence County Planning Commission
April 2013
Allen Miller

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208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD 422 MCBRIDE RD HILLSVILLE RD BAIRD RD Marshall Run ERSKINE QUARRY RD JACOBSON RD GRAHAM RD SKYHILL RD 551 N EDINBURG RD HARBOR EDINBURG RD MAHONING TWP E RIVER RD Shenango River 224 Robinson Mahoning River W MAIN ST North Edinburg Hillsville FORDING RD Parkstown 224 STATE LINE RD W STATE ST Edinburg UNION TWP W WASHINGTON ST E MAIN ST CHURCHILL RD MOHAWK SCHOOL RD ERIE ST 376 Coverts WINTER RD W WASHINGTON ST MCCLELLAND RD MILLER RD EDINBURG RD COVERT RD HOFFMASTER RD KILDOO RD NEW CASTLE CITY Hickory Creek Bessemer Lake N MAIN ST W POLAND RD E POLAND RD 317 422 BESSEMER BOR SMALLS FERRY RD BREWSTER RD MOUNT JACKSON RD NORTH BEAVER TWP 108 TAYLOR TWP CRUM RD S MAIN ST Hickory Run Mount Jackson CLELAND MILL RD SUNNYSIDE RD COLUMBIANA RD WAMPUM RD COLUMBIANA RD MOUNT JACKSON RD VANCE RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD 18 KYLE RD 376 PADEN RD Beaver River GILMORE RD GILMORE RD MOUNT AIR RD Sugar Creek MCKIM RD NEW RD Edwards Run 108 551

CHAPTER 4: BIOLOGICAL RESOURCES

Biodiversity

"At least 40 percent of the world's economy and 80% of the needs of the poor are derived from biological resources (Why Is Biodiversity Important? Who Cares?)." The diversity of our biological resources provides benefits within our ecosystems, ranging from increased variety in food to newfound discoveries in medicine. Biodiversity, defined as the total number of living organisms in an area, taking into account the diversity within species, populations, and communities, helps to stabilize our ecosystems. It can provide an increased protection to the local water resource, an increased stability in soil production and protection, a larger variety of food resources, and in some areas it can even provide cultural values to the local human communities. In general, biodiversity is very important to maintaining a stable ecosystem. The following chapter will discuss the biological resources of the Mahoning River Watershed and the ecosystems they sustain.

Natural Environment

An **ecoregion** is the name given to an area having a distinctive composition and pattern of plant and animal species distribution (Washington State Department of Natural Resources, 2003). According to the Environmental Protection Agency, North America is divided into three levels of ecosystems, with Level I being the most general and Level III being the most specific. The Mahoning River Watershed lies within Level I: Easter Temperate Forests, Level II: Mixed Wood Plains, and Level III: Eastern Great Lakes Hudson Low Lands.

The Eastern Great Lakes Hudson Low Lands ecoregion incorporates the Mahoning River Watershed. The ecoregion broadly characterizes an area that encompasses many northeastern states including Pennsylvania. It is known for its humid, warm summers, and cold snowy winters. Before human development converted much of the area to cropland, it contained a vast mixed conifer-deciduous wood forest. Today, the area is dominated by species such as the sugar maple, yellow birch, eastern hemlock, basswood, and eastern white pine; beech occurs on warmer sites. Dry sites are dominated by red oak and pine, eastern white pine and cedar. Wetter sites support red maple, black ash, white spruce, tamarack, and eastern white cedar. Wildlife in the region includes white tailed deer, black bear, red fox, moose, coyote, wolf, snowshoe hare, red and gray squirrel, chipmunk, and other small mammals. Bird species include cardinal, wood thrush, screech owl, osprey, mourning dove, green heron, pileated and red-bellied woodpecker, Canada warbler, Canadian geese, mallard, wood duck, American and black ducks (Commission for Environmental Cooperation).

While an ecoregion can give a broad description of the biological resources present within an area, **ecosystems** give more detailed, site-specific descriptions. By definition, an ecosystem is a community of living and non-living things that work together. These areas can vary in size, being as small as a backyard garden or as large as a desert. They contain everything in the area from the soil and water to the animals and plants. The Mahoning River watershed contains many ecosystems, varying in size and type, smaller more specific systems even within larger systems. The following subsections highlight the most notable ecosystems in the watershed, along with significant flora within these ecosystems.

Wetlands

A wetland, as defined by the Clean Water Act, is an area inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. In addition to being just a defined geographical location, wetlands provide many services to an ecosystem. Most importantly for developed areas, wetlands provide areas for water quality improvement and flood abatement (U.S. Fish and Wildlife Service, Fisheries and Habitat Conservation).

A notable wetland within the Mahoning River Watershed is located within the Maryvale swamp and is categorized as a bottombush wetland due to the presence of the common **buttonbush**, a wetland shrub. The shrub is

characteristic of this type of ecosystem and provides a food source for eight different species of waterfowls and three species of mammals, increasing the biodiversity of the area (USDA and NRCS. Common Buttonbush Cephalanthus Occidentalis L.).

Swamp

A swamp, commonly referred to as a wetland, is any wetland that is dominated by woody plants and is characterized by highly saturated soils. Throughout the East Coast, there is a variety of swamps ranging from extensive bottomland hardwood forest swamps to the Red Maple swamps of the far northeast (Swamps). Within the Mahoning River Watershed, there are two notable swamps, the Edinburg Swamp and the Maryvale Swamp.

The Edinburg Swamp, considered a shrub wetland, is home to the **water willow**. The water willow is a perennial, which grows along stream and lake edges. The willow, which can grow to three feet tall, can form dense thickets that help stabilize shorelines (Water-willow [American Water-willow] AQUAPLANT). The Edinburg Swamp is located along the banks of the Mahoning River (Western Pennsylvania Conservancy 2002), allowing the water willow to help stabilize the shoreline of a floodplain, providing greater protection to the soil in the area.

The Maryvale Swamp is considered a mature **bottomland oak-hardwood palustrine forest**. Common species found within the swamp include Pink Oak, Red Maple, and Slippery Elm. During drought periods, these forested swamp areas can sometimes provide the only source of water for wildlife in an area, especially if the palustrine forest is isolated from surface waterways (Water-willow [American Water-willow] AQUAPLANT).

In general, swamps provide many services to an area, similar to wetlands. Swamps can help to mitigate flooding and reduce pollution through nutrient uptake. There mineral rich soil also allows for a diverse group of plants to grow, leading to a more diverse ecosystem all the way around, in many cases creating a biodiversity hot spot within a watershed.

Successional Forest

Successional forests can be found in areas of high disturbance, leading to the natural process of forest regeneration. Depending on the extent of the disturbance, successional forests may be in various stages of growth. An early successional forest is dominated mainly by grasses, herbaceous vegetation, small shrubs and tree saplings. The forest is starting over again and for this reason can be very vulnerable to invasive species such as Multiflora Rose (as seen throughout the Mahoning River Watershed). Following this early stage, the successional forest will move to a middle stage dominated by tree growth. The understory, once littered with grasses and herbaceous vegetation, is now mostly dominated by woody shrubs tolerant to shade. Once trees have become full-grown and are providing habitats and are becoming a food source for the wildlife, the forest is considered to be mature. These forests provide a stable ecosystem for the wildlife and if managed properly, can provide an economic value to the landowner (Western Pennsylvania Conservancy 2008).

In the Mahoning River Watershed, one of the successional forests to note is a Biological Diversity Area (reference later section). This successional forest, when evaluated in 2003 would have been placed as a mature forest, making it stand out as much of that area has been disturbed by strip mining causing the younger forests to be in the early or middle stages (Western Pennsylvania Conservancy 2002). This mature forest is dominated by species such as white oak, white ash, sugar maple, sassafras and American Beech. It provides various food sources for animals such as the whitetail deer.

Wildlife

In order to manage for diversity of wildlife, a diversity of quality habitats must be preserved and sustained to support wildlife communities. "Wildlife depends on the availability of food in all seasons, clean water, cover (for protection from predators and the elements), and space (to forage, raise young, and expand territory.)" (Western Pennsylvania Conservancy 2008). Over the years, the Mahoning River watershed has been disrupted as development has entered, clearing land for farming, building homes, and constructing roadways. This development has led to the fragmentation of the original ecosystems, which provided distinct habitats for the wildlife in the area. Historically, the area use to be home to bison, elk, black bear, mountain lion, bobcats, porcupine, and the timber wolf, but as the area became fragmented with human development these animals soon disappeared (or became very sparse) without enough food, space and protection to provide a quality of life.

Ecosystems depend on stability from every aspect of their makeup, from the plants and geology that create the habitats for the wildlife, to the wildlife becoming pollinators for the plants. Each species has a role to play within its ecosystem, and if that species is eliminated the ecosystem will begin to change, no matter how small of a role that animal may have played. When human development first entered the area, the populations of the white – tail deer and bald eagle seriously declined, but with conservation practices installed, these species have made recoveries within the area. Their recoveries are helping to restore the original diversity and stability of the original ecosystem.

This diversity of wildlife is not only important for the stability of the local ecosystems but also for the local economy and quality of life. Outdoor recreational activities practiced within the watershed, such as hunting, fishing, hiking, biking, and canoeing, not only increase cash flow within the area, but also provide opportunities for people to enjoy the outdoors.

In general, if development continues to fragment the natural habitats of the local wildlife, conservation practices will need to be installed to ensure the survival of the species and their ecosystems. For example, the whitetail deer population is regulated by the PA Game Commission to ensure that hunting of the animal will not drive it to extinction. Limitations are placed on the number of deer that can be harvested by one individual along with the season the animal can be harvested in. On the other hand, the Game Commission also notes that some areas can become overpopulated by the species as its natural predators, such as the Mountain Lion, have been eliminated from the original ecosystem. In this case, the Game Commission can raise the number of licensees distributed for hunting during a particular season, helping to bring the population back in check. Over time, it will be seen that some species, like the whitetail deer are more adaptable to human development than others, such as the Elk. For those species that are less adaptable, additional management recommendations will be needed to ensure their survival and the stability of the local ecosystem.

Invasive Species

According to the National Invasive Species Council, an invasive species is defined as a species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health. Invasive species can include plants, animals, and other organisms such as microbes (Invasive Species: About NISIC - What Is an Invasive Species?). Invasive species can be a considerable threat to biological conservation in Pennsylvania, and more specifically the Mahoning River Watershed. Once established in a foreign habitat, the invasive species are able to reproduce rapidly as there are no natural predators or pathogens.

Once the invasive species dominates an area, "they often cause decreased land value, increased maintenance and control costs, degraded soil or water quality, or direct human health concerns. West Nile Virus is one example of a non-native pathogen that has the potential to affect human health. Weeds associated with agricultural crops or grazeland may decrease crop yields, affect livestock health, and require costly control efforts. On private lands, invasive species may be aesthetically unpleasing, encroach upon homes and gardens, affect landscaping, and threaten pets and humans." (Western Pennsylvania Conservancy 2008).

If you would like more information on invasive species, two good starting points include the USDA National Invasive Species Information Center (NISIC) at www.invasivespeciesinfo.gov or the Global Invasive Species Database at www.issg.org/database.

Invasive Plants

An Invasive Plant is a plant that is introduced into an ecosystem that has become a weed pest. Its characteristics allow the plant to grow aggressively, dominating, and limiting the diversity of the natural species within the invaded ecosystem. Because of their ability to spread aggressively and reproduce prolifically, they easily out-compete native plants for light, space, and nutrients, totally changing the natural habitat. As the invasive plants outgrow the native species, they begin to change the availability of food for the local wildlife (insects, birds, and mammals). As certain wildlife depend upon native species, not having adapted to the invasive species now more available, their populations can decline due to a lack of food. As these species, dependent on the herbaceous food source, tend to be at the bottom of the food chain, their decline can have a domino effect throughout the entire food chain, all the way up to the top. Additionally invasive plant species can cause problems in agricultural fields, competing with crops for nutrients, and potentially decreasing the overall yield of the field.

It is important to prevent an invasive species from dominating an area because once established, the plants are extremely difficult to control and can cost a lot to remove. Becoming knowledgeable about common invasive species can help you identify the plants, leading to early prevention. In most cases, if spotted early, invasive species can easily be removed by weeding, making sure to remove the root system in its entirety. Most of these invasive plants should be bagged and sent to a landfill to prevent the seeds from spreading. Additionally, many native ecosystems, such as some of the Biological Diversity Area's mentioned previously in this report, are small, making them more vulnerable to degradation, at a much faster pace. Therefore, early prevention is essential in some of these small ecosystems. If a species has dominated an area, though, ridding the species will be much more difficult and costly. At this point, most invasive plant species will require some form of herbicide application to kill the plant indefinitely. Herbicide applications can be costly depending on the type and amount needed. In addition, and of greater concern to the local watershed, herbicide can be a source of non-point source pollution. If applications are over applied, applied right before a rain event, or near a waterway, the risk of a pollution event increases. Therefore, not only are the invasive species causing immediate problems with the native ecosystems, but in attempting to control the species, pollution risk increases, making it a watershed wide issue.

Invasive Plants in Pennsylvania have been categorized based on their threat to human health and safety, along with their ability to invade and be controlled. At the top of the list are noxious weeds, invasive plant species that pose a threat to human or animal health (Western Pennsylvania Conservancy 2008). These weeds are also regulated by the Federal Noxious Weed Act of 1974, making it illegal to "propagate, sell, or transfer any of the state designated noxious weeds (USDA and NRCS. "Introduced, Invasive, and Noxious Plants."). Noxious weeds, along with a few other persistent species, have been categorized together as a high threat level, as they are the worst offenders to our native ecosystems.[3] Medium threat level species can easily invade, but with vigilance are most often removed. They are not as big of a concern as the high level species.

In the section to follow you will find a list of invasive plants that have been identified within the Mahoning River Watershed. This list is, by all means, not inclusive but one that will change over time as further invasive species are identified or removed from the area. Each section will give the common name of the plant, followed by the scientific name, threat level (as designated by the Department of Conservation and Natural Resources), general plant identification characteristics, potential habits, and current ways to control or eliminate species from your own property.

If you would like to know more about any particular species, please consult *Plant Invaders of Mid-Atlantic Natural Areas*, a guide produced by the National Park Service and U.S. Fish and Wildlife Service (Western Pennsylvania Conservancy 2008).

Japanese Barberry

Scientific Name: *Berberis thunbergii*
Threat: Medium
Characteristics: Small, dense deciduous shrub growing 2 – 8 feet in height with thorns at leaf nodes. Small bright green and oval shaped smooth edge leaves, alternating on the stem. Flowers appear in mid-April – May as cluster of small pale yellow flowers leading to egg-shaped shiny red berries. Berries are eaten by small mammals and birds.
Habitat: Full sun to shade including forest, open woodlands, wetlands, and meadows
Control: Plants can be hand pulled while wearing thick gloves to protect skin from sharp thorns. Repeated cutting or mowing has been successful as has treatment with systemic herbicides.

Common Privet

Scientific Name: *Ligustrum vulgare*
Threat: Medium
Characteristics: A fast growing, deciduous shrub, which can grow up to 15 feet tall. Leaves are a simple oval to elliptical in shape with a smooth edge and dark green, glossy appearance. Small white flowers do grow in clusters at the end of the branches. By late summer – early fall, small, blue-black berries appear.
Habitat: Commonly used landscape plant naturalizes in area of full sun to part shade

Control: The entire plant, including roots, can be dug out if plants are small. This method will disturb the soil producing an avenue for additional infestations. Plant will resprout from the remaining roots. For larger plants, cut and paint stumps with systemic herbicide like glyphosate.

Garlic Mustard

Scientific Name: *Alliaria petiolata*
Threat: High
Characteristics: Cool season biennial herb with heart or triangular shape leaf with sharply toothed edge. Leaves give off garlic sent when crushed. Small, white flower with four white petals typically clustered at the top of stalks, blooming in April – May. Seeds persistent and prolific.
Habitat: Shady to partly shady areas with preferably moist soils.
Control: Cut plant to ground level. Pulling can potentially cause further disturbance and lead to an avenue for additional infestations. Burning and herbicides have been used effectively. Seeds mature on flowering cut plants so plants should be disposed of in plastic bags and sent to a landfill, as the seeds can remain viable for several years following.

Common Reed

Scientific Name: *Phragmites australis*
Threat: High
Characteristics: Tall perennial rhizomatous grass (wetland grass) with hollow stem and occasional multiple branches, reaching 3-16 feet in height. Grasses can form huge colonies. Contains a narrow leaf with stiff, sharp points, and smooth edges. Purplish – brown plumes fade to tan in late June. Seeds can easily spread by wind.
Habitat: Brackish and freshwater marshes, wet and riparian areas
Control: To control common weed, cut at the end of July, consistently for several years to reduce plant vigor. All shoots should be removed in entirety to prevent resprout. Application of an aquatic form of glyphosate has also been found to control the species. This application should be done after the plumes have developed.

Japanese Knotweed

Scientific Name: *Polygonum cuspidatum*
Threat: High
Characteristics: Upright, bushy perennial growing up to 10 feet. Forms dense thickets but dies back at first frost leaving bamboo like debris. Leaves are broad ovals to triangular with smooth edges growing to 4-6 inches in length. Spiked white to green-white flowers bloom in late summer on female plants.
Habitat: In sun or shade near water, low-lying or waste areas, near old railroad beds.
Control: Very difficult to control. It can regenerate from small segments of rhizomes left in the ground. Pulling you plants can be effective if entire root system is removed. Cutting and covering with weed mats may kill small infestations. Applications of systemic herbicide are most effective if done two weeks before fall frost. Combined cutting in June and spraying of plant in fall is recommended. Any control must be repeated over a number of years to be successful.

Purple Loosestrife

Scientific Name: *Lythrum salicaria*
Threat: High, PA Noxious Weed
Characteristics: A tall upright herbaceous perennial with a woody stem, growing from 3 – 10 feet in height. Leaves are whorled and opposite with a smooth edge. Showy purple spiked flowers bloom from June – September, attracting many pollinators.
Habitat: Varied wetland areas, ditches, stream edges, and marshes. Prefers wet soil but can grow in dry upland areas.
Control: Small infestations can be hand pulled preferably before seed set (as reproduction occurs with seed dispersement). Spot treatment with herbicide has been used for older plants, using glyphosate formulated for either water or upland. Herbicide applications tend to be more effective when done late in the season.

Multiflora Rose

Scientific Name: *Rosa multiflora*
Threat: High, PA Noxious Weed
Characteristics: Thorny, perennial shrub with arching stems, which can grow to approximately 13 feet, forming large dense hedges as it spreads. The leaves are compound, divided into five to eleven leaflets with sharply toothed edges. Small, white to pinkish – white flowers grow in clusters in May – June, leading to a reddish fleshy fruit, known as rose hips. The fruit remains on the plant throughout the winter and does provide food to the local wildlife.
Habitat: Fields, forests, prairies and riparian areas.
Control: Hand pulling of young plants can be successful. Larger plants will need cut or mowed repeatedly (3 – 6 times during the growing season) to weaken and eventually kill the shrub. Cut stumps or treat with systemic herbicide to kill roots. If using herbicide treatment, apply late in the growing season.

Tree-of-Heaven

Threat: High
Characteristics: A tree that can grow over 80 feet in height containing a single trunk with compound leaflets. In June, small yellow-green flowers appear at the end of the branches. Fruits produce seeds with prolific germination rates.
Habitat: Thrives in disturbed soil, poor soil, roadsides, forests, and field edges.
Control: Seedlings can be hand pulled. Do not girdled or cut trees, as they will re-sprout vigorously. Glyphosate can be applied as foliar spray, stump treatment, injection or with the hack and squirt method. It is most effective when applied during the growing season. Basal bark treatment, with the chemical Triclopyr, is also effective, particularly when done in the fall. Additionally, there is antidotal evidence that copper roofing nails driven into the trunk will kill the tree.

Animals & Insects

Asian Longhorn Beetle

Scientific Name: *Anoplophora glabripennis*
Characteristics: The beetle, being about 1 inch is size as a mature adult, has a black body with white specks of color. The beetle is destructive to its host tree as it chews the bark to create an area to lay its eggs. The young larva must then feed on the inner bark, and when it becomes time to emerge as an adult, they must bore holes through the tree in order to exit.
Habitat: The beetle is found on tree species such as the maple, including Boxelder, Elm, Willow, Birch, Horsechestnut, London Planetree, Poplar, Ash, Mimosa (Silktree), Hackberry, and Mountain Ash.
Control: To prevent the beetle from expanding into native territory, it is important to learn what the signs of current infestation look like. When you see infestation, for example, on firewood, it is important to not spread that wood, potentially transferring the beetle to a new area.[22]

Emerald Ash Bore

Scientific Name: *Agrilus planipennis*
Characteristics: Adults are roughly 3/8 to 5/8 inch long with metallic green wing covers and a coppery red or purple abdomen. They may be present from late May through early September but are most common in June and July.
Habitat: The Asian beetle infests and kills North American ash species including green, white, black and blue ash. Thus, all native ash trees are susceptible hosts for the insect.
Control: Most ash trees, once infected, will die within 2 – 4 years. It is important to take note of any infected or weak trees in your area. If you see these, have the trees removed. For stronger trees, if infected there are various insecticides proving useful that you could try. For more information, you can visit www.emeraldashborer.info/ (Emerald Ash Borer).

Invasive Pathogens

An Invasive Pathogen can wreak havoc on an entire ecosystem, especially if the pathogen attacks an endangered species. These pathogens can affect animals, plants, humans, and insects, transmitting their virus or disease in a variety of ways including animal bites, blood transfusions, or from the basic movement of infected animals and insects with the changing climate and migration patterns (Invasive Pathogens Demand Sophisticated Warning

Systems). Below is a common invasive pathogen occasionally found within the Mahoning River watershed. Once again, this list is not complete, but ever changing.

West Nile Virus (WNV)

Definition: a mosquito born arbovirus originating in Uganda.

Transmission: "The virus is most often spread by the bit of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite."

Controls: The best way to prevent contracting WVN is to protect yourself from mosquito bites. By using outdoor insect repellent, wearing a long sleeve shirt and pair of pants during dawn and dusk (most active time of day for mosquitoes), ensuring proper screens are installed on windows and doors within your home, and by removing standing water from your property you will decrease your chances of contracting a mosquito bite and more importantly, decrease your chances of being bitten by an infected WNV mosquito.

Location: The virus has been identified in Lawrence County Mosquito Samples in past years, including townships located within the Mahoning River Watershed. For specific information on the year and townships, please visit http://www.westnile.state.pa.us/ (West Nile Virus: What You Need To Know).

Conservation Concerns

Various species of plants and animals within Lawrence County have been designated as a species of special concern. A species of "special concern" is a species that has been given a ranking of "vulnerable" or low based upon its population number documented within a specific geography. These species of special concern can then be considered threatened or endangered. An endangered species is a species that is considered to be in danger of becoming extinct throughout its range. A threatened species is a species at risk of becoming endangered unless special action is taken (Western Pennsylvania Conservancy. Connoquenessing Creek Watershed Conservation Plan). In Pennsylvania, one of four agencies determines a species status. The Pennsylvania Fish and Boat Commission is responsible for fish, reptiles, amphibians, and aquatic organisms. The Pennsylvania Game Commission is responsible for wild birds and mammals. The Department of Conservation and Natural Resources is responsible for preserving the Commonwealth's native wild plants, terrestrial invertebrates, significant natural communities, and geologic features. Lastly, the federal U.S. Fish and Wildlife Service is responsible for federally listed, proposed, and candidate species under the Federal Endangered Species Act.

These four agencies, together with the Nature Conservancy and Western PA Conservancy, have put together a database of all the native biological diversity within Pennsylvania. This database, commonly known as the Pennsylvania Natural Diversity Inventory (PNDI), provides a list of species of concern by county - giving the species common name, scientific name, and its federal and state ranking. To see listings of species of special concern specific to Lawrence County, visit http://www.naturalheritage.state.pa.us/species.aspx.

When a species of special concern is identified within an area, certain environmental assessments must be completed before a development project can take place to ensure the protection of the species natural habitat. In most circumstances, just changing the design of the project or timing of the project can accommodate the protection of the species.

In the sub-sections to follow, you will find animals and plants that are considered species of special concern, specific to the Mahoning River Watershed.

Animals

Myotis sodalis, more commonly known as the Indian Brown Bat, is considered a nationally and state endangered species. The bat itself, which closely resembles the common Little Brown Bat, has a characteristic pink colored facial area, separating it from other *Myotis* species. During the summer months, the bats find shelter among trees such as oaks, hickories, ashes, elms, cottonwoods, locusts, and maples (some of which are found within the Mahoning River Watershed.) During hibernation, the bat finds refuge amongst caves and old mines, many of which are present in Western PA. While the Indian Brown Bat may only have a small role in some of the ecosystems within the Mahoning River Watershed, the bat is very beneficial to the area, helping to control pests, pollinate plants, and disperse seeds. Any disturbances to the bat's habitat could increase stress on the animal and lead to its extinction. For this reason, development projects found within the bats habitat are usually adjusted by altering their timeline to ensure the bats are not disturbed when nesting or hibernating.

Plants

Oxypolis rigidior, more commonly known as Stiff Cowbane, is considered a species of special concern in Pennsylvania. This perennial herb is found within the Mahoning River Watershed's Upper Coffee Run Biological Diversity Area. In general, the plant tends to grow in habitats such as wet meadows, prairies, fields, swamps, and marshes, requiring wet soil to thrive. It is not currently endangered in Pennsylvania but is considered to be endangered in New York ("Image Gallery." Oxypolis Rigidior [Stiff Cowbane]).

Areas of Conservation Concern

Natural Heritage Inventory

The Lawrence County Natural Heritage inventory identifies and locates Lawrence County's most significant ecological resources. These areas are set apart from common areas by the types of plant or animal species present, notable geological features, high quality watersheds, or uncommon wildlife habitat. The Western Pennsylvania Conservancy completed the Lawrence County Natural Heritage inventory in 2003. The inventory itself does not

protect any of the identified areas but provides both public and private organizations with a tool for responsible land planning.

The Inventory identifies two types of natural heritage areas, a Biological Diversity Area (BDA), and a Landscape Conservation Area (LCA). A BDA is as an area that contains one or more locations of plants, animals, or natural communities recognized as a state or federal species of concern. It includes high quality examples of natural communities or areas supporting exceptional native diversity. A LCA is a large contiguous area, which is important because of its size, open space, habitats, and/or the inclusion of one or more BDA's. Although an LCA includes a variety of land uses, it typically has not been heavily disturbed and thus retains much of its natural character. There are 35 natural heritage areas within Lawrence County, 33 BDA's, and two LCA's (Western Pennsylvania Conservancy 2002).

Each identified area is ranked according to its significance ecologically or biologically. These rankings are then used to give priority to certain sites. For examples, should an opportunity arise, such as a potential grant, the county or other agency could use the ranking of the identified area to support the need for the grant. Below, in table 4-1 you may view the ranks and their descriptions for reference (Western Pennsylvania Conservancy 2002).

Table 4-1. Significance Ranks as Determined by the Natural Heritage Inventory

SIGNIFICANCE RANK	EXPLANATION
Exceptional	Sites are of exceptional importance for the biological diversity and ecological integrity of the county or region. Sites in this category contain one or more occurrences of state or national species of special concern or a rare natural community type that is of a good size and extent and is in relatively undisturbed condition. Sites of exceptional significance merit quick, strong, and complete protection.
High	Sites that are highly important for the biological diversity and ecological integrity of the county or region. These sites contain species of special concern or natural communities that are highly ranked, and because of their size or extent, relatively undisturbed setting, or a combination of these factors, rate as areas with high potential for protecting ecological resources in the county. Sites of high significance merit strong protection in the future.
Notable	Sites that are important for the biological diversity and ecological integrity of the county or region. Sites in this category contain occurrences of species of special concern or natural communities that are of either lower rank (G and S rank) or smaller size and extent that exceptional or high-ranked areas, or are compromised in quality by activity or disturbance. Sites of notable significance merit protection within the context of their quality and degree of disturbance.
County	Sites that have great potential for protecting biodiversity in the county but are not, yet, known to contain species of special concern or state significant natural communities. Often recognized because of their size, undisturbed character, or proximity to areas of known significance, these sites invite further survey and investigation. In some cases, these sites could be revealed as high or exceptional sites.

Below you will find descriptions, by township, of the identified BDA's located within the Mahoning River Watershed. Included in each description will be the significance rank, the location, a general description of the BDA, threats and stresses to the BDA, and suggested recommendations for the BDA. All the information presented is from the Lawrence County Natural Heritage Inventory (Western Pennsylvania Conservancy 2002).

Mahoning Township

Edinburg Swamp Biological Diversity Area

Significance: County

Location: Mahoning Township Southeast of Edinburg

Description: Vegetated floodplains along the Mahoning River area. Only 13% of the river has a forested buffer within 300 feet of the shoreline (Ohio EPA 1996). Edinburg BDA represents one of these areas and is the site of the only water-willow swamp seen in Lawrence County. These floodplains serve as a place for the river to deposit sediments and lower the velocity of floodwaters as they spread out across the floodplain. The floodplain is dominated by Silver Maple, Sycamore, Tulip tree, Slippery Elm, and Black Locust. Understory associates include Black Willow, Silky Dogwood and on elevated areas, Multiflora Rose is thick in places. Common herbaceous species are Wingstem, Garlic Mustard, Blue Vervain, Spotted Jewelweed, and Dame's Rocket A water willow (Decodon verticillatus) shrub wetland is located in the center of the floodplain between the river and an active railroad. Water willow occurs in other locations in Lawrence County but is uncommon and reaches the limit of its geographic range. This species forms very thick, often homogenous masses. Other species in the swamp include both Red Maple and Green Ash.

Threats and Stresses: Water willow (Decodon verticillatus) needs a constantly wet environment in order to thrive. Hydrologic alteration of the wetland would change the structure of the community and allow other species adapted to less wet conditions to invade. Vegetation changes or other earth moving activities would reduce the buffer here. Pollution from urban runoff upstream could flow into the swamp during flooding events and concentrate in the intervening dry periods making a toxic environment for the plants and natural community in the swamp. Given the available moisture and nutrients at the site, invasive species such as common reed and Japanese knotweed threaten the floodplain and bank of the river and purple loosestrife threatens the water willow swamp.

Recommendations: Alterations in the hydrology of the wetland or the flood regime of the river could negatively impact the natural communities. The swamp receives water from the high water table present near the river and is also replenished from occasional flooding along the river. Additional wooded buffer along the river would help remediate some of the non-point source pollution affecting the area. Exotic invasive species should be monitored at this site. These species are easier to control before full establishment with early detection being a preferred strategy. Activities that alter the hydrology or flooding regime should be avoided in order to maintain the high water table level needed by the water-willow. Additional forested buffer around the wetland and along the river would greatly improve the function of the wetland and help reduce nutrients inputs into the river.

Quaker Falls Biological Diversity Area

Significance: Notable

Location: Mahoning Township Northwest of Hillsville

Description: Falling Spring Creek drains strip-mined lands south of US 224 and as such, is impacted by abandoned mine drainage. Just North of US 224 the creek flows through a steep gorge on its way to the Mahoning River. Falling Spring Creek Gorge is similar in structure and vegetation to Hells Hollow in McConnell's Mill State Park. Unlike Hell Run, this gorge has a northern exposure creating a cool microclimate suitable for the gorge community within. Falling Spring Run Gorge begins narrowly upstream and widens considerably downstream. On its journey north, the run cascades over two waterfalls, Quaker Falls being the most notable. Quaker Falls is similar in elevation and geology to other falls in the area including Hell Run Falls and Springfield Falls in Mercer County. Eastern Hemlock, Red Oak, Red Maple, Basswood, White Ash, and Black Cherry make up the copy in Falling Spring Creek Gorge. Understory associates include Cucumber Tree, Witch-Hazel, Slippery Elm, and Spicebush. Shrubs include Hazelnut and Showy Raspberry. Profuse herbaceous vegetation composed of Wingstem, Selfheal, Blue Lobelia, Black Cohosh, Yellow Jewelweed, and White Thoroughwort covers the floor. Mountain Maple and Marginal Log Fern, both species not often seen in Lawrence County, were seen here and at Hells Run during the inventory of the county. Some exotic invasive plant species were seen in scattered places about the gorge. These include Multiflora Rose, Japanese Knotweed, Tree-of-Heaven, and Day Lily.

Threats and Stresses: The area surrounding the gorge is mostly abandoned mines and other industrial land uses associated with the mines. Both of these land uses serve to fragment the natural communities in the gorge and serve as corridors for the movement of invasive species. In addition, the two rights of way present in the gorge (power line and railroad) further fragment the natural community. All of these factors provide issues for the viability of the forest community in the gorge.

Recommendations: Informing the landowner of the significance of the gorge and the natural community within would be a good first step in the protection of this natural resource. The sheltered slopes provide a moist and cool environment for the species that live in the gorge. Activities that further fragment the gorge such as road construction or rights-of-way establishments should be avoided. If possible, additional buffer should be added to the gorge to improve the viability and enhance the microclimate of the gorge community. Invasive species already present in the gorge should be monitored and action taken to prevent their further spread an impact on the natural resources.

Soap City Slopes Biological Diversity Area

Significance: County

Location: Mahoning Township North of the Mahoning River, Northwest of Hillsville

Description: Soap City Slopes is located across the Mahoning River from Quaker Falls BDA on a south-facing slope and just east of the Ohio Stateline. Like the Quaker Falls side, most of the surrounding area has been strip-mined. Therefore, any mature forests remaining in the area would be of note, as I this one.

Where the north-facing slopes of the Mahoning are cool and moist, the south-facing slopes are dry and warm. The slope forests are fairly mature with diameters of trees ranging from 1 to about 2.5 feet in diameter, although the majority of the forest, like most of the surrounding area is disturbed and successional with little definition between the overstory and understory. Glacial erratic or rocks brought south from the Canadian Shield by the glaciers are present in the ravines of the tributaries. Canopy species include White Oak, White Ash, Sugar Maple, Sassafras, and American Beech. In some places along the tributary, there were Tuliptrees and Slippery Elm growing. The understory is quite diverse with species such as Spiceburch, Bladdernut, Blackhaw Biburnum, Witch-Hazel, and Flowering Dogwood. Common herbaceous species are White Snakeroot, Farewell summer, Christmas Fern, Indian Pipes, Large Flowered Trillium, and many others. As in most disturbed situations there is substantial coverage of invasive species. Species present in this site include Multiflora Rose, Garlic Mustard, Common Privet, and Japanese Barberry. Some deer browsing of seedlings and understory species was noticed during the site visit.

Threats and Stresses: Threats to this site include the small size of the forested area, invasive species and to a lesser extent, deer browsing. The small size of the site affects the viability of the forest community and allows the second threat, invasive species, to gain a foothold in the area. The shade and well established soils and herb layers of large, mature forests tend to slow the distribution of exotic species.

Recommendations: To maintain the viability of this site, greater buffers are needed as well as full canopy conditions. Activities that promote additional fragmentation are not recommended. Efforts should be made to combat the invasive species already present and prevent new exotic species from colonizing. Deer population should be kept at a level compatible with the ecological integrity of the forest community.

Pulaski Township

Upper Coffee Run Biological Diversity Area

Significance: Notable

Location: Pulaski Township, North of Villa Maria Road

Description: Flat topography with low swampy depressions describes the headwaters of Coffee Run. The forest at the headwaters is mature although some disturbance and tree removal has recently occurred, especially in the understory. Common canopy species include Red Maple, Green Ash, Tuliptree, and Shagbark Hickory. The slopes support abundant Beech and Cucumber Trees, and the understory holds numerous species including Spicebush, Black Gum, Slippery Elm, and Sassafras. Herbaceous species such as Spotted Jewelweed, Snakeroot, Sensitive Fern, Halbeard-leaved Tearthumb, and intermediate Log Fern occupy the forest floor. Multiflora Rose grows in dense patches throughout the site. The eastern side of the BDA supports a seepage area containing **Stiff Cowbane** (Oxypolis rigidior) a plant species of special concern in PA. Associates include Cut-Leaf Grape Fern, Dark Green Bulrush, Yellow Fruit Sedge, Cottongrass Bulrush, and broad-leaved Cattail.

Threats and Stresses: The plant species of special concern relies on a constant source of groundwater seepage. The recharge zone contains a variety of land uses ranging from forestland to agriculture to scattered residences. Intense use of herbicides or fertilizer on the agricultural fields may add nutrients to surface and subsurface waters and negatively impact the seepage. Deer browsing and invasive species intrusion are the main threats for this BDA. A high amount of deer browsing was obvious in the forested areas of the site. The intense browsing was threatens the diversity of the community by limiting the reproduction of herbaceous and woody plants and preventing the recruitment of overstory species. Invasive species already pose a threat and given the disturbance already present they stand to become much more of a problem.

Recommendations: Working with the landowner to establish larger and better buffers and control invasive species would be a good first step in the protection of the area. The landowner is interested in protecting the site and understands its value. Activities that change the hydrology or add nutrients to the seepage need to be curtailed or carefully considered with respect to their impacts on the seepage. Deer populations need to be kept at a level compatible with the ecological health of the natural communities.

Maryvale Swamp Biological Diversity Area

Significance: Notable

Location: Pulaski Township, North of Upper Coffee Run BDA and South of 422

Description: A good and mature example of a **bottomland oak-hardwood Palustrine forest** with an interior buttonbush wetland les within this BDA. Both natural communities are considered wetland communities and saturated soils and seasonally standing water are typical of these areas. The community is minimally invaded by exotic species but Multiflora Rose is present on the drier uplands nearby to the wetland. Canopy species include Pin Oak, Red Maple, and Slippery Elm. The understory is composed of Black Gum. There is a dense shrub layer of Deerberry, Silky Dogwood, White Meadowsweet, and Arrow-wood. Black Willow grows in the center of the wetland with a surrounding "ring" of buttonbush. This section is a good example of a buttonbush wetland. Associated herbaceous species include Sensitive Fern and Eastern March Fern.

Threats and Stresses: The swamp community is confined to a small patch of hardwood forest surrounded by land cleared for a variety of uses. The viability of this community is comprised by small buffers and may be vulnerable given the condition of nearby land uses. Species such as Purple Loosestrife, Common Reed, and Multiflora Rose can thrive in these types of environments.

Recommendations: This community relies on groundwater discharge. Activities that could alter the hydrology of the wetlands by reducing quantity or quality of water, especially through the addition of nutrients or pollutants should be carefully considered. Direct disturbance such as draining and ditching should be avoided. The impact of salt-fortified runoff and spray from the adjacent roads would need to be evaluated to determine if steps are needed to reduce impacts. Allowing some of the adjacent land to revert to forest would provide a larger buffer which would enhance the viability of the community and help it fend off invasions of exotic species. Exotic invasive species, while not currently an issue within the wetland, needs to be monitored to prevent them from establishing and dominating the wetland.

Management Recommendations

Wildlife and Biodiversity

- Develop areas for wildlife viewing and education to raise awareness about the high biodiversity within the watershed.
- Develop stronger partnerships between organizations to discuss the threats to natural resources and develop protection strategies; this may include regular meetings with conservation groups.
- Educate citizens about biological diversity and the vital importance of habitats in protecting species.
- Improve aquatic life habitat for fish, mussels, and other organisms by implementing BMPs and other restoration activities.

Important Habitat Areas

- Develop a program or means through which landowners can obtain conservation easements for biologically diverse areas on their properties.
- Develop an incentive program to encourage and reward landowners who develop management plans, decrease development, and employ other conservation practices in and around riparian corridors and biologically diverse areas.
- Establish more private backyard conservation areas to serve as wildlife habitat and travel corridors by providing activities and programs for landowners.
- Identify and protect additional environmentally sensitive areas and areas of high biodiversity.
- Preserve natural habitats using smart land-use planning strategies that set aside open space for wildlife corridors.
- Protect wetland habitats for birds and wildlife by limiting development, storm runoff, and other disturbances in wetland areas and buffers surrounding them.

Riparian Areas

- Encourage streamside property owners to leave a minimum 15-foot buffer from the edge of the stream when mowing their lawn.
- Increase habitat by planting riparian buffers or allowing them to grow back through streambank fencing programs.
- Promote the preservation of riparian areas through education about their benefits for wildlife, flood prevention, and groundwater supplies.

County Natural Heritage Inventories

- Develop a land steward program for Biological Diversity Areas through which volunteers would be responsible for regular monitoring of these areas and educating landowners.
- Develop more detailed management plans by working with landowners of biologically diverse areas, including inventories of natural features and invasive or exotic species monitoring plans for the properties.
- Educate the public about the use and purpose of County Natural Heritage Inventories in planning, with an additional focus on understanding the importance of the natural resources that exist.
- Incorporate County Natural Heritage Inventories into municipal plans.
- Study and expand areas to be included in natural heritage inventories as Biological Diversity Areas.

Rare, Threatened, or Endangered Species

- Develop monitoring strategies and management plans for species of concern that are particularly vulnerable to habitat destruction by working with the Pennsylvania Natural Heritage Program.
- Protect habitats that support threatened and endangered species and species of concern through acquisition, easements, and/or landowner education.

Invasive Species

- Compile an Internet database of exotic and invasive species sightings within the watershed that can be accessed and added to by the public.
- Conduct a watershed-wide invasive species plant survey by sub-watershed to develop a list of areas where invasive species pose the greatest threats to biodiversity.
- Develop an eradication strategy for removing invasive species, especially from high-quality areas or areas where an invasive species is expanding its territory.
- Develop monitoring plans for invasive species on private properties by working with landowners, especially those whose properties contain high-quality natural communities.

Native and Sensitive Plants

- Encourage the use of native plants in landscaping and wildlife habitat plantings.
- Promote native tree plantings in stream-bank fencing projects.

Wetlands/ Swamps

- Conserving wetlands, swamps, and riparian buffers on agricultural lands and within developed areas is essential to maintaining good water quality throughout a watershed.
- Encourage farmers and local businesses to conserve or recreate these types of areas on their property.

Other

- Provide educational programs for municipal officials about land-use planning that incorporates conservation goals to make communities more attractive and protects biodiversity.

CHAPTER 5: CULTURAL RESOURCES

Recreation

The Mahoning River watershed is fortunate to have numerous recreational amenities. Several parks exist in the watershed. Fishing, boating, hunting, camping, bicycling, hiking, camping, golfing, bird watching and swimming are common recreational activities.

Table 5-1. Mahoning River Watershed Amenities

Park or Recreational Facility	Amenities	Municipality
Bessemer Lake Park	Fishing, boating, parking, boat ramp	Bessemer
The "CYO" Field	Baseball field, parking	Bessemer
The Pump House	Playground, basketball court	Bessemer
Mahoning River Water Trail	Canoeing, kayaking	Mahoning, New Castle North Beaver, and Union
Scenic Byway Bike Lane	Bicycling	Mahoning, New Castle, North Beaver
Mahoning Township Park	Pavilion, playground, pool, baseball field	Mahoning
Mohawk Trails Golf Course	18 hole public golf course	Mahoning
Mahoning Sportsmen's Association	Hunting, fishing, camping, shooting range, walking trails	Mahoning
Stavich Bike Trail	Bicycling, walking trail	Mahoning and Union
Clayton Street Playground	Basketball court, playground	New Castle
North Beaver Park	Playground, shelter, picnic area, walking trails	North Beaver

Parks

Several municipal and community parks exist within the watershed, and they are shown in Table 5-1 & Figure 5-1. Two parks in the watershed are Bessemer Lake Park and the Mahoning Township Park.

Bessemer Lake Park, which is 28 acres in size, is located in Mahoning Township and is managed by the Pennsylvania Fish and Boat Commission (PFBC) for recreational purposes. The main recreational uses of the lake are fishing and boating. PFBC stocks the lake with trout, and the lake is designated as an Approved Waters Open to Year-Round Fishing. Shore fishing is permitted ("Pennsylvania Lakes - Bessemer Lake.").

Boating is limited to boats powered by electric motors and un-powered boats. There is one (1) launch ramp and a small parking area. To be used at the lake, boats must be registered or have a valid launch permit ("Pennsylvania Lakes - Bessemer Lake.").

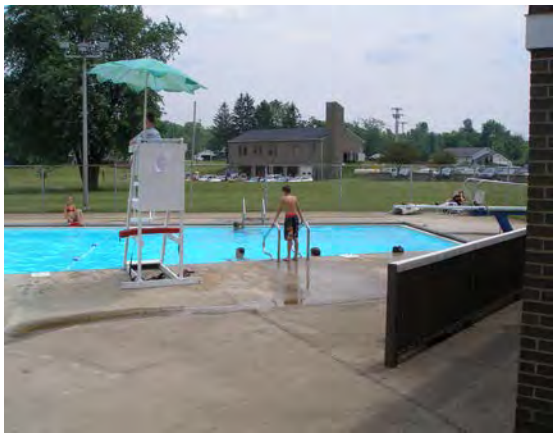
PFBC has taken initiative in taking care of the natural wildlife of the lake. They have constructed several habitats to encourage wildlife growth such as porcupine cribs, turtle basking platforms, and nesting structures for fish. They also have cleared felled shoreline trees and are planning on constructing several more sites to encourage wildlife growth and diversity.

Mahoning Township Park, which is 40 acres in size, is located in Mahoning Township. The park has several amenities including a pavilion available for rent, a playground, a pool, and a baseball field. The property is owned and operated by Mahoning Township.

Mahoning Township has recently renovated the baseball field by constructing a batting cage, painting old fencing, installing new bases, among other work on the field. Mahoning Township Park is the largest municipal park in the watershed.

The baseball field is dedicated to Henry Pezzuolo for his many years of dedication to baseball. He spent more than 40 years coaching baseball in the township, amassing more than 300 wins. He was a Mahoning Township Supervisor from 1984 to 1989.

Mahoning Township Park entrance.



Mahoning Township Park pool.

Trails

A link between communities, trails provide alternative transportation, recreation, and educational opportunities. Trails are used for a variety of activities including hiking, bicycling, cultural and historic cultivation, and environmental education. The Mahoning River watershed has three (3) recreational trails. The three trails are Stavich Bike Trail, PA Bike Route "V," and the Scenic Byway Bike Lane.

Converting abandoned and unused rail corridors into public trails began in the 1960s. Once rail lines were removed, people began utilizing the corridors to walk, socialize, and explore. In 1965, a movement promoting conservation ethics and healthy lifestyles led to the development of the Rails-to-Trials program.

Stavich Bike Trail, which is approximately 10.5 miles (6.5 existing within Lawrence County), extends from Covert Road in Union Township to Struthers, Ohio by way of the Village of Lowellville, Ohio. The trail follows an old trolley track that parallels two (2) train tracks. The bike trail has benches, a restroom, and a picnic table.

In addition to being an asset to county residents, the Stavich Trail is a potential link to a vast planned trail system in Eastern Ohio. The Ohio Greenways initiative, completed in 2001, developed a state-wide map of existing and planned greenways and trails. This map serves as a foundation for state-wide greenways planning and advocacy in Ohio identifies the connection of a planned shared use path to the western end of the Stavich Bike Trial in Struthers, OH.

This connection will provide an essential link in the chain of trails stretching from Cleveland and other points in Northeastern Ohio into Pennsylvania. Using the Stavich Bike Trail, a connection is possible over the state line to New Castle, and further southward into Beaver County. The ultimate goal of this connection is the linkage of the Ohio Trails with the Great Allegheny Passage. This would create an uninterrupted bike route from Cleveland to Washington, D.C.

Figure 5-1
Parks & Recreational Facilities

Legend

- Limited Access Highways
- Major Roads
- Local Roads
- Major Streams
- Minor Streams
- Unamed Streams
- Watershed
- Municipalities
- Tax Parcels
- Parks and Recreation Facility
- Stavich Bike Trail
- PA Bike Route V
- Scenic Byway Bike Lane

Prepared by the
Lawrence County Planning Commission
February 2013
Allen Miller

0 0.5 1 2 3 Miles

N W E S

PULASKI TWP
MAHONING TWP
UNION TWP
BESSEMER BOR
NORTH BEAVER TWP
TAYLOR TWP
NEW CASTLE CITY

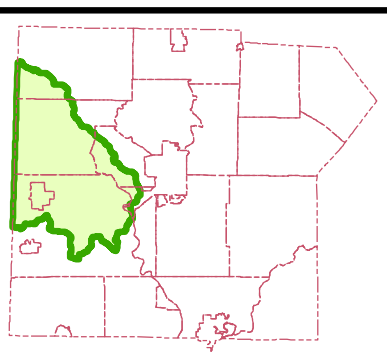
Villa Maria
Villa Maria Education & Spiritual Center
Robinson
Hillsville
Mahoning Twp Park
Hillsville School Playground
Mahoning Sportsman's Association
Bessemer Lake Park
Bessemer Lake (PA Fish & Boat Commission)
The "CYO" Field
Bessemer Elementary School
The "Pump House"
Mohawk Trails Golf Course
Mohawk Area School District Elementary, Junior and Senior High Schools
North Beaver Twp Park
Mt Jackson Elementary School
Mount Jackson
North Edinburg
Edinburg
Parkstown
Coverts
Clayton St Playground

Coffee Run
Hickory Creek
Marshall Run
Mahoning River
Shenango River
Beaver River
Sugar Creek
Edwards Run
Hickory Run

S STATE LINE RD
STATE LINE RD
VILLA MARIA RD
EVERGREEN RD
COFFEE RUN RD
AMBROSIA RD
MCBRIDE RD
HILLSVILLE RD
BAIRD RD
ERSKINE QUARRY RD
JACOBSON RD
GRAHAM RD
SKYHILL RD
N EDINBURG RD
HARBOR EDINBURG RD
E RIVER RD
W MAIN ST
W STATE ST
E MAIN ST
FORDING RD
W WASHINGTON ST
WINTER RD
ERIE ST
MCCLELLAND RD
MOHAWK SCHOOL RD
EDINBURG RD
COVERT RD
MILLER RD
KILDOO RD
CHURCHILL RD
N MAIN ST
HOFFMASTER RD
W POLAND RD
E POLAND RD
SWALLS FERRY RD
BREWSTER RD
CLELAND MILL RD
MOUNT JACKSON RD
SUNNYSIDE RD
WAMPUM RD
VANCE RD
CRUM RD
COLUMBIANA RD
MCCURLEY RD
WESTFIELD RD
MOUNT AIR RD
REED RD
PADEN RD
KYLE RD
GILMORE RD
MCKIM RD
NEW RD

224 422 208 551 108 317 376 18

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.



Stavich Bike Trail on a sunny day.

Beginning of Stavich Bike Trail in Pennsylvania.

Pennsylvania Bike Route V runs from the Ohio border west of Bessemer, Lawrence County east to the New Jersey border at the Delaware River in Portland, Northampton County. The route goes through the central part of the state and largely follows the Interstate 80 corridor throughout the state.

Pennsylvania bike routes were designed by experienced bicyclists to provide bicycling members of the traveling public who wish to traverse the state with a guide to some of the Commonwealth's highways and rail-trails. Few of these routes contain bike lanes or other facilities designed specifically for bicyclists travelling within the four corners of the Commonwealth.

Each bicyclist is responsible for his or her personal safety and welfare and for remaining alert and mindful of conditions on the roads or trails. Bicycle PA users are expected to be licensed drivers or persons at least sixteen (16) years of age who have several years of road bicycling experience ("ExplorePATrails.com.").

Scenic Byway Bike Lane (Segment J), which is 59 miles (55 in Lawrence County), is an on-road bike lane that follows the Scenic Byway driving route. The Scenic Byway driving route is a broad circle through most parts of Lawrence County. The route provides long-distance bicyclists the opportunity to visit the Amish countryside and many of the quaint villages in Lawrence County's countryside.

The bike lane is marked and signed, and guides bicyclists and motorists alike to points of historic, cultural, recreational, and scenic points of interest along the route. The bike lane may continue into Butler County in the future.

Hunting

There are no State Game Lands, Wildlife Areas, or State Forests within the watershed. However, hunting is possible at the Mahoning Sportsmen's Association and is permitted on private land, with landowner permission. In addition, there are 235,276 acres of farmland open to hunting through cooperative farmland and safety zone programs in Mercer, Lawrence, and Crawford counties.

In 1936, the Cooperative Farmland Program was established to protect farmland property from acts of vandalism and to increase hunting opportunities. It provides landowners with advice and incentives to conserve soil, increase wildlife habitats, and incorporate other profitable practices. There are two programs: the safety zone program and the farmland program. The safety zone program involves individual landowners, with a minimum of 50 acres, opening their land for public hunting. The farmland program is several safety zone locations blocked together. Having property in the farmland program provides better incentives for the landowners. In Mercer, Lawrence, and Crawford counties, there are 404 safety zones. There are also 13 areas, involving 2,006 landowners, enrolled in the farmland program (Western Pennsylvania Conservancy and DCNR).

The Mahoning Sportsmen's Association, which currently has roughly 2,000 members, owns approximately 700 acres of land and leases an additional 1,300 acres, for a total of 2,000 acres of recovering strip mines land. Their land includes four (4) lakes, and several smaller ponds for fishing and boating. Other sporting activities include two professional trap houses, a rifle range with sheltered bench rests, a short range for hand gunners and youths, and a walk through, straw target archery course. After hunting season ends, the outdoor activities continue with sled riding. Camping and swimming is permitted in the main lake, Crystal, as well. There are also miles and miles of trails available to hike on the property.

Covered rifle shooting area.


Children learning archery.

Fishing

The Mahoning River watershed provides ample fishing opportunities for a variety of species. Hickory Run is an Approved Trout Stream and trout is regularly stocked in the lake by the PA Fish and Boat Commission and Bessemer Lake is as well.

Bessemer Lake is in the Approved Trout Waters Open to Year-round Fishing program, meaning that fishing for trout is allowed year-round, but they cannot be kept between March 1st and the opening day of trout season. A trout stamp is not needed to fish at Bessemer Lake unless trout are kept. ("Pennsylvania Lakes - Bessemer Lake.").

Fishing licenses are required in order to fish on all bodies of water in Lawrence County except strip mine bodies of water in possession of Sportsmen's clubs or private ponds. Fishing licenses can be obtained through the Pennsylvania Fish and Boat Commission (PFBC).

The Mahoning River is also frequently fished for recreational purposes, along with many of the other streams in the watershed. Fishing has greatly improved in recent years, with many more people fishing in the watershed for recreational purposes. While those that do fish on the Mahoning River do not eat the fish for fear of pollution, the water quality has seen improvement, and with that the fishing. PFBC is planning to test water sampling in 2013 with the possibility of stocking the river in the future. PFBC has said that more fish are colonizing in the Mahoning River, showing progress from a habitat health standpoint. Hickory Run and Bessemer Lake are the current bodies of water in both Lawrence County and the Mahoning River watershed that are stocked with trout by the PFBC.

Boating

There are ample opportunities for boating within the watershed. Canoeing and kayaking are the two favorite types of boating on the Mahoning River, while boating is common on Bessemer Lake and in the Mahoning Sportsmen's Association. Portions of Hickory Run may be navigable as well.

The Mahoning River Water Trail (Segment G), is approximately 10.5 miles in length and offers canoe and kayak access at several points in the western portion of the county, and extends upstream into Ohio. This trail also meets the Shenango/Beaver River Water Trail at the confluence of the Mahoning and Shenango Rivers in the extreme southwestern corner of the City of New Castle. Canoeists and kayakers are able to paddle between Mercer, Lawrence, and Beaver Counties in Pennsylvania and across the state line into Ohio (Pashek Associates).

Camping

There is only one campground in the Mahoning River watershed, and it is located at the Mahoning Sportsmen's Association (MSA) in Mahoning Township. Camping outside of the designated campgrounds is allowed at the MSA on the first weekend of Pennsylvania's trout season. Permission to set up a camp site on other areas of the club's property must be obtained by one of the land managers.

Golfing

There is one golf course in the Mahoning River Watershed. Mohawk Trails Golf Course is located in Mahoning Township and is an 18 hole public golf course. It offers over 6,000 yards of golf for a par of 72. The course was designed by the Eichenlaub family and opened in 1965.

Mohawk Trails Golf Course is open from March 1st, weather permitting, until December 31st, weather permitting. It also has a putting green, banquet facilities, snack bar, and a lounge.

Mohawk Trails Golf Course entrance.

Environmental Education

Environmental education was born when the agricultural community began teaching conservation. The movement broadened to include land-use issues, preservation of natural resources, water quality improvements, and protection of native plants and animal species. Educating the public about important environmental challenges and developing knowledgeable citizens actively participating in addressing these challenges is critical to sustaining the balance between environmental and human activities.

Environmental education, as defined by the National Environmental Education Advisory Council (NEEAC), is a learning process that increases knowledge and awareness of the environment and associated challenges, develops skills and expertise to address these challenges, and fosters attitudes, motivation, and commitment to make informed decisions and take responsible actions (NEEAC 1996). Environmental education is relevant to ensuring the health and welfare of the watershed, protecting human health, advancing quality education, expanding employment opportunities, promoting sustainable development, and protecting our natural heritage (NEEAC 1996).

In January 2002, the Pennsylvania Department of Education (PDE) added environment and ecology academic standards to the educational standards required for high school graduation. Following these standards, students will become active participants in, and problem solvers for, real issues that affect their communities, families, and schools. These standards will establish essential elements that students will need to know to help them understand decision-making processes, problem-solving skills, and the art of compromise.

With the rapid changes in our environment, the education of stakeholders is an ongoing process. There are several organizations and agencies that provide environmental education to landowners, students, and other stakeholders in the Mahoning River watershed.

The **PGC** provides a variety of education programs. Project Wild is training for educators about the environment, the outdoors, and their interactions. This program is designed to assist educators of grades K-12. It evaluates the activities and cross-references them with the PDE environmental standards. Wildlife Conservation Officers provide education programs in the schools. The programs are designed to be appropriate for each grade level. PA Song Birds is a program that is co-sponsored by the PGC, DCNR, and the Audubon Society. Similar to Project Wild, the PA Song Birds program provides teacher workshops and lesson plans for educators. In addition to the educator workshops and education presentations, PGC has reference materials available to all educators.

The **PFBC** provides several workshops for educators, including the Keystone Aquatic Resource Education (KARE) Teacher Workshop, and the Pennsylvania Amphibian and Reptile Educator workshop. These workshops provide educators with curricula to meet the environmental standards required by PDE. PFBC has numerous educational videos, brochures, and fact sheets available for students and instructors/educators about a variety of topics.

The **DCNR** provides a variety of education programs through its different divisions. The Bureau of Forestry is a leader in educating people about forestry and native wild plant conservation and management. Audiences include school-aged children, educators, organizations, local governments, private landowners, consulting foresters, industry, and the general public. The office of Wild Resource Conservation produces a variety of education materials including posters, activity books, and videos for the state's conservation agencies, PDE, and conservation groups. More information about the resources available through the Wild Resource Conservation office can be found in Appendix ____ (Pennsylvania Department of Conservation and Natural Resources). Other watershed education programs are offered through the DCNR. These programs provide school-aged children field learning experiences through hands-on activities (Table 5-2).

Table 5-2. Watershed Education Programs Offered by DCNR	
Program	**Program Description**
Watershed Tour	Students explore their own watershed by traveling on a bus, taking a hike, or through an audiovisual program. They identify clues relating to the culture and history of the area, uses of local streams and rivers, and impacts on the watershed.
Adopt-A-Stream	Students discover the fascinating world of stream ecology and monitor the impacts of natural and human activities taking place within their watershed. Students learn to measure physical, chemical, and biological parameters in their local stream.
Network with Other Schools	Students use the Internet to share data, discoveries, experiences, and ideas with other participating schools.
Interacting with the Community	Through research networkin, and stewardship projects, students become active community members.

Villa Maria, the Motherhouse of the Sisters of Humility of Mary, offers youth programs, farm-based environmental programs that provide hands-on learning that fosters an ethic of care for Earth, and Eco-Spirituality classes for people of all ages, cultures, and religions that provide information on experiential activities rooted in the physical health of all creation.

Boy Scouts and **Girl Scouts** have been participating in conservation projects since their beginnings in 1910 and 1912, respectively. The Boy Scouts of America offer 23 different ecology and conservation merit badges. The Cub Scout program has environmental components required to advance their rank. The Girl Scouts of America work on educating girls about the environment with numerous conservation projects and badges that can be earned.

Archaeological and Historical References

Historical Overview

Glacial movements across northwestern Pennsylvania changed the landscape of the Mahoning River watershed. Ice movements gouged out hills, filled in valleys, and left the contours of the land level.

Early Settlers

The first inhabitants of this area were American Indians called Monongahelas or Mound Builders, who for unknown ages occupied the soil and followed the wild and untamed pursuits of barbarian life – the chase and the war path. They lived in the area from about 500 B.C. to 1650 A.D. Although the reason for their departure is unknown, there is speculation that war, disease, encroachment, or the gradual breakdown of their society could be the reason.

In 1681, the Lenne Lenape, or Delaware Indians, inhabited the land when Europeans arrived in the area. In 1742, after losing their land to white settlers, they relocated to western Pennsylvania and Ohio.

As early as the 1720s, Delaware Indians began moving into the region from eastern Pennsylvania. According to a journal entry of Christian Frederick Post in 1748, Kuskuskies, an important Indian center, was located at the delta of the Mahoning and Shenango Rivers. Inhabited first by the Senecas and preceding the arrival of the Delawares, Kuskuskies was abandoned during the revolutionary war.

Agriculture

The early white settlers were primarily agriculturalists, providing for the needs of their families. Early farmlands were covered with trees and brush that required removal before farming could take place. The ground was crudely plowed among dead trees and harrowed by dragging a tree with projecting branches over it. Grain was cut by a sickle and threshed with a flail. Corn was shelled by hand.

With many streams to provide waterpower, gristmills for grinding grain were in operation around the 1800s. Farming gradually changed from subsistence to commercial agriculture. Inventions such as mechanical planters, thresh machines, and steam engines enabled agricultural production to develop with growing domestic markets.

After World War II, farming was further revolutionized with the development of modern farming machinery, increased acreage of farmlands, specialization, and scientific advances. Most farmers specialized in one type of operation: dairying; beef, poultry, or hog production; or fruit or crop production. Scientific advances improved the quality and quantity of production or yield.

Industrial

The first industries established within the watershed were along streams and within close proximity to raw materials and other natural resources. A key factor inhibiting the expansion of early industries was the limitations of transportation. Transportation was slow and expensive.

After the establishment of gristmills, sawmills were developed throughout the region. Sawmills were used to reduce logs to boards for easier construction and better furniture. As the population grew, forests were cut down and some wildlife species were eliminated.

The iron and steel industry had a major impact on the growth of the eastern portion of the watershed. Forges and iron furnaces developed throughout, bringing prosperity and economic development to the local villages in which they were located. As transportation evolved, smaller facilities were abandoned and large consolidated operations were established.

In October 1893, a large tin plate manufacturing company was opened after the McKinley Tariff Act of 1892 placed a tax on importing tin plates. New Castle became known as the "Tin Plate Capital of the World."

Transportation

As settlers moved into new lands and established new communities, transportation was needed. One of the early methods of transportation used 12-foot canoes. Settlers were able to transport merchandise as they paddled up and down the rivers.

Another method of early transportation was the use of primitive trails developed by Native Americans. These trails were often narrow, worn, and usually followed streams. Settlers traveled these trails by foot and horseback. They also used these trails for the transportation of merchandise on packhorses.

Simple roads stretched between early settlements. Before the invention of the automobile, roads and streets were primarily dirt. The roads became well-packed from usage, but were dusty or muddy, depending on weather conditions. Once the automobile was invented, roads in towns were often paved using bricks. Outside of towns, the roads were unpaved and farmers were the primary users of those roads.

It was not until 1805 that a state system of roads was developed. Existing local roads were used before any new roads were constructed. In 1802, Congress authorized a national highway, which by 181 ran from Baltimore, Maryland to Wheeling, West Virginia. Shortly after, lateral roads were developed, connecting rural areas.

In 1825, the Erie Canal was completed. It was the first transportation revolution that changed this region. Materials were now sent to villages through the use of the canals. Once the Erie Canal was completed it set off a wave of canal building.

In 1834, the Pennsylvania Canal connected Philadelphia with Pittsburgh and the Ohio River. The Beaver Division, a portion of the Erie Extension of the Pennsylvania Canal, also opened in 1834. This section traversed over 30 miles from Beaver to the Western Reserve Harbor, a point six miles north of New Castle on the Shenango River. In 1848, the Erie Extension was completed from New Castle to Erie.

In 1833, after the Beaver Division Canal reached New Castle, work began on the Pennsylvania and Ohio Canal, known locally as the "Cross Cut," which was located near the Mahoning River. A canal bridge was used to carry canal traffic across the Shenango River between the Beaver Division and Cross Cut Canals.

Canals were the major method of transportation until the introduction of the railroad in the 1860s. The railroad again changed the way people did business. They connected an increasing number of communities, providing transportation for materials and passengers.

New Castle became a railway center, eventually being serviced by all the major carriers. Approximately 70 to 80 passenger freight carriers arrived and departed daily.

After World War II, freight hauling by train decreased. Larger and more powerful tractor-trailers and improved roadways drew much of the freight business. The new highway system, more comfortable automobiles, and air travel decreased the need for passenger rail service.

Postal Delivery

As early as 1801, horsemen delivered mail weekly, stopping at county seats between Pittsburgh and Erie. Post offices were established quickly in the region. There are currently four (4) post offices in the watershed.

Origin of Names

Mahoning is named for an Indian word meaning "salt lick." A salt lick, or mineral lick, is a natural mineral deposit where animals in nutrient-poor ecosystems can obtain essential mineral nutrients.

Historical Notes, Sites, Structures, and Districts

In 1966, the National Historic Preservation Act established the National Register of Historic Places. The Pennsylvania Historical and Museum Commission (PHMC) manages the register for Pennsylvania, as does

the Ohio Historical Society for Ohio. Listed properties include districts, sites, buildings, structures, and other objects significant to American history, architecture, archaeology, engineering, and culture. A listing in the register contributes to the preservation of properties but does not interfere with the property owner's rights. Within the Mahoning River watershed in Lawrence County there is one (1) site on the national register.

McClelland Homestead, a historic farm, is located along McClelland Road northeast of Bessemer. The farm includes a multitude of buildings that were constructed in the middle of the 19th century.

William McClelland purchased the property in North Beaver Township in 1807 and operated it successfully. His son, Joseph McClelland, gave up ownership of the property in 1895, but the farm remained in the McClelland family at least into the 1980s. It was roughly 89 acres in 1989.

Joseph McClelland's two-story farmhouse was erected in the 1840s. Its foundation is stone, the walls are brick, topped with corbelling and rising to gables, and the roof is covered with slates and is an amazing example of Federal style architecture (Donnelly, Lu). The leading architectural feature of the house is a grand Palladian window above the main entrance.

The barn is a two-story frame structure built to shelter both plant products and livestock. Stalls are in place on the ground floor that can hold more than thirty cattle (Donnelly, Lu). The surprisingly well-preserved original construction is its most historically important aspect.

The McClelland Homestead.

The Pennsylvania Historical Marker Program, administered by the Pennsylvania Historical and Museum Commission since 1946, places historical markers to capture the memory of people places and events that have affected the lives of Pennsylvanians over the centuries since William Penn founded his Commonwealth. More than 2,000 cast aluminum markers tell the stories of Native Americans and settlers, government, and politics, athletes, entertainers, artists, struggles for freedom and equality, factories and businesses, and a multitude of other topics. There are currently five (5) of these locations within the Mahoning River watershed in Lawrence County. Map 5-2 shows both the national and state sites that are in the Mahoning River watershed in Lawrence County, and table 5-3 discusses each state marker.

Table 5-3. Pennsylvania Historical Marker Program		
Marker Title	**Dedication Date**	**Marker Text and Municipality**
Ira D. Sankey	Friday, March 19, 1948	Famous singing evangelist, fellow worker with Dwight L. Moody in Europe and America, was born Aug. 28, 1840, at Edinburg, in a house since removed. He died in Brooklyn, New York, on Aug. 13, 1908. (Mahoning)
Kuskuskies Towns	Friday, March 19, 1948	Of this group of towns, the last one occupied by the Indians stood near here in 1785, when Gen. Wm. Irvine toured the Donation Lands just before their division into tracts given to Revolutionary soldiers. (Mahoning)
Kuskuskies Towns	Friday, March 19, 1948	Important group of Indian towns on and near site of present New Castle. First inhabited by Senecas; but after 1756 settled chiefly by Delawares from eastern Pennsylvania. Abandoned during Revolutionary War. (New Castle)
C. Frederick Post	Thursday, August 01, 1968	Sent by Provincial officials to draw Indian friendship away from the French, the Moravian missionary held councils at Kuskuskies Towns, August to November, 1758. His work, and the threat of Gen. Forbes' army, forced the French to leave present-day Pittsburgh on November 24, 1758. (New Castle)
Cross-Cut Canal	Friday, March 19, 1948	The Pennsylvania and Ohio Canal, in use 1838-1872. Chartered by both states, 1827. Joined Beaver Canal just below New Castle, linking Pittsburgh with Youngstown and Cleveland. Followed Mahoning River on line of present railroad. (Mahoning)

Management Recommendations

Environmental Education

- Educate developers, planners, and municipal officials about environmentally friendly and sustainable development.
- Secure local, state, federal, and private funding to provide environmental education to municipal officials, watershed residents, businesses, and school-aged children about the importance of watershed protection, watershed issues such as trash dumping and agricultural related runoff, and the value of natural resources.
- Utilize and develop the Mahoning River as an ecological and education center that can be used in order to explain the effects that both point and non-point pollution can have on a habitat.

Historic Preservation

- Establish driving, walking, and/or biking tours that highlight historical sites in the watershed and structures to increase awareness of historical sites, structures, and history of the area.
- Partner with county historical society to preserve existing historical sites and structures in the Mahoning River watershed.
- Work with the Pennsylvania Historic Museum Commission, individuals, and agencies to determine if local historical sites and/or structures could be added to the National Register or the State Marker Program.

Marketing Recreation

- Identify local, state, federal, and private funding to promote ecotourism.
- Promote tourism utilizing available natural and recreational resources such as the Stavich Bike Trail.
- Utilize river resources for recreation opportunities by gathering local, state, federal, and private funding for Mahoning River clearing/cleanup.

Recreational Opportunities

- Develop public access sites to the Mahoning River and some of its tributaries, including adequate parking and amenities.
- Enhance existing community parks with updated equipment.
- Enhance recreational facilities to be multi-use facilities providing a variety of activities and amenities.
- Establish year-round recreational opportunities.
- Identify and protect areas open to hunting.
- Increase local, state, federal, and private funding for establishing and maintaining multi-use parks, providing access to waterways, maintaining open space and maintaining area fishing hot spots.
- Encourage landowners to allow hunting on their properties and educate hunters about the importance of land etiquette.
- Protect and improve area waterways to maintain area fishing hot spots.
- Work with private landowners to provide access to waterways for anglers and small non-powered watercraft.

Trails

- Conduct feasibility studies for the development of recreational areas and trails for off-road vehicles as they currently do not have an all-terrain vehicle (ATV) trail in the Mahoning River watershed.
- Convert abandoned rail lines into multi-use trails.
- Develop additional trailheads on existing trails.
- Educate ATV riders to recreate in an environmentally sound way and the importance of land etiquette.
- Establish a network of multi-use trails by connecting existing and new trails together.

- Establish environmentally sound public trails or parks for ATVs.
- Establish a water trail on Hickory Run.
- Increase local, state, federal, and private funding for trail maintenance and development.
- Increase safety for trails along roadways by erecting signs alerting motorists to trails and trail crossings, and offering trail safety seminars to trail users.
- Maintain trail paths, whether water or land, and keep free of debris for the safety of those utilizing the resources available.

Figure 5-2
Historic Locations

Legend

- Municipalities
- Tax Parcels
- Watershed
- Major Streams
- Minor Streams
- Unamed Streams
- Limited Access Highways
- Major Roads
- Local Roads
- National Register of Historic Places
- Pennsylvania Historical Marker Program

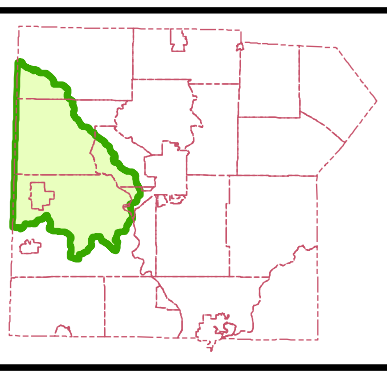
Prepared by the
Lawrence County Planning Commission
February 2013
Allen Miller

0 0.5 1 2 3 Miles

N W E S

208 422 S STATE LINE RD Coffee Run VILLA MARIA RD Villa Maria PULASKI TWP EVERGREEN RD COFFEE RUN RD AMBROSIA RD 422 MCBRIDE RD HILLSVILLE RD Marshall Run BAIRD RD ERSKINE QUARRY RD JACOBSON RD GRAHAM RD SKYHILL RD N EDINBURG RD HARBOR EDINBURG RD 551 Shenango River 224 MAHONING TWP E RIVER RD Mahoning River Robinson W MAIN ST Hillsville STATE LINE RD W STATE ST Kuskuskies Town North Edinburg Cross Cut Canal Edinburg Ira D. Sankey FORDING RD Parkstown 224 UNION TWP W WASHINGTON ST E MAIN ST CHURCHILL RD MOHAWK SCHOOL RD McClelland Homestead MCCLELLAND RD ERIE ST 376 Coverts WINTER RD W WASHINGTON ST MILLER RD EDINBURG RD COVERT RD KILDOO RD NEW CASTLE CITY Hickory Creek N MAIN ST HOFFMASTER RD W POLAND RD E POLAND RD 317 MOHAWK SCHOOL RD BESSEMER BOR SMALLS FERRY RD BREWSTER RD 422 MOUNT JACKSON RD TAYLOR TWP C. Frederick Post NORTH BEAVER TWP 108 CLELAND MILL RD SUNNYSIDE RD WAMPUM RD Hickory Run Mount Jackson CRUM RD S MAIN ST COLUMBIANA RD VANCE RD 18 COLUMBIANA RD MOUNT JACKSON RD MCCURLEY RD WESTFIELD RD MOUNT AIR RD REED RD KYLE RD PADEN RD 376 108 551 GILMORE RD GILMORE RD Beaver River MOUNT AIR RD Sugar Creek MCKIM RD NEW RD Edwards Run

Property lines as depicted on this map are for visual reference only and are not to be utiliized in lieu of an actual survey.



CHAPTER 6: ISSUES AND CONCERNS

Several methods were used to identify issues and concerns of watershed stakeholders. The Lawrence County Planning Department and Steering Committee hosted a public meeting, mailed citizen, municipal, and school district surveys, and conducted key person interviews to gather information from watershed residents. The information gathered was used to identify these issues and concerns and are not the opinions of the Lawrence County Planning Department or the Steering Committee.

The surveys were anonymous and the results identified how stakeholders use and perceive the watershed. Key stakeholders, identified by the steering committee, were interviewed for their opinions about watershed matters. This information was used to help determine the management recommendations, which can be found in Chapter 7.

Meeting Summary

Initial Meeting

In November 2012, an introductory public meeting was held at the Mahoning Township municipal building. During this meeting, the Mahoning River Watershed Conservation Plan was introduced to those in attendance as well as background information about watershed conservation planning. Attendees identified key issues in the watershed such as obstructions in the Mahoning River, dumping, the potential for canoe and kayaking growth and the need for a boat launch on the Mahoning River/in the watershed.

Issues and Concerns

Many issues and concerns that were brought to light by the watershed community are interconnected and cannot be addressed separately. Projects should be designed to resolve the issues collectively whenever possible. The issues identified by watershed stakeholders are summarized in the following sections.

Water Quality

A goal of stakeholders is having clean and vibrant waterways. Resolving drinking water taste and odor issues, sanitary sewage overflows, stormwater, and the potential impact of unconventional gas wells on drinking water are priorities in the watershed. Working with the agricultural community to implement best management practices to help control sedimentation, erosion, and excess nutrient runoff is important to watershed stakeholders as well.

Taste and Odor Issues

Watershed residents in portions of the watershed complained of odors in their drinking water. During certain times of the year the extremely high biological activity results in the production of chemical compounds known as Geosmin and Methylisoborneol (MIB). Depending on seasonal weather conditions, the problem can be severe and persist for several months. Public water suppliers cannot adequately address the problem. Although the water is safe to drink and meets drinking water regulations, consumers find the water objectionable. Collaboration with water suppliers to detect and correct the problem is needed.

Taste and odor issues have also been blamed on the recent influx of unconventional gas wells in Lawrence County. While drinking water is tested before and after wells are put in, citizens are greatly concerned about the potential impact an oil and gas well can have on their drinking water.

Abandoned Mine Drainage

Abandoned mine drainage (AMD) entering a stream adversely affects aquatic life and water use. AMD is formed through a series of complex chemical reactions, which usually pollute the water with high levels of

dissolved metals and acid. Acid waters can appear clean and clear while being severely toxic to aquatic organisms and plant life. Often, impaired streams are stained orange from high levels of iron. Upon entering a stream, metals deposit on the stream bottom and severely degrade the habitat of aquatic organisms. Installing treatment systems for major abandoned mine discharges allows the water to be treated before entering the streams.

Septic and Sewage

The development of adequate wastewater treatment is needed throughout the watershed. Malfunctioning and absent septic systems allow nutrients and bacteria to enter the water causing contamination of streams and groundwater. This contamination can lead to potential health hazards. Within the watershed, there are many private land owners that complain about the current septic situation in their respective municipalities. Working with landowners to repair or install properly designed and functioning on-lot septic systems, or community sewage systems, is needed. Educating property owners on the adverse effects of faulty septic and sewage systems is the first step.

In residential areas, homes are connected to wastewater treatment plans that treat sewage waste. Sewage is pumped into these plants where it goes through a three-step process to remove sewage waste and treat the water. Once the treatment is complete, the water is released back into a nearby waterway. Older wastewater treatment systems were designed to collect wastewater and stormwater. When large storm events occur and cause these systems to exceed capacity, combined sewage overflows allow nutrients and bacteria to contaminate waterways. Designing wastewater treatment systems to adequately serve communities is needed. Separating stormwater from wastewater systems can ease the amount of combined sewage overflows occurring within the watershed.

Stormwater Management

Stormwater management involvers planning for surface runoff into stream and river systems during rain or snowmelt events. Problems with stormwater occur when there is a large amount of impervious surface, such as driveways, roads, and parking lots. Surface runoff during storm events can cause excess sediment and pollutants to enter the streams. Flooding can also occur during storm events due to old stormwater systems that cannot handle large amounts of runoff. The development of a stormwater management plan is needed for the watershed, especially in urbanized areas such as Bessemer, New Castle, Hillsville, and Mount Jackson.

Erosion and Sedimentation

Erosion and sedimentation are important issues within the watershed. Erosion can result from a number of land-use practices, including construction activities, poor agricultural practices, and poor logging techniques. Soils lacking vegetation are susceptible to extensive erosion, allowing large amounts of silt to enter the stream, especially during storm events. Erosion occurs on streambanks where little or no vegetation is present because there are no roots to hold the soil in place. On streambanks lacking vegetation, native species of plans could be grown to limit the amount of erosion and sedimentation in the streams and protect streambanks.

Agricultural Runoff

Agriculture is one of the primary land uses within the watershed. Working with the agricultural community to control runoff and stabilize streambanks would be beneficial to the watershed. Educating the agricultural community to understand that the implementation of the best management practices is not only beneficial to the environment, but also to farmers, is critical. Streambank fencing, for example, removes cows from the stream, resulting in re-established vegetation, stabilized streambanks, a reduction in soil erosion and sedimentation, and improved water quality. This also increases the health of the herd, resulting in a financial gain for farmers.

All-Terrain Vehicles (ATVs)

One of the most controversial issues within the watershed is the use of ATVs. ATVs are one of the causes of soil erosion within the watershed. Drivers typically ride on areas of steep slopes, or streambeds, ripping up vegetation and allowing additional sediment to enter the streams. Enforcement of current regulations

and the strengthening of these regulations are needed within the watershed. Keeping ATVs off of private lands and unauthorized trails is difficult with the increased interest in ATVs. Establishing more designated areas for ATVs could potentially eliminate some of the problems as there are currently no ATV dedicated areas in the watershed. Proper design of ATV trails helps control erosion and sedimentation.

Waste Cleanup

Illegal Dumping

A number of illegal dumps presently impact the watershed. In addition to being unsightly, they also pose direct threats to the watershed and have a high potential to contaminate the water. Waste containing hazardous materials soaked by rainfall may cause contaminants to leach through the soil or run off the land surface, contaminating ground or surface water. Trash and debris can directly enter the stream by way of floods or heavy rainstorms, affecting the water quality and stream aesthetics. Debris can collect in the stream, having a clogging effect, raising water levels, and causing flooding.

Finding and cleaning up these dumps is a very important issue for the community living in the watershed. A reduction of the number of illegal dumpsites can occur through cleanups, education, and alternate disposal methods. Active participation by watershed residents and local government officials is needed to address illegal dumping issues. In addition, educating the public about the threats of illegal dumping is an important step in battling against the problem.

Old Industrial Sites

Old industrial sites are areas that could be marketed for redevelopment. Some of the old industrial sites can be classified as brownfield sites. These are sites that were contaminated from past industrial uses, and often left vacant. This is an important planning issue because the amount of remediation needed at a particular site is examined when the redevelopment of a brownfield site is considered. In most cases, incentives and cleanups are required before industries consider redeveloping old sites. In order to clean up these sites, funding is needed. Placement on the Superfund list is one possible way to acquire financial resources to make the cleanup possible. Once the areas are cleaned up, new industries may be attracted to the area, bringing jobs. Brownfield redevelopment is an important concept, because it also helps to reduce sprawl development through the reuse of industrial sites. Funding to restore brownfield sites is available from the U.S. Department of Interior's Office of Surface Mining (OSM), the Environmental Protection Agency (U.S. EPA), and the Pennsylvania Department of Environmental Protection (PA DEP).

Even though refuse piles and abandoned mines fit the popular definition of brownfields, they do not fall under the state's policy. Refuse piles and abandoned mines lack the infrastructure needed for redevelopment. US EPA and OSM have begun to consider them as "greyfields." The benefits of greyfield redevelopment closely parallel those associated with brownfields.

Public Awareness and Education

Education is the key to actively involved citizens and an improved quality of life for watershed residents. Within the watershed there seems to be a lack of concern for the environment. This lack of concerns leads to poor environmental planning, minimal environmental awareness, and missed funding opportunities. Educating residents and officials to understand the economic benefits and importance of watershed protection is essential to watershed improvements.

Environmental education is generally targeted to school-aged children. Adult environmental educational programs are limited. Implementing programs to help landowners understand the importance of watersheds could be a first step to getting them more involved. Stakeholders have identified a need to make the public more aware of environmental issues affecting the watershed community, such as illegal dumping, water conservation, and environmentally friendly development.

The Pennsylvania Department of Education (PDE) established environmental ecology standards requiring educators and students to become more involved in watersheds. Educators often look to local organizations, such as watershed groups, to assist them in educating the youth. Reaching out to help the

local school districts teach students about watersheds may inspire kids to become more involved in their local communities.

Recreation

Watershed residents expressed an interest in capitalizing on the recreation opportunities that exist. Marketing of current recreational facilities is limited. Hunting, fishing, boating, hiking, and visiting scenic vistas have been identified as popular recreation activities and can be enhanced through additional planning and protection. The watershed has a variety of recreational facilities. Working to connect these facilities to one another and enhancing the amenities of these facilities would be beneficial.

Extending and linking existing trails, along with the development of new trails, is something that residents would like to see. Watershed stakeholders also identified the desire for more access to trails, and the creation and maintenance of water trails. Parking facilities and access points for boating were also suggested.

Historic Preservation

Watershed residents expressed the importance of preserving remaining historic sites. Preserving historic sites for future generations is key to protecting the culture of the region. To help preserve these historic areas, municipal officials must get involved with local citizens and preservation groups. Establishing self-guided auto tours that highlight the history of the area could also make local citizens and visitors more aware of the local culture and increase tourism.

Smart Growth and Planning

Development is going to occur. It can be done attentively and wisely through the implementation of cooperative land-use strategies. Smart growth principles promote the use of sound land-use planning, including mixing land uses; making development decisions predictable, fair, and cost effective; strengthening and directing development toward existing communities; fostering distinct, attractive communities with a strong sense of place; and preserving open space, farmland, natural beauty and critical environmental areas. By employing smart growth principles, businesses and industries could be attracted to the area, b ringing in needed jobs while maintaining the natural settings prized by residents and tourists. Smart growth also involved educating landowners about the process and its benefits.

The establishment of zoning ordinances and comprehensive plans help communities protect themselves from unwanted land uses. Each municipality should consider zoning ordinances (and constantly updating them if they are adopted to meet the needs of the municipality) and comprehensive municipal plans and/or joint plans with neighboring municipalities. Many watershed residents are interested in working with municipal officials to establish ordinances to protect their community from sprawl and other unwanted land uses.

Protecting Biodiversity

Biodiversity means having a large variety of living things in an area. The watershed is fortunate to have a great diversity of plants and wildlife. Conducting an inventory of wild plants and animals would be beneficial because it would help protect biodiversity. The County Natural Heritage Inventory program documents areas and species of special concern. The findings from biodiversity studies can be used to market the watershed for its natural areas, potentially bringing in more tourism and recreational opportunities, while protecting the resources.

A part of protecting biodiversity involves controlling invasive species. Invasive species become dominant species taking over areas of native vegetation. These species spread quickly and are difficult to eradicate.

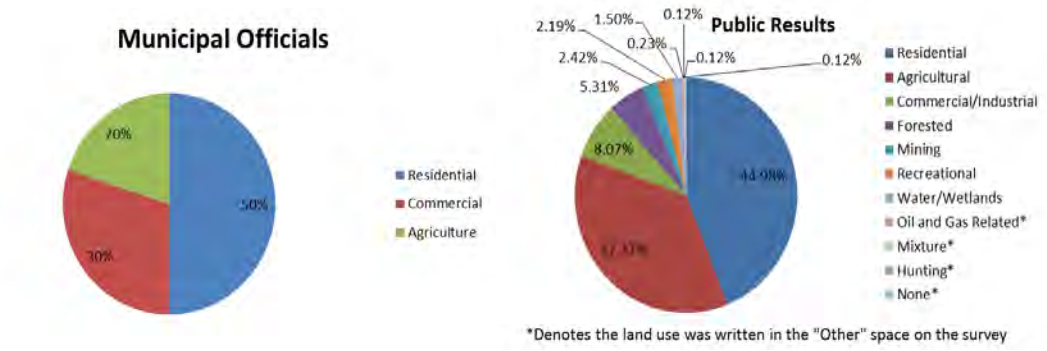
Survey Results

Watershed residents, municipal officials, and school district superintendents were asked to complete surveys to determine how stakeholders perceived the watershed and how they use the watershed. A copy of the survey is located in Appendix _____. The results of the surveys are listed in the next section. A total of 465 surveys from residents of the watershed were returned to Lawrence County. These surveys make up the "Public Results." Five surveys from municipal officials were received, and the results are summarized below.

Land Use

When asked what they thought were the most common land uses within the watershed, residents and municipal officials thought that residential and agricultural were the top two uses. Land-use data identified agriculture as the major land use within the watershed. More information about land uses within the watershed is identified in the Land Resources chapter.

Diagram 6-1. Common Land Uses as Viewed by Municipal Officials (left) and Watershed Stakeholders (right).



Fifty (50) percent of municipal officials who responded thought that residential uses are the most common land use, while thirty (30) percent felt it was commercial uses, and twenty (20) percent felt it was agricultural uses.

While watershed residents agree that residential is the most common land use in the watershed by voting almost fourty-five (45) percent for it, there are great differences after that similarity. Over thirty-seven (37) of watershed residents feel that Agriculture is the most common land use, followed by eight (8) percent who believe that commercial/industrial is the most common land use.

Water Quality

Participants were asked to rank a list of watershed attributes according to their priority, with five (5) being the most important and one (1) being the least important (Table 6-1). Table 6-1 shows that water quality improvements, attractive natural settings, preserving historic sites, and new businesses/jobs were the top four (4) priorities. Other values identified but not listed in table 6-1 include fish edibility, gas wells, drilling affecting water quality, ATV riding, employment opportunities, trash everywhere, dumping affecting water quality, agriculture, access to waterways, less government, bird sanctuary, wildlife habitats, air quality, a site for renewable resources, future pollution, hunting, no industrial waste water taxes, and I don't know.

Table 6-1. Watershed Values by Importance for the Mahoning River Watershed

Values	Very Important (Percent)	Somewhat Important (Percent)	Neutral (Percent)	Not Very Important (Percent)	Not Important (Percent)
Attractive Natural Settings	57.76%	29.22%	9.82%	1.83%	1.37%
Preserving Historic Sites	41.10%	33.56%	19.18%	3.88%	2.28%
Recreation Opportunities	34.01%	36.04%	22.52%	4.95%	2.48%
Water Quality Improvement	82.05%	12.95%	3.18%	1.36%	0.45%
New Businesses/Jobs	44.14%	28.97%	19.08%	5.29%	2.53%
Community Activities	21.86%	40.47%	29.77%	5.81%	2.09%
Residential Development	22.95%	25.00%	34.77%	9.55%	7.73%
Educational Opportunities	35.07%	27.38%	28.96%	5.88%	2.71%
Private Property	39.86%	24.24%	25.41%	6.29%	4.20%
Trash/Recycling Services	41.30%	25.52%	23.43%	5.80%	3.94%

*Table 6-1 shows the percentage of respondents in each category ranked from very important to not important for each individual value.

Recreational Opportunities

Participants were asked to list how they use or view the watershed for recreation, rating them from five (5) to one (1), with five (5) being very important and one (1) being not important. The results, in table 6-2 below, show some very interesting information. The most popular recreational activities are fishing, hunting, and hiking. When the neutral votes for ATV Riding are removed, roughly 60% of those that answered the question believed it was either not very important or not important, with almost 40% voting not important. Other activities identified but not listed in table 6-2 include ziplining, tubing, ice skating, cross country skiing, scuba diving, trapping, mountain biking, camping, and observing wildlife.

Table 6-2. Recreational Activities by Importance for the Mahoning River Watershed

Recreational Activities	Very Important (Percent)	Somewhat Important (Percent)	Neutral (Percent)	Not Very Important (percent)	Not Important (percent)
Boating	21.58%	26.22%	33.87%	9.51%	8.82%
Hiking	27.36%	37.93%	24.14%	5.29%	5.29%
Fishing	36.65%	33.26%	19.68%	4.75%	5.66%
Canoeing/Kayaking	27.71%	28.41%	25.87%	9.24%	8.78%
Horseback Riding	8.53%	22.12%	39.86%	14.75%	14.75%
Swimming	18.01%	18.94%	36.95%	12.93%	13.16%
Hunting	38.58%	23.52%	21.00%	8.45%	8.45%
Bird Watching	22.43%	26.54%	32.49%	9.38%	9.15%
Picnicking	17.59%	34.26%	31.94%	9.03%	7.18%
Visiting Scenic Vistas	25.87%	33.03%	29.10%	6.24%	5.77%
Organized Sports	12.50%	19.21%	42.59%	12.04%	13.66%
Photography	19.91%	29.75%	34.10%	7.55%	8.70%
Visiting Public Parks	19.67%	33.96%	32.55%	7.49%	6.32%
ATV Riding	14.49%	17.29%	24.07%	14.72%	29.44%
Biking	27.52%	34.40%	23.85%	5.96%	8.26%

*Table 6-2 shows the percentage of respondents in each category ranked from very important to not important for each individual value.

Positive Attributes

Participants were asked to provide three positive attributes of the Mahoning River Watershed. The results are listed in the bulleted sections below.

Socio-economics

- Sense of community
- Low development pressure
- Peaceful, safe, quiet settings
- Nice place to raise a family
- Variation between urban and rural settings
- Easy access via interstates
- Friendly people
- Scenic area
- Safe environment
- School system
- Privacy
- Small community
- Community events
- Uncongested traffic
- Road condition
- Home values are maintaining
- Trash/recycling services
- Good potential for further development
- Being close to commercial areas
- Private property
- Having access to utilities

Land Resources

- Attractive land
- Forested areas
- Green space
- Agricultural setting
- Natural, rural setting
- Centrally located
- Somewhat secluded

Water Resources

- Clean water
- Lakes
- Low in development
- Quaker Falls

Biological Resources

- Diverse wildlife and vegetation
- Reptiles and amphibians
- The wild birds
- No pollution

Cultural Resources

- Recreational resources
- Access to recreational amenities

- Outdoor areas for hunting, fishing, hiking, etc.
- Picnicking
- Historical value and sites

Methods for Improvement

Participants were asked to provide three methods for improvement to address negative attributes of the Mahoning River watershed. The results are listed in the bulleted sections below.

Socio-economics

- Better jobs in the watershed
- Keep rural areas rural
- Redevelopment instead of development
- Bring in new businesses
- Better informed and involved politicians and citizens
- More employment opportunities in the watershed
- Industrial growth

Socio-economics (continued)

- Tax break for businesses
- Less politics
- County manager – no commissioners
- Re-route traffic
- Remove toll from I-376 bridge
- Provide municipal utilities
- Lower taxes
- More law enforcement pertaining to speed limits
- Better access to problems (information)
- Monitor commercial growth and grey water output
- More educational opportunities
- Fiber optic cable/internet
- Housing development restrictions
- Establish more parks
- Lower the crime rate
- Stop squatters from living along the river in tents

Land Resources

- More recycling programs
- Dumping cleanup efforts, stiff penalties on dumping
- Allow the agricultural use of fertilizer
- Keep more forested regions
- Limit/monitor unconventional gas wells
- Do not allow burn barrels
- Fix land uphill/upstream so flooding does not occur
- Too many EPA regulations

Water Resources

- Improve the water quality
- Monitor the water quality
- More regulations and restrictions for unconventional gas wells
- More access to water bodies
- Clear riverbanks of litter
- Dredge the rivers/streams to get rid of pollutants
- Streambank fencing

- Flood control
- Control agricultural runoff
- Municipal utilities

Biological Resources

- More wildlife is needed in the watershed
- Stock water bodies with fish

Cultural Resources

- Create a swimming area
- Create more access to recreational amenities
- Create more parks
- More places to go hunting
- Better upkeep of Stavich Bike Trail
- Build eagle lookout points
- More hiking trails
- Build a restroom facility on the bike trail.

Other

- Leave us alone
- No more regulations
- 24 hour ATM
- I never knew it was bad
- I don't know

Comments about the Watershed or Conservation Plan

Citizens were asked to voice any comments about the watershed or the conservation plan at the end of the survey. Their comments are as follows.

- I think land has been donated for a boat ramp in the Hillsville Area. What isn't something being done by the County Supervisors? I'm sore a donation would be easy to get.
- I think in this time of shale drilling, we must be very cautious to protect our natural areas for future generations.
- The Bessemer water supply is horrible. I have to use a water softener to correct the pH, despite the fact that I have "city" water. This is UNACCEPTABLE. What is going on here? Please let me know how I can help.
- I don't know anything about the Watershed Conservation Plan.
- The scope of the plan is not obvious as described in this survey.
- A good conservation plan would be to plant trees that can adapt along the river.
- Test the current rail beds for contamination flowing from them into the watershed. Educate people in the watershed areas about fertilizers, used oil, etc. Dredge the Mahoning River bottom, make the river what it was 400 years ago.
- Finding those responsible for pollution, make them share in clean up keeping creek and run waterways debris free.
- Water quality has greatly improved over the years. It has to move forward not go backwards.
- A need for improved working relationships between the various municipalities exists.
- More areas to view the river without cutting down old trees.
- Cleaning the banks of the washed up debris from downstream.
- Never really looked at it, didn't know it existed.
- Stop the pollution of our area by removing the trash and disposing of it in a proper manner.
- I think as a nation we need to use a lot less pesticides. It's affecting our lives in many ways.
- I believe it is important to monitor and maintain the quality of our local watershed.
- What is the Mahoning River Watershed?

- I applaud those striving to put into place a well thought out and useful plan!
- Lower taxes and don't send these surveys out, it costs at least $1 postage, take it off my taxes rather then send surveys out.
- Apparently you don't have enough to do! Close down your shop and reduce taxes by doing so! Thanks.
- Model the Shenango River Watchers.
- The recreational activities weren't important because I don't have the time, but I have no issues with those who want to do them, other than ATV riding on property without permission.
- I am very concerned about "fracking" affecting the water supply adversely, and also seismic testing damaging underground water supply channels.
- Replace the bridge on Hickoryview Drive with a clear span bridge. The original bridge has two large pipes that clog with trees and trash and causes the roadway to flood, trapping residents from emergency vehicles or evacuation.
- My biggest concern is the issue of gas drilling, what it could do to the environment and the water supply. How will this benefit us other than the property owners (financially) whose land is being drilled on?
- Prevent gas drilling from ruining the area.
- Please try to keep what is there without being so restrictive we as a community remain so stagnant. With some real thought we can have both. Real thought involves real compromise from all parties. If big developments make major impacts, they need to balance with natural not commercial contributions.
- Stop looking for ways to circumvent private property ownership! Stop looking for ways to SPEND tax payer money! Give us a tax break/reimbursement instead. Stop looking for ways to increase government regulations. Stop looking for ways to create more red tape that PRIVATE businesses and property owners have to comply with. Stop looking for ways to regulate what happens on private property! It's none of your business. "Conservation" is code word for increased government spending, increased government power, increased government regulations and a REDUCTION of private citizen RIGHTS.
- I don't believe I fully understand the benefits. Your letter did little to explain.
- This has become necessary.
- Government employees are NOT new jobs but a drain on taxpayer resources.
- More taxing on wells so you can fix roads and regulate slickwater and brine and help families negatively impacted by fracking.
- Zone Marcellus wells away from parks, residences, streams, lakes, forests, gamelands, state parks, national parks, and municipalities.
- Gas well drilling. Protect the environment.
- The new electric power plant is too big for this area.
- Tree cutting is too close to the river banks.
- I have no idea what good this survey is going to do.
- The turnpike toll at Mt. Jackson to Union Township and back. The toll is 90¢ for 1 mile and going up January 2013. The toll across PA is about 11¢ /mile. This is hurting Lawrence County businesses. If this toll is fair the toll across PA should be = 390 x .90 = 356.40 WOW! This is something positive for the commissioners to work on, as well as all elected officials in Lawrence County.
- I am concerned about potential major problems with the quality of water, because of fracking throughout the County.
- Source water protection. Protecting against gas drilling impacts is very important.
- I feel that the watershed has come full circle from 30 years ago when the water was terrible and polluted. Now it is a part of the community again and not an eyesore.
- I believe in keeping the Mahoning River watershed as close to original as possible, contamination by any source should be prohibited.
- Keep it and improve it, in an ecological balance within this area - keep it, and sustain it, for the future.
- It seems to me, and I might be wrong, to be of good quality.

- Put good, sound conservation practices in place and not foolish ones that waste tax-paer dollars.
- I think the community would whole heartedly support and volunteer for an improvement project. It's a beautiful natural resource being wasted as a sewage dumping ground. I would be excited to help. I'm glad someone is finally taking the initiative to improve and enhance our watershed and community.
- Too many drugs in the County are making enforcement in public parks and ATV riding virtually impossible.
- You have listed as Hickory "Run" what I grew up thinking was "Creek," and still do. This is good to see that someone is attempting to address issues in our area by sending out these surveys. I hope you get a lot of feedback.
- The Mahoning River unfortunately is perceived by many in the area as an industrial/polluted waterway. However, since moving to the area I have found it to be a scenic and beautiful area. This needs to be promoted and utilized.
- How often is water pollution checked and thus treated and eliminated?
- Give the residents the opportunity to participate in organized river clean ups along the Mahoning and its tributaries. Even roadway clean ups would help keep trash out of the streams. Get the schools involved.
- My son and I canoed and fished the River for the first time this past summer. The quality of the experience and the fishing was tremendous! We hope to continue with the experience in the future.
- Your package is too vague…more information may give you educated responses!
- I don't know enough about it to give an intelligent reply.
- Do not let the waste water from fracking get dumped into the water.
- I would not be happy if this costs me more in taxes (local, county, state, federal). I already pay far too much (especially county).
- Kids, teenagers, and young people party along the Mahoning River where it comes into Pennsylvania from Ohio, and they litter alcoholic beverage containers, shoot up trees and targets, and leave unsightly fire remnants. It's just out of control.
- Please help us protect our environment for future generations. Fresh water is the number one concern in the near future.
- I've lived along the Mahoning River for 50 years and remember how dirty it looked from all of the pollution from the steel mills. It does look cleaner now that many of the steel mills have closed.
- The Stavich Bike Trail is an underutilized asset. Maintaining it is very important. I don't think there are any significant water quality issues other than the huge waste management site to the west near Hillsville.
- Runoff - Shale industry/fracking runoff.
- The more people that know how beautiful an area is the more willing they are to take care of it. Educational programs are great.
- Cleaning the river up?
- An awesome river - it's sinful that we destroyed this natural watershed for selfish reasons.
- Finish quarrying of limestone in Ambrosia property along R. 224. Reclaim the area to end illegal dumping of trash and stolen cars.
- Leadership should come representative segments of each area with people who are trained in various facets of community development. Leave the politicians out of the picture until the time is appropriate. This is the most important.
- I am very happy that someone is actually working on helping this area with watershed. If you need any help or insight to this area in which I live I am certainly available especially if you are willing to help my front yard not be a swamp area. Thanks.
- Dismantle blight along riversides (ie unused bridges, buildings, houses, bridge piers etc.)
- Just fix our roads!
- This is a waste of money.
- Improved roadways after stormwater system upgrades.
- A lot of talking has taken place over the years and nothing has been done.
- I would like to see the river dredged.
- The water is awful. Something needs to be done with it.

- Hunting and discharge of firearms should be prohibited.
- Too new to the area to offer any additional comments.
- What about our young children? You have money for this program but our kids have nothing to do. Come up with a plan for them.
- I fear the shale gas frenzy!
- I am not in the flood area. The river is much improved in water quality. Wildlife has greatly improved.
- PA Game and Fish should be involved.
- Good; Natural environment without overdevelopment (commercial or residential). Maintain outdoor activities (bike trail, hunting). Minimum disturbance by development i.e. wise city/county planning when commercial or residential development is needed. Do not overload a small county road with residential traffic. Do not zone commercial areas that should remain rural. No large residential developments "dropped" into small roads or forested areas.
- Residential and industrial development need to be initiated/sponsored.
- I think the Bike Trail was the best thing they ever did for this area. And if they would figure out how to get the water cleaner, and get better access to the water to be used for recreation. I believe parking is going to be a problem on Stavich Trail. The ideal area would be on the East side of the new 224 bridge.
- I really love the outdoors. The bike trail and the natural surroundings. I do not hunt; fish; go boating or ride horses.
- Cleaning the Mahoning River requires a significant effort.
- Since I have no clue what the conservation plan is, I don't feel qualified to comment on it.
  One of the first water areas that Muskelunge identified in the 1800s.
- Control dumping of trash.
- Protect our water wells.
- What gets into the water upriver before this area?
- This survey is a waste of time, paper, and postage.
- The sewage treatment plant at 18 and 108 stinks.
- We need to develop more things that are outdoors that are free for our teens to do. Also someone offering education days informing our children about their past.
- Develop a picnic area at confluence of Shenango River and Mahoning River.
- The Mahoning River is getting cleaner since there is less industrial waste coming from upstream. I have noticed fish and turtles in the water that weren't there decades ago. I have even noticed eagles flying close to the river.
- It will keep a place for natural wildlife.
- This survey is a joke! This is why we must limit the Government intrusion into our lives!
- Stop wasting natural resources that pollute the environment.
- Trying to improve conditions in one way will hurt them in another. Perhaps through water back-up, more flooding, and more contamination. Hopefully we'll leave this Earth before you get too carried away.
- Sorry you are getting this late. I hope it helps.

Interview Results

Interviews were held with key individuals identified by the steering committee. The interviews were conducted via telephone and e-mail. The results of the interviews are listed by question below. A copy of the interview sheet is located in Appendix F.

Recalling the Mahoning River 20 or More Years Ago

- Stay out of the river.
- Don't eat fish.
- Polluted.
- Good source of Indian relics.
- A peaceful body of water.
- Sewage issues from Edinburg and Hillsville.
- Pollution from Youngstown - frequent floods.
- Heavily polluted with heavy metal concentrations.
    - Agriculture may have been one cause of pollutants, but heavy industry used it as a dumping ground. On the Pa. side, we also had the 'Moonscape', an area that still exists of abandoned coal and limestone mining.
- Not as clean as today, I don't think.
- Water quality was atrocious (no-contact advisory for Mahoning River).
- Lots of small farms with no manure management.
- Little recreational opportunities.
- Many areas disturbed from strip-mining, and unreclaimed.
- Dirty.
- Never freezing.
- No easy access.

Changes in the Mahoning River Watershed over the Past Ten Years

- None that I can see, but then I don't pay that much attention to it.
- Much cleaner.
- Improved sewage treatment and better water quality.
- Word of water quality improvement, but at what cost?
    - Increased development, mainly homes with malfunctioning conventional septic systems. Many of these homes are now under mandate (construction underway) to connect to the municipal sewage systems that are being built. Most major industry is gone.
- I think it's a little bit cleaner and it seems like no till farming has become common in the last few years, that way you aren't plowing up and discing ground.
- Improvement in water quality based on fish caught, but still no edible catches.
- Many farms have gone out of production, especially dairy, which has minimized nutrient loading.
- Still have strip mine scars.
- Now I see people boating on the Mahoning River, and much more and varied wildlife, including eagles.
- Cleaner.
- Less flooding.
- More access.

Your Vision for the Mahoning River Watershed in 5 Years/10 Years

- Continue its regeneration.
- More recreational opportunities.
- Continue to increase access.
- Completion of the plan once developed by the Army Corps to dredge the polluted (PCB) sediment from behind several abandoned low dams in Ohio.

- Hopefully the no-eat fish advisory can be lifted.
- 5 - Continue the practices that have been in place here in recent years.
- 10 - It'd be nice to see it be utilized more by the public. (fishing, recreation)
- I remember a 'plan' to dredge areas of the river to remove toxic sediments.
    - Was there any risk, or plan, to control substances that would move downstream once disturbed? My Vision would be to see a cleaner river. A water body that can be an asset to enhance recreation, business, and the overall environment.
- Clean water - recreational use.
- Keep it clean and in the manner nature intended.
- Recreational boating, especially canoeing.

The Big Issues Regarding the Mahoning River Watershed

- Continue cleanup of approaching urban sprawl.
- Non point pollution from up river and flooding.
- Inaction. All the plans in the world don't mean much if they are not implemented.
    - I'm sure some intentions are there, but cost (probably primary) would be a factor. Strained Municipal budgets likely have other pressing priorities. And now... we have the fast moving Marcellus Shale industry, with many 'unknowns' related to ground water and air quality.
- Trying to clean up past pollutions, many, many years past practices.
- Trying to rectify past damages.
- In Lawrence County, farming "run-off"
- In Mahoning County, urban/industrial "run-off"
- Potential for problems from gas well drilling.
- I don't know.

Opportunities for Programs or Projects

- Make a big push for homeowners in the watershed to be aware of the improvements, and push for them to do their part to continue it.
- See if anyone (PA American Water?) has any good long-term water quality monitoring data, and if not, seek an opportunity to begin doing so.
- Act 13 monies
- From the aspect of farming/habitat work utilize stream bank fencing for farmers' cattle.
- Stream bank fencing programs for cattle pastures.
- Get EVERYONE living in the Watershed notified/informed to the needs and potentials for this River and surrounding area.
    - This would hopefully enlist a higher potential percentage of people and resources to help implement the Plan. More ideas will come with these contacts.
- Clean up areas along railroad tracks and more boat launch ramps.
- Leave as nature intended.
- I am not unaware of any programs or opportunities.

Future Management of the Watershed

- I don't really have any ideas.
- Enforce pollution, litter, and trespass laws.
- Preserve flood plain areas as open space.
- Getting the plan information out to stakeholders.
- More areas for recreational access.
- More canoe/boat launches.
- More recreational use.
- I'd like the watershed conservation plan to be available to all planning groups, and USED by them, instead of sitting on a shelf somewhere.
- Obviously, more recreational opportunities.

- Better "land use" management as far as run-off issues are concerned.
- Possibly enlist private recreation/environmental organizations as "partners."

What I would like to see in the Mahoning River Watershed Conservation Plan

- Becoming a stocked river.
- More public access.
- More organized activities.
- ATV riders on private property is a serious problem, but not necessarily a watershed or water quality problem.
- Getting out there that programs are available.
- Promote stream bank fencing programs to farmers.
- Get sportsmen's' clubs together to raise money for launches.
- Measures to address ALL potential sources of pollution. Then work on the most pressing first. The benefits of implementation.
- A plan to manage hillside runoff.
- Preserve flood plains.
- More access - better coordination with Ohio.
- Keep it simple.
- Recreational amenities.

What Might Prevent the MRWCP from Being Successful

- Municipal and county politics.
- Lack of enforcement.
- Ohio and money.
- Not fully presenting the needs and benefits of action.
- Priority in the minds of the local population, and adequate financial support. Real financial support would be critical for the major items to be addressed.
- Lack of awareness of the public, not just the farmer. The general public, and more interested groups such as bird watchers, water recreation participant such as hunters and fishermen.
- Lack of effort by the COE to fulfill their own plan to improve water quality. As I understand it, the plan is limited to Ohio only, but should be extended to PA.
- Apathy, lack of interest on local elected officials part
- Lack of funding
- Major development

Advice in Preparing the MRWCP

- Keep the "locals" involved - make them "responsible" - a part of the plan.
- Keep planning!
- Focus on the low-cost, big bang-for-the-buck items like tree planting, especially in riparian areas, streambank fencing/livestock exclusion; consider that now farmers may be better off financially due to gas royalties and can likely afford to make changes that couldn't be done before.
- Talking to some farm groups, from borough, sportsmen's clubs, Lawrence County Conservation group, Lawrence County Federation of Sportsmen's Clubs. Give them the opportunity to express ideas and have input.
- Something of this large scope can begin with 'baby steps' in getting other groups interested in taking on visible and meaningful projects. But don't lose sight of the major issues that are the reason this whole Plan is being developed.
- Meet with Ohio officials.
- Constant education and input from those living in the watershed.

Other Key Persons You Should Interview

- All the usual type groups and people. You already have experience with these. Also foundations, teaming up with Pa. and Ohio Game & Fish Commissions, City and Township Trustees, and Supervisors.
- Groups that would use the River like boaters/kayakers, fishermen.
- Fish and Boat Commission.
- Just brainstorming here: Boy and Girl Scout Troops or their leaders; garden clubs, if any exist; sportsmen's clubs.
- Mahoning County Planning Director, Environmental staff.
- Meet with Ohio officials.

Other Comments to be made for the Record

- Get moving.
- Whatever you do….do well. Even if it is only a few things, in other words, Quality, not Quantity. Hopefully the Plan will gain momentum. It will certainly take time. People need to see results, and these results need to be shared by the news media. Thanks for the opportunity to comment.
- Thanks for asking for my opinion…
- Good job! Keep up the good work.

CHAPTER 7: MANAGEMENT RECOMMENDATIONS

Management recommendations are suggestions to improve the quality of life within the watershed. They are non-regulatory in nature and may be used by any citizen, group, or agency. Potential partners are Groups with the resources best suited to assist in meeting the objectives. Potential funding sources identify avenues through which the objectives may be financed. The Groups listed as potential partners or potential funding sources are suggestions and should not be limited to the identified Groups due to ever changing circumstances.

The recommendations were derived from correspondences, comments, issues, and concerns the recommendations reflect the views expressed by local citizens. Discussed in further detail in the Issues and Concerns chapter are the issues, topics, and concerns identified throughout the planning process. The watershed community developed the management recommendations through comments, interview, public meeting workshops, and the completion of surveys. The prioritization of the recommendations was determined by the local steering and advisory committees and the during the draft review phase. Committee members prioritized the recommendations based upon impacts to the watershed, feasibility, and probability of funding.

This matrix of recommendations includes goals, methods to achieve the goals, potential partners, and potential funding sources. They are listed by priority, with the higher priorities for each goal listed first. An additional listing of potential funding sources and the types of projects funded by each source is included in Appendix E. Listed in Table 7-1 are acronyms used in the management recommendations.

Table 7-1. Acronyms used in Management Recommendations Matrix

BAMR	Pennsylvania Department of Environmental Protection Bureau of Abandoned Mine Reclamation
CREP	Conservation Reserve Enhancement Program
DCED	Pennsylvania Department of Community and Economic Development
DCNR	Pennsylvania Department of Conservation and Natural Resources
DEP	Pennsylvania Department of Environmental Protection
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
HUD	Housing and Urban Development
LWV	League of Women Voters
NRCS	United States Department of Agriculture Natural Resources Conservation Service
OSM	United States Department of Interior Office of Surface Mining
PABS	Pennsylvania Biological Survey
PACD	Pennsylvania Association of Conservation District
PALMS	Pennsylvania Lake Management Society
PASA	Pennsylvania Association for Sustainable Agriculture
PDA	Pennsylvania Department of Agriculture
PEMA	Pennsylvania Emergency Management Agency
PENNDOT	Pennsylvania Department of Transportation
PENNTAP	Pennsylvania Technical Assistance Program
PENNVEST	Pennsylvania Infrastructure Investment Authority
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
PHFA	Pennsylvania Housing Finance Agency
PHMC	Pennsylvania Historical & Museum Commission
PNHP	Pennsylvania Natural Heritage Program
PSAB	Pennsylvania State Association of Boroughs
PSATS	Pennsylvania State Association of Townships
RUS	Rural Utility Service
RWA	Rural Water Authority
SEO	Sewage Enforcement Officer
USACE	United States Army Corps of Engineers
USDA	United State Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WPC	Western Pennsylvania Conservancy
WPCAMR	Western Pennsylvania Coalition for Abandoned Mine Reclamation
WREN	Water Resources Education Network

Project Area Characteristics

Land Use Planning and Regulation

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Alter perceptions of zoning by building partnerships and educating residents about the value of zoning.	Municipalities, Citizens, Planning Organizations. Cooperative Extension	DCED	High
Designate growth and conservation areas based upon data analysis from the County and Municipal Comprehensive Plans.	Planning Organizations, Conservation District, Municipalities, WPC, Conservation Groups	DCNR	Medium
Develop individual or joint municipal comprehensive plans.	Municipalities, Planning Organizations	DCED, Municipalities	Medium
Encourage municipalities to utilize regulation control powers available to them, including zoning, to preserve and improve quality of life for watershed residents.	Municipalities, Planning Organizations, Cooperative Extension	DCED	Medium
Enforce existing land use ordinances.	Municipalities	Private sources	High
Implement smart growth practices when developing residential and commercial areas.	Municipalities, Planning Organizations	DCED, PHFA, PENNDOT, Private sources	Medium
Protect critical and environmentally sensitive areas with land-use regulations.	Planning Organizations, Conservation District, Municipalities, Cooperative Extension	DCNR	High

Economics

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Attract new businesses to the region with incentives and tax breaks.	Municipalities, Planning Organizations, Legislators	Legislature, DCED	High
Create tax incentives for private landowners who implement conservation practices.	Municipalities, Planning Organizations, Legislators, Conservation District	Legislature, DCED	Medium
Offer incentives to help keep young adults in the area.	Municipalities, Planning Organizations, Legislators	Legislature, DCED	High
Promote redevelopment of abandoned industrial sites through the Brownfields program, incentives, tax breaks, or other efforts.	Planning Organizations, Municipalities, EPA, Legislators, Businesses	DEP, EPA, Foundations, Private Sources	High
Utilize available nature-based tourism opportunities to increase revenue.	Municipalities, Businesses, Planning Organizations, Tourist Bureau	DCED, Business Associations	Medium
Encourage the establishment of value added agriculture processing to provide income opportunities for small agricultural producers.	PASA, Conservation District, PENNTAP	Legislature, DCNR, Foundations	Medium

Education

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Conduct workshops, seminars, and demonstrations for decision makers, including developers and government leaders, emphasizing best management practices.	Conservation District, Municipalities, NRCS, Planning Organizations, Conservation Groups	DEP, EPA, DCNR, Private Sources, Foundations	High
Identify additional local, state, federal, and private funding for environmental education.	School Districtss, Conservation District, Conservation Groups	Private Sources, Foundations	Low
Increase municipal awareness and cooperation for preserving, protecting, and restoring the natural resources of the watershed.	Conservation District, Municipalities, NRCS, Planning Organizations, Conservation Groups	DEP, EPA, DCNR, Private Sources, Foundations	Medium
Provide public education and awareness programs about the economic benefits and importance of watershed protection.	Landowners, Conservation District, Municipalities, Conservation Groups, DCNR	DEP, DCNR, Private Sources, Foundations	Medium

Other

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Establish more collaboration amongst environmental Groups, including the development and support for more Groups.	Conservation Groups, Conservation District	Private Sources, Foundations	High
Establish memorandums of understanding between municipalities, and public entities to utilize equipment to clean up after local disasters such as flooding, and tornados.	Municipalities, Businesses	Private Sources	Low
Conduct workshops and programs to educate the agricultural community about best management practices and new technologies and programs available.	Landowners, Farmers, Conservation District, Municipalities, NRCS, Planning Organizations, Conservation Groups	DEP, EPA, DCNR, Private Sources, Foundations	Medium

Land Resources

Agricultural Land

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Enroll agricultural landowners in the Conservation Reserve Enhancement Program (CREP), a voluntary program, to take marginal farmland out of production for wildlife habitat, or other similar programs.	Conservation District, NRCS, Conservation Groups, PGC	DEP, EPA	Medium
Identify additional local, state, and federal funding for the implementation of agricultural best management practices.	Conservation Groups, Conservation District	Private Sources, Foundations	High
Promote and implement conservation practices such as cover crops and crop residue, contour strips, grassed waterways, and minimal pesticide/herbicide use.	Conservation District, Cooperative Extension, NRCS, Farm Bureau	DEP, NRCS, Farm Bureaus	Medium
Promote and utilize farmland preservation programs to sustain agricultural base and rural heritage.	Conservation District, NRCS, Agricultural Preservation Groups, Cooperative Extension, Farmers, Municipalities	Farm Bureaus, Conservation Groups	High
Protect active farmlands to retain their agricultural uses by designating them as agricultural security areas, purchasing conservation easements, or assisting in the multi-generation transfer of ownership.	Conservation District, Agricultural Preservation Groups, Conservation Groups, Landowners, Municipalities	Farm Bureaus, Conservation Groups, Private Sources	High
Encourage agricultural landowners to install stream fencing and spring development			High

Erosion and Sedimentation

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Establish land-use planning and zoning to limit development in floodplains and other critical areas subject to erosion and sedimentation problems.	Conservation District, Planning Organizations, Municipalities	FEMA	Medium
Include sound geologic investigation and best management practices during maintenance and construction of roadways.	Municipalities, PENNDOT	PENNDOT	Low
Utilize best management practices to control erosion and sedimentation in agriculture, forestry, development, and mining industries.	Conservation District, Conservation Groups	DEP, DCNR	High

Forestry

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Host workshops and/or programs promoting sustainable forestland management for loggers, landowners, and municipal officials.	Municipalities, USFS, Foresters, Conservation Groups, DCNR, Conservation District, Cooperative Extension	DCNR	Medium
Educate forestland owners by providing them with accurate information regarding sound silviculture practices, forest management plan development, and insect and disease problems that can affect forest health.	Foresters, Landowners, Conservation Groups, Cooperative Extension, Conservation District	DCNR, Private Sources, Foundations	High
Encourage the development and use of Forest Stewardship Plans or forest management plans and participation in the PA Forest Stewardship and/or the Tree Farm Program.	Landowners, Foresters	DCNR	Medium
Encourage timber harvesters to use techniques based upon forest type and size under the direction of a professional forester.	Foresters, Landowners, Conservation Groups	DCNR	High
Promote tree plantings and sustainable harvesting.	Foresters, Conservation Groups, Conservation District	DCNR, Private Sources, Foundations	High
Support laws and regulations to maintain whitetail deer populations at levels that will ensure healthy forests, productive agricultural lands, and healthy deer populations.	Foresters, PGC, Conservation Groups	Conservation Groups, PGC	Medium

Waste Disposal

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Educate citizens about the economic and environmental impacts of illegal dumping.	Solid Waste Authorities, Citizens, Municipalities, Conservation District, Conservation Groups, Tri-County Cleanways	DEP	High
Partner with local landowners, businesses, and community Groups to sponsor community cleanups to remove trash along roadways, streambanks, and at dumpsites.	Municipalities, Community Groups, Businesses, Watershed Association, Tri-County Cleanways	DEP, PACleanWays, Private Sources, Foundations	Medium
Identify additional local, state, and federal funding to address the waste disposal needs of the area.	Community Groups, Conservation Groups, Solid Waste Authorities, Tri-County Cleanways	Business, Private Sources, Foundations	
Conduct an inventory and develop a remediation plan for illegal dumpsites within the watershed.	PA CleanWays, Solid Waste Authorities, Conservation District, Tri-County Cleanways	DEP, Businesses, Private Sources, Foundations	Low
Educate citizens about traditional and innovative ways to reduce, reuse, recycle, and properly dispose of household hazardous waste by providing public	PA CleanWays, Solid Waste Authorities, Conservation District,	DEP, PA CleanWays, Businesses, Foundations, Private Sources	Medium

service announcements, recycling workshops, and other education and outreach programs.	Conservation Groups, School Districts, Citizens, Tri-County Cleanways		
Provide convenient and affordable alternative disposal options, such as offering special collection days and drop-off locations for appliances and household hazardous wastes.	Municipalities, Solid Waste Authorities, PA CleanWays, Tri-County Cleanways	DEP, PA CleanWays, Businesses, Private Sources, Foundations	High

Riparian Corridors

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Educate landowners along waterways about the value of riparian buffers.	Conservation District, Conservation Groups	DEP, DCNR	Medium
Establish and protect riparian buffers along streams using smart growth practices as identified in the project area characteristics chapter.	Planning Organizations, Conservation Groups, NRCS	DEP, EPA, Private Sources, Foundations	Medium
Continue streambank restoration and riparian buffer initiatives on agricultural lands to minimize nutrients and sediments entering the waterways.	Conservation Groups, NRCS, PGC, WPC	DEP, EPA, Private Sources, Foundations	High

Development and Redevelopment

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Establish a planned approach to growth; revitalize existing structures before developing new lands.	Planning Organizations s, Municipalities	DCED	Medium
Promote the inclusion or preservation of open space in community development programs.	Planning Organizations s, Municipalities, Conservation Groups	DCED, Private Sources, Foundations	Medium
Establish more greenways and forestlands that are available for public use.	State Organizations, Private Landowners, Conservation Groups	DCNR, PGC, Private Sources, Foundations	High
Protect natural areas by converting them into parks, purchasing conservation easements, or utilizing other conservation methods.	Conservation Groups, PGC, DCNR	DCNR, PGC, National Park Service	Medium
Promote redevelopment of abandoned industrial sites through the Brownfields program, incentives, tax breaks, or other efforts.	Planning Organizations, Municipalities, EPA, Legislators, Businesses	DEP, EPA, Foundations, Private Sources	High

Other

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Conduct outreach campaigns to educate watershed residents about the land uses in their communities.	Conservation Groups, Conservation District	Private Sources, Foundations, WREN	Medium
Educate the public to utilize practices such as "Leave no trace" on public lands and private lands open to public use.	Landowners, Conservation Groups, Landowner Associations	Private Sources, Foundations	High

Water Resources

Water Conservation

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Establish guidelines that require installation of low-flow devices for all new construction.	Municipalities, Planning Organizations	DEP, Foundations, Private Sources	Low
Promote and establish a program for retrofitting homes and businesses for water conservation practices through tax breaks and rebates.	Municipalities, Businesses, Homeowners	Legislature, DEP, Foundations, Private Sources	Medium
Launch a watershed-wide water conservation program to educate the public about the value of reducing water consumption and utilizing water conservation products and techniques.	Conservation Groups, DCNR, Conservation District	WREN, DEP, Foundations, Private Sources	High

Wetlands

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Encourage interstate collaboration on standardizing methods used to delineate and identify wetlands.	DEP	DEP	Medium
Protect wetland habitats for their many uses and benefits.	Conservation Groups, PGC, Conservation District	DEP, DCNR, EPA	High
Update wetland maps and assess wetlands within the watershed for the purpose of prioritizing future conservation projects.	Conservation Groups, Conservation District	DEP	Medium
Expand outreach to municipal and county officials for planning and implementation of future wetland mitigation and the establishment of new wetlands.	Planning Organizations, Municipalities, PENNDOT	DEP	Medium
Inventory and monitor wetland plants and animals; take action when and where necessary to eradicate any invasive species.	DEP, Conservation District, NRCS, Conservation Groups	DEP, Foundations, Private Sources	Medium
Educate landowners about the importance of wetlands for habitat and water quality.	DEP, Conservation District, NRCS, DCNR, Conservation Groups, Landowners	DEP, Foundations, Private Sources	Medium
Encourage state acquisition of important wetlands for protection of groundwater recharge areas.	Conservation District, NRCS, DCNR, Conservation Groups	DCNR, Foundations, Private Sources	Low
Enhance/promote programs that restore wetlands to agriculture areas of limited value.	Conservation District, NRCS, DCNR, Conservation Groups	DCNR, Foundations, Private Sources	Low

Floodplains

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Strengthen the enforcement municipal floodplain ordinances.	Municipalities	FEMA, DCED	High
Develop educational programs about flood prevention and recovery.	Conservation Groups, Municipalities	DEP, FEMA, Foundations, Private Sources	High
Acquire properties that are frequently impacted by serious flooding and convert them to public open space such as a park or ball field.	Conservation Groups, Municipalities	DCNR, USACE, FEMA	Low
Encourage non-structural approaches to floodplain management.	Conservation District, DEP, FEMA	DEP, FEMA, Foundations, Private Sources	Medium
Establish adequate vegetation and floodplain integrity to limit degradation of water quality and biological resources.	Conservation Groups, Municipalities, DEP, Landowners	DEP, Foundations, Private Sources	Low

Riparian Buffers

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Protect and enhance existing riparian buffers to achieve maximum protection of water resources.	Conservation Groups, Municipalities, DEP	DEP, Foundations, Private Sources	High
Establish riparian buffers along all types of waterways.	Conservation Groups, PGC, Conservation District, Landowners	DEP, Foundations, Private Sources, CREP	Low
Educate all watershed stakeholders about the importance of riparian corridors.	Conservation Groups, PGC, Conservation District, Landowners	DEP, Foundations, Private Sources	Medium

Water Pollution

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Educate homeowners about the significance of water use designations and ways to minimize non-point source pollution.	DEP, Conservation District, Conservation Groups, Citizens	DEP, WREN	Medium
Develop and implement education workshops and/or outreach programs about point source pollution, how to report point source violations, and how to research permit information.	Conservation District, Conservation Groups, DEP	DEP, WREN, Foundations, Private Sources	Medium
Encourage the transfer of permit violation fees to a local organization for water quality improvements within the watershed.	DEP, Conservation Groups	DEP	Low
Work with DEP to develop TMDLs on all impaired streams.	DEP, Conservation Groups	DEP	High
Implement TMDLs that have been developed.	DEP, Conservation Groups	DEP	Medium
Encourage the establishment and maintenance of wetlands and riparian vegetation as cost-effective means of non-point source pollution reduction.	DEP, Conservation Groups	DEP	Low

Stormwater

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Increase local, state, and federal funding for adequate stormwater management facilities.	Conservation Groups, Municipalities	DEP, Foundations, Private Sources	High
Work with PENNVEST to address current drainage issues.	Municipalities	PENNVEST, Private Sources	Medium
Continue educational outreach with municipal and county officials about planning for future stormwater BMP implementation.	Municipalities, Planning Organizations	DEP, Foundations, Private Sources	High
Employ watershed protection and stormwater management techniques in stormwater-impacted watersheds.	DEP, Conservation Groups, Municipalities, Planning Organizations, Conservation District	DEP, Foundations, Private Sources	Medium
Inventory individual watersheds to determine percent impervious cover and stormwater impacts.	DEP, Conservation Groups, Municipalities, Planning Organizations, Conservation District	DEP, Foundations, Private Sources	Low
Protect those watersheds with 10 percent or less impervious cover.	DEP, Conservation Groups, Municipalities, Planning Organizations, Conservation District	DEP, Foundations, Private Sources	Medium
Employ restoration efforts in those watersheds considered damaged from stormwater runoff to improve water and habitat quality.	DEP, Conservation Groups, Municipalities, Planning Organizations, Conservation District	DEP, Foundations, Private Sources	Medium
Employ pollution prevention techniques in those (urbanized) watersheds containing over 60 percent impervious cover.	DEP, Conservation Groups, Municipalities, Planning Organizations, Conservation District	DEP, Foundations, Private Sources	Medium

Erosion and Sedimentation

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Implement streamside stabilization improvement projects using bioremediation techniques.	Conservation Groups, Conservation District	DEP, Foundations, Private Sources	High
Promote tax incentives and cost-share programs for sreambank fencing, barnyard stabilization, and other BMPs.	Conservation Groups, Conservation District, Landowners	DEP, Foundations, Private Sources, CREP	High
Continue the support of, and municipal participation in, the Dirt and Gravel Roads Program to reduce erosion and sedimentation.	Conservation District, Municipalities	DEP	Medium
Reduce erosion and sedimentation by incorporating BMPs in all Earth-moving activities, including logging and deforestation, construction and development, and natural resource extraction.	Conservation District	DEP	Medium

Sewage

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Upgrade sanitary sewer systems to eliminate CSOs.	Municipalities, DCED	DCED, Foundations, Private Sources	Medium
Work with local sewage enforcement officers, DEP, and municipalities to regularly update and enforce Act 537 Sewage Plans.	Conservation Groups, Landowners	DEP, Foundations, Private Sources	High
Provide programs for homeowners about maintenance and repair of on-lot sewage systems.	Municipalities, DEP, Homeowners	DEP	Medium
Perform a watershed-wide assessment of on-lot and municipal sewage systems to identify raw sewage discharges, combined sewage overflows, and sanitary sewage overflows.	DEP, Conservation District, Conservation Groups, Municipalities	DEP, Foundations, Private Sources	Medium

Agriculture

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Encourage farmers to take advantage of current cost-share programs to implement BMPs.	Farm Bureaus, Conservation Groups, Cooperative Extension	DEP, CREP, Foundations, Private Sources	Medium
Encourage farmers to have nutrient management plans developed to boost productivity and protect water resources.	Farm Bureaus, Conservation Groups, Cooperative Extension	NRCS, Foundations, Private Sources	High

Monitoring

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Host workshops or trainings about stream monitoring for adult and student volunteers.	DEP, Conservation District, Conservation Groups, Colleges and Universities	DEP, Foundations, Private Sources	Medium
Conduct sub-basin watershed assessments and develop restoration plans.	DEP, NRCS, Conservation District, Conservation Groups	DEP, Foundations, Private Sources	Medium
Conduct seasonal chemical, biological, and visual assessments for at least one year to provide background data for prioritization of future projects.	Conservation District, Conservation Groups, Colleges & Universities	DEP, Foundations, Private Sources	Low
Increase local and state funding to continue watershed monitoring efforts currently being conducted, in particular for the RPI and local educational institutions.	Conservation District, Conservation Groups	DEP, Foundations, Private Sources	High

Source Water

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Develop a locally based program for disseminating information about protecting private well supplies to homeowners.	Conservation District, Conservation Groups, Homeowners, DEP, Master Well Owners, Cooperative Extension	DEP, WREN, Foundations, Private Sources	Low
Educate homeowners about the effects on groundwater caused by the overuse of fertilizer, pesticide, and herbicide.	Conservation Groups, Homeowners, DEP, NRCS	DEP, WREN, Foundations, Private Sources	Medium
Partner with water suppliers to identify the source of the taste and odor issues of public drinking water.	Water Suppliers, Conservation Groups, Conservation District	DEP, WREN, Foundations, Private Sources	Medium
Promote groundwater quality awareness when conducting education and outreach programs for the watershed.	DEP, Conservation District, Conservation Groups	DEP, WREN, Foundations, Private Sources	High
Develop Source Water Protection Plans for all public water supplies.	Conservation District, Conservation Groups	DEP, WREN, Foundations, Private Sources	High

Other

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Study and monitor the effects of gas well drilling on surface and groundwater to determine its impact on water quality; work to minimize those impacts.	Conservation District, Conservation Groups, DEP	DEP, WREN, Foundations, Private Sources	High

Biological Resources

Wildlife and Biodiversity

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Develop areas for wildlife viewing and education to raise awareness about the high biodiversity within the watershed.	Colleges & Universities, DCNR, Conservation Groups, PGC, Conservation District, Municipalities	PGC, Private Sources, USFWS, Foundations	Medium
Develop stronger partnerships between organizations to discuss the threats to natural resources and develop protection strategies; this may include regular meetings with conservation Groups.	NRCS, Conservation and Sportsmen Organizations, Conservation District, DCNR	Private Sources	High
Educate citizens about biological diversity and the vital importance of habitats in protecting species.	Conservation Groups, Conservation District, PGC, DCNR, DEP, PFBC, PABS	DEP, DCNR, Foundations, Private Sources	Medium
Improve aquatic life habitat for fish, mussels, and other organisms by implementing BMPs and other restoration activities.	Conservation Groups, Conservation District, PFBC, DCNR	USFWS, PFBC, Foundations, Private Sources	Medium

Important Habitat Areas

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Develop a program or means through which landowners can obtain conservation easements for biologically diverse areas on their properties.	Conservation Groups, Landowners	Foundations, Private Sources	Medium
Develop an incentive program to encourage and reward landowners who develop management plans, decrease development, and employ other conservation practices in and around riparian corridors and biologically diverse areas.	Conservation District, Conservation Groups, Municipalities, Planning Organizations, Landowners	DCNR, Foundations, Private Sources	Low
Establish more private backyard conservation areas to serve as wildlife habitat and travel corridors by providing activities and programs for landowners.	DCNR, PGC, National Wildlife Federation, Conservation Groups, Landowners	PGC, Foundations, Private Sources, USFWS	Low
Identify and protect additional environmentally sensitive areas and areas of high biodiversity.	Conservation Groups, DCNR	DCNR, Foundations, Private Sources	Medium
Preserve natural habitats using smart land-use planning strategies that set aside open space for wildlife corridors.	Planning Organizations, PGC, Conservation Groups	PGC, Foundations, Private Sources, USFWS	High
Protect wetland habitats for birds and wildlife by limiting development, storm runoff, and other disturbances in wetland areas and buffers surrounding them.	Conservation District, NRCS, Conservation Groups, PGC,	PGC, Foundations, Private Sources, USFWS	High

Riparian Areas

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Encourage streamside property owners to leave a minimum 15-foot buffer from the edge of the stream when mowing their lawn.	Conservation Groups, Conservation District, Landowners	DEP, Foundations, Private Sources	Medium
Increase habitat by planting riparian buffers or allowing them to grow back through streambank fencing programs.	Conservation Groups, Conservation District, Landowners, NRCS	DEP, Foundations, Private Sources	Medium
Promote the preservation of riparian areas through education about their benefits for wildlife, flood prevention, and groundwater supplies.	Conservation Groups, Conservation District, Landowners, DEP	DEP, Foundations, Private Sources	High

County Natural Heritage Inventories

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Develop a land steward program for Biological Diversity Areas through which volunteers would be responsible for regular monitoring of these areas and educating landowners.	Conservation Groups, WPC	Foundations, Private Sources	Low
Develop more detailed management plans by working with landowners of biologically diverse areas, including inventories of natural features and invasive or exotic species monitoring plans for the properties.	Conservation Groups, DCNR, Landowners	DCNR, Foundations, Private Sources	Medium
Educate the public about the use and purpose of County Natural Heritage Inventories in planning, with an additional focus on understanding the importance of the natural resources that exist.	WPC, Municipalities, Planning Organizations, DCNR	DCNR, Foundations, Private Sources	High
Incorporate County Natural Heritage Inventories into municipal plans.	WPC, Municipalities, Planning Organizations	Private Sources	High
Study and expand areas to be included in natural heritage inventories as Biological Diversity Areas.	WPC, Municipalities, Planning Organizations, DCNR, Conservation Groups	DCNR, Foundations, Private Sources	Medium

Rare, Threatened, or Endangered Species

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Develop monitoring strategies and management plans for species of concern that are particularly vulnerable to habitat destruction by working with the Pennsylvania Natural Heritage Program.	Conservation Groups, PFBC, DCNR, PGC, WPC	Foundations, Private Sources, USFWS, PFBC, DCNR, PGC	Medium
Protect habitats that support threatened and endangered species and species of concern through acquisition, easements, and/or landowner education.	Conservation Groups, PFBC, DCNR, PGC	Foundations, Private Sources, USFWS, PFBC, DCNR, PGC	High

Invasive Species

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Compile an Internet database of exotic and invasive species sightings within the watershed that can be accessed and added to by the public.	Conservation Groups, DEP, PABS, DCNR	DCNR, Foundations, Private Sources	Medium
Conduct a watershed-wide invasive species plant survey by sub-watershed to develop a list of areas where invasive species pose the greatest threats to biodiversity.	Conservation Groups, PABS, DCNR	DCNR, Foundations, Private Sources	Medium
Develop an eradication strategy for removing invasive species, especially from high-quality areas or areas where an invasive species is expanding its territory.	Conservation Groups, DEP, PABS, DCNR	DCNR, Foundations, Private Sources	Medium
Develop monitoring plans for invasive species on private properties by working with landowners, especially those whose properties contain high-quality natural communities.	Conservation Groups, DEP, PABS, DCNR	DCNR, Foundations, Private Sources	High

Native and Sensitive Plants

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Encourage the use of native plants in landscaping and wildlife habitat plantings.	Conservation Groups, PABS	Foundations, Private Sources	Medium
Promote native tree plantings in stream-bank fencing projects.	Conservation Groups, PABS	DEP, Foundations, Private Sources	Medium

Wetlands/Swamps

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Conserving wetlands, swamps, and riparian buffers on agricultural lands and within developed areas is essential to maintaining good water quality throughout a watershed.	Conservation Groups, DCNR, Municipalities	Private Sources, Foundations, DCNR	Medium
Encourage farmers and local businesses to conserve or recreate these types of areas on their property.	Conservation Groups, DEP, DCNR, Municipalities	DEP, DCNR, Private Sources, Conservation Groups	Medium

Other

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Provide educational programs for municipal officials about land-use planning that incorporates conservation goals to make communities more attractive and protects biodiversity.	Conservation Groups, Planning Organizations, Municipalities	DEP, Foundations, Private Sources	High

Cultural Resources

Environmental Education

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Educate developers, planners, and municipal officials about environmentally friendly and sustainable development.	Municipalities, Planning Organizations, Conservation District	Foundations, Private Sources	High
Secure local, state, federal, and private funding to provide environmental education to municipal officials, watershed residents, businesses, and school-aged children about the importance of watershed protection, watershed issues such as trash dumping and agricultural related runoff, and the value of natural resources.	Municipalities, Landowners, Conservation District, Conservation Groups, School Districts	DEP, Foundations, Private Sources	Medium
Utilize and develop the Mahoning River as an ecological and education center that can be used in order to explain the effects that both point and non-point pollution can have on a habitat.	Lawrence Conservation District, DEP, DCNR, School Districts, Colleges and Universities, Conservation Groups	DEP, DCNR, Foundations, Private Sources	Medium

Historical Preservation

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Establish driving, walking, and/or biking tours that highlight historical sites in the watershed and structures to increase awareness of historical sites, structures, and history of the area.	Tourist Bureaus, Historical Societies, Citizens, Chambers of Commerce, Related Businesses, National Trust for Historic Preservation	PHMC, Foundations, Private Sources	Medium
Partner with county historical society to preserve existing historical sites and structures in the Mahoning River watershed.	Related Businesses, Preservation Historical Societies, Organizations, National Trust for Historic Preservation	PHMC, Foundations, Private Sources	High
Work with the Pennsylvania Historic Museum Commission, individuals, and Organizations to determine if local historical sites and/or structures could be added to the National Register or the State Marker Program.	National Park Service, PHMC, Historical Societies, National Trust for Historic Preservation	PHMC, Foundations, Private Sources	Low

Marketing Recreation

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Identify local, state, federal, and private funding to promote ecotourism.	DCNR, Tourist Bureaus, Conservation &Recreation Organizations	Private Sources, Foundations, DCNR, Businesses	High
Promote tourism utilizing available natural and recreational resources such as the Stavich Bike Trail.	Conservation &Recreation Organizations, Tourist Bureaus	Private Sources, Foundations, DCNR Businesses	High
Utilize river resources for recreation opportunities by gathering local, state, federal, and private funding for Mahoning River clearing/cleanup.	Tourist Bureaus, PFBC, Recreation & Conservation Groups, DCNR	Private Sources, Foundations, DCNR, Businesses	High

Recreational Opportunities

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Develop public access sites to the Mahoning River and some of its tributaries, including adequate parking and amenities.	DCNR, PFBC, Recreation &Conservation Groups, USACE	DCNR, USACE, Private Sources, Foundations	High
Enhance existing community parks with updated equipment.	Municipalities, Recreation Organizations	DCNR, Foundations, Private Sources	Medium
Enhance recreational facilities to be multi-use facilities providing a variety of activities and amenities.	DCNR, Municipalities, Conservation &Recreation Organizations	DCNR, Foundations, Private Sources	High
Establish year-round recreational opportunities.	DCNR, USACE, Sportsmen & Recreation Organizations	DCNR, USACE, Private Sources, Foundations	High
Identify and protect areas open to hunting.	Sportsmen &Conservation Groups, PGC	PGC, DCNR, Private Sources, Foundations	Medium
Increase local, state, federal, and private funding for establishing and maintaining multi-use parks, providing access to waterways, maintaining open space and maintaining area fishing hot spots.	Conservation District, Conservation &Recreation Organizations	DCNR, PFBC, Private Sources, Foundations	High
Encourage landowners to allow hunting on their properties and educate hunters about the importance of land etiquette.	Sportsmen, PGC	PGC, DCNR, Private Sources	Low
Protect and improve area waterways to maintain area fishing hot spots.	DEP, Sportsmen & Conservation Groups, PFBC, Conservation District	PFBC, DEP	Medium
Work with private landowners to provide access to waterways for anglers and small non-powered watercraft.	Landowners, PFBC, Conservation Groups	DCNR, Foundation, Private Sources	Medium

Trails

Issues and Recommended Approaches	Potential Partners	Potential Funding	Priority
Conduct feasibility studies for the development of recreational areas and trails for off-road vehicles as they currently do not have an all-terrain vehicle trail in the Mahoning River watershed.	Trail Groups, ORV Riders, Municipalities	DCNR	Medium
Convert abandoned rail lines into multi-use trails.	Trail Groups, Landowners, Conservation Groups	DCNR	Medium
Develop additional trailheads on existing trails.	Trail Groups, Conservation Groups, Municipalities	DCNR	High
Educate all-terrain vehicle riders to recreate in an environmentally sound way and the importance of land etiquette.	ORV Riders, DCNR, USFS	DCNR	Medium
Establish a network of multi-use trails by connecting existing and new trails together.	Municipalities, Trail Groups, Conservation Groups	DCNR	High

Establish environmentally sound public trails or parks for all-terrain vehicles.	ORV Riders, Trail Groups, DCNR	DCNR	Medium
Establish a water trail on Hickory Run.	Conservation Groups, PFBC, DCNR	PFBC, DCNR	Medium
Increase local, state, federal, and private funding for trail maintenance and development.	Conservation &Recreation Organizations, Trail Groups	Foundations, Private Sources	High
Increase safety for trails along roadways by erecting signs alerting motorists to trails and trail crossings, and offering trail safety seminars to trail users.	Trail Groups, PENNDOT, Municipalities,	Foundations, Private Sources	Medium
Maintain trail paths, whether water or land, and keep free of debris for the safety of those utilizing the resources available.	Trail Groups, PFBC, Conservation Organizations, Citizens	DCNR, Foundations, Private Sources	High

CHAPTER 8: REFERENCES

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Appendix A
Glossary

APPENDIX A: GLOSSARY

303(d) List	A listing of Pennsylvania streams that have not met or cannot maintain required water quality standards. See Integrated Waterbody List.
305(b) Report	A listing of Pennsylvania streams that have documented water quality issues. See Integrated Waterbody List.
Abandoned Mine Drainage	A groundwater discharge that emanates from former underground or surface mines.
Acid	Having a pH less than 7.
Acidity	The capacity of water for neutralizing a basic solution.
Agricultural Security Areas	Lands enrolled in a statewide program that has been established to promote the conservation and preservation of agricultural lands and the agricultural community.
Alkaline	Having a pH greater than 7.
Alkalinity	Buffering capacity; the ability to resist pH change.
Alluvial	Pertains to the environments, processes, and products of streams or rivers. Materials deposited by flowing water are referred to as alluvial deposits.
Bedrock	The solid rock that underlies the soil and other unconsolidated material, or that is exposed at the surface.
Best Management Practices	Refer to the most environmentally appropriate techniques for agriculture, forestry, mining, development, urban stormwater management, and other practices that are potential threats to natural resources.
Biodiversity	The number and variety of organisms found within a specified geographic region, or a particular habitat; the variability among living organisms on the earth, including the variability within and between species and within and between ecosystems.
Bog	Peatland that has virtually no contact with groundwater.
Brownfield	A piece of industrial or commercial property that is abandoned or underused and often environmentally contaminated, especially one considered as a potential site for redevelopment.
Buffer	To cushion, shield, or protect; any substance capable of neutralizing both acids and bases in a solution without appreciably changing the solution's original acidity or alkalinity.
Channelization	The physical cutting or forming of a desired channel or path to direct a stream or river.
Colluvial	Of or pertaining to loose earth material that has accumulated at the base of a slope.
Colluvium	Deposited at the edge of the slope.
Combined Sewage Overflows	Exceeding the capacity of a sanitary sewage system allowing untreated wastewater to be discharged to the stream.
Comprehensive Plan	A general policy guide for the physical development of a municipality, taking into

	account many factors, including locations, character, and timing of future development.
Confluence	The meeting of two waterways.
Coniferous Forest	A forest consisting primarily of trees that are evergreen.
Conservation	The maintenance of environmental quality and physical, biological, and cultural resources; ecosystem management within given social and economic constraints; producing goods and services for humans without depleting natural ecosystem diversity, and acknowledging the natural dynamic character of biological systems.
Conservation Easement	A deed restriction that landowners can voluntarily place on their properties to protect natural resources.
Contamination	The act of making impure or unsuitable by contact or mixture with something unclean, bad, etc.
Critical Areas	Areas that have constraints that limit development and various other activities.
Cropland	Land used for cultivating crops.
Cultivation	Preparation and use of land for crops.
Deciduous Forest	A forest consisting primarily of trees that shed their leaves annually.
Dendritic Drainage Pattern	A drainage pattern of a branching form.
Drumlins	Clusters of elongated hills of unstratified mixtures of clay, silt, sand, gravel, and boulders.
Easement	A deed restriction that a landowner may voluntarily place on a property to protect its future uses.
Ecology	The study of the interrelationships among and between organisms, and between them and all aspects, living and nonliving, of their environments.
Elevation	The height above sea level of a location.
Encroachment	The act of advancing beyond established or proper limits.
Environmental Education	A learning process that increases knowledge and awareness of the environment and associated challenges, develops skills and expertise to address these challenges, and fosters attitudes, motivation, and commitment to make informed decisions and take responsible actions.
Envirothon	An environmental competition among high school students.
Ephemeral Streams	Streams that flow for a short time, usually after a rain or snowmelt event.
Erosion	The mechanical transfer by water and air of soils and rocks that have been weathered into finer particles.
Eskers	A sinuous ridge of sediment, typically gravel or sand, deposited by streams that cut channels under or through a glacier's ice.
Fauna	Animal life.
Fens	Nutrient rich, high alkalinity, wetlands composed of decaying matter.

Floodplains	The level land along the course of a river or stream formed by the deposition of sediment during periodic floods.
Flora	Plant life.
Fluvial	Of or pertaining to rivers or streams.
Fragipan	Dense subsoil that roots cannot penetrate.
Fragmentation	Broken or split into several pieces or portions.
Geology	The study of the development of the earth's crust, including rocks, fossils, etc.
Glaciers	A river of ice moving very slowly.
Greenway	A corridor of open space.
Groundwater	Groundwater Water beneath the earth's surface; found in pore spaces in rock material. Supplies wells and springs as a source of drinking water for many; also contributes to surface water.
Hazardous Areas	Those areas that pose danger, risk, or difficulty.
Headwaters	Refers to upstream reaches of a stream or river.
Herpetological	Dealing with reptiles and amphibians.
Hydrology	The study of the movement of water on the earth; includes surface water and groundwater.
Illegal Dumps	Sites where trash and other unwanted items are disposed of illegally. Typically along streams and roadways.
Impervious Cover	Material that covers the land that water cannot penetrate.
Important Bird Areas	Those areas protected for outstanding avian habitat as determined by a group of scientific advisors, based on strict scientific criteria. IBAs include migratory staging areas, winter feeding and roost sites, and prime breeding areas. They also include critical habitats, such as grasslands, bogs, marshes, and bottomland hardwood swamps.
Impoundment	Usually refers to a manmade body of water, often through damming a stream or river.
Infrastructure	The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water, sewer, and power lines, and public institutions, including schools, post offices, and prisons.
Integrated Waterbody List	An integrated format for Clean Water Act Section 305(b) reporting and Section 303(d) listing. This document contains summaries of various water quality management programs including water quality standards, point source control and non-point source control. It also includes descriptions of programs to protect lakes, wetlands, and groundwater quality, and a summary of the use support status of streams and lakes.
Invasive Species	Environmentally noxious weeds that grow aggressively, spread easily, and displace other plants.
Kames	Deposits that are formed when running water and stagnant ice come into contact.
Kettles	Blocks of ice left behind on outwash plains by retreating glaciers, or outburst floods

	from ice-dammed glacial lakes caused by collapse of the ice dam.
Landslides	The falling or sliding of a mass of soil, detritus, or rock from a steep slope.
Limestone	A sedimentary type of rock comprised largely of calcium carbonate.
Lysimeters	Devices used for measuring percolation and leaching losses of water and solute uses.
Macroinvertebrates	Organisms generally associated with soil or stream substrates that lack backbones and can be seen without magnification.
Management Recommendations	Non-regulatory suggestions to improve the quality of life.
Marshes	Wetlands that are seasonally inundated with water.
Mitigate	To lessen or minimize the impacts of.
Moraines	Sediment consisting of mud, sand, gravel, and boulders deposited in long mounds.
Native Plants	Plant species that occur naturally in a given area.
Natural Heritage Inventory	A method of assessing areas of important plants, animals, and ecological communities.
Nitrification	Conversion of ammonium to nitrate by bacteria.
Non-point Source Pollution	Pollutants that have no readily visible source and often require detailed analysis and research to discern the source.
Non-regulatory	Not enforceable.
Nutrient Management Plans	Plans providing information about nutrient allocations, excess manure utilization, runoff controls, and best management practices for farms with an annual density of more than two animal units per acre.
Ordinance	An authoritative decree or law; a municipal regulation.
Outwash Plains	Gentle slopes in front of a glacier where eroded materials, transported by water, were deposited.
Palustrine Community	Animal and plant species found in marshes and swamps.
Peat	Partially carbonized vegetable matter, usually mosses, found in bogs and used as fertilizer and fuel.
Pennsylvania Natural Heritage Program	A partnership that conducts inventories and collects data to identify the state's most sensitive and significant organisms and features.
Permeability	The rate of flow of a liquid or gas through a porous material.
Permit	A decree granting permission to do something.
pH	A measure of acidity or alkalinity of a medium.
Physiographic	The physical relatedness of all areas within a given region.

Point Source Pollution	Pollutants that can easily be traced to their sources.
Potable	Suitable for drinking.
Preservation	The act or process of keeping something safe from harm or injury; the act of maintaining or reserving.
Prime Agricultural Soils	Soils that are extremely well suited for agricultural uses and meet certain physical, chemical, and slope characteristics.
Rails to Trails	A program that converted abandoned or unused railroad corridors into public trails.
Reclamation	The conversion of wasteland into land suitable for use of habitation or cultivation.
Recycle	To treat or process used or waste materials so as to make suitable for reuse.
Restoration	Returning to its original state or condition.
Riparian Habitats	Area of protective vegetation next to a body of water that serves as a barrier against polluted runoff and provides habitat corridors for wildlife.
Riverine Species	Animals and plant species found in or near a river.
Runoff	Rainfall or snowmelt not absorbed by soil that flows over the surface of the ground to a receiving waterway.
Sanitary Sewage Overflows	Occur when water entering a sanitary sewage system causes it to exceed capacity, resulting in raw sewage being discharged to nearby streams.
Sedimentation	The deposit of particles moved by erosion.
Sewage enrichment	Addition of nutrients to a waterway from sewage waste.
Silviculture	The branch of forestry dealing with the development and care of forests.
Sinkhole	A hole formed in soluble rock by the action of water, serving to conduct surface water to an underground passage.
Smart Growth	A current movement that focuses on redevelopment of established urban areas and other ways to reduce sprawl pressures on undeveloped countrysides.
Soil Associations	A classification of soil types that comprise two to three major soil types and a few minor soil types.
Stakeholder	Anyone who lives, works, and recreates in an area.
Stewardship	Management of a property.
Stormwater	Water that runs off the land into surface waters during and immediately following periods of precipitation.
Stormwater Management	Planning for surface runoff into streams and river systems during rain and/or snowmelt events.
Subsidence	The downward movement of surface material involving little or no horizontal movement.
Subwatershed	The watershed of a tributary stream; it is a sub-unit of the receiving stream, river, or

	lake's watershed.
Succession	A series of things or events that follow one another.
Superfund Sites	A hazardous waste site placed on the Superfund National Priorities List and financed for clean up by the US EPA.
Swamps	Wetlands with standing or gently flowing water, seasonally inundated from an adjoining stream or lake.
Temperate Climate	A climate without extremes of temperature or precipitation.
Terrestrial	Living or growing on land; not aquatic.
Total Maximum Daily Load	A limit for pollutant load placed on a waterway by PA DEP. TMDLs are determined for a waterway based on how much pollutant it is determined that the waterway can assimilate and still meet its designated use criteria. TMDLs will be used to regulate the percentage of total pollutant load that each source in a watershed can contribute.
Topography	Describes landscape features of an area.
Tributary	A stream that feeds into another (receiving) stream, river, lake, or ocean.
Vegetation	Plants, collectively.
Vernal Pools	Temporary ponds of water typically found in the spring.
Water Budgets	A document detailing water needs, water usage, and water availability.
Water Conservation	The act of using water wisely, as to not waste or injure the quality or quantity.
Watershed	The area of land that drains to a particular point along a stream. Each stream has its own watershed. Topography is the key element affecting this area of land. The boundary of a watershed is defined by the highest elevations surrounding the stream. A drop of water falling outside the boundary will drain to another watershed.
Wetlands	Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
Woodland	Land mostly covered with trees.

Appendix B
Planning Committee

APPENDIX B: PLANNING COMMITTEE

Lauren Anderson	Lawrence County Conservation District	Resource Technician
Megan Gahring	Tri-County Cleanways	Treasurer
Robin Kirkwood	Bessemer Borough	Beautification Committee
Jo Ann McBride	Lawrence County TPA	Director
Jo Ann McCready	Lawrence County Conservation District	District Manager
Amy McKinney	Lawrence County Planning Department	Director
Joe Morris	PA Fish & Boat Commission	Waterway Conservation Officer
Jon Natale	PA American Water	
Ed Petrus	NRCS	District Conservationist
Scott Rondeau	Mahoning Sportsman Club	Representative
Jay Russell	Lawrence County Conservation District (former employee)	Ag Technician
Jason Shallcross	Lawrence County Planning Department	GIS Planner
Cliff Wallace	Mohawk Area School District	FFA Coordinator
Jerry Zona	Lawrence County Recycling & Solid Waste	Director

Appendix C

Rare, Threatened, and Endangered Species (PNDI)

APPENDIX C: RARE, THREATENED, AND ENDANGERED SPECIES (PNDI)

Scientific Name	Common Name	Federal Status	State Status	PBS Status	Global Rank	State Rank
Birds						
Circus cyaneus	Northern Harrier		PT	PT	G5	S2B,S4N
Haliaeetus leucocephalus	Bald Eagle		PT	PT	G5	S3B
Mammals						
Myotis septentrionalis	Northern Myotis			CR	G4	S1
Muscles and Snails						
Amblema plicata	Three-ridge			PT	G5	S2S3
Epioblasma triquetra	Snuffbox	LE	PE	PE	G3	S1
Fusconaia subrotunda	Long-solid			PE	G3	S1
Obovaria subrotunda	Round Hickorynut		PE	PE	G4	S1
Pleurobema clava	Clubshell	LE	PE	PE	G1G2	S1S2
Pleurobema sintoxia	Round Pigtoe			PE	G4G5	S2
Quadrula cylindrica	Rabbitsfoot	C	PE	PE	G3G4	S1
Quadrula pustulosa	Pimpleback			PX	G5	S1
Quadrula verrucosa	Pistolgrip Mussel		PE	PE	G4G5	S1
Villosa fabalis	Rayed Bean Mussel	LE	PE	PE	G2	S1S2
Villosa iris	Rainbow Mussel			PE	G5Q	S1
Plants						
Filipendula rubra	Queen-of-the-prairie		TU	TU	G4G5	S1S2
Oxypolis rigidior	Stiff Cowbane		TU	PT	G5	S2
Penstemon laevigatus	Beard-tongue		N	TU	G5	S3
Prenanthes crepidinea	Crepis Rattlesnake-root		PE	SP	G4	S4
Pyrola chlorantha			N	PE	G5	S1
Veratrum virginicum	Virginia Bunchflower		N	PE	G5	S1
Communities						
Water-willow (decodon verticillatus) shrub wetland	Water-willow (decodon verticillatus) shrub wetland				GNR	S3
Geology						
Waterfalls and rapids	Waterfalls and Rapids				GNR	SNR

Appendix D
Wildlife Listing

APPENDIX D: WILDLIFE LISTING

Mammal Species

(developed from Carnegie Museum of Natural History records and published distributions)

Common Name	Scientific Name
Allegheny woodrat	*Neotoma floridana*
bat, hoary	*Lasiurus cinereus*
bat, northern long-eared	*Myotis septentrionalis*
bat, silver-haired	*Lasionycteris noctivagans*
bat, big brown	*Eptesicus fuscus*
bat, eastern pipistrelle	*Pipistrellus subflavus*
bat, little brown	*Myotis lucifugus*
bat, red	*Lasiurus borealis*
bear, black	*Ursus, americanus*
beaver	*Castor canadensis*
chipmunk, eastern	*Tamias striatus*
coyote	*Canis latrans*
deer, whitetailed	*Odocoileus virginianus*
fox, gray	*Curocyon cinereoargenteus*
fox, red	*Vulpes vulpes*
lemming, bog	*Synaptomys cooperi*
marten, pine	*Martes americana*
mink	*Mustela vision*
mole, hairy-tailed	*Parascalops breweri*
mole, star-nosed	*Condylura cristata*
mouse, deer	*Peromyscus maniculatus*
mouse, house	*Mus musculus*
mouse, meadow jumping	*Zapus hudsonius*
mouse, white-footed	*Peromyscus lencopus*
mouse, woodland jumping	*Napaeozapus insignis*
muskrat	*Ondatra zibethicus*
opossum	*Didelphis virginicana*
otter, river	*Lutra canadensis*
rabbit, eastern cottontail	*Sylvilagus floridanus*
raccoon	*Procyn lotor*
rat, Norway	*Rattus norvegicus*
shrew, least	*Cryptotis parva*
shrew, masked	*Sorex cinereus*
shrew, smoky	*Sorex fumeus*
shrew, short-tailed	*Blarina brevicauda*
skunk, striped	*Mephitis mephitis*

squirrel, fox	*Sciurus niger*
squirrel, red	*Tamiasciurus hudsonicus*
squirrel, southern flying	*Glaucomys volans*
vole, meadow	*Microtus pennsylvanicus*
vole, pine/woodland	*Microtus pinetorum*
vole, red-backed	*Clethrionomys gapperi*
weasel, least	*Mustela nivalis*
weasel, long-tailed	*Mustela frenata*
weasel, short-tailed	*Mustela erminea*
woodchuck or groundhog	*Marmota monax*

Amphibian and Reptile Species

(Developed from "Amphibians and Reptiles of Pennsylvania and the Northeast")

Common Name	**Scientific Name**
bullfrog	*Rana catesbeiana*
frog, pickerel	*Rana palustris*
frog, green	*Rana clamitans*
frog, mountain chorus	*Pseudacris brachyphona*
frog, northern leopard	*Rana pipiens*
frog, western chorus	*Pseudacris triseriata triseriata*
frog, wood	*Rana sylvatica*
mudpuppy	*Necturus maculosus maculosus*
newt, red-spotted	*Notophthalmus viridescens viridescens*
peeper, northern spring	*Pseudacris crucifer crucifer*
rattlesnake, eastern massasauga	*Sistrurus catenatus*
salamander, ravine	*Plethodon richmondi*
salamander, eastern hellbender	*Cryptobracnchus alleganiensis alleganiensis*
salamander, four-toed	*Hemidactylium scutatum*
salamander, Jefferson	*Ambystoma jeffersonianum*
salamander, longtail	*Eurycea longicauda longicauda*
salamander, mountain dusky	*Desmognathus ochrophaeus*
salamander, northern dusky	*Desmognathus fuscus fuscus*
salamander, northern red	*Pseudotriton ruber ruber*
salamander, northern slimy	*Plethodon glutinosus*
salamander, northern spring	*Gyrinophilus prophyriticus porphyriticus*
salamander, northern two-lined	*Eurycea bislineata*
salamander, redback	*Plethodon cinerius*
salamander, spotted	*Ambystoma maculatum*
skink, five-lined	*Eumeces fasciatus*
snake, black rat	*Elaphe obsoleta obsoleta*
snake, eastern milk	*Lampropeltis triangulum triangulum*
snake, eastern ribbon	*Thamnophis sauritus*

snake, eastern garter	*Thamnophis sirtalis*
snake, northern black racer	*Coluber constrictor constrictor*
snake, northern brown	*Storeria dekayi dekayi*
snake, northern copperhead	*Agkistrodon contortrix mokasen*
snake, northern redbelly	*Storeria occipitomaculata occipitomaculata*
snake, northern water	*Nerodia sipedon sipedon*
snake, queen	*Regina septemvittata*
snake, smooth green	*Opheodrys vernalis*
snake, northern ringneck	*Diadophis punctatus edwardsii*
toad, eastern American	*Bufo americanus americanus*
toad, Fowler's	*Bufo woodhoussii fowleri*
treefrog, gray	*Hyla versicolor, Hyla chrysoscelis*
turtle, Blanding's	*Emydoidea blandingii*
turtle, bog	*Clemmys muhlenbergii*
turtle, common musk	*Sternotherus odoratus*
turtle, common snapping	*Chelydra serpentina serpentina*
turtle, eastern box	*Terrapene carolina carolina*
turtle, eastern spiny softshell	*Apalone spinifera*
turtle, painted	*Chrysemys picta*
turtle, spotted	*Clemmys guttata*
turtle, wood	*Clemmys insculpta*

Bird Species

(developed from Bartramian birding club sightings and the US Breeding Bird Survey)

Common Name	**Scientific Name**
avocet, American	*Recurvirostra americana*
black duck, American	*Anas Rubripes*
blackbird, red-winged	*Agelaius phoeniceus*
blackbird, rusty	*Euphagus carolinus*
bluebird, eastern	*Sialia sialis*
bobolink	*Dolichonyx oryzivorus*
bunting, Indigo	*Passerina cyanea*
cardinal, Northern	*Cardinalis cardinalis*
chat, yellow-breasted	*Icteria virens*
catbird, gray	*Dumetella carolinensis*
chickadee, black-capped	*Poecile atricapillus*
coot, American	*Fulica americana*
cormorant, double-crested	*Phalacrocorax auritus*
cowbird, brown-headed	*Molothrus ater*
creeper, brown	*Certhia americana*
crow, American	*Corvus brachyrhynchos*
cuckoo, black-billed	*Coccyzuz erythrophthalmus*

cuckoo, yellow-billed	*Coccyzuz americanus*
dove, mourning	*Zenaida macroura*
dove, rock	*Columba livia*
dowitcher, long-billed	*Limnodromus scolapaceus*
dowitcher, short-billed	*Limnodromus griseus*
duck, bufflehead	*Bucephala albeola*
duck, canvasback	*Aythyra vallisneria*
duck, common goldeneye	*Bucephala clangula*
duck, common merganser	*Mergus merganser*
duck, hooded merganser	*Lophodytes cucullatus*
duck, long-tailed	*Clangula hyemalis*
duck, red-breasted merganser	*Mergus serrator*
duck, redhead	*Aythya americana*
duck, ring-necked	*Aythya collaris*
duck, ruddy	*Oxyura jamaicensis*
duck, wood	*Aix sponsa*
dunlin	*Calidris alpina*
eagle, bald	*Haliaeetus leucocephalus*
egret, great	*Area alba*
falcon, peregrine	*Falco peregrinus*
finch, house	*Carpodacus mexicanus*
finch, purple	*Carpodacus purpureus*
flicker, northern	*Colaptes auratus*
flycatcher, Acadian	*Empidonax virescens*
flycatcher, great-crested	*Myiarchus crinitus*
flycatcher, least	*Empidonax minimus*
flycatcher, olive-side	*Contopus cooperi*
flycatcher, willow	*Empidonax trailli*
flycatcher, yellow-bellied	*Empidonax flaviventris*
gadwall	*Anas strepera*
gnatcatcher, blue-gray	*Polioptila coerulea*
goldfinch, American	*Carduelis tristis*
goose, Canada	*Branta canadensis*
goose, snow	*Chen caerulescens*
goshawk, northern	*Accipiter gentilis*
grackle, common	*Quiscalus quiscula*
grebe, eared	*Podiceps nigricollis*
grebe, horned	*Podiceps auritus*
grebe, pied-billed	*Podilymbus podiceps*
grosbeak, blue	*Guiraca caerulea*
grosbeak, rose-breasted	*Pheucticus ludovicianus*
grouse, ruffed	*Bonasa umbellus*
gull, Bonaparte's	*Larus philadelphia*

gull, Franklin's	*Larus pipixcan*
gull, great black-backed	*Larus marinus*
gull, herring	*Larus argentatus*
gull, ring-billed	*Larus delawarensis*
harrier, northern	*Circus cyaneus*
hawk, Cooper's	*Accipiter cooperii*
hawk, red-shouldered	*Buteo lineatus*
hawk, red-tailed	*Buteo jamaicensis*
hawk, sharp-shinned	*Accipiter striatus*
heron, black-crowned night	*Nycticorax nycticorax*
heron, great blue	*Ardea herodias*
heron, green	*Butorides virescens*
hummingbird, ruby-throated	*Archilochus colubris*
ibis, glossy	*Plegadis falcinellus*
jay, blue	*Cyanocitta cristata*
junco, dark-eye	*Junco hyemalis*
kestrel, American	*Falco sparverius*
kildeer	*Charadrius vociferus*
kingbird, eastern	*Tyrannus tyrannus*
kingfisher, belted	*Ceryle alcyon*
kinglet, golden-crowned	*Regulus satrapa*
kinglet, ruby-crowned	*Regulus calendula*
lark, horned	*Eremophila alpestris*
loon, common	*Cavia immer*
mallard	*Anas platyrhynchos*
martin, purple	*Progne subis*
meadowlark, eastern	*Sturnella magna*
merlin	*Falco columbarius*
mockingbird, northern	*Mimus polyglottos*
nighthawk, common	*Chordeiles minor*
nuthatch, red-breasted	*Sitta canadensis*
nuthatch, white-breasted	*Sitta Carolinensis*
oriole, Baltimore	*Icterus galbula*
oriole, orchard	*Icterus spurius*
osprey	*Pandion haliaetus*
ovenbird	*Seiurus aurocapillus*
owl, barred	*Strix varia*
owl, eastern screech	*Otus asio*
owl, great horned	*Bubo virinianus*
parula, northern	*Parula americana*
phalarope, red-necked	*Phalaropus lobatus*
phalarope, Wilson's	*Phalaropus tricolor*
pheasant, rink-necked	*Phasianus colchicus*

phoebe, eastern	*Sayornis phoebe*
pintail, northern	*Anas acuta*
pipit, American	*Anthus rubescens*
plover, American golden	*Pluvialis dominica*
plover, black-bellied	*Pluvialis squatarola*
plover, semipalmated	*Charadrius semipalmatus*
rail, Virginia	*Rallus limicola*
red knot	*Calidris canatus*
redstart, American	*Setophaga ruticilla*
robin, American	*Turdus migratorius*
ruddy turnstone	*Arenaria interpres*
sandpiper, Baird's	*Calidris bairdii*
sandpiper, buff-breasted	*Tryngites subraficollis*
sandpiper, least	*Caliris minutilla*
sandpiper, semipalmated	*Calidris pusilla*
sandpiper, solitary	*Tringa solitaria*
sandpiper, spotted	*Actitis macularia*
sandpiper, stilt	*Calidris himantipus*
sandpiper, western	*Calidris mauri*
sandpiper, white-rumped	*Calidris fuscicollis*
sapsucker, yellow-bellied	*Sphyrapicus varius*
sanderling	*Calidris alba*
scaup, greater	*Aythya marila*
scaup, lesser	*Aythya affinis*
scoter, surf	*Melanitta perspicillata*
shoveler, northern	*Anas clypeata*
shrike, northern	*Lanius excubitor*
snipe, common	*Gallinago gallinago*
sparrow, chipping	*Spizella passerina*
sparrow, field	*Spizella*
sparrow, fox	*Passerella Iliaca*
sparrow, house	*Passer domesticus*
sparrow, Lincoln's	*Melospiza lincolnii*
sparrow, Savannah	*Passerculus sandwichensis*
sparrow, song	*Melospiza melodia*
sparrow, swamp	*Melospiza georgiana*
sparrow, vesper	*Pooecetes gramineus*
sparrow, white-crowned	*Zonotrichia leucophrys*
sparrow, white-throated	*Zonotrichia albicollis*
starling, European	*Sturnus vulgaris*
swallow, bank	*Riparia riparia*
swallow, barn	*Hirundo rustica*
swallow, cliff	*Petrochelidon pyrrhonota*

swallow, northern rough-winged	*Stelgidopteryx ruficollis*
swallow, tree	*Spizella arborea*
swan, mute	*Cygnus olor*
swan, trumpeter	*Cygnus cuccinator*
swan, tundra	*Cygnus columbianus*
swift, chimney	*Chaetura pelagica*
tanager, scarlet	*Piranga olivacea*
teal, blue-winged	*Anas discors*
teal, green-winged	*Anas crecca*
tern, black	*Chlidonias niger*
tern, Caspian	*Sterna caspia*
tern, common	*Sterna hirundo*
tern, Forster's	*Sterna forsteri*
thrasher, brown	*Toxostoma rufum*
thrush, hermit	*Catharus guttatus*
thrush, Swainson's	*Catharus ustulatus*
thrush, wood	*Hyocichla mustelina*
titmouse, tufted	*Baeolophus bicolor*
towhee, eastern	*Pipilo erythrophthalmus*
tree sparrow, American	*Spizella arborea*
turkey, wild	*Meleagris gallopavo*
vireo, blue-headed	*Vireo solitarius*
vireo, Philadelphia	*Vireo philadelphicus*
vireo, red-eyed	*Vireo olivaceus*
vireo, warbling	*Vireo gilvus*
vireo, white-eyed	*Vireo griseus*
vulture, turkey	*Cathartes aura*
Warbler, bay-breasted	*Dendroica castanea*
warbler, black-and-white	*Mniotilta varia*
warbler, blackburnian	*Dendroica fusca*
warbler, blackpoll	*Dendroica striata*
warbler, black-throated green	*Dendroica virens*
warbler, blue-winged	*Vermivora pinus*
warbler, Canada	*Wilsonia canadensis*
warbler, Cape May	*Dendroica tigrina*
warbler, cerulean	*Dendroica cerulea*
warbler, chestnut-sided	*Dendroica pennsylvanica*
warbler, Connecticut	*Oporornis agilis*
warbler, hooded	*Wilsonia citrina*
warbler, magnolia	*Dendroica magnolia*
warbler, Nashville	*Vermivora ruficapilla*
warbler, orange-crowned	*Vermivora celata*
warbler, palm	*Dendroica palmarum*

warbler, pine	*Dendroica pinus*
warbler, Tennessee	*Vermivora peregrina*
warbler, Wilson's	*Wilsonia pusilla*
warbler, yellow	*Dendroica petechia*
warbler, yellow-throated	*Dendroica dominica*
waterthrush, Louisiana	*Seiurus motacilla*
waterthrush, northern	*Seiurus noveboracensis*
waxwing, cedar	*Bonbycilla cedrorum*
whimbrel	*Numenius phaeopus*
whip-poor-will	*Caprimulgus vociferus*
wigeon, American	*Anas americana*
willet	*Catoptrophorus semipalmatus*
woodcock, American	*Scolopax minor*
woodpecker, downy	*Picoides pubescens*
woodpecker, hairy	*Picoides villosus*
woodpecker, pileated	*Dryocopus pileatus*
woodpecker, red-bellied	*Melanerpes carolinus*
woodpecker, red-headed	*Melanerpes erythrochephalus*
wood-pewee, eastern	*Contopus virens*
wren, Carolina	*Thryothours lodocicianus*
wren, house	*Troglodytes aedon*
wren, winter	*Troglodytes troglodytes*
yellowlegs, greater	*Tringa melanoleuca*
yellowthroat, common	*Geothlypis trichas*

Appendix E
Funding Sources

APPENDIX E: FUNDING SOURCES

Sponsoring Organization	Description/Restrictions
BMP	
State Conservation Commission-Dirt and Gravel Roads Maintenance	Available to local municipalities and state agencies for projects dealing with the BMPs for erosion and sedimentation control problems and fugitive dust in watersheds; dirt and gravel road jurisdiction required.
Energy	
DEP - Alternative Fuels	The Alternative Fuels Incentive Grants program continues to fund a considerable number of projects that use alternative fueled energy sources to reduce air pollution and our dependence on foreign oil. Alternative fuels include compressed natural gas.
Environmental	
Beldon II Fund	Support environmental organizations working at the state-level. Some grants are made to regional and national organizations for efforts that support the work of state level groups.
Eddie Bauer	Fund projects in certain local areas that support environmental goals such as clean rivers and streams or beautifying parks and school grounds. Must be 501(c) 3 and proposal should be kept between 2-3 pages.
Howard Heinz Endowment	This program promotes environmental quality and sustainable development by supporting efforts to eliminate waste, harness the power of the market, and create a restorative economy. Should Promote sustainable urban design. Concentrated in Western Pennsylvania.
Surdna Foundation	The foundation's goal is to prevent damage to the environment and to promote more efficient, economically sound, environmentally beneficial, and equitable use of land and natural resources. Does not fund environmental education, sustainable agriculture, food production or toxic and hazardous waste.
Vira I Heinz Endowment	This program promotes environmental quality and sustainable development by supporting efforts to eliminate waste, harness the power of the market, and create a restorative economy. The program's goal is to promote sustainable urban design. Western Pennsylvania watersheds only.
Environmental / Watershed	
EPA-Clean Water State Revolving Fund	The Safe Drinking Water Act, as amended in 1996, established the Drinking Water State Revolving Fund (DWSRF) to make funds available to drinking water systems to finance infrastructure improvements. The program also emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water.
WREN - Conference/Training Scholarships	The activities funded must be educational and relate to drinking water source protection or watershed education. Applicant is required to provide a five percent match.
Western Pennsylvania Watershed Program, Howard Heinz Endowments	Provides funding to grassroots organizations and watershed associations for specific watershed remediation in western Pennsylvania. Select western Pennsylvania watersheds only.
Captain Planet	Supports hands-on environmental projects for children and youth to encourage innovative programs that empower children and youth around the world to work individually and collectively to solve environmental problems. Only for environmental education of children. Online only.
DEP Environmental Education Grants	Open to schools, conservation districts, and non-profits. Open in summer, awarded in spring. Final application due dates vary. Application available online. Requires twenty percent match and reimbursement program.
Education Mini Projects Program	Small grants for Pennsylvania-based grassroots educational projects that address non-point source watershed concepts.

EPA Environmental Education Grants Region III	Grants awarded to small non-profit groups for various projects in Region III.
PACD - Mini Projects	The objectives of the Educational Mini-Project must promote the We All Live Downstream message by: stimulating an awareness of and interest in Pennsylvania's non-point source water pollution problems and solutions; salaries are not an approved expenditure.
Project Wild	Project Wild is an interdisciplinary supplementary environmental and conservation program for educators of children in grades K-12. Small grants only.
Water Resources Education Network - LWV	Funding to develop education programs for water issues facing communities. Local contact is shrerenehess@yourinter.net, Indiana PA, 724-465-2595. Must be 501(c)3
WREN - Opportunity Grants	The activities funded must be educational and relate to drinking water source protection or watershed education.
Environmental Justice	
EPA-Environmental Justice Small Grant Program	The program provides financial assistance to eligible affected local community-based organizations working on or planning to work on projects to address local environmental and/or public health concerns.
Nathan Cummings Foundation	The foundation's purpose is to facilitate environmental justice and environmentally sustainable communities by supporting the accountability of corporations, governments, and other institutions for their environmental practices. Does not fund individuals, scholarships, or capital or endowment campaigns.
Norman Foundation	Support efforts that strengthen the ability of communities to determine their own economic, environmental, and social well-being, and that help people control those forces that affect their lives. Only fund in U.S. They do not fund individuals, universities, conferences, scholarships, research, films, media, arts projects, capital campaigns, fundraising drives, or direct social service programs.
Environmental Planning	
Coldwater Heritage Partnership	Grants for prioritizing watersheds in need of protection, for assessment of coldwater ecosystems, and for the development of watershed conservation plans.
DEP Nonpoint Source Control	Grants for planning and non-point source pollution control projects.
DCNR - Community Conservation Partnership Program	Available to organizations that conserve and enhance river resources. Planning grants are available to identify significant natural and cultural resources, threats, concerns, and special opportunities, and the development of river conservation plans. Grant requires 50 percent match.
NRCS Watershed Surveys and Planning	Providing assistance for planning in water and coordinated water and related land resource programs in watersheds and river basins. Types of surveys and plans funded include watershed plans, river basin surveys and studies, flood hazard analyses, and floodplain studies.
Flood Protection	
DEP Flood Protection Grant Program	Open to communities that need to perform non-routine maintenance or improvements to already existing flood protection projects. Also applies to the purchase of specialized equipment. Open to communities that have flood protection projects that are deemed operable.
General	
Archer-Daniels-Midland Foundation	Proposals can be sent in letter form containing: 1) Description of the organization applying. 2) Description of the project/What funding would be used for. 3) A budget including how much is going to administrative costs. Emphasis is given to corporate operating locations.
Audrey Hillman Fisher Foundation, Inc.	Must refer to Application Procedures for more information. Preference given to southwestern Pennsylvania and central New Hampshire.
Eureka Company	No specific interest, but, general focus is on social services, health, and the environment (wildlife, fisheries, habitat, and sustainable community development)
Henry Hillman Foundation	Preference is given to organizations in the Pittsburgh/southwestern Pennsylvania area.

Patagonia, Inc. Environmental Grants Program	Supports small grassroots organizations. Does not fund land acquisition.
The Boeing Company	Provides contributions for capital campaigns, seed money (one-time grants) for new programs or projects that address community needs and priorities, and one-time grants to buy equipment, improve facilities, or enable special projects.
The Education Foundation for America	EFA's priorities include supporting the monitoring of the utility restructuring process as it impacts the environment, combating the growth of the "wise-use" movement, opposing large-scale live-stock confinement, and cutting federal "pollution." Letter limited to two pages.
The Prospect Hill Foundation	The foundation's environmental grant making concentrates on habitat and water protection in the northeastern region of the United States. Must have 501(c)3. The organization does not fund individuals, basic research, sectarian religious activities, or organizations that lack tax exemption under U.S. Law.
GIS	
DEP-GIS Software Grant	The grants consist of the latest commercial release of ArcView GIS software; several texts about utilizing GIS for environmental applications and land-use planning; CD-ROM containing spatial data about the commonwealth. Only issue 10 per quarter.
Habitat	
General Challenge Grant Program – National Fish and Wildlife Foundation	Requires non-federal match of 2:1. Address actions promoting fish and wildlife conservation and habitat; should involve conservation and community interest; leverage available funding and evaluate project outcomes.
Keep the Wild Alive (KWA) Species Recovery Fund	Fund on-the-ground projects that directly improve conditions for the endangered species highlighted in the KWA campaign. Current National Wildlife Federation employees are ineligible and applications must be submitted in English.
Small Grants Program - National Fish and Wildlife Foundation	Address priority actions promoting fish and wildlife conservation and the habitats on which they depend; work proactively to involve other conservation and community interest; leverage available funding, and evaluate project outcomes. A 2:1 match of non-federal funds is required.
Internship	
Office of Surface Mining Intern Program	Candidates must organize their work, work well with community groups and on their own, quickly internalize the requirements of acid mine drainage remediation and the national Clean Streams program, write well and enjoy public presentations. Academic credit. Can be undergraduate or graduate student. Positions available in AL, IL, IN, IA, KY, MD, MS, OH, OK, PA, TN, VA, WV. Must provide housing for interns.
Land Protection	
DCNR - Land Trust Grants	Provide funding for acquisition and planning of open space and natural areas which face imminent loss. Lands must be open to public use and priority is given to habitat for threatened species. Eligible applicants are non-profit land trusts and 501(c)3. Requires 50 percent match.
Lowes Charitable Foundation	Environmental initiatives that support the continued enhancement of the natural landscape, natural environment enhancers, and/or park improvement projects. Must apply online. Must be a 501(c)3.
Michael D. Ferguson Charitable Foundation	General environment, wildlife, fisheries, habitat, sustainable community, and development.
Nationals Parks Service - Land & Water Conservation Fund	Provide federal grants for land acquisition and conservation to federal and state agencies.
The Wilderness Society	To preserve wilderness and wildlife, protect America's prime forest, parks, rivers, and shore lands, and foster an American land ethic. Alternate address Montana Regional Office, 105 West Main St., Suite E, Bozeman, MT 59715-4689
Town Creek Foundation	Environmental issues of interest to the foundation include: 1) Preserving the ecological richness of our natural heritage, with a major focus on our federal public lands. 2) Promoting policies and practices to protect the land, estuaries, and coastal bays.

Loan	
Environmental Loan Fund	The loan can be used for membership development, creating and implementing a workplace giving program, cause-related marketing, donor development, special events, direct mail campaigns, mission related business enterprises, or capital campaign work.
Pennsylvania Infrastructure Investment Authority Drinking Water Loans	Must show water quality impact, must have qualified loan candidate. Loans to stormwater projects and non-point source projects. Interest is 1-2.8 percent over 20 years.
Multiple	
Acorn Foundation	Interested in small and innovative community-based projects which preserve and restore habitats supporting biological diversity and wildlife, and advocate for environmental justice. Does not fund the following: direct services, capital expenditure, construction or renovation programs, programs undertaken by tax-supported institutions or government initiatives, emergency funding, scholarship funds, or other individual aid.
Allegheny Foundation	The Allegheny Foundation concentrates its giving in the western Pennsylvania area and confines its grant awards to programs for historic preservation, civic development, and education. No event sponsoring. Does not fund individuals.
Anne & George Clapp Charitable & Educational Trust	Fields of interest include education, social services, youth and child welfare, and aging. Limited support for cultural programs, historic preservation, and conservation. Southwestern Pennsylvania only; grants are not made to individuals. No grants are made for medical research, research projects, filmmaking, conferences, or field trips.
Charlotte and Donald Teast Foundation	Sustainable communities, arts, humanities, civic and public affairs, education, the environment, health, and social services.
DCNR Community Conservation Partnership Program	Conserve and enhance river resources by offering planning grants, technical assistance, implementation grants, development grants, and acquisition grants.
Ford Foundation	Interested in general/operating support, continuing support, endowment funds, program development, conferences/seminars, professorships, publication, seed money, fellowships, internships, research, technical assistance, consulting services, and program-related investments.
Max and Victoria Dreyfus Foundation	Consider support for museums, schools, educational and skill training projects, programs for youth, seniors, and the handicapped. Must be located in the U.S. Does not issue grants to individuals.
National Fish and Wildlife Fund -Five Star Restoration Challenge	Projects must involve diverse partnerships of, ideally, five organizations that contribute funding, land, technical assistance, workforce support, and/or other in-kind services. Projects involving only research, monitoring, or planning are not eligible. No mitigation work.
National Parks Foundation	Education, training, preservation, and conservation. The grants that are available change often. See the website for current funding opportunities. Projects must connect with National Parks, be located on or next to National Park or River, and work in cooperation with the National Park. Alternate Phone: 202-785-3539.
Native Plant Conservation Initiative - National Fish and Wildlife Foundation	Through this initiative, grants of federal dollars will be provided to non-profit organizations and agencies at all levels of government to promote the conservation of native plants. There is a strong preference for "on-the-ground" projects that involve local communities and citizen volunteers in the restoration of native plant communities. Projects that include a pollinator conservation component are also encouraged.
Public Welfare Foundation	The Public Welfare Foundation supports organizations that address human needs in disadvantaged communities, with strong emphasis on organizations that include service, advocacy and empowerment in their approach: service that remedies specific problems; advocacy that addresses those problems in a systemic way through changes in public policy; and strategies to empower people in need to play leading roles in achieving those policy changes and in remedying specific problems.
Robertshaw Charitable Foundation	Money to assist those organizations who work to enhance the educational, health and welfare, cultural, youth development, social welfare, and community development needs of the area. Only one grant per year will be awarded to any organization. Preference to southwestern Pennsylvania organizations.

Scaife Family Foundation	Grants awarded will support programs that strengthen families, address the health and welfare of women and children, or promote animal welfare. No event sponsorships, endowments, capital campaigns, renovations, or government agencies. No grants to individuals.
The French Foundation	Environment, and natural resources
The Lawrence Foundation	The mission of The Lawrence Foundation is to make a difference in the world by providing contributions and grants to organizations that are working to solve pressing educational, environmental, health, and other issues.
The Max and Anna Levinson Foundation	Interested in the environment, including preservation of ecosystems and biological diversity, but also environmental justice, alternative energy, alternative agriculture, and toxics. Must have 501(c)3 status. Rarely fund organizations with budgets in excess of $500,000.
Turner Foundation	Supports activities to preserve the environment, conserve natural resources, protect wildlife, and develop and implement sound population policies. Interested in protecting rivers, lakes, wetlands, aquifers, oceans. Does not provide funding for buildings, land acquisition, endowments, start-up funds, films, books, magazines, or other specific media projects. Alternate Phone: 404-681-0172.
Natural Resources	
Beneficia Foundation	Only applications for projects focusing on conservation of the environment or the arts will be considered. Beneficia has no geographic preferences, but favors requests for project support over general support and does not look favorably upon requests for general overhead or construction of facilities.
Canaan Valley Institute	Promotes the development and growth of local associations committed to improving or maintaining the natural resources of their watersheds in the Mid-Atlantic portions of Pennsylvania.
Charles A. and Anne Morrow Lindburgh Foundation	Grants awarded for the conservation of natural resources and water resource management. Grants are awarded to individuals for research and educational programs, not to organizations for institutional programs.
Dana Corporation	Will consider funding air quality, environment, general, and water resources projects. Emphasis is given to areas where the corporation operates.
DCNR - Community Conservation Partnership Program	Awarded for local recreation, park, and conservation projects, including rehabilitation and development of parks and recreation facilities, acquisition of land for park and conservation purposes, and technical assistance for feasibility studies, and trail studies. Requires 50 percent match, except for some technical assistance and projects eligible as small community projects.
Home Depot	Assistance is provided to non-profit organizations that direct effort toward protecting our natural systems. The grant program focuses on forestry and ecology, clean up, and recycling, green building design, and lead poisoning prevention.
W. Alton Jones Foundation, Inc.	The goals of the foundation are to build a sustainable world by developing new ways for humanity to interact responsibly with the planet's ecological systems, and build a secure world by eliminating the possibility of nuclear war by providing alternative methods of resolving conflicts and promoting security.
Leo Model Foundation	Grants for habitat conservation, watershed conservation, and species preservation in the U.S.
National Fish and Wildlife Fund Challenge Grants for Conservation	The foundation, in partnership with the NRCS and NACD (National Association of Conservation Districts) provides challenge grants. Primary goal of the program is to support model projects which positively engage private landowners.
Rivers, Trails and Conservation Assistance Program	Grants to work with National Park Service to conserve land and river resources, and provides funding for various projects dealing with the conservation of these resources, including the development of trails and greenways.
The River Restoration - NOAA	Submittal by email whenever possible. Encourage contact to discuss project prior to submitting application. Formal non-federal matches not required, but encouraged. Dam removal and fish passage. Available in northeast, Mid-Atlantic, and California.
The Watershed Protection and Flood Prevention Act	Plan development for natural resource concerns within a watershed area; cost sharing available to carry out plan.

The William C. Kenney Watershed Protection Foundation	Protecting the remaining wild rivers of the west and ensuring the effectiveness of small environmental organizations.
Other	
Charles Stewart Mott Foundation	The environmental program is devoted to reform of international lending and trade policies. Projects must be part of a national demonstration when out of the Flint, Michigan area.
North American Fund for Environmental Cooperation	Funds community based projects in Canada, Mexico and the U.S. to enhance regional co-operation, prevent environmental and trade disputes, and to promote the effective enforcement of environmental law.
PA DEP Brownfields Inventory	Grantees will be paid $1,000 for each site registered into the PA Site finder. Municipalities and economic development agencies may apply for the grant by submitting an application.
Retired and Senior Volunteer Program (RSVP)	Provides a variety of opportunities for people aged 55+ to volunteer in the management of trails, rivers, and open space. Grants can be used for staff salaries, fringe benefits, travel, equipment, and transportation.
Plantings	
National 4-H Council	Grants are used to stimulate community tree planting and/or reforestation projects. Awarded to communities in support of on-going community planting/reforestation project or to stimulate new and creative youth-led projects. Orgganization must secure matching funds or in-kind contributions from other sources equal to the amount requested.
National Gardening Association	One hundred grants to be awarded to start-up programs involving children, and 300 will be awarded to established programs. Covers tools, seeds, plant materials, products, and educational resources. Grant restricted to programs involving children. There is a $10.00 administrative fee.
Plant Material Centers	American Indian Liaison Resource Conservation and Community Assistance Division of USDA/NRCS. PMC select and grow plants that grow naturally and provide them to those people who wish to grow native plants.
Remediation/Restoration	
Abandoned Mine Land Reclamation Program - Office of Surface Mining	Applications accepted anytime. Provides for the restoration of eligible lands and waters that have been mined, abandoned, or left inadequately restored. Two different grants are available. Protects land and corrects environmental damage caused by coal mining.
AMD Watershed Assessment - Bureau of Mining and Reclamation	Must be a municipality, municipal authority or incorporated non-profit. AMD projects only.
American Canoe Association CFS Grants	For grassroots organizations to improve waterways. Cleanups, riparian corridor, and water quality monitoring projects. Very flexible as long as it is improving waterways and fish habitat. Cannot be used to pay staff. However, it can be used to pay a contractor. Must use volunteer help.
PA DEP - BAMR Abandoned Mine Reclamation Grants	Funds must be used for project development, design, construction, and directly related expenses. Site chosen must be located in a watershed or area with an approved rehabilitation plan. No administrative cost. Must be a municipality, municipal authority, or incorporated 501(c)3.
Bring Back the Natives - National Fish and Wildlife Foundation	Supports on-the-ground habitat restoration projects that benefit native aquatic species in their historic range.
EPA - Nonpoint Source Implementation Grants	Funds are provided to the state to carry out non-point source projects and programs pursuant to Section 319 of the Clean Water Act as amended by the Water Quality Act of 1987. Grants are awarded to a single agency in each state, designated by the governor. 40 percent non-federally funded match required. Only one administered to each state.
NOAA Fish Habitat Restoration Program	Financial assistance for community-based habitat restoration projects, to restore fish habitats.
Office of Surface Mining Clean Stream Initiative	This grant is used to treat AMD. Design and administration is covered but the bulk of funding must go into construction. Must have funding partners. Applications available upon request. Review period takes 2.5-3 months, depending on eligibility. Must be a

	cooperative agreement.
PA DEP -Stream Improvement Project Reimbursements	Provides assistance in an instance where a stream is posing a treat to structures, such as homes or businesses. Must pose threat to structure. Must be applied for by a conservation group or municipality.
PA Fish and Boat Commission	Habitat improvement and technical assistance.
Partnership with the U.S. Army Corps of Engineers	To foster cooperation on projects of mutual interest, such as fish and wildlife habitat restoration, nonstructural flood control opportunities, wetland restoration, and endangered species protection.
Research	
USDA - Nutrient Science for Improved Watershed Management	Funds for integrated research in extension management of nutrients on a watershed level. Nutrients of interest are nitrogen and phosphorous. Please note that a research foundation maintained by a college or university is not eligible. These grants are for research.
Stormwater Management	
DEP Stormwater Management Program	Watershed planning for stormwater control and implementation of programs at local levels.
Streambank Fencing	
Ducks Unlimited - PA Stewardship Program	Provides strong incentives to landowners to create wooded stream buffers, create wider than minimum buffers, and fence cattle out of the stream. Grant is available for fencing and tree planting.
Fish America Foundation	Grants awarded for streambank stabilization materials, instream habitat improvements, contracted heavy equipment, and stream morphology work. Match not required, but is highly recommended.
Partners for Fish and Wildlife Program	The Partners for Fish and Wildlife Program provides technical and financial assistance to private landowners for habitat restoration on their lands. A variety of habitats can be restored to benefit Federal trust species (for example, migratory birds and fish and threatened and endangered species.) Normally the cost share is 50 percent (the Service and the landowner each pay half of the project costs), but the percentage is flexible. Services or labor can qualify for cost-sharing.
US Fish and Wildlife Service	Assists landowners in installation of high-tensile electric fence to exclude livestock from streams and wetlands. No buffer requirements.
USDA Conservation Reserve Program	Statewide cost share program for creating stream buffers. A 40 percent practice incentive as well as a $10/acre incentive. Buffers of 35-180 feet per side of the stream. Land must have been pasture.
USDA - Environmental Quality Incentives Program	A statewide program based on environmental problems. It addresses all environmental problems on a farm. They fund BMPs.
Technical Assistance	
Watershed Assistance Grants	Funding supports organizational development and capacity building for watershed partnerships with diverse membership. Match requested but not required. Non-profits, tribes, and local government only.
Trails	
DCNR - PA Recreational Trails Program	Will consider proposals for maintenance and restoration of existing recreational trails; development and rehabilitation of trailside and trailhead facilities and trail linkages; purchase and lease of recreational trail construction and maintenance equipment. Must have 20 percent match. Eligible applicants include federal and state agencies, local governments, and private organizations.
DCNR - Rails to Trails	Provide 50 percent funding for the planning, acquisition, or development of rail-trail corridors. Applicants include municipalities and non-profit organizations established to preserve and protect available abandoned railroad corridors for use as trails. Grants require 50 percent match.

Volunteers	
3M Foundation	3M sponsors a volunteer program called Community Action Retired Employee Service (CARES). Company favors projects that impact 3M communities. Alternate Phone: 612-737-3061
Wetlands	
U.S. Fish and Wildlife Service	For wetland Conservation projects. Must have 50 percent non-federal match in small-grant program with North American Wetlands Conservation Council.
Wetlands Reserve Program USDA Natural Resources Conservation Service	Restore and protect wetlands on private property; provide landowners with financial incentives to enhance wetlands in exchange for retiring marginal agricultural land.

Appendix F
Key Person Interview

Mahoning River Watershed Conservation Plan

Watershed Interview Questions

Contact Information (Optional): Name _____
Phone: _____ E-mail: _____

1. How do you recall the Mahoning River Watershed 20 or more years ago?

2. What changes have you seen in the Mahoning River Watershed in the past 10 years?

3. What is your vision for the Mahoning River Watershed in 5 years? In 10 years?

4. What do you think are the "BIG" issues regarding the Mahoning River Watershed?

5. Are you aware of any opportunities for programs or projects that would be advantageous to the future of the Mahoning River Watershed?

6. What ides do you have regarding how you would like the Mahoning River Watershed to be managed and used in the future?

7. What would you like to see in the Mahoning River Watershed Conservation Plan?

8. What do you think might prevent the Mahoning River Watershed Conservation Plan from being successful?

9. What advice do you have for us as we go throughout the watershed in the process of preparing the Mahoning River Watershed Conservation Plan?

10. Do you have any suggestions for other key persons we should interview?

11. Do you have any other comments that you would like to make for the record before we conclude this interview?

Thank you!

Appendix G
Public Meetings

Public Meeting

Mahoning River
Watershed Conservation Plan

Hickory Creek at Cleland Mill Road

Meeting Highlights

- Overview of Conservation Plan Development
- Mahoning River Watershed Maps
- Issues and Concerns for the Watershed
- FREE Cookies and Refreshments!

December 3, 2009 at 6:30 PM

Mahoning Sportsmen's Clubhouse

3839 West Main Street

Hillsville, PA

For more information contact:

Lawrence County Conservation District
Megan Gahring, Watershed Specialist
724-652-4512

Lawrence County Planning Department
Amy McKinney, Director
724-656-2193

Lawrence County
Planning Department
Facsimile Cover Page

Date: November 18, 2009	**# of pages:** 1
To: Linda Craig	**From:** Amy McKinney
Co./Dept.: New Castle News (Legal Ads)	**Re:** Attached ad
Phone #: 724-654-6651	**Phone #:** 724-656-2193
Fax #: 724-654-9593	**Fax #:** 724-656-2151

Linda:

Please publish the attached ad on November 22, 2009. You may bill Account #93815-9. Thank you. Could you please email me and let me know you received this: amckinney@co.lawrence.pa.us

Public Meeting

The Lawrence County Planning Department and Lawrence County Conservation District will conduct a public meeting to receive input for the development of the Mahoning River Watershed Conservation Plan. The public meeting will be held on December 3, 2009 at the Mahoning Sportsmen's Clubhouse, 3839 West Main Street, Hillsville, PA at 6:30 p.m.

Mahoning River Watershed Conservation Plan
Public Meeting Number One
December 3, 2009
SWOT Analysis

STRENGTHS

- Hickory Run Trout Fishing
- Transportation Access within the watershed
- PA FBC Lake in Bessemer
- Hunting
- Scenic vistas
- Biking trails
- Biological diversity areas
- Villa Maria
- Quality Schools and education (Mohawk Area School District)
- Quaker Falls
- Abundance of community groups in the watershed

WEAKNESSES

- Lack of Economic Development
- ESSROC Closing
- Lack of Curbside Recycling for residents
- On-Lot Sewer system malfunctioning
- Mobile Home Parks (sewage violations)
- Abundance Strip Mined lands
- Stormwater management
- Minimal River Access
- Contamination of the Mahoning River with PCB's
- BFI Landfill in Ohio and associated risks
- Illegal dump sites

OPPORTUNITIES

- Racetrack and associated economic development
- New Sewer Systems proposed
- Community Groups and active memberships

- Strip Mine lands - potential for reclamation, acquisition, and recreation opportunities
- Stormwater Management- Adopting of the Act 167 stormwater ordinance, riparian buffer, conservation design elements
- Stavich Bicycle Trail - potential trail connections
- Mahoning Township - adopting Ag Preservation and Ag Security areas

THREATS

- Ohio Landfill and unknown groundwater contamination
- Improper or lack of Stormwater Management/BMP's
- Marcellus Shale drilling opportunities
- Resistance to Intergovernmental Cooperation
- Ohio/PA state boundary and regulatory differences
- Sprawl and "uncontrolled" development from racetrack

Public Meeting

Mahoning River
Watershed Conservation Plan

Hickory Creek at Cleland Mill Road

Meeting Highlights

- Overview of Conservation Plan Development
- Mahoning River Watershed Maps
- Issues and Concerns for the Watershed
- FREE Cookies and Refreshments!

December 14, 2010 at 6:30 PM

Mohawk Area High School Cafeteria

385 Mohawk School Road

New Castle, PA

For more information contact:

Lawrence County Conservation District
Megan Gahring, Watershed Specialist
724-652-4512

Lawrence County Planning Department
Amy McKinney, Director
724-656-2193

Lawrence County
Planning Department
Facsimile Cover Page

Date: December 2, 2010	**# of pages:** 1
To: Linda Craig	**From:** Amy McKinney
Co./Dept.: New Castle News (Legal Ads)	**Re:** Attached ad
Phone #: 724-654-6651	**Phone #:** 724-656-2193
Fax #: 724-654-9593	**Fax #:** 724-656-2151

Linda:

Please publish the attached ad on December 7, 2010. You may bill Account #93815-9. Thank you. Could you please email me and let me know you received this: amckinney@co.lawrence.pa.us

Public Meeting

The Lawrence County Planning Department and Lawrence County Conservation District will conduct a public meeting to receive input for the development of the Mahoning River Watershed Conservation Plan. The public meeting will be held on December 14, 2010 at the Mohawk Area High School Cafeteria, Mohawk School Road, Bessemer, PA 16112 at 6:30 p.m.

Mahoning River
Watershed Conservation Plan

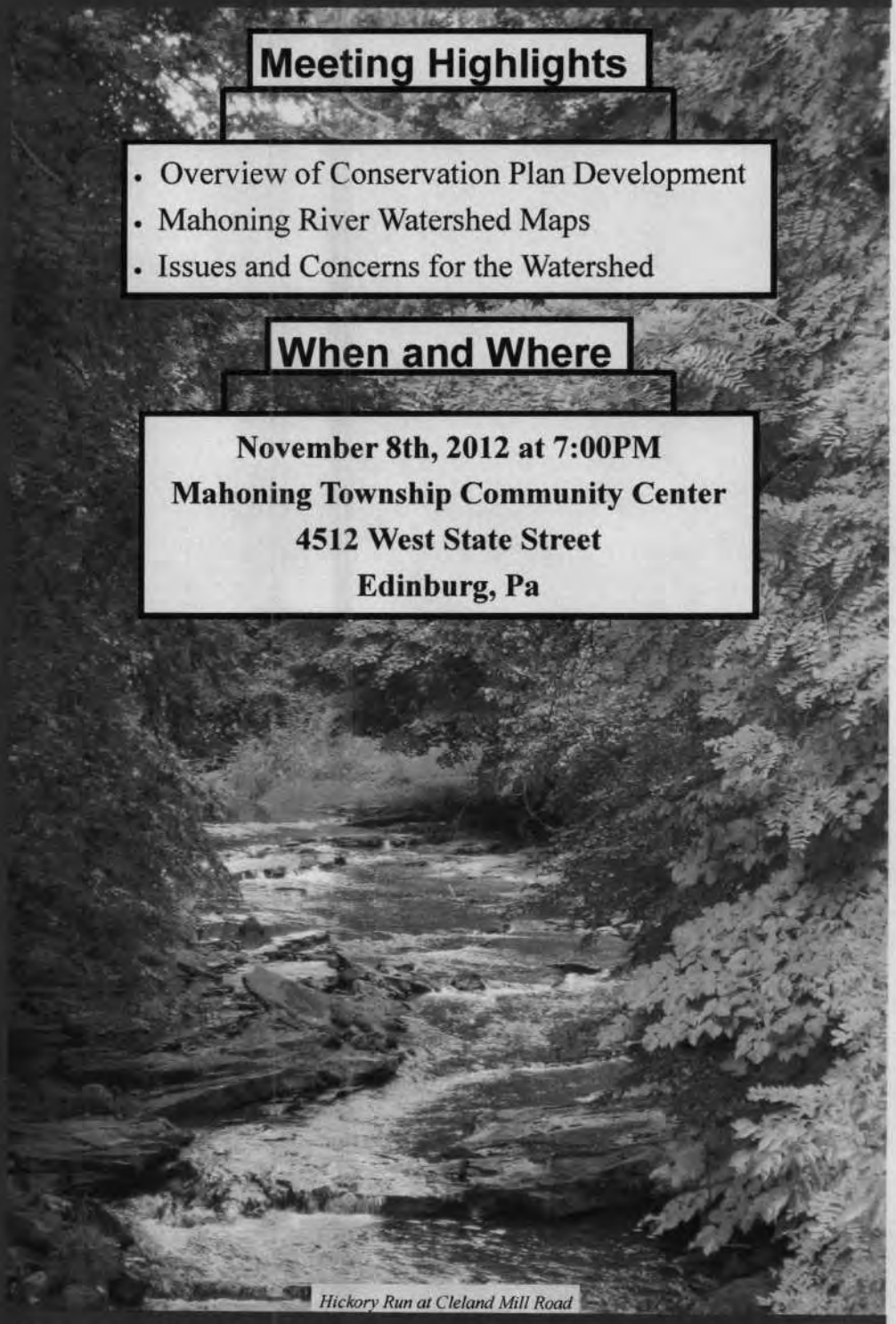
Public Meeting

Meeting Highlights

- Overview of Conservation Plan Development
- Mahoning River Watershed Maps
- Issues and Concerns for the Watershed

When and Where

November 8th, 2012 at 7:00PM
Mahoning Township Community Center
4512 West State Street
Edinburg, Pa



Hickory Run at Cleland Mill Road

For more information contact:

Lawrence County Conservation District
Lauren Anderson, Resource Technician
724-656-2474

Lawrence County Planning Department
Amy McKinney, Director
724-656-2193

Lawrence County
Planning Department
Facsimile Cover Page

Date: October 25, 2012	**# of pages:** 1
To: Linda Craig	**From:** Amy McKinney
Co./Dept.: New Castle News (Legal Ads)	**Re:** Attached ad
Phone #: 724-654-6651	**Phone #:** 724-656-2193
Fax #: 724-654-9593	**Fax #:** 724-656-2151

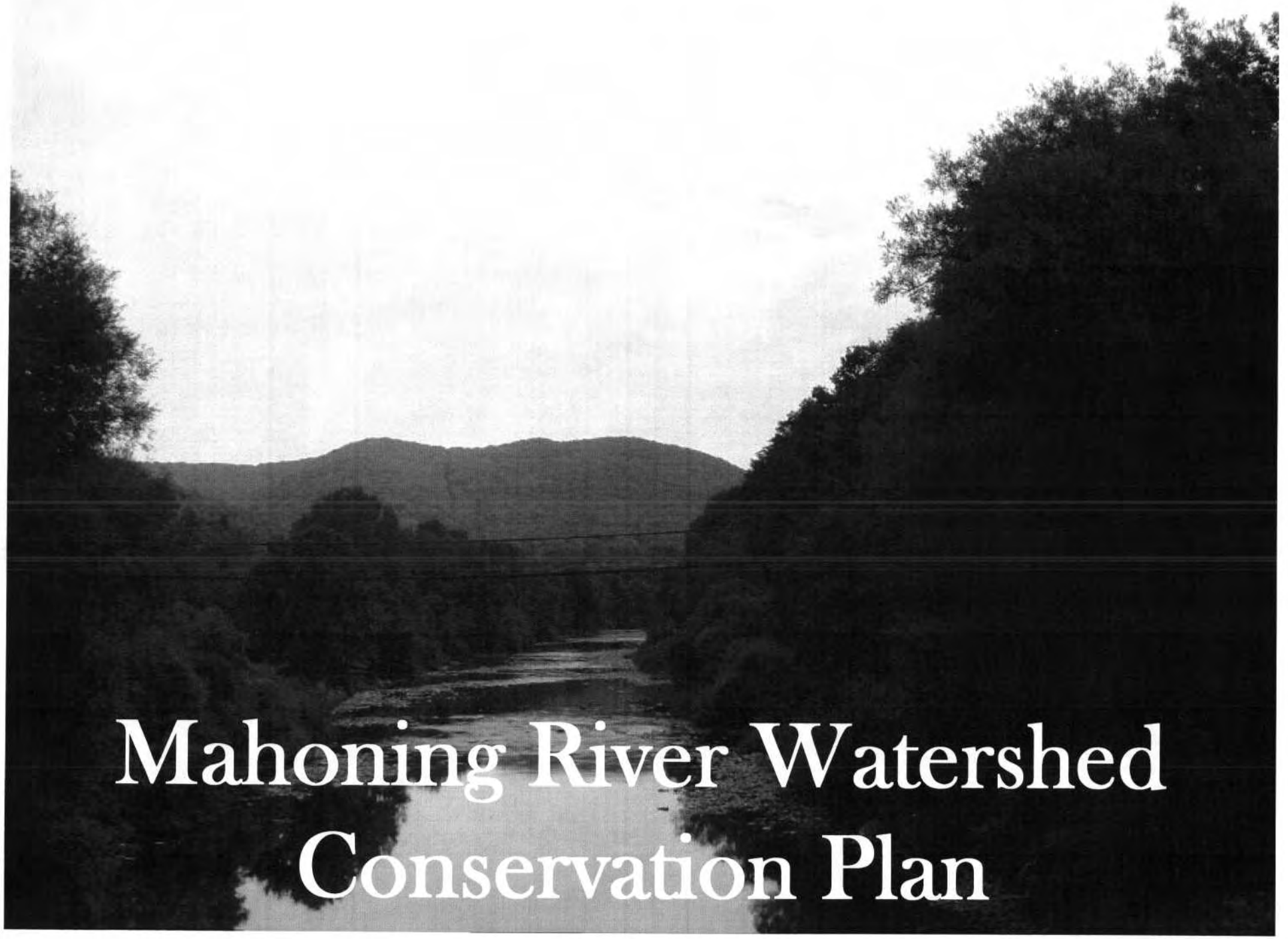
Linda:

Please publish the attached ad on Monday, October 29th, 2012. You may bill Account #93815-9. Thank you. Could you please email me and let me know you received this: amckinney@co.lawrence.pa.us

Public Meeting

The Lawrence County Planning Department and Lawrence County Conservation District will conduct a public meeting to receive input for the development of the Mahoning River Watershed Conservation Plan. The public meeting will be held on November 8, 2012 at the Mahoning Township Community Center, 4512 West State Street, Edinburg, PA at 7:00 P.M.

Appendix H
Public Meeting PowerPoint



Mahoning River Watershed Conservation Plan

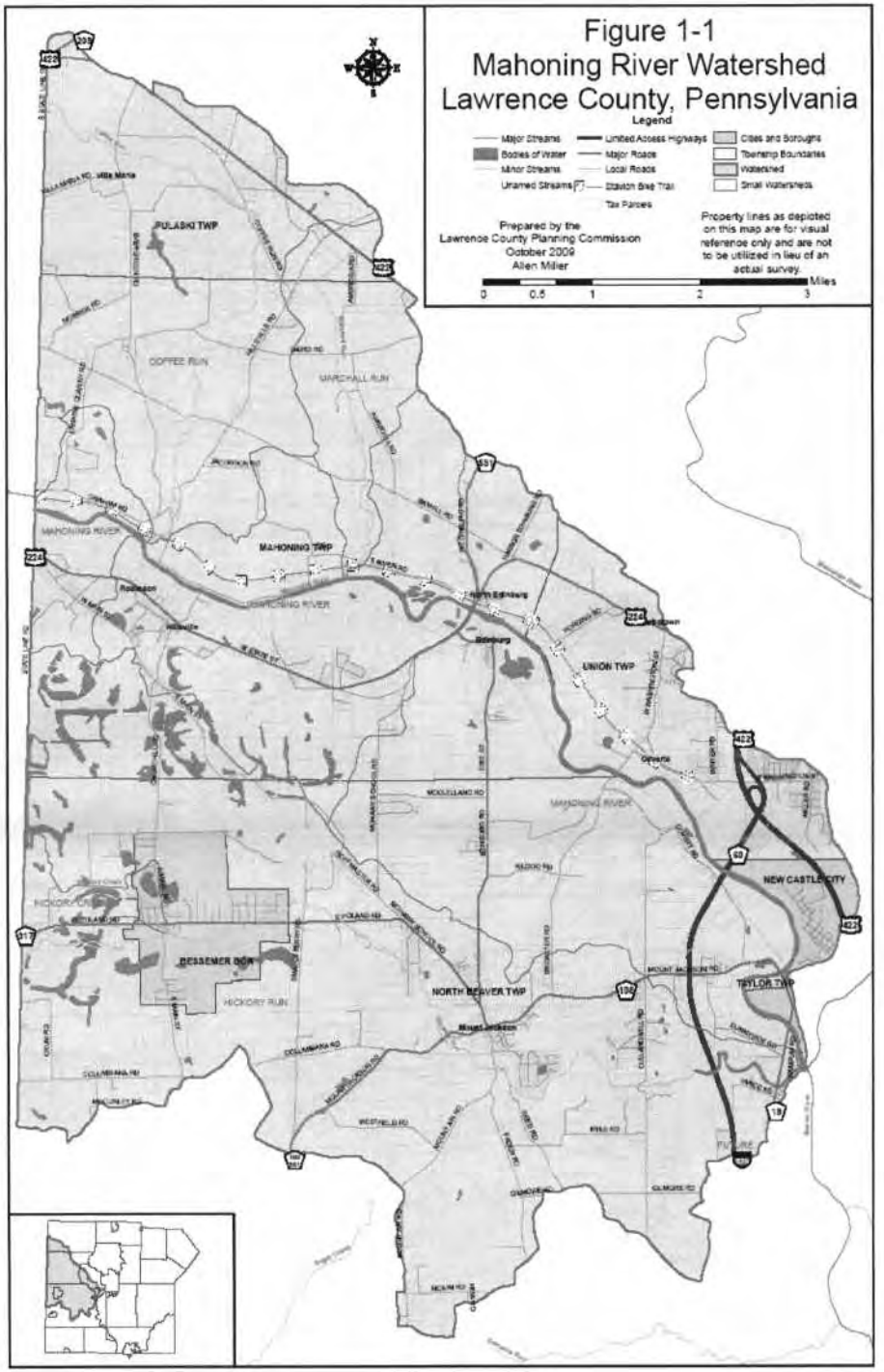


Figure 1-1
Mahoning River Watershed
Lawrence County, Pennsylvania
Legend
Major Streams
Bodies of Water
Minor Streams
Unnamed Streams
Limited Access Highways
Major Roads
Local Roads
Station Bike Trail
Tax Parcels
Cities and Boroughs
Township Boundaries
Watershed
Small Watersheds
Prepared by the
Lawrence County Planning Commission
October 2009
Allen Miller
Property lines as depicted on this map are for visual reference only and are not to be utilized in lieu of an actual survey.
0 0.5 1 2 3 Miles
PULASKI TWP
COFFEE RUN
MARSHALL RUN
MAHONING TWP
MAHONING RIVER
UNION TWP
NEW CASTLE CITY
TAYLOR TWP
NORTH BEAVER TWP
DESSEMER RUN
HICKORY RUN

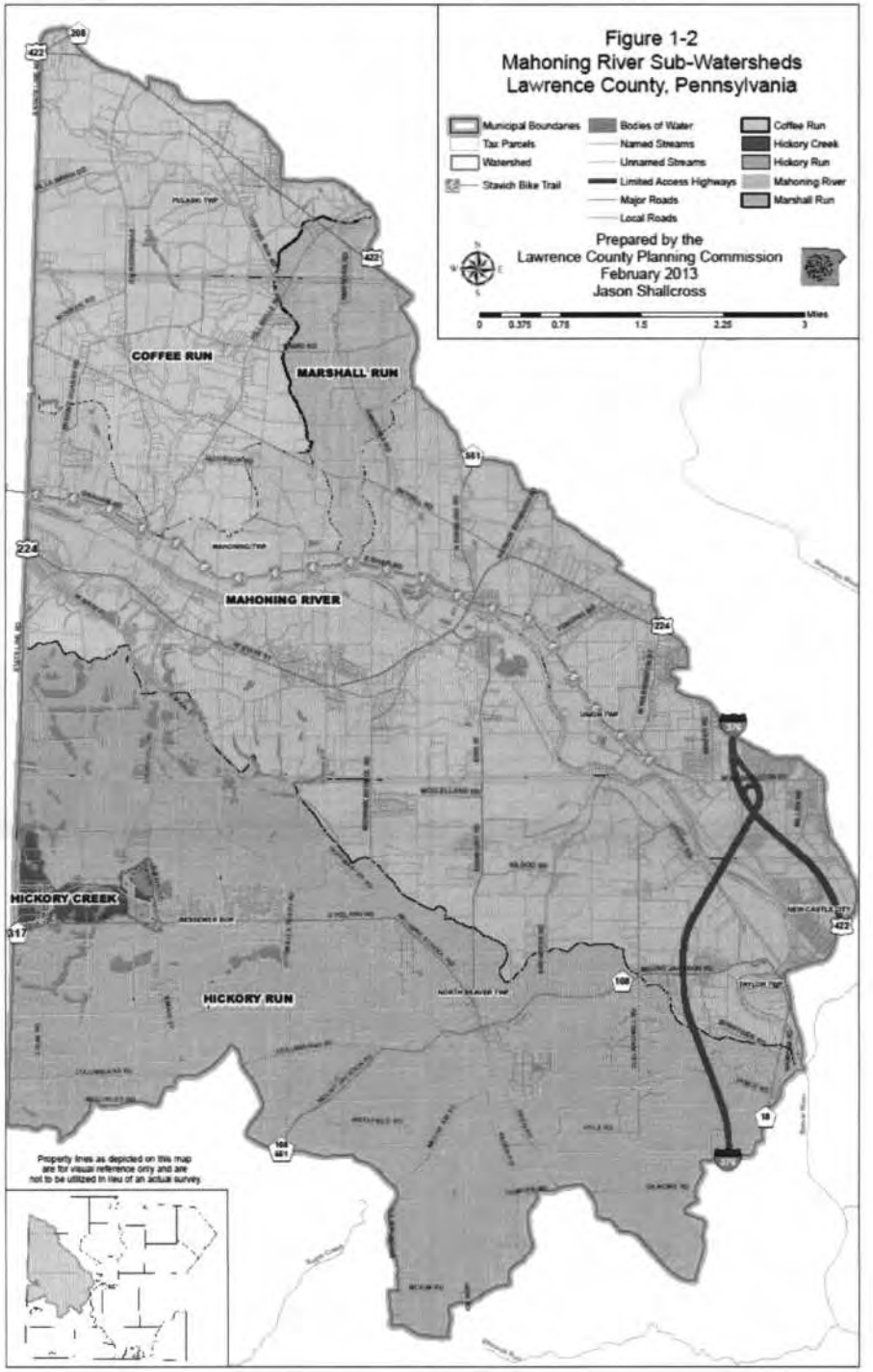


Figure 1-2
Mahoning River Sub-Watersheds
Lawrence County, Pennsylvania
Municipal Boundaries
Tax Parcels
Watershed
Stavich Bike Trail
Bodies of Water
Named Streams
Unnamed Streams
Limited Access Highways
Major Roads
Local Roads
Coffee Run
Hickory Creek
Hickory Run
Mahoning River
Marshall Run
Prepared by the
Lawrence County Planning Commission
February 2013
Jason Shallcross
0
0.375
0.75
1.5
2.25
3
Miles
COFFEE RUN
MARSHALL RUN
MAHONING RIVER
HICKORY CREEK
HICKORY RUN
Property lines as depicted on this map
are for visual reference only and are
not to be utilized in lieu of an actual survey.

PURPOSE OF THIS MEETING

- **Understand the watershed conservation planning *purpose* and *process***
- **View mapping of watershed resources**
- **Provide public input**

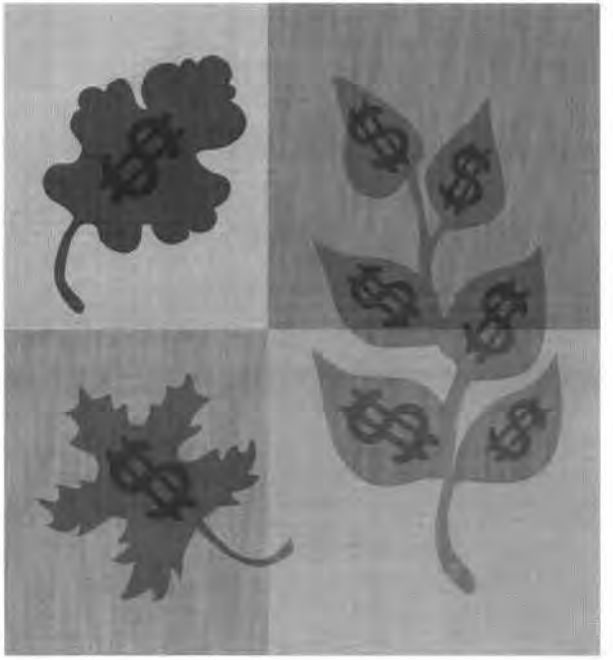
WHAT ARE WATERSHED CONSERVATION PLANS (WCPs)?

- **Comprehensive**
- **Locally-driven**
- **Non-regulatory**
- **Additional funding opportunities**

HOW ARE THEY FUNDED?

PA Department of Conservation and Natural Resources (DCNR) – Community Conservation Partnership Program (50 percent)

Lawrence County and Lawrence County Conservation District



Mahoning River WCP

Evaluate watershed resources (research & data)

Identify issues of concern (public participation)

Develop locally-based management recommendations (based on public input)

Place the Mahoning River watershed on the PA Rivers Registry (more funding opportunities)

DCNR's Four Step Watershed Planning Process…

Step 1: Determine Initial Interest

Step 2: Collect and Analyze Resource Data

Step 3: Prepare a Draft Watershed Conservation Plan

Step 4: Prepare a Final Watershed Conservation Plan

FINALLY

Submit final plan to DCNR for approval

Once approved, the watershed is placed on the PA Rivers Registry

The projects begin…

WHAT TYPE OF GRANT FUNDING WILL BE AVAILABLE ONCE THE PLAN IS COMPLETED?

- Planning Grants
- Acquisition Grants
- Development Grants

Project Area Characteristics

Land Resources

Water Resources

Biological Resources

Cultural Resources

Issues and Concerns

Management Recommendations

MANAGEMENT RECOMMENDATIONS

WHERE DO WE GO FROM HERE?

- ☑ Continue public outreach
  - ☑ Surveys
  - ☑ Municipal Outreach
  - ☑ Key Individual Interviews
  - ☑ Community Festival and Events
- ☑ Continue researching and writing
- ☑ Committee review
- ☑ Final Public Comment

FOR MORE INFORMATION CONTACT US AT:

Jason Shallcross
GIS Planner
Lawrence County Planning Department
jshallcross@co.lawrence.pa.us
724-656-2148

Lauren Anderson
Resource Technician
Lawrence County Conservation District
landerson@lawrencecd.org
724-656-2474

LAWRENCE COUNTY
CONSERVATION DISTRICT

Appendix I
Steering Committee Meetings

MEMORANDUM

TO: Mahoning River Watershed Conservation Planning Steering Committee

FROM: Amy B. McKinney, Director
Megan Gahring, Watershed Specialist

DATE: July 17, 2009

RE: First Steering Committee Meeting

Earlier this year, you were selected by your County Commissioners to be part of the Mahoning River Watershed Conservation Plan Steering Committee. This steering committee was created to provide a means of education and gathering input from citizens into the planning process.

The first steering committee meeting will be held on **Monday, August 17th at 2:00 p.m.** at the Lawrence County Courthouse, 3rd Floor, Old Courthouse.

If you have any questions, comments or concerns please feel free to call us. Thank you.

We'll look forward to seeing you then.

Mahoning River Watershed Conservation Plan
Advisory Council Meeting
August 17, 2009
Meeting Minutes

Advisory Council Members Present:

Amy B. McKinney – Lawrence County Planning Director
Megan Gahring – Watershed Specialist (Conservation District)
Jay Russell – Lawrence County Conservation District
Jerry Zona – Lawrence County Recycling Solid Waste/PA Cleanways
Scott Rondeau – Mahoning Sportsmans Club
Joseph Morris – PA Fish and Boat Commission
Jon Natale – PA American Water Company
Robin Kirkwood – Bessemer Borough
JoAnn McBride – Lawrence County Tourism
Edward Petrus – USDA Natural Resources Conservation
Elaina Rader – USDA Natural Resources Conservation Intern
Cliff Wallace – Mohawk High School Vo Ag

The meeting began with Amy McKinney welcoming everyone to the meeting. The group went around and everyone introduced themselves and discussed the organizations that they represented.

Megan Gahring gave a brief power point presentation on the purpose of the Mahoning River Watershed Conservation Plan, what was included in the plan, funding for the plan and the advisory council members role in the creation of the plan.

The group then went into an open discussion of data resources, issues, and concerns:

Project Area
JoAnn McBride brought up the planned Racino and Mahoning Township.
PA 60 is being upgraded to I-376

Land Resources
Ed Petrus of NRCS created aerial photography with historic property boundary information overlayed for the Revolutionary War land grants. Ed Petrus will provide this information.

Farm Service Agency (FSA) in Mercer can produce mapping of property owners participating in USDA/government funded programs

ESSROC has a two-year land reclamation plan for the surface mining properties in and around Bessemer. The facility shut down operations in early summer of 2009.

Gretchen Yeo is the property owners for a large tract of agricultural land located within the watershed. Ed Petrus can provide her contact information.

PA Cleanways has the results of an Illegal Dump survey completed for Lawrence County. Jerry Zona will provide this information.

Water Resources

The BFI landfill located in Ohio has groundwater monitoring wells on the property of the Mahoning Sportsman Club.

The PA American Water Company has some water quality data for the watershed that would be accessible for inclusion into the plan. There is evidence of some water quality improvements in the watershed and Mahoning River. Jon Natale will provide.

Other items brought up were Bessemer Lake, the library in Bessemer flooding and Ohio having a no contact in the Mahoning River (on the Ohio side)

Biological Resources

Joe Morris from the Fish and Boat Commission (FBC) reported that there is a fish consumption advisory for carp taken from the Mahoning River. In Ohio, there is a no water contact advisory and warning for all activities in the Mahoning River. The Mahoning River is contaminated with PCB's from past industrial activities.

The FBC biologist from Linesville has biological data from past electroshocking sampling events on the Mahoning. He can be contacted for copies of the results. Joe Morris will provide the contact information.

Other items brought up were the Lawrence County Natural Heritage Inventory, the fish population being higher downstream then towards the Ohio line and the consumption advisory.

Cultural Resources

Concerns were expressed with ATV riders along Mahoning River corridor.

Recreational areas discussed were the number of different golf courses, B & B Marine is located within the watershed at Fox Quarry for recreational diving and lessons, the "Bahamas" quarry, Villa Maria (Frank Romeo will be a key person to interview), Stavich Bike Trail and Quaker Falls.

Joe Morris express that, in his opinion, the Mahoning River is the most trafficked waterway in Lawrence County. There is a need for additional public access to the Mahoning River for recreational purposes. One potential access area may exist at Coverts Crossing.

Big Foot Turtle Farm has educational displays for youth (at the Agway in Bessemer) and conducts demonstrations upon request.

A dam exists at Edinburg that makes recreational travel difficult on the Mahoning.

The committee discussed the next steps in the process. Amy and Megan will email everyone the Project Area chapter prior to the next meeting for the committee to review and comment on.

The next meeting is scheduled for October 7, 2009 at 2:00 p.m.

Mahoning River Watershed Conservation Plan
Advisory Council Meeting
August 17, 2009

Sign In Sheet

Name	Organization	Email or Phone Number
Jerry Zona	Law. Co. Recycling/Sw Pall	jzona@co.lawrence.pa.us
Amy McKinney	Law Co. Planning	amckinney@co.lawrence.pa.us
Scott Rondeau	Mahoning Sportsman	724-652-6045 Scooters_Lures@Yahoo.com
[illegible]	[illegible]	[illegible]
Jay Russell	Lawrence Co Cons. Dist	jrussell@lawrencecd.org
Jon Natale	PAWC	jon.natale@amwater.com
Robin Kirkewood	Boss. Boro	Robin Kirkewood@comcast.net
Megan Gahring	Conservation District	mgahring@lawrencecd.org
Edward X. Petrus	USDA Natural Res Cons	edward.petrus@pa.usda.gov
Tonia McBride	Lawrence Co. Tourism	jmcbride@visitlawrencecounty.com
Elaina Rader	USDA-Natural Res Cons Intern	Elaina.rader@pa.usda.gov
Cliff Wallace	Mohawk High School Ag	Cwallace@mohawk.k12.pa.us

Mahoning River Watershed
DCNR River Conservation Plan
Advisory Council Meeting
August 17, 2009

During the data collection phase of the Conservation Plan, we will be gathering existing information and statistics on the following topics. Are there any people, places or other sources of information you would recommend? (i.e. landowners/residents, site locations, community groups, documents/reports, books) Also, please list any current and future projects that may be relevant.

Project Area (demographics, climate, air quality, transportation, infrastructure, economic trends)

_____
_____
_____
_____

Land Resources (geology, soils, development, land use, farmland preservation, hazardous areas)

_____
_____
_____
_____

Water Resources (wetlands, floodplains, groundwater, tributaries, stormwater, water quality)

_____
_____
_____
_____

Biological Resources (unique habitats, plant, animal, species of concern, deer overbrowsing)

_____
_____
_____
_____

Cultural Resources (historical areas and structures, tourism, recreational areas, environmental education)

_____
_____
_____
_____

Mahoning River Watershed
DCNR River Conservation Plan
Advisory Council Meeting
August 17, 2009

During the data collection phase of the Conservation Plan, we will be gathering existing information and statistics on the following topics. Are there any people, places or other sources of information you would recommend? (i.e. landowners/residents, site locations, community groups, documents/reports, books) Also, please list any current and future projects that may be relevant.

Project Area (demographics, climate, air quality, transportation, infrastructure, economic trends)

_____
_____
_____
_____

Land Resources (geology, soils, development, land use, farmland preservation, hazardous areas)

_____
_____
_____
_____

Water Resources (wetlands, floodplains, groundwater, tributaries, stormwater, water quality)

_____
_____
_____
_____

Biological Resources (unique habitats, plant, animal, species of concern, deer overbrowsing)

_____
_____
_____
_____

Cultural Resources (historical areas and structures, tourism, recreational areas, environmental education)

_____
_____
_____
_____

Mahoning River Watershed Conservation Plan
Advisory Council Meeting
Lawrence County Government Center
October 22, 2009

- Welcome
- Introductions
- Minutes
- New Watershed Activities
- Mapping
- Comments on draft chapter
- Public Meeting
- Next Advisory Meeting

Mahoning River Watershed Conservation Plan
Advisory Council Meeting
October 22, 2009
Meeting Minutes

Advisory Council Members Present:

Amy B. McKinney – Lawrence County Planning Director
Megan Gahring – Watershed Specialist (Conservation District)
Jay Russell – Lawrence County Conservation District
Scott Rondeau – Mahoning Sportsmans Club
Robin Kirkwood – Bessemer Borough
JoAnn McBride – Lawrence County Tourism
Edward Petrus – USDA Natural Resources Conservation

The meeting began with Amy McKinney welcoming everyone to the meeting. We reviewed the minutes the minutes from the August 17, 2009 meeting for clarification on some items.

Megan Gahring asked the group to discuss any new watershed activities. The following items were brought up:

-Wetland constructed at Mohawk school
-Christmas Tree Farms
-Fruit and Vegetable markets
-Bessemer Lake Park remains open to the public
-Bessemer Borough Conservation Area established
-Stream restoration project completed along Hickory Run
-Riparian buffer plantings in Hickory Run watershed
-Milk waste/Solar energy project pending
-Tree planting/reclamation request near ESSROC
-Powder Mill

Allen Miller from the Planning Department has been developing the maps that will be used in the document. Megan and Amy went over all of the maps with the group for changes. The following comments were made:

-Check the location of Union School to see if it is located in the project area (Allen confirmed that it is not)
-The group asked about obtaining updated flood maps from FEMA – Allen confirmed that we are still waiting on these maps
-There were questions in regards to the Census Block map and Allen came up to clear up the questions that the group had.
-The group recommended that a narrative be placed on map 1-10 and map 1-11 to explain the purpose of the map

The ROUGH draft of Chapter 1 was distributed prior to the meeting and Megan asked the group for any comments. The following comments were made:

-Add page numbers to the document
-Add the sanitary sewers in Mahoning Township
-Narrative on Stormwater Management/Infrastructure

The group discussed the date and location for the First Public Meeting. The First Public meeting will be held on December 3rd at 6:30 PM. The Mahoning Sportsmen's club has offered their Clubhouse for the meeting.

The next council meeting is scheduled for February 11, 2009 at 2:00.

Mahoning River Watershed Conservation Plan
Advisory Council Meeting
October 22, 2009

Sign In Sheet

Name	Organization	Email or Phone Number
Scott Ronderos	Mahoning Watershed	724-652-6045
Amy B. McKinney	Planning	724-654-2193
Edward X. Petrus	USDA - NRCS	724-652-5811
MEGAN GAHRING	LAW. CD	724 6562473
Jay Russell	Law CD	724-652-4512
Robin Kirkwood	Bess Bore	724-667-9324
JoAnn McBride	Lawrence County TPA	724-654-8408

Mahoning River Watershed Conservation Plan
Advisory Council Meeting
Lawrence County Government Center
September 27, 2012

- Welcome
- Introductions
- Update on the Plan
- New Watershed Activities
- Public Meeting
- Next Advisory Meeting

Mahoning River Watershed Conservation Plan
Advisory Committee Meeting, September 27, 2012
Lawrence County Government Center
1st Floor, Courthouse
New Castle, PA 16101

Minutes

Meeting called to order at 12:15 P.M.

Attendance

Lauren Anderson, Conservation
JoAnn McCready, Conservation
Jerry Zona, Recycling Solid Waste
Megan Gahring, Recycling Solid Waste
Jason Shallcross, Planning
Cliff Wallace

Update on the Plan

- Refocusing on completing the MRWCP as it must be closed out by June 30th, 2013.
- Chapter two, Land Resources, and chapter three, Water Resources, have completed drafts.

New Watershed Activities

- Citizen survey drafted for review by the advisory committee.
    - Review Comments:
        - Attach a better, more legible map. Perhaps a map with color.
        - Put the definition of what a watershed is at the top of the survey.
        - Phrase questions so they reflect opinions on the entire watershed, not individual sub-watersheds.
        - Add Trash/Recycling Services to question 5.
        - Put the survey on the county website and conservation website so it can be printed and mailed or e-mailed.
            - Editable PDF available online as well for citizens.
        - Send physical copy with return postage by request.
        - In the past there was a major discount on postage for bulk mail, but the center moved to Pittsburgh. Contact Renee from the jury commission for more information.

Public Meeting

- Scheduled for November 8th at 7 P.M. Location is TBA.
    - Would like to meet in the watershed.
        - Mahoning Township and North Beaver municipal buildings were suggested.

Mahoning River Watershed Conservation Plan
Advisory Committee Meeting, September 27, 2012
Lawrence County Government Center
1st Floor, Courthouse
New Castle, PA 16101

- Create poster for advertising.
- Tie into elections if possible?
    - Time frame issues perhaps.
- Press release with website link to the survey and contact information for postage
- Put together a PowerPoint presentation for Comcast as they run free PSAs.
- Use Recycling Solid Waste's email listing for announcements.
- Investigate whether or not Bessemer Borough still has a newsletter for possible advertising.
- Provide refreshments/snacks to increase attendance.

Next Advisory Meeting

- Suggested to be after the public meeting to review public participation input.
- Contact people that did not attend the meeting today for better availability times.
- Later in the afternoon, after 3 P.M. preferably, works best for Mr. Wallace.

Appendix J
Citizen Survey

Citizen Survey – Mahoning River Watershed Conservation Plan

Watershed Definition: A watershed can be defined as the area of land that drains to a particular point along a stream. Each stream has its own watershed. Topography is the key element affecting this area of land. The boundary of a watershed is defined by the highest elevations surrounding the stream. A drop of water falling outside of the boundary will drain to another watershed. – PA DCNR

1.) In which municipality do you reside?

Municipality _____

2.) In which sub-watershed do you live? Not sure, check out the attached sub-watershed map to check.

- ☐ Coffee Run Sub-Watershed
- ☐ Hickory Creek Sub-Watershed
- ☐ Hickory Run Sub-Watershed
- ☐ Mahoning River Sub-Watershed
- ☐ Marshall Run Sub-Watershed

3.) What do you think the two most common land uses are in your area?

- ☐ Residential
- ☐ Commercial/Industrial
- ☐ Water/Wetlands
- ☐ Mining
- ☐ Forested
- ☐ Agricultural
- ☐ Recreational
- ☐ Other _____

4.) What are the most prevalent water quality issue(s) in the Mahoning River Watershed?

- ☐ Abandoned Mine Drainage
- ☐ Urban/Road Runoff
- ☐ Sewage Systems
- ☐ Stormwater/Flooding
- ☐ Agricultural Runoff
- ☐ Land Development
- ☐ Industrial Discharges
- ☐ Other_____

5.) Please indicate the importance of the following watershed values for the Mahoning River Watershed.

	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Attractive Natural Settings	5	4	3	2	1
Preserving Historic Sites	5	4	3	2	1
Recreation Opportunities	5	4	3	2	1
Water Quality Improvement	5	4	3	2	1
New Business/Jobs	5	4	3	2	1
Community Activities	5	4	3	2	1
Residential Development	5	4	3	2	1
Educational Opportunities	5	4	3	2	1
Private Property	5	4	3	2	1
Trash/Recycling Services	5	4	3	2	1
Other _____	5	4	3	2	1

6.) Please indicate the importance of the following recreational activities in the Mahoning River Watershed.

	Very Interested	Somewhat Interested	Neutral	Not Very Interested	Not Interested
Boating	5	4	3	2	1
Hiking	5	4	3	2	1
Fishing	5	4	3	2	1
Canoeing/Kayaking	5	4	3	2	1
Horseback Riding	5	4	3	2	1
Swimming	5	4	3	2	1
Hunting	5	4	3	2	1
Bird Watching	5	4	3	2	1
Picnicking	5	4	3	2	1
Visiting Scenic Vistas	5	4	3	2	1
Organized Sports	5	4	3	2	1
Photography	5	4	3	2	1
Visiting Public Parks	5	4	3	2	1
ATV Riding	5	4	3	2	1
Biking	5	4	3	2	1
Other _____	5	4	3	2	1

7.) Is flooding an issue in your area? If so, please explain.

_____

_____

_____

8.) List three things you like about the area of the Mahoning River Watershed you live in.

A. _____

B. _____

C. _____

9.) List three things that you think would help improve your quality of life in the Mahoning River Watershed or improve conditions in the watershed.

A. _____

B. _____

C. _____

Other Comments you have about the Mahoning River Watershed or the Watershed Conservation plan not previously addressed.

_____

_____

_____

_____

Optional: Name: _____ **Address:** _____

Phone Number: _____ **E-mail:** _____

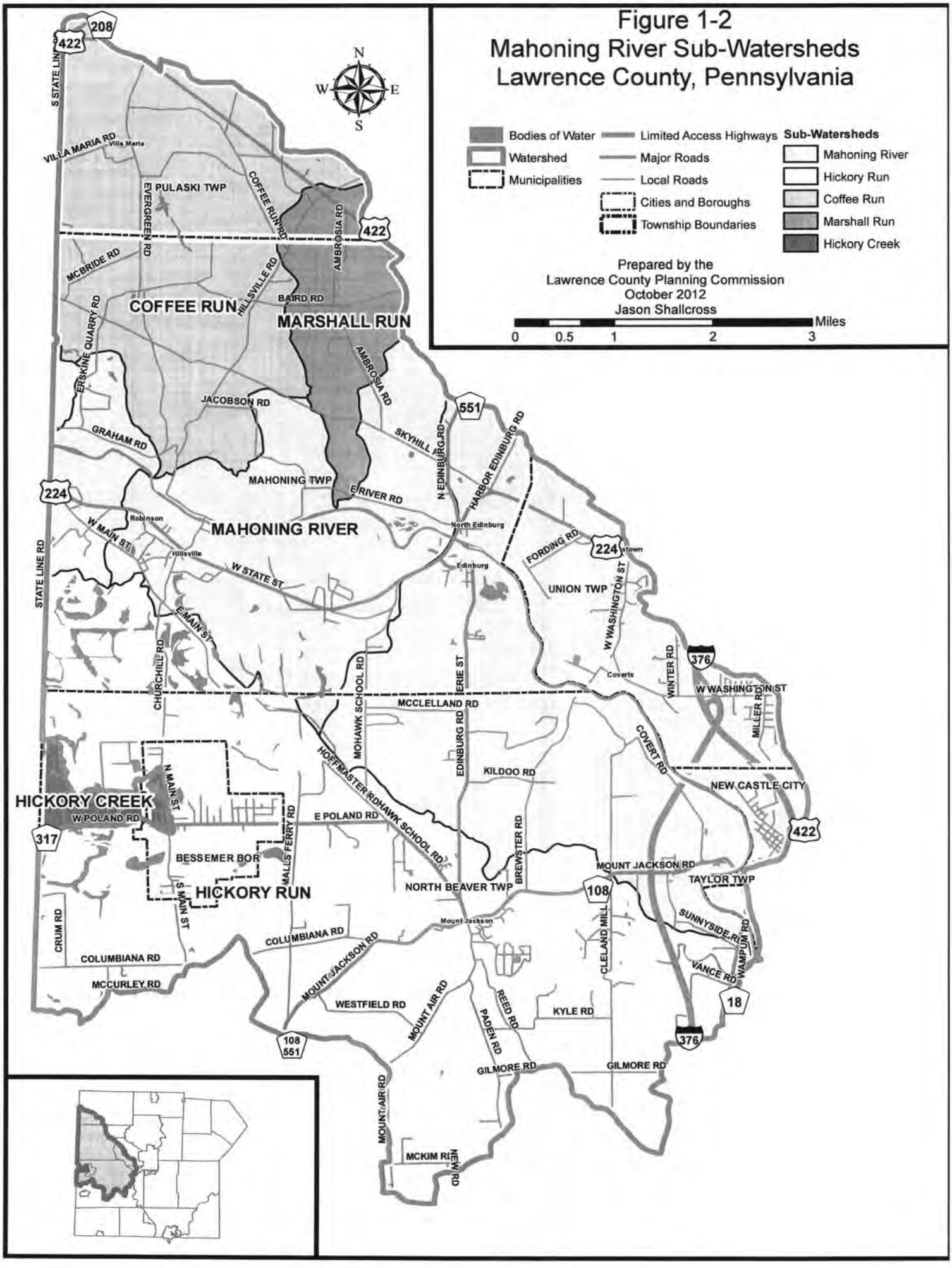


Figure 1-2
Mahoning River Sub-Watersheds
Lawrence County, Pennsylvania
Bodies of Water
Watershed
Municipalities
Limited Access Highways
Major Roads
Local Roads
Cities and Boroughs
Township Boundaries
Sub-Watersheds
Mahoning River
Hickory Run
Coffee Run
Marshall Run
Hickory Creek
Prepared by the
Lawrence County Planning Commission
October 2012
Jason Shallcross
0 0.5 1 2 3 Miles
N
W
E
S
COFFEE RUN
MARSHALL RUN
MAHONING RIVER
PULASKI TWP
MAHONING TWP
UNION TWP
NORTH BEAVER TWP
TAYLOR TWP
HICKORY CREEK
HICKORY RUN
BESSEMER BOR
NEW CASTLE CITY
Villa Maria
Robinson
Hillsville
North Edinburg
Edinburg
Coverts
Mount Jackson
S STATE LINE
VILLA MARIA RD
EVERGREEN RD
COFFEE RUN RD
AMBROSIA RD
MCBRIDE RD
HILLSVILLE RD
BAIRD RD
ERSKINE QUARRY RD
JACOBSON RD
GRAHAM RD
SKYHILL RD
N EDINBURG RD
HARBOR EDINBURG RD
E RIVER RD
W MAIN ST
W STATE ST
E MAIN ST
STATE LINE RD
CHURCHILL RD
FORDING RD
W WASHINGTON ST
WINTER RD
MILLER RD
MOHAWK SCHOOL RD
ERIE ST
MCCLELLAND RD
EDINBURG RD
COVERT RD
KILDOO RD
HOFFMASTER RD
N MAIN ST
W POLAND RD
E POLAND RD
MALLS FERRY RD
BREWSTER RD
MOUNT JACKSON RD
CLELAND MILL
SUNNYSIDE RD
WAMPUM RD
VANCE RD
S MAIN ST
CRUM RD
COLUMBIANA RD
MCCURLEY RD
WESTFIELD RD
MOUNT AIR RD
REED RD
PADEN RD
KYLE RD
GILMORE RD
MCKIM RD
NEW RD
208
422
224
551
317
108
376
18

Appendix K
Goals and Programs for Mahoning River Watershed Improvement

Goals and Programs for Mahoning River Watershed Improvement

The Mahoning River Watershed has a rich history, and as a result a lot of development took place before stormwater management ordinances were required. As a result, buildings and roads that do not let rain water soak into the ground were constructed. Instead rain water travels over those surfaces, picking up pollution as it goes, and hits our creeks and streams in a rush. This can cause problems with flooding and water pollution. The Mahoning River also has a history of industry related dumping upstream. Over the course of time, pollution levels are decreasing and fish populations are increasing in the watershed. The following goals and programs will help improve the water quality in the watershed and the quality of life of those living in the watershed.

Beyond Soils Boat Launch Construction

The construction of a Beyond Soils Boat Launch in the watershed will serve as a great recreational location in the watershed, offering residents more access to the Mahoning River. More access to the Mahoning River was a common comment in the civilian interviews, and something that the County is striving to achieve. The construction of a new boat launch in the watershed will help achieve this.

Acquisition of Quaker Falls

The acquisition of Quaker Falls for long term protection would greatly improve the watershed. Quaker Falls is a beautiful, natural resource that needs to be protected from pollution and deterioration. Quaker Falls is a historical and natural amenity that needs to be preserved. The acquisition of Quaker Falls will go a long way in ensuring its longevity as a natural resource that can be enjoyed.

Water Trail Promotion

The promotion of the water trail will result in more use of natural recreational resources in the watershed. The construction of boat launches to the confluence of the Mahoning River and Shenango River will provide much more access to the Mahoning River. Boat launches along the Mahoning River in Lawrence County will benefit not only those living in the watershed, but also those living in neighboring communities.

Marketing and Effectively Using Bessemer Lake

Marketing and better usage of Bessemer Lake is also a goal for improving the Mahoning River Watershed. It is currently a site for fish restocking and habitat rehabilitation, but further marketing this resource to citizens is the best way to get the most out of this natural area. The Lake has the potential to become a major destination point and with the right marketing and amenities.

Furthering Public Education on the Watershed

Furthering public education on current watershed conditions and improvement opportunities is vital to the health of the Mahoning River Watershed. Annual outreach programs to the public which discuss and explain the value of natural resources will go a long way in improving watershed conditions. The watershed can only fully recovered if the public is educated on current watershed issues and how to correct them.

Plugging Abandoned Oil Wells located along Coffee Run

Lawrence County, Fish and Boat Commission, and the Department of Environmental Protection need to come together to plug leaking, abandoned wells along Coffee Run. These wells are harming the environment and need to be taken care of.

Plug Abandoned Oil Well in Edinburg

There is also an abandoned oil well that is leaking in Edinburg. The County, the Department of Environmental Protection, and the Fish and Boat Commission need to come together to fix this problem. Abandoned oil wells are a well-documented issue in this area and plugging them is a chief concern.

Continue to use Best Management Practices (BMPs) on Interstate Trail Projects

Using BMPs to maintain and expand the current trail system in the watershed will provide a great recreational resource to those living in and around the watershed. Stavich Bike Trail is one of the most liked features of the watershed according to the results of the citizen surveys.

Continue to Construct Stream Bank Fencing along Hickory Run as Funds Allow

The construction of stream bank fencing along Hickory Run will go a long way in preventing agricultural related pollution in the watershed. Stream bank fencing is a simple, cost-effective way for farmers to improve water quality in the streams flowing through their farms and ultimately into the Beaver River. Installing fences and crossings limits livestock access to stream banks and establishes a vegetative buffer strip along the stream. Vegetative buffers help reduce soil erosion, control runoff, and absorb nutrients that could otherwise create water pollution.

Efforts to improve the water quality in the watershed need to be ongoing, and will result in happier citizens with higher qualities of life and more recreational opportunities. These programs and goals will go a long way in increasing the quality of life of those living in the watershed.