





Western Pennsylvania Conservancy

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Allegheny River Headwaters Conservation Plan

June 2011

Prepared for:

Upper Allegheny Watershed Association

Prepared by:

Western Pennsylvania Conservancy



Allegheny Regional Office 159 Main Street Ridgway, PA 15853



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- Northcentral Regional Planning and Development Commission
- Penn State Cooperative Extension
- Pennsylvania Fish and Boat Commission
- Pennsylvania Game Commission

- Pennsylvania Department of Conservation and Natural Resources
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- Port Allegheny Veterans Memorial, Incorporated
- Potter County Conservation District
- Potter County Planning Commission
- Seneca Chapter Trout Unlimited
- Smethport School District
- Upper Allegheny Watershed Association

ACRONYMS

ACB	Alliance for the Chesapeake Bay
AFO	Animal Feeding Operation
AMD	Abandoned Mine Drainage
APHIS	Animal and Plant Health Inspection Service
ASA	Agricultural Security Areas
ATA	Area Transit Authority
ATV	All Terrain Vehicles
BAMR	Bureau of Abandoned Mine Reclamation
BAT	Brownfield Action Team
BDA	Biological Diversity Area
BMP	Best Management Practices
CAFO	Concentrated Animal Feeding Operation
CCC	Civilian Conservation Corp
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CNHI	County Natural Heritage Inventory
CREP	Conservation Reserve Enhancement Program
CSO	Combined Sewage Overflow
CWA	Clean Water Act
CWF	Cold Water Fishery
DA	Dedicated Areas
DCNR	Department of Conservation and Natural Resources
DEP	Department of Environmental Protection
DMAP	Deer Management Assistance Program
DSA	Driving Surface Aggregate
EAB	Emerald Ash Borer
EPA	Environmental Protection Agency
ESM	Environmentally Sensitive Maintenance
EV	Exceptional Value
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
H+	Hydrogen Ion
HQ	High Quality
HU	Hydrologic Unit
IBA	Important Bird Area
IMA	Important Mammal Area
IMAP	Important Mammal Area
IPM	Integrated Pest Management
LCA	Landscape Conservation Area
LHP	Landslide Hazard Program
LHR	Lumber Heritage Region

Municipal Solid Waste Landfills
National Agricultural Statistic Service
National Flood Insurance Program
National Invasive Species Information Center
Nutrient and Odor Management Act
Nitrogen Oxides
National Pollutant Discharge Elimination System
National Pollutant List
Natural Resource Conservation Service
Hydroxide Ions
Pennsylvania Spatial Data Access
Pennsylvania Department of Agriculture
Pennsylvania Department of Education
Pennsylvania Fish and Boat Commission
Pennsylvania Game Commission
Particulate Matter
Pennsylvania Natural Heritage Program
Pennsylvania Nutrient Management Program
Pennsylvania Organization for Watersheds and Rivers
Quality Deer Management
Resource Conservation Recovery Act
Superfund Amendments and Reauthorization Act
Special Flood Hazard Areas
State Game Lands
Surface Mine Conservation Recovery Act
Susquehanna River Basin Commission
Sanitary Sewer Overview
Total Maximum Daily Loads
Trout Stocked Fishery
United States Department of Agriculture
United States Geological Survey
White Nose Syndrome
Western Pennsylvania Conservancy
Warm Water Fishery

WATERSHED DEFINITION

A watershed is an area of land that drains to a common waterway, such as a stream, lake, wetland, aquifer, or ocean. Each waterbody has its own watershed; some are small, such as Brokenstraw Creek, and others are larger, such as Allegheny River. The highest elevation surrounding a waterbody defines its watershed boundary. A drop of water falling outside the boundary will drain to another watershed.

Land uses and human influences can impact the quality of the watershed. Everyone lives in a watershed and "we all live downstream." Local impacts on the waterbody affect the quality of the watershed downstream, just as impacts upstream affect the local quality of the watershed.



EXECUTIVE SUMMARY

The Allegheny River Headwaters Conservation Plan is a comprehensive study that compiles broad-based data about recreational, historical, socio-economic, and natural resources throughout the region. The plan involves a strong community participation element through the identification of local needs and concerns.

This document is non-regulatory, and serves as a reference and educational tool promoting the conservation of natural resources, monitoring and improvement of water quality, and advocating sound community-planning practices. Recommendations identified in this plan are not enforceable by any agency. Implementation of this plan is the responsibility of the entire watershed community, and depends upon cooperation and collaboration among many different organizations.



Pennsylvania Rivers Conservation Program aids groups in accomplishing local initiatives through planning, implementation, acquisition, and development activities. As part of the program, Pennsylvania Department of Conservation and Natural resources (DCNR) established the Pennsylvania Rivers Registry to validate the completion of 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.

The Allegheny River Headwaters Watershed Conservation Plan was conducted to document current conditions that identify initiatives to improve the livability and attractiveness of the region. Through public perception of current conditions and future expectations, the plan engages community involvement into the development of a future vision for the watershed and creates a prioritized list of recommendations to achieve this vision.

Project Background

In 2008, Western Pennsylvania Conservancy received funding from Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Recreation and Conservation to prepare a watershed conservation plan for the Allegheny River headwaters watershed.

In 2009, public outreach was initiated through kickoff public meeting workshops, public surveys, municipal interviews, focus group meeting, and school workshops. Development of resource chapters began to take shape. Planning efforts continued into 2010 when key individual interviews were conducted and public surveys were finalized. The final touches of the Allegheny River Watershed Conservation Plan were conducted throughout the summer into the fall that including the prioritization of management recommendations, public review of the draft plan, and completion of the final Allegheny River Headwaters Conservation Plan in 2011.

Chapter Summaries

Project Area Characteristics

- The Allegheny River headwaters watershed is located within the Pennsylvania Wilds region.
- Population within the watershed is declining. Since 1980, the population has decreased by 6.9 percent to 47,119 residents in 2000. The declining population trend is also prevalent within the nine population centers.
- Land-use regulations, such as zoning and subdivision ordinances are not highly utilized within the project area. Only 38 percent of municipalities address and regulate land-use via comprehensive plans and/or zoning. The remaining municipalities rely their county's comprehensive plan to address and regulate land-use.
- The headwaters of the Allegheny River occupy 893 square miles within 37 municipalities in McKean, Potter, and Cameron counties. The watershed includes all the tributaries that enter the Allegheny River prior to its entrance into New York.
- Wastewater authorities and 15 drinking water authorities provide services within the project area. The majority of authorities obtain water from groundwater sources. Bradford City Water Authority is the only authority that obtains water from source waters.



• Vehicle transportation is the most popular form of transportation throughout the region. The

Eldred, Pa.

Land Resources

- Bradford Regional Airport provides commuter services to Cleveland Hopkins International Airport.
- Ecological conditions within the watershed are taut. The average household income within the project area is lower than average household income in Pennsylvania, New York, and U.S.
- The region has a rich history in oil and gas well drilling, especially in the area surrounding Bradford. In 2009, within the municipalities that comprise the Allegheny River Headwaters watershed 370 permits were issued for well development, of which 94% were located within McKean County. There were 137 wells drilled in the Allegheny River Headwaters region with 12 being Marcellus shale wells.
- Other areas of concern within the project area include two superfund sites, 130 Resource Conservation Recovery Act sites, 55 illegal dumpsites, with an estimated 139.5 tons of trash, and three brownfield sites.
- Agriculture has a significant role within McKean and Potter counties. Between 2005 and 2007, the number of farms increased by 13.7% to 691 farms. However, the average size decreased.

- Located within the project are 38,289 acres are enrolled in Agricultural Security Areas Program and another 485,724 acres are enrolled in Clean and Green Program.
- Forestland dominates the watershed accounting for 76% of the land-use. Agricultural pursuits are the second-leading land-use at 12%.



• The Allegheny River Headwaters are located within the Deep Valley and Glaciated High Plateau sections of the Appalachian Plateau Province. It is also located within the Allegheny Glaciated High Plateau and Unglaciated Allegheny High Plateau ecoregions

Water Resources

- The Allegheny River is a Cold Water Fishery that begins in central Potter County west of the village of Gold in Allegany Township.
- It originates at the triple dived—the location where three major river basins are divided—with the water flowing west entering into the Allegheny River Basin.
- The Headwater region incorporates all the tributaries within Pennsylvania that enter the Allegheny River from its origin to Tunungwant Creek encompassing approximately 889 square miles.
- Four major tributaries feed the Allegheny River. They include: Allegheny Portage Creek, Potato Creek, Oswayo Creek, and Tunungwant Creek



Potato Creek below the dam in Smethport

- Approximately 127 miles of stream within the Allegheny Headwaters region were impaired by siltation, nutrients, pH, organic enrichment and low dissolved oxygen, mercury, metals, and/or pathogens.
- Most of the impairments are from road runoff and agriculture although some impairments are caused by abandoned mine drainage, petroleum activities, removal of vegetation, point source discharges, channelization, or impoundments

Biological Resources

- The region contains a variety of natural habitats, which are highlighted in the 27 biologically diverse areas and four landscape conservation areas that have been identified within the project area.
- Invasive species pose a threat to the natural biodiversity. Within the headwaters region there are 22 invasive plant species and six invasive animal species.
- A diversity of plants and animals reside within the mostly rural and rugged Allegheny River headwaters, including 80 Species of Concerns, one geologic feature, and four natural communities.

o seven birds

o five reptiles

o five mussels

o five mammals

Species of Concern include:

- o 23 plants
- o 18 dragonflies or damselflies
- nine butterflies
- o eight fish

Cultural Resources

- The region has a variety of local attractions and annual events that attract visitors to the region. The Penn-Brad Museum, Zippo/Case Visitor Center, McKean County Historical Society Old Jail Museum, and Eldred World War II Museum are among some of the well-known attractions. Also included in these attractions are six sites and three districts that have been identified on the National Register of Historic Places.
- European settlement into the region was slowed by the resistance of Native Americans and contradicting land titles. The first settler within the region was Francis King who arrived in Ceres Township in 1798.
- The region's citizens played a significant role in the Underground Railroad by harboring or guiding escaped slaves through the rugged terrain onto safe passage into New York and Canada.



Marilla Springs Trail is one of the many local trails throughout the project area

• A variety of recreational opportunities exist throughout the Allegheny River headwaters region including some unique opportunities, such as sky diving and model airplane flying. In addition to specific recreational facilities there is an abundance of natural resources for activities, such as hunting, fishing, and geocaching.

Recreational facilities include:

- Four golf courses
- Four private campgrounds
- o 44 local, state, or regional parks
- Three environmental educational facilities
- Three regional trail networks—Tuna Valley Trail, Potato Creek Trail, and Kinzua Trail
- Over 41 miles of trails for all terrain vehicle and snowmobile use.

Issues and Concerns

- Identifying visions and goals is a fundamental element of watershed conservation planning. In order to obtain these visions and goals, local stakeholders were contacted using a variety of methods, including portable displays, public meeting workshops, student workshops, a focus group meeting, municipal surveys, individual interviews, personal communication, community events, and a project website.
- Stakeholder identified the following issues:
 - <u>Project Area Characteristics</u>—infrastructure, employment, legal and political, dirt and gravel roadways
 - o Land Resources—stone quarries and natural gas drilling
 - o <u>Water Resources</u>—brine usage and stormwater management
 - o <u>Biological Resources</u>—habitat destruction and decreased wildlife populations
 - <u>Cultural Resources</u>—respecting private lands, seasonal recreational opportunities, and environmental education

Management Recommendations

- Management recommendations are non-regulatory suggestions to maintain or improve the conditions that affect many aspects of life within the region. These recommendations are best used as a guide to conserving, restoring, or improving important watershed characteristics. They were compiled from municipal and public surveys, public meeting workshops, and key individual interview comments.
- No limitation to the number or types of issues, actions, approaches, partners or funding opportunities should be assumed, due to ever changing circumstances. Creativity in implementing the identified recommendations or developing additional suggestions is highly encouraged.

Table ES-1. Management Recommendation Goals

Project Area Characteristics

- Proactively plan for future development.
- Carefully plan development to ensure economic enhancement while preserving community character without adversely affecting quality of life.
- Enhance marketability to prospective business and establish economic stability to maintain a balanced workforce.
- Encourage economic growth with minimal impacts to the environment.
- Increase communications and cooperation among municipalities and counties within the region to promote sharing of services and improve conditions collectively affecting the watersheds.
- Identify impacts of acid precipitation to minimize and remediate these impacts.
- Enhance transportation infrastructure.
- Enhance financial support and services to prepare emergency response providers.
- Educate stakeholders how land use planning can be affective.
- Educate stakeholders about benefits of watershed protection and the use of best management practices.
- Support community libraries and expand service opportunities.

Table ES-1. Management Recommendation Goals (continued)

Land Resources

- Explore opportunities to generate alternative energy.
- Reduce impacts caused by dirt and gravel roadways.
- Establish cooperation between surface and subsurface rights landowners and develop protection rights for surface landowners in order to protect their property.
- Preserve agricultural lands and culture for future generations
- Establish or enhance incentives for land protection and conservation practice implementation.
- Identify, inventory, cleanup illegal dumpsites, and prosecute violators using illegal dumpsites.
- Work with agriculturalist to install best management practices at their farms to reduce impacts on herds and area waterways.
- Minimize impacts caused by exploration, production, retirement, and abandonment of wells.
- Reclaim abandoned wells, mines, and quarries.
- Protect ecologically significant lands.
- Increase awareness about practices to assist agricultural and forest landowner in managing their lands effectively.
- Increase awareness about the impacts from litter, illegal dumps, and abandoned vehicles.

Water Resources

- Protect area waterways while increasing wildlife habitat opportunities.
- Increase awareness about the benefits of riparian corridors.
- Further investigate wetlands and their functions and protect their resources.
- Educate stakeholders about the value and importance of wetlands.
- Reduce the amount of erosion and sedimentation entering waterways.
- Monitor water quantity to ensure demand does not exceed water supply.
- Monitor the use of brine water as a treatment on dirt and gravel roads.
- Minimize potential flooding damages by taking a proactive approach to managing floodplains.
- Encourage non-structural approaches to floodplain management.
- Minimize impacts from stormwater through planning.
- Establish, maintain, or upgrade sewage treatment facilities.
- Establish, maintain, or upgrade water treatment facilities.
- Investigate the need and effectiveness of establishing a water quality trading program within the Allegheny River Headwaters Watershed.
- Develop a monitoring plan for the watershed or completed project areas, integrating quality assurance/quality control standards into the plan.
- Establish and implement after conservation practices to reduce water consumption.
- Conduct an assessment of natural and man-made impoundments, and implement recommendations to enhance their ecosystems.
- Protect and evaluate waterways that are designated or eligible for classification as High Quality or Exceptional Value
- Reduce water quality impacts by properly disposing of un-needed medication.
- Provide educational programs educating residents about impacts and pollution sources.

Table ES-1. Management Recommendation Goals (continued)

Biological Resources

- Reduce impacts caused by invasive and nuisance species.
- Develop, adopt, and implement management plans to protect forest and wildlife resources.
- Implement best management practices to protect forest resources.
- Identify Important Bird and Mammal Areas
- Identify and protect biologically diverse areas.
- Enhance aquatic habitats.
- Protect rare, threatened, and endangered species and their habitats.
- Identify and protect important habitats for plant and animal species.
- Implement strategies to conserve rare and unique plant and animal communities.
- Increase the use of native plants in landscaping and remediation projects.
- Implement wildlife management practices to protect biodiversity.

Cultural Resources

- Increase awareness of recreational resources through marketing and outreach.
- Enhance recreational opportunities for sportsmen and outdoor enthusiasts.
- Increase recreational opportunities for area youth by establishing programs, encouraging outdoor recreational activities and opportunities.
- Improve recreational facilities and ensure availability and access.
- Establish, expand, and improve area trails.
- Link recreational facilities to each other.
- Encourage environmentally sound practices when operating recreational vehicles, and enforce existing laws to minimize intrusion on private lands.
- Expand awareness, appreciation, and support for the arts.
- Highlight and preserve local history within the region.
- Promote appreciation for the local history.
- Promote community involvement in conservation and educational initiatives.
- Establish ongoing environmental education programs and displays.
- Educate recreation users about proper and safe practices.

CHAPTER 1. PROJECT AREA CHARACTERISTICS

This section provides an overview of the project area, its location, watershed sub-basins, topography, municipalities, air quality, land-use regulations, and socio-economic factors.

Project Area

Location and Size

Situated within the Pennsylvania Wilds region, the headwaters of the Allegheny River occupy 893 square miles within 37 municipalities in McKean, Potter, and Cameron



counties. The watershed includes all the tributaries that enter the Allegheny River prior to its entrance into New York. Figure 1-1 and Table 1-1 identify the municipalities within the Allegheny River headwaters.

Table 1-1. Watershed Municipalities					
Municipality	Square Miles	Percent of Watershed	Municipality	Square Miles	Percent of Watershed
McKean County			Potter County		
Annin Township	33.83	3.79%	Allegany Township	27.80	3.11%
Bradford, City of	3.40	0.38%	Clara Township	19.66	2.20%
Bradford Township	52.42	5.87%	Coudersport Borough	5.63	0.63%
Ceres Township	40.54	4.54%	Eulalia Township	29.17	3.27%
Corydon Township	0.12	0.01%	Genesee Township	6.27	0.70%
Eldred Borough	0.94	0.11%	Hebron Township	43.75	4.90%
Eldred Township	39.04	4.37%	Homer Township	1.90	0.21%
Foster Township	44.05	4.93%	Keating Township	16.83	1.89%
Hamlin Township	24.69	2.76%	Oswayo Borough	1.38	0.15%
Keating Township	86.05	9.64%	Oswayo Township	35.09	3.93%
Lafayette Township	33.54	3.76%	Pleasant Valley Township	19.70	2.21%
Lewis Run Borough	1.84	0.21%	Roulette Township	32.64	3.66%
Liberty Township	82.45	9.23%	Sharon Township	33.98	3.81%
Mount Jewett Borough	0.72	0.08%	Shinglehouse Borough	2.09	0.23%
Norwich Township	73.63	8.25%	Summit Township	5.70	0.64%
Otto Township	34.89	3.91%	Sweden Township	24.93	2.79%
Port Allegany Borough	1.78	0.20%	Cameron County		•
Sergeant Township	27.74	3.11%	Shippen Township	2.85	0.32%

Major Tributaries

1.75

Smethport Borough

The Allegheny River begins in Potter County in Allegany Township near Colesburg, and it flows in a west-northwest direction through Coudersport, Port Allegany, and Eldred before flowing into New

0.20%

York. There are four major tributaries that join the Allegheny River to form its headwaters. Allegheny Portage Creek is the first major tributary; it joins in Port Allegany, Pa. after flowing through Keating Township in Potter County and Liberty Township in McKean County. Potato Creek is the second major tributary to enter the Allegheny River, joining near Coryville, Pa. Potato Creek begins in Norwich



Tunungwant Creek in Lewis Run, PA

Keating and Eldred townships in McKean County. Oswayo Creek is the next major tributary to join, entering the Allegheny River southwest of Portville, New York. Oswayo Creek begins in northern Potter County, east of Oswayo Borough, where it flows in a northwest direction through Shinglehouse and into New York. The final major tributary of the Allegheny River headwaters is Tunungwant Creek sometimes spelled Tunungant—which is locally referred to as "Tuna" Creek, for short. Beginning in Lafayette Township, it flows north through Lewis Run Borough, Bradford Township, City of Bradford, and Foster Township before joining the Allegheny River near Riverside Junction, New York.

Township, and flows north through Smethport Borough and

<u>Climate</u>

The region experiences a humid continental climatic regime with cold, snowy winters and warm summers with an occasional hot day. Westerly winds cross the region with an average wind speed of nine miles per hour occurring in the spring. During the winter months, the temperature averages 21 degrees Fahrenheit, with the record low temperature reaching -42 degrees Fahrenheit on January 5, 1904 in Smethport, Pa. The summer season brings warmer temperatures averaging 74 degrees Fahrenheit, with a record high of 98 degrees Fahrenheit in 1986 and 1988. Throughout the summer months, sunshine occurs 60 percent of the time [National Climatic Data Center (NCDC); The Weather Channel, 2009].

The growing season—the period between the last 32-degree temperature day of spring and the first 32-degree temperature day of fall—is between 100 and 165 days long. However, the region is better suited for the growing of trees, primarily hardwood species, as opposed to agricultural crops (Woods, Omernik, & Brown, 1999).

Precipitation occurs throughout the year, but more frequently during the spring and summer months, and is heavier on the windward or west-facing slopes. Approximately 43 inches of precipitation accumulates annually. The region experiences approximately 30-35 days of thunderstorms a year, mostly within the summer months. Smethport, in McKean County, holds a world record for rainfall—30.8 inches of rain fell over 4.5 hours on July 18, 1942. The national rainfall record of 34.5 inches over a 24-hour timeframe is also held by Smethport, occurring July 17–18, 1942. This region accumulates an average of 84 inches of snowfall during the winter months. On average, 82 days per year have one inch or more of snow covering the ground. The greatest snow depth at one time within the region was 44 inches (NCDC; Churchill, 1987).

The region is not immune to severe weather. Blizzards, severe thunderstorms, tropical storms, and tornados periodically threaten the region. Severe thunderstorms are the most common serious weather concern. As previously mentioned the region experiences 30–35 days of thunderstorms each year. However, not every storm is severe enough to cause flooding. Localized flooding can occur from heavy storm events, spring thaws, or a combination of the two weather conditions. A flood of notable severity occurs approximately once every eight years. Often times, storm events that threaten the region are the tail end of a tropical depression, as in the case of the 1972 flood that impacted Eldred, Pa.

One of the worst floods to occur in the region was the result of Tropical Storm Agnes in June, 1972. The region received 12.05 inches of rain increasing the depth of area streams to 28 feet above their normal levels. Flooding within the Borough of Eldred was so severe that the water level reached the second level of many homes and the only viable form of transportation was that by boat.

Each year nearly ten tornados form within Pennsylvania, ranking it 25th nationally for tornadic activities. Within Pennsylvania, tornados occur primarily in the extreme northwestern, southwestern plateau, and southeast piedmont regions. According to the National Weather Service in Buffalo, New York, the Pennsylvania-New York border is considered a hot spot for tornado activity, averaging two tornadoes per year. On July 21, 2003, an F1 tornado destroyed the Kinzua Bridge just north of Mount Jewett, Pa. On July 27, 2009, a tornado touched down in the eastern portion of Cattaraugus County, New York, in the Allegany State Park just a few miles north of the Bradford region (Pennsylvania Department of Conservation and Natural Resources (DCNR²); NCDC; Connolly, 2009; Pennsylvania tornadoes).

Topography

An area's land surface contains features, such as mountains and glacial outwash that define its topography. These natural land features influence the establishment of communities and their facilities. This region's landscape of rolling hills and meandering waterways spurred development in valley areas, such as Bradford, Smethport, Lewis Run, Port Allegany, Eldred, Shinglehouse, and Coudersport. The valley areas were selected for development because it was easier to clear the valley land opposed to mountainous terrain. Even the arrangement of roads, utilities, and water lines are impacted by topography. Typically, areas that contain a slope less than 15 percent are suitable for most development; areas with a slope between 15–30 percent require caution, and areas with a slope of 30 percent or more should remain undeveloped (Potter County Planning Commission, 2005). Figure 1-2 displays the topography of the region.

Coudersport Ice Mine

The Coudersport Ice Mine is a unique natural feature within the Allegheny River watershed, located approximately four miles east of Coudersport. Although called a mine it is actually a cave or pit that demonstrates a coldness trap or Glaciere. A coldness trap occurs when the cold, dense winter air becomes trapped in the cave and unable to leave.

In 1897, the Coudersport Ice Mine shaft was built to search for a strange ore, believed to be silver ore. The ore turned out to be worthless and mining was ceased. When the mine shaft was built ice had already filled the cracks in the rocks giving the mine its name as "ice mine" (Duckeck, 2008).

In this cavern, icicles form during the summer months and melt by winter. This is because the cave maintains a temperature cold enough to freeze water. During the winter months, no icicles form because the cracks in the rocks are completely frozen not allowing additional water into the cave. During the spring and summer, the cracks thaw and allow water to flow into the cavern, where it freezes and creates icicles. Once a popular tourist destination, the site was destroyed when the nearby landscape was altered (Duckeck, 2008).

More information about physiographic resources is included in the Land Resources chapter.

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 (Pennsylvania Department of Environmental Protection [DEP], 2003). Any substance in the air that causes damage to life, ecosystems, or property is an air pollutant.

Both 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. Amended in 1977 and again in 1990, the act set a national goal to have clean and healthy air for everyone.

Airborne pollutants can travel very long distances. They fall to the ground in raindrops, fog, dew, dust, or simply due to gravity in a process called atmospheric deposition. It is difficult to identify the source of airborne pollutants found in a body of water. Pollutants enter waterways through direct and indirect deposition. Direct deposition occurs when the pollutants enter directly into the waterways. Through indirect deposition, pollutants are washed into waterbodies with runoff. Researchers have developed the concept of airsheds to assist in the study of atmospheric deposition (U.S. Environmental Protection Agency [EPA], 2003).

Airsheds are geographic areas responsible for emitting 75 percent of the air pollution that reaches a body of water. Different pollutants have different airsheds because of the varied behaviors they exhibit 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).

Atmospheric Deposition

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, and trees; the particles are then washed away in runoff during storm events.

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

Atmospheric deposition can negatively affect the water quality in lakes and streams, terrestrial and aquatic wildlife, forests, human health, visibility, and the materials used to make automobiles, statues, and buildings. More information about the effects of acid precipitation is located within the Water Resources chapter.

Critical Pollutants

Six critical pollutants that affect air quality have been identified nationally. They include carbon monoxide, lead, nitrogen oxides, ozone, particulate matter, and sulfur dioxide. Overall, McKean and Potter counties are ranked among the cleanest counties in the U.S. and in Pennsylvania.

Carbon Monoxide

Carbon monoxide is a poisonous compound that is produced as a result of the incomplete consumption of fuels, such as in motor vehicle exhaust, industrial processes, and wood stoves. It can impair vision, alertness, and other mental and physical function when inhaled. Individuals with cardiovascular disease are at the highest risk, but carbon monoxide can also affect healthy individuals. Carbon monoxide poisoning can be fatal when high levels are present, because it replaces the oxygen in blood and inhibits the delivery of oxygen to body tissues (DEP⁹).

Potter and McKean counties are among the cleanest counties within Pennsylvania, ranking in the 0th and 10th percentiles. They are also among the cleaner counties when compared to other counties within the U.S., ranking in the 30th and 50th percentiles. A percentile is a descriptive statistic that indicates the percent of a distribution; i.e. a rank in the 50th percentile means McKean County's carbon monoxide contamination is greater than or equal to 50 percent of the counties nationwide. Lower percentile rankings indicate cleaner conditions, whereas higher percentiles indicate dirtier or worse conditions. In 1999,

21,952 tons of carbon monoxide was emitted into the air from mobile, area, and point sources within McKean and Potter counties (Green Media Toolshed, 2005).

Mobile sources are emissions from vehicles or off-road equipment—such as airplanes, trains, and construction equipment. Approximately 83 percent of carbon monoxide emissions in McKean and Potter counties come from mobile sources.

Area sources are sources that emit less than 10 tons from a single pollutant or less than 25 tons from of a combination of pollutants each year. They contribute up to 14 percent of the carbon monoxide emissions within McKean and Potter counties. Dry cleaners, gas stations, auto body shops, residential and commercial buildings, lawnmowers, grills, wastewater treatment, landfills, and backyard burning all classify as area sources.

Point sources are emitted from chemical plants, refineries, and power plants and emit pollutants greater than 10 tons for a single pollutant or more than 25 tons for a combination of pollutants per year. They account for only three percent of the carbon monoxide being emitted in McKean and Potter counties.

<u>Lead</u>

The use of leaded fuel and industrial processes, such as battery manufacturing and lead smelters, emits lead particles into the atmosphere. The metal development process is a major source of lead emissions. Ingested or inhaled, lead causes poisoning, which reduces mental abilities; damages blood, nerves, and organs; and raises blood pressure. Lead is highly toxic and accumulates in the body; even small doses are harmful (DEP⁹).

Nitrogen Oxides

Fossil fuels burned at temperatures that exceed 1,200 degrees Fahrenheit produce nitrogen oxides (NO_x) . Automobiles, trucks, buses, airplanes, industries, and power plants emit NO_x into the atmosphere. They contribute to the deposition of nitrogen in soil and water through acid precipitation and play a major role in the formation of ground-level ozone. Human health is impacted when NO_x enter the lungs, making it more difficult to breathe (DEP⁹).

Compared to other counties within the U.S., Potter and McKean counties are ranked in the 50th and 60th percentiles, respectively. However, within Pennsylvania they are ranked in the 20th and 30th percentiles. Within McKean and Potter counties in 1999, 8,304 tons of nitrogen oxides were emitted into the atmosphere with 64 percent coming from point sources and 34 percent from mobile sources (Green Media Toolshed, 2005).

<u>Ozone</u>

Ozone is a colorless, odorless gas that forms in the atmosphere. Dependant upon its location in the atmosphere, ozone can be beneficial or harmful. When located in the upper atmospheric layer, it makes up the ozone layer, filtering the sun's harmful ultraviolet rays. When located in the lowest atmosphere, it is ground-level ozone. Ground-level ozone is a secondary pollutant—a pollutant formed in the atmosphere instead of 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 (DEP⁹). Ozone, and pollutants that cause it, can travel hundreds of miles away from their source.

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

Particulate Matter

Particulates are tiny drops of liquid or small particles of dust, metal, or other materials that float in the air. Particulate matter is a mixture of these particles. Four different types and sizes exist. Particulates travel into the lungs and become trapped; they cause respiratory ailments, and can carry chemicals that can cause cancer and produce greater health problems (DEP⁹).

Total suspended particulates vary in size up to 45 micrometers in diameter. They can remain suspended in the air for anywhere from several seconds to several months (DEP⁹). Neither federal nor state air quality standards exist for total suspended particulates.

Particulate matter 10 (PM_{10}) is solid matter or liquid droplets from smoke, dust, fly ash, or condensed vapors that are suspended in air for long periods. They are less than 10 micrometers in diameter. Potter County is ranked in the 0th percentile, meaning that Potter County's PM_{10} pollution is greater than or equal to zero percent of the counties in the U.S. for PM_{10} . McKean County is ranked in the 20th percentile in the U.S. and Pennsylvania. Within McKean and Potter counties, 4,598 tons of PM_{10} were emitted in 1999, with 50 percent coming from mobile sources and 46 percent from area sources (Green Media Toolshed, 2005).

Particulate matter 2.5 ($PM_{2.5}$) is fine particulates 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^9). When compared to other counties in the U.S., Potter County ranked in the 20^{th} percentile, while McKean County ranked in the 30^{th} percentile. Among Pennsylvania counties, Potter County ranked in the 0^{th} percentile and McKean in the 30^{th} percentile. In McKean County, 1,055 tons of $PM_{2.5}$ was emitted in 1999 with 45 percent coming from area sources. Exact information about the emissions in Potter County was not available (Green Media Toolshed, 2005).

Sulfates and Nitrates

Classified together as a critical pollutant are sulfates and nitrates. Sulfates are one of the key components in the formation of acid precipitation. Studies to determine the impacts nitrates have in the formation of acid precipitation are ongoing. Both sulfates and nitrates have a role in reduced visibility.

Sulfur Dioxide

Emitted into the atmosphere from burnt coal or oils that contain sulfur, sulfur dioxide damages trees, plants, and agricultural crops. In addition, it can accelerate the corrosion of monuments, buildings, and iron-containing metals (DEP⁹). Sulfur dioxide is the main component of acid precipitation; it joins with water vapor in the atmosphere to form sulfuric acid. Children, the elderly, and individuals with asthma, chronic lung disease, and cardiovascular disease are most susceptible to the negative health effects of this pollutant.

Potter County is among the cleanest counties in regards to sulfur dioxide pollution in the U.S., being ranked in the 10th percentile. McKean County, on the other hand, is among the more polluted counties, being ranked in the 70th percentile. In Pennsylvania they rank in the 0th percentile and 40th percentile, respectively. In McKean and Potter counties, 2,471 tons of sulfur dioxide was emitted with 96 percent of it coming from McKean County. Point sources accounted for 86 percent of the total sulfur dioxide emitted from the counties (Green Media Toolshed, 2005).

Mercury

Although not identified nationally as a critical pollutant, mercury is important. Mercury occurs naturally in air, water, and soil. Many rocks, including coal, release mercury into the atmosphere when

burned. An estimated half of all mercury deposited within the U.S. comes from sources within the U.S. (EPA, 2005). Approximately 40 percent of the domestic mercury released is from power plants that burn coal. Of the mercury emissions from these plants, only one-third is deposited in the U.S.

Mercury emitted into the atmosphere eventually settles into water or onto land, where it is carried to water by runoff. Once deposited, certain microorganisms can change it into methylmercury, a highly toxic form of mercury that accumulates in fish, shellfish, and animals that eat fish (EPA, 2005). Some species of fish and shellfish amass more methylmercury than others; levels of methylmercury vary dependant upon what they eat, how long they live, and their trophic level—where they are located on the food chain.

People are exposed to methylmercury primarily through the consumption of fish and shellfish. At high levels, this exposure can harm the brain, heart, kidneys, lungs, and immune system. In unborn babies, newborns, and young children, high levels of methylmercury can affect the development of the nervous system and impair their ability to learn (EPA, 2005).

The EPA, U.S. Food and Drug Administration, and individual states work together to establish local fish advisories. These advisories suggest how often women who may become pregnant, pregnant women, nursing mothers, and young children should eat certain types of fish. Advisories for men, women, and children of all ages are issued when appropriate. Pennsylvania advisories are updated annually on DEP's website (keyword: fish advisories).

The Commonwealth of Pennsylvania advises citizens to limit their consumption of recreationallycaught sport fish from Pennsylvania waterways to no more than one half-pound meal per week. More proactive advice is available for fish caught in the Allegheny River from the confluence of Potato Creek to the Pennsylvania-New York border. It is recommended to limit consumption of recreationally-caught smallmouth bass to one eight-ounce meal per month because of mercury accumulation. In addition, it is recommended to limit consumption of carp caught from Tunungwant Creek between the confluence of the East and West Branches of Tunungwant Creek and the Pennsylvania-New York border to two eightounce meals per month (DEP, 2009b).

Impacts of Air Pollution

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

Socioeconomic Profile

Land-Use Planning and Regulation

Land-use plans and regulations protect communities from unwanted land uses. The Pennsylvania Municipalities Planning Code grants municipalities land-use regulation capabilities, such as comprehensive planning, zoning, subdivision regulation, and land-use ordinances. Unwanted or uncontrolled land uses may result when these protective measures are not utilized. Land-use controls utilized by municipalities are identified in Table 1-2 and Figure 1-3.

Comprehensive Plans

Comprehensive plans serve as a guide for public and private decisions to ensure appropriate development activities. Many municipalities and counties recognize that without formal plans they may be vulnerable to undesirable land uses through uncontrolled industrial, commercial, or residential

Table 1-2. Land-Use Ordinances						
Municipality	Comprehensive Plan	Zoning Ordinance	Subdivision Ordinance	Floodplain Ordinance		
Potter County	Yes	No	Yes			
Allegany Township	No	No	County Plan	Yes		
Clara Township	No	No	Yes	Yes		
Coudersport Borough	Yes	Yes	Yes	Yes		
Eulalia Township	No	No	County Plan	Yes		
Genesee Township	No	No	County Plan	No		
Hebron Township	No	No	County Plan	Yes		
Homer Township	No	No	County Plan	No		
Keating Township	No	No	County Plan	No		
Oswayo Borough	No	No	County Plan	Yes		
Oswayo Township	No	No	County Plan	No		
Pleasant Valley Township	No	No	County Plan	Yes		
Roulette Township	No	No	County Plan	Yes		
Sharon Township	No	No	County Plan	Yes		
Shinglehouse Borough	No	No	County Plan	Yes		
Summit Township	No	No	County Plan	Yes		
Sweden Township	No	No	County Plan	Yes		
McKean County	Yes	No	Yes	Yes		
Annin Township	No	No	County Plan	Yes		
Bradford City	Yes	Yes	Yes	Yes		
Bradford Township	Yes	Yes	Yes	Yes		
Ceres Township	No	No	County Plan	Yes		
Eldred Borough	Yes	Yes	County Plan	Yes		
Eldred Township	No	No	County Plan	Yes		
Foster Township	Yes	Yes	Yes	Yes		
Hamlin Township	Yes	No	County Plan	Yes		
Keating Township	Yes	No	County Plan	Yes		
Lafayette Township	Yes	Yes	Yes	Yes		
Lewis Run Borough	Yes	Yes	County Plan	Yes		
Liberty Township	No	No	County Plan	Yes		
Mount Jewett Borough	Yes	Yes	County Plan	Yes		
Norwich Township	No	No	County Plan	Yes		
Otto Township	No	No	County Plan	Yes		
Port Allegany Borough	Yes	Yes	County Plan	Yes		
Sergeant Township	Yes	No	County Plan	Yes		
Smethport Borough	Yes	Yes	County Plan	Yes		

n/a indicated information not available

(Source: Center for Local Government Services; Municipal Surveys; McKean County Planning Commission, 2007; Potter County Planning Commission, 2005; Dietrich, personal communication, 2009) development. Although often used to guide municipal actions, comprehensive plans have no regulatory authority unless implemented through the development of ordinances and other municipal regulations.

Within the headwaters of the Allegheny River, 38 percent of the municipalities have a municipal comprehensive plan. Only one municipality within Potter County—Coudersport Borough—has a municipal comprehensive plan. Municipalities that do not have an individual comprehensive plan utilize their county's comprehensive plan.

Subdivision Regulations

Subdivision regulations limit the number of times that a parcel can be divided into two or more smaller parcels. These regulations serve as an important tool in controlling sprawl. Subdivision regulations can ensure that new developments integrate infrastructure with present and planned facilities; provide adequate provisions for stormwater management, erosion control, water supply, wastewater, and traffic access; and do not overburden local roads, facilities, and services. Municipalities and counties without subdivision regulations should establish them to assist in growth management.

Within the Allegheny River headwaters watershed, 49 percent of the municipalities do not utilize subdivision regulations. Six municipalities have their own subdivision ordinance, while another 12 utilize their county's ordinance.

Zoning and Land-Use Ordinances

Zoning is a legal mechanism by which government bodies, in order to protect public health, safety, morals, and general welfare, can limit the use of the land and/or designate development restrictions through land-use ordinances. Ordinances divide all land within a municipality into districts and create regulations that apply to the municipality as a whole, as well as to the individual districts. Twenty-eight percent of the municipalities in the Allegheny River headwaters utilize zoning regulations.

One approach, **Conservation by Design**, utilizes local zoning and subdivision ordinances to conserve open spaces, greenways, and natural resources while establishing new developments. When Conservation by Design strategies are used, development is designed to decrease the amount of buildable space on each individual parcel, but increase the amount of open community space. It provides an alternative to the typical residential development of cul-de-sacs, manicured lawns, and boxy communities. It provides shared community space and vistas for all residents to enjoy. More information about Conservation by Design is available on the Natural Lands Trust website: www.natlands.org.

Another option is utilizing **Smart Growth** practices when new developments are being proposed. Smart Growth practices are cooperative land-use strategies aimed at addressing development issues and improving quality of life for area residents. Smart Growth invests time, attention, and resources in order to restore a sense of community and vitality to central cities and older suburbs. Smart Growth is towncentered, transit and pedestrian oriented, and has a greater mix of housing, commercial, and retail uses. It

also preserves open space and many other environmental amenities. Implementing Smart Growth practices provides a balanced, well-rounded community (Sustainable Community Network).

Pennsylvania Wilds Design Guide

Introduced in 2007, the Pennsylvania Wilds Design Guide is a non-regulatory tool to help municipalities guide development patterns to fit their community's aesthetics. The guide provides recommendations for specific design, placement, and signage. Public agencies, property owners, investors,



developers, design professionals, community organizations, and others are encouraged to use the design guide when designing or modifying local businesses. The guide is beneficial in strengthening the community and regional identity, increasing public awareness about design issues and options, avoiding development patterns that look foreign to the region, enhancing property values, and protecting the region's tourism industry.

Demographics and Population Patterns

Since 1980, the population within the watershed has declined, most notably between 1980 and 1990 (See Figures 1-4 and 1-5). The watershed's population was calculated using census block group data from 1980, 1990, and 2000. Table 1-3 compares the population changes between males and females from 1980 to 2000.

Table 1-3. Watershed Population						
Population	1980	1990	2000	Percent Change 1980-1990	Percent Change 1990-2000	Percent Change 1980-2000
Female	26,138	23,992	23,465	-8.9%	-2.2%	-11.4%
Male	24,224	23,329	23,654	-3.8%	1.4%	-2.4%
Total	50,362	47,321	47,119	-6.0%	-0.4%	-6.9%

(Sources: Free Demographics, 2009; U.S. Census Bureau, 1990; U.S. Census Bureau, 2000)

The ratio of males to females is approximately one to one, with males holding a slight edge-0.3percent. Table 1-4 displays the comparison of population by sex and age. Six categories are identifiedpreschool-aged, school-aged, college-aged, post collegiate-aged, midlife-aged, and retirement-aged.

Table 1-4. Population by Sex	
and Age	

Years	Male	Female	Total
<5	1,391	1,362	2,753
5-17	4,506	4,164	8,670
18-24	1,893	1,794	3,687
25-39	5,165	4,459	9,624
40-61	6,859	6,530	13,389
<u>>62</u>	3,825	5,171	8,996
Total	23,639	23,480	47,119

(Sources: Free Demographics, 2009; U.S. Bureau of Census, 2000)

Within the headwaters of the Allegheny River there are nine population centers. Overall, the population within these centers has decreased; nearly 24,700 residents have moved away from the population centers based on 2007 population estimates (U.S. Census Bureau, 2007). Table 1-5 lists the population of each municipality, percent of each municipality in the project area, and population per square mile.

The City of Bradford—named after a town in New England where many of its earliest settlers originated—is located in the northwestern corner of the watershed along Tunungwant Creek. Originally established as a borough in 1872, the town was incorporated into a city in 1879. The City occupies 3.15 square miles and is well-known for the invention and manufacturing of the Zippo[®] lighter. Between 2000 and 2007, it is estimated that the population within the city decreased by 8.3 percent to a population of 8,429 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Incorporated in 1848, the *Borough of Coudersport* is the county seat for Potter County, Pa. It was named for banker Jean Samuel Couder. Between 2000 and 2007, it is estimated that the population within the borough decreased by 9.7 percent to 2,416 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Table 1-5. Watershed Municipalities					
Municipality	Population	Size (miles ²)	Population per mile ²	Percent of Municipality in Project Area	
Cameron County					
Shippen Township	2,495	157.15	16	2%	
McKean County					
Annin Township	835	33.55	25	100%	
Bradford Borough	9175	3.45	2,660	100%	
Bradford Township	4816	55.56	87	94%	
Ceres Township	1003	40.7	25	100%	
Corydon Township	301	73.2	411	<1%	
Eldred Borough	858	0.88	979	100%	
Eldred Township	1696	39.37	43	100%	
Foster Township	4556	46.41	98	95%	
Hamlin Township	819	64.55	13	38%	
Keating Township	3087	98.15	31	88%	
Lafayette Township	2337	71.16	33	47%	
Lewis Run Borough	577	1.94	298	100%	
Liberty Township	1726	83.51	21	99%	
Mount Jewett Borough	1070	2.38	449	30%	
Norwich Township	633	95.62	7	77%	
Otto Township	1738	34.8	50	100%	
Port Allegany Borough	2335	1.83	1,286	100%	
Sergeant Township	176	80.28	2	35%	
Smethport Borough	1684	1.67	1,009	100%	

Potter County

Allegany Township	402	40.33	10	69
Clara Township	168	19.78	9	99
Coudersport Borough	2650	5.67	467	99
Eulalia Township	941	31.09	30	94
Genesee Township	789	36.02	22	17
Hebron Township	622	43.06	14	100
Homer Township	390	31.92	12	6
Keating Township	307	41.37	7	41
Oswayo Borough	159	1.1	144	100
Oswayo Township	251	37.84	7	93
Pleasant Valley Township	80	19.62	4	100
Roulette Township	1348	32.66	41	100
Sharon Township	907	33.98	37	100
Shinglehouse Borough	1250	2.09	599	100
Summit Township	112	49.4	2	12
Sweden Township	775	33.72	25	74

Eldred Borough is located within northern McKean County and occupies less than one square mile. Between 2000 and 2007, it is estimated that the population decreased by 7.3 percent to 800 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).Eldred Borough is the home of Kendall Bridge, one of only a few bridges in the world with a road turning from the suspended section of the bridge, creating a suspended intersection



Lewis Run is a small borough in McKean County that occupies 1.9 square miles. In 2007, the estimated population within the borough was 568 residents, a decrease of 9

Eldred Borough, PA

residents since the 2000 Census (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Mount Jewett Borough is located in the southwest portion of the Allegheny River headwaters watershed in McKean County and named for Hugh Judge Jewett, a politician and railroader from Ohio. Mount Jewett is tied for fifth highest elevation of a Pennsylvania town at 2,240 feet. Between 2000 and 2007, it is estimated that population within the borough decreased by 6.9 percent to 1,001 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Oswayo Borough is a small borough within the northeast portion of the watershed. The name is derived from the Native American term "place of flies." Between 2000 and 2007, it is estimated that the population within Oswayo Borough decreased 12 percent to 142 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Port Allegany is a borough occupying 1.8 square miles in the center of the watershed in McKean County. Between 2000 and 2007, it is estimated that the population within Port Allegany decreased by 6.9 percent to 2,203 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Shinglehouse Borough is located in northwest Potter County. It is named after a house built by a French immigrant named Jaudrie. Between 2000 and 2007, it is estimated that the population within the borough decreased by 11.2 percent to 874 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Smethport is the county seat of McKean County, occupying 1.7 square miles. The borough was named for Raymond and Theodore de Smeth, Dutch bankers and business agents. Between 2000 and 2007, it is estimated that the population within the borough decreased by 7.1 percent to 1,573 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

Infrastructure

Infrastructure is a set of interconnected structural elements that provide the framework for an entire system. Although the term has diverse meanings, it typically refers to municipal infrastructure, such as roadways, public transportation, airports, sewage, and public water supply. The existence of infrastructure is important to the development and redevelopment of communities. Sanitary sewer systems and public water supplies usually determine how much development a given area can support and where it can be located. A lack of clean water and proper sewage treatment and disposal facilities can hinder development and economic conditions. Preparation for infrastructure development and redevelopment is crucial to the future of the area.

Wastewater Treatment

Wastewater is treated via septic or wastewater treatment systems. Septic systems are individual sewage systems that treat waste on-site; they are often referred to as on-lot systems. In North America, approximately 25 percent of the population relies on septic tanks to treat waste water, typically in small towns and rural areas.

Given the general characteristics of the region's soils, there are severe limitations for establishing onlot sewage systems. These systems cannot support intense development. Therefore, sewage collection systems are situated around population centers. Areas not serviced by public sewage collection and unable to support on-lot systems remain undeveloped.

Sewage systems collect wastewater and transport it for treatment at off-site locations. There are three types of sewer systems: storm, sanitary, and combined. **Stormwater systems** carry water runoff from storm events through pipes and ditches to streams. **Sanitary systems** carry raw sewage from homes and businesses to wastewater treatment facilities. **Combined systems** carry a combination of raw sewage and stormwater runoff to wastewater treatment facilities. Combined systems often cannot effectively treat all of the water that reaches the sanitation plant during storm events.

When sanitation systems malfunction and cause raw sewage to enter streams, it is called a **sanitary sewage overflow (SSO)**. When the flow exceeds the capacity of the sanitary system, and allows untreated wastewater to enter area streams, it is a **combined sewer overflow (CSO)**. CSOs occur during heavy storm events. The overflow from the SSOs and CSOs flush human and industrial waste, oil, toxic materials, pesticides, and litter into streams.

There are six sanitary sewage authorities within the project area. Table 1-6 and Figure 1-6 identify the public sewage systems, their capacity, and receiving waters. The Bradford City Sanitary Authority operates the Bradford Wastewater Treatment Plant, the largest wastewater treatment facility in the project area. In addition to treating sewage from Bradford Township and the City of Bradford, the Bradford Plant treats wastewater from Foster Township Municipal Authority, Lafayette Township Sewer Authority, and

Table 1-6. Sewage Systems					
Authority	Service Area	Capacity (millions of gallons per day)	Service (number of facilities)	Receiving Waters	
Bradford City Sanitary	Bradford City, Lewis Run Borough,	6.300		Tunungwant	
Authority	and Bradford, Foster, and Lafayette Townships			Creek	
Bradford Regional Airport Authority	Lafayette Township	0.012		UNT Three Mile Run	
Coudersport Borough Sewage Authority	Coudersport Borough	0.950	1,200	Allegheny River	
Mt Jewett Regional Sewer Authority	Hamlin Township, Mt. Jewett Borough	0.210	460	Kinzua Creek	
Port Allegany Water & Sewer Authority	Port Allegany Borough	1.800			
Shinglehouse Borough	Shinglehouse Borough	0.160	481	Honeoye Creek	

(Sources: McKean County Planning Commission, 2007, Potter County Planning Commission, 2005; Tuna Valley Council of Governments & McKean County Planning Commission, 2001; Port Allegany Comprehensive Plan, 1978; & Mt. Jewett Borough & McKean County Planning Commission, 1990) Lewis Run Borough Sanitary Authority. However, each municipal authority is responsible for the maintenance and conveyance of waste to the Bradford Treatment Plant.

Public Water Supply

Access to clean water is essential. In Pennsylvania, 89 percent of the population obtains their drinking water from a public water supplier (DEP⁸). However, residents who reside outside of population centers typically rely on springs and wells for their daily needs. Installation and maintenance of public water and sewage service for residents outside of population centers is usually not cost effective.

There are 15 authorities that provide public drinking water within the project area (see Table 1-7 and Figure 1-7). The majority of the authorities' water is supplied by groundwater. The Bradford City Water Authority is an exception, obtaining its water from surface waters entering into area reservoirs, which are owned and operated by the Bradford City Water Authority.

Table 1-7. Public Water Systems

		Capacity	Service	
Authority	Service Area	(ganons per day)	facilities)	Source
Bradford City Water Authority	City of Bradford, portions of Bradford, Foster, and Lafayette townships	4.1 million	15,700	Surface
Rew Water Association	Foster Township	21,500	300	Ground
Hazel Hurst Water Company	Hamlin township		2,000	Ground
Gifford/Aiken Water Company	Keating Township		850	Ground
Bradford Regional Airport Authority	Lafayette Township	800	Airport Facilities	Ground
Lewis Run Borough Water Authority	Lewis Run Borough, portion of Bradford Township	43,700	578	Ground
Mt. Jewett Borough Water Authority	Mt. Jewett Borough		1,450	Ground
Crosby Water Association	Norwich Township		58	Ground
Rixford Waterworks Association	Otto Township		490	Ground
Port Allegany Borough Municipal Authority	Port Allegany Borough		2,575	Ground
Clermont Water Association	Sergeant Township		53	
Smethport Borough Authority	Smethport Borough		2,000	Ground
Shinglehouse Borough	Shinglehouse Borough	0.25 million	493	Ground
Coudersport Borough Water Authority	Coudersport Borough	2.80 million	1,300	Ground
Roulette Township	Roulette Township	0.75 million	431	Ground

(Sources: McKean County Planning Commission, 2007, Potter County Planning Commission, 2005; Tuna Valley Council of Governments & McKean County Planning Commission, 2001; Port Allegany Comprehensive Plan, 1978; & Mt. Jewett Borough & McKean County Planning Commission, 1990)

Transportation and Safety

Transportation and safety throughout the region are extremely important. Vehicle transportation is the most popular form of transportation. Figure 1-8 Emergency services are essential to the area, its residents, and visitors.


Figure 1-9. Methods of Transportation

Methods of Transportation

The most popular method of transportation among residents is the automobile. Within the project area, 78 percent of the employed population drives to work. Approximately 12 percent carpool, six percent walk or bicycle to work, and three percent work from home, leaving less than one percent that utilize public transportation. Figure 1-9 compares transportation methods used in 1990 to those used in 2000.

Public transportation services are provided throughout the area by the Area Transportation Authority of North Central Pennsylvania (ATA), which provides limited fixed routes and/or call-a-bus service. More information on ATA routes and services can be found on their website: www.rideata.net. Fullington Trailways (FT) also offers one daily round-trip service between Pittsburgh, PA and Buffalo, NY via Route 219. More information on FT can be found at: www.fullingtontours.com.

Roadways that crisscross the region are categorized as principal arterial, minor arterial, collector, or local roads. There are no interstates or freeways located within the project area.

Principal arterial roadways retain a high degree of thru-traffic mobility and serve major centers of urban facilitation and traffic generation. They provide high speed, high volume networks between major urban centers. U.S. Route 219 and U.S. Route 6 are the only principal arteries traversing the region.

U.S. Route 219 is a spur of Route 19 traversing south from West Seneca, New York to Rich Creek, Virginia crossing through Pennsylvania, Maryland, and West Virginia. Within the project area, U.S. Route 219 skirts the western portion of the watershed following Tunungwant Creek from the New York State line through Bradford and Lewis Run.

U.S. Route 6 was designated as a Pennsylvania Heritage Corridor in January 2005 by DCNR under the Heritage Areas Program. Route 6 crosses through 11 counties in northern Pennsylvania. It begins in Pike County, and travels west to the project area. It passes through the project area boroughs of Coudersport, Roulette, Port Allegany, Smethport, and Mount Jewett within McKean and

Potter counties. Route 6 continues west to Warren and Crawford counties before ending in Erie County.

Minor arterial roadways provide land access at a lower thru traffic mobility than principal arteries. These roads serve industries, larger schools, and small commercial areas. Routes 44, 46, 59, 155, and 446 are designated as minor arterial roadways. For example, Route 46 is a vital artery that connects Smethport to Emporium, while Route 59 connects Smethport to Warren.

Collector roads collect the traffic between local roads and arterial streets and provide access to elementary schools, industrial plants, office buildings, and commercial facilities that are not served by principal or minor arterials. They are often the most common designation of state roadways. Some of the

collector roadways in the project area include Routes 146, 244, 321, 346, and 770.

Local roadways are neighborhood streets that are local in character and serve farms, residences, and local businesses. These roads are primarily maintained by local municipalities and are not under the jurisdiction of the Pennsylvania Department of Transportation; many are composed of dirt and gravel.

Airports play a vital role in the transportation needs of today's society, sending passengers and goods around the world. Bradford Regional Airport is the only airport within the project area that provides commercial services. Passengers can



Rail line passing under Route 6 in Port Allegany

travel from Bradford Regional Airport to Cleveland Hopkins International Airport. There are several airports within 80 miles that provide commercial services, including Buffalo Niagara International Airport, Chautauqua County Jamestown Airport, DuBois Regional Airport, and Franklin Chess Lamberton Airport.

In addition, there are a few private airports throughout the region, such as Ceres Airport, Greeley Airport, Pecora Field Airport, Sam's Field Ultralight, and Johnsons Private Airport. Ceres Airport—located in Ceres Township near the state line—is the home of Freefall Oz Skydiving Center. Oz's offers sport parachuting and a sky diving school.

Railroads transport freight through the region utilizing two rail lines—Norfolk Southern Buffalo Line and the Buffalo & Pittsburgh mainline subdivision. However, no passenger rail service is available through the region; Erie is the closest hub providing passenger service.

Norfolk Southern Buffalo Line connects the Pittsburgh Line through Pennsylvania to the Southern Tier Line in New York. It is a secondary line that has been downgraded to a tactical line, as opposed to a strategic line. Beginning in Harrisburg, the line travels 227 miles through Lock Haven, Port Allegany, and Eldred, Pennsylvania to the New York border. Approximately 10 million gross tons are hauled on the line annually; however, the volume transported throughout the project area is decreased to 2 million tons from Driftwood to Port Allegany, and 1 million tons from Port Allegany to the Southern Tier Line annually (Pennsylvania Department of Transportation, 2003).

The Buffalo & Pittsburgh mainline subdivision follows Route 219 from the Pennsylvania-New York border to DuBois, and then to Butler, for a total distance of 184 miles. This line is a retailer of long haul services to area shippers providing connections with other rail lines, such as Norfolk Southern in Buffalo,

Driftwood, and Freeport; CSX in Erie, New Castel, and Buffalo; as well as CP Rail and Transcontinental Canadian Railroads via Buffalo. It currently carries eight million gross tons annually.

Emergency Services

Access to emergency services is essential. Typically, these facilities are found in centralized population areas where responders can react quickly to emergencies. Ambulance services, police departments, fire departments, and hospitals are examples of emergency services and facilities. Services to communities outside the population center also are available, with possible delays.

Within the headwaters of the Allegheny River region there are two hospitals, 10 municipal police departments, 13 ambulance service centers, and 25 fire departments servicing the area. The Austin



Dry hydrant located along an area waterway

Volunteer Fire Department is the largest fire district in Pennsylvania, servicing 222 acres. In municipalities where there are no police departments, the Pennsylvania State Police provide services. A listing of all emergency service providers is located in Appendix C.

Dry Hydrants

As the region is primarily rural, infrastructure capabilities are limited. The establishment of dry hydrants throughout the region is an important safety feature. Dry hydrants are non-pressurized pipe systems installed on ponds, lakes, or streams. They provide rural fire companies with access to water in order to respond to fires, increasing their life-saving capabilities and decreasing property damages resulting from fires. The hydrants save money, reduce operating cost, utilize freshwater as opposed to treated water, and may decrease insurance premiums (Northeast Missouri Resource Conservation and Development).

Economy and Employment

Economic conditions are constantly changing; employment circumstances contribute to those changes. When monitoring economic conditions, average household income and unemployment rates are examined. Table 1-8 compares the average household income and the unemployment rate within the watershed to that of Pennsylvania and the U.S.

In 1980, the average household income was \$16,668; in 2000, it jumped to \$42,560—an increase of 155 percent. The inflated cost of living and decreased population have had an impact on household income.

The seasonally adjusted unemployment rate is a statistical technique used to determine whether monthly employment changes are due to normal seasonal patterns or changing economic conditions.

	Table 1-8.	Economic Com	parison	
Year	Allegheny Headwaters Watershed	Pennsylvania	New York	U.S.
Average I	Household Incom	ıe		
1980	\$16,668	\$19,744	\$20,552	\$20,382
1990	\$27,817	\$36,675	\$44,225	\$38,464
2000	\$42.560	\$52,682	\$61.856	\$56.643

Unemployment Rate (Not Seasonally Adjusted)

8.3%

7.2%

2008 Data not available

2009 Data not available

1990

2000

Historically, the unemployment rate within the watershed had been above the state and national unemployment rates.

As of September 2008, the national unemployment rate was 7.6 percent, while unemployment rates in Pennsylvania and New York were 5.4 percent.

The manufacturing industry contributes significantly to the economy within the Allegheny headwaters region by employing 27 percent of the region's workforce. The healthcare industry comes in second, employing 10 percent of the

(Sources: Bureau of Labor Statistics, 2009; Free Demographics, 2009; U.S. Census Bureau, 1990, U.S. Census Bureau, 2000)

5.4%

4.2%

5.4%

8.3%

region; followed by retail trade, employing 9.9 percent. These leading industry statistics are consistent with those in Pennsylvania and throughout the U.S. Table 1-9 compares the manufacturing industries among the project area, Pennsylvania, New York, and the U.S.

5.3%

4.4%

5.4%

8.7%

3

5.6%

4.0%

7.6%

9.5%

Within the project area, 15 area businesses have been identified as major employers. Major employers are companies or organizations that employ 200 or more people. Zippo Manufacturing is the largest employer in the watershed, employing 750 people.

Adelphia Communications was a major employer in Coudersport, Pa. prior to filing for bankruptcy in 2003. Founded in 1952 by John Rigas, Adelphia Communications became the fifth largest cable company in the U.S. However, due to securities violations and the indictment of John and Timothy Rigas in 2003, the company filed for bankruptcy and was moved to Colorado. This left a brand new office building unoccupied and more than 200 Coudersport residents out of work.

Table 1-9. Breakdown of Employment by Industry

	Allegheny Headwaters		Pennsylvania		U.S.	
Industry	Absolute Employment % E		Absolute Employment	%	Absolute Employment	%
Manufacturing	5,302	27.30%	906,905	16.04%	18,295,669	14.10%
Health care and social assistance	2,014	10.37%	739,805	13.08%	14,459,058	11.15%
Retail trade	1,915	9.86%	684,299	12.10%	15,222,240	11.73%
Educational services	1,688	8.69%	497,027	8.79%	11,364,630	8.76%
Accommodation and food services	1,153	5.94%	324,036	5.73%	7,902,849	6.09%
Construction	1,068	5.50%	339,682	6.01%	8,811,981	6.79%
Information	995	5.12%	148,846	2.63%	3,996,594	3.08%
Public administration	930	4.79%	235,867	4.17%	6,212,425	4.79%
Other services (except public administration)	865	4.45%	274,059	4.85%	6,320,480	4.87%
Transportation and warehousing	748	3.85%	248,939	4.40%	5,569,629	4.29%
Wholesale trade	508	2.62%	201,137	3.56%	4,669,192	3.60%
Professional scientific and technical services	440	2.27%	307,537	5.44%	7,597,636	5.86%
Agriculture forestry fishing and hunting	385	1.98%	56,904	1.01%	1,931,064	1.49%
Administrative and support and waste management services	372	1.92%	167,338	2.96%	4,395,117	3.39%
Finance and insurance	338	1.74%	293,969	5.20%	6,483,758	5.00%
Utilities	212	1.09%	55,529	0.98%	1,174,876	0.91%
Mining	209	1.08%	16,566	0.29%	496,771	0.38%
Arts entertainment and recreation	169	0.87%	73,855	1.31%	2,306,263	1.78%
Real estate and rental and leasing	103	0.53%	78,124	1.38%	2,448,199	1.89%
Management of companies and enterprises	9	0.05%	4,140	0.07%	70,434	0.05%
TOTAL	19,423		5,654,564		129,728,865	

(Source: Free Demographics, 2009; U.S. Census Bureau, 2000)

Facility	Number of Employees	Location	Facility	Number of Employees	Location
Zippo Manufacturing Co., Inc.	750	Bradford, Pa.	W R Case & Sons Cutlery Co.	365	Bradford, Pa.
Bradford Hospital	580	Bradford, Pa.	Sunoco, Inc.	350	Bradford, Pa.
Olympus	530	Coudersport Pa	Wal-Mart Stores, Inc.	350	Bradford, Pa.
Communications, LP	559	Coudersport, Fa.	Bureau of Prisons	316	Bradford, Pa.
Zipcorp, Inc.	494	Bradford, Pa.	American Refining	300	Bradford Pa
Charles Cole	468	Coudersport Pa	Group, Inc.	500	Diadioid, 1 a.
Memorial Hospital	400	Coudersport, 1 a.	Children's Center For	300	Custer City Pa
Saint Gobain	440	Port Allegany Pa	Treatment & Education	500	Custor City, I d.
Container, LLC	110	r ort i moguriy, i u.	Bradford Forest	210	Bradford Pa
Pittsburgh Corning	375	Dort Allogony Do	Products Inc.	210	Diadioid, i d.
Corp	575	ron Anegany, Fa.	University of Pittsburgh	200	Bradford, Pa.

Table 1-10. Major Employers

Work Location and Time Travel to Work

In 2000, the majority of the regions workforce—74 percent—was employed within 30 minutes of their homes, while 21 percent traveled more than 30 minutes to work, and 3 percent worked from home. These numbers shifted slightly between 1990 and 2000 with people's increased willingness to travel further to work. In 2000, an additional five percent of the workforce drove 30 minutes or more to work.

This trend is also visible in location of employment; between 1990 and 2000, there has been a five percent decrease in the number of people who work within the municipalities in which they reside, and a four percent decrease among those working within the county in which they reside. Figure 1-11 compares time traveled to work between 1990 and 2000 while Figure 1-12 compares work locations between 1990 and 2000.



Figure 1-11. Time Travel to Work Comparison (1990-2000)

Education

Area youth are enrolled at one of the nine public, one vocational, and five private schools throughout the region. At each of these schools, not every student enrolled resides within the project area. In most cases, school facilities and residences of the majority of students that attend them are located within neighboring watersheds. Table 1-8 identifies each school district, the municipalities within the watershed that they serve, and schools that obtain a portion of their enrollment from the watershed area.

In addition, there is one university located within the project area, the University of Pittsburgh at Bradford. Pitt-Bradford is a public, four-year college that offers undergraduate degrees. Located in Bradford,



Pennsylvania, the university enrolls roughly 1,400 students annually.

Fable 1-10.	School	Districts	and	School	Enrollment

School	Grades	Enrollment	Watershed Municipalities in District
Austin Area School District [#]		246	
Austin Elementary School	PK-6	123	Kaating Township
Austin Area Junior-Senior High School	7–12	123	Keating Township
Bradford Area School District		2,835	
George Blaisdell Elementary School	K-5	569	
School Street Elementary School	K-5	531	City of Bradford, Lewis Run Borough, &
Floyd C. Fretz Middle School	6–8	682	Bradford, Corydon, & Foster townships
Bradford Area High School	9–12	1,053	
Coudersport Area School District		936	
Coudersport Area Elementary School	K-6	477	Coudersport Borough & Homer, Summit,
Coudersport Junior-Senior High School	7–12	459	Eulalia, Sweden, Hebron, & Allegany townships
Kane Area School District [#]		1,294*	
Mt. Jewett Elementary School	K-5	51	
Kane Area Middle School	6–8	296	Mt. Jewett Borough
Kane Area High School	9–12	440	
Northern Potter School District [#]		649	
Northern Potter Children's School	K-6	331	Conasaa Ullyssas & Allagany townshing
Northern Potter Junior/Senior High School	7–12	318	Genesee, Orysses, & Anegany townships

School	Grade	Enrollment	Watershed Municipalities in District
Port Allegany School District		1,051	
Port Allegany Elementary School	K6	500	Port Allegany Borough & Annin, & Liberty
Port Allegany Junior-Senior High School	7–12	551	townships
Oswayo Valley School District		533	
Oswayo Valley Elementary School	K-5	239	
Oswayo Valley Middle School	6–8	128	Sharon, Clara, Oswayo & Ceres townships &
Oswayo Valley High School	9–12	166	Shinglehouse & Oswayo boroughs
Otto-Eldred Area School District		787	
Otto Eldred Elementary School	K6	396	Eldred Borough & Eldred, Otto, & Ceres
Otto Eldred Junior-Senior High School	7–12	391	townships
Smethport Area School District		972	
Smethport Area Elementary School	K6	496	Smethport Borough & Hamlin, Keating,
Smethport Area Junior-Senior High School	7–12	476	Norwich, & Sergeant townships
Vocational Schools		325	
Seneca Highlands Area Vocational and Technical School	9–12	325	Austin Area, Bradford Area, Coudersport Area, Northern Potter, Oswayo Valley, Otto-Eldred Area, Port Allegany, and Smethport Area School Districts
Private Schools			Location
Bradford Area Christian Academy	2-10	31	Bradford, Pa.
St. Bernard's School	PK-8	200	Bradford, Pa.
The Learning Center	2-11	106	Bradford, Pa.
Hebron Center Christian School	PK-12	33	Coudersport, Pa.
Children's Center for Treatment & Education	2–12	98	Custer City, Pa.

Table 1-10. School Districts and School Enrollment (continued)

*Please note this district has another educational facility outside of the project area that is included in this total

[#] Please note that additional municipalities outside of the project area are also serviced by this school district *(Source: National Center for Education Statistics, 2007)*

CHAPTER 2. LAND RESOURCES

Geology

Geology is the science that deals with the study of the earth, its history, its natural processes and products. Geologic investigations of an area yield insight into the land's history, composition, structure, and natural resources. The landscape reflects millions of years of natural events. Forces acting on the land surface have had varying effects, resulting in a vast array of landscapes.

Geology influences various attributes of watersheds. For example, the presence or absence of a species in a region relies on geology, climate, and soil type. Even the path and flow of waterways have been determined by geology. Physiographic provinces and ecological sub-regions have related geology and frequently overlap.

More than 300 million years ago, the entire Allegheny headwaters region was covered with sandy, silty, clayey, limy sediment and organic material. The elevation of the region was raised, causing extreme pressure and weight on the sediments. Over a long period of time, the sediments consolidated into layers of sandstone, siltstone, shale, limestone, and coal. The subsequent years of uplifting, subsiding, erosion, and stream cutting has changed the surface of this plateau into highly dissected, rolling, hilly terrain.

Approximately 23,000 years ago, a major glacier covered the Oswayo valley and blocked the flow of the Allegheny River north of the project area, causing many valleys to partially fill with gravel, sand, and silt that washed from the surrounding hills. Therefore, the bedrock formations were nearly level with gently sloping synclines and anticlines that trend southwest and northeast (Churchill, 1987).

Physiographic Provinces

Geologists have divided the earth into physiographic provinces, which categorize landscapes and landforms with similar features. A **physiographic province** is a region containing similar terrain shaped by geologic history.

The entire project area is located within the Appalachian Plateau physiographic province. The Appalachian Plateau Province is subdivided into 10 sections, two of which are located within the



Angular drainage pattern

headwaters region of the Allegheny River. The majority of the area is located within the Deep Valleys Section, while a small portion in the northwestern corner of Potter County is located within the Glaciated High Plateau Section.

The Deep Valley Section is characterized by very deep, angular valleys and some broad to narrow uplands. Drainage is angulated or rectangular, resulting in tributaries having sharp bends and entering the mainstem at abrupt angles. Local relief—difference in elevation between two points—varies from 301 feet to more than 1,000 feet. Elevations range from 560–2,560 feet (Sevon, 2000).

The Glaciated High Plateau Section is located in a small portion of the watershed, in the northwestern corner of Potter County near the

Borough of Shinglehouse. This section contains broad to narrow, rounded to flat, elongated uplands and shallow valleys. Drainage within this section varies from angulated to dendritic—branching—patterns. The local relief varies from 101–1,000 feet.

Ecoregions

The project area is located within the North Central Appalachians ecological region as designated by U.S. Environmental Protection Agency (U.S. EPA). This ecoregion is characterized by vast, elevated plateaus that are composed of horizontally bedded sandstone, shale, siltstone, conglomerate, and coal. The region contains plateau surfaces, high hills, and low mountains primarily unaffected by continental glaciations. The area is predominately used for forestry and recreation; however, some mineral extraction activities occur, particularly the removal of gas and oil.

The majority of the Allegheny River headwaters region is contained within the Unglaciated Allegheny High Plateau subregion, while a small portion is located within the Glaciated Allegheny High Plateau subregion. Both subregions are deeply dissected highlands composed of plateau remnants, rounded hills, low mountains, and narrow valleys.

Unglaciated Allegheny High Plateau

The Unglaciated Allegheny High Plateau ecoregion is very rugged with steep valley sides, entrenched streams, high-gradient channels, and many waterfalls. It is characterized by extensive forests, nutrient-poor residual soils, high local relief typically 550–700 feet above sea level, nearly horizontal strata, and resistant rock. Oil wells are common throughout this ecoregion, accounting for more than half of Pennsylvania's total oil production (Woods, Omernik, & Brown, 1999).

Hilltop elevations commonly range from 1,700–2,000 feet above sea level, and ensure a cool, humid climate with long winters and a relatively short growing season of 100–160 days. The mean annual precipitation ranges from 34–44 inches, and increases westward (Woods et al., 1999).

Extensive woodland vegetation exists throughout the region, dominated by northern hardwood tree species, such as sugar maple, yellow birch, beech, and eastern hemlock with some intermixed bogs and a perimeter of Appalachian Oak Forest. Extensive logging and burning throughout the 19th century removed most of the natural vegetation. Soils in the region, derived from noncarbonated sedimentary rock, are low in fertility, often steep, stony, acidic, and classified as rigid Ultisols and Inceptisols (Woods et al., 1999).

Glaciated Allegheny High Plateau

The Glaciated Allegheny High Plateau ecoregion is a deeply dissected and forested highland that is composed of plateau remnants, rounded hills, low mountains, and narrow valleys. The Glaciated and Unglaciated Allegheny High plateaus are similar in rock types, elevation, relief, natural vegetation and prevailing land-use. However, the Glaciated Allegheny High Plateau was covered with ice, and has soils that were derived from acidic glacial drift. It also contains lakes and marshes formed by blocked valleys and closed depressions and thereby hosts flora and fauna associated with lake and marsh habitats (Woods et al., 1999).

Hilltop elevations commonly range between 1,900–2,300 feet above sea level, ensuring a short growing season of 100–165 days. The mean annual precipitation ranges from 33–39 inches. The local relief is between 300–700 feet (Woods et al., 1999).

From the Mississippian and Devonian ages, the nearly horizontal and resistant strata underlie Wisconsinan drift and are responsible for the highland formation, with Burgoon Sandstone being a

U.S. EPA Ecological Regions in the Allegheny River Headwaters Region

<u>Level I</u> Northern Forests

<u>Level II</u> Atlantic Highlands

Level III North Central Appalachians

<u>Level IV</u> Glaciated Allegheny High Plateau Unglaciated Allegheny High Plateau prominent ridge former. Most of the soils are frigid Inceptisols, derived from acidic glacial drift that are stony, acidic, low in fertility, and often steep (Woods et al., 1999).

The natural vegetation throughout the ecoregion is primarily northern hardwood tree species, such as sugar maple, yellow birch, beech and hemlock with some intermixed bogs, swamps, and marshes. Appalachian Oak Forests, primarily containing white and red oaks, also occur. The soils, climate, and ruggedness make the area well suited to trees and poorly suited for agriculture (Woods et al., 1999).

Rock Types

Within the Allegheny River headwaters region, there are five formations of rocks—Rock Units 7, 13, 14, 15, and 17. Unit 13 comprises shale and siltstone along major waterways, such as the Allegheny River, Oswayo Creek, and Tunungwant Creek. Adjacent to it is Unit 7, which contains red sedimentary rocks, such as sandstone, siltstone, shale, and conglomerate. The only exception is along Tunungwant Creek, where Unit 15—comprised of shale or siltstone with minor amounts of sandstone—splits Unit 7 and Unit 13. Unit 14—comprised of sandstone with minor amounts of shale and siltstone—is adjacent to Unit 7. Within the watershed, Unit 17 is the least common rock formation, and occurs furthest away from the tributaries. It occurs in patches that are surrounded by Rock Unit 14. Rock Unit 17 is composed of mixed sandstone and conglomerate with coal, shale, and siltstone (Berg, Sevon, & Abel, 1984).

Stratification

Sedimentary rocks cover 75 percent of the earth's surface. They form from weathered, eroded rocks or dissolved materials that precipitate out of solution. The sequence, or layering, of sedimentary rocks is known as stratification. The changes in the sequence reflect changing conditions during deposition.

Pennsylvanian-aged rocks are the youngest in the project area, and they underlie the highest elevations in the southern and western portions of McKean County. Belonging to the Allegheny and Pottsville groups, they contain a primarily cyclic sequence of shale, siltstone, and sandstone, forming soils within the Cookport-Hazleton association. Some coal is also found within the Allegheny formation (Churchill, 1987).

Within the project area, the second-oldest rock is from the Mississippian age. Belonging to the Shenango and Oswayo formations, these rocks are cyclic sequences of shale, siltstone, and sandstone located primarily on valley sides (Churchill, 1987).

The oldest rocks within the project area are from the Devonian age and include the Catskill, Venango, and Chadakoin formations. Rocks in the Catskill formation consist of red siltstone, shale, and sandstone found in the Buchanan-Hartleton-Leck Kill soil association. The Venango formation is comprised of gray siltstone, shale, and sandstone with some red shale from the Catskill formation. The Chadakoin formation consists of gray siltstone, sandstone, and shale. Soils in the Buchanan-Albrights soil association contain rocks from the Venango and Chadakoin formations.

Soil Characteristics

Soil Associations

Soil associations are landscapes with a distinctive pattern of soils. Typically, they contain one or two major soil types and a few minor types. They are named for the major soil types in the association. Different associations may have the same soils, but they appear in different patterns or percentages. The most dominant soil in each association is identified first. Figure 2-3 displays the 13 soil associations located within the project area.

- 1. The **Albrights-Buchanan association** consists of toe slopes along secondary and headwater streams. Soils of this association are formed on uplands from materials weathered from sandstone and shale. The terrain is strongly and gently sloping, with areas that are nearly level and moderately steep. Farming is the primary use within this association; however, it is limited by slow permeability and a seasonally high water table (Churchill, 1987).
- 2. The **Bath-Mardin association** contains soils that are yellow and brown, very acidic, and deep. Soils are well to moderately well drained. Potatoes, strawberries, small fruits, and small grains grow well in these soils; therefore, the association is well-suited for potato and berry farms (Soil Survey of Potter County, Pennsylvania, 1958).
- 3. The **Buchanan-Hartleton-Hazleton association** contains deep and very deep soils that are somewhat poorly drained to well drained. The terrain may be nearly level to very steep. The soils were formed on uplands from materials weathered from sandstone and shale. The slope and seasonally high water table in the winter and spring limit uses in this association. This association is too stony or steep for cultivated crops, and the majority of it is forestland or previously cleared land reverting to brushland and woodland (Churchill, 1987).
- 4. The **Buchanan-Hartleton-Leck Kill association** contains deep and very deep soils that range from somewhat poorly drained to well drained. The association is located on valley sides containing moderately steep, steep, and very steep topography, but includes some areas with gently and strong sloping narrow hilltops. Soils were formed on uplands in materials weathered from sandstone and shale. The slope and moderately slow permeability limit its use for urban uses. This association is mostly forested, due to the steep slopes (Churchill, 1987).
- 5. The **Cattaraugus-Culvers-Morris association** is developed from deep, reddish-brown glacial till and frost-worked materials. Soils in this association are well-suited for crop production and general farming (Soil Survey of Potter County, Pennsylvania, 1958).
- 6. The **Clymer-Cookport-Dekalb association** is suited for potatoes, small fruits, small grains, and pasture, but is best used as forestland. Soils in this association occur on deep to shallow, yellow to yellowish-brown residual accumulations derived from fine to coarse-textured sandstone. The Clymer and Dekalb soils are acidic and somewhat droughty, while the Cookport soils are moderately to somewhat poorly drained (Soil Survey of Potter County, Pennsylvania, 1958).
- 7. The **Cookport-Hazleton association** consists of broad plateaus dissected by waterways. Soils are formed on uplands in materials weathered from sandstone and shale. The terrain is mostly nearly level to moderately steep, but contains some areas that are steep and very steep. Limitations of this association include the high water table during the winter and spring and the depth to bedrock. The majority of this association is forested, yet some areas contain homes, secondary residences, and cleared areas for farming (Churchill, 1987).
- 8. The **Germania-Sweden association** contains soils that are well drained and strongly acidic. Soils occur on colluvium and terrace deposits along valley walls and near ridgetops in sequestered nooks. The soils are well suited to general crops and some fruits. Areas of this association are small and scattered, and they are often used the same as surrounding associations (Soil Survey of Potter County, Pennsylvania, 1958).
- 9. Soils of the **Lackawanna-Wellsboro-Cattaraugus-Culvers association** are located on deep, reddish glacial till and frost-worked materials. Widely distributed throughout Potter County, the association occurs primarily in the valleys and low uplands. Grasses, small grains, and small fruits

grow well in these areas making the association well suited for general and specialized farming. However, there are some wet areas that require drainage for row crops (Soil Survey of Potter County, Pennsylvania, 1958).

- 10. The **Leetonia-Dekalb association** contains the coarsest and most droughty soils in Potter County. Soils in this association are extremely acidic and sandy. Large stones and boulders of quartz conglomerate are located in these areas, so they are only suited for forests. There are a few small areas that contain medium-textured and less stony Dekalb soils that, if cultivated, will grow potatoes and small fruits well (Soil Survey of Potter County, Pennsylvania, 1958).
- 11. The **Lordstown-Oquaga association** is located in highland areas and areas with exposed bedrock. Most of the soils are used for forests, but some are used for potatoes and oats. Subsistence farming prevails in these regions, and wood cutting is important (Soil Survey of Potter County, Pennsylvania, 1958).
- 12. The **Philo-Atkins-Basher association** is primarily located in valleys adjacent to major streams in floodplains. Soils are derived from sandstone and shale on floodplains. The soils are very deep,

poorly to well drained, and nearly level. The association is used for farming, urban, and industrial uses. Major limitations in this association include flooding, seasonally high water table during winter and spring, and slow permeability (Churchill, 1987).

13. Soils in the **Volusia-Mardin association** are developed from glacial till. Mottled gray, yellow, and brown in color, these soils are plastic, sticky, and slightly limy in the subsoil. Since these soils grow clover, grasses, and small grains easily, they are better suited for dairy farming and raising livestock (Soil Survey of Potter County, Pennsylvania, 1958).



Soils within the Volusia-Mardin association are well suited for livestock and dairy farming

Prime Agricultural Soils

Certain soils are important for short-term and long-term food production. Prime agricultural soils meet physical, chemical, and slope characteristics to produce the highest yields with a minimal input of energy and economic resources. They are designated by U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in each county based upon predetermined criteria. Typically, the criteria include level to nearly level slopes, a well drained structure, deep horizons, an acceptable level of alkaline or acid components, and the capacity for producing food and crops. Figure 2-2 depicts the areas that have prime agricultural soils. There are 51 prime agricultural soils in the counties of the project area, and a listing of these soils is located in Appendix D.

Farmland of Statewide Importance

Soils that do not meet the criteria for prime agricultural soil designation, but produce high yields of crops when managed properly, are identified as farmland of statewide importance. Farmland of statewide importance is designated by the State Rural Development Committee and may include soils selected for agriculture by state law. Thirty-nine soils in the counties of the project area have been designated as farmland of statewide importance; they are identified in Appendix D.

Agricultural Land Preservation

Agricultural lands are often sought for commercial and residential development. These large areas of open space require less preparation prior to development and are less expensive to develop. According to the USDA's *Natural Resources Inventory* conducted between 1992 and 1997, more than 11 million rural areas in the country were converted to a developed use, and over half of that acreage was agricultural land. That conversion translates into a loss of over one million acres of agricultural lands each year, more than 3,250 acres every day (USDA, 2000).

Pennsylvania's farmland, in quantity and land cover, reached its pinnacle in 1900, when two-thirds of the state's land use was devoted to farming. Since that time, farmland and the number of farms has been steadily declining. As the percentage of farmland declines, the average farm size has increased, which is inline with national trends of fewer, larger farms and an overall reduction in farmland. According to the Brookings Institute, between 1982 and 1997, approximately 1.14 million acres in Pennsylvania were converted from fields, natural lands, and open spaces to other land uses (Pennsylvania Department of Agriculture (PDA), 2007b).



Preserving agricultural lands, such as this corn field, not only protects the land, it preserves the farming culture

Agriculture Security Areas

Within McKean and Potter counties, there were 691 farms in 2007, an increase of 13.7 percent from 608 farms in 2002. However, there was a loss of 6,107 acres of agricultural lands, and a 1.8 percent decrease in average farm size.

Pennsylvania has been actively pursuing farmland preservation since 1988, when the Farmland Protection Program was formed by the state legislature. Since its inception, the program has preserved 411,892 acres on 3,745 farms (PDA, 2009). With these impressive numbers, Pennsylvania leads the nation in both acres of farmland and number of farms preserved. To qualify for the Farmland Protection Program, farms must be designated in agricultural security areas (ASA).

The ASA program is administered at the township level. ASAs are rural, agricultural areas targeted for protection from urban development. They receive special consideration regarding local ordinances affecting normal farming practices, state agency rules and regulations, and in eminent domain condemnation proceedings. To be eligible for an ASA designation, at least 250 acres must be nominated. The 250 acres do not have to be contiguous, but individual parcels must be no less than 10 acres. Lands eligible for the program include pasture, hayland, woodland, or cropland (PDA, 2007a).

There are approximately 38,289 acres within the project area enrolled in the ASA program. Two ASAs are located within the McKean County portion of the watershed, preserving 6,237 acres. The oldest ASA was established in Liberty Township in 1989 on 3,548 acres. Then in 1995, an additional 2,689 acres were enrolled into the program in Keating Township. Potter County has approximately 32,052 acres enrolled in the program within seven municipalities. Allegany Township has the largest area enrolled in ASA, with 10,380 acres (McKean, personal communication, 2009; Dietrich, personal communication, 2009).

Landowners benefit by enrolling their land into an ASA. Benefits include limited government ability to condemn land for roads, parks, and other infrastructure projects; a municipal agreement not to create

nuisance laws, including odor and noise ordinances that would limit agricultural practices; and eligibility of landowners to sell the development rights of their farm as a conservation easement to the Commonwealth of Pennsylvania (Bureau of Farmland Preservation).

A conservation easement is a deed restriction that landowners may voluntarily place on their property with another entity, thus establishing a material interest in the property to protect its natural resources (American Farmland Trust, 1998). With an easement agreement, the owner agrees to authorize the easement holder to monitor and enforce restrictions set forth in the agreement, and it ensures that the property will be protected indefinitely.

Clean and Green Program

Established by Act 319 in 1974 by the Pennsylvania legislature, the Clean and Green Program preserves agricultural and forestry lands by providing tax benefits through assessing property based on its "use value" as opposed to the normal "market value." The program is voluntary and administered by individual county assessment offices. Owners who enroll must agree to maintain the land solely for agricultural use, agricultural reserve, or forest reserve use. Agricultural reserve areas are non-commercial, public open space used for outdoor recreation or scenic enjoyment.

In order for a property to be eligible for the Clean and Green Program, it must be 10 contiguous acres of farm, forest, or open land. One exception to this requirement is agricultural lands that are less than 10 acres and earn a minimum of \$2,000 gross income from farming activities. Agriculture or forest land uses must occur on the land for three years prior to applying for the Clean and Green Program. All land and structures, including residences and agricultural buildings, are considered part of the farmstead, and are eligible for enrollment. Interested landowners should contact their local agricultural preservation board, township office, or county assessment office for an application (Kanagy, 2001; PDA, 2007b).

Owners who wish to withdrawal from the program face a rollback penalty for up to seven years—the current year and previous six years. The rollback penalty is the difference between taxes paid and what taxes would have been paid if land was not enrolled in the program. Each year's rollback is subject to interest at a rate of six percent. Enrollment in the program transfers with ownership of the property, if sold, the new owners could be subject to the rollback penalty if they change the land use (Kanagy, 2001).

Approximately 485,724 acres within the project area are enrolled in the Clean and Green Program. There are 124,370 acres enrolled in Potter County, while McKean County enrolls approximately 361,354

acres located on 3,191 parcels (McKean, personal communication, 2009; Dietrich, personal communication, 2009).

Land Use

The way that land is used within a region reveals a significant amount of information about the region. Land uses provide clues about major economic catalysts in a region, and offer a glimpse into the area's past. Looking at a region's land use can even identify trends not seen during everyday observation, such as insights into possible sources of environmental degradation. It is important to continually monitor land-use changes in a region in order to inform decision makers regarding planning and natural resources protection.



Coudersport students visiting the Hoffman farm located within the Oswayo Creek subwatershed (Source: Potter County Conservation District)

Within the Allegheny headwaters watershed, forests dominate the landscape, accounting for 76 percent of the total land area. Agriculture is the second-leading land use, utilizing 12 percent, while open spaces, such as shrub and grasslands, account for seven percent. Development accounts for three percent, wetlands two percent, and barren lands and water account for less than one percent each.

Forestry

Forests provide a variety of resources and services, including timber, wildlife, water filtration, aesthetics, recreation, and employment. Over 90 percent of the nations' threatened and endangered species depend on forestlands.

In 1603, an estimated 95 percent of Pennsylvania was forested. However, harvesting timber to support a growing nation reduced the forest cover to approximately 30 percent by 1907. Over the past century, forestlands have been able to rebound, and Pennsylvania Department of Conservation and Natural Resources (DCNR) estimates that 58 percent of Pennsylvania's landscape is currently covered in forestland (2004).

Forestry is a key component to both the history and future of many communities, including the communities within the Allegheny River headwaters. Prior to settlement, this region contained vast forestlands that were home to

Land Use Type	Square Miles	Percent of Land Area
Forest	675.68	76
Deciduous Forest	570.27	64
Evergreen Forest	27.80	3.
Mixed Forest	77.61	9
Agriculture	108.85	12
Pasture/Hay	99.61	11
Cultivated Crops	9.24	1
Open Land	58.69	7
Shrub/Scrub	47.88	5
Grassland/Herbaceous	10.81	6
Developed	26.64	3
Open Space	20.46	2
Low Intensity Development	4.25	<1
Medium Intensity Development	1.54	<1
High Intensity Development	0.39	<1
Wetlands	18.15	2
Woody Wetlands	16.99	2
Herbaceous Wetlands	1.16	<1
Barren Lands	3.09	<1
Water	0.39	<1

Table 2-1. Current Land Use

numerous species of large game animals, such as bear, elk, and eastern mountain lions. Today, the region remains an immense forestland—accounting for 76 percent of the land cover—that supports a healthy wildlife population.

Forestry plays a major role in the economy and history of the Allegheny River headwaters watershed; in fact, the Warren County portion is included in Pennsylvania's Lumber Heritage Region (LHR). The LHR is one of 11 heritage regions in Pennsylvania, and the designation recognizes the forested landscapes that dominate the project area. More information about the LHR is available at: http://www.lumberheritage.org.

Within McKean and Potter counties, the forestry industry annually adds approximately \$132 million to Pennsylvania's economy via the value-added industries, such as wood and paper products. The estimated value of timber within the counties is over \$2.618 billion (Jacobson & Kovach, 2009). Table 2-2 compares forestry and agricultural statistics, including economic contributions.

Agriculture

Farming in Pennsylvania dates back to its earliest inhabitants, the Native Americans. Since that time, numerous technological inventions have advanced the industry. Agriculture is the leading industry in Pennsylvania and one of the major producers of food in the U.S. Dairy farming is Pennsylvania's top

Table 2-2. Agricultural and Forestry Statistics for McKean and Potter Counties

		McKean	Potter
Ge	eneral Statistics		
	Acres in County	628,229	691,987
	Acres of Forestland in County	518,251	593,362
	Acres of Agriculture in County	31,411	62,279
	% Area Forested	78%	78%
	% Area Agriculture	5%	9%
	% Forestland Privately Owned	68.3%	47.5%
	Estimated # Forestland Owners	16,380	12,012

industry, ranking fourth nationally for the production of milk and ice cream. Many livelihoods are based on the agricultural industry.

The number of farms and the amount of farmland has been steadily declining. In some areas, development pressures are to blame. It is more profitable for landowners to sell their properties, as opposed to farming them. In 1959, Pennsylvania had 100,051 farms covering 11.9 million acres, and by 2001, there were 59,000 farms covering 7.7 million acres.

Within the Allegheny headwaters region, agricultural production—although ranked the second major land use—is limited by the availability of land for agricultural uses. The mountainous terrain dominant throughout the region is not suitable for agricultural endeavors. Among the 13 soil associations in the watershed, four are ideal for

(Jacobson & Kovach, 2009)

(in millions)

Industries (in millions)

Economic Contributions

Product Industries

Industries

Forestry and Wood Product

Employees in Forestry and Wood

Annual Economic Contribution

Annual Economic Contribution

from Agricultural Industries

from Forestry and Wood Product

farming, while another six can accommodate agricultural activities with limitations, such as seasonally high water tables, slow permeability, and flooding. Pasture and hay—accounting for 91.5 percent—dominate the watershed's agricultural lands.

39

1,106

93.43

5.23

18

295

38.91

7.49

Only seven percent of the landscape within McKean and Potter counties is used for agricultural endeavors. Among Pennsylvania's 67 counties, Potter County ranked 41st and McKean County ranked 62nd in total value of agricultural products sold. Potter County also ranked first in acres of sweet corn, third in vegetables harvested, and eighth in value of sales of vegetables, melons, potatoes, and sweet potatoes (National Agricultural Statistics Services [NASS], 2009).

The total market value of agriculture in McKean and Potter counties increased eight percent between 2002 and 2007 (NASS, 2009). McKean County's market value of production for 2002 was \$5,185,000. Potter County's market value of production for 2002 was \$31,377,000.

Table 2-3. Agricultural Lands and Value by County

		McKean			Potter	
	2007	2002	Percent Change	2007	2002	Percent Change
Number of Farms	313	265	18%	378	343	10%
Land in Farms (acres)	41,466	41,634	0%	88,457	94,396	-6%
Market Value of Production (thousands)	\$5,185	\$4,792	8%	\$31,377	\$26,442	19%
Crop Sales (thousands)	\$867	\$1,046	-17%	\$6,353	\$9,371	-32%
Livestock Sales (thousands)	\$4,318	\$3,746	15%	\$25,024	\$17,071	47%

Development

Development occurs, and is needed to some extent, to enhance the quality of life within the watershed. The key is effectively managing development activities as identified in county, municipal, and multi-municipal planning documents. As discussed in the Project Area Characteristics chapter, land-use plans and regulation ordinances protect communities from unwanted development and land uses.

Existing development is located around the population centers, such as Bradford and Coudersport. However, the majority of existing development—77 percent—is rural residential development, also termed open-space development. Low intensity development consists of small towns and villages, such as Turtlepoint and Oswayo; they make up 16 percent of the project area's development. Medium intensity development would be a mid-sized borough, such as Port Allegany and Smethport. These mid-sized, medium-intensity development areas account for six percent of the developed area of the watershed, leaving one percent of high-intensity residential population centers.

Mining

Mining is the extraction of minerals, such as coal, limestone, sand, and gravel from underground. These materials are then brought to the surface. There are two methods of recovering the minerals surface mining and subsurface mining. Strip mining, quarrying, open-pit mining, and mountain top removal are examples of surface mining techniques used to reach mineral resources underground. In these methods, the land surface and bedrock above the minerals is stripped off to provide access to the minerals. Subsurface or underground mining requires the digging of tunnels or shafts into the earth's surface to remove minerals. Longwall mining, room and pillar, drift mining, slope mining, and shaft mining are examples of underground mining techniques.

Within the Allegheny headwaters, mining is not a major land use. In fact, mineral extraction and barren areas account for less than one-half percent of land use within the project area. The removal of minerals is classified into two categories for management and oversight—coal and non-coal mining.

Non-Coal Mining

Non-coal mining is the extraction of non-fuel or industrial minerals, such as aggregate, shale, and crushed stone. It is estimated that industrial mineral production generates 1.25 billion annually and provides jobs, taxes to local municipalities, and supports local business. Pennsylvania is among the top 10 states for producing aggregate and crushed stone (DEP⁶).

Home and roadway construction, agriculture, landscaping, and industrial processes utilize a variety of mineral resources. Concrete—made from aggregates, such as sand, gravel, or limestone—is used for constructing building foundations and bridges. Lime is added to agricultural fields to raise the pH of acidic soils. Crushed stones and minerals, such as bluestone, flagstone, and shale, are used in landscaping. Non-fuel minerals are used as abrasives, binders, or additives in industrial processes or in the treatment of air or water as a part of the manufacturing process. There are 57 active industrial mining permits within the municipalities that comprise the Allegheny headwaters watershed. See Appendix E for a listing of these quarries.

Coal Mining

Coal is found in flat layers between veins of non-fuel minerals, such as sandstone, shale, and limestone, which are referred to as overburden in the coal mining process. Within Pennsylvania there are 40 layers of coal, varying in thickness from inches to over eight feet. The majority of it is located within the Pittsburgh, Upper Freeport, Lower Freeport, Upper Kittanning, and Lower Kittanning coal seams (DEP, 2005; DEP⁷).

There are currently no active coal mining operations within the project area. However, the southwestern portion of the watershed in McKean County has seen mining activities in the past, as evident by the old strip mine located at the headwaters of Hamlin, Railroad, and Scaffold Lick runs.

Oil and Gas Exploration

For over a century, oil and gas exploration has been a common fixture. Pennsylvania's history of oil and gas exploration dates back to 1859, when the world's first intentional and successful oil well was drilled in Venango County, near Titusville. Until oil fields were discovered in Texas during the 1900s, western Pennsylvania generated over half of the world's petroleum supply. Pennsylvania's annual contribution to the national petroleum supply since 2000 is less than one percent, but still notable due to the distinguishing lubrication properties of Pennsylvania crude oil (Shultz, 1999).



One of many active gas wells located within the project area

As the demand for oil and natural gas grows around the world, exploration for these resources expands as well. Due to increased demand, and therefore increased prices, oil and gas exploration in Pennsylvania has been expanding since the 1970s, and even more so in recent years. In 2007, DEP issued 1,151 oil and gas well drilling permits, which represents a 21.8 percent increase in permits issued from 2006 (DEP, 2009a).

	Table 2-4. Oil and Gas Well Permits by County					
Co	ounty & Year	Gas	Oil	Combined	Other	Total
ıty	2009	55	291	2	1 unknown	348
Cour	2008	62	959	54	1 test well	1,076
an C	2007	108	952	91		1,151
SKe:	2006	71	766	108		945
М	2005	72	743	140		955
	2009	19	3	0		22
unty	2008	83	73	15	1 storage well	172
er Col	2007	58	44	5	2 storage wells	109
Pott	2006	54	35	31		120
	2005	40	8	13	1 injection well	62
Note proje wate	e: All sites ect area; ho ershed's m	in each owever unicipa	all site lities.	y may not be l s are located v	ocated within t within one of th	he ie

The Allegheny River headwaters watershed is located within a region of Pennsylvania that is already producing, or is likely to produce natural gas. For example, areas within the McKean County portion and northwestern corner of Potter County have already been drilled, while the majority of the area in Potter County has not yet been explored. However, with increased interest in the Marcellus Shale formation, the entire region is likely to see increased natural gas drilling.

Within the project area, 265 wells were drilled in 2008, 128 of which were located in Foster Township. In 2009, within the municipalities included in the Allegheny Headwaters watershed 137 wells were drilled, of which 12 were Marcellus shale Gas wells.

(Source: DEP¹; DEP²; DEP^s; DEP, 2008; DEP, 2009a; DEP, 2010a)

Erosion and sedimentation, forest fragmentation, and water pollution from abandoned wells are impacts associated with oil and gas drilling. The construction of wells and access roads can increase erosion and sedimentation. Forest fragmentation occurs as additional wells are developed, dissecting important forests serving as critical habitats. Forest fragmentation affects wildlife through habitat loss and increasing susceptibility to predators. Contaminated groundwater from insufficient case piping, leaking or flooded waste fluid holding pits, or drilling site spills can penetrate into private water well aquifers. Another potential contaminate of private water wells from gas wells is the migration of methane gas, which in hard to detect and poses an explosive hazard.

Marcellus Shale

The Marcellus shale is the second largest shale formation in the U.S. and is among the top natural gas shales in the world. Found in the Appalachian Region it extends 575 miles through West Virginia, Ohio, Pennsylvania, and New York. It received its name from the discovery of the first outcrop in Marcellus, New York in 1839. Formed during the Devonian period, the black shale is slightly radioactive with a low density and is organically rich. These naturally occurring organic carbons may include methane, ethane, propane butane, and other hydrocarbons (petroleum). Naturally occurring radioactive materials, or NORM, found in Marcellus shales may include elements, such as uranium, radium, thorium, and radon (Bishop, 2009).

In 2002, it was believed that 1.9 trillion cubic feet of natural gas was available for development within the Marcellus Shale formation in Pennsylvania (National Park Service, 2009). Since then, additional studies have been conducted, and now the Marcellus Shale formation is believed to have the potential to produce nearly 500 trillion cubic feet of natural gas. It is believed that the amount of natural gas produced from the Marcellus Shale formation could support the entire U.S. for more than 20 years (Engelder, 2009).

Natural gas recovery within the Marcellus shale formation is a relatively new industry in Pennsylvania. The number of permits issued within Pennsylvania for Marcellus shale gas wells increased from 475 permits in 2008 to 3,314 permits issued in 2010 (DEP, 2011).

Natural gas within the Marcellus shale formation occurs within pore spaces, fractures, or breaks in

the shale. It can also be absorbed in mineral grains and organic material. The Marcellus gas is an unconventional gas, meaning that it requires stimulation and work in order to recover it. The majority of the gas is located within pore spaces, which are fine and poorly connected, making it difficult for the gas to escape. Gas that is naturally discharged escapes very slowly. Utilizing hydrofracturing techniques—blasting large amounts of water, sand, and other chemicals at the shale causing it to fracture—can establish a network for the natural gas to easily flow through the created cracks and into wells (DEP, 2010c).

When drilling for natural gas, a vertical well is bored into the ground. In order to increase permeability and recover the gas from the Marcellus formation, horizontal drilling and hydrofracturing are used. When horizontal

What's in the Slick Water?

Friction Reducer: An organic polymer or potassium chloride

Wetting agent: A non-ionic surfactant or soap

Biocide: Toxic compound to control micro-organism growth

Scale inhibitor: An organic polymer or phosphonate

drilling techniques are used, the cost can more than double, but productivity can increase by 15–20 times. Hydrofracturing techniques work well in recovering the gas; however, it requires a large volume of water, up to 300,000 gallons per day per well, which becomes contaminated during the process. Initially hydrofracturing one horizontal Marcellus well may use from two to nine million gallons of water, and additional hydrofracturing may occur over the productive life of the well (five to 25 years or more) (The Pennsylvania State University, 2009b).

In addition to the millions of gallons of water, chemicals—including a friction reducer, wetting agent, biocide, and scale inhibitor—are added to create slick water. The slick water mixes with water naturally found in the formation to create the fracturing solution, termed "frac" water. Each drilling company is required by law to provide the DEP with the material safety data sheet for the slick water. Appendix T provides a summary of hydraulic fracture solutions used within the Marcellus shale formation.

The necessary use of this volume of water and the resulting contamination has caused drilling for gas in the Marcellus Shale to be met with resistance. One of the main concerns is that only 5–10 percent of the injected water is recovered, leaving the majority of water and chemicals underground where they have the potential to cause additional problems. The development of a method for fracturing the formation without contaminating millions of gallons of water and efforts to increase recovery rate are imperative.

Even before the addition of injected water, Marcellus shale has been shown to contain radioactive materials. The evidence of high radionuclide content in the shale is present in geochemical studies and in gamma-ray logs from wells drilled into the Marcellus formation. In a study of trace elements and uranium in the Devonian shale of the Appalachian Basin, 17 cores were analyzed from wells in Pennsylvania, New York, Ohio, West Virginia, Kentucky, Tennessee, and Illinois (Leventhal, 1981). The radioactivity in the Marcellus was found to be more than 20 times higher than background. Gamma ray detectors have also been used historically to detect Marcellus formations by producing a chart of radioactivity versus depth. This was portrayed when radioactivity of rock cuttings from two wells in Lebanon and Bath, NY were found to be far higher than background concentrations in New York State (NYSDEC, 2009).

Wastewater production from Marcellus shale gas extraction efforts in Pennsylvania is estimated to be well above current treatment capacity. Currently three types of treatments are being used—pretreatment and discharged at publicly owned treatment works, evaporation with and without pretreatment, and chemical precipitation followed by discharge, recycle, or evaporation.

Efforts to recycle frac water are currently being explored and implemented. Before the frac water can be reused it needs to be filtered and treated. The reuse of the recycled water can decrease cost to the drilling companies and reduce the amount of water being withdrawn from area streams. Further studies are needed to increase frac water recovery, recycling opportunities, and wastewater treatment to ensure that the discharged water meets the standards of the receiving waters where it will be discharged (Abdalla et al., 2011b).

In 2009, 14 Marcellus shale wells were drilled within the municipalities of the Allegheny River Headwaters watershed. Of these 14 Marcellus shale wells 71 percent utilized horizontal drilling techniques. Withdrawals for hydraulic fracturing for the year utilize the same amount of water that is withdrawn for power production in three days. However, less than 50-70 percent of the water used is recovered and what is recovered is categorized as a waste product. For more information about potential impairments to water resulting from Marcellus shale gas extraction, see the Chapter 3. Water Resources Impairments section. For more information about Marcellus shale and gas well drilling, visit Penn State Cooperative Extension's website at http://naturalgas.extension.psu.edu/publications.htm.

Land Ownership

Within Pennsylvania, surface land can be owned by one person or entity, while the sub-surface rights or mineral rights can be owned by different entities based on the mineral. For example, natural gas, oil, and coal for a property can each have a different sub-surface owner. A property purchased in "fee simple" means the surface and subsurface rights of a property are owned by one owner (DEP, 2007a).

Surface landowners who do not own the subsurface rights to their property cannot prevent reasonable access to subsurface owners for development and production, but surface landowners are afforded rights for the protection of their resources, such as water quality. If presented with the situation, surface landowners should contact an attorney knowledgeable in oil and gas or mining laws.

Oil and Gas Well Drilling

In the case of oil or gas wells, landowners should work with well operators to ease tensions and develop a strategy that will compliment both parties' interests. The selection of well sites, access roads, gathering pipelines, etc., should be discussed between the surface and subsurface owners to minimize damage to the surface property and provide reasonable access for development and production of subsurface minerals and gas. Landowners should request that the well operator hire a certified lab to analyze sources of water used for consumption or irrigation prior to drilling to document baseline conditions, incase adverse impacts on the quality of water from the extraction activities occur (DEP, 2007a).

The Western Pennsylvania Conservancy developed a conservation guidance document to assist in decision-making around natural gas exploration and extraction for landowners, partners and others. The guidance document is titled "Conservation Guidance for Landowners on Natural Gas Development" and can be found on the www.WaterLandLife.org website, as well as Appendix W.

Critical Areas

Critical areas have constraints that limit development and other activities. Critical natural areas contain rare, threatened, or endangered species, natural communities of concern, or significant ecological and geological landscapes worthy of protection. Steep slopes, ridgetops, floodplains, streambanks, and wetlands are examples of critical natural areas. Figure 2-6 depicts the environmentally sensitive areas within the project area.

Landslides

Ground movements, such as rock falls, slope failures, and shallow debris flows that negatively impact the stability of slope are considered landslides. Most landslides occur on steep slopes where loose colluvial soils exist. Gravity forces rock and debris down the slope in a gradual or sudden, flashy manner. Typically, landslides occur along road cuts that have unstable bank conditions (Delano & Wilshusen, 2001).

Landslides can be caused by natural or human events and actions. Groundwater pressure can destabilize the slope, making it susceptible to landslides. A lack of vegetation, soil nutrients, and soil structures increase the vulnerability of a slope. Erosion, permeability after precipitation, and earthquakes can also trigger landslides. Vibrations from machinery or traffic, blasting, earth moving activities, vegetation removal, and construction activities are examples of human influences. Any activity that changes the amount of water that infiltrates the soil, natural or man-made, can increase the likelihood of landslides.

Landslide Hazards Program (LHP) was established as part of the U.S. Geological Survey (USGS) in the mid 1970s. Their role is to reduce long-term losses from landslide hazards by improving the understanding of the causes of ground failure and suggesting strategies to mitigate these causes. Through information gathering, research, and emergency and disasters response, LHP is able to produce scientific reports to a variety of audiences.

Landslides occur throughout Pennsylvania and are heavily concentrated in southwestern Pennsylvania. Within <u>Landslide Hazards: A National Threat</u>, the Allegheny River headwaters were identified as being located with a region of the U.S. that has a moderate to high potential for the occurrence of landslides (USGS, 2005). Landslides cause damage to transportation routes, utilities, and buildings. They can create travel delays and other side effects. The threat of landslides should always be assessed when planning any development project. Proactively avoiding a landslide is cheaper than the clean-up, repair, and time that is required after a landslide. If development within a landslide-prone area is ultimately chosen, additional precautionary measures should be taken during development, such as additional drainage features and proper site planning, which are essential to minimize the risk of a landslide (Delano & Wilshusen, 2001).

Subsidence

Subsidence is the downward movement of surface material involving little or no horizontal movement. Occurring naturally due to physical and chemical weathering of certain types of bedrock, subsidence usually takes place locally as a result of underground mining, excessive pumping of groundwater, or subsurface erosion due to the failure of existing utility lines. Subsidence usually occurs slowly over long periods, but also can happen rapidly. The development of a sinkhole occurs when the support of the land is gradually removed, causing the land surface to sag and finally collapse, leaving a hole or cavity. Although subsidence is not common in the watershed, the potential exists; especially in areas that were previously mined (Kochanov, 1999).

Erosion and Sedimentation

Erosion is the transfer of soil particles through air or water. The relocation of these particles is sedimentation. Erosion and sedimentation are natural earthmoving processes, but the extent of this movement can be greater than normal due to poor land-use practices. Erosion and sedimentation are very serious issues with the potential to cause significant degradation to an area's waterbodies.

Erosion is common along streambanks, steep slopes, and ridgetops. Streambank erosion occurs when the banks of a creek or river erode and deposit sediment into a waterway. Typically, erosion is caused by improper land uses and a lack of vegetation along the streambank. Vegetation anchors soils in place, preventing it from washing away during high stream levels or heavy rains. However, if the vegetation is removed or inadequate, the soil is easily washed into the waterbody. A lack of vegetation also leaves soils vulnerable to high winds, which can induce erosion.



Improperly built and managed dirt and gravel roadways increase the amount of sediment entering streams via runoff following a precipitation event (Source: Upper Allegheny Watershed Association)

An increase in sediment in a waterbody is itself a cause for concern, as it alters native aquatic habitats. Excessive sedimentation clouds the water, which reduces the amount of sunlight reaching aquatic plants. It covers fish spawning areas and food supplies and may clog their gills. Other pollutants attached to soil particles are deposited in waterbodies with the sediment. Sediment deposits can significantly alter the channel and flow of the stream.

Erosion can negatively impact a stream's water quality. Soil eroded from construction sites, timber operations, or agricultural operations exacerbates sedimentation problems in streams. Dirt particles from poorly designed and managed dirt and gravel roadways enter waterways by direct runoff or are deposited in waterways as dry deposition being transported in a cloud of dust.

In an effort to reduce erosion and sedimentation, the

disturbance of earth materials is regulated by DEP through the Erosion and Sediment Pollution Control Program, administered by county conservation districts. Any earth moving activities, such as timber harvesting, construction activities, agricultural plowing and tilling, etc., over 5,000 square feet must have an erosion and sedimentation (E&S) control plan on site. Disturbances of less than 5,000 square feet are required to minimize the potential for accelerated erosion and sedimentation through the implementation and maintenance of best management practices (BMPs). Contact your county conservation district for more information regarding E&S concerns (Pennsylvania Code, 2000).

Groundwater Recharge Areas

Recharge areas occur where precipitation is capable of infiltrating the ground to the saturated zone an area where all pore spaces and fractures are filled with water. Parking lots, sidewalks, roofs, and streets are examples of impervious surfaces that block water infiltration and suppress groundwater recharge. When a watershed is covered by 10–25 percent impervious cover, it is deemed impacted. Watersheds are considered damaged if 25 percent or more consists of impervious surfaces (Center for Watershed Protection, 1999).

Impervious surfaces increase the volume of stormwater by 16 percent when compared to natural forest habitats, impacting dry and wet weather stream flows, the shape and size of a stream channel, water quality, and habitats for plants and animals. The increased volume of stormwater leads to frequent flooding and increased severity of flood events. Due to the higher volume of stormwater, the velocity of the flow increases and leads to eroded streambanks, which deepens, widens, and straightens the stream's channel. Sediment that is washed into the stream is carried and deposited downstream, smothering habitat, decreasing the depth of the stream, and ultimately changing the path of the waterway (Center for Watershed Protection, 1999).

As the amount of impervious surface of a watershed increases, the quantity and diversity of aquatic life decreases. Limiting the amount of impervious surfaces and installing best management practices, such as porous pavement, rain barrels, and swales, can increase groundwater recharge. It is important to protect open spaces and limit the amount of impervious surfaces to allow water to infiltrate the ground to recharge groundwater. During dry conditions and droughts, the amount of water in streams, lakes, and ponds is supplied by groundwater. If groundwater supplies are insufficient due to impervious surfaces, the impacts of dry conditions will be intensified (Center for Watershed Protection, 1999).

Fish and Wildlife Habitat

Habitats are the natural environments upon which animals and plants depend. Healthy habitats are important to maintaining a diversity of biological resources. Interferences and changes to habitats affect the plants and animals that depend on them. Habitats where rare, threatened, and endangered species reside are critical. Important habitats in the watershed include forested and riparian areas, floodplains, and wetlands.

Riparian Corridors

Riparian corridors are lands located next to a body of water. When densely vegetated, they serve as a buffer against polluted runoff and provide habitat corridors for many species of wildlife. The Water and Biological Resources chapters of this plan provide specific information about riparian corridors and their benefits.

<u>Floodplains</u>

Floodplains are land areas that lie adjacent to waterbodies, such as the Allegheny River and its tributaries, which absorb the occasional overflow of water beyond the banks of the stream. Floodplains are delineated by the frequency of flooding events that cover them with water. Floodplains often contain rich sediments, as occasional flooding deposits nutrient rich soils from floodwaters. Floodplains are also

inhabited by unique plants and wildlife accustomed to the periodic inundation of water. Many species found in floodplains are seldom seen in other areas.

<u>Wetlands</u>

Wetlands are areas that are inundated or saturated by surface or groundwater during a portion of the year and contain plant species that tolerate or thrive in wet conditions. They are delineated according to hydrology, soil type, and vegetation. Whether naturally occurring or constructed, wetland areas have a variety of appearances. They might appear as standing water, inundated soils, or apparently dry fields. Wetlands are a vital component to a healthy watershed, as they provide many unique and critical functions. More information regarding wetlands is discussed in the Water Resources chapter.

Wind Energy

In the search for alternative energy, wind energy is one of the front-runners in Pennsylvania and throughout the U.S. It is a sustainable, renewable, economical, and fast growing alternative energy source. Although not located within the top 25 sites for wind energy potential, Pennsylvania has moderate potential. Eight percent of Pennsylvania lands have the potential for commercial wind energy development. DEP estimates there is potential to generate 45 billion kilowatt-hours annually (DEP, 2002).

Wind speed and turbine height are key variables in determining how much electricity a turbine can produce. Wind speed increases as the height of the turbine increases. Energy generated from wind is calculated as a cube of its speed; a wind speed of 11 mph generates 30 percent more energy than a wind speed of 10 mph (DEP¹⁰).

In order to establish a wind farm, six components are needed—open space, wind turbines, transmission lines, substations, weather stations, and access roads. Open space is required, as each turbine unit requires a 15-foot non-vegetative diameter base. Turbines are typically distributed one unit per eight acres of land. Wind turbines are supported by towers that reach over 200 feet above the ground. They are needed to provide the turbines access to wind speeds between 7 and 35 miles per hour (mph). Transmission lines must be located within close proximity of the wind turbines so that electricity generated can be sold to a utility. Substations change the voltage of generated electricity to match the voltage in the transmission lines. Weather stations collect wind data in order to adjust turbines for maximum efficiency. Access roads for construction and maintenance activities are needed for each turbine (DEP, 2002).

Areas desired for wind energy often coincide with areas of ecological significance. Forest ridges and other landscapes, where high wind speeds are generated, often contain the most biologically rich forests and streams in the Commonwealth. For this reason, site selection for establishing wind farms can be very controversial.

Issues with wind farms vary among nuisance, safety, and ecological concerns. Nuisance issues include noise, spoiling views, excessive lighting, and interference with communication signals, such as television. Impacts to wildlife include bird and bat mortality, habitat loss and fragmentation, and interference with migration patterns (American Wind Energy Association).

In an attempt to deter controversy, protect ecological resources, and generate energy, representatives from environmental agencies, conservation organizations, and the wind industry formed the Pennsylvania Wind and Wildlife Collaborative. The group pools resources in collecting, sharing, and reviewing scientific data to address how to enhance development of wind energy in Pennsylvania in an environmentally responsible manner. Together, they developed policies, best management practices,

guidelines, and tools to assess risks to habitat and wildlife, and mitigate impacts from the development of wind farms in Pennsylvania.

Potter County established an ordinance regulating the construction, location, operation and decommissioning of wind turbine generators/energy facilities within the county. The ordinance establishes setback standards and safety requirements to protect the health, welfare and safety of its citizens. Currently McKean County does not have an ordinance regulating the development of wind energy.

Hazardous Areas

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

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. EPA, 2004). By creating a tax on chemical and petroleum industries, a trust fund was established to provide for cleanup when no responsible party can be identified. In 1986, the Superfund Amendment and Reauthorization Act (SARA) amended CERCLA.

Short-and long-term action responses were identified in the law. Short-term actions 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. Two Superfund sites are located within the project area—DuPont Explosives and Joyce National Powder.

Prior to 1953, DuPont operated an explosive manufacturing plant in Custer City, Pa., where nitroglycerin was manufactured. After the plant closed, DuPont maintained the 20-acre site that contained two lagoons that may have contained nitroglycerin from a spill. The lagoons were purposely made to collect the spilled nitroglycerin. After a consent order was issued by U.S. EPA in 1988, the lagoons were enclosed with a six foot fence that was inspected monthly for five years. In addition, water samples were taken annually to ensure that hazardous materials were not escaping from the lagoon.

Joyce National Powder, originally National Powder Corporation, a former explosives manufacturing plant was located near Eldred, Pa. Nitroglycerin was manufactured at the site from 1940 through the early 1970s. In 1977, Joyce Powder purchased the property to produce Judymite, which it manufactured through the mid 1980s. Beginning in 1997, the buildings were sold off in parcels and the new owners found deteriorating containers of waste that primarily contained nitroglycerin and dinitrotoluene, along with picric acid, ethyl ether, nitric acid, and sodium hydroxide. Between September 1997 and September 1998, cleanup activities occurred at the site, removing 100 drums and several roll-off containers of waste materials for proper disposal.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) is a federal statute that regulates the transportation, handling, storage, and disposal of solid and hazardous materials. Federal facilities may control regulatory responsibilities, including obtaining permits, identifying and listing hazardous waste, adhering to procedures when transporting or disposing of waste, developing risk management plans, and

managing records (U.S. EPA, 2002). Requirements for underground storage tanks, including cover tank design, operation, cleanup and closures, are also contained in RCRA. There are 130 active RCRA sites in the area; they are listed in Appendix F.

Waste Removal

<u>Landfills</u>

A landfill is a disposal site for various types of waste, which are discarded into or onto the land. Landfills are the chief method for the disposal of solid waste in Pennsylvania. In fact, Pennsylvania has been the nation's leading importer of waste since 1992. In 2005, Pennsylvania imported 7.9 million tons of municipal solid waste and 1.7 million tons of other non-hazardous waste, accounting for 19 percent of all imported waste in the U.S. However, this is a decrease of 2.7 million tons when compared to waste imported in 2001, largely impart to increases in the tipping fee and lack of railroad service to landfills. Pennsylvania is a major importer of trash due to its geographic proximity to major urbanized areas, such as New York and Washington, D.C. The majority—96 percent—of trash imported to Pennsylvania is from New York and New Jersey (McCarthy, 2007).

In the past, landfills were situated for convenience, and did not utilize any measures to control leachate, which is the liquid formed when water infiltrates the waste and draws out chemicals, metals, and other materials. Without proper (and now federally mandated) measures, leachate can easily infiltrate and contaminate groundwater resources. Federal regulations for municipal solid waste landfills (MSWLF) mandated by U.S. EPA fall under Subtitle D (Part 258) of RCRA, which was last revised in 1991. The eight main components of the regulations are listed below (U.S. EPA, 2008b).

- **Location restrictions** ensure that landfills are built in suitable geological areas away from faults, wetlands, floodplains, or other restricted areas.
- **Composite liner requirements** include a flexible membrane (geomembrane) overlying two feet of compacted clay soil lining the bottom and sides of the landfill; the liners protect groundwater and the underlying soil from leachate releases.
- Leachate collection and removal systems sit on top of the composite liner and remove leachate from the landfill for treatment and disposal.
- **Operating practices** include frequently compacting and covering waste with several inches of soil to reduce odor; control litter, insects, and rodents; and protect public health.
- **Groundwater monitoring** requires testing groundwater wells to determine whether waste materials have escaped from the landfill.
- Closure and post-closure care requirements include covering landfills and providing long-term care of closed landfills.
- **Corrective action provisions** control and clean up landfill releases to achieve groundwater protection standards.
- **Financial assurance** provides funding for environmental protection during and after landfill closure (i.e. closure and post-closure care).

There are no active municipal waste landfills within the project area. The nearest landfill to the region is the Kness Landfill located in Kane, Pa.

Illegal Dumping

In remote areas, streambeds, hillsides, back roads, and old coal mines are often littered with old tires, appliances, and other items that people no longer want. These unauthorized and illegal dumpsites grow with continued use over time, and can cause a variety of environmental and health problems. Currently, it is the responsibility of each municipality to identify and clean up illegal dumpsites.

In an effort to assist municipalities, PA CleanWays chapters and affiliates have been established throughout Pennsylvania 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 areas two to three times per year, similar to the Adopt-a-Highway program run by Pennsylvania Department of Transportation. County governments or volunteer groups organize chapters and affiliates of PA CleanWays.

McKean County is the only PA CleanWays chapter that is active within the project area. In 2008, PA CleanWays conducted an illegal dump survey throughout McKean County, identifying and documenting illegal dumpsites. Within the project area, 55 dumpsites were discovered with an estimated 139.5 tons of trash among them. Appendix G provides more information about the individual dumpsites.

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, buy-back centers, and/or deposit/refund programs. After sorting, recyclable materials are sold and purchased in the same manner as any other commodity. Material recovery facilities buy the materials and remanufacture the recyclables into new products.

The benefits of recycling are numerous and can have positive impacts on a community. Recycling material keeps them out of municipal landfills, and therefore, reduces the need for such facilities. Recycling also limits the amount of raw materials required to produce products, which reduces the need for resource extraction, reduces emissions, and saves a significant amount of energy in the process. Recycling programs also create numerous jobs. In Pennsylvania alone, 81,322 jobs have resulted from recycling programs (DEP, 2006).



Drop off recycling next to old county

home in Smethport

Pennsylvania Act 101—the Municipal Waste Planning, Recycling, and Waste Reduction Act of 1988—mandates curbside recycling for municipalities with populations of at least

curbside recycling for municipalities with populations of at least 5,000 or a population density of at least 300 persons per square mile. Additionally, each county is responsible for developing its own municipal waste management plan (DEP, 2006). The City of Bradford is the only municipality within the project area that qualifies for Act 101 curbside recycling.

Drop-off recycling is available in both McKean and Potter County. Within McKean County there are a variety of drop-off centers that have been established throughout the communities including several businesses that accept recyclable materials and the County's recycling center at the landfill. In Potter County, the county recycling center and Lions Club recycling program provide opportunities for individuals who choose to recycle.

Salvage Yards

Salvage yards, commonly referred to as junkyards or wrecking yards, serve as locations for decommissioned and wrecked vehicles that are useable for parts and materials. Environmental impacts are related to fluids from operations at the salvage yard, including crank case oil, hydraulic oil, brake fluid, gasoline, antifreeze, transmission fluid, window cleaner, and oil and wastewater recovered from stream cleaning. In addition, tires and lead acid batteries must be properly stored or disposed of. All generated wastes and associated procedures must be managed in compliance with municipal ordinances, DEP, and U.S. EPA regulations. There are no salvage yards identified within the project area.

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 undeveloped, open land, while improving and protecting the environment (U.S. EPA, 2006).

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 obtaining liability protection for sites. There are currently no BAT project sites located within the Allegheny River headwaters watershed.

DEP also developed a joint program in 2004 with U.S. EPA called the "One Cleanup Program." The purpose of the program is to ensure that brownfields recovered under Pennsylvania Brownfields Program also satisfy requirements under federal regulations. Listed in Table 2-5 are the brownfield sites located within the project area (DEP⁴).

Tab	le 2-5. Brownfield Sites	
Brownfield Site	Address	Zoning Type
Holley Avenue Multi-tenant Center	57 Holley Avenue, Bradford	Light Industrial
BEDC Hilton Avenue Lot	Hilton Avenue, Bradford	Industrial/Commercial
Pure Sil Building	1 Silicon Way, Bradford	Commercial/Industrial
(Source: DEP ⁵)		

CHAPTER 3. WATER RESOURCES

The manner in which the headwaters of the Allegheny River are managed influences the condition of the watershed downstream. This section provides an overview of resources available and current conditions of the watershed. The following documentation will discuss measures that can be taken to protect water quality and quantity.

Location

The project area is located at the start of the 11,600 square-mile Allegheny River watershed; more specifically, the upper Allegheny River watershed Hydrologic Unit (HU) 05010001. The watershed encompasses approximately 889 square miles of headwater tributaries in McKean and Potter counties in Pennsylvania before the Allegheny River flows into New York.



Marilla Brook as it enters into the Marilla Brook Reservoir outside of Bradford, PA

The HU is a cataloging system that describes the location of water resources in the U.S. The system divides and subdivides water resources into smaller drainage units. Waterways are divided into regions, sub-regions, basins, sub-basins, watersheds and sub-watersheds. The HU for the general area can be describes as:

<u>Region 05</u>: Ohio River basin, excluding the Tennessee River basin <u>Sub-region 01</u>: Allegheny River basin, Pennsylvania and New York <u>Basin 00</u>: Allegheny River basin, Pennsylvania and New York <u>Sub-basin 01</u>: upper Allegheny River, Pennsylvania and New York

The Allegheny River is a Cold Water Fishery (CWF) that begins in central Potter County, Pennsylvania west of the village of Gold in Allegany Township. It originates at the triple divide—the location where three major river basins are divided, where west flowing water runs into the Allegheny River basin, east flowing waters enter the Susquehanna River basin, and northern flowing waters run into the Genesee River basin.



Allegheny Portage Creek near the Johnson Airport

Four major tributaries—Allegheny Portage Creek, Potato Creek, Oswayo Creek, and Tunungwant Creek—feed the Allegheny River in the headwaters region. Appendix H identifies the named tributaries and their water quality designations.

Allegheny Portage Creek

Allegheny Portage Creek is the first major tributary to join the Allegheny River. It starts near the village of Keating Summit in Potter County, and flows in a northwestern direction to Port Allegany, where it joins the Allegheny River. The Allegheny Portage Creek mainstem is a Trout Stocked Fishery (TSF), except for the section between Brown Hollow to Scaffold Lick Run which is designated as a High Quality Cold Water Fishery (HQ-CWF). The tributaries that join Allegheny Portage Creek are CWF, except for Brown Hollow and Fair Run, which are HQ-CWF.

Potato Creek

Potato Creek starts in southern McKean County in Norwich Township, and flows in a northern direction through Smethport to Coryville, where it joins the Allegheny River. The mainstem of Potato Creek is a TSF from its source to Cole Creek. From Cole Creek to the mouth, it is designated as a Warm Water Fishery (WWF). The tributaries that join Potato Creek vary between CWF and HQ-CWF except for the South Branch of Cole Creek, which is designated as an Exceptional Value (EV) waterway. Table 3-1 identifies the HQ-CWF streams within the Potato Creek subwatershed.

Oswayo Creek

Oswayo Creek starts in Genesee Township, and flows in a western direction through Oswayo Borough and Shinglehouse Borough, and joins the Allegheny River south of Portville, New York. Oswayo Creek is designated as a CWF, except for the segment from Brizzee Hollow to Clara

Table 3-1. Designated High Quality Waterways in the Potato Creek Subwatershed

East Branch Potato Creek
West Branch Potato Creek
Brewer Run
Wernwag Hollow
Colegrove Brook
Robbins Brook
Bayer Brook
Daly Brook
Sherman Run
Santeen Run
Warner Brook
Stanton Brook
Blacksmith Run -Source to Smethport Water Intake

Creek, which is designated as a HQ-CWF. The tributaries that join Oswayo Creek vary between CWF and HQ-CWF, except for South Branch Oswayo Creek, which is designated as an EV waterway. There are seven waterways within the Oswayo Creek subwatershed that have been designated as HQ-CWF; they include Brizzee Hollow, Bradley Run, Elevenmile Creek, Cow Run, Butter Creek, Janders Run, and Taylor Brook.

<u>Tunungwant Creek</u>

Tunungwant Creek begins in Bradford, where the east and west branches join to form the mainstem, which flows in a northern direction and joins the Allegheny River near Riverside Junction, New York. The mainstem is designated as a WWF, as is the Kendall Creek tributary. The tributaries that join Tunungwant Creek vary between CWF and HQ-CWF, except for Railroad Run and Minard Run, which are designated as EV waterways. The HQ-CWF waterways that flow into Tunungwant Creek include East

Branch Tunungwant Creek—from source to State Route 4002 bridge, West Branch Tunungwant Creek—from source to Marilla Brook, and Gilbert Brook.

Water Attributes

Water—in the form of precipitation, groundwater, and surface water—moves freely between the atmosphere, land, and underground by changing states of matter; from liquid to solid or gas. This movement is described as the hydrologic cycle.

In the hydrologic cycle, energy from the sun evaporates water from plants, soils,

Figure 3-6. The Water Cycle



and surfaces, transforming it into water vapor in the atmosphere. When water vapor cools, it condenses to form clouds, and precipitation falls to the earth's surface once enough vapors condense. Some water seeps into the ground, becoming groundwater. The remaining water runs off the land contributing to stream flow. It is used by vegetation, or evaporates back into the atmosphere, continuing the cycle.

Groundwater and Surface Water

When water is stored below the surface it is called groundwater. Water that is stored on the surface in ponds, lakes, or wetlands is surface water. Groundwater and surface water are often considered separate resources, but they are the same; water is constantly moving back and forth from surface level to below ground.

Base flow is the flow of a waterway supplied solely by groundwater, with no surface water or runoff joining it. When a waterway is dry, the water table has dropped below the land surface. During dry seasons, the entire flow of many waterways is provided explicitly by groundwater. This causes the water table to drop slowly due to diminished recharge of the groundwater supply as a result of a lack of precipitation and the use of precipitation by growing plants.

Groundwater

Groundwater is stored in empty spaces and cracks between soil, sand particles, gravel and rock. As previously mentioned, rain causes some water to permeate the ground and replenish the supply. When all the empty spaces and cracks have been filled, the water table has reached the upper surface of the zone of saturation.

The depth of the water table is influenced by topography. In valleys, it is closer to the surface than in hilly and mountainous regions. Where the water table intersects the surfaces, it forms streams, lakes, and wetlands; the water is then classified as surface water.

In Pennsylvania, 100 inches of water—equivalent to 80 trillion gallons—is stored underground. While underground, water flows through the cracks and layers of rock. Gravity supplies the pressure needed to force the water's flow from higher elevations—such as the hills and mountains—to the valleys and lower elevations where the water table is exposed. However, unlike surface water, groundwater receives additional pressure from the weight of the water above it. This can cause water in the discharge area to flow upward; if enough pressure is achieved, gravity can be overcome. Slope and permeability impact the rate at which groundwater flows. Groundwater moves slowly at an average rate of 35–1,100 feet per year (Fleeger, 1999; A brief explanation on groundwater flow systems and groundwater hydrogeology in Pennsylvania).

In Pennsylvania, 37 percent of the population obtains water from wells and springs for drinking and domestic uses, while in rural areas the dependency of groundwater is higher (League of Women Voters). Springs are formed when groundwater flow is blocked by non-permeable rocks and is forced to flow laterally in permeable layers until it is discharged at the surface. Therefore, it is important that the quality of groundwater is protected. It is a well owner's responsibility to ensure their drinking water is safe for consumption by conducting frequent water quality analysis.

Groundwater, if not protected, can become contaminated. The methods in which we utilize land resources may impact the quality of our water. Waste



Agricultural practices, such as allowing livestock access to waterways, increases erosion, sedimentation, and nutrient pollution; streambank fencing and alternative watering systems are examples of best management practices to decrease impacts to water quality and improve livestock health

disposal, resource extraction, agriculture, and urbanization can affect water quality.

Waste disposal is the primary source of groundwater contamination. In 1990, Pennsylvania had more rural residents than any other state, and one-quarter of homes utilized on-lot septic systems. Improperly installed or maintained systems can inadvertently introduce bacteria, viruses, nitrates, phosphorous, chlorides, and organic solvents into groundwater. Activities, such as draining household chemicals and using a garbage disposal, can impede the effectiveness of treatment within septic systems. Unlike public wastewater systems that discharge waters to the surface, individual septic system discharges are released into the groundwater system. However, septic systems are not the only method of waste disposal that impacts groundwater quality. Leachate from the 55 illegal dumpsites throughout the watershed and discarding household chemicals and motor oil into storm drains also impact the quality of water (Fleeger, 1999; League of Women Voters; Raymond, 1988).

Resource extraction activities, such as mining, oil and gas drilling, and abandoned, unsealed oil and gas wells are other potential sources of groundwater contamination. Within the project area, there are 51 active industrial mining permits. Surface and deep mining can alter both the quality and quantity of groundwater. Quality can be altered through the formation of abandoned mine drainage and the introduction of iron, manganese, sulfate, and dissolved solids. Oil well drilling produces brine, which can leak into groundwater if storage lagoons are not properly lined. In 2009, there were 194 wells drilled within the watershed municipalities, 12 of which were drilled within the Marcellus Shale formation. Private water wells can be contaminated from methane gas from nearby gas wells that are under pressure. Abandoned oil and gas wells that are not sealed leave the potential for groundwater contamination through illegal disposal into the well; improper or deteriorated casings can allow contaminants to spread between aquifers (Fleeger, 1999; League of Women Voters; Raymond, 1988).

Some **agricultural practices** impact the quality of ground and surface waters. The improper or ill-timed application and over-use of fertilizers increase nitrate and bacteria levels in nearby waterways. The excessive, ill-timed use and improper storage and handling of pesticides cause them to leach into the soil or run off into nearby waterways. The contamination affects humans, land animals that drink the water, plant growth, and aquatic life (Fleeger, 1999; League of Women Voters; Raymond, 1988).

Human activities, such as construction and highway maintenance, have an impact on water quality. In **urbanized areas**, asphalt and concrete pavement impede water infiltration and groundwater recharge. Instead, water runs off the land, having the potential to pick up additional contaminants before entering a nearby waterway or eventually penetrating the ground. Water quantity is another major issue within urbanized areas. Often with large demand, there is an over withdrawal of water within the aquifer that leads to a drawdown, reducing the water table and the amount of base flow in local streams. Other urbanized activities that can affect the quality of groundwater include the use of road salt, storage tanks, chemical spills, and landfills (Fleeger, 1999; League of Women Voters; Raymond, 1988).

Surface Water

Streams, rivers, wetlands, springs, lakes, and ponds form when the water table intersects with the land surface, and groundwater reaches the surface to establish the base flow. Once the water reaches the surface, it becomes surface water. Surface water encompasses all the water on the surface of the earth, including runoff.

Tributaries form in higher elevations, where groundwater is discharged to the surface. They grow in size and volume as the water flows to lower elevations, collecting surface runoff and groundwater discharges, joining other tributaries to form runs, creeks, streams, and rivers.

According to the Pennsylvania Code (1997), streams are classified as intermittent, ephemeral, or perennial. This is based on relative position of stream bottom with respect to the water table. When detailed water table fluctuation data is unavailable, benthic macroinvertebrate communities are a good indicator of stream class.

An **intermittent stream** is a "body of water flowing in a channel or bed composed of substrates primarily associated with flowing water, which during periods of the year is below the water table and obtains its flow from both surface runoff and groundwater discharges."



The Allegheny River in Coudersport, PA, is a perennial stream that retains its flow year-round

In an **ephemeral stream**, "water conveyance lacks substrates associated with flowing waters and flows

only in direct response to precipitation in the immediate watershed or in response to melting snowpack and is always above the water table."

A **perennial stream** is a "body of water flowing in a channel or bed composed primarily of substrates associated with flowing water and is capable, in the absence of pollution or other manmade stream disturbances, of supporting a benthic macroinvertebrate community composed of two or more recognizable taxonomic groups of organisms upon available substrates in a body of water or water transport system." Perennial streams flow year-round because they are always below the water table.

Larger waterways are impacted by the quality of water in the tributaries and the quality of groundwater that discharges into them. Alterations to the quality of water, whether natural or man-made, have an impact on the quality of the stream and anyone who uses it.

Lakes, Ponds, and Reservoirs

Lakes, ponds, and reservoirs are inland bodies of water. Lakes and ponds are very similar, and classifying them can be challenging because there is no single set of criteria to distinguish them. Typically, features, such as water clarity, plant growth, and temperature changes between top and bottom layers, are used to classify these inland bodies of water as lakes or ponds. Lakes are deeper, have more visible waves, rooted plant growth near the shoreline, and water temperatures that vary with depth. Ponds are shallow, have rooted plant growth within the water body, and temperatures that do not vary with depth. Reservoirs are man-made structures, such as dams, that are built across waterways for the purpose of storing water for public water supply, safety, or recreation. Lakes and ponds tend to form more naturally and are usually the result of geological events (US EPA, 2007; Spring Creek Aquatic Concepts).

While lakes and ponds do form naturally, some are man-made. Natural lakes are uncommon in Pennsylvania, except in northwestern and northeastern Pennsylvania where glaciers once covered the region, leading to the development of glacial lakes. There are no glacial lakes located within the project area.

There are no natural lakes in Pennsylvania other than glacial lakes; however, lakes have the potential to be formed by natural events, but these lakes do not typically get termed as natural lakes. Oxbow lakes form when the river channel is changed isolating a portion of the river from its former channel. Beavers build dams across small waterways backing up the flow of water creating a pond. Earthquakes and



Marilla Spring Reservoir near Bradford, PA

landslides can also create lakes and ponds, but these events are unlikely within the Allegheny River headwaters region (U.S. EPA¹, 2007; Spring Creek Aquatic Concepts).

Upstream impacts can threaten the health of lakes. An overabundance of nutrients and sediment; the addition of organic waste, metals, and other organic chemicals; and rapid fluctuations in water levels are major threats to the water quality of lakes. A variety of sources, such as malfunctioning sewage treatment systems and septic tanks, runoff from pavements like parking lots, roads, and rooftops; urbanized areas, lawns, agricultural practices, and the destruction of shoreline vegetation can increase the amount of erosion and sedimentation.

The region has four significant impoundments—Hamlin Lake, the center point of Hamlin Park, and three water supply reservoirs used by the Bradford Water Authority to provide drinking water to the Bradford region (See Figure 3-7).

Hamlin Lake is the centerpiece of Smethport, being a cultural and recreational center. Originally built in 1822, John Applebee used the lake to support a gristmill for grinding grain. Shortly after, a saw mill was built, which used water power from the lake to operate the mill. During the lumbering era, during the 1800s and 1900s, the old mill pond was used for storage as it was filled with floating logs waiting to be milled. In 1929, the lake and surrounding lands were donated to Smethport Borough for the creation of a park (Porter, 2008).

Bradford Water Authority has constructed three reservoirs to provide drinking water to over 5,000 residents within the Greater Bradford area. Gilbert Reservoir was first to be constructed in 1888; it is located along Gilberts Run in Bradford Township. It has the capacity to hold 206 million gallons. In 1898, Marilla Reservoir was constructed along Marilla Brook to increase the volume of water needed by the water authority to adequately service the region. In 1920, the Marilla Reservoir was enhanced, and now can hold a capacity of 120 million gallons. The third reservoir, the primary source of water to the Bradford water system, is the Heffner Reservoir, located on the West Branch on Tunungwant Creek. Built in 1956, the Heffner Reservoir can hold 760 million gallons of water (Bradford City Water Authority).

Wetlands

Areas that contain water-loving plants and have undrained wet soils that are saturated or covered by shallow water at some point during the year are wetlands. Water storage, water filtration, and biological productivity are the primary functions of a wetland.

Wetlands act like a sponge, absorbing water, then slowly releasing it. A one-acre wetland can store one to one and a half million gallons of floodwater. This process allows groundwater to recharge, maintains a base flow during dry periods, and slows the flow of water, reducing the potential for erosion and flooding. The longer the water remains in the wetland, the more suspended materials are filtered out of the water. Wetlands are one of the most biologically productive and diverse natural systems in the world. They provide unique habitat and are ecologically valuable to plant and animal species.

Approximately two percent of the land cover within the project area is wetlands, although this only accounts for 18.15 square miles within the Allegheny River headwaters region. The majority of the wetlands in this area—97 percent—are woody wetlands. Woody wetlands are also sometimes referred to as forested wetlands containing trees and shrubs as the major component. The remaining three percent of wetland is herbaceous wetlands, wetland areas that contain vegetation that lack a wooded stem. Figure 3-7 depicts wetlands within the project area.

Within the project area, there is a 6,132-acre continuous wetland located along the mainstem of the Allegheny River from Turtlepoint, Pennsylvania to the New York border and along Potato Creek starting near Farmers Valley to the confluence with the Allegheny River. This wetland complex may be the largest wetland area within the Unglaciated Allegheny Plateau (Western Pennsylvania Conservancy, 2008).

Wetland Loss

Since the settlement of Pennsylvania and the U. S., wetlands were drained and filled in for agricultural, development, and transportation purposes. It is estimated that in the 1600s, within the continental U.S., there were 221 million acres of wetlands. By 2004, approximately 108 million acres remained. Historically, agriculture was the dominant cause of wetland loss nationally; since 1882, the dominant source of wetland loss has been through development (Dahl and Allord, 1994; Dahl, 2006).

Historical events, technological advances, and the values of society all played a role in the decline of wetlands. In the 1700s, wetlands were viewed as swampy lands that bred disease, restricted travel, impeded farming, and were not useful for survival. Technological advances in the development of equipment made it easier to access and drain wetlands. The federal government supported the drainage and reclamation of wetlands for settlement and development purposes. In 1849, congress passed the Swamp Lands Act, and in the 1930s, the government provided funding to assist farmers in draining wetlands and opening additional acres of land for agriculture (Dahl and Allord, 1994).

Starting in 1987, wetland conversion rates slowed when the government started increasing efforts to restore wetlands. As the value of wetlands increases, the interest in their preservation grows. Between 1998 and 2004, there was a net gain of wetlands. These gains came from the conversion of agricultural lands and acres in transition—areas in the natural process of changing land cover—back into wetlands (Dahl and Allord, 1994; Dahl, 2006).

Types of Wetlands

There are four types of wetlands—marshes, bogs, fens, and swamps. In the western Pennsylvania region the term wetland most often refers to a marsh wetland; however, within the project area, swamp wetlands are more prevalent due to past glaciations throughout the region. The Allegheny River Wetlands Complex contains the majority of the wetlands throughout the watershed.

Marsh wetlands are frequently or continually inundated with water. They are characterized by softstemmed vegetation that adapts to saturated soil conditions. Marshes receive water and nutrients from surface and groundwater sources. They recharge groundwater supplies,



Wetland area within the Allegheny Portage Creek headwaters
moderate stream flow, reduce flooding, and filter pollution. **Vernal pools**—seasonal depressions covered by shallow water for variable periods of the year and sometimes completely dry during others—are a type of marsh wetland (U.S. EPA²).

Bogs are wetlands with spongy peat deposits and acidic waters. A thick layer of sphagnum moss blankets the bog wetland. Precipitation is the only source of water and nutrients. Bogs are beneficial, because they absorb precipitation and prevent or reduce flooding (U.S. EPA^2).

Peat-forming wetlands that receive nutrients from runoff and groundwater are **fens**. Although similar to bogs, fens are less acidic and can have higher nutrient values. Functionally, fens help improve water quality, reduce the risk of flooding, and provide habitats for unique plant and animal communities (U.S. EPA²).

Swamps are wetlands dominated by woody plants and characterized by saturated soils during the growing season and standing water during certain times of the year. There are two types of swamps—forested and shrub swamps. Swamps are beneficial in removing nutrients and preventing flooding (U.S. EPA²).

Floodplains

Lands adjacent to a waterway that allow floodwaters to dissipate are termed floodplains. These scenic and valuable habitats are extremely beneficial in reducing streambank erosion, sedimentation, flooding, loss of property, and degradation of water quality. Some even consider floodplains to be natural sponges due to their ability to absorb and slowly release floodwaters, decreasing velocity and volume, and recharging groundwater. Floodplains also improve water quality by trapping sediment and capturing pollutants, similar to wetlands.

Floods and floodplains are typically defined by the likeliness of a flood event. A 100-year flood is a flood that has a one percent chance of occurring in a given year.

Beginning in 1968, Federal Emergency Management Agency (FEMA), through the National Flood Insurance Act, administered the National Flood Insurance Program (NFIP). This program was established to allow property owners to purchase flood insurance protection at a reduced rate in communities where floodplain ordinances were adopted. The floodplain ordinances must meet regulatory standards of the NFIP and Pennsylvania Floodplain Management Act. All communities within the project area have ordinances and are eligible to purchase flood insurance protection (FEMA, 2008; FEMA, 2010).

The threat of flooding and the degree of damage fluctuates depending upon the impacts of human activity. Activities, such as development in the floodplain, dredging, and channelization, alter and deepen the stream channel to accommodate and increase volume of water. When the channel is straightened, the water has fewer obstacles to maneuver around and quickly gains speed. With a deeper, straighter channel, the velocity of flow increases. When the force of water hits the streambank, the soil erodes, adding sedimentation to the waterway and decreasing the size of the floodplain. With less area available to absorb the water in the floodplain, flooding occurs when streams breach their banks.

Floodplains provide critical habitat for common, rare, threatened, and endangered species that flourish in floodplains and have adapted to these unique conditions. Plant species are limited based on soil types and water tables, while animal species are limited based upon the habitat provided by the plant species. Floodplain flora and fauna are discussed in more detail in the Biological Resources chapter.

Riparian Zones

The land area bordering the waterfront of the stream is its riparian zone. These areas, which are often floodplains, filter pollutants and sediments from runoff and provide an area of transition between water and land. A highly functional riparian zone acts as a floodplain by reducing flooding and erosion by decreasing the velocity of the flow, retaining water, and stabilizing the surrounding soil. Riparian zones or corridors, as they are sometimes called, regulate water temperature, create fish habitat, provide important corridors for wildlife, and enhance recreational activities.

Vegetative buffers prevent erosion and the undercutting of banks. The roots of plants and trees hold the soil in place, as opposed to non-vegetative buffers, where the destabilized soil erodes into the waterway. The above-ground portion of the plants slows down runoff, allowing more water to be absorbed and recharge groundwater supplies. In addition to ecological benefits, vegetative riparian buffers can increase property values, decrease property loss due to erosion, and provide privacy and scenic beauty. Native plants and warm season grasses are most effective, because they tolerate the surrounding environment and weather conditions, and are naturally resistant to pests and disease.

The wider the riparian zone, the more effectively it functions. Many agricultural and developed areas along waterways do not have a substantial riparian zone. This leads to bank erosion and the establishment of invasive species. Figure 3-8 displays the recommended riparian buffer width for each beneficial use.



Figure 3-8. Recommended Riparian Buffer Widths

A variety of programs and tools are available to assist landowners in protecting these areas. Programs may have a minimum buffer requirement for cost share funding. Individual landowners should contact their local Farm Service Agency to determine which program would work best for them.

Land Purchase

A conservation organization or municipality may purchase land or have property donated to them in order to protect, restore, conserve, or provide public access to that property. The organization or municipality becomes the owner of the property and is responsible for maintenance and financial obligations.

Conservation Easements

Conservation easements are legal agreements between a landowner and a land trust or governmental agency. These agreements restrict the land use of the property and preserve it for future generations. These restrictions become part of the deed for the property and are transferred to new property owners

when the property is sold. The landowner maintains ownership of the land, but gives up some of the development rights, while being compensated for the economic loss from the restrictions.

Municipal Planning

Through the Municipalities Planning Code, there are a variety of options for municipal planning. Comprehensive plans—county, individual, or joint—address development issues. Although these plans are non-regulatory, they influence municipal ordinances because all zoning ordinances must be consistent with a municipality's comprehensive plan. The plan contains an official municipality map, which designates existing and proposed areas of open space, growth areas, and areas that restrict certain activities. Ordinances restrict activities within a certain distance of a stream, based on size, slope, content, and location. This includes limiting the building of new structures in areas prone to flooding, removing riparian zones, and earth disturbances.

Transferable Development Rights

Discussed further in the Biological Resources chapter, transferable development rights are used to compensate landowners in areas where development is restricted by allowing them to sell development rights to increase development densities in other areas.

Density Bonuses

Developments that utilize Conservation by Design strategies often utilize density bonuses to award developers by allowing them to increase development density in exchange for conserving natural areas or contributing to an open space fund.

Stormwater Credits

A stream riparian buffer reduces stormwater runoff. Developers can receive stormwater credits, which result in construction of less costly stormwater management facilities, in exchange for maintaining or restoring riparian buffers (Alliance for the Chesapeake Bay, 2004).



Stormwater discharge following a significant rainstorm near Foster Township Park

Stormwater

Stormwater is precipitation that falls during storm events that is used by vegetation or becomes surface water. When rapid or extended storm events occur, more precipitation falls than the natural processes can manage. Depending on existing conditions, accelerated stormwater can produce different results. When the water cannot permeate the ground, it is shed off the land, becoming runoff. Soil particles and pollutants can adhere to the runoff as it meanders across the land before pervading the ground or entering surface waters. When runoff enters surface water, it causes increased volumes and rates for area streams. This sometimes leads to the scouring of streambanks as increased water volume and velocity erodes the streambank. Scouring alters the stream channel, increasing sedimentation and the risk of flooding.

In areas, such as Bradford, Smethport, and Port Allegany, impervious surfaces are often linked to stream impacts. Impervious surfaces are areas where water cannot be absorbed into the ground. These include concrete, pavement, rooftops, and areas with highly compacted soils. Even when only 10 percent of the land cover is comprised of impervious surfaces, significant impacts occur (Schueler, 2003). Minimizing the amount of impervious surface can protect water resources. Zoning, residential design, open spaces, and new technologies are available to help with planning minimal impervious surfaces.

Reducing impervious surfaces not only has environmental benefits, but reduces social, economic, and development costs as well.

Act 167 (Stormwater Management Act) was established in 1978 in an effort to respond to impacts of accelerated stormwater runoff resulting from land developments. Each county is required to prepare and adopt a watershed-based stormwater management plan. In addition, municipalities are required to adopt and implement ordinances consistent with these plans to regulate development (Pennsylvania Department of Environmental Protection (PA DEP), 2010b).

In 1993, Potter County enacted a stormwater management plan for the Allegheny River watershed. From 1993–2001, six townships—Homer, Keating, Pleasant Valley, Roulette, Summit, and Sweden—have implemented municipal ordinances.

Dams

Historically, dams were often installed along streams and rivers to harness the natural power of water

for operating mills of varying sorts, storing water reserves, or for flood control. Dams are also utilized in the middle and lower sections of the Allegheny River for navigational and transportation purposes. Within the project area, four major impoundments exist with dam structures—Hamlin Lake, Marilla Reservoir, Gilbert Reservoir, and Heffner Reservoir.

In 1822, in order to power a gristmill on Marvin Creek, John Applebee constructed a dam creating an impoundment that was also used to operate a sawmill and store logs waiting to be milled. In 1929, the lake and adjacent land—owned by the Hamlin Family at the time—was donated to Smethport Borough for the creation of a recreational park that featured swimming, fishing, and boating (Porter, 2008).



The Hamlin Lake Park dam in Smethport, PA

Gilbert, Heffner, and Marilla Brook reservoirs were constructed in order to store source water as part of the Bradford Water Authority's public water service. Gilbert Reservoir was created in 1888, when a dam was constructed to impound Gilberts Run in Bradford Township. Then in 1898, due to rising demand for public water service another dam was constructed on Marilla Brook. The Heffner Reservoir was created in 1956 when a dam was built on the West Branch of Tunungwant Creek (Bradford City Water Authority)

The potential for smaller splash dams and old mill dams may exist within the watershed, although their locations are currently unknown. Often times, these dams no longer serve a purpose and are abandoned. If not maintained, they may fall into a state of disrepair and pose a safety risk. Dam failures may cause flooding, resulting in injury or death, property damage, and interruption of transportation and emergency services. Dams obstruct migration paths of fish, and may inhibit the movement and dispersal of other aquatic life. Abandoned dams also hinder paddlers' ease of transportation down a stream.

Some of these dams are located on private property. Efforts to reach out to individual landowners and educate them about the liability and risks of abandoned dams would benefit the watershed and the landowner. However, if a landowner decides to remove a dam, the decision must be qualified based on maintenance costs, safety, and potential uses of the dam; and a plan must be developed for the removal process and to restore the stream and its natural habitat afterwards.

There are a few organizations responsible for the oversight of dam maintenance, regulations, and removal in Pennsylvania, including U.S. Army Corps of Engineers, Pennsylvania Department of Environmental Protection, Pennsylvania Fish and Boat Commission, and American Rivers. Necessary permits must be obtained prior to removing a dam, and assistance is available to support the planning and restoration process. A useful resource for additional information about the benefits of dam removal, volunteer monitoring, and references for assistance in the *Citizen's Guide to Dam Removal and Restoration*, which can be obtained from the Pennsylvania Organization of Watershed and Rivers website: www.pawatersheds.org.

Watershed Protection Laws

Clean Water Act

In 1977, the federal Water Pollution Control Act was amended and became known as the Clean Water Act (CWA). The basic structure for managing and regulating pollution discharges and water quality standards for surface waters was established with this Act. Its purpose is to reduce direct pollution discharges, finance wastewater treatment facilities, and manage polluted runoff. U.S. Environmental Protection Agency (U.S. EPA) is responsible for implementing the act and working with individual states to restore and maintain the chemical, physical, and biological integrity of the nation's waters so they can support "the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water" (Elder, Killam, & Koberstein, 1999).

National Pollutant Discharge Elimination System

It is unlawful to discharge any pollutant from a specific source into navigable waters, unless a permit is obtained. In the permit, legal limits are established for the types and amounts of pollution that may be discharged into public waters. Under section 304 of the CWA, the National Pollutant Discharge Elimination System (NPDES) lists all permitted discharges, key permits, and summaries of discharge monitoring reports. Each state is responsible for managing the NPDES permits and obtaining discharge monitoring reports from permit holders on a regular basis (Elder, Killam, & Koberstein, 1999). NPDES permits will be discussed further in the water quality section of this chapter.

Integrated Water Quality Monitoring and Assessment Report

Section 305(b) of the CWA requires states to report on the overall health of their surface waters every two years. These reports compare stream conditions to established clean water goals. Within the report, impaired waterways are identified along with known or suspected causes of contamination, and proposed corrective actions. In 2010, the results of the assessment indicated that approximately 127 miles of stream within the Allegheny River headwaters region were impaired (PA DEP, 2010d).



Scaffold Lick Run was identified as being impaired by abandoned mine drainage in the 2010 Integrated Water Quality Monitoring and Assessment Report

Waterways that are not expected to meet water quality goals—even after current regulatory requirements are met are considered impaired waters. Section 303(d) of the CWA requires states to identify impaired waters and create a timetable to develop action plans. Impaired waters, source of impairments, and a plan of action to remediate these impairments are identified in watershed specific cleanup and restoration plans, also known as Total Maximum Daily Load (TMDL) reports. More information about TMDL reports can be found in the water quality section of this chapter.

Beginning in 2006, the 305(b) report was combined with the 303(d) list in the DEP Integrated Water Quality

Monitoring and Assessment Report that is submitted by DEP to U.S. EPA every two years. This report summarizes the water quality management program, water quality standards, point and non-point source pollution control, and includes descriptions of programs aimed at protecting lakes, wetlands, and groundwater quality. Waterways not meeting their expected water quality goals are identified in Figure 3-9 and Appendix I.

Pennsylvania Clean Streams Law

In 1931, Pennsylvania passed the Clean Streams Law granting the commonwealth the power to enact legislation and regulation pertaining to stream protection. It was established to preserve and improve the purity of Pennsylvania waterways for the protection of public health, animal and aquatic life, industrial consumption, and recreational purposes. It is also responsible for the creation of the Clean Water Fund that is used to eliminate pollution.

Prior to the passing of this law, intermittent and ephemeral streams were not awarded the same protection as perennial streams. Mining companies were able to reclassify perennial streams as ephemeral and intermittent, because they did not require special protection under the existing mining regulations. As a result of this legislation, intermittent and ephemeral streams received protection similar to perennial streams before mining, logging, or other earth-moving activities are approved.

The Clean Water Fund was established to eliminate pollution. Monetary support behind the Clean Water Fund is provided by the fines collected under penal provisions; civil penalties under section 605; permit fees excluding sections 202, 203, and 207; bond forfeitures; and costs recovered under Act 315.

Pennsylvania Sewage Facilities Act

In 1960, Act 537—known as the Pennsylvania Sewage Facilities Act—was passed to correct existing sewage disposal problems and to prevent future problems. The act is part of Article II of the Pennsylvania Clean Streams Law, and it requires every municipality to develop and implement an official sewage plan addressing present and future sewage disposal needs. If new development projects or sewage disposal needs not originally identified in the plan arise, then an update of the plan will be required.

Among the 36 watershed municipalities, the majority—47 percent—have plans that are older than 20 years, being completed from 1970 to 1972. Another 22 percent of the municipalities' plans are between 10 and 20 years old, and 31 percent of the plans are less than 10 years old.

Pennsylvania Floodplain Management Act 166

Floodplain management regulation is specified in the Pennsylvania Floodplain Management Act and Chapter 106 of the Pennsylvania Code. The purpose of this regulation is to (Pennsylvania Code, 1983):

- Encourage planning and development in floodplains consistent with sound land-use practices
- Protect people and property in floodplains from danger and damages of floodwater and from materials carried by such events
- Prevent and eliminate urban and rural blight resulting from flood damage
- Authorize a comprehensive and coordinated program of floodplain management based upon the NFIP designed to preserve and restore the efficiency and carrying capacity of the streams and floodplains of the Commonwealth of Pennsylvania
- Assist municipalities in qualifying for NFIP
- Provide for and encourage local administration and management of floodplains
- Minimize expenditure of public and private funds for flood control projects and for relief, rescue, and recovery efforts

Surface Mining Control and Reclamation Act

Surface Mining Control and Reclamation Act (SMCRA) is a federal act that established uniform standards for coal mining activities on state and federal lands. The standards include environmental performance protection standards to reduce adverse effects on aquatic and terrestrial wildlife and other environmental values. Under this regulation, mining companies are required to conduct remediation efforts for environmental degradation cause after the establishment of this act in 1977. It gives companies an incentive to reduce environmental impacts in order to avoid the high costs of remediation. Through this program the Abandoned Mine Reclamation (AMR) fund was created to provide financial assistance to clean up mine lands abandoned prior to the passing of the act, which are not covered by the new standards and regulations (Environmental Literacy Council, 2008).

SMCRA and CWA have important implication for mining activities throughout Pennsylvania. Future mining activities must comply with SMCRA and the anti-degradation component of the CWA (Environmental Literacy Council, 2008).

Water Quality

Classification of Water Pollution

Water pollution is divided into two categories—point and non-point sources. Point sources are pollution discharges from an identifiable source, such as discharge pipes from a factory or wastewater treatment plant. Non-point source enters a waterbody through unidentifiable sources, such as agricultural or stormwater runoff.

Regulated under the CWA through the NPDES program, point source pollutants—because they come from an identifiable location—are easier to manage. In Pennsylvania, an earth disturbance from one to five acres in size requires a NPDES permit if there is a point source discharge at the site. Agricultural uses, other than Confined Animal Feeding Operations (CAFOs) and timber operations that are fewer than



Point source discharges require a NPDES permit to discharge waste into a waterway

25 acres, are not required to obtain a NPDES permit. There are 31 NPDES permitted discharge sites within the Allegheny River headwaters. They are identified in Appendix J.

Erosion and sedimentation, stormwater, and agricultural sources and culprits of non-point source pollution. Non-point source pollutants are not visible without detailed analysis and research to identify their origins.

Sources of Impairment

Erosion and Sedimentation

Human influences, such as agricultural and forestry practices, commercial and residential development, and dirt and gravel roadways, accelerate erosion and sedimentation rates within the Allegheny Headwaters watershed.

Erosion is a natural process that involves the displacement of soils, sediment, or rocks by wind or water. However, it is the accelerated movement of theses materials—usually following human influences—that cause the greatest ecological concern. Increased rates of erosion and sedimentation

impact aquatic habitats, aquatic vegetation, and other aquatic species and their food supply, creates unstable streambanks, and increases drinking water treatment costs. Pollutants, such as heavy metals, pesticides, and excess nutrients, are carried with the sediment by runoff and with the stream flow, which affects conditions downstream, as well as the source.

In order to minimize impacts caused by accelerated soil erosion, **Chapter 102 of the Pennsylvania Code**, under the authority of the Pennsylvania Clean Streams Law, was established in 1972 and later amended in 2000. According to the law in the Pennsylvania Code, "anyone conducting earth disturbance activities must use best management practices (BMPs) to minimize the amount of sediment leaving the site of the earth disturbance activity." PA DEP is responsible for overseeing Chapter 102 requirements, and has given conservation districts with trained staff the responsibility to review erosion and sedimentation control (E&S) plans, conduct trainings, perform site inspections, and –in some counties—the authority to conduct compliance and enforcement actions (PA DEP, 2007b).

Erosion and sediment control plans must meet Chapter 102 requirement by being properly designed and implemented and available on site for all earth disturbance activities. These plans must document how land and water resources are being protected against accelerated erosion through the implementation of BMPs. The timing and sequencing of the BMP installation must be accounted for in the plan. Minimizing disturbances, utilizing silt fence, mulch, diversion ditches, sediment traps, and sediment basins are examples of erosion control BMPs.

Excluding agricultural plowing and tilling, timber harvesting, and road maintenance activities, all other earth disturbances greater than five acres of disturbances between one and five acres with a point source discharge must obtain a NPDES stormwater permit. As previously mentioned, farms that are not CAFOs and timber operations that are fewer than 25 acres are not required to obtain a NPDES permit, but are required to have a conservation plan or an E&S plan for their activities. Timber harvesting activities that disturb 25 acres or more for haul roads, skid trails, and landing areas, as well as road maintenance activities disturbing 25 acres or more, is required to obtain a NPDES permit. Agricultural activities do not require a permit, but do require an E&S plan (PA DEP, 2007b).

The Dirt and Gravel Road Maintenance Program,

enacted in April 1997 through section 9106 of the Pennsylvania Vehicle Code, provides dedicated funding to eliminate stream pollution caused by dust sediment from unpaved roads. The notion for this program was initiated in Potter County, Pa, in April 1990, when members from Pennsylvania Council of Trout, U.S. Fish and Wildlife Service, and God's Country Chapter of Trout Unlimited met for a fishing trip, which was impractical due to a severe rain storm. Instead, the groups observed the local waterways and were shocked when they witnessed the amount of sediment being washed into area waterways.

The program receives four million dollars annually from the State Conservation Commission (SCC) through dedicated and earmarked funding that is given to county conservation districts based on need. Conservation districts, in turn,



Improperly designed dirt and gravel roadways can increase the amount of sediment washed into nearby waterways (Source: Potter County Conservation District)

disseminate funds to municipalities and other road-owning entities. Funding is provided to address pollution on problems previously identified in county-wide dirt and gravel road assessments. The assessment, conducted in 2000, provided information from field investigations where dirt and gravel roads were identified and evaluated using 12 criteria. The criteria included: amount of road sediment in

stream, wet site conditions, road surface material, road slope/grade, road shape, distance from stream, slope to stream, outlet to stream, outlet bleeder stability, road ditch stability, road bank stability, and average canopy cover. From the evaluation worksites—locations where unpaved road runoff affects stream quality—were identified, establishing the basis of the Dirt and Gravel Roads Program in each county.

In order to be eligible for funding, the applicant must attend a two-day environmentally sensitive maintenance of dirt and gravel roads training workshop. Projects must be site-specific, and require long-term solutions to prevent erosion and pollution. Activities, such as chip-sealing and paving, are not eligible expenses. Eligibility is based upon road ownership, not political boundaries. Federal roads are not eligible for funding; while roads owned by a municipality or county, roads within state parks, state forests, state game lands, public boat launches and PFBC access roads are eligible. Within McKean and Potter counties, more than 2.8 million dollars had been spent on dirt and gravel road projects between 1997 and 2009; however, all of these sites are not located within the project area (Center for Dirt and Gravel Road Studies, 2009). For more information about dirt and gravel roads, visit the Penn State Center for Dirt and Gravel Road Studies website at http://www.dirtandgravelroads.org.

Agricultural Practices

Agricultural practices are responsible for 39 percent of the non-point source pollution in Pennsylvania (U.S. EPA, 2008a). Improper fertilizer and manure management, including improper manure storage, unintended effects of pesticides, along with erosion and sedimentation alter the quality of area waterways. The installation and use of BMPs can minimize the impacts to the land and water, and can improve heard health and crop yields.

1. High residue management leaves at least 30 percent of the ground covered with crop residue, such as leaves and stalks, after crops are planted. This limits erosion by protecting and binding the soil.

2. Cropland protection cover, or cover crop, is a crop of close-growing grasses, legumes, or small grains usually grown for a year or less. It is not grown for harvest, but for many different functions in crop rotations, such as preventing erosion and improving soil fertility.

3. Nutrient management is the management and crediting of nutrients from all sources, including legumes, manure, and soil reserves, for the application of manure and commercial fertilizers. Management includes the rate, method, and timing of the application for all sources of nutrients to minimize the amount of nutrients entering surface or groundwater. This practice includes manure nutrient testing, routine soil testing, and residual nitrogen soil testing.

4. Pesticide management is the management, handling, disposal, and application of pesticides, including the rate, method, and timing of application to minimize the amount of pesticide pollution entering surface and groundwater. This practice includes integrated pest management (IPM), which is the practice of using economical and efficient means of pest control that will have the least detrimental impact to people, property, and the environment (U.S. EPA¹).

5. Rotational grazing is a practice that divides pastures into multiple cells that receive a short, intensive grazing period followed by a period of recovery of the vegetative cover. Rotational grazing can correct existing pasturing practices that result in degradation. When summer dry-lots result in water quality degradation, they should be replaced with this practice.

6. Livestock fencing encloses or divides an area of land with a permanent structure that acts as a barrier to livestock or big game. The fencing excludes livestock from areas that should not be

grazed, subdivides land to permit use of grazing systems, and protects new seeding and plantings from grazing.

7. Streambank fencing excludes livestock from the near-shore area to prevent trampling and grazing to protect the riparian habitat.

8. Channel crossings are stable surfaces installed on the bottom of streams to provide a crossing for equipment or livestock. They typically coincide with streambank fencing.

9. Manure storage facilities are structures used to store manure until it can be applied to the land as fertilizer. The facility is needed to properly store manure so that it does not leach into the soil and become a non-point source of pollution.

10. Field diversions are shallow channels constructed across the slope of the land to divert water from areas where it may cause flooding or erosion. The water is diverted to where it can be stored or safely transported.

11. Terraces are a system of ridges and channels with appropriate spacing constructed on the contour with a suitable grade to prevent erosion in the channel.

12. Grassed waterways are natural or constructed channels that are shaped, graded, and established with suitable cover to prevent erosion by runoff water.

13. Agricultural sediment basins are structures designed to reduce the transport of sediment, agricultural waste, and other pollutants from agricultural fields and barnyards to surface waters, closed depressions, and wetlands.

14. Shoreline and streambank protection is the stabilization and erosion protection of stream and lake banks and the protection of fish habitat and water quality from impacts caused by livestock. Methods include fencing, shaping, and seeding the banks with vegetation; as well as using rock, riprap, bioengineered materials, or structures to stabilize shorelines and/or provide fish habitat.

15. Shaping and seeding is the planting of vegetation, such as trees, shrubs, vines, grasses, or legumes, on highly erodible or critically eroding areas. This vegetation stabilizes the soil, reduces damage from sediment and runoff, and improves wildlife habitat and visual resources.

16. Remote watering systems are a combination of portable tanks, pumps, and pipes designed to bring water to livestock in all grazing cells rather than allowing the animals to have direct access to the stream, where erosion and sedimentation can occur.

17. Shoreline buffers are permanently vegetated areas immediately adjacent to lakes, streams, channels, and wetlands designed and constructed to manage critical non-point pollutant sources or to filter pollutants from runoff.

18. Wetland restoration is the construction of berms or the removal of tile lines or drainage ditches to create conditions suitable for wetland vegetation.

19. Barnyard runoff management includes structural measures to redirect barnyard runoff and collect, convey, or temporarily store it. Management includes the use of sediment basins, roof gutters, and clean water diversions.

20. Animal lot relocation involves moving an animal lot from a critical site, such as a floodway, to a more suitable site to minimize the amount of pollutants entering surface or groundwater.

Channelization

The intentional straightening, diversion, widening, and deepening of a stream channel to drain wetlands, improve navigation, control flooding, or divert water for agricultural or construction purposes is channelization. These activities alter aquatic and terrestrial habitats, increase wetland loss, and destabilize streambanks, leading to increased erosion and sedimentation problems. Through the channelization of the stream, the velocity and flow of the waterway is increased, which may also cause increased flooding.

Acid Precipitation

Rainwater is naturally acidic, generally having a pH of around 5.6, due to the atmospheric reaction of carbon dioxide and oxygen to form carbonic acid. However, acidity from unnatural sources has caused rainwater in some areas to have an acidic pH of 4.9 or lower.

Acidity in precipitation (rain, snow, fog, dew, etc.) that forms from the reaction of air pollutants with

water in the air is called acid precipitation. These pollutants mainly include sulfur and nitrogen oxides, which turn into sulfuric and nitric acids. Other times, pollutants fall as dry deposition, or acidic gases and particles that deposit onto buildings, cars, etc. When it rains, the particles are washed from objects and increase the pH of the runoff. Sources of this pollution include vehicles, industrial sources and power generating plants. The effects of acid precipitation are usually felt many miles away from the source. Most pollutants in the project area come from emissions from more populated areas in the east and Midwest and from coal-burning power plants to the west.

The best way to document the pH of rain is to collect rainwater by setting out containers or installing rain gauges. Rain that is not affected by pollutants will naturally be acidic, with a pH of 5.0 to 6.0. A pH below 5.0, however, may indicate acid precipitation.

Acidic, Basic, and Neutral

The term pH is used to quantify whether a solution is an acid or a base. It is measured on a scale of 1-14, with a pH of 7.0 being neutral.

Acidity is created by the concentration of hydrogen (H+) ions in solution, while basicity is created by the concentration of hydroxide (OH-) ions. A solution with an equal number of hydroxide and hydrogen ions is considered neutral. The lower the pH, the more acidic a solution is, while higher pHs are more basic.

The 1990 CWA amendments include the most significant legislation that has been enacted to lessen emissions contributing to acid precipitation. The amendments promote the use of market-based approaches to reduce emissions, including pollution trading, encouraging innovative technologies to reduce sulfur and other emissions, and promoting the use of low sulfur coal. Through the use of stricter standards for the emission of sulfur and the use of innovative sulfur scrubbers, sulfur emissions are now 20 percent lower than when the legislation was enacted. This has translated to a significantly lower concentration of sulfuric acid in precipitation. Unfortunately, affordable technologies have not been developed to remove the nitrogen component. As a result, nitrogen emissions have not decreased, and nitric acid precipitation is still a serious problem. In fact, precipitation within western and central Pennsylvania is located within the portion of the U.S that contains the highest levels of nitrogen-containing compounds (Driscoll et. al., 2001).

Acid precipitation can have additional effects on water quality, besides the impacts of low pH. Toxic metals previously deposited in soils can be leached into streams and groundwater when they react with

the anions found in acid precipitation. In some cases, the concentrations are high enough to negatively impact aquatic life. Aluminum is another common metal that is amplified in waterways that receive acid precipitation. Both aluminum and acidity disrupt the water-salt balance in fish, causing red blood cells to rupture and contributing to heart attacks. Acid precipitation can also leach important nutrients from forest soils and decrease the growth of a forest.

Fortunately, ecosystems impacted by acid precipitation can recover. Research shows that macroinvertebrate life in a stream re-establishes itself within three years of decreased acidity, whereas fish populations may take up to 10 years to recuperate (Driscoll et. al., 2001). A visible lowering of sulfuric acid in streams has occurred as a result of the 1990 legislation. However, 1990 reductions were not adequate to allow for the full, or even partial, recovery of aquatic ecosystems. Further and stricter regulatory controls are needed to reduce emissions from industrial and power plants, as well as vehicles.

The acid precipitation issue is particularly difficult because there is little that can be done locally to solve the problem. Alkalinity-producing chemicals can be added to streams, but this is a temporary solution that may cause more problems for aquatic systems. Individuals interested in reducing the impacts of acid precipitation can make changes to reduce their personal contribution to emissions through activities, such as driving fuel-efficient cars and using less energy. Additionally, constituents should encourage their legislators to support stricter regulations that would further reduce the pollution released by smokestacks and cars.

Although evidence points to a significant decrease in the quality of water due to acid precipitation, more research is needed to determine normal pH reference conditions for the project area and the extent of the impact caused by low pH precipitation.

Total Maximum Daily Load

All waterways are classified with an expected use based on water quality and waterways that do not attain this use are considered impaired and must have a Total Maximum Daily Load (TMDL) study conducted. The study is performed to determine the maximum amount of pollution that a waterbody can handle, while meeting certain safe water quality standards. The subsequent report on the study identifies objectives and methods to restore and maintain good water quality. The targeted pollutant load reduction is the difference between the maximum pollution load a waterway can tolerate and its existing amount of pollution.

More than 125 miles of waterways within the project area have been identified as Category 5 impaired waterways on the 2010 Pennsylvania Impaired Waterbody List. A listing of these 72 waterways and anticipated TMDL dates are available in Appendix I. To date, no TMDL studies have been completed; however, 28 TMDL studies are scheduled to be completed in 2011 (PA DEP, 2010d).

Abandoned Mine Drainage

Past coal mining activities have altered the landscape and through abandoned mine drainage (AMD) impacted water quality. Unlike many other sources of pollution, AMD is formed when mining activities fracture bedrock over coal seams, allowing rain, groundwater, and oxygen to come into contact with the seam and surrounding bedrock. This contact causes chemical and biological reactions to occur, resulting in water contaminated with dissolved metal byproducts of those reactions, including iron, manganese, and aluminum.

AMD can be either acidic or alkaline. When sulfur-oxidizing bacteria in the rock convert inorganic sulfur to sulfate and sulfuric acid, and there are insufficient neutralizing compounds, the water will become acidic. When the rock material contains calcite and/or dolomite the discharge tends to be alkaline.

Polluted water discharges into streams and groundwater through mine openings, springs, and seeps. When the water is exposed to oxygen in the air, the metals precipitate, or drop out of the solution as silllike solids, and coat stream bottoms. High levels of iron and aluminum can poison fish and threaten drinking water supplies (Fripp, Ziemkiqeicx, & Charkavorki, 2000). Siltation from the metals and the altered pH can affect the survivability of aquatic macroinvertebrates, which form the base of the food chain, and thus, the basis of a healthy, functioning stream ecosystem.

AMD discharges vary due to geology, hydrology, and flow; therefore, a treatment that works at one site may not be suitable at another. The goal of an AMD treatment system is to neutralize, isolate, stabilize, and remove pollutants from the water. This is done by adding alkalinity to increase the pH— except in discharges that are already alkaline—and then focusing on the capture and removal of metals. Two treatment methods are used to remediate AMD—active and passive. More detailed information about mine drainage treatment is available at http://amrclearinghouse.org.

Active treatment of mine drainage uses alkaline chemicals, such as lime, soda, ash, or ammonia, to decrease acidity and speed up the removal of metals. This method of treatment can be very expensive, but can work in areas where there is limited land availability for a passive treatment system.

Passive treatment utilizes a series of ponds or wetlands to collect and treat AMD discharges. Several sources of AMD can be collected and diverted to the treatment system. Polluted discharge water slowly flows by the force of gravity through the series of ponds or wetlands, where sediment particles settle out, metals are oxidized. Organic materials used to line the bottom of the ponds and limestone that lines the channels connecting the ponds reduce acidity. Because the chemical make-up and flow of discharges differ, each treatment system requires a specialized strategy to effectively clean up and improve the water quality. Passive treatment systems are typically limited to areas where land is available.

Within the headwaters region, AMD impacts are limited to the southern McKean County portion and primarily within two tributary streams—Scaffold Lick Run and Railroad Run. The entire Scaffold Lick Run subwatershed—a headwater tributary to Allegheny Portage Creek—is identified as impacting aquatic life caused by AMD in the 2010 Integrated Water Quality Monitoring and Assessment Report originally identified in 1998. Railroad Run—a headwater tributary to Potato Creek—was also identified in the 2010 Integrated Water Quality Monitoring aquatic life stemming from AMD. It was initially listed in 2006.

Marcellus Shale Gas Extraction

In order to recover the gas in the Marcellus shale formation, a large volume of water is required, which becomes contaminated during the extraction through a process called hydrofracking. As a part of the permitting process for Marcellus shale operations, drilling companies are required to complete a water management plan for each site. The management plan identifies where the operator intends to obtain and store the water needed for the drilling process and to ensure it coincides with Act 220—Water Resources Planning Act (PA DEP, 2010c).

In addition, drilling companies must account for the wastewater that is generated, including how it will be stored, treated, and/or disposed. Under the Pennsylvania Clean Streams Law, DEP finalized new regulations to protect Pennsylvania's water bodies and public drinking water in 2010, by limiting the amount of total dissolved solids (TDS) that could be discharged into waterways from wastewater of the natural gas industry (Abdalla, Drohan, Saacke Blunk, & Edson, 2011b). Wastewater fluids that are recovered must be reused, recycled, or collected and treated at an authorized treatment facility.

Several steps exist in the Marcellus shale drilling process that allow radionuclides, particularly Radium-226 (please see Chapter 2 for more details), to concentrate in liquid wastewater. Drilling fluids that include various chemical additives are artificially introduced into the borehole by high pressure injection to cool and lubricate the drill bit, to prevent the well hole from caving in, and to circulate drill cuttings to the well surface. Formation water, or natural brine, contained within the pore spaces and fractures of the rock can mix with the drilling fluid and be circulated to the well surface. The formation water can be contained in the rock formations for centuries and can contain extremely high levels of water-soluble radionuclides. In addition to mixing with brine, the drilling fluid may also become contaminated when it comes in contact with the NORM in Marcellus shales discussed prior (Resnikoff, Alexandrova, & Travers, 2010).

As mentioned prior in Chapter 2, the reuse of recycled water can decrease costs to the drilling companies and reduce the amount of water being withdrawn from area streams. Although drilling fluid has potential to be reused many times, so does radium have the potential to progressively concentrate in it after each reuse. Publicly-owned water treatment works have been identified as not being currently capable to properly treat industry wastewater (Resnikoff, et al, 2010). New technologies for treating Marcellus wastewater are currently an area of intense research. Most involve evaporation and crystallization of salts and mobile evaporator units. Advantages of this kind of advanced treatment option include the effluent meeting new state standards and direct reusability of the treated water in fracking other wells. However, disadvantages include production of a large solid waste residue (salts) and high costs. In Lycoming County, one of the first facilities for treating flowback and produced water in the Marcellus shale area became operational in April 2010. As of September 2010, the facility had treated and returned 12 million gallons of water to clients for reuse in fracking. An additional facility is planned for Tioga County and two for Bradford County. If expanded, this process should reduce the need for future water withdrawal permits (Abdalla et al., 2011b).

The major water resource concerns surrounding the Marcellus shale gas extraction include the volume of water required to extract the gas and the impacts the irretrievable wastewater might cause to nearby aquifers. Drilling and fracking water and wastewater is also increasingly being transferred between river basins, further complicating permitting and big-picture water management (Abdalla, Drohan, & Becker, 2010).

Precedent among concerns for pollution of nearby aquifers is its potential effect on human drinking water. The Pennsylvania Oil and Gas Act includes language to protect drinking water supplies near gas wells, including a requirement that gas well drilling operators restore or replace any water supply determined by DEP to be polluted as a result of nearby gas well drilling, defined as being within 1,000 feet. The gas well operator is presumed responsible for pollution of any public or private drinking water supply only if it occurs within six months after completion of drilling or alteration of the gas well. During the six-month period, the gas well operators can use any one of five defenses to prove they are not responsible for water contamination: the pollution existed prior to the drilling; the landowner or water supplier refused to allow the operator access to conduct a pre-drilling water test; the water supply is not within 1,000 feet of the gas well; the pollution occurred more than six months after completion of gas well drilling; or the pollution occurred as the result of some cause other than gas well drilling (Abdalla, Drohan, Swistock, & Boser, 2011a).

New regulations, including many oil and gas well construction standards that the industry must follow to prevent methane gas migration, became effective on February 5, 2011 in response to recent incidents in some parts of Pennsylvania where gas had migrated into drinking water supplies or homes, posing health and safety threats. The regulations also require drillers to detail the chemicals found in flowback water, and to electronically report production and waste volume data (Abdalla et al., 2011b).

An Ohio River Basin Commission

Some regions of the state are protected by quantitative threats to water by the presence of river basin commissions. Commissions such as the Susquehanna River Basin Commission (SRBC) and Delaware River Basin Commission (DRBC) are granted extensive authority over allocation of basin water. They review both surface and groundwater withdrawals that may have a "substantial effect" on basin waters. Commissions are also concerned with the lowering of groundwater levels, water quality degradation, and any loss of aquifer storage capacity or major impact of flow and play a vital role in regulating such parameters (The Pennsylvania State University, 2009b).

With the exception of state laws regulating the withdrawal of surface water by public water supply agencies, Pennsylvania has no statewide regulatory program mandating the acquisition of permits for withdrawing surface or ground waters. Basin level regulatory programs of the SRBC and DRBC have largely displaced the courts as the authority of water rights issues in the eastern two-thirds of the Commonwealth. Due to the water consumption requirements where commissions are present, gas companies may not begin gas well construction, drilling, or fracking without commission approval. This requirement has allowed the commission to regulate individual and cumulative impacts of the gas industry on water resources, playing an important role in the development of the industry in Pennsylvania (Abdalla et al., 2011a).

The Ohio River basin is currently without a basin commission, raising a number of issues about justice and consistent permit requirements in this gap of authority coverage. Many stakeholders have suggested that the Ohio River basin would benefit from creation of a water quantity–focused river basin commission with powers similar to those of the SRBC and DRBC.

Benefits of river basin commission established in the Ohio river basin would be countless. River basin commissions take a regional view and can work across state jurisdictional boundaries to settle disputes before they escalate. The interstate compact process gives states the ability to address mutual problems through consensus building rather than legal action. An important strength of the river basin approach stems from their flexibility to deal with changing situations, such as those presented by shale gas extraction.

The Army Corps of Engineers in Pittsburgh, along with three other Corps districts and the 15 Ohio river basin states, is participating in the Ohio River Basin Comprehensive Reconnaissance Study. Among other objectives, an official water quantity–focused commission for the basin is one ultimate goal of the study (Abdalla et al., 2010).

Water Quality Trading

Water quality trading is an innovative approach to reduce the overall impact of a particular pollutant. It is achieved when one entity purchases the right to pollute from another entity in the form of credits, or units of pollution reduction beyond federal or state required levels (PSU, 2006). This method is only effective when there is reason to decrease the amount of pollution being generated through a TMDL or NPDES permit, and if there is a difference in treatment cost and opportunities.

In order for water quality trading to be effective, there must be consensus among stakeholders and regulatory agencies to try innovative approaches and to engage in trading design and implementation. All trading should be conducted with legal, regulatory framework, such as the NPDES Program, which requires point source polluters to obtain permits to discharge pollution in waterways of the U.S. and comply with the requirements of the CWA.

Within Pennsylvania, water quality trading is a voluntary program aimed at reducing nutrients from point and non-point pollution sources. Only comparable nutrients credits expressed as a mass per unit time, for example pounds per year, can be exchanged between eligible parties. Trading may only occur within the bounds of the same watershed as defined by PA DEP, but may vary from stream segments to the entire watershed basin. Currently, water quality trading is limited to the Susquehanna and Potomac watersheds. The potential for developing a trading program within the Allegheny River watershed and the framework needed to support it is currently being explored, referencing the trading programs in the Susquehanna and Potomac watersheds (PA DEP, 2008c).

Water Quantity

The amount of water available for use is dependent upon the amount of groundwater recharge. Groundwater recharge is the amount of water that has permeated the ground during periods of precipitation. During periods of drought, more water is being withdrawn and used than can be recharged into the ground. Some areas in Pennsylvania and across the U.S. withdraw more water than can be recharged on a regular basis. In these areas, water quantity, in addition to water quality, becomes an extremely important issue.

Water is withdrawn from both surface and groundwater sources. Many public water suppliers utilize groundwater or surface water from local waterways, and treat it to ensure that it meets safety standards for drinking water. In many rural and suburban areas, public water systems are not available, and residents depend upon private wells and springs.

When groundwater is utilized, a well is drilled into the aquifer—an underground area containing

sufficient porosity and permeability to transmit an adequate supply of groundwater. Water is pumped out of the well, causing the aquifer to draw down. When this occurs water from adjacent aquifers flows toward the well to refill it.

There are two kinds of aquifers—confined and unconfined. In a **confined aquifer**, groundwater is under pressure because there is typically a layer of impermeable or nearly impermeable rock above it to confine the groundwater. When a well is drilled into the aquifer, pressure forces the water up the borehole. These are called artesian wells, and some artesian wells receive so much pressure that they flow without being pumped. **Unconfined**



Water being withdrawn from Marvin Creek in Hamlin Township, McKean County

aquifers contain a water table or do not have a layer of low permeability above to restrict flow through the aquifer. Wells established in unconfined aquifers must be pumped (Fleeger, 1999; Reese, personal communication, 2009).

Source Water

Source water is simply water that is obtained from a location by a water provider prior to treatment. Among the 15 water authorities providing water service to the region, the majority obtain their water by pumping groundwater to the surface. Bradford Water Authority is the only supplier that utilizes surface water and needed a Source Water Protection Assessment. The Source Water Protection Assessment was conducted in 2003 and identifies potential threats to the raw water supply.

Pennsylvania State Water Plan

In 2008, an updated draft of the Pennsylvania State Water Plan was unveiled, providing a vision to sustain water supply with goals and recommendations. The plan includes an inventory of water availability, an assessment of current and future water use demands and trends, and an assessment of resource management alternatives and proposed methods of implementation. It also provides an analysis of problems and needs associated with specific water resource uses, such as navigation, stormwater management, and flood control (PA DEP, 2008c).

In the updated Pennsylvania State Water Plan, information is broken down into six watershed regions—Ohio River, Great Lakes, Potomac River, Delaware River, upper/middle and lower Susquehanna River. The Allegheny River is located within the Ohio region, which is subdivided into smaller regions; the headwater region is located within the upper Allegheny River region.

Water Use

In 2000, it was estimated that Pennsylvania withdrew 9,950 million gallons of water per day. Of the water withdrawn, 93 percent came from surface water. Table 3-2 shows water withdrawal trends in Pennsylvania from 1990 to 2000 (Hutson, et al., 2004).

Table 3-2. Water Use											
	Gr	oundwat	ter			Surface				Total	
Year	Fresh	Saline	Total		Fresh	Saline	Total	_	Fresh	Saline	Total
1990	1,020	0	1,020		8,810	0	8,810		9,830	0	9,830
1995	860	0	860		8,820	0	8,820		9,680	0	9,680
2000	666	0	666		9,290	0	9,290		9,950	0	9,950

All values are in millions of gallons per day

(Sources: Solley, Pierce, & Perlman, 1993 & 1998; Hutson, et al., 2004)

It was estimated that the largest water withdrawals in the U.S. in 2000 were used for thermoelectric power—48 percent—and irrigation—34 percent. Public water supply utilized 11 percent, while the remaining seven percent was utilized for industrial, mining, livestock, and aquaculture purposes (Hutson, et al., 2004).

The majority of the water withdrawn from the Ohio River region, Pennsylvania, and the U.S. was utilized for thermoelectric production. The majority of water withdrawn within the upper Allegheny River region—46 percent—was used to supply water. Another major difference in water use was for agricultural purposes. The upper Allegheny River region utilized 25 percent of the water withdrawn for agricultural uses while the Ohio region, Pennsylvania, and U.S. agricultural withdrawals only accounted for one percent. Figure 3-11 illustrates the withdrawn water uses in the U.S., Ohio River region, and upper Allegheny River region (PA DEP, 2008c).



Figure 3-11. Water Use Comparison

CHAPTER 4. BIOLOGICAL RESOURCES

Natural Setting

Ecosystem and Biodiversity

A group of plants and animals—including humans—living and interacting together within a specific physical environment is an ecosystem. An ecosystem that is biologically diverse incorporates a wide variety of species and community interactions. The more biologically diverse a community is, the greater the likelihood of a healthier and high functioning ecosystem.

Each native species and wildlife community helps to maintain the ecosystem's integrity. Each species has a specific role to perform; whether a plant or animal provides food for wildlife or humans, pollinates, cleans water, decomposes, cycles nutrients, cleans air, or improves soils; they are fulfilling their individual role in maintaining the ecosystem's health and functionality. Losing just one species can have a profound effect on the entire ecosystem.

Ecoregion Characteristics

An ecoregion is a geographic locality containing a compilation of distinct natural communities that interact and thrive in a particular area in ways that sustain their collective existence over a period of time (World Wildlife Fund, 2010). As mentioned in the Land Resources chapter, the project area is located within two EPA designated subregions—Glaciated Allegheny High Plateau and the Unglaciated Allegheny High Plateau within the North Central Appalachians ecoregion. The majority of the project area is located within the Unglaciated Allegheny High Plateau, but both subregions are deeply dissected highlands composed of plateau remnants, rounded hills, low mountains, and narrow valleys. These ecoregions are discussed in more detail within the Land Resources chapter.

In addition to EPA-designated ecoregions, U.S. Forest Service (USFS) has delineated domains, divisions, provinces, and ecoregions. Through this classification, the Allegheny River Headwaters watershed is located within the Northern Unglaciated Allegheny Plateau and Northern Glaciated Allegheny Plateau ecoregions within the Laurentian Mixed Forest Province of the Warm Continental Division in the Humid Temperate Domain.

Natural Habitats

A habitat is a specific area where particular species of plants and animals naturally live or thrive. A variety of natural habitats occur within the headwaters of the Allegheny River, ranging from unique wetland plant to animal species, some of which cannot live elsewhere.

<u>Wetlands</u>

Wetlands are defined as areas having anaerobic or hydric soils, wetland vegetation, and evidence of the area being either permanently or seasonally inundated with water. They are functional, ecological components of a watershed. Many feeder streams originate from wetlands in headwater areas, which aid in groundwater recharge. Wetlands in riparian areas and on the margins of farmlands are vital in filtering excess nutrients, chemical pollutants, and sediment from water before it enters streams. Also wetlands harbor a multitude of plants and animals, making them biodiversity hot spots of the watershed. Several plant species grow exclusively in wetlands. Wetland vegetation plays an important role in filtering water, slowing its flow to allow sediments to drop out, and allowing groundwater to recharge. Wetland vegetation also provides a variety of food sources, cover, and nesting material for insects, birds, mammals, and other wildlife.

Within the Allegheny River headwaters region there are 18.15 square miles of wetlands, of which 94 percent are woody wetlands and the remaining six percent are herbaceous wetlands. Forested wetland areas provide critical habitat for species of waterfowl, turtles, and an assortment of other wildlife. They also play an important role in filtering water, controlling flood waters, groundwater recharge, and offering recreational potential. Forested wetlands are threatened by deforestation, hydrology alternation, draining, and the damming of associated streams.

Rivers and Streams

Many of the biological organisms that live in rivers and streams are indicators of water quality. These creatures are referred to as **bioindicators**. Freshwater mussels, aquatic macroinvertebrates, and lungless salamanders are all natural indicators of water quality and ecosystem health.

Characteristics of streams and rivers can vary greatly. Headwater streams are typically smaller and shallower than the larger order streams, which they flow into. With theses variations come an assortment of plants and animals that inhabit different sections of a waterway. Small, headwater streams are home to small fry (young fish) and aquatic macroinvertebrates. Small and fast flowing streams, especially those with an intact vegetative riparian buffer, tend to have cold water and host fish species, such as trout and dace. Streams that may be slightly warmer, but are still considered cool-water streams, are host to chubs, shiners, suckers, and other similar fish species. These fish serve as food for larger fish, birds, and mammals.

In larger, slower flossing streams and rivers, adult fish and larger organisms can be found. In pool areas along streams and in streams with little or no vegetative riparian buffer to shade and cool the water, warm-water fish species, such as bass, bluegill and sunfish, tend to thrive.

Forest Habitats

Forestlands provide habitat for plant and animal species, timber for fuel and wood products, income possibilities from other forest products for private forest owners, and recreational opportunities. Extensive woodlands cover northcentral Pennsylvania, including the Allegheny National Forest to the west and Susquehannock State Forest to the east of the project area. Hardwood species, such as oak and maple, are dominating, but hemlock, pitch pine, and white pine are also found here. The soils, climate, and ruggedness of the region provide the necessary habitat for forest species; therefore, the area is better suited for trees and forestland rather than opening the land for agricultural endeavors.

The natural vegetation was primarily northern hardwood species with sugar maple, yellow birch, beech and hemlock being intermixed with bogs and a perimeter of Appalachian oak forest. During the 19th century, extensive logging and burning removed the majority of the natural vegetation.

Presently the vegetation throughout the region is still dominated by northern hardwood forest and Appalachian oak forest. Eastern hemlock and American beech-hemlock forests are abundant on most sites. American beech-sugar maple forests that included red maple, sweet birch, black cherry, white ash, eastern white pine, yellow poplar, and cucumbertree are located within drained sites.

Forests also play an important role in the regulation of global climate change and air quality. Carbon dioxide, one of the most abundant greenhouse gases, is naturally present in the atmosphere. During photosynthesis, plants convert water and carbon dioxide from the atmosphere into sugar—for the plants' growth—and oxygen, which is released back into the air. The carbon removed from the atmosphere is stored in the plant's leaves, stems, branches, roots, and other components, a process called carbon sequestration. When leaves or trees are downed, the carbon is contributed to the soil matter. Carbon dioxide is also released back into the atmosphere through respiration and the decomposition of organic

matter. This natural exchange of carbon, along with other greenhouse gases, including those released from the burning of fossil fuels and gas combustion, contribute to the "greenhouse effect."

In the absence of greenhouse gases, the earth would be a cold planet, void of life. Yet, excess greenhouse gases contribute to global warming. Human activities, such as deforestation, poor agricultural practices, vehicle exhaust and the burning of fossil fuel, have greatly increased the contribution of carbon dioxide to the atmosphere. The preservation of forests, maintenance of vegetative riparian buffers, and sustainable forestry management practices aid in carbon storage within plants and soil materials, rather than contributing it to the atmosphere.

Sustainable forestry and the use of best management practices (BMPs) when utilizing forest resources will ensure the future health of forest ecosystems throughout the watershed. Service foresters are available to assist private and public landowners with technical advice on sustainable forest management. Certified foresters provide cost-share assistance, Forest Stewardship Plans, regional planning, education, and assistance with tree planting and riparian buffer restoration (Pennsylvania Department of Conservation and Natural Resources [PA DCNR], 2009).

By selectively planning a harvest with a certified forester, one can ensure the continual return for their investment. Trees can be harvested on a staggered schedule to provide recurring income. The best quality trees can be left to reseed the area. Nearby, competing trees of less value can be removed to allow remaining trees a greater allocation of resources and nutrients, ensuring a faster growth rate and high quality of wood. As tree leaves continue to fall to the ground each autumn, the soil is supplemented with organic matter and nutrients, which also contribute to better growth rates. Erosion and sedimentation are reduced by leaving some trees to stabilize the soil.

Maintaining a diversity of tree species is important to protect forests from the devastating effects of insect and disease outbreaks. Plantation-style monocultures—areas consisting primarily of one species—are particularly vulnerable to invasive pest species that attack one species or family of trees. The emerald ash borer, an invasive beetle which has devastating effects on ash tree populations, is one such insect. Invasive species will be further discussed later in this chapter.

Pruning and other maintenance activities will enhance the quality of timber in a forest lot. Selectively eliminating diseased and infested trees will improve the overall health of the forest. Wildlife should also be considered when harvesting a forested area. Brush piles made of cut limbs and saplings may provide cover for small game, birds, reptiles, and amphibians. Dead, standing trees, called snags, are utilized by cavity nesting birds and other wildlife for shelter. Insects that eat the decaying wood material provide food for many forest birds as well. While snags that are particularly large or hazardous should be downed to eliminate the safety risk, some snags should remain to provide habitat. Downed woody debris should also be left as habitat for creatures of the forest floor, such as amphibians, spiders, and insects.

Forestlands also offer products other than timber, which can be utilized for income by landowners. Herbs and mushrooms harvested in a sustainable manner may provide ample educational, recreational, and economic benefits. Botanicals and medicines may be derived from some forest species. Wreaths and other crafts can be made from limbs, vines, and other forest vegetation. Additional forest products include maple syrup, fence posts, wood fuel, fruits and nuts.

Successional Forest Habitat

Succession is the natural process of forest regeneration over time. Succession occurs after a forest habitat is disturbed by either a natural event, such as a tornado, or as a result of human actions, like logging. It can also occur as the edge of a forested area transitions gradually. For example, if an area once occupied by croplands lays fallow, eventually shrubs, small woody vegetation, tree seedlings and saplings

will grow. As time goes on, trees establish into a mature forest covering the land. The entire process may take an extensive period of time and can occur on varying scales, from areas encompassing several hundred acres to small areas created when an old tree falls in a forest and opens a gap in the canopy.

The period of succession referred to as the **early-successional** stage occurs when the land is primarily occupied by grasses, herbaceous vegetation, small shrubs, and tree saplings. During this critical phase, grasses, seeds, berries, and twigs provide abundant nutrition for forest animals, and shrubs and dense vegetation offer cover and safety for birds and small mammals. Early-successional habitats are preferred by a variety of wildlife species, such as rabbits, certain warbler species, and the American woodcock (Rodewald, 2004).

During the **middle-successional** stage of forest regeneration, otherwise known as the pole timber stage, trees grow and dominate the landscape. The understory is still relatively dense, harboring seedlings and some shrubby species that are more tolerant of shade. Salamanders and interior-forest birds prefer this type of transitional habitat (Pennsylvania Envirothon).

Once trees are established, the habitat is referred to as a **mature forest**. During this stage, trees that have been overtopped by competing, faster-growing, or longer-lived trees tend to die and form snags. These snags provide food, perches, and opportunities for cavity nesters, such as owls, woodpeckers, raccoons, and bats. Retaining downed wood on the forest floor also serves to provide habitat. In a mature forest, there is a greater abundance of mast-producing trees that offer acorns, nuts, and soft or fleshy fruits and seeds. Wild turkey, black bear, and pileated woodpeckers prefer mature forest habitats (Pennsylvania Envirothon).

Landowners and forest land managers should promote differing stages of successional forest habitats for wildlife species. Also, when timbering an area, foresters should stagger and soften the edges of cuts by leaving some older trees and shrubs on the perimeter, cutting in a meandering fashion to avoid abrupt transitions between habitats, which can lead to increased predation.

Urban and Backyard Natural Areas

Not only are rural forest blocks important for the sustainability of healthy ecosystems and water quality, but urban forestry also is an important aspect of watershed conservation. Trees planted in urban settings and along roadways perform a number of functions, ultimately improving the livability and attractiveness of communities. Trees in urban settings help to regulate heat radiation and ambient air temperature by shading sidewalks, parking lots, and roads. They can control erosion and help manage stormwater. Trees can also be utilized to reduce energy costs and improve property values. Trees in urban settings also improve the air quality of the city, boost a community's sense of pride, and enhance business and economic development.

Shinglehouse Borough and Smethport Borough participate in Tree City, USA—an Arbor Day Foundation program that is co-sponsored by U.S. Department of Agriculture (USDA) Forest Service and the National Association of State Foresters. The program provides direction, technical assistance, public attention, and national recognition for urban and community forestry programs. Four standards were established to ensure that every qualifying community would have a viable tree management program. The qualifications include having a tree board or department, a tree care ordinance, community forestry program with an annual budget of at least two dollars per capita, and an Arbor Day observance and proclamation. Other municipalities should consider becoming Tree Cities; and the University of Pittsburgh in Bradford should consider becoming a Tree Campus, USA.

Becoming a Tree City or Tree Campus (Arbor Day Foundation):

• Encourages better care of community forests

- Touches the lives of people within the community who benefit daily from cleaner air, shadier streets, and aesthetic beauty that healthy, well-managed urban forests provide
- Recognizes and rewards communities for annual advancements in urban forestry practices
- Increases public awareness of the many social, economical and environmental benefits of urban forestry practices
- Provides education to improve current urban forestry practices
- Builds cooperation between public and private sectors to effectively manage urban forests
- Encourages, supports, and strengthens effective urban forestry programs in diverse communities nationwide
- Can make a strong contribution to a community's pride
- Serves as a blueprint for planting and maintaining a community's trees
- Puts people in touch with other communities and resources that can help them improve their program
- Brings solid benefits to a community, such as helping to gain financial support for tree projects and contributing to safe and healthier urban forests
- Helps present the kind of image that most citizens want to have for the place they live or conduct business
- Tells visitors, through signage, "here is a community that cares about its environment"
- Sometimes gives preference over other communities when allocations of grant money are made for trees or forestry programs
- Provides a way to reach a large number of people with information about tree care

Pennsylvania Community Forests and PA DCNR Bureau of Forestry are able to assist municipalities and commissions in organizing and implementing urban and community forestry management programs. Natural Resources Conservation Services (NRCS) offers the Environmental Quality Incentive Program (EQIP) to private forest owners in Pennsylvania and New York. The New York State Urban and Community Forestry Council promotes comprehensive planning and urban forestry (PA DCNR, 2009; NY DEC⁴).

Developing or maintaining woodlot natural habitats in backyards attracts a variety of wildlife, such as songbirds, butterflies, and toads, which may help reduce stress and anxiety. These species also help rid yards of harmful pests, which may reduce or eliminate the need for chemical pesticides.

Backyard natural areas offer opportunities for families to bond and learn about ecosystems together. Natural areas encourage outdoor recreation, which can help combat the obesity epidemic. Even small backyard habitats or nearby woodlots offer opportunities for the exploration of nature close to home.

Private property owners are encouraged to consider natural landscaping with native wildflowers, trees, and shrubs versus mowing their entire lawn, particularly in areas adjacent to water sources. Native plant species that are adapted to the local weather conditions are best for landscaping, as they require minimal watering and maintenance. Native plant species are often preferred by native wildlife for food and cover, as well. Reducing the amount of mowed lawn on a property will save time, money—in maintenance costs for gasoline powered equipment—and energy used for powering the electrical equipment, thereby reducing air pollution.

Grasslands Habitat

Native wildflowers, grasses, forbs, and prairie-type habitats can be used to beautify property, enhance ecological interactions, and reduce lawn maintenance. Native grassland habitats, small or large, provide food, cover, and nesting material for a diversity of wildlife. Many native species attracted to

grasslands offer natural pest control and pollination services. This reduces pesticide costs, and is also more environmentally friendly than using harsh chemical pesticides.

NRCS suggests planting drought tolerant warm-season grasses suitable to the region, such as big bluestem, little bluestem, buffalo grass, and beardgrass. These adapted grasses provide shelter and nutrition for wildlife, help improve soils, and require little upkeep. When maintaining a warm-season grassland, it is important to schedule hay harvest around the nesting season of ground-nesting birds, generally before May 1st and after August 15th, which will allow enough time for grass regrowth to provide cover throughout the winter months (NRCS, 2006). Snake mortality associated with mowing is another aspect to consider, especially with species of concern. If possible, mowing should take place in the colder months of December through March, when snakes and other reptiles and amphibians are overwintering. Another harvest practice that may reduce wildlife mortality is to begin mowing in the center of the field, working you way out. This will give animals the opportunity to take cover elsewhere.

Wildlife

As critical components of an ecosystem, the diversity of wildlife and their habitats needs to be preserved. Wildlife depends on the availability of food in all seasons, clean water, cover to protect them from predators and the elements, and space in which to forage, raise young, and expand their territory. Both year-round residents and migratory species rely on the resources within the Allegheny River headwaters region. Conserving natural areas, improving soil and water quality, and restoring degraded habitats will benefit wildlife populations.

Wildlife and fisheries diversity benefits recreation potential, which in turn improves the local economy and quality of life of watershed residents. According to *Pennsylvania's Recreation Plan* (PA DCNR, 2009), walking, wildlife watching, fishing, and birding were among the top 10 favorite recreational activities among Pennsylvanians. These activities are enhanced by the presence of biodiversity, high quality habitats, and clean air and water. Therefore, these activities inherently include the preservation and conservation of wildlife, fisheries, and their associated habitats.

Native wildlife species are typically classified into two categories—generalist and habitat species. The classifications are based upon the habitat needed for each species to thrive.

Generalist species are those that possess the ability to ensure their survival in a wide range of habitat types and are well represented throughout Pennsylvania. Species, such as the northern short-tailed shrew, white-footed mouse, striped skunks, Virginia opossum, coyote, eastern chipmunk and other rodent, shrew and mole species, are generalist species. Another generalist species, the raccoon, is increasing in population due to its ability to adapt to human settings surrounding suburban development.

Habitat specialist species have fairly restrictive habitat needs and may be limited to specific habitats, such as grasslands, the forest interior, upper elevation ridgelines, wetlands, streams, caves or mines, during a portion of their life cycle. The meadow vole, fisher, Allegheny woodrat, muskrat, beaver, and most bat species are examples of habitat specialist species located within the project area.

A sampling of some of the wildlife within the headwaters of the Allegheny River is highlighted in this section.

Mammals

Mammal diversity is typically associated with large, intact tracks of forest, which are common in the rugged landscape of the Allegheny River headwaters. Predominant mammal species of the region include

the whitetail deer, black bear, bobcat, beaver, red fox, gray fox, raccoon, striped skunk, coyote, gray squirrel, mink, muskrat, and river otter (McNab & Avers, 1994).

Whitetail Deer Management

Proper management of whitetail deer populations may help to keep the negative impacts associated with this species to a minimum. In areas that are overpopulated with deer, forest regeneration may be hindered, crops may be damaged, and resources may be scarce for other wildlife. Habitat destruction by overabundant deer populations has had a serious impact on songbird populations, especially woodland warblers. Many of the bird species affected are in decline. In addition, overabundant deer populations pose a significant risk to the safety of motorists and damage to vehicles when roadway collisions occur. Whitetail deer management at the state level is regulated in Pennsylvania through hunting permits allocated by the Pennsylvania Game Commission (PGC), and in New York through hunting permits issued by the New York State Department of Environmental Conservation (NY DEC).

Public land managers experiencing high density deer populations should incorporate considerations into land and habitat management techniques. Food plots may be established to improve herd health and decrease the animals' dependency on natural areas. Public and private landowners may enroll in a program through PGC or NY DEC called the Deer Management Assistance Program (DMAP), which provides additional permits to hunt antlerless deer on registered properties to help reduce deer populations (PA DCNR¹; NY DEC²).

<u>Beaver</u>

Beavers are North America's largest rodent and the state animal of New York. Once trapped to extirpation throughout the region for their prized furs, reintroductions to the area occurred in the early 1900s. Those parent populations reproduced and expanded their territory, which now includes the headwaters of the Allegheny River.

These small mammals are capable of extraordinary feats, like downing trees several feet in diameter, though they more commonly use smaller trees and saplings for food and the construction of their lodges and dams. By damming small streams, beavers create wetlands, thus providing habitat for a variety of other species. Sometimes their incessant behavior of damming to hush the sound of running water may lead to problems, especially when they clog drainage pipes used to regulate water levels in reservoirs and

lakes or impact roadways. Beaver-proof cages can be constructed around drainage pipes to deter this behavior.

Reptiles and Amphibians

While amphibian and reptile populations are most diverse in warmer climates, the wetlands habitats within the Allegheny River headwaters region attribute to a high level of herpetological diversity, despite harsher winters, during which these cold-blooded animals hibernate in order to survive. Amphibians depend on moisture to stay alive, while some reptiles are able to tolerate dryer conditions.



Beaver lodge

Amphibian and reptile species within the region include

the red-backed salamander, spotted salamander, marbled salamander, northern dusky salamander, redspotted newt, mudpuppy, northern green frog, northern leopard frog, timber rattlesnake, eastern smooth green snake, wood turtle, and northern coal skink (McNab & Avers, 1994). Many amphibians can be studied as indicators of water quality. Additionally, many terrestrial salamanders depend on the vernal pools present in forestlands to lay eggs and reproduce. Reptiles, especially snakes, keep pest populations under control by consuming a variety of insects, mice, and voles.

<u>Timber Rattlesnake</u>

This venomous pit viper has developed a bad reputation without much just cause. The secretive and docile timber rattlesnake, although quite poisonous, does not readily attack humans and is a rather important species of the forest, especially for pest control. Timber rattlesnakes will hide, move away, or warn humans with their signature rattle to avoid confrontation. They will only strike if surprised, cornered, or touched. Maintaining a buffer of three feet around even the largest adults should prevent any bites from occurring (PSU, 2003).

Timber rattlesnakes can be found in both black and yellow color phases throughout the Pennsylvania and New York portions of the watershed. They have a large, flat, triangular head; it is shaped in such a way due to the facial heat-sensing pits used for detecting prey. Rare specimens may grow up to 70 inches, while the average snake is between 35 and 50 inches in length. They have a rattle at the end of their tail that is used to warn intruders before defending themselves. Segments are added to the rattle each time the snake sheds its skin, once or twice a year. However, the rattle is fragile and often breaks. Therefore, counting a snake's rattle segments is not an accurate measure of age (PA DCNR³).

In both New York and Pennsylvania, timber rattlesnake populations are declining. They are threatened within New York State and are a candidate species in Pennsylvania. Their decline is due mostly to habitat loss and fragmentation, but their negative reputation with humans has also affected their



A timber rattlesnake (Source PNHP)

them, simply because they feel that the snake poses a threat. However, timber rattlesnakes are very beneficial species, and their populations within the region and throughout their range are necessary in maintaining healthy ecosystems. If a timber rattlesnake becomes a nuisance or is taking up temporary residence near buildings or homes, contact a local conservation officer to have the snake removed (PA Fish and Boat Commission [PFBC], 2004).

numbers. Snakes are often killed by those who encounter

<u>Birds</u>

Birds vary from small, pollinator hummingbirds to forest dwelling warblers and robins. Larger birds of prey, such as eagles, hawks, and owls, hunt small rodents and fish. Birds provide hours of enjoyment for birdwatchers, they control insect and rodent pests, and pollinate wildflowers and trees.

Some birds common to the project area are wild turkey, ruffed grouse, woodcock, wood duck cerulean warbler, mourning warblers, black-throated green warbler, saw-wheat owl, great horned owl, barred owl, screech owl, red-tailed hawk, red-shouldered hawk, broad-winged hawk, Cooper's hawk, northern goshawk, pileated woodpecker, yellow-bellied sapsucker, and American bald eagle. Wood duck populations, once nearly extirpated, made a recovery in the 20th century, and are once again fairly common (McNab & Avers, 1994).

Bald Eagle

Bald eagle populations were once ravaged by the secondary effects of excessive hunting and pesticide pollution; but bald eagles are now on the rebound. In the 1980s, only three breeding pairs remained in Pennsylvania; while as early as 1960, only one pair remained in New York. Reintroductions of juveniles in both Pennsylvania and New York and protection through the Endangered Species Act led to a steady increase in populations. As a result, the bald eagle's status was downgraded from endangered

to threatened in Pennsylvania, New York, and on the federal level. PGC and NY DEC manage this important bird species in their respective states.

As a symbol of our nation, this regal creature is a top predator on its food chain. It is one of the largest birds of prey, weighing up to 17 pounds, with a wingspan of seven feet. Bald eagles primarily feed upon fish, other birds, and small mammals, but they have often been observed stealing prey from other birds.

The greatest threat to the continued recovery of bald eagle populations is human disturbance. Overuse of recreational waters, which bald eagles heavily rely on for food sources, hinders their ability to thrive. In addition, too much human disturbance may lead to nest abandonment and decreased reproductive success (PGC, 2009b).

Northern Goshawk

The goshawk is a ferocious, yet secretive bird that requires large tracts of forest for nesting, unlike most hawk species. As expanses of mature, old-growth forests decline, so do goshawks. They are listed as a species of concern in New York, and are considered imperiled in Pennsylvania. Goshawks build numerous large nests within their territory, but they only use and defend one nest each year, if any. The unused sites provide essential nesting opportunities for birds that do not build their own nests, such as spotted owls and great gray owls, as well as Cooper's hawks, red-tailed hawks, and great-horned owls, among other species. Conserving large tracts of mature forests within the watershed will help ensure the survival of this great bird and many other forest species within the region (Center for Biological Diversity).

Fish and Aquatic Invertebrates

Within Pennsylvania waterways, the Aquatic Community Classification system recognizes patterns in aquatic biodiversity and systematically identifies stream communities and habitat types for freshwater mussels, macroinvertebrates, and fish. **Communities** are groups of organisms that occur together in a particular habitat that require similar habitat features and may or may not directly depend on each other for survival. The community types provide a general account of what organisms are likely to occur, not every organism within the designated community will exist. The aquatic communities for each type of organism can be used to describe the aquatic resources, habitat, type, and stream quality. Appendix L identifies the macroinvertebrate, freshwater mussel, and fish communities within the project area.

Macroinvertebrate Communities

Three macroinvertebrate communities have been identified within the Allegheny River headwaters region—High Quality Small Stream, High Quality Large Stream, and Common Large Stream.

High Quality Small Stream Macroinvertebrate Community is found in smaller streams that flow through high elevations with heavily forested catchments with little urbanization. Agricultural development is sparse, water temperatures are typically cool, and water chemistry values reflect little impairment. This community contains a rich assemblage of organisms including a large number of species that are sensitive to pollution. Most common community members, such as iron dun mayfly, riffle beetle, stripetail stonefly, salmonfly, stonefly, and free-living caddisfly, indicate the presence of quality riffle habitat (Walsh, Deeds, & Nightingale, 2007).

This community faces fewer threats than communities in valley streams or those in urbanized areas. Threatening the quality of the High Quality Small Stream Macroinvertebrate Community are unhealthy levels of sediment and nutrients in area waterways via non-point source runoff from poorly maintained and poorly buffered agricultural lands. However, installation of vegetated riparian buffers along pastures,

crop fields, and unpaved roadways will reduce the amount of sediments and contaminants introduced to the streams (Walsh, Deeds, & Nightingale, 2007).

High Quality Large Stream Macroinvertebrate Community represents high-quality mid-reached streams found in higher elevations with moderate gradients (Walsh, Deeds, & Nightingale, 2007). This community type is typically located in high quality habitats and in highly forested catchments, while urbanized development and agricultural operations are typically minimal. Water temperatures are cool, and water chemistry values suggest some disturbances exist in the watershed, but do not indicate elevated pollution levels.

Blue-winged olive dun mayfly, acentrellan mayfly, dark leadwinged olive mayfly, ephemerellid mayfly, pale evening dun mayfly, fingernet caddisfly, netspinner caddisfly, and small minnow mayfly are typical species found within this community. This community contains a biologically diverse assemblage of organisms, of which many are intolerant of organic pollution (Walsh, Deeds, & Nightingale, 2007).

Threats to the High Quality Large Stream Macroinvertebrate Community increase as streams reach valleys and urbanized areas. Pollution, habitat alteration, acidic precipitation, and increased levels of sediment and nutrients from poorly managed buffers and agricultural areas can affect this community. Streambank fencing and vegetated riparian buffer plantings can mitigate sedimentation and agricultural runoff. Retention and treatment of any municipal discharges can help improve water quality and habitat conditions (Walsh, Deeds, & Nightingale, 2007).

The **Common Large Stream Community** occurs in medium sized to large streams that maintain fairly good water quality. These streams typically occur in high elevations with high gradients and high quality in-stream habitats. Sections of stream within this community are often affected by disturbances, such as non-point source pollution, that can cause excess sedimentation and could decrease water quality.

This community contains a diverse assemblage of organisms that has a relatively high richness. Nemourid broadback stonefly, ameletid mayfly, taeniopterygid broadback stonefly are indicator species for this community (Walsh, Deeds, & Nightingale, 2007).

Threats to this community come from agricultural operations, municipal point source pollution, and urban stormwater effluents. Agricultural runoff and animal feed lots increase sedimentation; however, implementing vegetative streambank buffers and livestock crossings can reduce sedimentation and improve conditions. Mitigating stream discharges, such as stormwater runoff and point source sewage effluents, through treatment and upgraded systems reduces pollution impacts on the streams habitat (Walsh, Deeds, & Nightingale, 2007).

Mussel Communities

The **Spike Mussel Community** inhabits medium sized streams to large rivers that contain sand and gravel substrate within riffle areas of fast moving and low gradient waterways. It is commonly found in the larger tributaries to the Allegheny River, such as Potato Creek. Species that typify this community include spike mussel and black sandshell. Other mussels, such as mucket, fatmucket, fluted-shell, and pocket-book are also commonly found within this community, but are common in other communities, as well (Walsh, Deeds, & Nightingale, 2007).

Habitats that support this community are often located in areas that have substantial agricultural operations that likely impact the water quality. Managing agricultural runoff through the installation of vegetative riparian buffers and riparian fencing should improve conditions. Strategies for retention of stormwater and encouraging groundwater recharge could be applied where impervious surfaces create runoff. Implementing additional proactive approaches to reducing sediment and nutrient loading that is

caused by agriculture operations, such as the management of livestock, crops, and soils can minimize degradation (Walsh, Deeds, & Nightingale, 2007).

Fish Communities

Three fish communities have been identified within the Allegheny River headwaters region—coldwater, coolwater, and warmwater.

Coldwater Fish Community occurs in small, swift headwater streams that contain cold water temperatures. Undisturbed forested landscapes often surround coldwater community streams. The forested buffers preserve the cold and well-oxygenated high quality waterways. Natural cover, such as logs, woody debris, and loose gravel, are abundant to support spawning and healthy fish populations. Brook trout, mottled sculpin, brown trout, and rainbow trout are prevalent species within this classification. Streams in these watersheds may have wild-reproducing populations of brook and/or brown trout.

Streams within this community can be threatened by acid deposition, agricultural runoff, and increased sedimentation from suburban development and road runoff. Riparian buffers, rotational grazing, and other erosion control practices can minimize agricultural impacts, but runoff from roadways and suburban development need to be addressed, especially while new home and commercial development is occurring.

Coolwater Fish Community typically occurs in small to medium sized waterways that are fairly fast flowing and have intermediate temperatures often designated as Cold Water Fisheries (CWF) by PA DEP. Coolwater habitats are valley streams with cobble and gravel substrates with available cover for fish species. Blacknose dace, creek chub, stocked brown trout, white sucker, redside dace, longnose dace, fathead minnow, pearl dace, and slimy sculpin are typical species found within this community; although fish tolerant of cool and warm temperatures are also present. This community often represents a transition between coldwater and warmwater communities.

Often located in waterways with low to moderate water quality, coolwater fish communities face a variety of pollution sources that impact conditions—agricultural operations, urban runoff, wastewater outfalls, and a lack of vegetative riparian buffers. Restoration of stream temperature, habitat, and water quality are needed. Managing stormwater runoff, restoring vegetative riparian buffers, and reducing erosion and sedimentation would improve conditions.

Warmwater Fish Community is found in larger streams that are characterized by a diverse fish community. Species, such as greenside darter, central stoneroller, rainbow darter, johnny darter, fantail darter, logperch, stonecat, silver shiner, golden redhorse, mimic shiner, pumpkinseed, yellow bullhead, largemouth bass, green sunfish, tonguetied minnow, and Ohio lamprey, are typically found within this community. Warm water temperatures are common, and there are more thermal tolerant fish species in this community group than coldwater or coolwater communities. Streams within this community represent small to medium-sized warmwater systems with little silt and turbidity. Impaired waterways within this community have poor water quality, increased turbidity and low dissolved oxygen levels.

Non-point source pollution from agricultural runoff, impervious surfaces, and poorly managed agricultural areas are threats within warmwater communities. Supporting streams may be impaired by siltation, low dissolved oxygen, organic enrichment and hydro modifications from agricultural operations. Point sources, such as sewage treatment plants, may damage stream habitats increasing the nutrient load. Warmwater streams typically occur in valleys downstream from human influences and are subject to pollution. Stormwater management, riparian buffer restoration, erosion control, and streambank fencing are needed to improve conditions.

Large River Community is found in larger streams, such as the Allegheny River, that are located in moderate elevations with relatively low gradients. Water temperatures are the warmest of all the fish communities. A variety of habitats exist within this community including shallow shorelines, deep channels, and slow or non-flowing impoundments. Species, such as channel catfish, sauger, common carp, gizzard shad, freshwater drum, walleye, white bass, shorthead redhorse, spotted bass, silver redhorse, quillback carpsucker, emerald shiner, flatheaed catfish, black crappie, smallmouth buffalo, river redhorse, and mooneye, are indicator species for this community.

Conditions within this community are improving, although detriments to habitat conditions remain. Non-point source pollution contributes excess nutrients, sediment, and pesticides into the waterways from agricultural sources. Stormwater runoff and municipal point source discharges are concentrated within urbanized areas. Reducing point source pollution and stormwater runoff would improve water and habitat quality. Sand and gravel dredging also threaten habitat within the large river community. Dams within the community interrupt and alter flows and restrict movement of fish, segregating populations.

Species of Concern

Plants and animals are ranked on state and global scales based on the number of times the species has been documented in a geographic area. Most species have a rank assigned to them, even if they are not threatened or endangered. In Pennsylvania, a species is commonly considered to be of concern if it has a ranking of vulnerable or lower. Global ranks are assigned based on data collected at similar state offices worldwide as a part of a network called NatureServe.

The Endangered Species Act of 1973 (and its amendments) provides broad protection for aquatic and terrestrial species of wildlife and plants that are listed as threatened or endangered in the U.S. or elsewhere. An **endangered species** is one 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. A **candidate species** is one that is proposed by a state or federal agency for listing as threatened or endangered at the state or local level.

In Pennsylvania, threatened or endangered status is determined by the appropriate state agency. For instance, PGC is responsible for assigning state statuses to bird and mammal species, while PFBC is responsible for fish, amphibians, and reptiles. Since there is no state agency that oversees invertebrates, such as moths and butterflies, these species can only receive threatened or endangered status if they are federally listed. Therefore, there may be some species that technically meet the state threatened or endangered requirements, but have not officially been given this designation. These species are typically monitored by Pennsylvania Natural Heritage Program (PNHP).

Provisions are made for listing species, as well as for the development of recovery plans and the designation of critical habitat for listed species. As part of both federal and state acts, an environmental assessment of properties for species of concern is required before development projects can be permitted. However, rather than stopping development altogether, changes in design or timing of construction can often be made to protect the habitat for these resources.

Within the Allegheny River headwaters, 32 invertebrates, 25 vertebrates, and 23 plant species have been identified as species of concern. In addition, four natural communities and one geological feature have been listed among the species of concern as important natural features and habitats of conservation significance. To protect these important species and landowners, the location of individual species cannot

be provided. Appendix M lists state and global rankings for species of concern identified within the project area.

Conservation Areas

Natural Heritage Inventories

County Natural Heritage Inventories (CNHIs) identify and map areas that sustain species of concern, exemplary natural communities, and broad expanses of intact natural ecosystems that support important components of Pennsylvania's native species biodiversity. Through the completion of a CNHI, conservation areas (also known as biological diversity areas) and landscape conservation areas are identified.

Landscape Conservation Area

A Landscape Conservation Area (LCA) is a large contiguous area that is important because of its size, open space, habitats, and/or inclusion of one or more conservation areas. They include large forest blocks of contiguous forest, extensive wetland complexes, and/or areas linking rare element occurrences, such as those recognized in Biological Diversity Areas. There are four LCAs located within the project area.

Allegheny Wetland Complex LCA is a highly significant landscape that contains a 6,132-acre wetland complex along the Allegheny River between Turtlepoint and the New York border; it also includes the wetlands along Potato Creek, from Farmers Valley to its confluence with the Allegheny River. Wetland complexes, such as this one, are rare in the Unglaciated Allegheny Plateau; and this one may very well be the largest wetland complex in the physiographical region.

Draining, dredging, stream channelization, ditching, ground water withdrawal, stream diversion, deposition of fill materials, and impoundments can lead to significant alterations to the hydrologic regime that could result in changes in water temperature and chemistry, soil chemistry, nutrient cycling, and increased sedimentation. Sedimentation reduces wetland water storage capacities, smothers vegetation, reduces light penetration and oxygen content, and affects the entire ecosystem richness, diversity, and productivity. Toxic substances adhere to sediment and may accumulate in impoundments as a result of decreased water circulation and bioaccumulation of contaminants in wetland biota may occur.

Lookout Mountain LCA is a 13,667-acre forestland located between the Allegheny River and Allegheny Portage Creek in McKean and Potter counties in Pennsylvania that has a notable significance. Approximately 29 percent of the LCA is located within Susquehannock State Forest; and therefore, is publicly owned. Development, road building, large scale timber harvesting, extension of utility right-ofways, and wind farms impact or could impact the contiguous forest that make this LCA ecologically significant. Fragmented landscapes within the LCA, such as ATV trails and state highways, receive a varied effect depending on the composition of wildlife and plants located at the site and their threshold for disturbance. In order to reduce impacts, utilize previously disturbed areas for new projects, consolidate roads and right-of-ways where multiple routes exists, and restore unused cleared areas, such as abandoned roads or railroad tracks, to forestland.

Potato Creek LCA is an exceptionally significant landscape within Foster, Keating, Liberty, Norwich, Otto, and Sergeant townships in McKean County. This area contains a section of the Potato Creek watershed and its supporting riparian corridor that encompasses a number of smaller-scale aquatic conservation areas. **Upper Allegheny River LCA** is an exceptionally significant landscape within sections of Allegheny Portage Creek and the Allegheny River and their tributaries, including riparian corridors that encompass a number of smaller-scale aquatic conservation areas.

Biological Diversity Areas

Biological Diversity Areas (BDAs) or Conservation Areas (CAs) are natural areas identified in CNHIs that support species or natural communities of concern, high-quality natural communities or ecosystems, or exceptional natural diversity. The core of these areas is typically small and is surrounded by a larger area of supporting habitat. Table 4-1 identifies the CAs within the Allegheny River headwaters region.

Table 4-1. Conservation Areas

ALLEGHENY RIVER AT REED RUN BIOLOGICAL DIVERSITY AREA

Description:	Cores of the Biological Diversity Area are delineated around a section of the Allegheny
	River that provides habitat for the American brook lamprey and two animal species of
	concern not identified at the jurisdictional agency's request. The area also contains a
	hemlock palustrine forest community that is dominated by eastern hemlock. Speckled alder
	and black holly are dominant shrub species, where the canopy is open. The forest floor
	contains pits holding standing water and is dominated by sphagnum moss. The brown water
	stream flowing from the wetlands are high in tannic acid and naturally low in pH with the
	potential of supporting unique aquatic fauna, particularly insects.
Significance:	Exceptional
Location:	Eulalia and Roulette townships, Potter County
Rare Occurrences:	American brook lamprey, species of concern not identified at request of jurisdictional
	agency, palustrine hemlock forest
Threats:	1. Hemlock woolly adelgid poses potential threats to hemlock trees, resulting in high levels
	of hemlock mortality, which opens the forest canopy, illuminating the forest floor to full
	sunlight. In addition, loss of the adjacent hemlocks could impact the hydrologic regime of
	the watershed.
	2. Maintaining suitable aquatic habitats is key to continued success of these species of
	concern.
	3. Runoff from dirt and gravel roads in close proximity to rivers can contribute to physical
	degradation of river channel, erosion, and sediment pollutants in the river.
	4. Canopy removal, whether biological or human influenced, may increase temperatures
	within the wetland, potentially altering its habitat quality and species composition.
	Increased temperatures could negatively affect populations of snowberry that are more
	adapt to cooler, northern climates.
Recommendations:	1. Land management decisions should account for potential impacts, such as alterations to
	light, temperature, and hydrologic regimes.
	2. Periodic monitoring for invasive species, particularly the hemlock woolly adelgid.
	3. Periodic surveys or monitoring to document amphibian and insect species located within
	this wetland habitat.
	4. Timbering, road development, and other construction activities should avoid riparian
	buffers in order to avoid degrading important aquatic and riverside habitats.

Description:	A section of Allegheny River that encompasses habitat for six species of concern, of which					
	three are not identified at the request of the jurisdictional agencies.					
Significance:	Exceptional					
Location:	Annin Township, McKean County					
Rare Occurrences:	American brook lamprey, elktoe mussel, round pigtoe mussel, sensitive species 2, sensitive					
	species 3, sensitive species 5					
Threats:	1. Siltation within the riffle and run habitats.					
	2. Runoff from dirt and gravel roads in close proximity to streams can contribute physical					
	degradation of stream channels, erosion, and sediment pollution in the stream.					
	3. Loss of forest cover in riparian zones may increase water temperatures and distribution					
	of natural nutrient cycling linked to streams.					
	4. Removal of forest cover on steep slopes is especially problematic because of the					
	potential for increased runoff and erosion following storm events.					
Recommendations:	1. Timbering, road construction, oil and gas development, or other construction activities					
	should be kept well away from riparian corridors in order to avoid degrading important					
	aquatic and streamside habitat.					
	2. A high degree of forest cover should be maintained for additional protection of water					
	quality and ecological integrity.					
	3. Landowners engaged in timber harvesting should implement best management practices.					

ALLEGHENY RIVER AT TURTLEPOINT CONSERVATION AREA

INDIAN CROSSING SWAMP CONSERVATION AREA

Description:	Adjacent to the Lower Knapp Biological Diversity Areas, this area contains 71 acres and i			
	part of an extensive wetland complex that is fed by springs and seeps that drain to Knapp			
	Creek. A portion of the wetlands is a black ash-balsam fir swamp with scattered shrub and			
	graminoid-dominated openings and ponded water.			
Significance:	Exceptional			
Location:	Eldred Township, McKean County			
Rare Occurrences:	Black ash, downey willo-herb, stalked bulrush, Wilson's snipe, sensitive species #8			
Threats:	1. Hemlock woolly adelgid poses a potential threat to hemlock trees in the region.			
	2. Canopy removal in the vicinity of the wetland may increase temperatures in the wetland			
	potentially altering its habitat quality and species composition.			
	3. Over-browsing deer eliminate tree seedling, sapling, shrub layers, and greatly reduce			
	herbaceous species diversity in large areas.			
Recommendations:	1. Road development and timber harvesting should be avoided in the vicinity of the			
	wetland; however, if it cannot be avoided, implementation of best management practices is			
	recommended.			
	2. Periodic monitoring for invasive species, including the hemlock woolly adelgid.			
	3. Surveys of monitoring to document amphibian and insect species within the wetland			
	should be conducted.			

OSWAYO CREEK AT SHINGLEHOUSE BIOLOGICAL DIVERSITY AREA

Description:	The main channel of Oswayo Creek is approximately 50–65 feet wide and seven feet deep.					
	Along the edge, some places have exposed soils or gravel with little herbaceous cover due					
	to steep banks. Other areas are herb-dominated marshes, shrub thickets, and floodplain					
	forest. Within the area, the aquatic habitat supports two mussel species of concern (round					
	pigtoe and long-solid). They are known to inhabit medium to large rivers with sand and					
	gravel substrate.					
Significance:	Exceptional					
Location:	Sharon Township, Potter County					
Rare Occurrences:	round pigtoe, long-solid					
Threats:	1. Pollution that lowers dissolved oxygen and increases ammonia levels and siltation, as					
	well as dredging threaten native freshwater mussels.					
	2. Removal of forest cover on steep slopes may be problematic, increasing the potential for					
	runoff and erosion following storm events.					
	3. Runoff from dirt and gravel roads in close proximity to the stream can contribute to					
	physical degradation of the site.					
Recommendations:	1. Implement best management practices to minimize and prevent water pollution.					
	2. Support and engage in research of degraded surface and groundwater resources.					
	3. Preserve riparian corridors along waterways to maintain high water quality. Timbering,					
	road development, and other construction activities should be kept away from riparian					
	corridors to avoid degrading important aquatic and streamside habitat.					

	OSWAYO CREEK CONSERVATION AREA			
Description:	The main channel of Oswayo Creek is 50-65 feet wide and seven feet deep. In places along			
	the stream, the edge has some exposed soil or gravel with little herbaceous cover because			
	of the stream's steep banks. Other areas adjacent to the stream are herb-dominated marsh			
	shrub thickets, and floodplain forest. The stream provides habitat for round pigtoe mussel,			
	wavy-rayed lampmussel, elktoe mussel, and Ohio lamprey. It is a warm-water community,			
	characteristic in medium to large waterways found in relatively high elevations, with			
	intermediate alkalinity and conductivity values and slightly basic pH values. Warm water			
	temperatures are also characteristic in this community.			
Significance:	Exceptional			
Location:	Ceres Township, McKean County			
Rare Occurrences:	Elktoe mussel, Ohio lamprey, round pigtoe mussel, wavy-rayed lampmussel			
Threats:	1. Runoff from dirt and gravel roads in close proximity to streams can contribute physical			
	degradation of stream channels, erosion, and pollution in the stream.			
	2. Loss of forest cover in riparian zones may increase water temperatures and disruption of			
	natural nutrient cycling linked to streams.			
	3. Removal of forest cover on steep slopes is especially problematic because of the			
	potential for increased runoff and erosion following storm events.			
Recommendations:	1. Preserve forested stream corridors to maintain high water quality. Timbering, road			
	construction, oil and gas development, or other construction activities should be kept well			
	away from riparian corridors to avoid degrading important aquatic and streamside habitats.			
	2. A high degree of forest cover should be maintained for additional protection of water			
	quality and ecological integrity.			
	3. Implement agricultural best management practices that are suitable for reducing or			
	minimizing water quality impacts, as part of a watershed approach to management.			

Description:	This area provides habitat for the American brook lamprey, an aquatic animal species of
	concern that requires cool, clear water and inhibits large creeks and small to medium sized
	rivers.
Significance:	Exceptional
Location:	Clara, Hebron, and Sweden townships, Potter County
Rare Occurrences:	American brook lamprey, harpoon clubtail, northern bluet, Ohio lamprey, sable clubtail,
	stalked bulrush, and a species of concern not identified at the request of the jurisdictional
	agency.
Threats:	1. Runoff from dirt and gravel roadways in close proximity to waterways can contribute to
	degradation of stream channels and increase erosion and sedimentation pollution.
	2. The loss of forest cover could increase water temperatures and disrupt the natural
	nutrient cycling linked to the river. If substantially reduced, water quality is likely to
	decline, due to increased sediment load. The removal of forest cover along steep slopes
	would increase runoff and erosion following storm events.
Recommendations:	1. Preserve forested river and stream corridors to maintain high water quality.
	2. Timbering, road development, and other construction activities should avoid riparian
	buffers in order to avoid degrading important aquatic and riverside habitats.
	3. Forest cover should be maintained to protect water quality and ecological integrity of the
	aquatic ecosystem.
	4. Landowners conducting timbering activities should implement best management
	practices to minimize impacts.

OSWAYO CREEK BIOLOGICAL DIVERSITY AREA

POTATO CREEK CONSERVATIONAREA

Description:	Aquatic habitat within Potato Creek and several of its tributaries. Because the site is linked				
	by flowing water, each rare species within the site may well be a member of a single				
	population extending throughout the Potato Creek system.				
Significance:	Exceptional				
Location:	Keating and Norwich townships, McKean County				
Rare Occurrences:	American brook lamprey, Ohio lamprey, sensitive species #2, sensitive species #3				
Threats:	1. Runoff from dirt and gravel roads in close proximity to streams can contribute to				
	physical degradation of stream channels and erosion and pollution of/in streams.				
	2. Loss of forest cover within riparian zones may also result in increased water				
	temperatures and disruption of natural nutrient cycling linked to streams.				
	3. Removal of forest cover on steep slopes is especially problematic because of the				
	potential for increased runoff and erosion following storm events.				
Recommendations:	1. Preserve forested stream corridors to maintain high water quality.				
	2. Timbering, road construction, oil and gas development, or other construction activities				
	should be kept well away from riparian corridors in order to avoid degrading important				
	aquatic and streamside habitats.				
	3. A high degree of forest cover should be maintained for additional protection of the water				
	quality and ecological integrity of the aquatic ecosystem.				
	4. Landowners engaged in timbering operations should implement best management				
	practices.				

Description:	Encompasses a section of Potato Creek and two of its largest tributaries—Cole Creek and
	Marvin Creek.
Significance:	Exceptional
Location:	Keating and Norwich townships, McKean County
Rare Occurrences:	American brook lamprey, creek heelsplitter mussel, elktoe mussel, round pigtoe mussel, sensitive species 2, sensitive species 3, sensitive species 5
Threats:	1. Runoff from dirt and gravel roads in close proximity to streams can contribute to physical degradation of stream channels and erosion and pollution in streams.
	2. Loss of forest cover within riparian zones may also result in increased water temperatures and disruption of natural nutrient cycling linked to streams.
	3. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.
Recommendations:	1. Preserve forested stream corridors to maintain high water quality.
	2. Timbering, road construction, oil and gas development, or other construction activities should be kept well away from riparian corridors in order to avoid degrading important aquatic and streamside habitats.
	3. A high degree of forest cover should be maintained for additional protection of the water quality and ecological integrity of the aquatic ecosystem.
	4. Landowners engaged in timbering operations should implement best management practices.

POTATO CREEK-COLE CREEK CONSERVATION AREA

ALLEGHENY RIVER AT EULALIA BIOLOGICAL DIVERSITY AREA

Description:	The region possesses cool, clear water and inhabits large creeks and small to medium
	rivers. The American brook lamprey and other aquatic animal species of concern not
	identified at the jurisdictional agency's request.
Significance:	High
Location:	Eulalia Township, Potter County
Rare Occurrences:	American brook lamprey, species of concern not identified at the request of the jurisdictional agency
Threats:	1. Maintaining suitable aquatic habitats is key to continued success of these species of concern.
	2. Runoff from dirt and gravel roads in close proximity to rivers can contribute to physical degradation of river channel and erosion and sediment pollutants in the river.
	3. Loss of forest cover within core areas resulting in increased water temperatures and disruption of natural nutrient cycling. Water quality decline from increased sediment loads
	 Removal of forest cover on steep slopes due to increased potential for increased runoff and erosion following storm events.
Recommendations:	1. Preserve forested river corridors maintaining high water quality.
	2. Keep timbering road development and other construction activities away from riparian corridors in order to avoid degrading important aquatic and river ecosystems.
	3. Maintain a high degree of forest cover throughout the watershed to protect water quality and ecological integrity of aquatic ecosystems
	4. Minimize impacts from timber harvesting through the implementation of best management practices.
Description:	Aquatic habitat along the Allegheny River that supports a mussel, damselfly, and bufferfly
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	species.
Significance:	High
Location:	Eldred Township, McKean County
Rare Occurrences:	Blue-tipped dancer damselfly, Elktoe mussel, Long dash butterfly
Threats:	1. Runoff from dirt and gravel roads in close proximity to streams can contribute to
	physical degradation of stream channels, erosion, and pollution in the streams.
	2. Loss forest cover within riparian zones may result in increased water temperature and
	disruption of natural nutrient cycling linked to streams.
	3. Removal of forest cover on steep slopes is especially problematic because of the
	potential for increased runoff and erosion following storm events.
Recommendations:	1. Preserving forested stream corridors. Timbering, road construction, oil and gas
	development and other construction activities should be kept well away from riparian
	corridors in order to avoid degrading important aquatic and streamside habitat.
	2. A high degree of forest cover should be maintained for additional protection of the water
	quality and ecological integrity of the aquatic ecosystems.
	3. Landowners active in timbering operations should implement best management
	practices.

ALLEGHENY RIVER AT LARABEE CONSERVATION AREA

BROWN VALLEY CONSERVATION AREA

Description:	Encompasses a mixed hemlock-hardwood riparian forest along an unnamed tributary of
	Marilla Brook, supporting a breeding pair of Swainson's thrush (a neo-tropical migratory
	bird associated with deciduous forest).
Significance:	High
Location:	Bradford Township, McKean County
Rare Occurrences:	Swainson's thrush
Threats:	1. Hemlock woolly adelgid infestation resulting in high levels of mortality in hemlock trees
	and habitat for the Swainson's thrush and other species.
	2. Loss of canopy cover and shrub understory from timbering may negatively affect the
	thrush's habitat until dense regrowth appears.
Recommendations:	1. Preserve forest within riparian zones.
	2. Periodic monitoring for invasive species, including the hemlock woolly adelgid.
	3. Proposed treatments for insect outbreaks should consider impacts to aquatic and forest
	animals.
	4. Timbering within the core area should be restricted to non-breeding season of the
	Swainson's thrush. Only silviculture treatments that maintain at least a partial canopy and
	enhance structure in the understory should be utilized.

BULLIS MILLS CONSERVATION AREA

Description:	Forest, scrub-shrub, and graminoid-dominated marsh within a large wetland complex adjacent to the Allegheny River that provides habitat for Wilson's snipe and a species of
	concern not identified at the jurisdictional agency's request.
Significance:	High
Location:	Eldred Township, McKean County
Rare Occurrences:	Wilson's snipe, sensitive species #7

DOLLIS WILLS CONSERVATION AREA (conunaca)	
Threats:	1. Toxic chemical concentrations with lower trophic levels and accumulated toxins.
	2. Human intrusion, particularly during the breeding season and maturing of young.
Recommendations:	1. Human intrusions and disturbances should be avoided between January 1 and August 31
	within core and supporting habitats.
	2. Timber harvesting, road building, and other habitat-altering activities should not occur in
	the core habitat.

BULLIS MILLS CONSERVATION AREA (continued)

CORYVILLE RAILROAD GRADE CONSERVATION AREA

Description:	Located along a section of railroad right-of-way within the large wetland complex along the Allegheny River that provides habitat for stalked bulrush.
Significance:	High
Location:	Eldred and Keating townships, McKean County
Rare Occurrences:	Stalked bulrush
Threats:	No imminent threats.
Recommendations:	Any activities that might alter the hydrology, such as ditching or deposition of fill materials should be avoided.

DUTCHMAN HILL BIOLOGICAL DIVERSITY AREA

Description:	A rich, mesic forested slope that is occupied by the West Virginia white (butterfly species
	of concern within Pennsylvania). The forest community is a northern hardwood forest that
	is dominated by sugar maple and eastern hemlock.
Significance:	High
Location:	Eulalia Township, Potter County
Rare Occurrences:	West Virginia white
Threats:	1. Forest fragmentation due to the West Virginia white's reluctance to traverse large forest openings to colonize new areas.
	2. The invasive species garlic mustard causes direct mortality when caterpillars feed upon it.
	3. Gypsy moth spraying and deer over-browsing of host plants.
Recommendations:	1. Monitoring and removing garlic mustard in known West Virginia white habitats and in stands of toothwarts.
	2. Avoid or minimize gypsy moth spraying.
	3. Minimize activities on timbering operations in early spring months to maintain habitat
	when the West Virginia white host plants could be destroyed.
	4. Selective harvesting that maintains canopy cover conditions is preferable to other
	harvesting practices.

FISHING CREEK BIOLOGICAL DIVERSITY AREA

Description:	Fishing and East Branch Fishing creeks provide habitat for the American brook lamprey and an aquatic animal species of concern not identified at jurisdictional agency's request.
Significance:	High
Location:	Clara and Roulette townships, Potter County
Rare Occurrences:	American brook lamprey, species of concern not identified at jurisdictional agency's
	request.

FISHING CREEK BIOLOGICAL DIVERSITY AREA (continued)

Threats:	1. Runoff from dirt and gravel roads in close proximity to rivers can contribute to physical
	degradation of river channel, erosion, and sediment pollutants in the river.
	2. Canopy removal, whether biological or human influenced, may increase temperatures
	within the wetland, potentially altering its habitat quality and species composition.
	3. Removal of forest cover on steep slopes increases the potential for increased runoff and
	erosion following storm events.
Recommendations:	1. Preserve forested river and stream corridors to maintain high water quality.
	2. Timbering, road development, and other construction activities should avoid riparian
	buffers in order to avoid degrading important aquatic and riverside habitats.
	3. Landowners conducting timbering activities should implement best management
	practices to minimize impacts.

FRINKS BIOLOGICAL DIVERSITY AREA

Description:	A hemlock palustrine forest community that supports a small population of a Pennsylvania
_	rare plant species, creeping snowberry. Creeping snowberry grows in bogs and wet woods
	often on decaying logs in northern Pennsylvania. Eastern hemlock, yellow birch and
	eastern white pine dominate the forest canopy with some striped maple. The region also has
	a diverse population of herbs.
Significance:	High
Location:	Eulalia, Hebron, and Sweden townships, Potter County
Rare Occurrences:	creeping snowberry, palustrine hemlock forest
Threats:	1. Hemlock woolly adelgid poses potential threats to hemlock trees that result in high levels
	of hemlock mortality, which as a result, opens the forest canopy illuminating the forest
	floor to full sunlight. In addition, loss of the adjacent hemlocks could impact the hydrologic
	regime of the watershed.
	2. Canopy removal, whether biological or human influence may increase temperatures
	within the wetland potentially altering its habitat quality and species composition.
	Increased temperatures could negatively affect populations of snowberry that are more
	adapt to cooler, northern climates.
Recommendations:	1. Activities greater than foot traffic should be avoided due to sensitivity of the habitat.
	2. Forest canopy within a 1,350-foot buffer zone surrounding the wetland should not be
	removed in order to avoid detrimentally impacting snowberry and to help maintain water
	quality and the natural microclimate conditions in the wetland.
	3. Periodic monitoring for the invasive species, including the hemlock woolly adelgid.
	4. Any proposed treatment for insect outbreaks should consider impacts to aquatic and
	forest organisms.

HAVENS RUN CONSERVATION AREA

Description:	A headwater stream above Potato Creek that supports the American brook lamprey.
Significance:	High
Location:	Norwich Township, McKean County
Rare Occurrences:	American brook lamprey
Threats:	1. Runoff from roads in close proximity can contribute to physical degradation of stream channels, erosion, and sediment pollution.

HAVENS RUN CONSERVATION AREA (continued)

Threats:	2. Loss of forest cover within the riparian zone may result in physical degradation of the
	stream channels, erosion, and sediment pollution in the streams, higher water temperatures,
	and disruption of natural nutrient cycling linked to the stream.
	3. Removal for forest cover on steep slopes is especially problematic because of the
	potential for increased runoff and erosion following storm events.
Recommendations:	1. Timbering, road construction, and oil and gas development or other construction
	activities should be kept well away from riparian corridors in order to avoid degrading
	important aquatic and streamside habitat.
	2. A high degree of forest cover should be maintained for additional protection of the water
	quality and ecological integrity of the aquatic ecosystem.
	3. Landowners engaged in timbering operations should implement best management
	practices.

LOWER KNAPP CREEK CONSERVATION AREA

Description:	The area encompasses a section of Knapp Creek and its associated riparian forest, which
	provides habitat for the American brook lamprey and Leonard's skipper butterfly.
Significance:	High
Location:	Eldred Township, McKean County
Rare Occurrences:	American brook lamprey, Leonard's skipper butterfly
Threats:	1. Alterations to water quality or sediment load impacts habitat for the American brook
	lamprey.
	2. Runoff from dirt and gravel roads in close proximity to streams can contribute to
	physical degradation of stream channels, erosion, and pollution of the streams.
	3. Loss of forest cover within riparian zones may result in increased water temperature and
	distribution of natural nutrient cycling linked to streams.
Recommendations:	Implement best management practices for stormwater management, agriculture, forestry,
	and small urban sites when planning or conducting projects in Knapp Creek.

SMETHPORT UPLAND CONSERVATION AREA

Description:	Upland forest that supports a species of concern that is not identified at the request of the	
	jurisdictional agency.	
Significance:	High	
Location:	Keating Township, McKean County	
Rare Occurrences:	Sensitive species #4	
Threats:	1. Timber harvesting is a serous potential threat to nesting colonies of sensitive species	
	2. Human disturbances, including casual visitation within approximately 330 feet.	
	3. Removal of trees (living or dead) may eliminate valuable habitat.	
Recommendations:	1. Core habitat should be protected from disturbances by respecting an undisturbed forested	
	buffer of approximately 1,600 feet around the site.	
	2. Any logging operations in the vicinity of the site should be scheduled to occur in the fall	
	and early winter and strictly avoid early spring and summer.	

Description:	A section of Knapp Creek that supports a sensitive species that is not identified at the	
	request of the jurisdictional agency.	
Significance:	High	
Location:	Otto Township, McKean County	
Rare Occurrences:	Sensitive species #2	
Threats:	1. Runoff from roads in close proximity can contribute to physical degradation of stream	
	channels, erosion, and sediment pollution.	
	2. Loss of forest cover with the riparian zone will likely result in physical degradation of	
	the stream channels, erosion, and sediment pollution in the streams, higher water	
	temperatures, and disruption of natural nutrient cycling linked to the stream.	
	3. Removal of forest cover on steep slopes is especially problematic because of the	
	potential for increased runoff and erosion following storm events.	
Recommendations:	1. Timbering, road construction, and oil and gas development or other construction	
	activities should be kept well away from riparian corridors in order to avoid degrading	
	important aquatic and streamside habitat.	
	2. A high degree of forest cover should be maintained for additional protection of the water	
	quality and ecological integrity of the aquatic ecosystem.	
	3. Landowners engaged in agricultural operations should implement best management	
	practices.	

UPPER KNAPP CREEK CONSERVATION AREA

WEST BRANCH TUNUNGWANT CREEK CONSERVATION AREA

Description:	The area supports aquatic habitat for the American brook lamprey. It is a cool-water stream		
_	habitat, characteristic of small to medium sized streams at moderate to high elevations,		
	with typically neutral pH. Fish occurring within this community are habitat generalists and		
	somewhat pollution tolerant.		
Significance:	High		
Location:	Bradford Township, McKean County		
Rare Occurrences:	: American brook lamprey		
Threats:	1. Runoff from roads in close proximity can contribute to physical degradation of stream		
	channels, erosion, and sediment pollution.		
	2. Loss of forest cover with the riparian zone will likely result in physical degradation of		
	the stream channels, erosion, and sediment pollution in the streams, higher water		
	temperatures, and disruption of natural nutrient cycling linked to the stream.		
	3. Removal for forest cover on steep slopes is especially problematic because of the		
	potential for increased runoff and erosion following storm events.		
Recommendations:	1. Timbering, road construction, and oil and gas development or other construction		
	activities should be kept well away from riparian corridors in order to avoid degrading		
	important aquatic and streamside habitat.		
	2. A high degree of forest cover should be maintained for additional protection of the water		
	quality and ecological integrity of the aquatic ecosystem.		
	3. Landowners engaged in timbering operations should implement best management		
	practices.		

Description:	Aquatic habitat within Allegheny Portage Creek, the upper Allegheny River, and several of	
	their tributaries. There are numerous individual collection locations for each rare species	
	within the site, but they form a single population.	
Significance:	Notable	
Location:	Liberty Township, McKean County and Keating Township, Potter County	
Rare Occurrences:	American brook lamprey	
Threats:	1. Runoff from roads in close proximity can contribute to physical degradation of stream	
	channels, erosion, and sediment pollution.	
	2. Loss of forest cover within the riparian zone will likely result in physical degradation of	
	the stream channels, erosion, and sediment pollution in the streams, higher water	
	temperatures, and disruption of natural nutrient cycling linked to the stream.	
	3. Removal of forest cover on steep slopes is especially problematic because of the	
	potential for increased runoff and erosion following storm events.	
Recommendations:	1. Preserve forested river corridors maintaining high water quality.	
	2. Keep timbering, road development and other construction activities away from riparian	
	corridors in order to avoid degrading important aquatic and river ecosystems.	
	3. Maintain a high degree of forest cover throughout the watershed to protect water quality	
	and ecological integrity of aquatic ecosystems.	
	4. Minimize impacts from timber harvesting through the implementation of best	
	management practices.	

ALLEGHENY PORTAGE CREEK BIOLOGICAL DIVERSITY AREA

ALLEGHENY RIVER AT COUDERSPORT BIOLOGICAL DIVERSITY AREA

Description:	The region possesses cool, clear water and inhabits large creeks and small to medium	
	rivers. The American brook lamprey and other aquatic animal species of concern not	
	identified at the jurisdictional agency's request.	
Significance:	Notable	
Location:	Eulalia Township, Potter County	
Rare Occurrences:	American brook lamprey, species of concern not identified at the request of the jurisdictional agency	
Threats:	1. Maintaining suitable aquatic habitats is key for continued success of these species of concern.	
	2. Runoff from dirt and gravel roads in close proximity to rivers can contribute to physical degradation of river channel and erosion and sediment pollutants in the river.	
	3. Loss of forest cover within core areas resulting in increased water temperatures and disruption of natural nutrient cycling. Water quality decline from increased sediment loads.	
	4. Removal of forest cover on steep slopes increases the potential for increased runoff and erosion following storm events.	
Recommendations:	1. Preserve forested river corridors maintaining high water quality.	
	2. Keep timbering road development and other construction activities away from riparian	
	corridors in order to avoid degrading important aquatic and river ecosystems.	
	3. Maintain a high degree of forest cover throughout the watershed to protect water qualit	
	and ecological integrity of aquatic ecosystems.	
	4. Minimize impacts from timber harvesting through the implementation of best	
	management practices.	

Description:	Upland and roadside habitat that supports three small populations of cranesbill. Small tracts	
	of forest found between open habitats. The 57-acre Salter Preserve that is managed for	
	environmental education by Potter County is contained within this Biological Diversity	
	Area.	
Significance:	Notable	
Location:	Allegheny and Hebron townships, Potter County	
Rare Occurrences:	s: Cranesbill	
Threats:	Threats to this species are minimal, since the plant appears to occur in disturbed habitats	
and may naturally have a low number of occurrences.		
	1. Destruction of the plant with the use of herbicides and de-icing chemicals along area	
	roadways.	
	2. Displacement by invasive, exotic plant species.	
Recommendations:	1. Remove non-native invasive plants.	
	2. Inform roadside maintenance crews about the presences of the rare species and manage	
	application of chemical controls to avoid the rare species habitat.	
	3. Roadside mowing should be postponed until plants have flowered and seeds matured,	
	typically mid June, to ensure a viable seed bank for the next generation.	

CARMEN HILL BIOLOGICAL DIVERSITY AREA

ELLISBURG COMPLEX BIOLOGICAL DIVERSITY AREA

Description:	Ephemeral/fluctuating natural pool (also known as seasonal pool complex) located on a		
	relatively high elevation saddle and an area approximately 1,000 feet that is intended to		
	capture additional critical habitat for wetlands species. The area is located along the divide		
	of Oswayo Creek, which flows to the Allegheny River, and the West Branch Genesee		
	River. It is a northern hardwood forest community with some black cherry and eastern		
	hemlock. The understory is dominated by striped maple and American beech. The largely		
	continuous forest found within the site is important in maintaining water quality of these		
	wetlands and the health of adjacent habitats.		
Significance:	Notable		
Location:	Genesee Township, Potter County		
Rare Occurrences:	Ephemeral/fluctuating natural pond		
Threats:	1. Changes in hydrologic patterns, light levels, or the contiguity of surrounding habitat may		
	negatively affect species and communities within the Biological Diversity Area. The		
	seasonal pools are fed by surface runoff; therefore, any earth disturbance could potentially		
	alter the hydrological pattern and conditions within the seasonal pool.		
	2. Disruptions to surrounding habitat may impact populations associated with the seasonal		
	pool. Conditions of the forest floor, including the presences of woody debris and leaf litter,		
	moisture levels, and temperature are important to the ability of amphibians to use this		
	habitat.		
Recommendations:	1. Avoid activities that remove the forest canopy or result in earth disturbances within 650		
	feet of seasonal ponds in order to avoid disrupting natural hydrological patterns in the		
	ponds and to avoid impacts to potential amphibian populations.		
	2. Where road clearing or staging areas have already been constructed within the Biological		
	Diversity Area, ditching and other drainage solutions should be directed toward preserving		
	the natural drainage of the site and should provide effective erosion control.		
	3. Periodic inventories for invertebrates and amphibians should be conducted.		

Description:	Hemlock palustrine forest community along Peet Brook with a 300-foot buffer intended to capture additional potential habitat for amphibians that the wetland may support. The canopy is dominated by eastern hemlock with red maple, yellow birch and eastern white pine comprising smaller portions. Species, such as American beech, eastern white pine, eastern hemlock, striped maple, blueberry and blackberry, comprise the understory. The forest floor maintains several pits holding standing water, and is dominated by sphagnum moss.	
Significance:	Notable	
Location:	Allegheny Township, Potter County	
Rare Occurrences:	: Hemlock palustrine forest	
Threats:	1. Invasion of hemlock woolly adelgid can result in high levels of hemlock mortality, which can open the forest canopy and alter the light, evaporation and transpiration within the wetland habitat.	
	2. Gas pipeline right-of-ways alter the local hydrology.	
Recommendations:	1. Land management decisions should account for potential impacts, such as alterations to light, temperature, and hydrologic regimes.	
	2. Periodic monitoring for the invasive species, particularly the hemlock woolly adelgid.	
	3. Periodic surveys or monitoring to document amphibian and insect species located within this wetland habitat.	

PEET BROOK BIOLOGICAL DIVERSITY AREA

EAST BRANCH FISHING CREEK SLOPES BIOLOGICAL DIVERSITY AREA

Description:	A mesic, southwest-facing super slope that contains approximately 20 eastern white pine		
	trees that are uncommonly mature, at approximately 300 years in age. Other canopy species		
	include sugar maple, striped maple, eastern hemlock, black cherry, and red maple. The		
	understory is dominated with American beech. Herb cover is sparse and includes violets,		
	blackberry and raspberry. Past logging is evident by presence of stumps in a state of		
	advanced decay. The younger forest that surrounds the area is in second-and-third growth		
	forest and contains some clear-cut areas.		
Significance:	Local		
Location:	Hebron Township, Potter County		
Rare Occurrences:	Eastern white pine forest		
Threats:	Threats to this area are minimal. The land is privately owned and the landowner is aware of		
	the unique habitat and intends to continue preservation of the site. However, the invasive		
	hemlock woolly adelgid poses a risk to hemlock trees.		
Recommendations:	Periodic monitoring for the invasive species, particularly the hemlock woolly adelgid.		

Important Bird Areas

Areas that are part of a global network of places recognized for their outstanding value to bird conservation are Important Bird Areas (IBAs). These areas are nominated based upon the types of species that are present at the site, such as species of conservation concern, range restricted species, species vulnerable because they occur in one general habitat type, and species vulnerable due to tendency to occur in large numbers. Currently, no IBAs occur within the project area.

Important Mammal Areas

Important Mammal Areas (IMAs) are nominated based on the site's ability to support diverse or unique communities of mammals, high density populations, species or subspecies listed as endangered or

threatened, species or subspecies that are declining or vulnerable nationally or listed as candidate species by Pennsylvania Biological Survey, including sites that are important for public education.

The Northern Allegheny Plateau IMA, which spans 4,000,000 acres across nine counties in northcentral Pennsylvania, is the only IMA located within the project area. It represents the largest block of relatively unfragmented forest habitat remaining, and is the largest IMA in Pennsylvania. The IMA provides a variety of habitats and types of human disturbances.

Invasive Species

Plant and animal species that do not naturally occur in the area and are likely to cause harm to the natural environment, the economy, or human health are termed invasive species. Not all non-native species are harmful to other species or to wildlife, but some exotic species may have severe impacts. They impose enormous economic costs to agriculture, forestry, fisheries, and other enterprises, as well as human health. They are a major threat to biodiversity, because they out-compete native species, due to their fast spreading tendencies. Once these species overtake an area, they degrade the habitat value for other plants and wildlife.

These non-native, invasive species have been introduced to Pennsylvania, whether purposely or accidentally, since the 17th century (Thompson, 2002). Some of the non-natives that have been identified in the project area were originally introduced for wildlife cover, to reduce erosion, or for food cultivation. Other species have accidently been introduced unknowingly as contaminants in seed, through ship ballast, or in wooden pallets used in packing materials that are transported between countries. When an invasive species dominates an area, it often decreases land value, increases maintenance and control costs, degrades soil or water quality, causes direct human health concerns, or reduces yields and health of agricultural operations.

Integrated Pest Management (IPM) techniques incorporate science and information about the target pest, varying economic approaches, and utilization of ecologically sensitive control tactics to deal with

infestations. In order to be effective at managing invasive species, the first step is prevention. Most invasive species are opportunistic, and take advantage of disturbed areas and weakened species. By managing landscapes and protecting pristine natural areas, invasive species are less likely to overtake an area. By preventing an invasive species from establishing or spreading to an area, little or no money and/or chemicals will be necessary to control it.

The second step is to detect early, and begin control as soon as possible. Early detection and rapid response will result in less money and effort required to control the species. Numerous tools and publications are available to help one properly identify invasive species. Two starting points to access the information are USDA National Invasive Species Information Center (NISIC) at http://www.invasivespeciesinfo.gov and the Global Invasive Species Database at http://www.issg.org/ database.

Eight Ways to Combat Invasive Species

- 1. Only purchase non-invasive species and request that plant suppliers only sell native species.
- 2. Seek information about invasive species.
- 3. Scout your property for invasive species and remove invasive species before they become problematic. If you can not remove them, at least prevent them from going to seed.
- 4. Clean your boots before and after visiting natural areas to prevent the spread of invasive species.
- 5. Do not release aquarium plants or animals into the wild.
- 6. Volunteer at local parks and natural areas to assist efforts to control invasive species.
- 7. Help educate your community about invasive species.
- 8. Support public policies and programs to control invasive species.

Small, isolated populations should be contained to control spreading. Once established, invasive pests may be controlled by manual (physically pulling, cutting, or mowing weeds), chemical application of herbicides and pesticides, or biologically (utilizing another living species to control the invasive target) methods. Often, for well-established invasive species, a combination of control methods is necessary to effectively and efficiently control the invasives. When chemical means are necessary to control an infestation, the person(s) applying the pesticide must be certified by the Commonwealth of Pennsylvania. Landowners, and land managers should contact their county cooperative extension office or a private, certified applicator to seek assistance.

Education is a critical component in the management of invasive species. Volunteers, land managers, and citizens in general should be taught the correct identification of invasive species that threaten the watershed, so they can be detected and reported to the proper agency at the first sign of encroachment. Addressing the problem early also helps to minimize the negative impacts on native species and natural resources. Once well established, many of these species are difficult and costly to control

Plants

Invasive plant species post the most significant threat in areas that have been altered by disturbances, such as impoundments, development, oil and gas extraction, poor forestry and agricultural management practices, or those that border invasive plants in the landscape. In disturbed areas, invasive species can displace native plants intolerant to the changing conditions; and native wildlife that prefer native plant species will tend to avoid feeding on invasive plants, which allow the invasives to proliferate.

Invasive plants that pose a threat to health and human safety are categorized as noxious weeds. This federal designation, set forth by USDA Animal and Plant Health Inspection Service (APHIS), adds additional penalties and controls on those species. According to the Pennsylvania Department of Agriculture (PDA), it is illegal in Pennsylvania to propagate, sell, or transfer any of the state designated noxious weeds (PDA, 2007c). Noxious weeds within the project area are identified in Table 4-2.

The sections below identify current invasive plant species, which have been identified within the project area.

Table 4-2. Noxious Weeds of Pennsylvania

Noxious Weed	Located in Project Area
bull or spear thistle (<i>Cirsium vulgare</i>)	$\mathbf{\overline{A}}$
Canada thistle (Cirsium arvense)	\checkmark
giant hogweed (<i>Heracleum mantegazzianum</i>)	\checkmark
goatsrue (Galega officinalis)	
jimsonweed (Datura stramonium)	
Johnson grass (Sorghum halepenses)	
kudzu (Pueraria Montana v. lobata)	
marijuana (<i>Cannabis sativa</i>)	
mile-a-minute (Polygonum perfoliatium)	\checkmark
multiflora rose (Rosa Multiflora)	\checkmark
musk or nodding thistle (Carduus nutans)	
purple loosestrife (Lythrum salicaria)	
shattercane (Sorghum bicolor)	

Autumn and Russian Olives

Autumn olive and Russian olive species are deciduous shrubs or small trees that can grow up to 20 feet tall. The woody stems contain silvery scales that are predominant in younger plants. Each plant is capable of producing up to 80 pounds of fruit per growing season

Native to Asia, autumn olive can thrive in poor soils. It was introduced in the U.S. in 1830 as an ornamental plant. Autumn olive was cultivated for use in wildlife habitat and erosion control because of its fast growth rate and ability to grow into deep thickets. It is widely dispersed by birds.

Russian olive, native to Eurasia, was introduced into the U.S. during the late 1800s, and is used as an ornamental plant and in erosion control, wildlife cover, landscaping, and mining reclamation.

Both species aggressively overtake native species. Their nitrogen fixing capabilities adversely affects the nitrogen cycle of the native communities. It creates heavy shade, suppressing plants that require direct sunlight for growth.

Due to its rapid growth rate, controlling populations of autumn olive and Russian olive can be challenging. Avoid cutting and mowing areas that contain populations of autumn olive and Russian olive; these activities cause vigorous resprouting, even when frequently cut, increasing the species' ability to spread. It can be hand pulled, and the use of herbicides following cutting during the growing season seems to be effective. It may take multiple treatments before eradication of the species is successful (Invasive Plant Species Assessment Working Group (IPSAWG), 2006).

Autumn olive and Russian olive are established in Potter County. Although not detected in McKean County as of 2010, the area is at risk with the potential for establishment. Extra caution and surveillance are needed in order to stop the spread of these species and eradicate them before a prolific population is established.

Exotic Bush Honeysuckles

Amur, Standish, Tartarian, and Morrow honeysuckles are often grouped together and termed exotic bush honeysuckles. Native to eastern Asia, they were introduced into the U.S. as early as 1752 for wildlife cover, erosion control, and as ornamental plants.

These species of honeysuckle are approximately 6–15 feet high, and grow as a deciduous shrub. The flower color varies from cream to pink or crimson. They are shade intolerant and mostly located along forest edges, abandoned fields, pastures, roadsides, and other open upland areas.

Amur and Standish honeysuckles have established in Potter County, while Morrow and Tartarian honeysuckles have established in McKean and Potter counties. Morrow honeysuckle is capable of invading bogs, fens, lakeshores, sand plains, and other uncommon habitats.

Honeysuckles rapidly invade areas, overtaking a site by forming a dense shrub layer that crowds and shades-out native plant species. It alters habitats by decreasing light availability, depleting soil moisture and nutrients, and possibly releasing toxic chemicals that prevent other plant species from growing in the vicinity. They compete for pollinators, reducing seed sets for native species.

Prevention is the easiest control method available. Once the species are established, a variety of removal methods could be implemented; however, any control method should be initiated prior to seed dispersal. Manually pulling the plants can be effective but is very labor intensive especially on large infestations and requires several years to exhaust the seed bank. Chemical treatment using herbicides is also effective, and becomes even more effective when combined with manual removal techniques. Large infestations in open fields can be controlled with prescribed burning.

Japanese honeysuckle

Native to Japan and Korea, Japanese honeysuckle was introduced in the U.S. during the mid 1800s for erosion control, wildlife habitat, and as an ornamental plant. Its highly fragrant flowers provide a tiny drop of honey-flavored nectar. Japanese honeysuckle is a perennial vine that climbs and twists over obstacles, competing for light. Flowers are white to pink, turn yellow with age, and bloom from late April through July. Small black fruits containing two to three oval to oblong dark brown seeds are produced in autumn.

With few natural enemies, Japanese honeysuckle is able to flourish, rapidly out-competing native plants by vigorous root competition and blocking sunlight. It also has the capability to kill young trees and shrubs when its vines tightly twist around the stems and trunks, cutting off the flow of water and nutrients.

In order to control the spread of Japanese honeysuckle, manual and chemical treatments can be effective. The methods used will depend on the location and size of the infestation. For small infestations, repeated pulling of the entire vine and root system is effective, although frequent monitoring and maintenance are needed to prevent reestablishment. Large infestations can be removed by holding the vine mass off the ground, while cutting the stems as close to the ground as possible. Mowing is also an effective control practice; however, it requires at least two cuttings per year. Chemical treatment is also an effective management technique, especially because Japanese honeysuckle continues to photosynthesize after most native plants are dormant. The herbicide must be used on green, growing plants. It is more effective when combined with mowing techniques.

Canada Thistle and Bull Thistle

Two non-native species of thistle have established throughout McKean and Potter counties. Thistles are problematic in crowding native species and reducing crop and forage areas. The plants typically start growing in disturbed areas, such as ditches and abandoned lands, then spread into open fields and farmland. Thistles reduce pasture lands, because cattle typically will not graze near an infestation of the species.

Accidentally introduced through shipments of farm seed in the 1600s, Canada thistle is a creeping, perennial weed that is difficult to control. It reproduces via seeds and vegetative buds in its root system; and within two years, one plant can colonize an area three to six feet in diameter and can produce 1,000–1,500 seeds per flowering shoot. Canada thistle seeds remain viable in soil up to 22 years. Seeds are dispersed via wind, water, animals, farm equipment, and vehicles. The very extensive root system is able to grow six to 15 feet deep and spread over 15 feet horizontally. New plants can sprout from vegetative buds on the roots at anytime.

In order to control the species, the plant needs to be stressed so it is forced to use stored root nutrients. Control methods need to be repeated, and it takes several years before there are any signs of success. Mechanical control is ineffective, unless it is conducted at one-month intervals for several growing seasons and/or it is combined with chemical, biological, or cultural treatment (Beck, 2010).

Bull thistle is a biennial plant—plant with a two-year life cycle—that infests grassy areas, excluding other herbaceous plants from growing there. Each flower head produces up to 250 seeds, with each plant producing approximately 4,000 seeds. The seeds are dispersed by wind, and rapidly colonize in disturbed areas, with flowers typically present from June to October.

Similar to Canada thistle, controlling the spread of bull thistle requires the combined use of biological, chemical, and manual techniques. During manual treatment, flower heads are removed. If flower heads are removed before seeds are produced, then the dead plants can be left on site. However, if the flower heads are removed once seed production has begun, then they should be placed in bags, removed from the site, and burned.

<u>Cheatgrass</u>

Native to Europe, Asia, and Africa, cheatgrass—an annual winter grass—was accidentally introduced into the U.S. in 1861 through seed contamination and ship ballast. It bears many finely-haired, drooping, yellowish-green, bristly spikelets in a loose, much-branched, terminal cluster. Cheatgrass

germinates from seed in the fall, then grows into a seedling over winter, and primarily flowers in the spring. Seeds remain viable for two to five years in the seed bank.

Cheatgrass typically invades pasture lands and other open areas, as it has done in McKean County. It crowds native species as it competes for resources, such as space, sunlight, and nutrients.

Manual, chemical, and biological control methods are effective in reducing populations of cheatgrass. Control methods, such as fire, mowing, grazing, tillage, interseeding, and competitive native species, are examples of manual techniques that have been used to effectively reduce populations of cheatgrass. The use of herbicide, in addition to other control methods, increases the efficiency (USDA Forest Service, 2005a).

Crownvetch

Introduced into the U.S. in 1950 for erosion control purposes, the Europe, Asia, and African native is an herbaceous legume with creeping stems that can grow two to six feet long. It is used as a ground cover in areas susceptible to erosion, such as road banks and right-of-ways, because of its rapid growth. It spreads via seed dispersal and creeping root system. It has been known to invade woodland edges, agricultural fields, pastures, hayfields, streambanks, and gravel bars. Populations of crown vetch have been established in Potter County.

Manual and chemical control options are available. Prescribed burning that is conducted in late spring and needs repeated annually for several years to effectively exhaust the seed bank. Mowing conducted in late spring or multiple mowing sessions in June and late August—to correspond with successive leaf-out periods—will reduce populations. Chemical control with herbicides can be applied in early spring following instructions on the selected herbicide.

Garlic mustard

Native to Europe, garlic mustard was introduced to the U.S. in 1868, when it was cultivated for food and medical use. It has been identified within Potter County, while no infestations within McKean County have been detected.

This cool season biennial herb has stalked, triangular to heart-shaped, coarsely toothed leaves that, when crushed, give off an odor of garlic. Garlic mustard can reach two to three and a half feet in height, and produces button-like clusters of small white flowers, each with four petals in the shape of a cross. A single plant can produce 1,000 seeds. The seeds are produced in erect, slender pods that, when mature, become shiny black, beginning in May. By late June, the plants die, holding their seeds throughout the summer. The seeds remain viable for five or more years. Identification is critical, because it resembles several native species that grow alongside it, such as toothwarts, sweetcicely, and early saxifrage.

Garlic mustard crowds out native species by aggressively utilizing needed resources, such as light, moisture, nutrients, soil, and space. This, in turn, affects wildlife, depriving them of the essential food source the displaced native species provided.

For example, one rare insect species West Virginia white butterfly is suppressed by garlic mustard's dominating presence and destruction of toothwarts, native plants that serve as the primary food source and habitat for West Virginia white caterpillars. Due to the lack of toothwarts, the West Virginia white lays its eggs on the garlic mustard, which produces a chemical toxin that affects the eggs' ability to hatch.

To effectively manage garlic mustard involves a long-term commitment. Management options involve a combined effort of mechanical and chemical treatments, and vary depending on size of the infestation. In small infestations and where desirable native species occur, manual removal is possible;

although, removal of the entire plant, including the root system, is necessary to prevent regrowth. Larger infestations require clipping the plant's stem at ground level once seedpods are present, but before the seeds mature and scatter to prevent seed production. In both instances, the clippings and plant materials should be carefully removed from the site, so seeds are not dispersed, starting a new infestation. Where heavy infestations exist and where risk to desirable species is minimal, chemical treatment using an herbicide can be affective. However, chemical treatment kills any plant it contacts, so care should be taken to avoid non-target species. One advantage of this method is it can be used anytime of the year.

Burning can also be used to control large natural areas infested with garlic mustard. Burning opens the understory and can encourage germination of stored seeds and promote growth of emerging garlic mustard. In order to combat regrowth, burning must be conducted for three to five consecutive years, regardless of other control methods employed to ensure seed stores have been exhausted (Plant Conservation Alliance, 2009).

Giant hogweed

Native to Europe, giant hogweed was introduced into the U.S. in 1917 as an ornamental plant, possibly for its fruit, which is used as a spice in Iranian cooking. It has been identified as a federal noxious weed, making it illegal to bring to the U.S. or to move it across state lines. Populations of giant hogweed have established in McKean County.

This biennial or perennial herb grows 15 to 20 feet in height, with stout, dark, reddish-purple stems and spotted leaf stalks. Its compound leaves can grow up to five feet in width. It flowers from mid June to mid July, and produces approximately 1,500 seeds per flower head. It can grow and thrive in a variety of habitats but prefers moist soil conditions and partly shaded areas. It is likely to occur in disturbed areas, such as wastelands, riverbanks, and railroad right-of-ways (USDA Forest Service, 2005b).

Due to its size and rapid growth, giant hogweed is an aggressive competitor reducing wildlife habitat and increasing erosion on steep slopes and river banks. Contact with its sap can cause a skin reaction (photodermattis) in animals and people, which causes the skin to become sensitive to ultraviolet light—including sunlight—resulting in swelling and blistering. Contact with the eyes can cause temporary or permanent blindness.

Prevention is the most efficient control available; however, manual, chemical, and biological control methods are available to reduce and eradicate populations of giant hogweed. When implementing control practices, protective clothing, including gloves and a face shield are needed to reduce the risk of obtaining photodermattis. Giant hogweed can manually be removed, making sure to get the entire plant and root

structure. Herbicides can be applied early in the growing season, before the plant reaches two feet in height and before the plant flowers and sets seeds. Cattle and pigs can be used as biological control agents, since they are not affected by the sap and will eat hogweed. In addition, trampling damages the plant.

Japanese knotweed

Commonly found near waterways, in low-lying areas, waste places, utility rights-of-ways, and old home sites, Japanese knotweed was introduced in the U.S. during the late 1800s. It is an ornamental plant that was used for soil and erosion control because of its ability to spread quickly, forming dense thickets. However, the dense thickets of Japanese knotweed exclude native vegetation, altering the natural ecosystem.



Japanese knotweed in flower

Japanese knotweed grows from seeds and is able to regenerate from vegetative pieces. It can grow to over 10 feet in height. The very small, shiny, triangular shaped seeds can be dispersed via wind, water, fill-dirt, and on the soles of shoes. It is a very durable plant, capable of surviving high temperatures, droughts, and flooding.

In order to control populations of Japanese knotweed, a combination of mechanical and chemical treatment techniques must be employed. Single young plants may be pulled by hand if soil conditions and root development is right. However, to prevent resprouting, all roots and runners need to be removed from the site. Chemical treatment using glyphosate and tricolopyr herbicides can be applied to freshly cut stems or foliage (Swearingen, Reshefiloff, Slattery, & Zwicker, 2002).

Japanese honeysuckle

Japanese honeysuckle is a perennial vine that escaped cultivation and invaded natural areas. Introduced to the U.S. from eastern Asia during the 1800s, it was used to control erosion and as cover and food for wildlife. Populations of Japanese honeysuckle have been established in Potter County, while no populations have been reported in McKean County.

It is capable of spreading rapidly due to its vigorous root competition and its ability to twine itself up trees and shrubs in order to dominate the light source. These activities destroy nearby vegetation and girdle trees and shrubs. Like evergreens, Japanese honeysuckle is able to continue growing while most native species are dormant, providing additional opportunities to overtake the native vegetation.

Manual and chemical control methods can be utilized to reduce Japanese honeysuckle populations. Manual removal of small infestations can be effective when the whole plant, including the root, is removed. Sites undergoing manual treatment need frequent monitoring and removal of new outcrops. Creeping vines need to be cut and removed in order to protect trees and shrubs from being girdled. In order to remove larger patches of honeysuckle, hold the vine mass above the ground with a rake while cutting the stem as close to the ground as possible. Mowing is also applicable, but requires two treatments—mid July and mid September. Combining mowing with chemical treatment increases the effectiveness of treatment. Chemical treatment is most effective when desirable native species are dormant and Japanese honeysuckle continues growing. Apply the herbicide to healthy, green leaves during temperatures in which the honeysuckle continues to grow. This will control the honeysuckle population with reduced risk to native species.

<u>Mile-A-Minute</u>

Initially introduced to the U.S. in the late 1800s, mile-a-minute is native to eastern Asia and the Philippines. It is an herbaceous, annual, trailing vine that contains recurved barbs on the stems and leaf blades that can self pollinate. The leaves, light green in color, are shaped like triangles. Ocreae—cup shaped leaf structures that surround the stem and nodes—are where the flowers and fruits emerge. The deep blue fruits are located in terminal clusters, with each berry-like fruit containing a single glossy black or reddish-black seed known as an achene. Mile-a-minute is a prolific seeder, producing many seeds from a single plant. The seeds are durable, remaining viable in soil up to six years, with staggered germination and buoyancy in water for seven to nine days (Okay, Goldstein, & Swearingen, 2010).

Mile-a-minute invades open fields, forest edges, roadsides, ditches, streambanks, and uncultivated fields. Its rapid growth allows it to cover existing vegetation and restricts light availability, potentially killing plants below. Dense mats of mile-a-minute can restrict the establishment of new vegetation. It is often found in extremely wet soils with poor soil structure and prefers sunlight, but can tolerate shade.

Populations of mile-a-minute have established in Potter County. A variety of control methods, such as biological, chemical, and mechanical practices, can be implemented to reduce or eradicate mile-a-

minute populations. Containing and eradicating existing populations is the most effective and economical control in preventing the spread of the species. Previously infested sites should be monitored several times a year, and new plants should be removed until the seed bank is exhausted.

<u>Multiflora rose</u>

Multiflora rose is a thorny, perennial shrub that was introduced in the U.S. in 1866 from Japan as a rootstock for ornamental roses. In the 1930s, this plant was also used for erosion control and living fences to contain livestock. Over the years, multiflora rose was also used for wildlife habitat and as crash barriers on some roadways (Bergmann & Swearingen, 2009).

Multiflora rose is a productive plant that can grow rapidly into impenetrable thickets that exclude native plants. It can be found in woodland, forest edges and successional fields, and can tolerate various soils, moisture, and light conditions. On average, each plant can produce up to a million seeds per year, and those seeds remain viable in soil up to 20 years. Seeds can be dispersed via wind, wildlife, and water. Germination of the seeds enhances as it progresses through the digestive system of birds.

To control populations of multiflora rose, chemical and manual techniques are currently being utilized, while biological controls are still being developed. Repetitive cutting and mowing of three to six times per growing season over two to four years has been effective in stressing the plant and reducing the seed reserve. Herbicides can be used, but require regular application. Combining the two methods increases the efficiency of control methods. Currently populations of multiflora rose have been established in Potter County.

Oriental bittersweet

Oriental bittersweet is a deciduous, woody perennial plant that grows as a climbing vine and trailing shrub. Introduced in the U.S. in the 1860s as an ornamental plant, it is native to Eurasia and is often associated with abandoned home sites from which it escaped into natural areas. It is commonly found in forest edges, woodlands, fields, and hedgerows within Potter County. Although it prefers open, sunny sites, it can tolerate shade.

Oriental bittersweet has vigorous growing capabilities and smothers nearby vegetation with excessive shading or breakage. When it climbs high onto trees to reach sunlight it increases the weight on the tree which can lead to uprooting and make it easier for trees to blow over during high winds and heavy snow storms.

Purple loosestrife

Native to Eurasia, purple loosestrife was introduced in the U.S. as an ornamental plant and for medicinal uses. The plant grows 4–10 feet in height and produces a showy display of magenta-colored flower spikes. Mature plants are capable of producing 30–50 stems from a single rootstock. Flowers are produced from June to September and can produce two to three million seeds per year. The flowers are pollinated by insects. In addition to seed dispersal, purple loosestrife can vegetatively reproduce at a rate of one foot per year.

Purple loosestrife adapts to natural and disturbed wetlands. It outcompetes with native grasses, sedges, and other flowering plants. Purple loosestrife forms dense homogeneous stands that restrict native wetland plants and reduce habitat for wildlife.

Established in McKean and Potter counties, management opportunities are limited. Manual and chemical treatments are effective for small infestations, while biological controls are more effective on larger infestations. Infestation of young plants can be manually removed, and should occur prior to seeds being set. In older, more-established populations, the use of herbicides is recommended. Herbicides are

most effective when applied late in the season, while the plants are preparing for dormancy. However, an initial treatment mid-summer along with the late treatment would be effective to reduce the amount of seeds being produced.

Spotted Knapweed

Accidentally introduced to the U.S. in the late 1800s as a contaminant in seeds and discarded soil from ship ballasts, spotted knapweed has been established in McKean and Potter counties. This short-lived, perennial, herbaceous plant derived its name from spots that are formed by black margin on the flower's bract tips.

Spotted knapweed forms a basal rosette of leaves during its first year, and then blooms in subsequent years, typically for three to seven years. It has a deep and stout taproot that allows it to draw in water from deep in the soil during dry conditions. The flowering stems reach eight to 50 inches tall and contain 25–35 purple-to-pink flowers per head. Each year—between June and October—the plant produces 500–4,000 seeds per square foot and the seeds remain viable in soil for five to eight years. Seeds are dispersed via humans, wildlife, livestock, vehicles, fill dirt, crop seed, and contaminated hay.

Spotted knapweed infests natural and semi-natural habitats, including barrens, fields, forest, prairies, meadows, pastures, and rangeland. In addition to outcompeting native species, it reduces native plant and animal biodiversity, decreases foliage production, and increases erosion, surface runoff, and stream sedimentation. It prefers to establish in well-drained, light-textured soils that received summer rainfall. However, it does not compete well with vigorously growing grasses in moist areas.

Manual, biological, and chemical treatments can be used to combat spotted knapweed populations; combining these efforts increases the effectiveness of their use. Persistent hand pulling of the species prior to seed set is effective when the entire crown and taproot is removed. Two larvae, three moth species, and a weevil are natural predators of spotted knapweed, and when introduced into large infestations, they can reduce seed production by half. A variety of herbicides are also available treatment options; however, each one has advantages and disadvantages. Before using any treatment method, determine which method is the best for the infested site and consider a combination of treatment methods.

Animals

Invasive animal species include forest pests, such as gypsy moth, Sirex woodwasp, and common pine shoot beetle, as well as the aquatic spiny water flea. Information regarding invasive animal species is not as readily available and numerous as that for invasive plant species. The section below details the known invasive animal species.

Common pine shoot beetle

Native to Europe, the common pine shoot beetle was accidentally introduced into the U.S. from infested packaging materials in 1992. This invasive beetle impacts pine trees by breeding under the bark at the base of the trees. The entire State of Pennsylvania remains in a quarantined area, restricting the movement of pine materials in order to prevent further infestation of the species.

The adult beetles range in size from three to five millimeters long, are brown or black and cylindrical. The larva is approximately five millimeters long, with a white, legless body and brown head.

In March and April, the adult beetles become active, leaving their over-wintering sites in order to mate and lay eggs in dying or stressed pine trees, freshly cut trees, stumps, logs, and bark mulch. The adult females deposit their eggs into gallery systems bored approximately 10–25 centimeters long between the inner bark and outer sapwood of the host. From April to June, the larvae feed and mature under the pine bark in separate feeding galleries. When matured, they stop feeding, pupate, and tunnel

through the bark to emerge as adults from July to October. Once they emerge, they fly to new or oneyear-old pine shoots to begin maturation feeding. The beetles enter the shoot approximately 15 centimeters or less from the tip and move up the shoot hollowing out the center of the shoot for 2.5 to 10 centimeters, causing the infected shoot to droop, turn yellow, and eventually fall off. When shoot feeding is severe, diameter and height growth are reduced, weakening the tree to the point where the beetles begin using the tree as a host for laying its eggs (U.S. Department of Agriculture, 2002).

Emerald Ash Borer

Introduced into the U.S. accidentally through wood packaging materials, the emerald ash borer (EAB) is an invasive beetle from eastern Asia and China. It was first discovered in the U.S. in 2002 and in Pennsylvania in 2007. Although not identified within the project area, McKean County has been added to the list of counties that are under a firewood quarantine to reduce the spread of EAB. The EAB has been positively identified in nearby Cameron County.

This invasive, metallic-green beetle is approximately 13 millimeters long, and impacts the health of ash trees. Infestations of EAB are fatal within one to three years, with no available cure. From May to August, the adults emerge from over-wintering sites under the bark to mate. The females lay their eggs in bark crevices, and within 10 days, larvae hatch. The larvae tunnel under the bark to feed and grow through the fall. They remain dormant during winter, when they pupate and emerge as adults in the spring, exiting the tree is a unique D-shaped exit hole.

The most effective management method is to prevent further infestation. Infected counties are placed in a quarantine, which does not permit the transportation of ash products, such as lumber or firewood. Since most of the general public cannot identify the species of tree from which wood came, the ban effectively limits the transport of all firewood. The use of pesticides can be effective in controlling EAB populations, but once a tree is infested, it will die. Wood peckers and two parasitic insect species are natural enemies of EAB and can reduce their populations.

European starling

The European starling is a hole-nesting bird species that was introduced to the U.S. in 1890 as part of a plan to introduce all the birds mentioned in the works of Shakespeare. Native to Europe, the starling competes with native species for habitat and destroys crops.

The European staling is a shinny black, glossed-purple or green bird that is speckled with white spots. It is approximately 19–22 centimeters long and weighs 60–90 grams. It prefers urban and suburban habitats, but is also common in grassy areas, such as agricultural fields, pastures, ball fields, and golf courses. Occasionally the European starling will inhabit open forest and woodland areas, but rarely inhabits dense or wet forest habitats.

Sirex woodwasp

The Sirex woodwasp, a native to Europe, Asia, and North Africa, has the potential to cause mortality to pine trees. The adult is a large, robust insect, approximately one to 1.5 inches long with a spear-shape plate (cornus) at the tail end. Its body is dark, metallic-blue or black with reddish-yellow legs. It was introduced into the U.S. in 2004 accidently through wood packaging materials. It was first detected in McKean County in 2007 and Potter County in 2008.

From July to September, the adults emerge from the host tree, and after initial flight, the females are attracted to stressed pine species. They drill their ovipositors into the outer sapwood and inject a symbiotic fungus, toxic mucus, and eggs. The mucus and fungus work together to kill the tree, creating a viable habitat for the eggs. Females lay anywhere from 25–350 eggs. The fertilized eggs become females, while the unfertilized eggs become males. The larvae feed on the fungus as they tunnel through the wood

for 10–11 months. Once mature, the larvae pupate close to the bark surface, and then chew threw the bark to emerge within approximately three weeks (Haugen & Hoebeke, 2005).

While native woodwasps only attack dead or dying trees, the invasive Sirex woodwasp will also attack living pine trees. Infected trees show signs of infection; within three to six months following the infestation, the tree's foliage initially wilts, then changes from dark green to light green, then to yellow, and finally red. As the adults emerge, they chew round exit holes 1/8 to 3/8 of an inch in diameter (Haugen & Hoebeke, 2005).

European gypsy moth

The European gypsy moth was introduced to the U.S. in 1869 for the production of silk, and it escaped confinement. The entire Commonwealth of Pennsylvania is infested by European gypsy moths. Female moths lay their egg mass—cluster of eggs—from which approximately 1,000 hungry caterpillars hatch and feed upon the leaves of 300 species of trees and shrubs.

Infestations of the European gypsy moth are being reduced and controlled by fungal and viral pathogens. *Entomophaga maimaigo* is a fungus that attacks the gypsy moth caterpillars and was first reported in 1989. Nuclopolyhedrovirus was accidentally introduced in Boston in 1906. The virus infects gypsy moth caterpillars and is used by the U.S. Forest Service to control European gypsy moth populations.

Spiny water flea

The spiny water flea is a tiny crustacean with a long, sharp barbed tail spine that was accidentally introduced in the U.S. in 1984 when it was discovered in Lake Huron. Most likely, its introduction was from contaminated ballast water from a trans-oceanic freighter.

When in warm water conditions, the female spiny water flea reproduces rapidly, producing 10 offspring every two weeks. During winter months, the produced eggs lie dormant. The water flea competes with small native species that feed on plankton. They are prey for larger fish species, smaller fish species cannot feed on them, due to their long tail spine.

Most often, they are accidentally dispersed when they or their eggs, although unseen, end up in bilge water, bait buckets, and livewells—aerated bait storage containers for live bait. It is even possible that fishing lines and downriggers could be coated with eggs and adults; and therefore, should be thoroughly washed, along with any watercraft equipment, after each use, especially after being in different waterbodies.

CHAPTER 5. CULTURAL RESOURCES

This section provides an overview of the culture of the Allegheny River headwaters region by examining the historical and recreational resources available within the area. Included in this section is a summary of recreational opportunities, environmental education efforts, an historical overview, and an inventory of historical sites located throughout the region.

Located within the Pennsylvania Wilds, the headwaters of the Allegheny River region boasts of numerous recreational activities that may charm people of all ages and backgrounds. The region is an asset; with a well-managed and balanced tourism industry, it appeals to visitors and local citizens, while protecting the original character of the region.

Recreation

Any activity conducted for amusement during leisure time is considered recreation. In Pennsylvania, recreation and tourism are big business, ranked as the second leading industry. For some areas in Pennsylvania, it is the only industry. Recreation brings in revenue from tourists seeking food, accommodations, and mementos of their visit to the area.

Recreation is not only beneficial to the economy, but to the health of citizens and visitors of the region. Recreation is essential to improving quality of life, building strong



Children on the playground at Roulette Township Park

families and communities, and reducing health care, social services, police, and justice costs. Individuals who partake in recreational endeavors have more active lifestyles and have a reduced potential for self-destruction and anti-social behaviors (Panorma Recreation, 2004).

There are a variety of recreational facilities throughout the project area. Figure 5-1 displays the location of these facilities, which include a fitness trail, ball fields, and playgrounds.

<u>Parks</u>

Among the 44 parks within the project area, there is a great diversity of resources. Some parks are passive, not offering any facilities other than untouched open space, while others have picnic pavilions and playgrounds to entertain visitors. The region includes a variety of unique parks including a model airplane flying field and a sky diving center.

Parks within the region are classified into four categories based upon size, service population, and intended use. In addition to being identified on Figure 5-1, park sites and their amenities are identified in Appendix N.

Regional parks

Regional parks are located within 30–60 minutes of the population they serve, and they typically offer a variety of amenities Hamlin Lake Park, Callahan Park, and Coudersport Area Recreation Park (CARP Park) are regional parks. The Potter and McKean County Fairgrounds are also deemed regional parks, although their use is limited to organized events, such as county fairs.

Hamlin Lake Park is nestled among the fingers of Hamlin Lake in Smethport. The park offers a variety of recreational facilities for basketball, volleyball, baseball, soccer, non-motorized boating, walking, skating, and passive recreation. In addition, the park has restrooms, a swimming pool, playground equipment, and picnic pavilions.

Callahan Park located behind the Bradford Area High School attracts visitors from all over the



region. Amenities at the park include a playground, pavilion, basketball court, ball fields, and a swimming pool.

CARP Park is located north of downtown Coudersport, off East Seventh Street. The park features a lighted softball field, baseball field, football field, track facilities, tennis and basketball courts, sand pit volleyball, picnic facilities, playground, hiking trails, and restrooms.

Community Parks

Community Parks are primarily located within 30 miles of their users. These facilities provide recreational resources close to home, while still offering a variety of opportunities.

Hamlin Township Community Park

Sites within this classification include parks with multiple uses and swimming pools that attract a variety of users.

Thirteen community parks are located within the project area: Assembly Park, Foster Brook Community Park, Hamlin Township Community Park, Hanley Park, Lafayette Township Community Park, Mitchell Park, Mount Jewett Community Park, Otto Township Community Park, Port Allegany Community Pool, Roulette Township Park, Shinglehouse Memorial Park and Nature Trail, and West Branch Community Park.

Neighborhood Parks

Neighborhood Parks are local parks servicing the needs of the immediate local community. Elementary school playgrounds, baseball fields, hiking trails, a skate park and smaller parks, including a model airplane flying field, and a fitness trail are among the neighborhood parks.

There are 18 neighborhood parks in the project area; Charles Center Health Park, Congress Street Park, Cunningham Field, Dana Field, Eldred Memorial Park-Sullivan Armstrong Memorial Park, Heritage Park, Jim Gleason Ball Field, Lewis Run Borough Playground and Andy Pantuso Memorial Ball Field, Moose 460 Family Park, Ray Batt Memorial Flying Field, Rew Ball Park, Rochester Street Park, Ron Hooben Memorial Park, Roulette Skate Park, Scott Ball Fields, Town Square, and Welch Avenue Park.

Other Parks

Other is a classification given for nature preserves and facilities that charge a fee for service. Campgrounds and golf courses fall into this category, in addition to the Freefall Oz Skydiving Center and the Rainbow Paradise Trout Farm. Each of these facilities will be discussed in later sections of this chapter.

<u>Trails</u>

As links among communities, trails provide alternative transportation, recreation, and educational opportunities. Trail activities include walking, jogging, hiking, bicycling, horseback riding, ATV riding, snowmobiling, cultural and historic cultivation, and environmental education.

This region is fortunate to have numerous trails and trail organizations, such as Tuna Valley Trail Association (TVTA), Potato Creek Trail Association (PCTA), and Kinzua Valley Trail Club (KVTC). These groups are working to provide a network of trails throughout the region. In addition to the TVTA, PCTA, and KVTC systems, the **Saulter Watershed Preserve Trail** is a onemile interpretive nature trail through the 57-acre Saulter Watershed Preserve.

Tuna Valley Trail System



Hikers enjoying the scenery along the Marilla Bridges Trail

Within the TVTA system there are nine trails

throughout the Tunungwant valley. Located in the Bradford area, the system provides approximately 28 miles of hiking trails for residents and visitors of the region. There is interest in expanding the system through the development of two additional trails that would link to the existing trails—Kendall Creek Watershed Trail and Kinzua Valley Rail Trail.

The **Kendall Creek Watershed Trail** is a proposed multi-use trail that would follow Kendall Creek from the Lafferty Hollow Industrial Park to TVTA at North Kendall Avenue near Holley Avenue. This trail was initially identified in the <u>2007-2035 North Central Pennsylvania Long Range Transportation</u> <u>Plan</u> as a part of the Bradford, Port Allegany, and Kane streetscape projects.

KVTC is interested in establishing a link from the **Kinzua Valley Rail Trail** to the TVTA trail system. Currently, the Kinzua Valley Trail starts in Westline, offering four miles of trail for use. Eventually, a 20-mile extension will be added to the trail, beginning at the Red Bridge area of the Allegheny River Reservoir, and connecting to the TVTA Trail at Kinzua Bridge State Park near Mt. Jewett.

Existing trails within the TVTA system include:

Richard E. McDowell Trail is a 1.3-mile, gentle path along the west branch of Tunungwant Creek that provides access for fishing and wildlife watching. It also provides a glimpse of the area's oil history, while crossing through the University of Pittsburgh at Bradford (UPB) campus. There is an interpretive tree identification guide that corresponds with the trail available on TVTA's website: http://www.tunavalleytrail.com.

Expanding from the Campus Drive trailhead of the McDowell Trail, **Community Park Trail** is in the design stage of development. The trail will progress from UPB to Hanley Park on Davis Street in Bradford. A conceptual design, including right-of-ways, and surveying are being conducted to design the trail.

Crook Farm Trail is a 1.4-mile trail that follows the left bank of Tunungwant Creek from Bolivar Drive north of Bradford, through Crook Farmstead, to the Tuna Crossroads Bridge. Efforts are underway to convert the trail into a loop trail crossing the stream and retreating back along the right bank of Tunungwant Creek. An additional parking area is being added near Tuna Crossroads Bridge.

South Trail is a six-mile trail along an unimproved railroad grade south of Bradford. Beginning at Owens Way, it follows Tunungwant Creek into Lewis Run.



The covered bridge over the dam of the Marilla Reservoir allows hikers to continue along the Marilla Bridges Trail

Marilla Bridges Trail is a one-mile loop trail around the 20-acre Marilla Reservoir, west of Bradford. From the Marilla Bridge Trail, users can access the Marilla Springs and White Pine trails along the southern and eastern ends of the loop, respectively. Madeline's Birders' Rest Gazebo, a wildlife observation gazebo, is located at the trailhead of the Marilla Springs Trail.

The **Marilla Springs Trail** travels 3.5 miles along Marilla Brook from the Marilla Bridge Trail to Stickney in the Allegheny National Forest. The Marilla Springs trailhead is located at the Madeline's Birders' Rest Gazebo. Parking areas are available in Stickney and at the Marilla Bridges Trailhead.

The **White Pine Trail** also spurs from the Marilla Bridge Trail. It forms a loop by connecting back to the Marilla Springs Trail. Less than 3 miles in length, the trail provides access to a small stand of old growth white pines.

Indian Pipe Trail is a multiple-use trail designed for hiking, biking, and jogging across a 4,000-acre tract of Allegany Northern Hardwood Forest. The trail extends 7.4 miles from the Marilla Reservoir to the Pennsylvania-New York state line on the Interstate Parkway.

Hidden Valley Trail also originates near the Marilla Reservoir and at the trailhead of the Indian Pipe Trail. The south branch of the trails parallels West Washington Avenue for 1.5 miles. The north branch leads to a grassy road, and after approximately two-tenths of a mile, connects to Hidden Valley Passage—a one-mile segment that links to the Indian Pipe Trail—creating a 3.6-mile loop.

Potato Creek Trail System

The goal of the PCTA is to create a network of trails surrounding the community of Smethport to include opportunities for hiking, mountain biking, canoeing, horseback riding, and cross-country skiing. Routes follow abandoned railroad grades, logging roads, park paths, and scenic waterways. Within the PCTA system, there are 15 trails or spurs.

Sandy Lane— the main trail—is the hub of the trail system's activity. It supports recreational uses, including hiking, mountain biking, cross-country skiing, and horseback riding. There are six spurs from the main trail that provide loops, short cuts, wildlife watching opportunities, scenic overviews, and links to other trails.

Golfing

Within the project area there are four active golf courses. There are two courses near Bradford, one in Smethport, and one in Coudersport.

Coudersport Golf Club is a semi-private establishment with an 18-hole course that was built in 1935. Other facilities at the site include a lounge, locker room and banquet facilities. The course is located off of Route 44 in Coudersport.



Clubhouse at the Penn Hills Golf Club near Bradford. PA

Penn Hills Golf Club is an 18-hole private course adjacent to Route 770, two miles south of Bradford. Built in 1937, the course is open only to members from April 1 through November 1.

Pine Acres Country Club, built in 1970, is an 18-hole semi-private golf course and banquet facility near Bradford, Pa.

Smethport County Club is a semi-private nine-hole course that was built in 1922. Located just west of Smethport, the club is open April 1 through October 31.

Camping

Camping is a popular recreational activity within the region due to the extensive opportunities available to visitors within the Pennsylvania Wilds region. There are three campgrounds located within the project area that offer an array of services and amenities to visitors; however, all of the camping facilities are private businesses.

Allegheny River Campground is located along Route 6 in Potter County between Roulette and Coudersport. The 28-acre facility offers a variety of sites from primitive camping to full-hookup camper and RV sites. Cabins also are available to rent, and provide air conditioning, heat, refrigerators, and microwaves. Other amenities at the campground include a dump station, onsite pump out, shower houses, a camp store, playground, game room, Frisbee golf, and river fishing. Kayak and tube rentals are also available through the campground.

Black Bear Campground is located along Route 59, east of Marshburg, Pa. on the western border of the watershed. The campground features a fishing pond, playground, and camp store. Sites are available to accommodate RVs, trailers, and tent campers.



Bettum's Idlewood Family Campground is located near Lewis Run, Pa. The campground is operated year-round on 46 acres with amenities, such as public water, sewage, electricity, nightly trash pick up, and a laundry mat, shower house, dump station, general store, and propane filling station. Recreational facilities include a swimming pool, playground, enclosed pavilion, covered grilling area, game room, horseshoe pits, a volleyball court, hayrides, fire truck rides, ATV and snowmobile trails, cross-country skiing, snowshoeing, and hunting.

Potter County Family Campground is located along Route 6 in Sweden Township near the eastern border of the watershed. The campground features 48 sites with RV hookups and 4 isolated, primitive tent-camping sites. Amenities include a camp store, heated shower house, pavilion, playground, free train rides for children on the "Potter County Express," a dump station, campground patrol, and access to ATV and snowmobile trails in the Susquehannock State Forest.

Fishing

Since 1866, the responsibility to protect and manage Pennsylvania's fishery resources and regulate recreational fishing and boating has been that of the Pennsylvania Fish and Boat Commission (PFBC). Nearly two million people fish in Pennsylvania each year, with an estimated economic impact of \$1.35 billion (PFBC¹). Fishing license sales in Pennsylvania reached a five-year high in 2009 with 871,499 licenses sold by September 13 (PFBC, 2009a).

Located within the project area is the **Oswayo State Fish Hatchery**. This facility was originally built in 1968, and is located on 1,250 acres near the village of Oswayo in Potter County. It contains raceways, an earthen pond, and a hatchery building with indoor rearing, egg incubation, and a visitors' center. The hatchery is supplied by two non-limestone aquifer springs. The facility produces an average of 181,261 pounds of brook, brown, rainbow, and golden trout each year at a cost of approximately \$3.20 per pound.

The Pennsylvania Wilds region, which encompasses the Allegheny River headwaters watershed, provides ample opportunities for anglers. The opportunities are compiled in the Pennsylvania Wilds Fishing Guide, available on the Pennsylvania Wilds website: http://www.pawilds.com. Areas within the watershed are summarized below. However, these designations change frequently, so please consult the annual fishing summary guidelines for any changes and additions to these regulations.



Trophy trout section of Tunungwant Creek in Lewis Run, PA

Class A Wild Trout

Class A Wild Trout streams support a population of naturally reproducing trout of sufficient size and abundance, which will support long-term, rewarding fisheries. Waterways under this designation do not participate in stocking programs. Within the project area, nine tributaries have received the designation of Class A Wild Trout streams and are identified in Appendix N.

Approved Trout Waters

Approved Trout Waters are waterways—lakes, ponds, and reservoirs—that meet criteria qualifying them to be stocked with trout by PFBC. The 20 waterways designated as Approved Trout Waters within the project area are identified in Appendix N.

Special Regulation Areas

Special regulation areas are waterways that fall into various regulations of PFBC, such as catch and release, fly-fishing only, and delayed harvest. As of 2009, there were five special regulation areas in the Allegheny River headwaters watershed.

Two **Delayed Harvest Artificial Lures Only** areas are located along the Allegheny River and West Branch Tunungwant Creek. These 3.9 miles are restricted for angling—fly-fishing or spin casting—using artificial lures made of metal, plastic, rubber, or wood; and/or flies and streamers constructed of natural or synthetic materials. Up to three fish per day may be kept, if they are at least nine inches in length and caught between June 15 and Labor Day. The Allegheny River section provides 2.7 miles from Pond Road to a ford—an area where the river is shallow enough to cross by wading—approximately three tenths of a mile below the Prosser Hollow Bridge. A stretch of 1.2 miles of the West Branch Tunungwant Creek, from the Route 499 Bridge to a pipeline near the confluence of Gates Hollow, is also designated as a Delayed Harvest Artificial Lures Only waterway (PFBC, 2009b).

The **Trophy Trout Program** opens streams to fishing year-round; however, a limit of only two fish over 14 inches in length per day may be kept between opening day through Labor Day. All fish caught that are shorter than 14 inches, and fish caught between Labor Day and opening day, must be released. Anglers must use artificial lures constructed of metal, plastic, rubber, or wood and/or flies and streamers created from natural or synthetic materials. Fly-fishing or spinning gear may be used, and anglers must possess a trout stamp. Three miles of East Branch

Tunungwant Creek from Pigeon Run to the Main Street Bridge in Lewis Run are designated as Trophy Trout waters (PFBC, 2009b).

Catch and Release Fly-Fishing Only areas restrict anglers to fly-fishing gear with a maximum of 18 feet of leader line. Anglers must release all fish caught. These waterways are open to fishing year-round and require the angler to have a trout stamp. Marvin Creek, starting three miles south of the high voltage lines in Smethport, for a distance of nine-tenths of a mile downstream, is the only waterway designated as catch and release fly-fishing only within the project area (PFBC, 2009b).

The **Early Season Trout-Stocked Lake Program** is active within the Marilla Reservoir west of the City of Bradford. This designation permits anglers to fish for trout from March 1 to March 31. Only three trout, seven inches in length or longer, may be kept per day. Anglers are required to possess a trout stamp (PFBC, 2009b).

Rainbow Paradise Trout Farm is a private business that offers interested anglers an opportunity to catch a trophy trout. The fees for fishing in the nine-acre facility vary depending on whether the angler is participating in catch and release, catch and keep, fly-fishing, or bait and lure programs.



Paradise Pond is a trophy trout pond located at Rainbow Paradise Trout Farm

Boating

There are three main angling locations within the Rainbow Paradise Trout Farm. Paradise pond is a two-acre trophy trout pond that contains tiger, rainbow, brown, brook, and golden trout between 14–30 inches in length. Sunset Lake contains bass and trout; Rainbow Run contains trout, bass and bluegill.

Fly-fishing classes can be scheduled for a half day to two days in length, with class sizes varying from individual instruction to small groups. More information about angling opportunities and fly-fishing classes is available on the Rainbow Paradise Trout Farm website: http://rainbowparadisetroutfarm.com.

Boating regulations are under the jurisdiction of the PFBC. An estimated 2.5 million people boat on the 83,000 miles of Pennsylvania waterways each year. In 2005, approximately 350,600 boats were registered. Recreational boating generates an estimated \$1.7 billion for the economy annually (PFBC, 2008).

PFBC manages 250 public access areas to Pennsylvania waterways; in addition, organizations and municipalities manage many other access points. In 2005, in an effort to increase public access to waterways, PFBC initiated the Boating Facility Grant Program. This program provides grant money to public entities to assist with establishing stream access points that are open to the public. Grants are awarded for land acquisition, project design, engineering, development, expansion, and rehabilitation of public recreational boat access facilities. The grants require a 25 percent match.

Within the project area, there are no official boat launch sites on any streams. In fact, the only boat launch in the project area is located at the 32-acre Hamlin Lake Park. Boating in the lake is restricted to non-motorized watercraft, such as row boats, canoes, and kayaks. Boats utilizing electric motors are permitted on the Marilla Reservoir; however, there is no boat launch.

Establishing official boat launch sites and developing a water trail for the headwaters of the Allegheny River will increase usage of the river for recreational purposes. The establishment of formalized access sites guides users to designated locations to access the streams, thereby limiting trespassing on private land.

Water trails are a series of public access points along a waterbody where paddlers can access the waterway. Development of the water trails on area streams, including Tunungwant Creek, Allegheny Portage Creek, Marvin Creek, Potato Creek, Oswayo Creek, and the Allegheny River is needed. Along with developing the needed access sites, signage and printed maps identifying access sites, safety features, and services available should be developed. For more information on boating visit PFBC website: www.fish.state.pa.us.

<u>Hunting</u>

Hunting is a popular form of recreation throughout Pennsylvania; there are over 33,000 acres of public lands open for hunting within the Allegheny River headwaters. Pennsylvania Game Commission (PGC) manages and regulates hunting in Pennsylvania. An individual can begin to hunt at 12 years of age after passing a hunter safety course.

The number of hunters in many states is rapidly declining, as it is in Pennsylvania. It is essential for future wildlife management and preservation of the hunting and trapping heritage of Pennsylvania that the recruitment of new hunters and trappers is successful. Since 1998, the sale of licenses has decreased. Table 5-1 list the number of hunting licenses sold from 1998-2008 (PGC, 2009a).

In an effort to increase hunting, youth have been targeted in two new programs being offered by the PGC—Junior License and Mentored Youth Programs.

Junior Hunting License Program

The Junior Hunting License Program allows youth between the ages of 12 and 16 to hunt. The program provides special hunting days where only youth hunters can hunt pheasant, wild turkey, and waterfowl. Junior hunters who have the proper tags may harvest an antlerless deer during the permitted season.

Mentored Youth Hunting Program

Mentored Youth Hunting Program allows unlicensed youth younger than 12 years of age to hunt with a licensed, adult mentor. Mentors must be 21 years of age and are held liable and responsible for the youth they are mentoring. The program is designed to give youth the opportunity to gain experience and to learn first-hand about Pennsylvania's hunting heritage. Through the guidance of a mentor, youth learn ethics, safety, responsibility, and the enjoyment of hunting. Mentored youth can hunt groundhogs, squirrels, and antlered deer. During the spring gobbler season, mentored youth may also hunt turkey. More information about the Mentored Youth Hunting Program is available on the PGC website.

Area sportsmen's groups organize hunts and youth programs in an effort to increase participation. Local sportsmen's clubs, in cooperation with PGC, host hunter safety courses that educated new hunters about laws and safety.

Pennsylvania state game lands are public lands dedicated to wildlife habitat enhancement, but are managed with an emphasis on game species. There are portions of six state game lands within the project area that provide 33,832 acres of public land for hunting. In addition, many private landowners permit

Table 5-1. Hunting Licenses Sold

Year	Licenses
1998	1,071,205
1999	1,033,315
2000	1,038,846
2001	1,047,820
2002	1,017,154
2003	1,018,248
2004	1,013,866
2005	964,158
2006	945,842
2007	924,448
2008	926,892

⁽Source: PGC, 2009a)

hunting on their property. However, before hunting on private property you should obtain written or verbal permission from the landowner. For more information about public lands open for hunting visit PGC and DCNR websites: http://www.pgc.state.pa.us and http://www.dcnr.state.pa.us.

Geocaching

Initiated in Portland, Oregon in 2000, geocaching is on the rise as a recreational activity. This adventurous treasure hunt game uses global positioning system (GPS) units to find hidden caches. Geocaching encourages technologically savvy individuals who might not otherwise venture to the outdoors an opportunity to enjoy their natural surroundings.

Originally called GPS Stash Hunt, the name was changed to geocaching because of the negative connotation of the word "stash." The name geocache comes from "geo," referring to geography, and "cache," a French word referring to a place to store or hide an item. Caches are hidden all over the world. The number of caches in an area varies depending on the interest of participants. For example, within 10 miles of Bradford, Pennsylvania, there are more than 300 caches to be found; while within 10 miles of Coudersport, only 19 caches were hidden as of October 2009.

This simple game can be played anywhere. Players obtain latitude and longitude coordinates to a cache site via the Internet. They then travel to the coordinate and search for the hidden treasure. When a participant finds a cache, they may take an item from the cache if they can replace it with an item of equal value. Each visitor, whether exchanging something from the cache or not, should sign the logbook providing information to the cache hider about who visited and when the cache was found. More information about geocaching is available on the geocaching.com website.

The Allegheny Geo Trail is a series of geocaches throughout 10 counties in northwestern and north central Pennsylvania. Each county, including McKean and Potter counties, have 10–20 designated caches, of which each seeker must find six or more to earn that county's coin. Seekers collecting six caches in each of the 10 counties are eligible for the Allegheny Geo Trail coin. For more information about the Allegheny Geo Trail visit the trails website: http://alleghenygeotrail.com.

Recreational Vehicles

All-Terrain Vehicle (ATV) and snowmobile use are popular recreational activities. An off-road vehicle, off-highway vehicle, or ATV is any motorized vehicle capable of cross-country travel on land, water, snow, ice, marsh, swampland, or other natural terrain. A snowmobile is an engine-driven vehicle designed to travel over snow or ice with an endless belt track or tracks, steered by a ski or skis, and has an overall width of 48 inches or less. The use of ATVs and snowmobiles is on the rise, and the improper or illegal use by some has given these activities a bad reputation.

DCNR, along with the Commonwealth of Pennsylvania, regulates the use of ATVs and snowmobiles as defined in Chapter 77 of the Pennsylvania Vehicle Law. In 2001, Act 68 modified the law requiring ATV owners and operators to register their vehicles. Snowmobile registration is required with DCNR. In addition, snowmobiles in Pennsylvania purchased after October 23, 2001 must have a title issued by DCNR. Older snowmobiles do not require a title until transferred to a new owner. ATV and snowmobile registration fees are used to finance efforts to develop and maintain trails on public lands, encourage trail development on private lands, to teach safety and trail etiquette, and for law enforcement.

Enhanced efforts are needed to educate riders to recreate in a sound manner. Youth snowmobile operators between the ages of 10 and 16 must complete a snowmobile safety course to ride on public trails. Youth under the age of 10 cannot operate a snowmobile on any public land. Youth ATV operators between eight and 16 years of age must complete an ATV safety course to permit them to ride on public

lands. Youth under the age of eight cannot operate an ATV on any public land. Youth operators under the age of 16 cannot ride on or across highways and roads.

Majestic Kamp and Lost Trails is a privately owned and operated campground with a network of legal ATV trails near Smethport, Pa. Established in 2001 as a result of landowners closing their lands to ATV use due to liability lawsuits and damages caused by irresponsible riders. It offers over 41 miles of maintained trails and features challenging mountain terrain along two, one-way loop trails. Additionally, a single-track for dirt bikes, a motocross area open to dirt bikes and ATVs, and a pee wee motocross track are available. Grooming is conducted regularly to control erosion and to maintain trail quality. Annual memberships, or daily usage fees are charged for the use of the facility. Majestic Kamp is open yearround, except during the two-week rifle hunting season following Thanksgiving. For more information visit the Majestic Kamp and Lost Trails website: http://www.majestictrails.com.

Other riding opportunities are nearby in the Alleghany National Forest (ANF) and Susquehannock State Forest. The ANF offers 70 miles of trails that restrict use to the Friday before Memorial Day through the last Sunday of September. The Willow Creek trailhead, located 11 miles west of Bradford, is the closest trailhead to the project area. Within the Susquehannock State Forest, 43 miles of trail are available for ATV use from the Friday before Memorial Day through the last Sunday of September. Access to the Township Road Connector is available at the Potter County Family Campground.

Snowmobile use within the ANF is restricted based on the depth of snow. Trails need to be covered with at least four inches of packed snow for optimal snowmobiling conditions. Trails are open from the day after the end of antlerless deer season—established by PGC—through April 1. For more information visit the ANF website: http://www.fs.fed.us/r9/forests/allegheny.

Sky Diving

Located on 122 acres at the Ceres Airport on the border of McKean County, PA and Allegany County, NY, is Freefall Oz Skydiving Center. The center provides skydiving opportunities for everyone from neophytes to experienced skydivers. Stressing safety, the center works with students on a one-to-one ratio making sure they are extremely comfortable before their jump. For more information visit the website: http://freefallozskydiving.com.

Environmental Education

Environmental education is "a learning process dealing with the interrelationships among components of the natural and human-made world, producing growth in the individual, and leading to responsible stewardship of the earth" (Pennsylvania Center for Environmental Education). As an ongoing venture with roots in the agricultural community, environmental education changes and advances as new techniques and technologies emerge.

Many organizations and agencies provide environmental education to people of all ages. Conservation districts, Pennsylvania Department of Environmental



Saulter Watershed Preserve is a 57-acre mixed pine and hardwood forest near Colesburg, PA

Protection (DEP), PFBC, PGC, and the U.S. Army Corps of Engineers (USACE) partner with local organizations, such as Upper Allegheny Watershed Association (UAWA) and Western Pennsylvania Conservancy (WPC) to host environmental education workshops, educate individuals and landowners, and provide environmental education programs to schools.

The Students Testing Aquatic Resources Together (START) Program is an environmental education program in which UAWA works with local school districts to get students out of the regular classroom and into streams to collect biological and chemical information.

Environmental Education Facilities

There are three facilities within the watershed that provide environmental education opportunities.

Oswayo Fish Hatchery, located near Oswayo in northwestern Potter County, features a raceway, earthen pond, and hatchery building with indoor early rearing, egg incubator units, and visitor's center. Displays within the visitor's center are non-interactive and static; however, potential to expand the visitor's center into an education center with interactive displays and educational interpretation does exist.



Old Red Schoolhouse and Wildlife Center owned and operated by world renowned Bwana Jim from the Bwana Jim Wildlife Show

The **Saulter Watershed Preserve** is a 57-acre mixed pine and hardwood forest with an educational center, one-mile interpretive nature trail, pavilion, and restrooms. It is located near Colesburg in Potter County.

Old Red Schoolhouse and Wildlife Center is located near Shinglehouse, within the old Sharon Center School. Numerous exotic animals find refuge at the center after their previous owners could no longer care for them. The center is open for scout groups, schools, summer recreation groups, and safari themed birthday parties.

The center is owned and operated by Jim and Linda Moulton as an educational center and wildlife sanctuary. Jim Moulton is also known as Bwana Jim as the Moulton's perform the Bwana Jim Wildlife Show around the world educating people about animals.

Historical Resources

Historical Overview

<u>Settlement</u>

Prior to 1784, the vast wilderness of the project area was occupied by Native Americans. Members of the Mohawk, Oneida, Onondaga, Cayuga, and Seneca nations joined forces during the 16th century. The Tuscarora nation joined them in the 18th century, forming the Iroquois League known as the Six Nations.

In 1784, a famous Seneca war chief called Cornplanter and Captain Aaron Hill, a subordinate chief of the Mohawk nation, signed the Treaty of Fort Stanwix as representatives of the Six Nations, transferring ownership of the Ohio lands to Commonwealth of Pennsylvania. The Ohio lands include the area north of the former purchase line in Indiana County, Pa (granted in the 1768 Treaty of Fort Stanwix) to the northern Pennsylvania border. However, many tribes, including a tribe of Seneca living along the Allegheny River valley, did not honor this treaty believing that Cornplanter and Hill did not have authorization to concede land. Members became hostile to any European settlers who tried to take up residence.

In 1794, the Six Nations gave up their claim to the Ohio region when they signed the Treaty of Canandaigua. This treaty provided the Seneca nation aboriginal lands in Cattaraugus County in southwestern New York, where they established the "Allegany Indian Reservation" along the Allegheny River north of Bradford, Pa.

European settlement in the region was slowed, not only by the resistance among Native Americans, but also by contradicting land titles. Early land titles in some areas were issued for the same property to different owners causing confusion and frustration among settlers, ultimately deterring settlement in the project area.

In 1798, Francis King came to Ceres Township—which at one time covered the entire McKean



Historical marker in Port Allegany, PA

County territory—to survey the Keating Lands, ultimately becoming the first settler to reside within the project area. Along his journey, he and his men camped at the confluence of Allegheny Portage Creek and the Allegheny River, where they made dugout canoes to continue down the Allegheny River. The location of their camp was given the name, "Canoe Place," which eventually became Port Allegany.

Settlement in Port Allegany began in 1815, when Samuel Stanton purchased a track of land from the Keating Lands, which he visited the next year. During his visit to his new property, Mr. Stanton erected a cabin before returning to Williamsport for his family.

Unfortunately, Mr. Stanton died on the return trip to his new homestead. As a result, Mr. Stanton's son-in-laws, Lordwick Lillibridge and Stanton Steele, and their families became Port Allegany's first settlers. They established the village, which they called Keating, in 1826. In 1838, the name was changed to Port Allegheny. The spelling of the town's name was changed to Port Allegany in 1840.

During its early days, Port Allegany prospered as a small lumbering town, containing several businesses that supported the lumber industry, such as toothpick and butter dish manufacturing. The town's location at the confluence of Allegheny Portage Creek and the Allegheny River made it a significant center of activity, especially during the railroad era.

Up the Allegheny River from Port Allegany, located in Potter County, is the small village of Roulette. In 1831, a colony of Germans settled in the region, calling it Streetertown, named for the number of streets in the village. The name Dutchtown was later adapted, honoring the German settlers who lived there. Finally, it was renamed Roulette after John Roulette, who was a partner of John Keating. The area remained fairly undeveloped until the railroad came in 1883. With access to the railroad, numerous houses and businesses were established in the region, including a large sash and blind factory and a steam mill. However, the village never formally organized as a borough, and it remains an unincorporated village in Roulette Township.

Further upstream, the town of Coudersport formed where Obadiah Sartwell, Potter County's first settler and blacksmith, settled. He later moved to the mouth of Sartwell Creek—named after him—near Burtville, west of Roulette Township. Growth within Coudersport was slow until the 1880s and the establishment of the railroad. The railroad brought about a population boom and attracted manufacturing jobs, such as the glass plant, hub factory, condensed milk company, and clothespin factory. The population grew from 677 residents in 1880 to 3,200 residents in 1900.

The earliest settler in the Oswayo valley is believed to have been Jaundrie, a Frenchman who established residence along Oswayo Creek near Shinglehouse in 1806. He built a log cabin covered in hand-made, wooden shingles, for which the town was named. Lumbering was the early occupation among settlers in Shinglehouse, mostly due to the vast amount of white pine forests in the area. Prior to 1830, three saw mills were established. Lumber remained the major industry until mid-century, when agricultural practices were engaged. The growth of the town was slow until the New York Pennsylvania Railroad extended into town. This brought manufacturing into the valley, including the establishment of the Palmer Window Glass Plant in the 1900s and Shinglehouse Bottle Plant in 1904.

Smethport, located at the confluence of Marvin and Potato Creek, was first surveyed by Dutch surveyors in 1807. The vast resources of the timber, oil, and railroad industries throughout McKean County increased monetary flow into Smethport, the governmental headquarters and financial center of the county. In 1811, William A. Williams built one of the earliest homes in Smethport along what is now East Main Street. The current structure replaced the original structure in 1828. Many of the early structures within Smethport remain today as part of the Historic Smethport Mansion District.

A well-known resource, Hamlin Lake, was originally created in 1823 by John Applebee to power an up and down saw. Once a mill pond, it stored logs waiting to be cut at the Gifford Sawmill. Currently, the lake is the centerpiece of the recreational complex at Hamlin Lake Park.

The Underground Railroad—a series of routes and safe houses that helped escaped slaves in route to freedom in Canada—was active throughout this portion of Pennsylvania. Many citizens harbored or guided escaped slaves through the rugged terrain of north central Pennsylvania into New York. The Medbury House, built in 1828 near McCoy's corners in Smethport, was just one of many stations along the Underground Railroad.

Attracted to the region for the vast forestlands, pioneer settlers first arrived in Bradford between 1823 and 1827 to engage in lumbering and agriculture activities. John Melvin, who established here in 1826, and the Hart family in 1827, were among those early settlers. In 1837, Col. Levitt Little, an agent for the U.S. Land Company, purchased 250,000 acres in and around Bradford, where he established a residence in what was then called Littleton. Littleton remained a rural village, with the larger villages of Tarport establishing to the north, and DeGolier to the south. In 1858, the name Littleton was changed to Bradford. Growth within Bradford was slow until 1871, but the village developed rapidly after successful oil drilling. Bradford was incorporated as a borough in 1873, and within three years, the once quiet forest village was transformed into a bustling city full of people, houses, and oil wells.

Industrialization

The region's early industries were typical of early settlements within vast wilderness. Scattered over the landscape were several mills, tanneries, blacksmiths, cabinet makers, and wagon shops. Logging and agriculture were the primary occupations of early settlers, and these were daunting jobs.

The Oswayo valley was fortunate to have one of the best and most extensive stands of white pine in Pennsylvania. The trees grew so close together that underbrush was rarely seen. These massive trees grew 100–150 feet high, with the lowest branches approximately 50 feet from the forest floor. The lumber and logs were rafted down the Allegheny River to Pittsburgh or banked and rolled into the water during spring floods, then transported to the mills downstream.



Hamlin Lake Park in 2009

Early mills, particularly before the 1830s, were small, family operations and integral components of functional farms. Lumber was harvested during the winter months, as farming was not viable during winter weather, and it was easier to transport logs across frozen ground to nearby waterways. This let farmers concentrate on their fields in the summer when water levels were too low to transport logs or operate mills.

In 1798, Francis King built the first sawmill in Ceres. According to Lumber Heritage Region of Pennsylvania (LHR), eight more mills were built throughout the project area to process logs into lumber. In 1815, a joint saw and grist mill was built along the Allegheny River in Burtville, Potter County. Lumbering maintained its small, family-operated roots until 1837, when industrial lumbering began with the formation of the Oswayo Lumber Company.

Prior to the 1870s, hemlock was not a desirable lumber; in fact, the value of hemlock was half that of the value of pine. Hemlock did not become commercially viable until the 1870s, as the remaining virgin pine forests were dwindling; only 1,000 acres remained by 1879. The first sawmill to cut hemlock commercially was built in Keating Township in 1874. Additionally, the use of leather was on the rise, as it was being used for machinery belts in industrial plants. The increased need for leather opened the door for a new major industry in the region—bark peeling.

In 1877, the first large tannery was established in Oswayo. Tanneries used tannic acid extracted from the bark of hemlock trees, which was needed for the leather tanning process. Tanning is a complex and labor intensive process involving procurement and processing of hemlock bark, as well as cleaning, scraping, tanning, coloring, and drying of hides. Additional town tanneries—Coudersport Tannery and AJ Tucker Tannery—were established within the project area (LHR, 2001).

Another industry that led to the rise of communities within the project area was the gas and oil industry. Oil was known to be present throughout northwestern Pennsylvania and southwestern New York for sometime. Many of the oil reservoirs were located near the surface. Fractures within the underlying rocks caused oil seeps. Native Americans harvested the oil for medicinal purposes, and used it as a waterproofing sealant. Even early settlers skimmed oil from seeps for lamp fuel and machinery lubrication.

When oil was first retrieved, it was viewed as a byproduct of drilling salt and drinking-water wells. Wells containing oil were often abandoned. The first successful, intentionally-drilled oil well in the U.S. was located in Titusville, Pennsylvania in 1854.

In 1871, the first successful well in the Bradford Oil Field was exposed, spurring the oil boom. Once oil was discovered, numerous derricks were established. Towns appeared soon after, attracting scores of people to the region. Early wells were drilled haphazardly with no knowledge of geological structures.

In 1880, natural gas was discovered in the region by two boys in Sharon Township. When the boys moved a flat piece of sandstone (on what was then the Graham Farm) they noticed the gas escaping from the ground. That evening with their father they constructed a barrel suit using gas pipe and clay to collect the gas. By June, 1884, the first gas producing well was struck north of Shinglehouse, yielding 18 barrels a day.

Postal Delivery

The current postal system used in the U.S. was developed from the messenger and horseback delivery system utilized in the 1800s. Prior to the development of a postal system, communication depended on friends, merchants, and Native Americans carrying messages back-and-forth.

Originally started by private services, mail delivery occurred every two weeks. Depending upon weather conditions, trips took three to five days for carriers. By 1802, the U.S. Postal Service took over, and delivered mail once a week to the nearest tavern or store.

In 1816, the first mail route was established through the Allegheny River headwaters region, from Olean to Jersey Shore. The first post office was established in Ceres, and mail was carried by horseback. In 1825, mail was brought into Coudersport by horseback once every other week from Jersey Shore on its way to Olean (Beers, 1890).

Many families waited days, weeks, or months, coordinating trips for supplies, in order to pick up their mail. In 1893, the introduction of rural delivery no longer required residents to wait or schedule trips to get their mail. Proponents' against rural delivery claimed that safety and cost were not worth the convenience. Originally, the cost of sending a letter varied based upon its intended destination. Letters that traveled less than 40 miles cost 8 cents, 40–90 miles cost 10 cents, 90–500 cost between 12.5–20 cents, and anything over 500 miles cost 25 cents. Beginning in 1863, postage was charged by the weight of the letter or package (U.S. Postal Service).

As mail delivery grew, so did the need for infrastructure. The development of many roadways was a byproduct of postal delivery; local government began to extend and improve highways after the postal service refused rural delivery on routes that were in poor condition.

As routes extended, stage coaches were used to transport mail. As time went on, the introduction of the railroad further advanced postal delivery. Trains were able to transport mass volumes of mail more rapidly.

Transportation

The initial transportation in the region was via the waterways for settlers arriving from Philadelphia and New England. Other settlers entered the region using old Native American paths. These early paths were mere foot or walking paths used for trading, hunting, and during times of war. The paths extended long distances and often intersected, creating a system of trails.

The Native American paths were too narrow for European settlers entering the region with their horses and other pack animals. In order to get through, they widened the foot paths into pack trails. As the region was enhanced, pack animals were no longer adequate for carrying the needed supplies and were replaced with larger, heavy wagons. Once again, the paths were deemed insufficient and were widened, making way for the establishment of early roads.

In 1807, the State Commission authorized the construction of an east-west roadway across the northern tier of Pennsylvania, creating a pathway for development. Charming villages, communities, and towns matured along the route. In 1925, this tranquil roadway through the pristine forestland of McKean and Potter counties was incorporated as part of U.S. Route 6, linking the region to Cape Cod, Massachusetts and Long Beach, California, becoming one of America's first transcontinental highways.

There wasn't a dire need for the railroad industry throughout Pennsylvania until the establishment of the Erie Canal. With the establishment of the canal, possibilities grew for shipment of goods and products into and out of the region; the railroad industry could transport goods and products to and from the canal.

The introduction of railroads to the region played an important role in the lumber history. Once railroads were established throughout the region, it was more economical and beneficial to transport timber via the railroad. This ended log drives, booms, and rafting of timber. Utilizing railroads, the logging industry could continue throughout the year, no longer needing to rely on spring floods to

transport timber to mills or markets. The Coudersport and Port Allegany Railroad was used to haul timber from Ulysses to Coudersport before it was abandoned in 1970.

Railroads assisted in the delivery of mail and passengers, reducing travel time and resulting in quicker services. The majority of the railroads throughout the region were used for hauling of goods, such as the Smethport Line from the Larabee "Y," which primarily hauled coal. The majority of rail lines within the project area are located within the McKean County portion of the watershed. Most of the railroad lines that existed throughout the area in 1895 have become part of the Western New York and Pennsylvania Railroad, including McKean and Buffalo Railroad; Kendall and Eldred Railroad; and Olean, Bradford, and Warren Railroad (Pennsylvania railroad stations past and present).

There were at least 13 train stations located within the Allegheny headwaters during the height of the railroad industry. Stations were located in Bradford, Coryville, Coudersport, East Bradford, East Smethport, Eldred, Keating Summit, Lewis Run, Mount Jewett, Ormsby, Port Allegany, Roulette, and Smethport (Pennsylvania railroad stations past and present).

Education

Early in the settlement of the region, educating youth became an important task. The earliest known school within the region was located in Ayers Hill. It was conducted as a subscription school during the winter of 1816–1817, where a dozen students attended classes. Early students were primarily males who attended during winter months when not needed in agricultural fields. Young females stayed at home to help their mothers with housework, such as cooking, cleaning, and sewing.

As the population of the region increased, so did the need for additional schools to educate students. Schools were established throughout different portions of the region, many being temporary and only teaching the basics of reading, writing, spelling, and mathematics. The majority of the schools were established during the 1830s and 1840s. This was due to the passing of the Common School Law in 1834. The Law made it possible for anyone to attend classes at no cost regardless of age, sex, class, or race. By 1887, within the City of Bradford there were 31 schools educating 1,880 youth costing the City an average of \$1.03 per student.

Many of the first schools were one-room schoolhouses where students of all levels were educated in one classroom. The first graded school in Potter County was established in Oswayo in 1866. However, by 1953 the majority of schools throughout Oswayo Township were closing and merging students into one large school system—the Oswayo Valley School in Shinglehouse.

Origin of Names

The name "Allegheny" has several possible origins; most believe it came from the Lenape tribe of Native Americans, and that it is translated as "fine river." Others suggest that the name came from an old Lenape legend about another nearby tribe known as "Allegewi," who once resided along the river. According to David Zeisberger, a Moravian missionary who lived among Native Americans, the entire watershed is called the "Alligewinenk," meaning "land into which they came from distant parts." However, the Moravian called the river "Alligewi Sipo," from which European settlers made "Alleghene." The Six Nations called the river "O Hi Yo," or Ohio most likely believing that the Ohio River began in Potter County as opposed to where it begins today in Pittsburgh when the Allegheny and Monongahela Rivers meet.

The name Oswayo could have come from two different Native American words; either "Os-wa-so" meaning "many waters" or "O-sa-ayeah," which means "pine forest."

Significant People

Charles Cole, a Coudersport native, was a talented salesman. Though he held many salesmen positions, his most notable was with the Rochester Times Recording Company, which became International Business Machines or IBM. Before his death in 1961, Mr. Cole sought the establishment of a hospital within the community of Coudersport. In 1967, with the generosity of his widow Edith Pinney, the Charles Cole Memorial Hospital opened.

Walter Hall, an eccentric stone worker from Port Allegany, Pa. built several structures in the region, including the stone gateway to Port Allegany Community Park (Port Allegany High School), Lynn Hall, and the entrance to McKean County Memorial Park. However, he is most well-known for his role in constructing Fallingwater, the famous Frank Lloyd Wright-designed house constructed over a waterfall in Mill Run, Pa. for the Kaufmann family.

James Herzog developed the Wooly Willy—a magnetic art toy—in Smethport in 1955. Herzog, while working for Smethport Specialty Company, gathered magnetic shavings—a waste product from magnets that were rounded off using a grinding wheel—placed them on a piece of paper, and began moving them around in patterns using a magnet. His curiosity led him to envision the simple Wooly Willy toy.

Joshua Kinney, from Coudersport, was a relief pitcher for the St. Louis Cardinals. Called up to the major leagues in 2006, his first major league pitch was hit for a home run by Ryan Langerhans of the Atlanta Braves. He pitched in two games of the 2006 World Series, and obtained a championship ring when the Cardinals beat the Detroit Tigers.



Lynn Hall was built by Walter Hall along Route 6 near Port Allegany, PA

Historical Sites, Structures, and Districts

In 1966, the National Historic Preservation Act established the National Register of Historic Places. Listed properties include districts, sites, buildings, structures, and other objects significant to American history, architecture, archeology, engineering, and culture. Although maintenance to preserve the historic integrity of sites and structures is encouraged, private property owners can maintain or manage their property as they see fit.

Pennsylvania Historical and Museum Commission manages the register for Pennsylvania. The State Historic Preservation Officer submits nominated properties to the State Review Board. If the property owners, or the majority of the owners (if the property is owned by more than one person),

object to the nomination, it is sent to the National Parks Service for a determination of eligibility without the property being listed in the National Register (National Parks Service, 2001).

Within the project area, six sites and three districts have been listed on the National Historic Registry. There are several other historic sites within the project area that could be eligible for submission to the registry, such as the McKean County Home in Smethport.

The **Bradford Armory** was built for Company C, 16th infantry, of the Pennsylvania National Guard. The Pennsylvania National Guard organized in Bradford in September of 1880. The Guard used the Producer's Petroleum Exchange building to store weapons, ammunition, and uniforms. In 1905, when the State Armory Board was created, it initiated the construction of an Armory in Bradford. The Armory was completed with an official dedication ceremony held on November 26, 1912. The Bradford Armory was
placed on the registry in 1999 for its unique architectural style. The layout of the building is a classical "T" design consisting of a drill hall, rifle range, kitchen, locker room, class rooms, and offices.

Bradford Downtown Historic District encompasses the traditional core of downtown Bradford. Within the district there are 166 buildings (of which three are individually listed on the National Registry), 136 significant structures, and 27 non-contributing structures.

Crook Farm Homestead is a historic homestead located on 80 acres northeast of Bradford in Foster Township—along what is now Seaward Avenue Extension. It consists of the farmhouse, carpenter shop, barn, bank building, and school house. The site is currently owned and operated by Bradford Landmark Society as a tourism and education center. Tours of the farmstead are available on weekdays during the summer.

The farmhouse was the original building, erected in 1847 is believed to be one of the oldest buildings in the area. The house remained in the Crook family throughout four generations and 125 years before the historical society purchased it in 1974. The house was renovated to reflect the 1870s era.

In 1875, the Olmstead oil well was drilled on the homestead. It was the first producing well in the Bradford Oil Field. The Crook family used the proceeds from the well to pay off their debt and repair the farm house.



Crook Farm Homestead in Bradford, PA

School house No. 8, which was built in 1850 or 1889 on West Corydon Extension, was moved to the farmstead in 1975. The school—originally established for children of wood chemical work employees—functioned until 1929, when students merged into the West Branch School. Every spring, Bradford Landmark Society conducts living history school programs for Pennsylvania and New York students in grades 4–6. Students spend a day at the farm experiencing what life was like in the 1870s with activities, such as washing clothes in wash tubs, pressing fabric using irons heated on a wood burning stove, dipping candles, using hand tools, and weaving on a loom.

Each August, the Society holds its annual Crook Farm Country Fair, providing demonstrations, live music, tours of the homestead, story tellers, children's activities, and food. Demonstrations represent trades during the early settlement of the region, such as broom making, candle making, weaving, basket weaving, quilting, and wood carving. For more information about the festival or Crook Farm visit Bradford Landmarks Society's website at http://www.bradfordlandmark.org.

Coudersport Courthouse stirred up quite a controversy during its construction between 1951 and 1953. The majority of the controversy was related to the use of tax monies to pay for a structure at a time when residents felt it was to extravagant and unneeded. It was listed on the registry in 1975 for its Greek revival style blended with Victorian elements.

Coudersport Historic District is a unique location within Potter County. For the most part, the district has remained frozen in time with the Victorian streetscape being largely untouched. The district covers 306 acres with 73 buildings.

The **Coudersport and Port Allegany Railroad Station** was added to the National Historic Registry in 1976. Originally built in 1900, the railroad station was located along the 17-mile Narrow Gauge Coudersport and Port Allegany Railroad. The station, along with the railroad, was sold in 1964 to the



Rufus Barrett Stone house is uniquely positioned between Tunungwant Creek, Boylston Street, and East Washington Street

Wellsville, Addison, and Galeton Railroad, and then abandoned in 1970. The Borough of Coudersport purchased the station in 1975 and renovated it for office space.

Lynn Hall is located approximately 6.5 miles west of Port Allegany in Liberty Township. Built by Walter Hall and his son Raymond Viner in 1935 as a restaurant and residence, the building was inspired by Frank Lloyd Wright's organic movement. Impressed by the stone work within Lynn Hall, the Kaufmann family hired Walter Hall to construct Frank Lloyd Wright's design of Fallingwater.

Old Bradford City Hall was built in 1897 with an elegant Victorian motif, similar to most rural communities. It was designed as a large municipal building that balances function with art. It replaced Bradford's first city hall that was

destroyed by fire. The building functioned as the city hall from 1897 to 1961, when it was deemed too small and a new city hall was constructed. Old Bradford City Hall was listed on the registry in 1976 over concerns for its possible destruction. The hall was renovated in 2006 at a cost of five million dollars and the building contains a variety of offices and the VA Clinic.

Rufus Barrett Stone House was built in 1903 by Rufus Barrett Stone. The triangular shaped, flat iron building was a law office and residence for Mr. Stone until his death in 1929. The site was listed on the registry not only for its unique shape, but because of its creator; Mr. Stone was a very influential business man serving on various committees and boards during his lifetime.

Local Attractions and Annual Events

Allegheny Arms and Armor Museum, located in Smethport, is open daily from 10:00 a.m. to 6:00 p.m. The museum protects and preserves military vehicles, armor, and weapons so future generations can observe and study them. The museum is dedicated to all the men and women who have served in the armed forces. Displays at the museum include water craft, air craft, assault vehicles, tanks, weapons, uniforms, and other military relics. For more information visit the website http://www.armormuseum.com.

Bradford Landmark Society—an organization founded in 1969 that is dedicated to the preservation and dissemination of the Bradford and Tuna Valley area's history —maintains two historical exhibitions. The Herbig Bakery, the organization's headquarters, contains an extensive collection of historical and genealogical materials while the Crook Farm Homestead exhibits the old day life in Bradford.

The **Coudersport Consistory** is unique because of its location in one of the smallest towns to ever have a consistory. The consistory's membership is larger than the town's population. The consistory house is located at the site of the first brick store in Potter County and the former home of Isaac Benton. In 1887, Mr. Benson began construction of a new three story brick house, one of the most elaborate dwellings in the northern tier. Located on 27 acres along the banks of the Allegheny River, the new home was quite elegant featuring different polished wood trims in each room. The third floor featured a 30 by 30 foot open room for use as a billiard room for the Masons.

Following Isaac Benson's death in 1894, his widow remained in the home until the mansion and surround property was transferred to the Lodge of Perfection on March 6, 1912. Since that time a cathedral building, large auditorium, and adjoining rooms have been added. For more information visit their website: http://www.coudersportconsistory.com.

The **Coudersport Theatre** has been in operation in Coudersport, Pa. since it was built for \$25,000 in 1922. Over the years, the theatre was renovated numerous times from a hall where silent pictures were

once shown to the movie theatre it is today. The theatre can seat 276 people and is open evenings Thursday to Monday. It is among the last small town movie theatres still in operation in the U.S. For more information about the theatre, its history, and what movies are playing, visit their website http://www.coudersporttheatre.com/index.html.

Eldred World War II Memorial Museum opened on Memorial Day in 1996. The museum is dedicated to the memory of U.S. fighting forces and citizens on the home front who supported the war efforts, such as those who worked in the British and American munitions plant in Eldred to produce bombs, mortar shells, and fuses. The museum features a large research library and exhibits that are dedicated to preserving the history of World War II. More information about the museum, including hours of operation



McKean County Historical Society is located in the "Old Jail," which is believed to be haunted by a convicted murder who threatened to haunt the jail after his execution

and cost, can be found on their website at http://www.eldredwwiimuseum.org.

McKean County Historical Society Old Jail Museum's "Windows of Time" is a historical display about the life, times, style, and towns within McKean County. Additionally, the museum features exhibits about the Bucktail Regiment and the oil boom. The museum also houses the Society's library, which contains historic newspapers, cemetery listings, and genealogical information.

Olga's Living with Art and Yarn is a local store in Coudersport, Pa. that sells a wide selection of hand-made fine arts and crafts; hand-knit, wearable art created by Olga Snyder; and an extensive selection of luxury yarns and natural fibers. Her art is inspired by the natural resources and landscapes within the Pennsylvania Wilds region. In addition knitting and arts and craft workshops are offered. For more information visit the website: http://www.eggdecorator.com/default.aspx?pageId=1

Penn-Brad Oil Museum is located along Route 219 south of Bradford. The museum features artifacts associated with the oil boom in northcentral Pennsylvania in the late 1800s, including old equipment and memorabilia, as well as a 72-foot drilling rig. The museum is open from Memorial Day through Labor Day. For more information visit the planet ware website: http://www.planetware.com/bradford/penn-brad-oil-museum-us-pa-pb.htm.

Potter County Historical Society maintains a reference library at its headquarters in Coudersport, Pa. The library contains over 3,000 archives of reference and genealogical materials. The Society is open on Mondays and Fridays from 1:00 p.m. to 4:00 p.m. or by appointment. A catalog of the library's resources can be reviewed on the Historical Society's website at: http://history.pottercountypa.net.

Potter County Marathon, also known as **God's Country Marathon**, is a 26.2-mile race starting in Galeton and finishing in Coudersport. According to Runners' World magazine, the race is classified as one of the "Top Ten Toughest" marathons. During the course of the race, runners transcend 1,124 feet to

the top of Denton Hill, and then make their way down 684 feet to the other side of the large hill. More information about the race is available online at http://www.pottercountypa.org/.

Smethport's Mansion District is a compilation of houses built within the Smethport area during the mid-to-late 1800s when lumbering, oil drilling, and railroading were the primary industries and the economy in Smethport flourished. A self-guided walking tour highlights the town's history and elegant architecture. Identified in the district are 32 mansions tucked away among a variety of charming shops and locally owned restaurants. For more information visit http://smethportpa.org/heritage/mansion-district-walking-tour-brochure.

The Annual **Tioga-Potter Counties Maple Festival** is held the first weekend in May in Coudersport, Pa. Festivities include a carnival, games, maple products and demonstrations, live music, star gazing, food, crafts, and vendors. For more information visit Coudersport Chamber of Commerce website: http://www.coudersport.org/events.php

Zippo/Case Museum and Visitors Center opened on July 18, 1997 in Bradford, Pa. The facility traces the history of the Zippo lighter and the Case knife in Bradford. Exhibits include hands-on displays, interactive activities, and the inside story on how Zippo and Case products are made. A museum store is on hand. The museum is open Monday through Saturdays from 9:00 a.m. to 5:00 p.m. For more information visit the Zippo/Case Museum website: http://www.studioshowroom.com/zippo/museum.html.

CHAPTER 6. ISSUES AND CONCERNS

One of the most important steps in the development of a watershed conservation plan is providing opportunities for local residents to express their concerns and address issues within the watershed area. Local stakeholders were given the unique opportunity to give their perspective on topics affecting everyday life in the region. Initial meetings, school visits, public and municipality surveys, and key individual interviews were conducted in an effort to gather this public perspective. Expressed views and opinions represent those of the stakeholders, and do not necessarily reflect the views and opinions of the Western Pennsylvania Conservancy (WPC) or representatives of the project steering committee.

Meeting Summaries

Initial Meetings

In March 2009, a series of three meetings were held for the McKean and Potter County communities, as well as surrounding communities, in an effort to develop a plan for the future of the region, in regards to the Allegheny River and its tributaries. These meetings were hosted by WPC, as well as Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Recreation and Conservation, and local partners. Those who attended were given an opportunity to offer their input concerning the natural and community resources in the region.



Initial public meeting held in Bradford March 2009

School Visits

From December 2008 to May 2009, three high schools—Coudersport High School, Port Allegany High School, and Smethport High School—in the area were visited to gain input from the students of the region. Students discussed a wide variety of topics in regards to the region, such as likes, recreation, needed improvements, and potential projects. The results of the school visits will be identified later in this chapter.

Surveys and Interviews

Surveys and interviews of key individuals were performed to get a better understanding of the thoughts, feelings, and ideas of the local residents in this region. Surveys were distributed in an effort to obtain information pertaining to the importance of certain aspects in the area. It asked questions that covered watershed values, the importance of recreation, key issues to address in the plan, and lastly, what amenities are lacking in the area.

Interviews of key individuals in the area were also performed in an effort to gain information with regards to the region. The interviews consisted of questions about how the area has changed over the years, the needs of the community, recreational opportunities, positive and negative features of the watershed, and potential projects. The results of both the surveys and interviews will be identified later in this chapter.

Issues and Concerns

Issues and concerns of the community members in the watershed region will be identified and summarized in the following sections. The issues and concerns about to be discussed have been

developed from the information gathered through the initial meetings, school visits, surveys, and individual interviews.

Water Resources

The importance of the water resources in this area cannot be stressed enough. The area contributes to the beginning of three major rivers in Pennsylvania: the Genesee, Allegheny, and Susquehanna rivers. It also offers recreational activities, such as fishing and boating, that are of major importance to the surrounding community members. Overall, the local community suggests that water quality is the most important issue in relation to the project.

<u>Brine Usage</u>

One concern of citizens in the region is the usage of brine as a means of dust control on local dirt and gravel roads. Brine is water that is saturated with sodium chloride and is commonly used for this purpose. The local community residents would like to see that the use of brine be stopped in an effort to help preserve the natural water resources in the area.



Downtown Bradford during a storm event

Stormwater Management

The community residents suggested that they have a concern over the management of stormwater and its possible effects on the local water resources in the watershed area. They felt that something must be done to improve the management of stormwater to preserve the overall water quality in the area.

<u>Stone Quarries</u>

Another area of concern of the local communities is the large amount of stone quarries throughout the watershed. The stone quarries are a source of erosion and can lead to reduced water quality.

Sedimentation to Local Streams

Another concern of the local community is the issue of sedimentation to local streams. They want to see more projects start in an effort to reduce the amount of sedimentation and preserve the quality of the local water resources.

Infrastructure

There are many issues relating to the infrastructure of the watershed area. One of the first issues is the lack of roads in and out of the region, making it difficult for both the local population and tourists to travel. Some local residents suggest that the area needs an interconnected trail network that connects existing trails and leads to local businesses. This suggestion included the utilization of township roads, old railroad corridors, and state game lands in order to create this network. Overall, the ability to travel in and out of the region, as well as throughout the region, is an area of major concern to the local population.

Cell phone connectivity and high speed internet connection are both poor in the area, which is another concern. The surrounding community members feel that the lack of these two amenities deters tourists from visiting and inhibits business success. They also feel that there is a definite lack of shopping opportunities, as well as gas stations, to serve both tourists and the local citizens. In the hopes of increasing tourism to the watershed area, some suggest the construction of more public restrooms, visitors' centers, and better community maintenance of houses, buildings, and trash collection. Another main point that was brought up in one of the initial local meetings is the unfinished 600+ acre golf course in Potter County. The local community wants the golf course to be put to better use, with some suggesting that it be restored to a more environment-friendly state.

Garbage and recycling methods and systems used in the area need significant improvement as well. The local residents feel that this would be a good first step in an effort to minimize litter in the area. As of April 2009, recycling within the project area had ceased.

Employment

Employment opportunities are lacking in the region. Many local residents feel that the area needs more diversified opportunities for employment. They are also burdened with high unemployment and healthcare difficulties. Some suggestions include better job training and volunteering. The overall perception by the local residents is that more volunteering can lead to effective projects that will help the watershed area, such as trash clean up, recycling, and removing invasive species.. The major employment industries in this region are hospitals, farms, forestry, oil/gas maintenance, manufacturing, education, and technology.

During the visits to local high schools, one of the questions posed was whether the students would return at an older age to seek employment in the area. Those that said no suggest that there are better opportunities elsewhere, the job market is better in other areas, the local communities are too small, and that there is a lack of businesses to create more jobs for the region. It is important that the youth of the area maintain a positive outlook for the region's future in both economical and environmental aspects. This issue of employment opportunities is important to the students of the three local high schools.

Another major issue in the area is the return of the gas and oil drilling industry. It has helped to revitalize the area in terms of unemployment, but some local residents suggest that this type of industry can be detrimental to the health of the environment. Overall, they feel that it is a good thing in the sense that it is bringing in more jobs, but it must be properly regulated in order to preserve and protect the area. Another industry that has similar issues is logging. It provides local jobs, but at the same time, the local population feels that it must be properly regulated to preserve the area's forests and natural habitats for wildlife and clean water.

Legal and Political

From a legal standpoint, the local communities feel that something must be done with the regulation of several activities, such as developing farmland, mineral extraction, timbering, ATV use, and land-use. Overall, there should be better regulation for developing farmland and the mineral extraction industries. In 2009 alone, there were 500 applications for gas and oil wells in Potter County, which illustrates the importance of proper regulation. The local citizens also want to see improved timbering management, as well as education of timber harvesters, to encourage the use of sustainable methods and techniques. Unrestricted ATV use is also an issue in the area that must be addressed. Suggestions included the establishment of designated trails, as well as the creation of an ATV recreation park. Lastly, there are some concerns and issues with land-use regulation in the area. Because land-use regulations change with ownership of public lands, there needs to be more consistency among different public land agencies to avoid any confusion.

There is a concern that there is not enough political involvement in conservation practices in the watershed area. The perception from the neighboring population is that the local government needs significant improvements in its infrastructure. This way, the local government will have the ability to become more involved in conservation activities, specifically with raising money for said activities. The lack of funding is a concern of the local residents, and they feel that something needs to be done with the

local government to raise more money. Other issues that they want to have addressed by the local government are the increasing crime rate and illegal dumping within the watershed area.

Recreation

The headwaters of the Allegheny River watershed lends itself to numerous recreational activities due to its many high quality trout streams, beautiful national forest access, and several trail associations. Several of the recreational opportunities that exist in the area include, but are not limited to, fishing,



McDowell Trail access from University of Pittsburgh-Bradford Campus

hunting, ATV riding, biking, skiing, hiking, wildlife viewing, and boating. The major issue in the area is the preservation of these wonderful recreational opportunities.

One concern is that the local residents will lose the outdoor recreational areas due to landowner postings. A suggestion that would ensure that hunting will remain available is a program proposed by the PA Game Commission. The goal of the program is to keep private land open for public access in order to maximize the available hunting land in the watershed area. As part of the program, private landowners are offered an incentive, such as a tax break, to keep their land open for public use, and the PA Game Commission would then patrol and enforce regulations on the land.

Biological

The main concern here is the destruction of habitats for certain species. The local residents presented their concern for certain species, such as the woodcock, warblers, and rattlesnakes. Protected areas already exist for these three, but more management needs to take place in order to sustain these protected environments. There is also a call for early successional stage forest, in terms of small shrub and brush trees, in order to maintain a habitat for these species. There are also issues with a wide variety of invasive plants and insects in the area.

Other concerns are related to the decreased population of certain animals, such as deer and rabbits, and the issue of poaching. One resident stated that it seems the population of these two animals has decreased dramatically over the past ten years, and suggested that poaching may be a cause. She said that she hears gunshots in the early morning hours, such as 1:00 a.m. and 3:00 a.m., and feels that something must be done to better police poaching in the area.

A number of people throughout the local communities feel that the local wildlife is exceptional and would like to see projects developed to preserve their existence and natural habitats. The overall feeling is that the wildlife in the area provides an excellent draw for tourists who are looking for a good area for outdoor recreational activities, such as bird watching, hunting, fishing, and wildlife photography.

Cultural

There are some concerns with cultural resources in this watershed area. First, the local community feels that there is a need for conservation programs to be offered to both school-age children and adults. One suggestion is the creation of adult environmental education programs with the focus being on balancing economic growth with environmental issues. Similar programs should be offered to the area's youth, as well, in order to promote conservation and outdoor recreation.

Another major cultural issue is tourism. Seasonal recreational opportunities limit the ability for yearround tourism. Along with this, access to recreational lands and streams is limited in some areas. The local residents feel that tourism is, for the majority, a good thing, but it has its downsides. Even though it brings in money to the local economy, poor behavior of tourists can lead to landowners increasing postings. An influx of tourists during peak times in the year stresses the local infrastructure and personnel, such as local fire departments, businesses, and police. Some suggestions included the creation of good, useable maps for various activities, including tourism and travel. There also is a need for a tourism coordinator position and funding for such a position in the area.

Public Meetings Results

The participants at the initial public meetings were asked to list the positive assets of the watershed, as well as identify lacking amenities, needs, and limitations with the watershed. Below is a comprehensive list of all the recorded input from these meetings.

The first section lists the positive assets of the watershed as described by the participants, and the second section displays the lacking amenities, needs, and limitations within the watershed. These comments do not necessarily reflect the views of WPC. All comments and suggestions from the public were recorded and taken into consideration while developing the conservation plan.

Positive Assets of the Watershed

Project Area

- Low population density
- Clean air
- No major through-ways/little traffic
- Undisturbed views of large areas
- Existing dirt and gravel roads fairly well maintained
- Four seasons
- Skilled work force
- Pitt-Bradford location
- Medical center
- Safe community

Land Resources

- Abundance of public land
- Lots of forested land
- Large areas of open farmland

Water Resources

- Natural growth along streams
- Exceptional value streams
- High quality aquatic resources

Biological Resources

- Abundant flowers/plant life
- Abundant wildlife

- Peaceful
- Beautiful scenery
- Low crime
- Locally owned businesses
- Reasonably close to metropolitan areas
- Good public school systems
- Sewer systems in region are improving
- "Living in paradise in the eyes of the world, and need to keep it that way."
- Sustainable agriculture and forestry
- High number of dairy and grazing farms
- Mineral assets
- Many high quality trout streams
- High quality water
- Clean environment
- Unique biological diversity

Positive Assets of the Watershed (continued)

Cultural Resources

- Good county conservation departments
 - High amount of conservation resources in terms of access, awareness, and visibility
 - National forest access and overall awareness
- Many high quality trout streams
- Access to outdoor recreation opportunities
- Trail Associations:
 - o Tuna Valley
 - o Potato Creek
 - o Kinzu Trail Club
- Available recreation opportunities that currently exist and are adequate in or near the watershed include, but are not limited to:
 - o Fishing
 - o Hunting
 - ATV riding
 - o Biking
 - o Skiing
 - Snowmobile riding
- Tourism is both a good and a bad thing within the watershed
 - Tourism brings money into the local economy
 - Poor behavior of tourists can lead to landowners increasing posting
 - Influx of tourists during peak times stresses infrastructure and personnel, such as local Fire departments, businesses, police, etc.

Lacking Amenities, Needs, and Limitations within the Watershed

Project Area

- Lack of funding for environmental projects
- Need for stronger political involvement in conservation practices
- Need to protect watershed, as it is the start of three major rivers in the region Genesee, Susquehanna, and Allegheny
- Brine water is still being spread on dirt and gravel roads for dust control
- Employment opportunities are lacking, as well as diversified opportunities
- Road access into and out of the watershed area is limited
- Crime rate increasing in certain parts of the watershed
- Cell phone connectivity is an issue in much of the watershed
- Unemployment issues
- Health care needs
- High speed internet unavailable in much of the watershed
- Shopping opportunities
- More volunteering needs to exist for projects like trash clean up, recycling, removing invasive species, etc.
- Improved government infrastructure on a local level

Land Resources

- Better regulation of the oil and natural gas industries
- Regulations for developing farmland
- 6-6

- o Hiking
- o Bird watching/wildlife viewing
- o Geocaching
- o Canoeing/kayaking
- o Boating

Lacking Amenities, Needs, and Limitations within the Watershed (continued)

Land Resources (continued)

- Many stone quarries in watershed causing erosion issues
- Improve timbering management and education of timber harvesters to use sustainable methods and techniques
- The PA Game Commission offers a program to open up private land for public access
 - o Game Commission then patrols/enforces regulations on land
 - There needs to be a tax break or incentive for joining the program
- A golf course was started and never completed in Potter County
 - Conservation efforts need to be made to improve this 600+ acres
- Mineral extraction/timbering needs more responsible management
 - o 500 applications for gas and oil wells in Potter County last year
 - DEP taking control of application and permit issues also taking money paid for those permits from local infrastructure
- Illegal dumps are an issue within the watershed
- Land-use regulations change with ownership (public lands)
 - o Increase awareness of the different regulations
- Garbage/recycling disposal centers

Water Resources

- Storm water management issues in certain areas
- Many stone quarries in watershed causing erosion issues
- Brine water is still being spread on dirt and gravel roads for dust control
- Sedimentation to local streams

Biological Resources

- Protected areas exist for woodcock, warbler, and rattlesnake habitat, but little management is taking place
- Habitat destruction

Cultural Resources

- School outdoor conservation programs
- Adult environmental education programs
- Need for youth programs promoting conservation/outdoor recreation
- Public participation needs to increase in terms of conservation
- Unrestricted ATV use must be curtailed
 - o Designated trails
 - Establish an ATV recreation park
- Seasonal recreation opportunities limit year-round tourism
- Access to recreational lands/streams is limited in some areas
- Tourism is both a good and a bad thing within the watershed
- Create good, useable maps for various activities/tourism/travel
- More community events & better promotion of them to tourists
- Need a tourism coordinator position and funding for such a position
- Need interconnected trail network to connect existing trails, as well as connect trails to local businesses
- For tourism, need more public restrooms, visitor centers, and community upkeep/maintenance of houses, buildings, trash on properties, etc.

1%

1%

6%

Survey Results

Two types of public surveys were conducted to gather information on the issues and concerns of the watershed residents—a general public survey and a municipality survey.

The results listed below do not necessarily reflect the views of the WPC or the steering committee. All comments and suggestions from the public were recorded and taken into consideration while developing the conservation plan.

Public Survey

Below are the results from the 99 public surveys that were completed by local residents and visitors to the watershed area. The goal of the survey was to get a feel for what the surrounding community valued, as well as how they felt about recreational activities, issues, and needs in the watershed area.

General Demographics The majority of survey participants—97 percent—were local residents of the areas. A total of 47 men, 42 women, and 10 people who opted not to disclose their gender completed surveys.

As indicated in Figure 6-1, the majority of participants were among the 46 to 65 age group. There were no participants within the 18 to 25 age group.



Residents

1. In what county and municipality do you reside?

Table 6-1. Location of Residents Completing Surveys							
County	Municipality	% of Participants	County	Municipality	% of Participants		
McKean	Aiken	1%	McKean	Norwich Township	2%		
McKean	Bradford	11%	McKean	Otto	1%		
McKean	Corydon Township	1%	McKean	Port Allegany	10%		
McKean	Ceres	1%	McKean	Smethport	23%		
McKean	Eldred	3%	McKean	Other	17%		

2%

1% 17%

2%

Olean

Other

Ulysses Township

Potter

Potter

Potter

McKean	Hamlin
McKean	Hazlehurst
McKean	Keating Township
McKean	Mt Jewett
McKean	Mt Jewett

6-8	

2. In what part of the Allegheny River headwaters do you reside?

43	Potato Creek	14	14 Tunungwant Creek1 Oswayo Creek		4	Other
31	Allegheny River	1			2	Don't Know
3.	How long have you lived	in the	area	?		
3	Less than one year		10	21–30 years	9	51–60 years
16	1–10 years		16	31–40 years	9	60+ years
17	11–20 years		19	41–50 years		
4.	How far do you travel to	work?				
18	Less than one mile		16	31–45 miles	2	60+ miles
43	1–30 miles		2	46–60 miles	15	Not Applicable

Visitors

1. How far did you travel to visit?

Two of the participants traveled over 90 miles to visit the region, while another traveled less than 30 miles to visit.

2. How long did you stay on this trip?

One visitor stayed one to two days, while the other two visitors stayed less than one day in the region.

3. Approximately how much did you spend? What were your two biggest expenses?

All the participants spent less than \$500 each during their visit. Their biggest expenses were gas, food, and lodging.

4. What was your reason for visiting?

The visitors that participated came for business, vacation, and to visit family and friends.

5. How often do you visit and do you plan to visit again?

The participants visit this region seasonally and plan to visit again.

General Questionnaire



2. Where did you obtain this survey?

50 Schools 18 Other 11 Kinzua Outdoor Show 11 Watershed Group 4 Business/Restaurant 2 Events 2 Rec. programs by Rotary1 Headwaters RC&D1 State Park/state forest1 WCP Public Meeting1 Website

3. Please indicate the importance of the following watershed values.



Table 6-2. Importance of Watershed Values

	Very Important	Somewhat Important	Neutral	Not Likely Important	Not Important	
	2 points	1 point	0 points	(-1 point)	(-2 points)	Score
Water Quality	79*2=158	11*1=11	1*0=0	0*-1=-0	0*-2=0	169
Attractive Natural Settings	62*2=124	23*1=23	4*0=0	1*-1=-1	1*-2=-2	144
Recreation Opportunities	56*2=112	24*1=24	10*0=0	3*-1=-3	0*-2=0	133
Educational Opportunities	43*2=86	31*1=31	13*0=0	2*-1=-2	2*-2=-4	111
Preserving History/Culture	39*2=78	35*1=35	15*0=0	1*-1=-1	1*-2=-2	110
New Business/Jobs	40*2=80	21*1=21	17*0=0	1*-1=-1	2*-2=-4	96
Community Activities	29*2=58	36*1=36	24*0=0	2*-1=-2	1*-2=-2	90
Residential Development	19*2=38	20*1=20	21*0=0	17*-1=-17	13*-2=-26	15

Other

Wildlife and Fish



4. Please indicate the importance of the following recreational activities in the watershed.

Table 6-3. Importance Values of Recreation Activities

	Very Important	Somewhat Important	Neutral	Not Likely Important	Not Important	
	(2 points)	(1 point)	(0 points)	(-1 point)	(-2 points)	Totals
Fishing	66*2=132	25*1=25	3*0=0	0*-1=0	1*-2=-2	155
Hunting	69*2=138	18*1=18	4*0=0	1*-1=-1	2*-2=-4	151
Hiking	46*2=92	39*1=39	8*0=0	1*-1=-1	2*-2=-4	126
Visiting Public Parks	47*2=94	34*1=34	10*0=0	0*-1=0	1*-2=-2	126
Visiting Public Vistas	41*2=82	30*1=30	16*0=0	2*-1=-2	2*-2=-4	106
Bird/Wildlife Watching	37*2=74	33*1=33	22*0=0	2*-1=-2	0*-2=0	105
Picnicking	37*2=74	34*1=34	18*0=0	3*-1=-3	3*-2=-6	99
Swimming	34*2=68	33*1=33	21*0=0	3*-1=-3	2*-2=-4	94
Canoeing/Kayaking	34*2=68	34*1=34	19*0=0	3*-1=-3	3*-2=-6	93
Photography	29*2=58	36*1=36	24*0=0	1*-1=-1	4*-2=-8	85
Biking	27*2=54	40*1=40	22*0=0	3*-1=-3	4*-2=-8	83
Boating	33*2=66	26*1=26	26*0=0	4*-1=-4	4*-2=-8	80

Table 6-3. Importance Values of Recreation Activities (continued)							
	Very Important	Somewhat Important	Neutral	Not Likely Important	Not Important		
	(2 points)	(1 point)	(0 points)	(-1 point)	(-2 points)	Totals	
Organized Sports	25*2=50	23*1=23	30*0=0	13*-1=-13	4*-2=-8	52	
Snowmobiles	27*2=54	30*1=30	16*0=0	6*-1=-6	14*-2=-28	50	
Horseback Riding	16*2=32	31*1=31	34*0=0	9*-1=-9	5*-2=-10	44	
ATV Riding	27*2=54	21*1=21	20*0=0	8*-1=-8	17*-2=-34	33	

5. Please indicate the importance of addressing the following watershed issues.



Table 6-4. Importance of Watershed Issues

	Very Important	Somewhat Important	Neutral	Not Likely Important	Not Important	
	(2 points)	(1 point)	(0 points)	(-1 point)	(-2 points)	Totals
Water Quality/Quantity	75*2=150	12*1=12	2*0=0	0*-1=0	1*-2=-2	160
Wildlife/Fisheries Habitats	72*2=144	15*1=15	3*0=0	0*-1=0	1*-2=-2	157
Illegal Dumping & Litter	65*2=130	17*1=17	8*0=0	1*-1=-1	0*-2=0	146
Preserving Agricultural Lands	51*2=102	25*1=25	12*0=0	3*-1=-3	1*-2=-2	122
Waste Sites/Hazardous Spills	53*2=106	21*1=21	12*0=0	3*-1=-3	1*-2=-2	122
Forestry Techniques	48*2=96	27*1=27	9*0=0	3*-1=-3	1*-2=-2	118
Environmental Education	43*2=86	33*1=33	14*0=0	1*-1=-1	1*-2=-2	116
Infrastructure (roads, water/sewage, etc.)	42*2=84	30*1=30	17*0=0	3*-1=-3	0*-2=0	111
Invasive Species	40*2=80	26*1=26	22*0=0	1*-1=-1	0*-2=0	105
Erosion & Sedimentation	39*2=78	29*1=29	22*0=0	1*-1=-1	1*-2=-2	104

	Very Important (2 points)	Somewhat Important (1 point)	Neutral (0 points)	Not Likely Important (-1 point)	Not Important (-2 points)	Totals
Flooding	41*2=82	28*1=28	16*0=0	5*-1=-5	1*-2=-2	103
Tourism Impacts	35*2=70	38*1=38	14*0=0	1*-1=-1	2*-2=-4	103
Economic Development	42*2=84	28*1=28	14*0=0	3*-1=-3	4*-2=-8	101
Historical & Cultural Heritage	31*2=62	37*1=37	19*0=0	1*-1=-1	1*-2=-2	96
Storm Water Runoff	26*2=52	40*1=40	19*0=0	3*-1=-3	1*-2=-2	87
Mine Drainage/Mine Lands	37*2=74	24*1=24	20*0=0	5*-1=-5	4*-2=-8	85
ATV/Snowmobile Conflicts	31*2=62	20*1=20	26*0=0	2*-1=-2	12*-2=-24	56

Table 6-4. Importance of Watershed Issues (continued)

Other

Continued, well regulated access for oil and gas development Preserving scenic views

6. What are the top three service/amenities that are lacking within the watershed?

35 Public Restrooms	2 Boat launches
22 Restaurants	2 Book stores
13 Gas Stations	2 Bus tours
10 Emergency Services	2 Camping areas
10 Erosion and sediment control	2 Camping with electricity and sewer
10 Events and activities for tourists	2 Clothing store
10 Fast food restaurants	2 Costas
10 Feed mills	2 Industries
10 Food markets	2 Information
10 Garbage bins	2 Natural springs for public use
7 Cell phone services	2 New roads, completion of 219
4 Picnic areas	2 Outdoor stores
4 Rest areas	2 Public rest stops
4 Programs for kids	2 Shopping
4 Parking	2 Speed limit enforcement
4 Parks	2 Trails for biking and walking
4 Paved trails	2 Veterinarians
3 ATV and snowmobile trails	1 Jobs
3 Good paying jobs	1 Lodging
3 Greenway identification	1 Machinery dealers
3 High speed internet	1 Road maintenance
3 Highway access	1 Rustic campgrounds
3 Hotels and motels	1 Scenic vistas
3 Hunting access	1 Wilderness areas
2 Allegheny River access	1 Wal-Mart

7. Other comments or concerns

- Do everything possible to keep it the way God gave it to us. Then we can enjoy it.
- Maintain a balance between the environment and human activities. Repair existing infrastructure. Building large highways and developments may create more jobs but at the expense of the environment. At the same time people must be able to make a living where they reside.
- More legal recreation opportunities such as ATV and snowmobile trails.
- More docks are necessary and they need to be more accessible.
- Concerned about more restrictions and laws enforced by government and escalating property taxes.
- More biking, walking, and horseback riding trails and more biking events.
- This is one of the few areas that you can enjoy nature without seeing human development. That is good, I don't want a resort.
- There needs to be a stronger promotion and dedicated effort to establish more wilderness areas to preserve more natural heritage. Greater cell phone coverage will aid in emergency communications while in wilderness areas.
- Too much rural and forestry road development.
- Preserve natural settings and establish more wild undeveloped areas.
- Make the area more inviting to visitors.
- The Potter Leader Enterprise has occasionally run a feature called "50 Things to Do in Potter County". This will include things like "read a book". In other words, some people find it hard to find stuff to do here. Personally, I love books and hiking, but when friends visit from out of the area, especially teens and young adults, there isn't much to do. Just relax.
- I would like to see more natural beauty and less commercialization.
- Beavers destroying trees at Hamlin Lake
- Deer numbers down needs better management and less doe killed, more coyote control, number of hunters coming in form other areas is way down
- Marcellus drilling, damage to roads and water quality
- Need to create jobs, but protect environment at the same time
- Natural gas development and preservation of high water quality
- Love the route 6 mileage signs

Municipal Survey

Thirty-four municipalities within the Headwaters of the Allegheny River Watershed were contacted to complete an information gathering survey. These municipalities were located in McKean and Potter counties. Of the 34 contacted, 29 responded through telephone interview. The surveys gathered valuable information about the issues and concerns of the municipal leaders of the watershed to be utilized during the development of the plan.

1. Does your municipality have a comprehensive plan?

• 22 of the 29 responded yes

1 did not know

• 6 of the 29 responded no

2. a) Does your municipality currently utilize zoning?

• 9 of the 29 responded yes

• 20 of the 29 responded no

b) Does your municipality currently utilize subdivision ordinances?

10 of the 29 responded yes 19 of the 29 responded no

c) Does your municipality have floodplain ordinances?

- 20 of the 29 responded yes
- 7 of the 29 responded no

3. Are there any municipal parks in your municipality? If yes, please list them?

14 of the 29 responded yes

15 of the 29 responded no

Callahan Park, City of Bradford, McKean County Burns Memorial Park, City of Bradford, McKean County Hanley Park, City of Bradford, McKean County Mitchell Park, Coudersport Borough, Potter County Coudersport Area Recreation Park, Coudersport Borough, Potter County Ron Hooben Memorial Park, Eldred Borough, McKean County Sullivan Armstrong Recreation Park, Eldred Borough, McKean County Foster Brook Community Park, Foster Township, McKean County Genesee Park, Genesee Township, Potter County Hamlin Township Community Park, Hamlin Township, McKean County Hilltop Community Park, Keating Township, McKean County East Smethport Park, Keating Township, McKean County Austin Dam, Keating Township, Potter County Lafayette Township Community Park, Lafayette Township, McKean County Andy Pantuso Memorial Ball Field, Lewis Run Borough, McKean County Lewis Run Borough Park, Lewis Run Borough, McKean County Heritage Park, Mount Jewett Borough, McKean County Mt. Jewett Park, Mount Jewett Borough, McKean County Norwich Township Park, Norwich Township, McKean County Otto Township Park, Otto Township, McKean County Assembly Park, Shinglehouse Borough, Potter County Hamlin Lake Park, Smethport Borough, McKean County

4. a) Does your municipality have any public water services in the project area?

- 16 of the 29 responded yes 13 of the 29 responded no
- b) Do you foresee the need to upgrade or establish a public water supply in your municipality in the project within the next ten years?
- 16 of the 29 responded no
- 5. a) Does your municipality have any public sewage systems in the project area?
 - 17 of the 29 responded yes

12 of the 29 responded no

- 2 did not know

b) Do you foresee the need to upgrade or establish a public sewage system in your municipality in the project area within the next ten years?

- 17 of the 29 responded no
- 6. Who provides emergency services, such as Police, Fire, and EMS?

	Table 6-5.	Emergency	Service	Providers
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	Municipality	Police	Fire	EMS
	Allegany Township	State police	Ulysses Triton Vol. Fire, Genesee Vol. Fire, Coudersport Vol. Fire	Coudersport Ambulance
	Clara Township	State police	Shinglehouse/Roulette Vol. Fire Dept.	Shinglehouse/Roulette Vol. Fire Dept.
	Coudersport Township	Borough Police	Vol. Fire Dept.	Coudersport Vol. Ambulance Assoc.
	Eulalia Township	State police	Coudersport Vol. Fire	Coudersport Vol. Ambulance Assoc.
nty	Genesee Township	State police	Genesee Volunteer Fire Dept.	Genesee Vol. Fire Dept.
er Cou	Hebron Township	State police	Coudersport Vol. Fire and Shinglehouse Vol.	Coudersport Vol. and Shinglehouse Vol.
Pott	Keating Township	State police	Austin Vol. Fire	Austin Vol. Fire
Π	Oswayo Borough			
	Oswayo Township	State police	Shinglehouse Vol. Fire	Shinglehouse Vol. Fire
	Pleasant Valley Township			
	Roulette Township			
	Sharon Township	State police	Shinglehouse Vol. Fire	Shinglehouse Vol. Fire
	Shinglehouse Borough	Shinglehouse Borough	Shinglehouse Vol. Fire	Shinglehouse Vol. Fire
	Summit Township	State police	Austin Vol. Fire and Coudersport Vol. Fire	Austin Vol. Fire
	Sweden Township	Township Police	Coudersport Vol. Fire	Coudersport Vol. Fire
	Annin Township	State police	Port Allegany Vol.	Port Allegany Vol.
	Bradford, city of	Bradford Police	Bradford City Fire Dept.,	Bradford City Fire Dept.
	Bradford Township	Bradford Township Police	Bradford Vol. Fire Dept.	Bradford Vol. Fire Dept.
	Ceres Township	State police	Shinglehouse Eldred	Shinglehouse Eldred
	Eldred Borough	Regional Police	Eldred Vol. Fire	Eldred Vol. Fire
Ity	Eldred Township	State police	Eldred Vol. Fire	Eldred Borough Ambulance
our	Foster Township	Foster Township Police	Foster Township. Vol. Fire	Bradford City Ambulance
nC	Hamlin Township	State police	Hazelhurst Vol. Fire	Mt. Jewett Ambulance
lcKea	Keating Township	State police	Smethport Borough Vol. Fire Dept. or Hilltop Vol. Fire	Priority Care Ambulance
Σ	Lafayette Township	State police	Lafayette Township. Vol.	Bradford city or Priority Care
	Lewis Run Borough	State police	Lewis Run Vol. Fire Dept.	Bradford City Ambulance
	Liberty Township	State police	Port Allegany Vol.	Port Allegany Vol.
	Mount Jewett Borough	Part time Borough Police	Mt. Jewett Vol. Fire	Mt. Jewett Ambulance
	Norwich Township	State police	Crosby Norwich Township. Vol. Fire	Priority Care Ambulance

Provider of Emergency Services

Table 6-5. Emergency Service Providers (continued)

				The full of Emergency serve	leeb
		Municipality	Police	Fire	EMS
		Otto Township	State police	Otto Vol. Fire	Otto Vol. Fire
rkan	ean ty	Port Allegany Borough	Port Allegany Police Dept.	Port Allegany Vol.	Port Allegany Vol.
	.cK oun	Sergeant Township			
2	ΣŬ	Smethport Borough	Borough Police	Smethport Vol. Fire	Priority Care

Provider of Emergency Services

7. Is there anything unique, or well known about your municipality that you would like to have highlighted in the plan?

- Carlson store, Annin Township
- Kendall Refinery, Case, Zippo, city of Bradford
- Early oil wells and oil well museum, Case, Zippo, Pitt-Bradford, Bradford Township
- WWII Museum, Eldred Borough
- WWII powder plant, Eldred Township
- Genesee Fire and ambulance dept. was a hotel -1^{st} twp. Building, Genesee Township
- Kinzua Bridge tornado damage, Hamlin Township
- McKean County fairgrounds, Keating Township (McKean)
- Austin Dam broke in 1911, large scale damage, Keating Township (Potter)
- Lynn Hall Hill, Raymond Hall, predecessor to Fallingwater, Port Allegany Borough
- Old Schoolhouse, twp. Building, Summit Township

8. Comments

• Rt. 44 north of Coudersport – large farm with storm water runoff down major hill into Oswayo Creek, has attached stream bed, Hebron Township

High School Visits

In an effort to ensure that the younger generations in the area were given a chance to provide their input into the plan, school programs were conducted at three different high schools in the watershed area. Students from Coudersport High School, Port Allegany High School, and Smethport High School were all engaged in open discussion that provided insight into the future of the watershed and also shed some light on what their concerns are for the watershed area. The results of the student surveys are listed below.

* Indicates that the response was identified by more than one of the schools

What do you like about the area?

- Wildlife*
- ATV trails
- Small town atmosphere*
- Quiet
- Fishing*
- State Game Lands*
- Good overall appearance

What could be improved?

- More businesses*
- Road quality
- High fuel costs
- Low deer population*
- Cell phone service
- High speed internet access*
- Local industrial pollution
- Negative impacts from tourists
- Littering along roads/streams*
- Deforestation
- Runoff pollution from roads*
- Less posted properties
- ATV limitations*
- Faster pickup of road-killed animals
- Cleaner, higher quality streams*

What type of recreational activities do you enjoy?

- Hunting*
- Fishing*
- Jogging
- Skiing*
- Snowboarding*
- ATV riding*
- School sports*
- Paintball
- Shopping
- Swimming*
- Canoe/Kayak*
- Hiking*

- Fish stocking*
- Air quality
- Better road maintenance*
- Bridges
- Building maintenance
- Clean up Hamlin Lake
- Dump site by Mt. Jewett
- Economy
- More culture (theatre, art)
- Parking
- Plant more trees
- Public water quality
- Recreation fields
- Storm water spillways
- Trail maps
- Camping*
- Video games
- Trapping*
- Bicycling (trail and road)
- Boating*
- Sled riding
- Organized sports*
- Trap shooting
- Music
- Shooting
- Skate park
- Winter sports

Do you visit state parks and state forests in your area? Why?

- Star gazing
- Hiking*
- Lumberjack competition
- Archery competition
- Swimming*
- Picnicking*
- Camping*
- Hunting
- Family reunion
- Outdoor education

- Skiing
- Photography
- Fishing
- Backpacking
- Air balloon ride
- Boating*
- Canoeing
- Rock climbing
- Sled dog racing
- Wildlife observation

What are some positive and negative impacts currently affecting land, water, and biological resources within the Headwaters of the Allegheny River Watershed?

Positive Impacts

- Community parks
- Recycling programs
- Watershed conservation groups

Negative Impacts

- Litter*
- Agriculture runoff
- Logging*
- Air pollution
- Natural gas industry
- Glass factory
- Carbon plants
- Water pollution
- Erosion (stream bank and farming)*
- Burning garbage

- Stream bank constructions
- Highway clean ups
- School recycling program
- Car exhaust
- Farm runoff
- High coyote population
- Honeywell International Wax refinery
- Magnet toy factory
- Mosquitoes spreading disease
- Oil drilling
- Paper mill in Johnsonburg
- Poaching
- Smoking

Can you suggest any projects that students could be involved in or would be interested in being involved in to help improve the area?

- Expand/improve recycling programs*
- Community service
- Endangered species awareness
- Clean up highway litter*
- Improve farming practices
- Create habitat along streams, both for fish and other wildlife
- Plant trees*
- Help stock fish*
- Community gardens
- Landscaping
- Help little kids fish
- Shovel snow
- Hellbender survey
- Public compost area
- Clean Hamlin Lake

- Clean illegal dump sites abandoned oil industry sites
- Clean up trash in the forest
- Create new nature trails
- Fix up softball field
- Monitor animal behavior
- Protect existing trees
- Raise money to plant trees
- Reduce exhaust pollution
- Alternative transportation
- Solar energy uses
- Study wax refinery pollution impacts
- Volunteer for environmental group
- Wildlife feeding

Could you see yourself returning to the area as an adult to live and work? What reasons make you want to stay, and what reasons make you want to leave?

Why stay?

- Small population*
- Quiet place to live
- Good hunting and fishing opportunities
- Enjoy the climate*
- Good ATV opportunities*

- Low traffic*
- Good public school system
- Low crime*
- Familiarity*
- Family*

- Friends
- Outdoor recreation opportunities*
- Family-owned business
- Good place to raise a family
- Friendly community

Why leave?

- Want to experience new places
- Want to see different wildlife
- Fewer taxes elsewhere*
- Too small of a community*
- Want more snow during winter months
- Better shopping elsewhere
- More fun to be had in more urban areas
- Lack of jobs*
- Climate*
- Lack of recreation opportunities*

- Job (Veterinarian)
- Like the summer
- Limited natural disasters
- Peaceful
- Stay to help the community
- Want different experiences*
- Family lives elsewhere
- Better jobs
- Bigger area
- Gas prices
- Meet new people
- More businesses
- Racism
- Want to live in an urban area
- Weather

Interview Results

Phone interviews with key individuals that have intimate knowledge of the watershed values and concerns were conducted to gain information for the conservation plan of the Headwaters of the Allegheny River Watershed. The questions were designed to allow the respondents to express their insight into the strengths and weaknesses of certain aspects of the watershed, address areas that need improvement, and provide suggestions to make the plan as successful as possible. The results of the interviews are summarized in the following section.

1. How has the area changed in the past 10 years in terms of:

Water Quality and Natural Resources

In general, the interviewees suggest that the water quality in the area is pretty good. There are concerns relating to the Allegheny River. Some suggest that it needs to be drudged and cleaned up, as local industries have had a negative impact on its water quality. The two biggest negative impacts are erosion and the local logging industry.

One interviewee suggests that over the past ten years the deer and rabbit population has decreased considerably in the Eldred Borough area. Another resident suggests that for the most part, the animal population has remained relatively consistent. A concern here is that poaching may be leading to decreased populations for certain animals.

Another major concern is the maintenance of the logging industry in the area. One interviewee suggests that Adelphia had taken a lot of timber off in the area, and that this had a negative impact on the forest area and all animals that inhabit it. They want to see better logging regulation to maintain the natural resources in the area, such as the forested areas.

<u>Landscape</u>

Overall, the perception here is that the local landscape needs to be protected from over-development, logging, and the flourishing gas industry. However, the consensus is that the landscape has remained relatively consistent over the past ten years.

Communities and Culture

The communities in the area are small and the culture is bad. The culture has decreased over the past ten years in relation to the lack of recreational and culture-related activities as well as the issue of unemployment. The communities haven't changed much in terms of size, but the population has decreased due to the poor local job market.

Presiding Industry and Local Economy

The return of the gas and oil industries in the area has helped to alleviate the problem of unemployment in the recent years, but overall the condition of the presiding industry and local economy is poor. Many businesses have closed and there have been numerous layoffs – with local hospitals and the bankruptcy of Adelphia. This has led to an outflow of the local population in search of jobs elsewhere.

2. How do the following meet the needs of the community?

Transportation

There is no mass transit available in the area. For the most part, transportation is lacking in general. The only source of transportation that is a positive aspect is a senior citizen bus service for older residents which can transport them to grocery stores, local businesses, and churches. The highways are in decent condition, but there is concern that heavy truck traffic relating to the gas and oil drilling industries will cause problems with the health of local roads and highways. Other comments relate to the needed improvement of mass transit availability, such as regular bussing, as well as the improvement of Route 6.

Infrastructure

The infrastructure of the area is improving in certain areas. There have been improvements made to cell phone service, although there are still some remaining "dead" areas. Currently, there are projects being undertaken to increase the availability of broadband internet to the local communities as well. Water and sewer lines are also being improved, although there are still a high number of residents that rely on well water as their source. Even though a large number of the residents use well water, many of those living in the larger communities have access to water lines.

Employment Opportunities

Almost all of the respondents mentioned high unemployment rates and the lack of a solid local job market. Some of the interviewees mentioned several layoffs and business closings in relation to the problem of unemployment. Many people in the area have left in search of better job opportunities. Some suggest that the local work force needs improved training that relates to available jobs in the area. Along with this, there is a need for better job training in general; not just for local jobs.

Educational Opportunities

The major problem addressed by those interviewed is the lack of trade schools and colleges in the area. The only college in the area is University of Pittsburgh – Bradford. There is also a lack of specific job training from trade schools in this area. There is a feeling that there are jobs available in the region, but there is insufficient training to help fill these jobs.

The respondents pointed to the lack of state funding leading to teacher layoffs at local high schools as well. One bright spot is the presence of the Challenger Learning Center, which offers different programs to aid with the education in the area. The education council was pointed to as bright spot because it brings in education and programs to meet the area's needs. Overall, the respondents feel that there is a definite lack of secondary education and that local high schools are suffering due to teacher layoffs.

Land-use Ordinances and Zoning

The concern from respondents here is that there needs to be better regulation of land-use ordinances and zoning. Ordinances and zoning plans need to be developed with the entire community in mind – better plans for the area as a whole – not just for individuals or individual properties. The respondents want the plans to be more proactive and have better regulation over this aspect as a whole.

3. <u>Do the recreational opportunities currently meet the needs of the community and visitors?</u>

Parks/Picnic Sites

The overall feeling from the respondents is that the parks and picnic sites in the watershed area are adequate and abundant. However, some state that a few of the parks are old and require improvements and better maintenance. The consensus is that there are a sufficient amount of parks to serve the local population, but some of them require needed upgrades.

Hiking/Biking Trails

Those interviewed agree that there are plenty of hiking and biking trails in the area. However, there are some issues associated with the trails. First, many of them are not well maintained and are in need of improvements and better maintenance. They are also poorly marked, which causes problems with tourists that are unfamiliar with the area. For the most part, only the local residents know the trails and agree that there need to be more signs and maps to help with navigation for tourists.

Off-Road Vehicle Riding

The respondents were in agreement that there are an abundance of trails for off-road vehicle riding. There are trails that range from 35-49 miles in length and provide an excellent area for these activities. The interviewees did say that some riding occurs on private land, and this causes a problem. They want to see better policing of this activity in the area.

Scenic Vistas/Photography

As one respondent put it, the scenic areas and photography opportunities in the area are "the best." The natural and beautiful environment and wildlife lend to the opportunities available for these recreational activities. The respondents' consensus is that the plan should make sure that the natural beauty of the area is maintained to ensure that these recreational activities can continue.

Wildlife/Bird Watching

For the most part, the respondents feel that the wildlife and bird watching is great in the region. The area provides sufficiently for both of these recreational activities due to the large amount of wildlife and vast forest areas. One respondent did mention that she has seen fewer birds over the past few years and suggested that this may be due to the logging in the area.

Hunting/Fishing

Most of the respondents agree that hunting and fishing are both plentiful in the watershed region. State lands provide for excellent opportunities for both of these activities. There are some concerns here, however, as a few respondents point to the issue of poaching. Some complained of hearing late night gunshots after dark and a decrease in the population of certain animals, such as rabbits and deer. Overall, the respondents feel that these recreational activities are excellent, but must be regulated more effectively.

Boating/Swimming

The respondents agree that neither of these two activities is as popular as hunting/fishing or wildlife/bird watching, but they state that kayaking is available in some areas. The water quality of the

Allegheny River was pointed to as a concern due to erosion and logging, which decreases the frequency of these two activities. For the most part, the respondents' consensus is that these two activities are not that common.

Historical Sites/Structures

The majority of respondents agree that historical sites and structures in the area are pretty good, specifically in Coudersport, where there is a major tourist draw for the starting site of the Allegheny River. Other sites include a WWII museum and lumber museum, and respondents point out the numerous historical placards throughout the region. Several of the respondents also mention that the area has a solid historical society that maintains these sites and structures. Overall, they would like to see better advertising for these different sites and structures.

Winter Recreation

According to the interviewees, the biggest winter recreational activity in the watershed area is snowmobiling. The vast forest areas and trails lend to the popularity of this activity and give both local residents as well as tourists the opportunity to engage in snowmobiling. Other responses include both skiing and snowboarding.

4. What are some of the positive features of the watershed area? What is one of the strongest or most attractive features/characteristics of the watershed area?

Most of the respondents feel that the natural beauty of the area is the strongest positive feature of the watershed. The natural environment of the watershed offers a beautiful place to live and lends itself to numerous outdoor activities. The respondents agree that the rural area is a nice aspect, as long as you're the type of person that enjoys small communities, the outdoors, and wildlife. Another comment addressed that good forest management in the region has led to the preservation of beautiful forested areas, which enhances the overall quality of the natural environment. Other respondents agree that summertime is the best season in the area because of the beautiful blue skies and calm and quiet atmosphere. Overall, the consensus is that the natural area and all of its aspects are the watershed's most positive qualities.

5. <u>What impacts are currently affecting the land, water, and biological resources?</u> <u>What positive/negative impacts are affecting the community character of the</u> <u>region? What impacts are affecting the local economy?</u>

One of the most commonly addressed issues by the respondents is the issue of transportation. Overall, the availability of public transportation is poor, if not completely unavailable, in most of the areas. The respondents agree that it is difficult to get around and feel that this makes it difficult for people to get in and out of the region. The condition of local roads is also poor and makes getting around difficult, for both local residents and tourists.

Another issue that could possibly lead to negative impacts in the area is the revival of the gas and oil drilling industry in the area. A few of the respondents mention that this industry has led to more heavy truck traffic on local roads, which is leading to worsened road conditions. The majority, though, agree that it is a concern because of the environmental effects on the local wildlife and natural resources. The main issue that they pointed out is the proper regulation of this industry, as they want to make sure that the area's wildlife and forests are preserved and protected.

Other miscellaneous issues that the respondents feel have an impact in the area are logging, snowmobiling, healthcare, and poaching. A few of the respondents express their concerns over logging in the area and want to see more done to make sure that it is being done in an environmentally safe manner.

There are also issues over snowmobiling, and the respondents agree that they want to see steps taken to ensure that it is done safely and in proper locations – not on private property. Many of the respondents brought up the issue of healthcare and its impact on the local economy. Healthcare is a nationwide issue, as one respondent states, but it is something that is definitely taking its toll on the local economy. The last miscellaneous issue is poaching. A few of the respondents claim that they hear gunshots late at night, and feel that certain animal populations are decreasing. They want to see something done to protect the wildlife population and protect them from poachers.

6. <u>Do you have any specific projects or type of projects you would like to see identified</u> <u>in the plan?</u>

The major project that respondents want to see as part of the conservation plan for this area is the preservation and reorganization of the trails in the area. They want to see the trails connect the small communities of the region in order to make travel more efficient. The respondents also want to see hiking promoted more effectively, as there are hundreds of miles of trails available in the area – and this can be a good tourist draw to help the regional economy. Along with this, they want to have more maps and markings available to help tourists find their way through the trails. Most of the respondents agree that for the most part, only the local residents know their way through the trails, so some navigation tools would be a nice upgrade.

7. What must the watershed conservation plan include to be successful?

Many of the respondents agree that any conservation work be done in collaboration with the PA Route 6 Heritage Communities Program, whose goal is to promote community development as well as tourism development for a large section of the watershed area. The respondents suggest that environmental work can be done in line with the PA Route 6 Heritage Communities Program in order to effectively address all of the issues in the area. The respondents feel that by getting a local group involved, all of the environmental issues can be addressed – from the most significant issues to small issues that may have otherwise been missed.

Gathering input and information from local stakeholders is a necessary and crucial step in the conservation plan development. Gaining local knowledge is important in order to understand the strengths and weaknesses of the watershed values. The best sources of information come from those who live in the area and understand the issues firsthand. The information gathered here determines what recommendations will be made to preserve the strengths and remediate the weaknesses affecting the Headwaters of the Allegheny River watershed.

CHAPTER 7. MANAGEMENT RECOMMENDATIONS

This section highlights recommendations to improve the quality of life. These management recommendations are non-regulatory and available for use by any citizen, group, or agency. Potential partners are groups with the resources best suited to assist in meeting these objectives. Potential funding avenues are included in the matrix. Groups listed as possible partners or funding sources are suggestion and should not be limited to those provided due to ever-changing circumstances. Identified in the general classification of conservation organizations are groups such as Black Forest Conservation Association, Eldred Conservation Club, Upper Allegheny Watershed Association, and Western Pennsylvania Conservancy, etc.

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 by the public 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 O. Listed in Table 7-1 are acronyms used in the management recommendations.

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

Table 7-1. Acronyms used in Management Recommendations Matrix

Project Area Characteristics

GOAL 1-1: UTILIZE PLANNING TO PROACTIVELY PLAN FOR THE FUTURE WHILE IMPROVING QUALITY OF LIFE.

Objective 1: Carefully plan development to ensure economic enhancement while preserving community character without adversely affecting quality of life.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Revitalize downtown areas to encourage the establishment of new businesses that preserve historic architecture and compliment community character.	Planning Departments, Conservation Groups, Historical Societies, Municipalities, DEP, HUD	Foundations, Private Sources, DCED	High
2.	Plan for commercial or residential development, based upon limitations of the physical characteristics of the region, including the consideration of water-use limitation in permitting decision, water quantity, soil type, etc.	Planning Departments, Conservation Groups, Municipalities, NRCS, DEP, USGS, HUD	Foundations, Private Sources, DCED	High
3.	Implement the use of smart growth principles or Conservation by Design practices when development opportunities arise to maintain the natural setting valued by residents and tourists.	Conservation Groups, Planning Departments, Municipalities, NRCS, DEP, HUD	Foundations, Private Sources, DCED	Medium
4.	Conduct a demonstration project utilizing low-impact, Smart Growth principals, and Conservation by Design practices at a local site. Utilize the Pennsylvania Wilds Design Guide in planning.	Conservation Groups, Planning Departments, Municipalities, NRCS, DEP, HUD	Foundations, Private Sources, DCED, HUD	Medium

Objective 2: Proactively plan for the future.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish individual or joint municipal comprehensive plans for municipalities that currently do not have plans and update plans that are 10 years or older.	Planning Commissions, Municipalities, Counties	Foundations, Private Sources, DCED	High
2.	Re-evaluate the need for establishing zoning or subdivision ordinances in accordance with municipal and county comprehensive plans to protect the character of communities and valuable resources from undesirable land uses.	Planning Commissions, Municipalities, Counties	Foundations, private Sources, DCED	High
3.	Build partnerships with municipal officials, businesses, developers, and other stakeholders to alter negative perceptions of zoning through education and awareness programs.	Planning Commissions, Municipalities, Counties	Foundations, Private Sources, DCED	Medium

GOAL 1-1: UTILIZE PLANNING TO PROACTIVELY PLAN FOR THE FUTURE WHILE IMPROVING QUALITY OF LIFE (CONTINUED).

Objective 3: Provide educational programs about land-use planning and other tools that incorporate conservation goals into making communities more attractive and protecting biodiversity.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Provide education sessions about integrated land-use planning, ordinance development, habitat conservation, and protecting and enhancing biodiversity. Include a session about the economic benefits and importance of watershed protection.	Conservation Groups, Conservation Districts, Municipalities, DCED, PSATS, PSAB	Foundations, private Sources, DCED, PSATS, PSAB	Medium
2.	Host workshops to educate and encourage municipal officials to create ordinances that support watershed-wide planning.	Municipalities, DCED, PSATS, PSAB	Foundations, Private Sources, DCED, PSATS, PSAB	Medium
3.	Conduct workshops, training seminars, and demonstration projects emphasizing the use of best management and sustainable maintenance practices.	Conservation Groups, Municipalities, DEP, Developers, DCNR	Foundations	Medium
4.	Increase municipal awareness of the values of preserving, protecting, and restoring the natural resources within the watershed, and promote inter- municipal cooperation.	Conservation Groups, Conservation Districts, Citizens	Foundations, Private Sources, DEP, DCNR	Medium

GOAL 1-2: INCREASE ECONOMIC STABILITY AND ATTRACTIVENESS TO POTENTIAL BUSINESSES.

Objective 1: Encourage economic growth with minimal impacts to the environment.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Study impacts of new businesses on local communities, streams, groundwater, and their effects downstream.	Planning Commissions, Conservation Groups	Foundations, Private Sources, DCED, DEP, DCNR	High
2.	Study the impacts of salt and ashes, utilized to remove snow and ice on roadways, have on the water quality, and investigate alternative practices.	Conservation Groups, Universities, DEP, PennDOT, EPA	Foundations, Private Sources,	High
3.	Conduct feasibility studies and demonstration projects to integrate biological by-products of agriculture and forestry with energy production in ways that make these industries more self-sufficient, economically sustainable, and less of an environmental impact.	Conservation Groups, Conservation Districts, DEP	Foundations, Private Sources, DEP, EPA	High
4.	Incorporate Natural Heritage Inventories into county and municipal comprehensive plans.	Conservation Groups, Municipalities, Counties, PNHP	Foundations, Private Sources, DCED	High

GOAL 1-2: INCREASE ECONOMIC STABILITY AND ATTRACTIVENESS TO POTENTIAL BUSINESSES (CONTINUED).

Objective 2: Establish economic stability and enhance marketability of the region to prospective businesses.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Capitalize on the nature-based tourism opportunities by conducting an economic impact study to determine the impacts tourism has on the local economy and how additional revenue could be generated.	Conservation Groups, Businesses, Business Associations, Chambers of Commerce, Planning Commissions, TPA	Foundations, Private Sources, DCNR	High
2.	Promote sustainable natural resource use, such as local resource-oriented sustainable industries like value- added products and farmers' markets.	Planning Commissions, PDA, Businesses, Chambers of Commerce, DCNR	Foundations, Private Sources, DCNR	High
3.	Diversify the job market by developing and offering incentives and tax breaks to attract new businesses.	Planning Commissions, Municipalities, Counties	Counties, Private Sources, Municipalities	Medium
4.	Establish a coalition among area business associations and chambers of commerce to promote and support local businesses in the region, such as creating a web site and/or business guide for areas residents.	Businesses, Business Associations, Chambers of Commerce, Planning Commissions, TPA	Private Sources	Medium

GOAL 1-3: ENHANCE INFRASTRUCTURE TO ENABLE THE REGION TO BE A COMPETITIVE MARKET TO ATTRACT NEW BUSINESSES.

Objective 1: Enhance the technology to aide in communication and entertainment.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Increase cell phone services without obstructing the view through the installation of stealth cell phone towers.	Municipalities, Cell Phone Service Providers	Cell Phone Service Providers	Medium
2.	Upgrade and maintain technology, such as high-speed internet and cable, to enable the region to be competitive and attract new businesses.	Telephone, Cable, and Satellite Companies, Municipalities	Telephone, Cable, and Satellite Companies	Medium
0	bjective 2: Enhance transportation infrastructure	•		
	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Implement best management practices that protect water resources when improving and upgrading dirt and gravel, secondary, or rural roadways.	Conservation Groups, Municipalities, Road Masters, DEP	Foundations, Private Sources, PennDOT, DCED	High

GOAL 1-3: ENHANCE INFRASTRUCTURE TO ENABLE THE REGION TO BE A COMPETITIVE MARKET TO ATTRACT NEW BUSINESSES (CONTINUED).

Objective 2: Enhance transportation infrastructure (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Include sound geologic investigation and best management practices during maintenance and construction of roadways to minimize impacts.	Conservation Groups, Road Masters, PennDOT	Foundations, Private Sources, PennDOT, DCED	Medium
3.	Conduct impact studies on highway and industrial development to minimize threats to the resources of the watershed.	Conservation Groups, Municipalities, PennDOT, DEP	Foundations, Private Sources, PennDOT, DCED	Medium
4.	Increase funding and maintenance using sustainable practices on area roadways, including the dirt and gravel roads program.	Conservation Groups, Conservation Districts, Municipalities, Penn State, PennDOT, DEP	Foundations, Private Sources, PennDOT, DEP	Medium
5.	Investigate the alternatives to applying brine water on dirt roads to reduce dust and stop the application of brine water on these roadways.	Conservation Groups, Muncipalities	Foundations, Private Sources, PennDOT, DEP, EPA	Medium

Objective 3. Enhance public and private sewage treatment facilities.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Install proper septic tanks, wastewater treatment facilities, or other alternatives to reduce the amount of untreated sewage entering the stream.	Municipal Authorities, Conservation Groups, Municipalities, SEO, DEP, PENNVEST	Foundations, Private Sources, DEP, DCED, PENNVEST	High
2.	Design wastewater treatment systems to adequately serve communities, by separating stormwater from wastewater systems, in order to ease the occurrence of combined sewage overflows.	Municipal Authorities, Municipalities, DEP, PENNVEST	Foundations, Private Sources, DEP, DCED, PENNVEST	High
3.	Upgrade failing and antiquated sewage lines and add new infrastructure in growth areas as identified in county and municipal comprehensive plans.	Municipal Authorities, Municipalities, DEP, PENNVEST	Foundations, Private Sources, DEP, DCED, PENNVEST	High
4.	Review Act 537 plans that are over 20 years old to ensure they are adequately addressing the current wastewater needs within the jurisdiction, if not update the plans.	Municipal Authorities, Conservation Groups, Municipalities, SEO, DEP, DCED	Foundations, Private Sources, DEP, DCED	Medium

GOAL 1-3: ENHANCE INFRASTRUCTURE TO ENABLE THE REGION TO BE A COMPETITIVE MARKET TO ATTRACT NEW BUSINESSES (CONTINUED).

Objective 3. Enhance public and private sewage treatment facilities (Continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
5.	Educate homeowners about alternative sewage treatment systems, proper testing and maintenance of existing on-lot sewage systems and establish or continue cost-share programs and grants to assist homeowners in septic repair, maintenance, and	Conservation Groups, Municipalities, DEP, PENNVEST	Foundations, Private Sources, DEP, PENNVEST	Medium

Objective 4: Enhance public and private water services.

replacement.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Upgrade failing and antiquated water lines and add new infrastructure in growth areas as identified in county and municipal comprehensive plans.	Municipal Authorities, Municipalities, DEP, PENNVEST	Foundations, Private Sources, DEP, DCED, PENNVEST	High
2.	Identify if additional public water supplies are necessary.	Municipal Authorities, Municipalities	Foundations, Private Sources, DEP	Low

GOAL 1-4: EXPAND COMMUNITY SERVICES, SUCH AS PUBLIC LIBRARIES AND EMERGENCY SERVICES.

Objective 1. Enhance access to literature for area residents

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Increase funding for libraries so that services can be expanded.	Municipalities, Citizens	Foundations, Private Sources	Medium
2.	Open school library collections to area residents in locations where no public library is available.	School Districts, Citizens	Foundations, Private Sources	Low
3.	Establish bookmobile routes in rural areas.	Municipalities, Citizens	Foundations, Private Sources	Low

Objective 2. Enhance financial support and services to prepare emergency response providers.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Improve emergency services through additional funding, upgraded equipment, and training for volunteer or professional responders.	Police Departments, Fire Departments, Paramedics, Hospitals, Emergency Call Operators	Foundations, Private Sources, DCED	Medium

GOAL 1-4: EXPAND COMMUNITY SERVICES, SUCH AS PUBLIC LIBRARIES AND EMERGENCY SERVICES (CONTINUED).

Objective 2. Enhance financial support and services to prepare emergency response providers (Continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Install dry hydrants in rural areas where public water supply is limited.	Planning Commissions, Fire Departments, Municipalities, Counties	Foundations, Private Sources, DCED	Medium
3.	Develop a map detailing the locations of fire hydrants and dry hydrants that could be used by fire fighters in cases of emergency.	Fire Departments, Planning Commissions, Emergency Call Operators	Foundations, Private Sources, DCED	Low
4.	Develop a maintenance program for dry hydrants.	Fire Departments, Municipalities, Counties	Foundations, Private Sources, DCED	Low

GOAL 1-5: IDENTIFY AND REDUCE IMPACTS CAUSED BY ACIDIC PRECIPITATION.

Objective 1. Identify impacts of acidic precipitation.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish a program to monitor groundwater and wells to determine if acidic precipitation is impacting water quality.	Conservation Districts, Conservation Groups, DEP, EPA	Foundations, Private Sources, DEP, EPA	High
2.	Map and identify acid precipitation patterns to determine impacts to aquatic life.	Conservation Districts, Conservation Groups, DEP, EPA	Foundations, Private Sources, DEP, EPA	Medium
3.	Develop a network of volunteers to identify acid precipitation by collecting rainwater and measuring its pH.	Conservation Districts, Conservation Groups, DEP, EPA	Foundations, Private Sources, DEP, EPA	Medium
4.	Educate residents about the impacts acid precipitation and mercury have on the environment impacting air quality.	Conservation Districts, Conservation Groups, DEP, EPA	Foundations, Private Sources, DEP, EPA	Medium

GOAL 1-5: **IDENTIFY AND REDUCE IMPACTS CAUSED BY ACIDIC PRECIPITATION** (CONTINUED).

Objective 2. Identify practices to reduce impacts of acidic precipitation.

Method to achieve objective:

- 1. Conduct an acid neutralization project to determine if such treatment could decrease acidity to the land and water.
- Potential Partners Conservation Districts, Conservation Groups, DEP, EPA

Potential Funding Foundations, Private

Sources, DEP, EPA

Priority High

Land Resources

GOAL 2-1: DEVELOP A STRATEGIC PLAN TO PRIORITIZE AND PROTECT AGRICULTURAL AND ECOLOGICALLY SIGNIFICANT AREAS.

Establish incentives for land protection and conservation practice implementation. **Objective 1:**

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Create tax incentives or tax reform to assist landowner in being able to maintain their property for conservation purposes.	Conservation Groups, Legislators, NRCS, DCNR, DEP	Foundations, Private Sources, Legislature, DEP, DCNR, EPA	High
2.	Establish tax incentives to maintain large tracts of land unfragmented.	Conservation Groups, Legislators, NRCS, DCNR, DEP	Foundations, Private Sources, Legislature, DEP, EPA, DCNR	High
3.	Ensure tax advantages and other incentives for enrolling in conservation programs remain as an encouragement to landowners.	Conservation Groups, Legislators, DEP, NRCS, PDA, EPA, USDA	Foundations, Private Sources, Legislature	High

Protect agricultural and ecologically significant lands through acquisitions, conservation **Objective 2:** easements, or enrollment into conservation programs.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Increase the acreage of land enrolled in cost-incentive	Conservation	Foundations, Private	High
	programs, such as the Environmental Incentive	Groups,	Sources, DEP,	
	Program, Conservation Reserve Enhancement Program,	Conservation	NRCS, PGC	
	Conservation Reserve Program	Districts,		
	-	Cooperative		
		Extensions, PDA,		
		NRCS, USDA		
GOAL 2-1: DEVELOP A STRATEGIC PLAN TO PRIORITIZE AND PROTECT AGRICULTURAL AND ECOLOGICALLY SIGNIFICANT AREAS (CONTINUED).

Objective 2: Protect agricultural and ecologically significant lands through acquisitions, conservation easements, or enrollment into conservation programs (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Increase the acreage of land enrolled in the Agricultural Security Area Programs, conservation easements, or other conservation programs in order to maintain active agricultural production.	Planning Commissions, Conservation Groups, Municipalities	Foundations, Private Sources, NRCS, PDA	High
3.	Establish incentives to reward landowners who purchase conservation easements or participate in conservation programs.	Conservation Groups, Legislators, DEP, NRCS, PDA, EPA, USDA	Foundations, Private Sources, Legislature	High
4.	Protect large forest tracts and key riparian areas by working with landowners to keep these tracts intact through enrollment in forestland stewardship programs, purchase of conservation easements, land acquisition, or establish zoning ordinances.	Conservation Groups, Planning Commissions, Municipalities, Landowners, DCNR	Foundations, Private Sources, DCNR	High
5.	Ensure tax advantages of granting conservation easements and enrollment in conservation programs remain as an encouragement to landowners.	Conservation Groups, Legislators, DEP, NRCS, PDA, EPA, USDA	Foundations, Private Sources, Legislature	High
6.	Protect prime farmland from conversion to non agricultural uses by purchasing conservation easements, assisting in multi-generation transfer of ownership, or utilize farmland preservation programs.	Conservation Groups, Planning Commissions, Municipalities, Landowners,	Foundations, Private Sources, NRCS, PDA	High

Objective 3: Preserve natural resources and agricultural lands through efficient land-use by redeveloping existing commercial and industrial properties.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct a study to inventory brownfield and grayfield sites and evaluate the feasibility of their reuse for economic development purposes.	Conservation Groups, Planning Commissions, DCED, DEP	Foundations, Private Sources, DCED, DEP	Medium
2.	Conduct a study to inventory abandoned, under utilized, and vacant buildings and lands; and determine the feasibility of their reuse for economic development purposes.	Conservation Groups, Planning Commissions, DCED, DEP	Foundations, Private Sources, DCED, DEP	Low

GOAL 2-1: DEVELOP A STRATEGIC PLAN TO PRIORITIZE AND PROTECT AGRICULTURAL AND ECOLOGICALLY SIGNIFICANT AREAS (CONTINUED).

Objective 4: Increase awareness about practices to assist agricultural and forest landowners in managing their land effectively.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Educate agricultural landowners through workshops and other programs available to increase sustainability and assist them financially; such as best management practices and new technology.	Conservation Groups, Conservation Districts, Landowners, NRCS, PDA, USDA	Foundations, Private Sources, DCNR	Medium
2.	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.	Conservation Groups, Landowners, Foresters, DCNR	Foundations, Private Sources, DCNR	Medium
3.	Educate loggers, landowners, and municipal officials about forestry best management practices, sustainable forestry management, and sustainable forestry certification through workshops and other programs.	Conservation Groups, Landowners, Foresters, DCNR, USFS	Foundations, Private Sources, DCNR	Medium

GOAL 2-2: PROMOTE LOCAL AGRICULTURAL PRODUCTS, PRODUCERS, MARKETS AND RELATED PROGRAMS.

Objective 1:	Purchase agricultural products from local producers.	

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish and support locally produced farmers markets.	Cooperative Extension, Conservation Districts, Conservation Groups	Foundations, Private Sources	High
2.	Establish "Buy Local" campaigns to support the family farms located within the region.	Cooperative Extension, Conservation Districts, Conservation Groups	Foundations, Private Sources	High

GOAL 2-2: PROMOTE LOCAL AGRICULTURAL PRODUCTS, PRODUCERS, MARKETS AND RELATED PROGRAMS (CONTINUED).

Objective 2: Promote businesses that utilize agricultural products from local producers.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Promote importance and economic viability of small farms through marketing and education.	Cooperative Extension, Conservation Districts, Conservation Groups	Foundations, Private Sources	High
2.	Establish or highlight businesses that through value- added processes support local farmers.	Cooperative Extension, Conservation Districts, Conservation Groups	Foundations, Private Sources	High

GOAL 2-3: ADDRESS LAND OWNERSHIP ISSUES.

Objective 1: Clarifying land-use regulations on public lands among the various agencies and organizations.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop a recreational brochure describing all the public lands throughout the region including a listing of acceptable recreational activities.	Conservation Groups, Municipalities, DCNR, USFS, PGC, PFBC, TPA	Foundations, Private Sources, USFS, PGC, PFBC, DCNR, TPA	High
2.	Develop a website describing land-use regulations for each entity owning public land.	Conservation Groups, Municipalities, DCNR, USFS, PGC, PFBC, TPA	Foundations, Private Sources, USFS, PGC, PFBC, DCNR, TPA	Medium
3.	Host an annual or semiannual land manager meetings to ensure open communication, coordinate activities, and discuss land use regulation changes among the various land managers.	Conservation Groups, Municipalities, DCNR, USFS, PGC, PFBC, TPA	Foundations, Private Sources, USFS, PGC, PFBC, DCNR, TPA	Medium
4.	Establish consistent regulations among public land agencies where feasible without infringing on specification of funding sources to obtain these lands.	Conservation Groups, Municipalities, DCNR, USFS, PGC, PFBC	Foundations, Private Sources, USFS, PGC, PFBC, DCNR	Low

GOAL 2-3: ADDRESS LAND OWNERSHIP ISSUES (CONTINUED).

Objective 2: Establish cooperation among surface and subsurface owners without significantly impeding each others' rights.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish laws to protect surface owner's rights and property from damage caused by subsurface mineral rights owners' access and resource extraction operations.	Conservation Districts, Conservation Groups, Legislators, DCNR, DEP	Foundations, Private Sources, Legislature	High
2.	Determine sub-surface ownership for private properties and encourage the landowners to purchase those rights if capable.	Landowners, Counties, DEP	Foundations, Private Sources, DEP	Medium
3.	Organize third-party moderated discussions between surface and subsurface rights owners prior to beginning exploration, construction, and production activities to address and resolve issues and minimize impact to the natural resources.	Conservation Groups, Conservation Districts, Landowners	Foundations, Private Sources, DEP	Medium

GOAL 2-4: PROMOTE SOUND MINERAL EXTRACTION PRACTICES AND REDUCE ASSOCIATED IMPACTS.

Objective 1: Reclaim abandoned wells and quarries.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Inventory abandoned wells and develop a remediation plan to plug the wells and reclaim the sites.	Conservation Groups, DEP	Foundations, Private Sources, DEP, EPA	High
2.	Inventory abandoned quarry sites and work with the landowner to establish a remediation plan that incorporates hazard reduction.	Conservation Groups, Concerned Citizens	Foundations, Private Sources	High
3.	Reduce hazards on active and abandoned industrial mining sites.	Conservation Districts, Conservation Groups, DEP	Foundations, Private Sources, DEP, EPA	High

Objective 2: Promote management practices on active mining sites to minimize and prevent impacts and to improve conditions where possible.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
Ι.	Promote strict enforcement of erosion and sedimentation regulations and dust control plans on active mining sites.	Conservation Districts, DEP, EPA	DEP, EPA	High

active mine sites.

GOAL 2-4: PROMOTE SOUND MINERAL EXTRACTION PRACTICES AND REDUCE ASSOCIATED IMPACTS (CONTINUED).

Objective 2: Promote management practices on active mining sites to minimize and prevent impacts and to improve conditions where possible (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Establish and enforce requirements for sealing core- drillings, preventing the contamination of water sources.	Conservation Groups, Conservation Districts, DEP	Foundations, Private Sources, DEP, EPA	High
3.	Utilize high-value hardwood tree plantings as one method to reclaim abandoned mine lands, and support the Pennsylvania Department of Environmental Protection and United States Department of Interior's Office of Surface Mining Reforestation Initiative on	Conservation Groups, Conservation Districts, DEP	Foundations, Private Sources, DEP, EPA	High

Objective 3: Minimize impacts caused by exploration, production, retirement, and abandonment of oil and gas wells.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Institute closer government oversight on gas-well exploration and production, including impacts to the natural resources.	Conservation Groups, Landowners, DEP	Foundations, Private Sources, DEP	High
2.	Establish water quality monitoring program for water wells located near proposed, existing, and abandoned oil and gas well sites.	Conservation Groups, Landowners, Drilling Companies	Foundations, Private Sources, DEP	High
3.	Plug abandoned gas wells to prevent brine water from entering streams and aquifers.	Conservation Groups, Landowners	Foundations, Private Sources, DEP	High
4.	Monitor cumulative impacts of oil and gas wells and implement best management practices to reduce impacts protecting watershed resources.	Conservation Groups, Conservation Districts, DEP	Foundations, Private Sources, DEP	High

GOAL 2-5: ADDRESS MARCELLUS SHALE CONCERNS.

Objective 1: Identify and alleviate impacts and concerns cause by the exploration of natural gas within the Marcellus shale formation.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop a method for fracturing the Marcellus shale formations without contaminating millions of gallons of water, such as reusing fracturing water and/or utilizing reverse osmosis units to remove salts and heavy metals from production water.	Gas Companies, DEP, EPA	Foundations, Private Sources, Gasl Companies, DEP, EPA	High
2.	Avoid potentially toxic substances in fracturing fluids and inform landowners about what substances are being used if and when they request the information.	Conservation Groups, Concerned Citizens, Gas Companies, Landowners, DEP, EPA	Gas Companies	High
3.	Conduct an environmental impact assessment of potential Marcellus shale drilling sites in order to alleviate impacts before development activities occur.	Conservation Groups, Gas Companies DEP, EPA	Foundations, Private Sources, DEP, EPA	Medium
4.	Treat fracking water at permitted facilities capable of treating the chlorides and toxins.	Conservation Groups, Gas Companies, DEP, EPA	Gas Companies	High
5.	Adopt the precautionary principle when fracturing formations and conduct no fracturing above the base of groundwater until a guarantee that there will not be any harmful impacts to groundwater supplies.	Conservation Groups, PAGS, USGS, DEP, EPA	Gas Companies, Foundations, Private Sources, DEP, EPA	High

Objective 2: Coordinate efforts among agencies, conservation groups, and industries in order to protect infrastructure and natural resources, while recovering natural gas within the Marcellus shale formation.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Require companies to host public meeting workshops prior to development activities to inform and educate areas residents about the process to alleviate their concerns.	Conservation Groups, Gas Companies, DEP	Private Sources, Gas Companies, DEP, EPA	Medium

and enforcement.

GOAL 2-5: ADDRESS MARCELLUS SHALE CONCERNS (CONTINUED).

Objective 2: Coordinate efforts among agencies, conservation groups, and industries in order to protect infrastructure and natural resources, while recovering natural gas within the Marcellus shale formation (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Change bonding requirements for existing vertical wells to cover the likely higher plugging cost required for Marcellus wells by working with neighboring states to establish sufficient bonding rates to cover the plugging costs if wells are abandoned.	Conservation Groups, Legislators, DEP, EPA	Foundations, Private Sources, DEP, EPA	Medium
3.	Work with Department of Environmental Protection to establish protection for Exceptional Value, High Quality, and Wilderness Trout streams requiring individual permits for gas development providing the public an opportunity to review, comment, or request a public meeting about the proposed drilling activities or not permits the sites at all.	Conservation Groups, DEP, PFBC	Foundations, Private Sources, DEP, PFBC	High
4.	Evaluate the overall impacts to groundwater and surface water flows and place a cap on permits to prevent total Maximum Daily Loads from being reached.	Conservation Groups, Conservation Districts, Gas Companies, DEP	Foundations, Private Sources, DEP, USGS	High
5.	Establish a tax or fee on natural gas extraction to develop a fund to reimburse impacted municipalities for road infrastructures, remediate impacts cause by the recovery of natural gas, and cover Pennsylvania Department of Environmental Protection's administrative costs, such as permitting, inspections,	Conservation Groups, Legislators, Municipalities, DEP, EPA	Foundations, Private Sources, DEP, EPA	High

GOAL 2-6: INCREASE AWARENESS TO REDUCE ILLEGAL DUMPING ACTIVITY.

Objective 1: Increase awareness about the impacts from litter, illegal dumps and abandoned vehicles.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Educate citizens about the impacts illegal dumping has on water quality and the environment, aesthetics, health and human safety, and the economy.	Conservation Groups, Municipalities, PA CleanWays, DCNR, DEP	Foundations, Private Sources, DEP	Medium
2.	Develop public service announcements about proper waste disposal and recycling opportunities.	Conservation Groups, Municipalities, Media, PA CleanWays, DEP	Foundations, Private Sources, DEP	Low

GOAL 2-6: INCREASE AWARENESS TO REDUCE ILLEGAL DUMPING ACTIVITY (CONTINUED).

Objective 1: Increase awareness about the impacts from litter, illegal dumps and abandoned vehicles (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
3.	Educate citizens about traditional and innovative ways to reduce, reuse, and recycle and how to properly dispose of household hazardous waste by providing workshops and other outreach campaigns.	Conservation Groups, Municipalities, PA CleanWays, DEP	Foundations, Private Sources, DEP	Medium
4.	Increase the number of people practicing "leave no trace" or pack it in pack it out practices through outreach campaign and demonstrations at community events.	Conservation Groups, Municipalities, Media, PA CleanWays, DEP	Foundations, Private Sources, DEP	Low
5.	Educate residents about safety, human health, and the environmental impacts cause by unlicensed or abandoned vehicles, and encourage proper disposal.	Conservation Groups, PA CleanWays, DEP	Foundations, Private Sources	Low
6.	Establish a PA CleanWays chapter in Potter County or expand the McKean County chapter into a multiple county chapter.	Conservation Groups, Concerned Citizens, PA CleanWays	Foundations, Private Sources	Medium

Objective 2: Reduce illegal dumping activities.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Monitor dumpsites for recent activity and increase enforcement and penalties for violators	Municipalities, Solid Waste Authorities, PA CleanWays, DEP	Foundations, Private Sources, Municipalities, DEP	Medium
2.	Increase access for recycling through expanded hours and/or drop-off locations.	Municipalities, Solid Waste Authorities, PA CleanWays, DEP	Foundations, Private Sources, Municipalities, DEP	High
3.	Increase participation in recycling programs through education and incentives for citizens, and regular receptacle maintenance and collection by service providers.	Municipalities, Solid Waste Authorities, PA CleanWays, DEP	Foundations, Private Sources, Municipalities, DEP	Medium
4.	Host cleanup events to eliminate illegal dumpsites and establish surveillance, monitoring to decrease the reoccurrence of dumping.	Conservation Districts, Conservation Groups, Municipalities, Solid Waste Authorities, PA CleanWays	Foundations, Private Sources, DEP	High

GOAL 2-6: INCREASE AWARENESS TO REDUCE ILLEGAL DUMPING ACTIVITY (CONTINUED).

Objective 2: Reduce illegal dumping activities (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
5.	Identify and secure local, state, and federal funding to adequately fund efforts to identify and remove illegal dumpsites, address waste disposal needs of the areas, and assist in establishing curbside recycling programs.	Conservation Groups, Municipalities, Civic Groups, PA CleanWays	Foundations, Private Sources, DEP	Medium
6.	Enhance the existing trash collection and recycling systems to expand services reducing the need for illegal dumping.	Conservation Groups, Municipalities, Civic Groups, PA CleanWays	Foundations, Private Sources, DEP	Medium

GOAL 2-7: ENHANCE WATERSHED COMMUNITIES

Objective 1: Revitalize communities.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Restore the former golf course in Coudersport in an environmentally sound manner to establish natural open space.	Conservation Groups, Civic Groups, Coudersport, Landowner	Foundations, Private Sources	Medium
2.	Reuse old commercials sites, including brownfield sites, when establishing new businesses instead of developing greenspaces, such as open fields or farmland.	Conservation Groups, Civic Groups, Coudersport, Landowner	Foundations, Private Sources	Medium
3.	Increase maintenance of houses and buildings in downtown areas to enhance the aesthetics of the community.	Municipalities, Civic Groups, Landowners	Foundations, Private Sources	Medium

Water Resources

GOAL 3-1: REDUCE THE RISK OF FLOODING.

Objective 1: Minimize potential flooding damages by taking a proactive approach to managing floodplains.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct a detailed flood-prone area assessment that	Conservation Groups,	Foundations, Private	Medium
	includes mapping to determine risk levels of flooding	Municipalities,	Sources, FEMA,	
	and establish a dedicated flood-control program and	PEMA	PEMA, DCED, DEP	
	discourage development in floodplain areas			

GOAL 3-1: REDUCE THE RISK OF FLOODING (CONTINUED).

Objective 1: Minimize potential flooding damages by taking a proactive approach to managing floodplains (continued).

Me	thod to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Acquire properties that are frequently impacted by serious flooding or at risk for serious flooding and convert them to public open spaces, such as parks, trails, or natural areas.	Conservation Groups, Municipalities, Counties, PEMA	Foundations, Private Sources, FEMA, PEMA, DCED, DCNR	Medium
3.	Consult a hydrologist and discuss the potential use of natural stream channel design techniques to decrease the risk of flooding.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, DCED, DEP	Medium
4.	Take proactive steps, such as maintaining culverts free of debris or establishing zoning ordinances in floodplains to alleviate the risk of flooding.	Conservation Groups, Municipalities, Counties, Civic Groups	Foundations, Private Sources, FEMA, PEMA, DCED, DEP	Medium
5.	Develop and education program addressing flood issues, flood prevention, flood recovery, and floodplain management.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, DEP, EPA, PEMA, FEMA	Low

Objective 2: Encourage non-structural approaches to floodplain management.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Identify areas where adequate riparian area vegetation and floodplain integrity can be re-established for flood control purposes and to limit degradation of water quality and biological resources.	Conservation Groups, Municipalities, Landowners, DEP	Foundations, Private Sources, FEMA, PEMA, DCED, DEP	High
2.	Implement channel improvement projects that use bioremediation techniques to limit flooding.	Conservation Districts, Conservation Groups, DEP	Foundations, Private Sources, FEMA, PEMA, DCED, DEP	High
3.	Create and maintain projects that promote alternative methods of flood control, reserving dredging as a last resort.	Conservation Districts, Conservation Groups, DEP	Foundations, Private Sources, FEMA, PEMA, DCED, DEP	Medium

GOAL 3-2: MANAGE STORMWATER

Objective 1: Utilize planning to minimize impacts from stormwater.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Educate municipal and county officials about planning for stormwater best management practice implementation and increase local, state, and federal funding for installation of best management practices.	Conservation Districts, Conservation Groups, Municipalities, Counties, DEP, EPA	Foundations, Private Sources, DEP, EPA	High
2.	Develop and implement stormwater management plans that incorporate water quality design and pollution reduction in stormwater management.	Conservation Districts, Conservation Groups, Planning Commissions, Municipalities, Counties	Foundations, Private Sources, DEP, DCED	High
3.	Develop a demonstration area of stormwater best management practices that incorporate water quality improvement techniques.	Conservation Districts, Conservation Groups, Planning Commissions, Counties	Foundations, Private Sources, DEP, DCED	Medium

Objective 2: Decrease the amount of impervious cover by 10 percent.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Inventory individual subwatersheds to determine percent impervious cover to use as a reference when managing and stormwater impacts and planning future land use changes.	Conservation Districts, Conservation Groups	Foundations, Private Sources, DEP	Medium
2.	Minimize the amount of impervious cover by implementing stormwater management practices, such as installing pervious pavement and green roofs.	Conservation Districts, Conservation Groups, Municipalities	Foundations, Private Sources, DEP	Medium
3.	Promote watersheds with 10 percent or less impervious cover.	Conservation Districts, Conservation Groups	Foundations, Private Sources, DEP	Medium

GOAL 3-3: REDUCE EROSION AND SEDIMENTATION IMPACTS.

Objective 1: Increase the miles of streams with riparian buffers to achieve maximum protection of water resources.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct an assessment of streambanks and riparian areas, and prioritize areas in need of restoration.	Conservation Districts, Conservation Groups, Landowners, DEP	Foundations, Private Sources	High
2.	Establish and maintain vegetated riparian corridors and implement best management practices using smart growth practices as a cost-effective means of non- point source pollution reduction.	Conservation Groups, Conservation Districts, Landowners, PFBC, DEP	Foundations, Private Sources, Cost-Share Programs, DEP, EPA	High
3.	Increase wildlife habitat by planting diverse natural plant communities along riparian buffers.	Conservation Groups, Conservation Districts, Landowners, PFBC, DEP	Foundations, Private Sources, Cost-Share Programs, DEP, EPA	Medium
4.	Promote the preservation and enhancement of vegetated streamside buffers through education about their benefits for wildlife, water quality, and flood prevention.	Conservation Groups, DEP, NRCS, PFBC, PGC, USDA, EPA	Foundations, Private Sources, DEP, NRCS, USDA, PDA, EPA, PFBC	Medium

Objective 2: Determine sources of erosion and sedimentation.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct a watershed study to determine source of sedimentation and develop strategies to reduce impacts by implementing best management practices.	Conservation Groups, Conservation Districts, DEP	Foundations, Private Sources, DEP, EPA	Medium
2.	Support updates to the Pennsylvania Non-Point Source Management Plan and implement practices to reduce erosion.	Conservation Groups, DEP, NRCS, PDA	Foundations, Private Sources, DEP, EPA	Medium

Objective 3: Implement practices to reduce erosion and sedimentation impacts.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Incorporate environmentally sensitive construction and maintenance techniques on dirt and gravel roadways and install best management practices to minimize erosion and sedimentation form entering area waterways.	Conservation Districts, conservation Groups, Center for Dirt & Gravel Roads, Municipalities, DEP	Foundations, Private Sources, DEP, EPA	High

GOAL 3-3: REDUCE EROSION AND SEDIMENTATION IMPACTS (CONTINUED).

Objective 3: Implement practices to reduce erosion and sedimentation impacts (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Use best management practices to control erosion and sedimentation in farming, forestry, development, mining, and oil and gas industries; and conduct more site inspections.	Conservation Districts, Conservation Groups, DEP, DCNR	Foundations, Private Sources, DEP, EPA	High
3.	Reduce impacts of erosion from stone quarries through the utilization of best management practices.	Conservation Districts, DEP, Quarries	DEP, Quarries	Medium

Objective 4: Establish controls to reduce erosion.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish a permit process that requires all earth moving industries to abide by the same erosion and sedimentation control standards.	Conservation Groups, Conservation Districts, DEP	Foundations, Private Sources, DEP, EPA	Medium
2.	Establish steep slope ordinances for earth moving industries.	Conservation Groups, Conservation Districts, Municipalities, DEP	Foundations, Private Sources, DEP, EPA	Medium
3.	Transfer permit violation fees to a local organization for water quality improvements within the watershed.	Conservation Districts, DEP Conservation Groups,	Private Sources	Medium

GOAL 3-4: EXPAND THE PROTECTION, STUDY, AND UNDERSTANDING OF WETLANDS.

Objective 1: Protect wetlands.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Acquire important wetland areas.	Planning Commissions, Conservation Groups, DCNR, PGC, DEP	Foundations, Private Sources, DEP, DCNR	High
2.	Protect wetland habitats and surrounding buffers for birds and wildlife by limiting development, storm runoff, and other disturbances.	Planning Commissions, Conservation Groups, DCNR, PGC, DEP	Foundations, Private Sources, DEP, DCNR	High
3.	Enhance and promote programs that restore wetlands from agricultural and streamside areas of limited use.	Planning Commissions, Conservation Groups, DCNR, PGC, DEP, USDA	Foundations, Private Sources, DEP, USDA	High

GOAL 3-4: EXPAND THE PROTECTION, STUDY, AND UNDERSTANDING OF WETLANDS (CONTINUED).

Objective 1: Protect wetlands (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
4.	Modify or establish municipal ordinances to protect	Conservation Groups,	Private Sources,	Medium
	wetland areas of biological importance.	Planning	DEP, DCED	
		Commissions,		
		Municipalities, DEP		

Objective 2: Investigate wetlands and their functions.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Inventory and assess the functionality of wetlands, and develop restoration strategies based upon the assessment.	Planning Commissions, Conservation Groups, DCNR, PGC, DEP	Foundations, Private Sources, DEP, EPA	Medium
2.	Update wetland maps and develop a digital coverage database.	Planning Commissions, Conservation Groups, DCNR, PGC, DEP	Foundations, Private Sources, DEP, EPA	Medium
3.	Study the impacts that economic development has had on historical wetland loss.	Planning Commissions, Conservation Groups, DCNR, PGC, DEP	Foundations, Private Sources, DEP, DCNR, EPA	Low

Objective 3: Conduct activities to educate the public about the benefits of wetlands.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop or expand outreach programs on the function and value of wetlands.	Conservation Groups, Conservation Districts, DEP	Foundations, Private Sources, DEP, EPA	Medium
2.	Educate municipal, county, state, and federal officials about planning and implementation of wetland mitigation and the establishment of replacement wetlands.	Conservation Groups, Elected Officials, DEP, EPA	Foundations, Private Sources, DEP, EPA	Medium
3.	Educate stakeholder about reducing erosion and sedimentation impacts through wetland development.	Conservation Groups, Conservation districts, Citizens, DEP, NRCS	Foundations, Private Sources, DEP, EPA, NRCS	Medium

GOAL 3-5: MONITOR WATER QUANTITY TO ENSURE DEMAND DOES NOT EXCEED WATER SUPPLY.

Objective 1: Protect the quality of drinking water.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct source water assessments and well-head protection plans in order to identify and protect public drinking water sources.	Conservation Districts, Conservation Groups, Municipalities, Water Authorities, DEP, LWV, RWA	Foundations, Private Sources, DEP, WREN\	High
2.	Develop a locally based program for disseminating information about protecting private well supplies to homeowners.	Conservation Districts, Conservation Groups, DEP, LWV, RWA	Foundations, Private Sources, DEP, WREN	High
3.	Study and monitor the effects of well drilling on surface water and groundwater to determine impacts on water quality, and work to minimize those impacts.	Conservation Districts, DEP, Conservation Groups.	Foundations, Private Sources, DEP, EPA	High

Objective 2: Monitor levels of water available and implement practices to increase the flow of groundwater.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Work with U.S. Geological Survey on updating stream gauging station database to include current groundwater flow, depths, and quality information.	Conservation Districts, Conservation Groups, PFBC, USGS, DEP	Foundations, Private Sources, DEP, EPA, USGS	High
2.	Monitor groundwater levels in critical areas that can be used as baseline data to determine loss of groundwater.	Conservation Districts, Conservation Groups, School Districts, Citizens	Foundations, Private Sources, DEP, EPA	High
3.	Conserve groundwater through the installation of riparian buffers, porous pavement, rain barrels, swales, and other best management practices.	Conservation Districts, Conservation Groups, Landowners	Foundations, Private Sources, Cost-share Programs, DEP	High
4.	Develop a water budget in order to better understand the sources and amounts of water available and the types of development activities that can be supported with the available resources.	Conservation Districts, Conservation Groups, PFBC, DEP, USGS	Foundations, Private Sources, DEP, EPA, USGS	Medium
5.	Install best management practices to increase the infiltration rate of stormwater to recharge groundwater supplies.	Conservation Districts, DEP, Conservation Groups, Water Authorities	Foundations, Private Sources, DEP, EPA	Medium

GOAL 3-5: MONITOR WATER QUANTITY TO ENSURE DEMAND DOES NOT EXCEED WATER SUPPLY (CONTINUED).

Objective 3: Reduce water consumption through implementation of water conservation practices.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Launch a watershed-wide water conservation program to educate the public about the benefits of reducing water consumption, utilizing water conservation products and techniques, and incorporating environmentally friendly water conservation practices into homes and businesses.	Conservation Districts, Conservation Groups, Citizens, Businesses, School Districts, Developers, Legislators	Foundations, Private Sources, DEP, WREN	Medium
2.	Establish a program to promote and retrofit homes and businesses for water conservation practices and establish guidelines that require installation of low- flow devices for all new construction.	Conservation Groups, Developers, Legislators, Landowners, DEP	Foundations, Private Sources, DEP, WREN	Medium
3.	Establish an ongoing program for school districts to promote and practice water conservation practices.	Conservation Groups, Conservation Districts, School Districts	Foundations, Private Sources, DEP, WREN	Medium

GOAL 3-6: PROTECT AND IMPROVE AREA WATERWAYS.

Objective 1: Monitor conditions of area waterways.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop a monitoring plan that integrates quality assurance and quality control standards.	Conservation Districts, Conservation Groups, Community Groups, School Districts	Foundations, Private Sources, DEP, EPA	High
2.	Conduct seasonal chemical, biological, and visual assessments to initial provide background data and to prioritize future project, and then to monitor changes in conditions.	Conservation Districts, Conservation Groups, Community Groups, School Districts	Foundations, Private Sources, DEP, EPA	High
3.	Incorporate schools and community groups into water quality monitoring programs and compile a database to record and compare monitoring data.	Conservation Districts, Conservation Groups, Community Groups, School Districts	Foundations, Private Sources, DEP, EPA	High

GOAL 3-6: PROTECT AND IMPROVE AREA WATERWAYS (CONTINUED).

Objective 1: Monitor conditions of area waterways (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
4.	Establish monitoring sites near withdrawal and	Conservation	Foundations, Private	High
	discharge sites and analyze water samples for bacteria	Districts,	Sources, DEP, EPA	
	and biochemical oxygen demand.	Conservation Groups,		
		Community Groups,		
		School Districts,		
		Water Authorities,		
		Wastewater Plants		

Objective 2: Access conditions at lakes and ponds.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct an assessment of natural and man-made impoundments for size, use, water quality, and aquatic life, and implement recommendations to enhance their ecosystems.	Conservation Groups, Conservation Districts, DEP, PALMS	Foundations, Private Sources, DEP, EPA	Medium
2.	Assess, control, monitor, and mitigate exotic species that directly affect lake uses.	Conservation Groups, Conservation Districts, DEP, PALMS	Foundations, Private Sources, DEP, EPA	Medium
3.	Inventory dams for their uses, and evaluate maintenance versus removal, while considering public safety, recreation, and present use.	Conservation Groups, American Rivers, PFBC, DCNR, DEP	Foundations, Private Sources, American Rivers, DEP, PFBC	Medium
4.	Protect aquatic life and stream habitats by gradually discharging overflows from flood control structures.	Conservation Groups, PFBC, DCNR, DEP	Private Sources	Medium

Objective 3: Develop water quality standards and enforce regulations to protect and restore water quality.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Enforce regulations protecting water quality, particularly for High Quality and Exceptional Value designated streams.	Conservation Groups, Conservation Districts, DEP, PFBC	Foundations, Private Sources, DEP	High
2.	Develop total maximum daily load studies for the impaired waterways that are identified in category five.	Conservation Groups, DEP, EPA	DEP, EPA	Medium

GOAL 3-6: PROTECT AND IMPROVE AREA WATERWAYS (CONTINUED).

Objective 4: Increase awareness about conservation practices to protect water quality and quantity.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Promote groundwater quality awareness when conducting education and outreach programs, and provide educational information about potential threats to water supply.	Conservation Groups, Conservation Districts, Municipalities, Water Suppliers	Foundations, Private Sources, DEP, DCED, EPA	Medium
2.	Educate homeowners about the effects of the overuse of fertilizers, pesticides, and herbicides on groundwater.	Conservation Groups, Conservation Districts, Landowners	Foundations, Private Sources, DEP	Low
3.	Educate homeowners about the significance of water- use designations and ways to minimize non-point source pollution.	Conservation Groups, Conservation Districts, Citizens	Foundations, Private Sources, DEP	Low
4.	Develop or implement educational outreach programs for private well owners, specifically concerning sole source aquifer protection programs and protecting groundwater supplies.	Conservation Groups, Conservation Districts, Landowners, DEP, RWA	Foundations, Private Sources, DEP	Medium

Biological Resources

GOAL 4-1: PROTECT FOREST AND WILDLIFE RESOURCES.

Objective 1: Develop, adopt, and implement plans.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop and implement forest stewardship, forest management, or wildlife management plans on privately owned property.	Conservation Groups, Planning Departments, Landowners, DCNR, PGC	Foundations, Private Sources, DCNR, PGC	High
2.	Increase the number of participants in Pennsylvania Forest Stewardship and Tree Farm programs.	Conservation Groups, Planning Departments, Landowners, DCNR	Foundations, Private Sources, DCNR	Medium
3.	Develop detailed management plans for landowners of biologically diverse areas, including inventories of natural features and monitoring plans for invasive or exotic species.	Conservation Groups, Landowners, PGC, DCNR	Foundations, Private Sources, DCNR, PGC	Medium

GOAL 4-1: PROTECT FOREST AND WILDLIFE RESOURCES (CONTINUED).

Objective 1: Develop, adopt, and implement plans (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
4.	Conduct studies in conjunction with Pennsylvania Natural Heritage Program to monitor biodiversity, including surveys for historical species of concern.	Conservation Groups, Sportsmen Groups, DCNR, PGC, PNHP	Foundations, Private Sources, DCNR	Medium

Objective 2: Implement best management practices.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct a demonstration project utilizing best management practices to restore degraded areas.	Conservation Groups, Landowners, DCNR	Foundations, Private Sources, DCNR	Medium
2.	Utilize sustainable management practices based upon forest type, management type, and size under the direction of a professional forester.	Conservation Groups, Landowners, DCNR	Foundations, Private Sources, DCNR	Medium
3.	Decrease forest fragmentation by maintaining contiguous forest tracts and/or travel corridors between existing non-contiguous forest tracts.	Conservation Groups, Sportsmen Groups, Landowners, DCNR, PGC	Foundations, Private Sources, DCNR, PGC	Medium
4.	Develop incentives to encourage the forest and logging industries to utilize sustainable management practices and promote tree plantings, sustainable harvesting, and other best management practices.	Conservation Groups, Landowners, Civic Groups, DCNR, USFS	Foundations, Private Sources, USFS, DCNR	Medium

Objective 3: Identify and protect biologically diverse areas and important habitats.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Partner with local Audubon chapters and birding clubs to identify, characterize, and recommend Important Bird Areas.	Conservation Groups, Landowners, DCNR	Foundation, Private Sources, Conservation Groups, DCNR	Medium
2.	Develop biological study areas and encourage local school districts to utilize these resources, thereby fulfilling state education curriculum of broadening the understanding of ecological resources.	Conservation Groups, Universities, School Districts, Landowners, DCNR, PGC	Foundations, private Sources, Universities, DCNR	Medium
3.	Develop a land steward program through which volunteers would be responsible for regular monitoring of important habitats and working with the landowners.	Conservation Groups, Landowners, DCNR, PGC	Foundations, Private Sources, DCNR	Medium

GOAL 4-1: PROTECT FOREST AND WILDLIFE RESOURCES (CONTINUED).

Objective 3: Identify and protect biologically diverse areas and important habitats (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
4.	Partner with local Audubon chapters and birding clubs to identify, characterize, and recommend Important Bird Areas.	Conservation Groups, Landowners, DCNR	Foundation, Private Sources, Conservation Groups, DCNR	Medium
5.	Develop biodiversity indices for selected stream segments to document the current biodiversity status and to track changes over time as projects are implemented.	Conservation Groups, Sportsmen Groups, DCNR, DEP, PFBC, USFWS	Foundations, Private Sources, DEP, DCNR, PFBC, PGC, USFWS	Medium

Objective 4: Identify and protect important habitats for plant and animal species.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Identify and protect additional environmentally sensitive areas and areas of high biodiversity.	Conservation Groups, Landowners, PNHP, PFBC, DCNR	Foundations, Private Sources, DCNR, PFBC	High
2.	Identify high quality wetlands and work with landowners to protect these sites through acquisition or conservation easement purchases.	Conservation Groups, DCNR	Foundations, Private Sources, DCNR	High

Objective 5: Increase awareness about the importance of biodiversity and protecting wildlife and natural resources.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Sponsor outreach programs to educate landowners about wildlife management practices.	Sportsmen Groups, PGC	Foundations, Private Sources, PGC	Medium
2.	Educate citizens about the use and purpose of Natural heritage Inventories in planning, with an additional focus on understanding the importance of the natural resources that exist.	Conservation Groups, Municipalities, Counties, PNHP	Foundations, Private Sources, DCNR	Medium
3.	Educate citizens about biological diversity and the vital importance of conserving habitats and protecting species.	Conservation Groups, DCNR, PGC, USFWS	Foundations, Private Sources, DCNR	Medium
4.	Provide educational field trips to elected officials emphasizing natural resources and the value of those resources to the region.	Conservation Groups, Elected Officials, DCNR, PGC, USFWS	Foundations, Private Sources, DCNR	Medium

GOAL 4-2: IMPROVE HABITATS.

Objective 1: Implement strategies to improve conditions for biologically diverse and important habitats.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Restrict activities, such as grazing and off-road vehicles, within biological diversity areas to minimize erosion and sedimentation impacts to control the spread of invasive species.	Conservation Groups, Landowners, DCNR, PGC	Foundations, Private Sources, DCNR	High
2.	Decrease the use of herbicide along highway right-of- ways and develop an alternative management technique that can be implemented.	Conservation Groups, Adjacent Landowners, Utility Companies, PennDOT	Foundations, Private Sources, DCNR	High
3.	Develop and 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 divers areas.	Conservation Groups, Sportsmen Groups, Landowners, DCNR, PGC, DEP	Foundations, Private Sources, Cost-Share Programs, DCNR, DEP, PGC	Medium

Objective 2: Implement strategies to improve aquatic habitats for fish, mussels, and other organisms.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Incorporate aquatic habitat improvements into streambank stabilization and water quality remediation projects.	Conservation Groups, Landowners, PFBC, DEP	Foundations, Private Sources, PFBC, DEP	High
2.	Increase habitat and passage for fish, mussels, and other aquatic organisms by removing non-functional dams and establishing fish ladders at functioning dams.	Conservation Groups, Sportsmen Groups, Landowners, PNHP, PFBC, DCNR, USACE	Foundations, Private Sources, DCNR, PFBC	High
3.	Utilize volunteers to quantify the amount of large woody debris in key stream reaches and headwater areas.	Conservation Groups, Conservation Districts, Sportsmen Groups, PFBC, DEP	Foundation, Private Sources, PFBC, DEP	Low

Objective 3: Implement strategies to enhance habitats for wildlife.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Increase the number of private backyard conservation areas to serve as wildlife habitat and travel corridors by providing activities and programs for landowners.	Conservation Groups, Landowners, PNHP, PFBC, DCNR, PGC	Foundations, Private Sources, DCNR_PFBC	Medium

GOAL 4-2: IMPROVE HABITATS (CONTINUED).

Objective 3: Implement strategies to enhance habitats for wildlife (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Refrain from using manicuring techniques on some fields in public ownership allowing them to revert to a more natural state providing habitat for wildlife.	Conservation Groups, Landowners, PNHP, PFBC, DCNR, PGC	NA	Medium
3.	Maintain grassland species habitats on public lands through practices, such as controlled burns and limited mowing.	Conservation Groups, Landowners, PNHP, PFBC, DCNR, PGC	Foundations, Private Sources, DCNR, PFBC	Medium
4.	Delay hay harvesting and mowing of fallow fields until July protecting bird nesting sites and young wildlife, if economic situation permits.	Conservation Groups, Landowners, PNHP, PFBC, DCNR, PGC	Foundations, Private Sources, DCNR, PFBC	Medium

Objective 4: Protect rare, threatened, and endangered species and their habitats.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	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, Landowners, PNHP, PFBC, DCNR	Foundations, Private Sources, DCNR, PFBC	Medium
2.	Protect or improve habitats that support threatened and endangered species and species of concern through acquisition, easements, and/or landowner education.	Conservation Groups, Landowners, PNHP, PFBC, DCNR	Foundations, Private Sources, DCNR, PFBC	Medium
3.	Submit recent identification of rare, threatened, or endangered species and their habitats to Pennsylvania Biological Survey.	Conservation Groups, Landowners, PNHP, PFBC, DCNR	Foundations, Private Sources, DCNR, PFBC	Medium

GOAL 4-3: REDUCE INVASIVE SPECIES POPULATIONS WHILE INCREASING THE USE OF NATIVE SPECIES.

Objective 1: Monitor and control invasive species.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Compile a publicly assessable Internet database of exotic and invasive species that allows moderated submissions from the public.	Conservation Groups, Conservation Districts, DCNR	Foundations, Private Sources, DCNR	Medium

GOAL 4-3: REDUCE INVASIVE SPECIES POPULATIONS WHILE INCREASING THE USE OF NATIVE SPECIES (CONTINUED).

Objective 1: Monitor and control invasive species (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority		
2.	Develop a prioritized early detection and rapid response control strategy for removing invasive species by partnering with public and private landowners.	Conservation Groups, Conservation Districts, DCNR	Foundations, private Sources, DCNR	High		
3.	Conduct a watershed-wide invasive species plant survey to identify areas where invasive species pose the greatest threats to biodiversity and develop prioritization and remediation plans.	Conservation Groups, Conservation Districts, DCNR	Foundations, Private Sources, DCNR	High		
4.	Monitor riparian buffers for invasive species and implement control practices to deter the spread of invasive species downstream.	Conservation Groups, Conservation Districts, Landowners, DCNR	Foundations, Private Sources, DCNR	Medium		
Ob	Objective 2: Increase the use of native plants.					
	Method to achieve objective:	Potential Partners	Potential Funding	Priority		
1.	Use native plants in landscaping, wildlife habitat plantings, and educational activities.	Conservation Groups, Conservation Districts, DCNR	Foundations, Private Sources, DCNR	High		
2.	Promote native tree plantings in remediation projects, such as streambank fencing, streambank stabilization, or surface mine reclamation.	Conservation Groups, Conservation Districts, DCNR	Foundations, Private Sources, DCNR	High		
3.	Conduct an assessment and develop a management plan for native species.	Conservation Groups, Conservation Districts, DCNR	Foundations, Private Sources, DCNR	Medium		
4.	Establish a reserve seed bank of native species that can be used in remediation efforts.	Conservation Groups, Conservation Districts, DCNR, USES	Foundations, Private Sources, DCNR, USFS	Low		

GOAL 4-4: CONTROL WILDLIFE POPULATIONS.

Objective 1: Increase opportunities for hunting.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Register additional acres into the Deer Management Assistance Program to keep deer herds at ecologically healthy levels.	Conservation Groups, Sportsmen Groups, DCNR, PGC	Foundations, Private Sources, PGC	Medium
2.	Establish incentives to landowners who permit the public to hunt on their property.	Conservation Groups, Sportsmen Groups, PGC	Foundations, Private Sources, PGC	Medium
4	Promote deer management strategies, such as special hunting tags and deer exclorsures in natural areas.	Conservation Groups, Sportsmen Groups, DCNR, PGC	Foundations, Private Sources, PGC	Medium
5.	Increase the number of hunters participating in the Deer Management Assistance Program.	Conservation Groups, Sportsmen Groups, DCNR, PGC	Foundations, Private Sources, PGC	Medium

Objective 2: Increase participation and interest in wildlife management.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Foster continued involvement in hunting and trapping activities among all age groups and educate hunters, trappers, and citizens on the importance of population control.	Conservation Groups, Sportsmen Groups, DCNR, PGC	Foundations, Private Sources, PGC	High
2.	Develop area for wildlife viewing and educational programs to raise awareness about biodiversity.	Conservation Groups, Sportsmen Groups, DCNR, PGC	Foundations, Private Sources, DCNR, PGC	High
3.	Support laws and regulations to maintain whitetail deer populations at levels that will ensure healthy forests, productive agricultural lands, and healthy deer populations.	Conservation Groups, Sportsmen Groups, DCNR, PGC	Foundations, Private Sources, PGC	Medium

Cultural Resources

GOAL 5-1: ENHANCE RECREATIONAL OPPORTUNITIES FOR SPORTSMEN AND OUTDOOR ENTHUSIASTS.

Objective 1. Increase the acreage of private land open to public hunting.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Enroll private lands into Cooperative Farmland, Cooperative Forestland, and Deer Management Assistance Program.	Conservation Groups, Sportsmen Groups, Landowners, PGC	Foundations, Private Sources, PGC, DCNR	Medium
2.	Establish an incentive to encourage private landowners to permit public hunting on their property.	Conservation Groups, Sportsmen Groups, Landowners, PGC	Foundations, Private Sources, Conservation Groups, PGC	Medium
3.	Establish new or expand existing state game lands increasing the acreage of public land open to hunting.	Conservation Groups, Sportsmen Groups, Landowner, PGC	Foundations, Private Sources, Conservation Groups, PGC	Low

Objective 2. Enhance fishing and boating access and opportunities.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Formalize unofficial access sites and develop an Upper Allegheny River water trail guide.	Conservation Groups, Citizens, Businesses, Municipalities, PFBC, DCNR, TPA	Foundations, Private Sources, PFBC, DCNR, TPA	High
2.	Develop public access to area waterways for anglers and small non-powered watercraft.	Conservation Groups, Landowners, PFBC, DCNR, USACE	Foundations, Private Sources, PFBC, DEP	Medium
3.	Remove non-functional dams to improve canoeing, kayaking, and natural fish passage.	Conservation Groups, American Rivers, PFBC	Foundations, Private Sources, PFBC, DEP	Medium

Objective 3. Enhance the opportunities for camping.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Acquire and develop areas along the stream for primitive camping.	Conservation Groups, Businesses, USACE, DCNR	Foundations, Private Sources, PFBC, DCNR	Medium

GOAL 5-1: ENHANCE RECREATIONAL OPPORTUNITIES FOR SPORTSMEN AND OUTDOOR ENTHUSIASTS (CONTINUED).

Objective 3. Enhance the opportunities for camping (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Enhance camping experience through facility and program updates.	Businesses, USACE, DCNR	Foundations, Private Sources, PFBC, DCNR	Low

GOAL 5-2: HIGHLIGHT AND PROMOTE NATURAL, CULTURAL, HISTORICAL, AND RECREATIONAL OPPORTUNITIES.

Objective 1. Develop a campaign to market the recreational and historical resources throughout the area.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop outreach programs to educate visitors about recreation resources available to the public and to respect private property owner rights.	Conservation Groups, Historical Societies, TPA	Foundations, Private Sources, TPA	High
2.	Develop a local recreation guide advertising the historical, cultural, and recreational resources in the region including public lands and fishing opportunities.	Conservation Groups, Historical Societies, Municipalities, Businesses, TPA	Foundations, Private Sources, TPA	High
3.	Establish signage for historical and recreational sites based upon guidelines established in the Pennsylvania Wilds Design Guide.	Conservation Groups, Historical Societies, TPA	Foundations, Private Sources, TPA	High
4.	Utilize local media and social media to advertise recreational and historical sites throughout the region.	Conservation Groups, Historical Societies, TPA	Foundations, Private Sources, TPA	Medium
5.	Establish local tourism coordinators position to promote historical and recreational features and to promote local community events.	TPA, Pennsylvania Wilds, Businesses	ТРА	Low

Objective 2. Develop an educational campaigns encouraging good sportsmanship while protecting private property owner's rights.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Educate hunters, fishermen, and other outdoor recreation enthusiasts on the importance of land etiquette.	Conservation Groups, Sportsmen Groups, Landowners, PFBC, PGC, DCNR	Foundations, Private Sources, PGC, PFBC, DCNR	Medium

GOAL 5-2: HIGHLIGHT AND PROMOTE NATURAL, CULTURAL, HISTORICAL, AND RECREATIONAL OPPORTUNITIES (CONTINUED).

Objective 2. Develop an educational campaigns encouraging good sportsmanship while protecting private property owner's rights (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Educate sportsmen about areas open to public usage providing detailed maps delineating public-use areas.	Conservation Groups, Sportsmen Groups, Landowners, PFBC, PGC, DCNR	Foundations, Private Sources, PGC, PFBC, DCNR	Medium
3.	Establish signage positively influencing and promoting good sportsmanship practices, such as leave no trace or pack it in, pack it out.	Conservation Groups, Sportsmen Groups, Trail Groups, DCNR	Foundations, Private Sources, DCNR	Medium

GOAL 5-3: ENHANCE RECREATIONAL FACILITIES AND EXPAND RESOURCES FOR A DIVERSITY OF USES.

Objective 1: Improve recreational facilities and ensure availability and access.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct playground safety audits at local playgrounds and implement recommendations from the audits.	Municipalities, Park & Recreation Authorities, Counties, DCNR	Foundations, Private Sources, Municipalities, Counties, DCNR	Medium
2.	Upgrade equipment and safety features at existing community parks and upgrade recreational facilities to comply with American Disability Act guidelines.	Municipalities, Park & Recreation Authorities, Counties, Citizens	Foundations, Private Sources, DCNR	Medium
3.	Establish or enhance amenities, such as bathrooms and parking lots, at recreational facilities, including trail heads and municipal parks.	Municipalities, Park & Recreation Authorities, PFBC, DCNR	Foundations, Private Sources, DCNR, PFBC	Medium
4.	Establish additional or enhance existing public access points to streams and trails, including amenities, such as parking and restroom facilities.	Municipalities, Park & Recreation Authorities, PFBC, DCNR	Foundations, Private Sources, DCNR, PFBC	Medium

GOAL 5-3: ENHANCE RECREATIONAL FACILITIES AND EXPAND RESOURCES FOR A DIVERSITY OF USES (CONTINUED).

Objective 2: Expand recreational opportunities at local facilities to provide a variety of activities and amenities.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish winter recreational activities at existing facilities, such as sledding, ice skating, and cross-country skiing.	Civic Groups, Trail Groups, Municipalities, Park & Recreation Authorities	Foundations, Private Sources, DCNR	Medium
2.	Develop low-impact recreational facilities for camping, hiking, biking, wildlife viewing, bird watching, picnicking, fishing, and hunting.	Conservation Groups, Community Groups, DCNR	Foundations, Private Sources, DCNR	Low
3.	Establish amenities to support tourist and local residents, such as public restrooms, visitor's center, gas stations, and shopping opportunities.	Municipalities, Park & Recreation Authorities, PFBC, DCNR	Foundations, Private Sources, DCNR, PFBC	Low

Objective 3: Investigate the need for the development of additional recreational facilities and how to better manage existing sites.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Conduct a feasibility study investigating the preservation of railroad corridors for uses, such as rails-to-trails, that preserve these corridors and offer recreational opportunities.	Conservation Groups, Historical Societies, Municipalities, Civic Groups, Landowners, Trail Groups	Foundations, Private Sources, DCNR	Medium
2.	Conduct a feasibility study to determine availability of suitable land for development of all-terrain vehicle trails and/or facilities.	Trail Groups, Counties, Municipalities, Park & Recreation Authorities, DCNR	Foundations, Private Sources, DCNR	Low
3.	Conduct a feasibility study for the development of recreational areas and trails for multiple uses including the use of off-road vehicles.	Conservation Groups, Municipalities, Trail Groups, Counties, ATV Clubs, DCNR	Foundations, Private Sources, DCNR	Low
4.	Conduct an economic impact study of recreational activities to determine the impact that recreation has on the local economy.	Conservation Groups, Historical Societies, Municipalities, Businesses, TPA	Foundations, Private Sources, TPA	Low

GOAL 5-4: UTILIZE TRAILS.

Objective 1: Expand the network of area trails.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop or designate certain areas of trails for specific uses, such as off road vehicle riding, snowmobiling, hiking, biking, and horseback riding.	Conservation Groups, Trail Groups, Civic Groups, Municipalities	Foundations, Private Sources, DCNR	Medium
2.	Develop bike lane trails along existing roadways connecting neighboring communities.	Municipalities, Counties, PennDOT	Foundations, Private Sources, PennDOT, DCNR	Low
3.	Expand area trail networks by connecting existing and new trails that lead to recreational and historical facilities, business districts, and downtown areas by utilizing township roads, old railroad corridors and state game lands.	Conservation Groups, Trail Groups, Park & Recreation Authorities, Municipalities, Counties	Foundations, Private Sources, DCNR, DCED	Medium

Objective 2: Enhance area trails through maintenance, signage, and safety.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Develop and adopt a trail maintenance plan for each trail that includes monitoring, annual maintenance, remediation, and enhancement efforts.	Conservation Groups, Trail Groups, Civic Groups	Foundations, Private Sources, DCNR	Low
2.	Increase safety for trails along roadways by erecting highway signage, alerting motorist of the trails, and offering trail safety seminars for trail users.	Municipalities, Trail Groups, PennDOT	Foundations, Private Sources, PennDOT, DCNR	Low
3.	Establish well-defined trailheads that include signage and amenities, such as parking and restrooms.	Conservation Groups, Trail Groups	Foundations, Private Sources, DCNR	Medium
4.	Develop volunteer programs to assist in maintenance of area recreational facilities.	Trail Groups, Park & Recreation Authorities, Conservation Groups, Municipalities	NA	Medium
5.	Improve signage along area trails, including mileage, educational information, and directions to local sites and nearby amenities.	Business Associations, Trail Groups, Chambers of Commerce	Foundations, Private Sources, DCNR	Low

GOAL 5-4: UTILIZE TRAILS (CONTINUED).

Objective 3: Utilize area trails to highlight the regions history, natural, and cultural resources.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish self-guided walking, biking, or automobile tours featuring historical and cultural sites of the region to increase awareness of local history.	Conservation Groups, Historical Societies, Trail Groups, Citizens, Municipalities	Foundations, Private Sources	Medium
2.	Establish a rail tour highlighting scenery and history of the railroad.	Conservation Groups, Historical Societies, Railroad Companies	Foundations, Private Sources, DCNR	Low

GOAL 5-5: ENCOURAGE ENVIRONMENTALLY SOUND PRACTICES WHEN OPERATING RECREATIONAL VEHICLES, AND ENFORCE EXISTING LAWS TO MINIMIZE INTRUSIONS ON PRIVATE LANDS.

Objective 1: Utilize environmental sound practices when operating recreational vehicles.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish ordinances to prohibit the use of recreational vehicles in areas at risk of being affected by their use, such as steep slopes, streambeds, stream crossings, and habitat for rare, threatened, or endangered species.	Conservation Groups, Municipalities, Counties, DCNR, PGC	Foundations, Private Sources, DCNR, PGC	Medium
2.	Monitor the use of recreational vehicles to minimize their impacts on the environment.	Conservation Groups, Conservation Districts, Municipalities, DEP	Foundations, Private Sources, DCNR, DEP	Low
3.	Establish environmentally sound public trails or parks for the exclusive use by off-road vehicles.	Conservation Groups, Trail Groups, Counties, Municipalities, DCNR	Foundations, Private Sources, DCNR	Medium

Objective 2: Educate riders about safe, ethical practices.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Work with Lost Kamp and Trails to take a lead role in facility development and safety promotion while encouraging ethical riding.	Dealerships, ATV Enthusiasts	Foundations, Private Sources, DCNR	Medium

GOAL 5-5: ENCOURAGE ENVIRONMENTALLY SOUND PRACTICES WHEN OPERATING RECREATIONAL VEHICLES, AND ENFORCE EXISTING LAWS TO MINIMIZE INTRUSIONS ON PRIVATE LANDS (CONTINUED).

Objective 2: Educate riders about safe, ethical practices (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
2.	Work with dealerships to offer incentives for customers attending riding etiquette and safety programs.	Conservation Groups, DCNR	Foundations, Private Sources, Businesses, DCNR	Medium
3.	Educate off-road vehicle operators to recreate in an environmentally sound manner.	Conservation Groups, Dealerships, DCNR	Foundations, Private Sources, DCNR	Medium

GOAL 5-6: HIGHLIGHT AND PRESERVE LOCAL HISTORY.

Objective 1: Preserve historical sites and landmarks.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Inventory historical sites throughout the watershed and work with Pennsylvania Historical Museum Commission, individuals, and agencies to determine if local historical sites and structures, such as McKean County Home, could be added to the National Register.	Historical Societies, Municipalities, Citizens, PHMC	Foundations, Private Sources	High
2.	Install interpretive signage at historical site locations.	Historical Societies, Municipalities, Citizens, PHMC	Foundations, Private Sources	High
3.	Protect historical sites from vandalism through increased monitoring and surveillance.	Historical Societies, Police Departments	Foundations, Private Sources	Medium

Objective 2: Promote awareness and appreciation for the local history.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Increase awareness and use of local museums, such as Eldred World War II Museum.	Historical Societies, PHMC, TPA	Foundations, Private Sources, PHMC	High
2.	Establish a regional network among historical societies and museums for support and collaboration in conducting projects and identifying funding.	Municipalities, Counties, Historical Societies, Citizens, PHMC, TPA	Foundations, Private Sources, PHMC	Medium
3.	Incorporate local history into classes taught at local school districts including the Native American culture.	Historical Societies, Schools, Citizens	Foundations, Private Sources, PHMC	Medium

GOAL 5-6: HIGHLIGHT AND PRESERVE LOCAL HISTORY (CONTINUED).

Objective 2: Promote awareness and appreciation for the local history (continued).

Method to achieve objective:

4. Host community events or festival commemorating local historical events, places, and cultures.

Potential PartnersPotential FundingHistorical Societies,
Municipalities, CivicFoundations, Private
SourcesGroupsSources

Priority Medium

GOAL 5-7: EXPAND AWARENESS, APPRECIATION, AND SUPPORT FOR THE ARTS.

Objective 1: Increase awareness for the arts, especially as it relates to nature art.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish or expand art appreciation section in public and private school curricula.	Schools, Local Artists, Cultural Councils	Foundations, Private Sources	Medium
2.	Establish a taskforce to expand, finance, coordinate and promote art activities.	Cultural Councils, Theaters, Local Artists, Universities, TPA	Foundations, Private Sources	Medium

Objective 2: Increase support for the art industry.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Broaden quantity and quality of volunteer pool supporting the arts.	Citizens, Schools, Universities	N/A	Low
2.	Expand space available for displays, storage, and instruction in the visual and performing arts.	Businesses, Schools, Universities	Foundations, Private Sources	Medium

GOAL 5-8: INVOLVE COMMUNITY RESIDENTS IN WATERSHED ACTIVITIES.

Objective 1: Identify opportunities to engage local citizens in conservation and stewardship efforts with opportunities of varying degrees of involvement to enable a wide range of able individuals to contribute.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Establish volunteer corps to assist efforts of community planners, conservation organizations, and civic groups.	Conservation Groups, Civic Groups	Foundations, Private Sources, DEP	Medium
2.	Host stream monitoring workshops to train volunteers about water quality monitoring.	Conservation Groups, Stakeholders DEP	Foundations, Private Sources, DEP	Medium

GOAL 5-8: INVOLVE COMMUNITY RESIDENTS IN WATERSHED ACTIVITIES (CONTINUED).

Objective 1: Identify opportunities to engage local citizens in conservation and stewardship efforts with opportunities of varying degrees of involvement to enable a wide range of able individuals to contribute (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
3.	Recruit maintenance and patrol crews to clean-up litter and maintain order at public sites and trails.	Conservation Groups, Concerned Citizens, DCNR	Foundations, Private Sources	Medium
4.	Partner with businesses and industries to support local watershed work.	Conservation Groups, Businesses	Private Sources	Medium
5.	Develop a watershed monitoring program for area school districts and establish a communication network for school districts within the project area to share information collected.	Conservation Groups, School Districts	Foundations, Private Sources, DEP	High

Objective 2: Promote environmental stewardship through education and scientific study.

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
1.	Increase awareness of watershed-related issues through the distribution of materials and educational programs.	Conservation Groups, Conservation Districts, Cooperative Extensions	Foundations, Private Sources, DEP, EPA	Medium
2.	Develop and implement education programs for schools about abandoned mine drainage and other sources of non-point source pollution.	Conservation Districts, Conservation Groups, WPCAMR, DEP	Foundations, Private Sources, DEP, EPA	High
3.	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 Groups, Sportsmen Groups, Citizens, DEP, EPA	Foundations, Private Sources, DEP, EPA	Medium
4.	Utilize media, such as newspapers, radio stations, and television stations, to outreach to residence for increased participation and educational messages.	Conservation Districts, Conservation Groups, Media	Foundations, Private Sources, DEP	Medium
5.	Expand the Upper Allegheny Watershed Association's role in environmental education.	Conservation Groups, Conservation Districts, School Districts	Foundations, Private Sources, DEP	Medium

GOAL 5-8: INVOLVE COMMUNITY RESIDENTS IN WATERSHED ACTIVITIES (CONTINUED).

Objective 2: Promote environmental stewardship through education and scientific study (continued).

	Method to achieve objective:	Potential Partners	Potential Funding	Priority
6.	Develop and implement locally based environmental/ social educational programs that focus on the Allegheny River watershed.	Conservation Districts, Conservation Groups, Cooperative Extensions	Foundations, Private Sources, DEP	Medium
7.	Create environmental education programs that focus on balancing economic growth with environmental issues.	Conservation Districts, Conservation Groups, Cooperative Extensions	Foundations, Private Sources, DEP	Medium
8.	Create environmental educational programs that promote conservation and outdoor recreation to youth and adults.	Conservation Districts, Conservation Groups, Cooperative Extensions	Foundations, Private Sources, DEP	Medium

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Figure 4-1. Biological Diversity Areas Key	
1	Allegheny River at Eulalia
2	Frinks
3	Peet Brook
4	Rose Lake
5	Allegheny River at Reed Run
6	Oswayo Creek
7	Fishing Creek
8	Allegheny River at Coudersport
9	Dutchman Hill
10	Carmen Hill
11	Oswayo Creek at Shinglehouse
12	Ellisburg Complex
13	East Branch Fishing Creek Slopes
14	Ormsby Swamp
15	Kasson Railroad Grade
16	Havens Run
17	Upper Knapp Creek
18	West Branch Tunungwant Creek
19	Brown Valley
20	Smethport Upland
21	Coryville Railroad Grade
22	Lower Knapp Creek
23	Indian Crossing Swamp
24	Pine Run Roadside
25	Bingham
26	Cobb Hollow Upland
27	Bullis Mills
28	Potato Creek
29	Allegheny Portage Creek
30	Potato Creek - Cole Creek
31	Allegheny River at Turtlepoint
32	Allegheny River at Larabee
33	Oswayo Creek
34	Allegheny Portage Creek BDA
35	Allegheny River at Eulalia






	APPENDIX A. GLOSSARY
Acidity	The capacity of water for neutralizing a basic solution.
Agricultural Preservation Areas	Lands enrolled in a statewide program that has been established to promote the conservation and preservation of agricultural lands and the agricultural community.
Air Pollutant	Any substance in the air that causes damage to life, ecosystems, or property.
Airsheds	Geographic areas responsible for emitting 75 percent of the air pollution reaching a body of water.
All Terrain Vehicle	A small, open motor vehicle having one seat and three or more wheels fitted with large tires. It is designed chiefly for recreational use over roadless, rugged terrain.
Atmospheric Deposition	The process of airborne pollutants falling to the ground.
Basicity	The extent to which a substance is a base, which is defined as having a pH over seven.
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 storm water management, and other practices that are potential threats to natural resources.
Biological Diversity	The number and variety of organisms found within a specific 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.
Biological Diversity Area	An area of land recognized as supporting populations of state, nationally, or globally significant species or natural communities, high-quality examples of natural communities or ecosystems, or natural exceptional native diversity.
Canal	A man-made waterway that is usually used to connect existing bodies of water.
Carbon Monoxide	A colorless, odorless, poisonous gas that results from the incomplete burning of carbon fuels.

Comprehensive Plans	A general policy guide for the physical development of a municipality, taking into account many factors including locations, character, and timing of future development.
Concentrated Animal Feeding Operation	A farm where large quantities of livestock or poultry are housed inside buildings or a confined area and all units of production, including feed, wastes and dead animals are concentrated in one area.
Conservation	The maintenance of environmental quality and resources; resources include physical, biological, or cultural. Ecosystem management within given social and economic constraints; producing goods and services for humans without depleting natural ecosystem diversity, and acknowledging the natural character of biological systems
Conservation Lands	Public or private lands with management plans that include the protection of natural areas as a primary objective.
Dedicated Area	An area of land recognized because of an owner's specific intention to protect it, which could result in the improving to become either a biological diversity area in the future or an even better high-quality area within an already designated biological diversity area.
Degradation	A degeneration to a poorer quality, condition or state.
Direct Deposition	Occurs when pollutants enter a waterway by falling directly into it.
Drainage Pattern	The arrangement of streams in a landscape in response to local topography and subsurface geology.
Easement	A deed restriction that landowners may voluntarily place of their property to protect its future uses.
Eco-region	A geographical unit based on associations of those biotic and environmental factors that directly affect or indirectly express energy, moisture, and nutrients regulating the structure and function of ecosystems.
Ecosystems	An area and its living and non-living components.
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.
Erosion	The processes by which solids are displaced from the earth's surface; includes weathering, dissolution, abrasion, corrosion, and transportation.

Factory Farms	Larger, corporate-based farms that emphasize high volume and profit.
Family Farms	Smaller farms that have been in operation for several generations.
Floodplain	The level land among the course of a river or stream formed by the deposition of sediment during periodic floods.
Forest Management	The art and science of treating a forest to promote a desired outcome.
Frack	To hydrologically—use water to—fracture the shale within the Marcellus shale formation to release the gases for collection.
Geology	Geology is the science that deals with the study of the earth and its history, and is the name of the natural features of our plant.
Ground-level Ozone	A harmful secondary pollutant formed in the atmosphere when nitrogen oxide (NOx) combines and reacts with volatile organic compounds in the presence of sunlight and warm temperatures.
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
High-Grading	Involves cutting of only the biggest, most profitable trees in a stand; considered a non-sustainable practice.
Hydric Soils	Soils that are adequately moist in the upper section to cultivate anaerobic conditions during the growing season.
Hydrologic Unit Code	A system for organizing watersheds of the United States that divides and subdivides the watershed into successively smaller hydrologic units and is then assigned an identifying number.
Hydrology	The study of movement of water on the earth; includes surface water and groundwater.
Indirect Deposition	Occurs when a pollutant enters a waterway by falling onto land and being washed into waterbodies as runoff.
Invasive species	Environmentally noxious weeds that grow aggressively, spread easily, and displaces other plants.
Karst	An area of limestone marked by irregularities such as sinkholes, fissures, caves, and underground streams, which are created by erosion.
Landscape Conservation Area	A larger area of land that contains minimal human disturbance and allows ecosystems to function on a landscape level.
Landslide	Ground movements that change the stability of slope from stable to unstable are landslides

Lichens	A symbiosis between a fungal and algal life form that usually grows on trees or rocks.
Major Employers	Companies having a minimum of 200 employees.
Management Recommendations	Non-regulatory suggestions to improve the quality of life.
Methylmercury	A neurotoxin formed by the transformation of mercury by certain microorganisms; it is highly toxic and easily accumulates in fish, shellfish and animals that eat fish.
Natural Heritage Inventories	A method of assessing areas of important plants, animals, and ecological communities.
Natural Resources	A naturally-occurring material with economic value.
Nonpoint Source	Pollutants that have no readily visible source and often require detailed analysis and research to discern the source.
Ozone	A colorless, odorless, gas that forms in the atmosphere.
Ozone Layer	A colorless, odorless, gas located in the upper atmospheric layer that filters the sun's harmful ultraviolet rays.
Particular Matter	Tiny drops of liquid or small particles of dust, metal or other materials that float in the air.
Physiographic Provinces	A region with a particular type of landscape and geology.
Point Source	Pollutants that can be easily traced to their source.
Precipitation	Any form of water that falls from the sky, including, rain, snow, sleet, fog, and hail.
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.
Red beds	Stratosphere of reddish-colored sedimentary rocks, such as sandstone, siltstone, and shale.
Restoration Riparian Areas	Returning to its original state or condition. Areas of protective vegetation next to a body of water that serves as a barrier against polluted runoff and provides habitat corridors for wildlife.
Runoff	Rainfall or snowmelt not absorbed by soil that flows over the surface of the ground to a receiving waterway.

Secondary Pollutant	A new air pollutant formed when primary pollutants react in the atmosphere
Sedimentary Rock	Rocks formed by the deposition of sediment.
Sedimentation	The deposit of particles moved by erosion.
Silviculture	The art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands.
Smart Growth Practices	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.
Stormwater	Water that runs off the land into surface waters during and immediately following periods of precipitation.
Stormwater Management Plan	Planning for surface runoff into streams and river systems during rain and/or snowmelt events.
Streambed	The channel base of a stream or river or creek; it serves as an interchange between groundwater and surface water.
Subsidence	The downward movement of surface material involving little or no horizontal movement.
Sustainable	The ability to provide for the needs of the world's current population without damaging the ability of future generations to provide for themselves. When a process is sustainable, it can be carried out over and over without negative environmental effects or impossibly high costs to anyone involved
Symbiosis	An alliance between two or more species that benefits each member.
Synthetic Processes	Human-controlled processes, such as burning fossil fuels.
Temperate Continental	A climate without extremes of temperatures or precipitation.
Topography	Describes landscape features of an area.
Total Maximum Daily Load (TMDL)	A limit for pollutant load placed on a waterway by Department of Environmental Protection. 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
Unemployment Rate	The percentage of people of the total labor force that are actively seeking a job but cannot find employment.
Value Added	The additional value added to a product at a stage of production.

Water Gap	An opening or notch which occurs when a section of a ridge has a weaker geological structure and a stream essentially cuts through a ridge to end up
Water Quality Trading	A program which allows facilities with higher pollution control costs to purchase the right to pollute from facilities that have reduced their pollution output below their required limits.
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 of the boundary will drain to another watershed
Wetland	An area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances support, a prevalence of vegetation typically adapted for life in saturated soil conditions
Wildlife Management Areas	Areas dedicated to wildlife management activities and low-intensity, wildlife-related recreation, including hunting and wildlife observation.
Zoning	A legal mechanism by which government bodies, for the sake of protecting public health, safety, morals and general welfare, can limit a landowner's right to use privately owned land by dividing land into districts and creating land-use regulations.

A	PPENDIX B. PLANNING COMMITTEES
Allegheny River H	leadwaters Watershed Conservation Plan Steering Committee
Jack Fleckenstein	Potter County Conservation District
Heather McKean	McKean County Conservation District
Charlotte Dietrich	Potter County Planning Commission
Frank Weeks	Upper Allegheny Watershed Association
Chris Nicholas	Susquehannock State Forest
William Daisley	Seneca Chapter Trout Unlimited
Jim Clark	Penn State Cooperative Extension
John Dzemyan	Pennsylvania Game Commission
Wes Fahringer	Pennsylvania Department of Conservation and Natural Resources, Northcentral Region
Kim McCullough	Pennsylvania Department of Conservation and Natural Resources, Northwest Region
Stan Hess	Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry
Deborah Lunden	McKean County Planning Commission
Denise Mitcheltree	Pennsylvania Game Commission
Jennifer A. Stambaugh	Hemlock Springs
Bob Volkmar	God's Country T.U., Duquesne University

Project Area Characteristics	5
Marlene Eaton	Concerned Citizen
Roger Klenovich	Kinzua Valley Trail Club
Land Resources	
Marlene Eaton	Concerned Citizen
Gary Fleeger	Pennsylvania Geological Survey
Roger Klenovich	Kinzua Valley Trail Club
Dr. Peter Ryan	God's Country Trout Unlimited
Jennifer Smith	Kinzua Valley Trail Club
John Snyder	North Central Forest Landowners Association
Water Resources	
Marlene Eaton	Concerned Citizen
Gary Fleeger	Pennsylvania Geological Survey
Roger Klenovich	Kinzua Valley Trail Club
Dr. Peter Ryan	God's Country Trout Unlimited
Jennifer Smith	Kinzua Valley Trail Club
Pialogiaal Descurres	
biological Resources	
Roger Klenovich	Kinzua Valley Irail Club
Dr. Peter Ryan	God's Country Trout Unlimited
Sue Swanson	McKean County Conservation District
Cultural Resources	
Marlene Eaton	Concerned Citizen
Roger Klenovich	Kinzua Valley Trail Club
Sue Swanson	McKean County Conservation District
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Allegheny River Headwaters Watershed Conservation Plan Advisory Committees

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APPENDIX C. EMERGEN	UY SERVICES		
Hospitals	Address	City	State
Bradford Regional Medical Center	116 Interstate Parkway	Bradford	\mathbf{PA}
Charles Cole Memorial Hospital	1001 East Second Street	Coudersport	PA
Police Departments	Address	City	State
Bradford City Police Department	18 Kennedy Street	Bradford	\mathbf{PA}
Bradford Township Police Department	136 Hemlock Street	Bradford	\mathbf{PA}
Coudersport Borough Polilce Department	201 South West Street	Coudersport	\mathbf{PA}
Foster Township Police Department	1185 East Main Street	Bradford	\mathbf{PA}
Mt. Jewett Police Department	P.O. Box 7215	Mt. Jewett	PA
Otto-Eldred Regional Police Department	3 Bennett Street	Eldred	\mathbf{PA}
Pennsylvania State Police	3178 Route 219	Kane	\mathbf{PA}
Pennsylvania State Police	3140 East Second Street	Coudersport	\mathbf{PA}
Port Allegany Police Department	1 Maple Street	Port Allegany	\mathbf{PA}
Shinglehouse Borough Police Department	P.O. Box 156	Shinglehouse	\mathbf{PA}
Smethport Borough Police Department	201 West Main Street	Smethport	\mathbf{PA}
Sweeden Township Police Department	121 Faith Street	Coudersport	PA
Fire Departments	Address	City	State
Austin Volunteer Fire Company, Inc	42 Main Street, P.O.Box 328	Austin	\mathbf{PA}
Bradford City Fire Department-Kennedy Street Station	24 Kennedy Street	Bradford	\mathbf{PA}
Bradford City Fire Department-Main Street Station	East Main Street	Bradford	\mathbf{PA}
Bradford Township Volunteer Fire Department-Interstate Parkway	368 Interstate Parkway	Bradford	\mathbf{PA}
Bradford Township Volunteer Fire Department-West Washington Street	West Washington Street	Bradford	\mathbf{PA}
Coundersport Volunteer Fire Department, Inc & Ambulance Association	West Second Street, P.O. Box 203	Coudersport	\mathbf{PA}
Eldred Fire Department	5 Platt Street	Eldred	PA
Eldred Township Volunteer Fire Department	RR 1	Eldred	\mathbf{PA}
Foster Township-Derrick City Volunteer Fire Department	P.O. Box 58	Derrick City	\mathbf{PA}
Foster Township-Rew Volunteer Fire Department	Main Street	Rew	PA
Genesee Volunteer Fire Department	P.O. Box 235	Genesee	\mathbf{PA}
Hamlin Township Volunteer Fire Department	P.O. Box 144	Hazelhurst	\mathbf{PA}
Hilltop Volunteer Fire Department			\mathbf{PA}
Lafayette Township Volunteer Fire Department-Westline #2	Westline #2		PA
Lafayette Township Volunteer Fire Department	SR 59, west of Lafayette		\mathbf{PA}

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Fire Departments (continued)	Address	City	State
Lewis Run Borough Volunteer Fire Department	46 Main Street	Lewis Run	PA
Mt. Jewett Volunteer Fire Department		Mt Jewett	PA
Norwich Volunteer Fire Department	P.O. Box 97	Crosby	\mathbf{PA}
Otto Township Volunteer Fire Department	P.O. Box 192	Duke Center	\mathbf{PA}
Roulette Volunteer Fire & Ambulance	P.O. Box 173, River Street	Roulette	\mathbf{PA}
Sergeant Township-Clermont	Star Route	Clermont	\mathbf{PA}
Shinglehouse Volunteer Fire Department	P.O. Box 475	Shinglehouse	\mathbf{PA}
Smethport Volunteer Fire Department		Smethport	PA
Star Hose Company No.1 & Port Allegany Volunteer Fire Department	65 West Maple Street	Port Allegany	\mathbf{PA}
Tri-Town Volunteer Fire & Ambulance	408 North Water Wtreet	Ulysses	PA
EMS	Address	City	State
Austin Volunteer Fire Company, Inc	42 Main Street, P.O.Box 328	Austin	\mathbf{PA}
Bradford City Fire Department	25 Chestnut Street	Bradford	\mathbf{PA}
Bradford Z Stat Ambulance Service	26 Pike Street	Bradford	\mathbf{PA}
Coundersport Volunteer Fire Department, Inc & Ambulance Association	West Second Street, P.O. Box 203	Coudersport	\mathbf{PA}
Eldred Borough Fire Department Ambulance	P.O. Box 146	Eldred	PA
Genesee Ambulance Association	P.O. Box 9	Genesee	PA
Mt. Jewett Area Ambulance Association	39 East Main Street, P.O. Box 154	Mt. Jewett	PA
Otto Township Ambulance Association	118 Sweitzer Drive, P.O. Box 315	Duke Center	PA
Port Allegany Ambulance Service	22279 Route 6, P.O. Box 223	Port Allegany	PA
Priority Care Ambulance	P.O. Box 344	Smethport	PA
Roulette Volunteer Fire & Ambulance	P.O. Box 173, River Street	Roulette	PA
Shinglehouse Ambulance Association	P.O. Box 98	Shinglehouse	PA
Tri-Town Volunteer Fire & Ambulance	408 North Water Wtreet	Ulysses	\mathbf{PA}

(Sources: McKean County Planning Commission, 2007; Potter County Planning Commission, 2005, Municipal Surveys, 2009) P.O. Box 98 408 North Water Wtreet

APPENDIX D. AGRICULTURAL SOILS

Prime Farmland

		Slope		
Мар		Character	Мар	
Symbol	Soil Name	(% slope)	Symbol	Soil Name
McKean (County		Potter Col	unty (continued)
AbB	Albrights silt loam	3 to 8	CfB	Chenango gravelly loam
Ва	Barbour loam		ClB	Clymer channery loam
Bb	Basher silt loam		CoB	Cookport channery loam
BeB	Braceville silt loam	3 to 8	На	Holly sandy loam
BuB	Buchanan silt loam	3 to 8	HaB	Hartleton channery silt loam
CbB	Castile gravelly silt loam	3 to 8	HuB	Hustontown channery silt loam
ChB	Chenango gravelly loam	3 to 8	HxB	Hazleton channery loam,
ClB	Clymer loam	3 to 8	LaB	Lackawanna channery loam
CoA	Cookport loam	0 to 3	LdC	Laidig channery loam
CoB	Cookport loam	3 to 8	LkB	Leck Kill channery loam
GnB	Gilpin channery silt loam	3 to 8	LoB	Lordstown channery silt loam
HbB	Hazleton channery loam	3 to 8	MaB	Mardin channery silt loam
KnB	Kinzua channery silt loam	3 to 8	Me	Middlebury sandy loam
LeB	Leck Kill channery silt loam	3 to 8	Mf	Middlebury silt
Ph	Philo silt loam		Mg	Middlebury silt loam, high
Ро	Pope loam			bottom phase
WaB	Wharton silt loam	3 to 8	ScA	Scio fine sandy loam-silt loam
			TaA	Tioga fine sandy loam
Potter Con	unty		TgA	Tioga gravelly loam
Ba	Barbour fine sandy loam	0 to 3	CoA	Cookport loam
	Barbour fine sandy loam, high			
Bb	bottom phase	0 to 3	CoB	Cookport loam
			ThA	Tioga fine sandy loam, high
Bc	Barbour gravelly fine sandy loam	0 to 3		bottom phase
Bd	Basher sandy loam	0 to 3		_

0 to 3

0 to 3

0 to 12

0 to 5

Basher silt loam

phase

Basher silt loam, high bottom

Braceville gravelly silt loam

Bath channery silt loam

Be

Bf

BhB

Bn

Slope Character (% slope)

 $\frac{3 \text{ to } 8}{0 \text{ to } 3}$

0 to 12

0 to 3

0 to 3

0 to 8

0 to 12

Tunkhannock gravelly loam

Wellsboro channery silt loam

Wharton channery silt loam

Unadilla fine sandy loam

Unadilla silt loam

TuB

UfA

UnA

WeB

WhB

Farmland of Statwide Importance

		Slope
Map		Character
Symbol	Soil Name	(% slope)
McKean (County	
AbC	Albrights silt loam	8 to 15
At	Atkins silt loam	
BuC	Buchanan silt loam	8 to 15
CaA	Cavode silt loam	0 to 3
CaB	Cavode silt loam	3 to 8
CeC	Ceres channery silt loam	8 to 15
CoC	Cookport loam	8 to 15
EdB	Eldred silt loam	3 to 8
ElB	Elko silt loam	3 to 8
EIC	Elko silt loam	8 to 15
GnC	Gilpin channery silt loam	8 to 15
HaB	Hartleton channery silt loam	3 to 8
HaC	Hartleton channery silt loam	8 to 15
HbC	Hazleton channery loam	8 to 15
KnC	Kinzua channery silt loam	8 to 15
LeC	Leck Kill channery silt loam	8 to 15
MaB	Mandy channery silt loam	3 to 8
MaC	Mandy channery silt loam	8 to 15
OnC	Onoville silt loam	8 to 15
PoB	Portville silty clay loam	3 to 8
ReA	Rexford silt loam	0 to 3
ShB	Shongo silt loam	3 to 8
WaC	Wharton silt loam	8 to 15

(Source: USDA NRCS, 2008)

68 soils designated as prime farmland

39 soils designated as farmland of statewide importance

U.S. Department of Agriculture Natural Resource Conservation Service. (2008). Electronic field office technical guide. Retrieved April 2, 2009 from Natural Resource Conservation Service website: http://www.nrcs.usda.gov/technical/efotg.

		Slope
Мар		Character
Symbol	Soil Name	(% slope)
Potter Cou	intv	· <u> </u>
AbA	Albrights silt loam	0 to 3
AbB	Albrights silt loam	3 to 8
AbC	Albrights silt loam	8 to 15
AbD	Albrights silt loam	15 to 35
At	Atkins silt loam	
BhD	Bath channery silt loam	12 to 20
CaB	Cavode silt loam	0 to 8
CaC	Cavode silt loam	8 to 15
CbB	Cavode channery silt loam	0 to 8
CbC	Cavode channery silt loam	8 to 15
CfD	Chenango gravelly loam	12 to 20
ClD	Clymer channery loam	12 to 20
CoC	Cookport channery loam	8 to 15
CrA	Craigsville gravelly loam	
DfB	Dekalb fine sandy loam	0 to 12
DfD	Dekalb fine sandy loam	12 to 20
DkB	Dekalb channery loam, 10 to 25	0 to 12
	inches deep	
DkD	Dekalb channery loam, 10 to 25	12 to 20
	inces deep	
HaD	Hartleton channery silt loam	15 to 25
HuC	Hustontown channery silt loam	8 to 15
LaC	Lackawanna channery loam	8 to 15
LoD	Lordstown channery silt loam	12 to 20
LwB	Lehew silt loam	3 to 8
LwC	Lehew silt loam	8 to 15
LwD	Lehew silt loam	15 to 25
MaC	Mardin channery silt loam	8 to 15
MoA	Morris silt loam	0 to 3
MoB	Morris silt loam	3 to 8
MoD	Morris silt loam	15 to 25
OaB	Oquaga channery loam	0 to 12
OaD	Oquaga channery loam	12 to 20
SoB	Solon channery silt loam	0 to 15
SoD	Solon channery silt loam	15 to 35
TuD	Tunkhannock gravelly loam	12 to 20
VoA	Volusia channery silt loam	0 to 3
VoB	Volusia channery silt loam	3 to 8
VoC	Volusia channery silt loam	8 to 15
WeC	Wellsboro channery silt loam	8 to 15
WhD	Wharton channery silt loam	12 to 20

APPENDIX E. ACTIVE INDUSTRIAL MINING PERMITS

County	Municipality	Туре	Mine Name	Company	Permit #
McKean	Annin	Large surface	Turtlepoint Mine	GL Carson Incorporated	4675SM18
McKean	Annin	Bluestone surface	Marcy 2 Mine	Carl Marcy Jr.	42070802
McKean	Annin	Bluestone surface	Annin 1 Mine	David D. Marcy	42000801
McKean	Annin	Bluestone surface	Nelson Mine	James Tucker	42040802
McKean	Annin	Small surface	Albaney Mine	Joseph Johnson	42060803
McKean	Annin	Bluestone surface	Bigley McDivitt Mine	Lois Barker	42070801
McKean	Annin	Bluestone surface	Knapp Mine	Ron F. Onufry Jr.	42060805
McKean	Annin	Small surface	Rock Run Mine	GL Carson Incorporated	42092802
McKean	Annin	Small surface	Culver Mine	William R. Culver	42080810
McKean	Annin	Short term construction	SR 6 Sect A02 & A03 Mine	Glen O. Hawbraker	42081006
McKean	Ceres	Large surface	Shinglehouse Mine	Glen O. Hawbraker	42950301
McKean	Ceres	Large surface	Faulkner Mine	Wayne Gravel Product	42850302
McKean	Eldred	Small surface	Frost Mine	William K. Robinson	42050801
McKean	Foster	Bluestone surface	Brent Schoonover Mine	Brent Schoonover	42080804
McKean	Keating	Large surface	John Peter Castelli Mine	John Peter Castelli	42820303
McKean	Keating	Small surface	Duffy III Mine	Duffy Incorporated	42910801
McKean	Lafayette	Small surface	Cherry Ridge Stone Mine	Kessel Construction Incorporated	42082802
McKean	Liberty	Small surface	Culver Mine	Bradley A. Greenman	42082807
McKean	Liberty	Large surface	Port Allegany Mine	Duffy Incorporated	42040301
McKean	Liberty	Bluestone surface & Small surface	Schulze Mine	James Tucker	42060806
McKean	Liberty	Small surface	Campbell Hollow Mine	Robert J. Ostrom	42060802
McKean	Liberty	Bluestone surface	Mill Street Mine	Robert J. Ostrom	42080801
McKean	Liberty	Small surface	Caulkins Mine	William K. Robinson	42060801
McKean	Mount Jewett	Small surface	Sees Soil & Aggregate Mine	Brian Sees	42002802
McKean	Port Allegany	Bluestone surface	Walter Miles Stone Mine	Walter D. Miles	42080803
Potter	Allegany	Bluestone surface	Carl Quarry	Samuel A. Treat	53080806
Potter	Allegany	Small surface	Robert Teuscher Quarry	Todd McCoy	53070803
Potter	Clara	Small surface	Carroll M. Winseck Quarry	Harriet Winseck	53020802
Potter	Clara	Bluestone surface	Fisk #1	Richard A. Davis	53080802
Potter	Eulalia	Small surface	Wildfire Quarry	Gaberseck Brothers	53960803
Potter	Eulalia	Bluestone surface	Crosby 1 Quarry	Kelly Crosby	53950802
Potter	Genese	Small surface	Dr. Reed Quarry	Donald R. Reed	53930801
Potter	Oswayo	Bluestone surface	Hyde Stone Quarry	Hyde Stone Quarry Incorporated	53060803

County	Municipality	Туре	Mine Name	Company	Permit #
Potter	Roulette	Small surface	Fessenden Quarry	Fessenden Construction Company Incorporated	53012802
Potter	Roulette	Small surface	Railroad Avenue Mine	Fessenden Construction Company Incorporated	53032801
Potter	Roulette	Small surface	Goodwin & Son Gravel Pit	Goodwin & Son Gravel Pit	53890808
Potter	Roulette	Bluestone surface	Groff Quarry	Groff Family Enterprises Incorporated	53010805
Potter	Roulette	Bluestone surface	Barney Quarry	Joseph E. Johnson	53990804
Potter	Roulette	Small surface	Cornelius Quarry #2	Randy Cornelius	53080803
Potter	Roulette	Bluestone surface	Cornelius Quarry	Randy Cornelius	53080801
Potter	Roulette	Bluestone surface	Lloyd Quarry	Richard A. Davis	53080803
Potter	Roulette	Bluestone surface	Green Quarry	Robert H. Ostrom	53030802
Potter	Roulette	Small surface	Anderson Quarry	Robert H. Ostrom	53950803
Potter	Roulette	Small surface	Savers Quarry	Robert H. Ostrom	53950804
Potter	Roulette	Small surface	Drabert Quarry	Robert H. Ostrom	53960804
Potter	Roulette	Small surface	Drabert 2 Quarry	Robert H. Ostrom	53030803
Potter	Roulette	Small surface	Burtville Gravel Quarry	Robert H. Ostrom	53900801
Potter	Roulette	Small surface	Seymore Flagstone Quarry 1	Seymore Stone & Wood Product Incorporated	53060801
Potter	Sharon	Small surface	Coole Quarry	Lawrence T. Coole	53910803
Potter	Sharon	Small surface	Blauvelt Quarry	Paul Blauvelt	53080801
Potter	Sweden	Bluestone surface	Reese Quarry	Gary L. Reese	53040801

(Source: DEP, 2009c)

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Handler	Permit #	Type	Address	City	State	Zip	Lat.	Long
Allegheny Store Fixtures	PAD083538033	CESQG	57 Holley Avenue	Bradford	ΡA	16701	41.98237	-78.654606
Allegheny Store Fixtures	PAR000028167	Unspec	500 Chestnut Street	Bradford	ΡA	16701	41.970344	-78.627213
Amer Ref Group Bradford	PAD001604693	CA	77 North Kendall Avenue	Bradford	PA	16701	41.966389	-78.62944
Amer Ref Group Bradford	PAD001604693	HWBR	77 North Kendall Avenue	Bradford	PA	16701	41.966389	-78.62944
Amer Ref Group Bradford	PAD001604693	LQG	77 North Kendall Avenue	Bradford	PA	16701	41.966389	-78.62944
Amer Ref Group Foster Brook	PAD000780171	Unspec	Bolivar Drive	Bradford	ΡA	16701	41.98237	-78.654606
American Heterocyclic Research	PAR000043331	CESQG	101 Mill Street	Bradford	PA	16701	41.963817	-78.638411
American Heterocyclic Research	PAD000619200	CESQG	20 Russell Boulvard	Bradford	\mathbf{PA}	16701	41.973238	-78.620839
Barrets Auto Body	PAD987357258	SQG	485 East Main Street	Bradford	PA	16701	41.965567	-78.624783
Bauschard Daodge	PAR000035832	CESQG	170 Seward Avenue	Bradford	PA	16701	41.974062	-78.629373
Bay Chevrolet	PAD981744410	SQG	880 East Main Street	Bradford	PA	16701	41.975458	-78.61729
Beckith Mach Bradford	PAD038636965	SQG	361-369 Congress Street	Bradford	PA	16701	41.944123	-78.65146
Bovaird	PAD987321940	SQG	181 Main Street	Bradford	PA	16701	41.955995	-78.645999
Bradford Area Sr. High School	PAD982568693	SQG	81 Interstate Parkway	Bradford	PA	16701	41.958142	-78.658105
Bradford Armory	PA0000960138	CESQG	38 Barbour Street	Bradford	PA	16701	41.95639	-78.652464
Bradford Electronics	PAD046762258	CA	550 High Street	Bradford	\mathbf{PA}	16701	41.946008	-78.643727
Bradford Firestone Store	PAD987399268	CESQG	One Bradford Mail	Bradford	PA	16701	41.977149	-78.618752
Bradford Laundry & Drycleaning	PAD987389772	SQG	210 Longmaid Lane	Bradford	PA	16701	41.942715	-78.679799
Bradford Regional Medical Center	PAD074026378	CESQG	116 Interstate Parkway	Bradford	PA	16701	41.963008	-78.662083
Bradford Sewage Treatment Plant	PAD000413302	Unspec	City Hall, 24 Kendall Street	Bradford	\mathbf{PA}	16701	41.93	-78.744722
Browns Machine Shop	PAR000016535	CESQG	311 High Street	Bradford	\mathbf{PA}	16701	41.950687	-78.643328
Bureau of Prisions FCI McKean	PAR000031740	SQG	Big Shanty Road & Route 59	Bradford	PA	16701		
Clayts Body Shop	PAR00000244	CESQG	591 South Avenue	Bradford	PA	16701	41.929651	-78.652893
Clayts Body Shop	PAR00000244	Trans	591 South Avenue	Bradford	PA	16701	41.929651	-78.652893
CTC Analytical Services, Inc.	PAR000043141	SQG	550 Chestnut Street	Bradford	PA	16701	41.949719	-78.648705
CTC Analytical Services, Inc.	PAR000025858	SQG	1 Amalie Way	Bradford	PA	16701		
Dexter's Service Center	PAD987393873	SQG	156 West Washington Street	Bradford	PA	16701	41.957223	-78.660407
Dresser Industries	PAD980550297	Unspec	36 Davis Street	Bradford	PA	16701	41.960869	-78.645345
Dresser Manufacturing Division	PAD002124360	SQG	41 Fisher Avenue	Bradford	PA	16701	41.962764	-78.632769
Fairway Ford	PAD013892369	SQG	472 East Main Street	Bradford	PA	16701	41.965358	-78.625024
Georgia Pacific Bradford	PAD002124378	CESQG	1 Owens Way	Bradford	PA	16701	41.929328	-78.650566
Graham Packaging	PAD048386809	CESQG	105 Bolivar Drive	Bradford	PA	16701	41.976791	-78.630296
Halliburton Service	PAD079941324	CESQG	350 High Street Extension	Bradford	PA	16701	41.949928	-78.643215

Handler	Permit #	Type	Address	City	State	Zip	Lat.	Long
Halliburton Service	PAD079941324	Trans (350 High Street Extension	Bradford	PA	16701	41.949928	-78.643215
Hoffman Carbon	PAR000025544	CESQG	105 Lafferty Hollow Road	Bradford	ΡA	16701	41.95494	-78.594612
K-Mart 9609	PAR000002402	Trans	1001 East Main Street	Bradford	PA	16701	41.981184	-78.61771
KOA Speer Electronics	PAD987346715	SQG	Bolivar Drive	Bradford	ΡA	16701	41.99736	-78.67502
Kwikfill M131	PAD987333267	CESQG	713 South Avenue	Bradford	ΡA	16701	41.920458	-78.651067
Kwikfill M61	PAD98733341	CESQG 2	227 East Main Street	Bradford	\mathbf{PA}	16701	41.961176	-78.634357
McCort Label Cabinet Company	PAD002125219	5QG	42-54 Bennett Street	Bradford	\mathbf{PA}	16701	41.93	-78.655611
McKinney Furniture Restoration	PAR000038240	CESQG	58 Derrick Road	Bradford	\mathbf{PA}	16701	41.975631	-78.610861
Microbac Lab Bradford	PAR000003350	CESQG	West Corydon Lane & Clark	Bradford	\mathbf{PA}	16701	41.937574	-78.675276
			Lane					
Monroe Muffler Brake 21	PAD982577033	SQG	1030 Main Street Extension	Bradford	PA	16701	41.982525	-78.617807
Penelec Bradford District	PAD013894340	Unspec	58 Chestnut Street	Bradford	\mathbf{PA}	16701	41.954235	-78.648054
Penelec Bradford District Office	PAR000022632	CESQG	475 High Street	Bradford	\mathbf{PA}	16701	41.947479	-78.643689
Penn Hills Club	PAR000029297	CESQG	146 Pennhills Drive	Bradford	\mathbf{PA}	16701	41.901763	-78.619029
Penn Hills Country Club	PAR000029397	SQG ,	440 Minard Run Road	Bradford	ΡA	16701	41.902307	-78.611669
Pure Sil	PAD982677072	Unspec	l Silicon Way	Bradford	\mathbf{PA}	16701	41.966348	-78.625188
Rink Brothers Chrysler Plymouth	PAD987360591	CESQG	900 East Main Street	Bradford	PA	16701	41.976515	-78.617125
Rink Brothers Chrysler Plymouth	PAD987364783	Unspec	900 East Main Street	Bradford	ΡA	16701	41.976515	-78.617125
Schlumberger Well Service	PAD982700114	SQG	95 Rutherford Run Road	Bradford	PA	16701	41.925439	-78.614111
Serveo Services Incorporated	PAD982570681	SQG	35 Mill Street	Bradford	ΡA	16701	41.96436	-78.639097
SJS Creative Wood Designs	PAR000029504	CESQG	593 South Kendall Aveune	Bradford	ΡA	16701	41.954034	-78.60817
Sunoco Service Station-Bradford	PAD000774257	Unspec	419 South Avenue	Bradford	ΡA	16701	41.939943	-78.654077
Sunoco Service Station-Bradford	PAD000774240	Unspec :	535 East Main Street	Bradford	ΡA	16701	41.966418	-78.623863
Sunoco Service Station-Bradford	PAD00774265	Unspec	111 South Avenue	Bradford	\mathbf{PA}	16701	41.934876	-78.653432
Tuna Valley Printing & Graphics	PAR000033712	CESQG 3	80-90 Mechanic Street	Bradford	\mathbf{PA}	16701	41.958264	-78.651485
University of Pittsburgh-Bradford	PAD074041088	SQG	300 Campus Drive	Bradford	\mathbf{PA}	16701	41.947667	-78.669592
Varikleen Industries	PAD982699761	SQG	1020 East Main Street	Bradford	\mathbf{PA}	16701	41.982039	-78.617803
Varikleen Industries	PAD982699761	Unspec	1020 East Main Street	Bradford	PA	16701	41.982039	-78.617803
Walmart Supercenter No. 3514	PAR000505891	CESQG :	50 Foster Brook Boulvard	Bradford	\mathbf{PA}	16701	41.980884	-78.617136
Werzalit of America Maunfacturing	PAD000437848	Unspec	40 Holley Avenue	Bradford	PA	16701	41.970673	-78.627145
Charles Cole Memorial Hospital	PAR000043323	CESQG	1001 East Second Street	Coudersport	\mathbf{PA}	16915	41.774467	-78.018046
Chucks Auto Body	PA0000827188	CESQG]	Route 6 East	Coudersport	\mathbf{PA}	16915	41.77825	-78.020701
Coudersport Area Jr./Sr. High School	PAR000021899	CESQG (598 Dwight Street	Coudersport	PA	16915	41.77383	-78.011567
Coudersport PA Store	PAD982577538	SQG	202 South Main Street	Coudersport	PA	16915	41.770675	-78.021333
Damascus Tanning Company	PAD001035740	Unspec	Port Allegany Road	Coudersport	PA	16915	41.7692	-78.026569

Appendix F. Active Industrial Mining Permits

Page 2 of 5

Handler	Permit #	Type	Address	City	State	Zip	Lat.	Long
Encon Eye Protection, Inc.	PAR000030536	CESQG	3 Arch Street	Coudersport	\mathbf{PA}	16915	41.766389	-77.963333
Encon Eye Protection, Inc.	PAR000256255	Unspec	412 North East Street	Coudersport	\mathbf{PA}	16915	41.776482	-78.019604
Jenigens Auto Body	PA0000815910	CESQG	383 East Second Street	Coudersport	\mathbf{PA}	16915	41.774512	-78.01913
Kightlinger Motors	PAR000502963	CESQG	336 Port Allegany Road	Coudersport	\mathbf{PA}	16915	41.765081	-78.032912
Kightlinger Motors, Inc.	PAD17750081	CESQG	1 Mill Street	Coudersport	ΡA	16915	41.774373	-78.016153
Kwikfill M0151 183	PAD987337821	CESQG	302 Port Allegany Road	Coudersport	ΡA	16915	41.765563	-78.032125
L.H. Lincoln & Sons, Inc.	PAD067541255	Unspec	Vine & Cherry Streets	Coudersport	\mathbf{PA}	16915	41.76802	-78.024426
Morgan AM&T	PAD002103273	CA	East Second Street	Coudersport	\mathbf{PA}	16915	41.775314	-78.002412
Morgan AM&T	PAD002103273	HWBR	East Second Street	Coudersport	\mathbf{PA}	16915	41.775314	-78.002412
Morgan AM&T	PAD002103273	DQL	East Second Street	Coudersport	\mathbf{PA}	16915	41.775314	-78.002412
PA DOT 0260	PAD982575763	CESQG	101 Locust Street	Coudersport	\mathbf{PA}	16915	41.765273	-78.024173
Sheetz Store No 165	PAR000526392	ÐÒS	208 South Main Street	Coudersport	\mathbf{PA}	16915	41.770593	-78.02125
Street Machines	PAD982580243	CESQG	Route 6 West, P.O. Box 494	Coudersport	PA	16915	41.716944	-77.952222
TC Specialist Printing	PAR000502658	Unspec	17 South Main Street	Coudersport	\mathbf{PA}	16915	41.772602	-78.02126
Tennesse Gas Pipeline Company 313	PAD000765891	HWBR	197 Tennessee Road	Coudersport	PA	16915	41.853056	-78.000556
Coudersport								
Tennesse Gas Pipeline Company 313 Coudersport	PAD000765891	SQG	197 Tennessee Road	Coudersport	PA	16915	41.853056	-78.000556
Tennesse Gas Pipeline Company 313 Coudersport	PAD000765891	Unspec	197 Tennessee Road	Coudersport	PA	16915	41.853056	-78.000556
Tennesse Gas Pipeline Company	PAD987324357	CESQG	896 State Route 44 North	Coudersport	PA	16915	41.732843	-77.938224
Hebron Storage								
Truck Lite Company, Inc.	PAD987357274	SQG	100 East Market Street	Coudersport	PA	16915	41.762778	-78.036111
McKean Manufacturing	PAD097643894	Unspec	Industrial Development Park	Custer City	PA	16725	41.899444	-78.688611
Varikleen Industries	PAR000042978	CESQG	2 Susquehanna Road	Custer City	PA	16725		
Witco Corporation Oil & Gas Division	PAD98111032	ÐÒS	Route 464	Derrick City	\mathbf{PA}	16727	41.983056	-78.57
Andrews Trucking	PAD982364945	Trans	Main Street	Duke Center	\mathbf{PA}	16729	41.957196	-78.501337
Atlantic Recovery Systems, Inc.	PAD096303862	Trans	Main Street	Duke Center	\mathbf{PA}	16729	41.957196	-78.501337
Eldred Paint & Body	PAD030209902	ÐÒS	Main Street	Eldred	\mathbf{PA}	16731	41.962955	-78.385247
Ethan Allen Incorporated/Eldred Plant	PAD982675316	CESQG	Route 446	Eldred	\mathbf{PA}	16731	41.925037	-78.3761
Honeywell Speciality Chemicals	PAR000042804	HWBR	RD 3 (Intersection of routes 46 & 446)	Keating Summit	\mathbf{PA}	16749		
Honeywell Speciality Chemicals	PAR000042804	DQG	RD 3 (Intersection of routes 46 & 446)	Keating Summit	ΡA	16749		

Appendix F. Active Industrial Mining Permits

Plan
Conservation
Watershed
River Headwaters
Allegheny

Handler	Permit #	Type	Address	City	State	Zip	Lat.	Long
PA Department of Transporation 0250	PAD982515656	SQG	Route 4003 (.25 miles east	Lafayette	\mathbf{PA}	16726	41.8225	-78.572778
			Bradford)	Township				
Allegheny Bradford Manufacturing	PAD987284924	HWBR	1522 South Avenue	Lewis Run	\mathbf{PA}	16738	41.947378	-78.648448
Allegheny Bradford Manufacturing	PAD987284924	SQG	1522 South Avenue	Lewis Run	\mathbf{PA}	16738	41.867783	-78.66688
Control Chief Corporation	PAD990752685	Unspec		Lewis Run	\mathbf{PA}	16738	41.816389	-78.695833
IA Construction Corporation McKean	PAR000508069	UOP	7024 Highway Route 59	Lewis Run	ΡA	16738		
Jim Shields Auto Body	PAR000002352	CESOG	15 Irvine Street	Lewis Run	ΡA	16738	41.876218	-78.663686
McCort Label	PAD038634341	CESQG	20 Egbert Lane	Lewis Run	ΡA	16738	41.872266	-78.744722
TSA Bradford Regional Airport	PAR000512269	CESQG	212 Airport Drive Suite E	Lewis Run	PA	16738		
National Fuel Gas Clermont Field	PAD987329513	CESQG	Route 12 (8.9 miles east)	Mt. Jewett	\mathbf{PA}	16740		
Applebys Dry Cleaners	PA0000943696	CESQG	801 North Main Street	Port Allegany	\mathbf{PA}	16743	41.823004	-78.290102
Ed Daughertys Body Shop	PAD987390317	SQG	RD 1 Box 612	Port Allegany	\mathbf{PA}	16743		
IA Construction Corporation Port	PAD002106979	SQG	Route 6	Port Allegany	\mathbf{PA}	16743	41.812565	-78.278902
Allegany								
Kwikfill M145	PAD987333267	CESQG	36 South Main Street	Port Allegany	\mathbf{PA}	16743	41.813313	-78.282072
Sheetx Store 166	PAR000526400	SQG	1 South Main Street	Port Allegany	\mathbf{PA}	16743	41.815232	-78.283719
St. Bobain Containers	PAD045167053	HWBR	One Glass Place	Port Allegany	\mathbf{PA}	16743	41.817415	-78.2888447
St. Bobain Containers	PAD045167053	ТQG	One Glass Place	Port Allegany	\mathbf{PA}	16743	41.817415	-78.2888447
Witter Gas & Oil	PAD987335205	SQG	27 Pearl Street	Port Allegany	\mathbf{PA}	16743	41.815132	-78.284971
Quaker State Oil-Burger Hollow	PAD980918346	CESQG	Route 246	Rixford	\mathbf{PA}	16745	41.930408	-78.455165
Forest House Hotel	PAD987392024	CESQG	1746 U.S. Route 6 West	Roulette	ΡA	16746	41.762115	-78.114968
Norms Collision	PA0000826867	CESQG	Maple Street (1 mile south Center	Roulette	ΡA	16746	41.773573	-78.155167
5 5	DA D00117171010			11.	Ļ		11 010010	
Daves Body Shop	PAD0941/4349	CESQG	Sunnyside Koad	Shinglehouse	PA	16/48	41.952942	-/8.18/449
Dominion Trasnporation Incorporated Sharon M&R	PAR000513317	LQG	982 Plank Road	Shinglehouse	PA	16748	41.973326	-78.109139
Eds Services	PAR000025981	CESQG	Route 44 & Honeoye Street	Shinglehouse	ΡA	16748	41.962525	-78.198775
John Hewitt Auto Body	PAR000018606	CESQG	Fairgrounds Road (100 feet W Route 44)	Shinglehouse	ΡA	16748		
Unimart Corporation	PAR000027250	CESQG	109 Oswayo & Honeoye Street	Shinglehouse	ΡA	16748	41.9621	-78.1984
Wayne Paving & Contracting	PAR000000315	CESQG	Ceres Street	Shinglehouse	\mathbf{PA}	16748		
Dons Body Shop	PAR000036103	CESQG	Route 6 (1 mile south Hazelhurst)	Smethport	PA	16749		
Internatioal Waxes Plant	PAD046761763	CA	Intersection of Routes 46 & 446	Smethport	PA	16749	41.857925	-78.440185
Internatioal Waxes Plant	PAD046761763	HWBR	Intersection of Routes 46 & 446	Smethport	\mathbf{PA}	16749	41.857925	-78.440185

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Allegheny

Handler	Permit #	Type	Address	City	State	Zip	Lat.	Long
Internatioal Waxes Plant	PAD046761763	SQG	Intersection of Routes 46 & 446	Smethport	PA	16749	41.857925	-78.440185
Kwikfill M146	PAD987337854	CESQG	326 West Main Street	Smethport	PA	16749	41.809527	-78.445838
Seneca Highlands 109	PA0000928820	CESQG	PO Box 1566	Smethport	PA	16749		
Smethport Auto Parts	PAD987302593	SQG	400 Main Street	Smethport	PA	16749	41.810567	-78.439447
Smethport Collision	PAR000022178	CESQG	106 Mechanic Street	Smethport	PA	16749	41.807119	-78.441614
Hawbreaker Glen O. Inc. Plant 7	PAR000008763	SQG	Route 155 & 1002	Turtlepoint	PA	16750		

LQG=Large Quantity Generator SQG=Small Quantity Generator Trans=Transporter CA=Corrective Action

HWBR=Hazardous Waste Biennial Reporter CESQG=Conditionally Exempt Small Quantity UOP=Used Oil Program

APPENDIX G. ILLEGAL DUMPSITES

Dumpsite Characteristics

Site				Proximity to	Visibility		Recent
ID	Dumpsite	Municipality	Tons	Waterway	from Road	Terrain	Activity
МсК	ean County						
01	Birch Run Road	Annin Township	0.5	No waterway nearby	Yes	Steep slope	Yes
02	Pine Grove Road	Annin Township	0.5	50 to 100 feet	Yes	Extremely steep	Yes
11	High Street Site 1	Bradford Township	1	50 to 100 feet	Yes	Gently sloped	Yes
12	High Street Site 2	Bradford Township	1	50 to 100 feet	Yes	Gently sloped	Yes
05	Niles Hollow	Bradford Township	2.5	No waterway nearby	Yes	Steep slope	Yes
06	Songbird Road	Bradford Township	2.5	In waterway/wetland	Yes	Medium slope	Yes
07	State Route 770 Site 1	Bradford Township	0.5	50 to 100 feet	Yes	Medium slope	Yes
08	State Route 770 Site 2	Bradford Township	1.5	More than 100 feet	Yes	Gently sloped	Yes
09	State Route 770 Site 3	Bradford Township	2.5	More than 100 feet	Yes	Gently sloped	Yes
10	State Route 770 Site 4	Bradford Township	0.5	More than 100 feet	No	Gently sloped	Yes
04	West Corydon Street	Bradford Township	1.5	More than 100 feet	Yes	Gently sloped	Yes
03	West Washington Street	Bradford Township	3	In waterway/wetland	Yes	Flat	Yes
13	Annin Creek Croad	Ceres Township	10	More than 100 feet	Yes	Extremely steep	Yes
19	Barbertown Road	Ceres Township	2	More than 100 feet	Yes	Steep slope	Yes
18	Bardern Brook	Ceres Township	3	More than 100 feet	Yes	Steep slope	Yes
16	Hanson Hollow	Ceres Township	0.5	Within 50 feet	Partial	Gently sloped	No
14	Newell Creek Road	Ceres Township	1	No waterway nearby	Yes	Steep slope	Yes
17	State Route 44	Ceres Township	1.5	50 to 100 feet	Yes	Steep slope	Yes
15	Whitetail Road	Ceres Township	2.5	No waterway nearby	Yes	Steep slope	Yes
26	Artline Road	Eldred Township	0.5	More than 100 feet	Yes	Medium slope	Yes
25	State Game Lands 301	Eldred Township	15	In waterway/wetland	No	Gently sloped	No
24	West Eldred Road Site 1	Eldred Township	1.5	More than 100 feet	No	Medium slope	No
28	West Eldred Road Site 2	Eldred Township	4	More than 100 feet	Yes	Medium slope	Yes
27	Windfall Road	Eldred Township	12.5	In waterway/wetland	Partial	Flat	Yes
31	Bolivar Dirve	Foster Township	2.5	50 to 100 feet	Yes	Flat	Yes
33	Derrick Road	Foster Township	1.5	No waterway nearby	Yes	Medium slope	Yes
32	Harrisburg Run	Foster Township	1.5	Within 50 feet	Yes	Gently sloped	Yes
29	Hedgehog Lane	Foster Township	5	More than 100 feet	Yes	Steep slope	Yes
30	Interstate Parkway	Foster Township	1	More than 100 feet	Yes	Medium slope	Yes

Dumpsite Characteristics (continued)

Site				Proximity to	Visibility		Recent
ID	Dumpsite	Municipality	Tons	Waterway	from Road	Terrain	Activity
34	Looker Mountain Trail	Foster Township	10	No waterway nearby	Yes	Medium slope	Yes
35	Pratt Hollow Site 1	Foster Township	3	No waterway nearby	Yes	Flat	Yes
36	Pratt Hollow Site 2	Foster Township	1.5	No waterway nearby	Yes	Gently sloped	No
46	Baker Road at Route 6	Keating Townhsip	0.5	No waterway nearby	Partial	Extremely steep	Yes
50	Bordell Road	Keating Townhsip	0.5	No waterway nearby	Partial	Gently sloped	No
49	East Valley Road	Keating Townhsip	4	More than 100 feet	No	Steep slope	Yes
48	Kent Hollow	Keating Townhsip	1.5	In waterway/wetland	Partial	Steep slope	No
47	Stickles Hollow Road	Keating Townhsip	2.5	No waterway nearby	Yes	Gently sloped	Yes
37	Big Shanty Road	Lafayette Township	0.5	No waterway nearby	Partial	Gently sloped	Yes
56	Bush Hill Road	Liberty Township	1.5	In waterway/wetland	Yes	Steep slope	Yes
58	Bush Hill Road/Baker Road	Liberty Township	0.5	No waterway nearby	Partial	Gently sloped	Yes
59	Coleman Mill Road Site 1	Liberty Township	5	In waterway/wetland	Yes	Steep slope	Yes
60	Coleman Mill Road Site 2	Liberty Township	5	50 to 100 feet	Yes	Extremely steep	Yes
55	Lillbridge Creek Road	Liberty Township	0.5	No waterway nearby	Partial	Steep slope	Yes
61	Strang Hollow Road Site 1	Liberty Township	6	More than 100 feet	No	Gently sloped	Yes
62	Strang Hollow Road Site 2	Liberty Township	1	50 to 100 feet	Partial	Medium slope	Yes
57	Upper Portage Road	Liberty Township	1	Within 50 feet	Yes	Steep slope	Yes
64	Christian Hollow	Norwich Township	1	No waterway nearby	Yes	Steep slope	Yes
63	Combs Creek Road	Norwich Township	2	No waterway nearby	Partial	Steep slope	Yes
65	West Valley Road	Norwich Township	1.5	More than 100 feet	No	Steep slope	Yes
68	Columbia Hill Road	Otto Township	1	No waterway nearby	Partial	Steep slope	Yes
70	Idlewild Road	Otto Township	2.5	No waterway nearby	No	Medium slope	No
69	Kansas Branch Road	Otto Township	1.5	Within 50 feet	Yes	Steep slope	Yes
66	Moody Hollow	Otto Township	1	No waterway nearby	Yes	Steep slope	Yes
67	State Route 646	Otto Township	1	No waterway nearby	No	Steep slope	Yes
73	Bank Street/West Valley Road	Smethport Borough	0.5	More than 100 feet	Yes	Gently sloped	Yes

Waste Characteristics at Dumpsites

Site	Dummeite	ires	ppliances	lectronics	Vs	ırniture	lattresses	ar Batteries	ar Parts	ag Trash	ousehold Waste	ecyclables	oushold azardous Waste	lean Fill	onstruction/ emolition Waste	ard Waste
	Dumpsite	Ë	A	E	Ľ	F	Σ	Ü	Ü	Ë	Η	Ř	H	Ü	ŬĂ	X
MCK	ean County							0								
01	Birch Run Road	3	2	1	1	1	0	0	No	No	Yes	Yes	No	No	No	No
02	Pine Grove Road	3	0	1	0	0	1	0	Yes	Yes	Yes	Yes	No	No	No	No
11	High Street Site 1	8	0	1	0	0	0	0	No	Yes	Yes	Yes	No	No	Yes	Yes
12	High Street Site 2	3	1	0	0	0	0	0	No	Yes	Yes	No	No	No	Yes	Yes
05	Niles Hollow	25	10	5	5	3	0	0	Yes	Yes	No	No	Yes	Yes	Yes	Yes
06	Songbird Road	0	0	0	0	0	1	0	No	Yes	Yes	Yes	No	Yes	Yes	Yes
07	State Route 770 Site 1	6	0	0	2	0	0	0	No	No	Yes	No	No	No	Yes	Yes
08	State Route 770 Site 2	0	0	1	1	0	0	0	No	Yes	No	No	No	No	Yes	Yes
09	State Route 770 Site 3	0	2	0	0	0	0	0	No	Yes	No	No	No	No	Yes	Yes
10	State Route 770 Site 4	0	0	0	0	0	0	0	No	No	Yes	No	No	No	No	No
04	West Corydon Street	3	0	0	0	0	0	0	No	No	Yes	No	No	No	No	Yes
03	West Washington Street	1	0	0	0	0	0	0	No	No	No	No	No	No	Yes	Yes
13	Annin Creek Croad	35	5	0	1	15	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
19	Barbertown Road	1	1	0	1	3	0	0	Yes	Yes	Yes	Yes	Yes	No	No	No
18	Bardern Brook	25	3	0	0	4	2	0	Yes	Yes	Yes	Yes	No	Yes	Yes	No
16	Hanson Hollow	1	1	0	0	0	0	0	No	No	Yes	Yes	No	No	No	No
14	Newell Creek Road	2	2	0	0	0	0	0	Yes	Yes	Yes	Yes	No	No	No	No
17	State Route 44	4	1	0	0	2	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
15	Whitetail Road	15	0	0	0	3	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
26	Artline Road	1	0	0	1	1	0	0	No	Yes	Yes	Yes	No	No	No	No
25	State Game Lands 301	25	6	0	0	0	0	0	Yes	No	Yes	Yes	No	No	No	No
24	West Eldred Road Site 1	8	5	0	0	0	0	0	Yes	Yes	Yes	Yes	No	No	No	No
28	West Eldred Road Site 2	60	1	0	0	0	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
27	Windfall Road	40	10	2	3	3	0	0	Yes	Yes	Yes	Yes	No	No	Yes	Yes
31	Bolivar Dirve	0	0	0	0	0	0	0	No	Yes	Yes	Yes	No	No	Yes	Yes
33	Derrick Road	8	0	0	0	0	0	0	No	No	No	No	No	No	Yes	Yes
32	Harrisburg Run	3	1	0	0	0	0	0	No	No	No	No	No	No	Yes	Yes

				1	Was	te Ch	narao	cteri	stics at	Dum	psites	5				
Site ID	Dumpsite	Tires	Appliances	Electronics	TVs	Furniture	Mattresses	Car Batteries	Car Parts	Bag Trash	Household Waste	Recyclables	Houshold Hazardous Waste	Clean Fill	Construction/ Demolition Waste	Yard Waste
29	Hedgehog Lane	7	0	0	0	0	0	0	No	Yes	No	Yes	No	Yes	Yes	Yes
30	Interstate Parkway	0	0	0	0	0	0	0	No	No	No	No	No	No	No	Yes
34	Looker Mountain Trail	100	5	1	0	0	10	0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
35	Pratt Hollow Site 1	0	2	0	0	0	0	0	No	Yes	Yes	Yes	No	No	Yes	No
36	Pratt Hollow Site 2	9	3	0	2	0	0	0	No	No	No	No	No	No	Yes	Yes
46	Baker Road at Route 6	1	1	0	0	2	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
50	Bordell Road	6	1	0	0	1	0	0	Yes	No	Yes	No	No	No	No	No
49	East Valley Road	20	5	1	1	4	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
48	Kent Hollow	15	1	1	0	1	0	0	Yes	Yes	Yes	No	No	Yes	Yes	No
47	Stickles Hollow Road	12	2	0	0	3	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
37	Big Shanty Road	0	0	0	0	0	0	0	Yes	Yes	No	No	No	No	No	No
56	Bush Hill Road	0	0	1	0	1	0	0	No	Yes	Yes	No	No	No	No	No
58	Bush Hill Road/Baker Road	0	1	1	0	3	0	0	No	Yes	Yes	Yes	No	No	No	No
59	Coleman Mill Road Site 1	40	8	0	1	5	1	0	Yes	Yes	Yes	Yes	No	No	Yes	No
60	Coleman Mill Road Site 2	20	10	0	3	20	2	0	Yes	Yes	Yes	Yes	No	No	Yes	Yes
55	Lillbridge Creek Road	3	0	0	1	0	0	0	Yes	Yes	Yes	Yes	No	No	No	No
61	Strang Hollow Road Site 1	15	5	2	3	5	1	4	Yes	Yes	Yes	Yes	No	No	Yes	Yes
62	Strang Hollow Road Site 2	2	0	1	0	3	0	0	Yes	Yes	Yes	Yes	No	No	No	No
57	Upper Portage Road	2	2	0	1	6	1	0	Yes	No	Yes	Yes	No	No	No	No
64	Christian Hollow	6	3	1	0	1	0	0	Yes	Yes	Yes	Yes	No	No	No	No
63	Combs Creek Road	3	7	1	0	1	0	0	Yes	Yes	Yes	Yes	No	No	No	No
65	West Valley Road	10	3	0	0	1	0	0	Yes	Yes	Yes	Yes	No	Yes	Yes	No
68	Columbia Hill Road	15	1	1	3	2	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
70	Idlewild Road	0	0	0	0	0	0	0	Yes	No	No	Yes	No	No	No	No
69	Kansas Branch Road	12	1	0	0	0	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
66	Moody Hollow	3	1	0	1	1	0	0	Yes	Yes	Yes	Yes	No	Yes	Yes	No
67	State Route 646	4	1	0	2	1	0	0	Yes	Yes	Yes	Yes	No	No	Yes	No
73	Bank Street/West Valley Road	3	1	0	0	1	0	0	No	Yes	Yes	Yes	No	Yes	Yes	Yes

(Source: PA CleanWays, 2008)

APPENDIX H. WATERWAY DESIGNATIONS

Designation Waterway **Allegheny River Watershed** Woodcock Creek HQ-CWF **Gross Hollow** CWF Wambold Hollow **HQ-CWF Pigeon Hollow CWF Toombs Hollow** CWF Kohler Hollow CWF Dwight Creek **HQ-CWF** Peet Brook **CWF** Lent Hollow **CWF** CWF **Prosser Hollow Baker Creek** CWF Steer Run **HQ-CWF Reese Hollow** CWF Mill Creek-Source to North Hollow **HQ-CWF** Mill Creek-North Hollow to Mouth CWF Dingman Run HQ-CWF Earl Hollow CWF Pump Station Hollow **CWF** CWF Elm Flat **Gleason Hollow CWF** Reed Run **HQ-CWF Trout Brook** CWF Laninger Creek HQ-CWF Fishing Creek CWF East Branch Fishing Creek HQ-CWF Card Creek **CWF** Sartwell Creek **CWF** Allegheny Portage Creek-Source to Brown Hollow & Scaffold Lick Run to mouth TSF Allegheny Portage Creek-Brown Hollow to Scaffold Lick Run HQ-CWF Planning Mill Hollow CWF Brown Hollow HQ-CWF Indian Run CWF Heath Hollow CWF Fair Run HQ-CWF Rock Run CWF Scaffold Lick Run CWF Cady Hollow CWF Hamilton Run CWF Tramroad Hollow CWF Combs Creek CWF Lillibridge Creek CWF

Designation Waterway Allegheny River Watershed (continued) **HQ-CWF** Skinner Creek CWF Two Mile Creek CWF Anin Creek CWF Rock Run **Open Brook CWF** Newell Creek Potato Creek-Confluence of East Branch and Havens Run to Cole Creek TSF WWF Potato Creek-Cole Creek to Mouth HQ-CWF East Branch Potato Creek Havens Run CWF CWF Indian Run Frog Camp Hollow CWF Kimball Hollow CWF West Branch Potato Creek HQ-CWF Sackett Hollow CWF Brewer Run HO-CWF **Evans Hollow** CWF Red Mill Brook CWF Wernwag hollow HQ-CWF Browns Mill CWFCombs Creek CWF Colegrove Brook HQ-CWF **Robbins Brook** HQ-CWF Walcott Brook CWF Bayer Brook HQ-CWF Daly Brook HQ-CWF Marvin Creek CWF Sherman Run HQ-CWF Santeen Run HQ-CWF Wildcat Hollow CWF Warner Brook HQ-CWF Stanton Brook HQ-CWF Bloonster Hollow CWF Blacksmith Run- Source to Smethport Water Intake HQ-CWF CWF Blacksmith Run- Smethport Water Intake to Mouth Cole Creek CWF South Branch Cole Creek EVPierce Brook CWF **Carpenter Creek** CWF Canfield Creek CWF CWF **Barden Brook**

Waterway

Designation

Knapp Creek	CWF
Tram Hollow Run	CWF
Kansas Branch	CWF
South Branch Knapp Creek	CWF
ndian Creek	CWF
North Branch Indian Creek	CWF
Aix Creek	CWF
AcCrea Run	CWF
Swavo Creek-Source to Brizzee Hollow: Clara Creek to Honeove Creek	CWF
Swavo Creek-Brizzee Hollow to Clara Creek	HO-CWF
Brizzee Hollow	HQ-CWF
South Branch Oswayo Creek	EV
Clara Creek	CWF
Bradley Run	HQ-CWF
Elevenmile Creek	HQ-CWF
Canada Run	CŴF
Wildcat Creek	CWF
Cow Run	HQ-CWF
Honeoye Creek	CWF
Butter Creek	HQ-CWF
Plank Creek	CWF
Janders Run	HQ-CWF
Horse Run	CWF
Bell Run	CWF
Shaytown Branch	CWF
Chapman Brook	CWF
Taylor Brook	HQ-CWF
Kings Run	CWF
unungwant Creek	WWF
McCrea Run	CWF
East Branch Tunungwant Creek-Source to SR 4002 Bridge	HQ-CWF
East Branch Tunungwant Creek-SR 4002 Bridge to confluence with West Branch	CWF
Railroad Run	EV
Sheppard Run	CWF
Minard Run	EV
West Branch Tunungwant Creek-Source to Marilla Brook	HQ-CWF
West Branch Tunungwant Creek-Marilla Brook to confluence with East Branch	CWF
Marilla Brook- Source to Marilla Brook Reservoir Dam	HQ-CWF
Marilla Brook- Marilla Brook Reservoir Dam to Mouth	CWF
<u>Gilbert Brook</u>	<u>HQ-CWF</u>
Kendall Creek	WWF
Bolivar Run	CWF
Foster Brook	CWF

		Length			Date	TMDL
Waterway	Use Designation	(miles)	Source	Cause	Listed	Date
Allegheny River	Fish Consumption	14.91	Unknown	Mercury	2002	2015
	Fish Consumption	13.58	Unknown	Mercury	2002	2015
	Aquatic Life	2.08	Unknown	Metals	2006	2019
	Recreational	9.22	Unknown	Pathogens	2010	2023
Unnamed Trib #112367505 to	Aquatic Life	0.31	Grazing Related Agriculture	Siltation	2006	2019
Allegheny River			Road Runoff	Siltation	2006	2019
Unnamed Trib #112367605 to	Aquatic Life	0.51	Grazing Related Agriculture	Siltation	2006	2019
Allegheny River			Road Runoff	Siltation	2006	2019
Unnamed Trib #112367609 to	Aquatic Life	0.21	Grazing Related Agriculture	Siltation	2006	2019
Allegheny River			Road Runoff	Siltation	2006	2019
Unnamed Trib #112367381 to	Aquatic Life	0.24	Grazing Related Agriculture	Siltation	2006	2019
Allegheny River			Road Runoff	Siltation	2006	2019
Unnamed Trib #112367485 to	Aquatic Life	048	Grazing Related Agriculture	Siltation	2006	2019
Allegheny River			Road Runoff	Siltation	2006	2019
Unnamed Trib #112367585 to	Aquatic Life	1.15	Grazing Related Agriculture	Siltation	2006	2019
Allegheny River			Road Runoff	Siltation	2006	2019
Barden Brook	Aquatic Life	3.64	Grazing Related Agriculture	Siltation	2006	2019
			Road Runoff	Siltation	2006	2019
Unnamed Trib #112363733 to Barden	Aquatic Life	0.68	Grazing Related Agriculture	Siltation	2006	2019
Brook			Road Runoff	Siltation	2006	2019
Unnamed Trib #112363751 to Barden	Aquatic Life	0.96	Grazing Related Agriculture	Siltation	2006	2019
Brook			Road Runoff	Siltation	2006	2019
Unnamed Trib #112363799 to Barden	Aquatic Life	0.64	Grazing Related Agriculture	Siltation	2006	2019
Brook			Road Runoff	Siltation	2006	2019
Unnamed Trib #112363347 to Barden	Aquatic Life	0.65	Grazing Related Agriculture	Siltation	2006	2019
Brook			Road Runoff	Siltation	2006	2019
Unnamed Trib #112363349 to Barden	Aquatic Life	0.41	Grazing Related Agriculture	Siltation	2006	2019
Brook			Road Runoff	Siltation	2006	2019
Canfield Creek	Aquatic Life	2.24	Agriculture	Siltation	2006	2019
Unnamed Trib #112364911 to Canfield	Aquatic Life	0.74	Agriculture	Siltation	2006	2019
Creek						

APPENDIX I. IMPAIRED WATERWAYS

Allegheny River Headwaters Conservation Plan

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Appendix I. Impaired Waters

Allegheny River Headwaters Conserv	ation Plan					
		Length			Date	TMDL
Waterway	Use Designation	(miles)	Source	Cause	Listed	Date
Unnamed Trib #112364933 to Canfield Creek	Aquatic Life	0.63	Agriculture	Siltation	2006	2019
Unnamed Trib #112374193 to Combs Creek	Aquatic Life	0.54	Road Runoff	Siltation	2006	2019
Unnamed Trib #112374551 to Combs Creek	Aquatic Life	0.6	Road Runoff	Siltation	2006	2019
Unnamed Trib #112374803 to Combs Creek	Aquatic Life	0.72	Road Runoff	Siltation	2006	2019
Unnamed Trib #112374915 to Combs Creek	Aquatic Life	0.52	Road Runoff	Siltation	2006	2019
Unnamed Trib #112374035 to Combs Creek	Aquatic Life	2.02	Road Runoff	Siltation	2006	2019
Foster Brook	Aquatic Life	2.36	Small Residential Runoff	Nutrients	2006	2019
Foster Brook	Aquatic Life	3.05	Petroleum Activities	Nutrients	2006	2019
				Siltation	2006	2019
			Road Runoff	Nutrients	2006	2019
				Siltation	2006	2019
			Small Residential Runoff	Nutrients	2006	2019
				Siltation	2006	2019
Unnamed Trib #112364717 to Foster	Aquatic Life	0.57	Petroleum Activities	Nutrients	2006	2019
Brook				Siltation	2006	2019
			Road Runoff	Nutrients	2006	2019
				Siltation	2006	2019
			Small Residential Runoff	Nutrients	2006	2019
				Siltation	2006	2019
Unnamed Trib #112364813 to Foster	Aquatic Life	0.37	Petroleum Activities	Nutrients	2006	2019
Brook				Siltation	2006	2019
			Road Runoff	Nutrients	2006	2019
				Siltation	2006	2019
			Small Residential Runoff	Nutrients	2006	2019
				Siltation	2006	2019
Lillibridge Creek	Aquatic Life	3.67	Grazing Related Agriculture	Siltation	2006	2019
	Aquatic Life	1.04	Small Residential Runoff	Siltation	2006	2019

Appendix I. Impaired Waters

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Allegheny River Headwaters Conserv	ation Plan					
		Length			Date	TMDL
Waterway	Use Designation	(miles)	Source	Cause	Listed	Date
Unnamed Trib #112368415 to Lillibridge Creek	Aquatic Life	0.39	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib #112368599 to Lillibridge Creek	Aquatic Life	0.38	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib #112369095 to Lillibridge Creek	Aquatic Life	0.47	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib #112369597 to Lillibridge Creek	Aquatic Life	0.51	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib #112369747 to Lillibridge Creek	Aquatic Life	0.61	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib #112370031 to Lillibridge Creek	Aquatic Life	1.19	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib #112373765 to Marvin Creek	Aquatic Life	1.41	Unknown	Nutrients Siltation	2006 2006	2019 2019
Newell Creek	Aquatic Life	6.01	Grazing Related Agriculture	Siltation	2006	2019
			Road Runoff	Siltation	2006	2019
Unnamed Trib #112364993 to Newell Creek	Aquatic Life	0.42	Road Runoff	Siltation	2006	2019
Unnamed Trib #112365813 to Newell	Aquatic Life	0.34	Grazing Related Agriculture	Siltation	2006	2019
Creek			Road Runoff	Siltation	2006	2019
Unnamed Trib #112365181 to Newell Creek	Aquatic Life	0.94	Road Runoff	Siltation	2006	2019
Unnamed Trib #112365337 to Newell	Aquatic Life	0.56	Grazing Related Agriculture	Siltation	2006	2019
Creek			Road Runoff	Siltation	2006	2019
Unnamed Trib #112365605 to Newell	Aquatic Life	1.09	Grazing Related Agriculture	Siltation	2006	2019
Creek			Road Runoff	Siltation	2006	2019
Unnamed Trib #112365717 to Newell	Aquatic Life	1.09	Grazing Related Agriculture	Siltation	2006	2019
Creek			Road Runoff	Siltation	2006	2019
Unnamed Trib #112365895 to Newell	Aquatic Life	0.38	Grazing Related Agriculture	Siltation	2006	2019
Creek			Road Runoff	Siltation	2006	2019
Unnamed Trib #112365949 to Newell	Aquatic Life	0.75	Grazing Related Agriculture	Siltation	2006	2019
Creek			Road Runoff	Siltation	2006	2019
Unnamed Trib #112365173 to Newell	Aquatic Life	0.12	Grazing Related Agriculture	Siltation	2006	2019
Creek			Road Runoff	Siltation	2006	2019

Appendix I. Impaired Waters

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		Length			Date	TMDL
Waterway	Use Designation	(miles)	Source	Cause	Listed	Date
Railroad Run	Aquatic Life	2.77	Abandoned Mine Drainage	Hd	2006	2019
Unnamed Trib #112377017 to Railroad Run	Aquatic Life	0.58	Abandoned Mine Drainage	Hd	2006	2019
Unnamed Trib #112377057 to Railroad Run	Aquatic Life	1.05	Abandoned Mine Drainage	pH	2006	2019
Rock Run	Aquatic Life	6.02	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112365829 to Rock Run	Aquatic Life	0.55	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112365885 to Rock Run	Aquatic Life	0.37	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112366159 to Rock Run	Aquatic Life	0.52	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112366415 to Rock Run	Aquatic Life	0.87	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112366663 to Rock Run	Aquatic Life	0.47	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112366723 to Rock Run	Aquatic Life	0.65	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112367273 to Rock Run	Aquatic Life	0.4	Grazing Related Agriculture	Siltation	2006	2019
Unnamed Trib # 112367945 to Rock	Aquatic Life	0.25	Grazing Related Agriculture	Siltation	2006	2019
Kun Scaffold Lick Run	Aquatic Life	69.9	Koad Kunou Abandoned Mine Drainage	Siliauon Organic Enrichment/Low D.O.	cuuz 1998	2019
	4)	hd	1998	2011
Unnamed Trib #112375003 to Scaffold Lick Run	Aquatic Life	0.35	Abandoned Mine Drainage	Organic Enrichment/Low D.O. pH	1998 1998	2011 2011
Unnamed Trib #112375169 to Scaffold Lick Run	Aquatic Life	0.7	Abandoned Mine Drainage	Organic Enrichment/Low D.O. pH	1998 1998	2011 2011
Unnamed Trib #112375213 to Scaffold Lick Run	Aquatic Life	0.42	Abandoned Mine Drainage	Organic Enrichment/Low D.O. pH	1998 1998	2011 2011
Unnamed Trib #112375747 to Scaffold Lick Run	Aquatic Life	0.13	Abandoned Mine Drainage	Organic Enrichment/Low D.O. pH	1998 1998	2011 2011
Unnamed Trib #112375099 to Scaffold	Aquatic Life	0.97	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
LICK KUI				рп	1998	1107

Allegheny River Headwaters Conservation Plan

Appendix I. Impaired Waters

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		Length			Date	TMDL
Waterway	Use Designation	(miles)	Source	Cause	Listed	Date
Unnamed Trib #112375379 to Scaffold	Aquatic Life	2.41	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run	I			Hd	1998	2011
Unnamed Trib #112375591 to Scaffold	Aquatic Life	0.17	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run	I			Hď	1998	2011
Unnamed Trib #112375755 to Scaffold	Aquatic Life	0.61	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run				Hd	1998	2011
Unnamed Trib #112375815 to Scaffold	Aquatic Life	0.69	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run				Hd	1998	2011
Unnamed Trib #112375817 to Scaffold	Aquatic Life	0.72	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run	I			Hď	1998	2011
Unnamed Trib #112375969 to Scaffold	Aquatic Life	1.09	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run				Hd	1998	2011
Unnamed Trib #112376189 to Scaffold	Aquatic Life	0.67	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run				PH	1998	2011
Unnamed Trib #112376223 to Scaffold	Aquatic Life	0.72	Abandoned Mine Drainage	Organic Enrichment/Low D.O.	1998	2011
Lick Run				Hd	1998	2011
Tunungwant Creek	Fish Consumption	4.55	Unknown	Mercury	2002	2015
	Aquatic Life	4.74	Channelization	Unknown	2006	2019
			Industrial Point Source	Unknown	2006	2019
			Removal of Vegetation	Unknown	2006	2019
West Branch Tunungwant Creek	Aquatic Life	0.76	Other	Nutrients	2006	2019
			Upstream Impoundment	Nutrients	2006	2019
Unnamed Trib #112366341 to West Branch Tunungwant Creek	Aquatic Life	0.83	Petroleum Activities	Metals	2006	2019

Allegheny River Headwaters Conservation Plan

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Expiration

Handler	Permit #	Type	Address	City	State	Zip	Date
llegheny Highlands Council	PA0032042	Minor	BSA-Elk Lick Scout Reserve	Smethport	\mathbf{PA}	16749	4/11/2004
merican Refing Group, Inc.	PA0002674	Major	77 North Kendall Avenue	Bradford	\mathbf{PA}	16701	4/20/2010
merican Refining Group, Inc	PAG108308	Minor	77 North Kendall Avenue	Bradford	\mathbf{PA}	16701	6/7/2012
azzoui, Wadid SFTP	PA0209945	Minor	656 Minard Run Road	Bradford	\mathbf{PA}	16701	6/9/2012
radford City Authority Water	PA0101621	Minor	West Corydon Street Extension	Bradford	\mathbf{PA}	16701	11/29/2010
reatment Plant							
radford Forest Products	PA0210625	Minor	444 High Street	Bradford	\mathbf{PA}	16701	6/28/2012
radford Sanitary Authority Sewage	PA0026379	Major	410 Seward Ave	Bradford	\mathbf{PA}	16701	5/20/2012
reatment Plant							
oudersport Area Municipal	PA0043419	Minor	Tolls Hollow Road	Coudersport	\mathbf{PA}	16915	12/31/2010
uthority							
aily Bread Cafe	PA0104035	Minor	2906 State Rout 155	Port Allegany	\mathbf{PA}	16743	9/30/2012
resser Piping Specialities, Inc	PA0002461	Minor	41 Fisher Ave	Bradford	\mathbf{PA}	16701	9/27/2010
Idred Borough Municipal Authority	PA0020052	Minor	Route 446	Eldred	\mathbf{PA}	16731	2/27/2010
ilen O. Hawbaker Incorporated	PAR708307	Minor	Turtlepoint Asphalt Plant 7	Turtlepoint	\mathbf{PA}	16750	9/5/2012
iraham Packaging	PAR238312	Minor	105 Bolivar Drive	Bradford	\mathbf{PA}	16701	4/15/2014
lamlin Township Sewer Plant	PA0210781	Minor	664 Dewey Avenue	Hazel Hurst	\mathbf{PA}	16749	9/30/2013
nternational Waxes Farmers-Valley	PA0002372	Major	Intersection of Routes 46 & 446	Smethport	\mathbf{PA}	16749	4/24/2010
lant							
Aorgan Advance Materials &	PA0003565	Minor	East Second Street	Coudersport	\mathbf{PA}	16915	6/30/2010
echnology							
A DOT-McKean County	PA0035581	Minor	Bingham Road	Cyclone	\mathbf{PA}	16726	10/3/2011
Aaintenance Facility							
ithold Water Association	PA0220906	Minor	Pithold Road	Cyclone	\mathbf{PA}	16726	1/14/2013
ittsburgh Corning Corporation	PA0002151	Minor	723 North Main Street	Port Allegany	\mathbf{PA}	16743	3/10/2013
ort Allegany Borough	PA0025739	Minor	Glass Place	Port Allegany	\mathbf{PA}	16743	7/19/2010
coulette Township	PA0209066	Minor	State Route 4003	Roulette	\mathbf{PA}	16746	1/31/2010
aint Gobain Containers	PA0001872	Minor	One Glass Place	Port Allegany	PA	16743	10/26/2010
hinglehouse Borough WWTP	PA0036773	Minor	Wolcott Drive	Shinglehouse	\mathbf{PA}	16748	2/28/2011

							Expiration
Handler	Permit #	Type	Address	City	State	Zip	Date
Smethport Wastewater Treatment Plant	PA0021521	Minor	Route 46 North	Smethport	ΡA	16749	2/14/2011
Zippo Manufacturing Company	PA0002976	Major	Congress Street Extension	Bradford	ΡA	16701	11/28/2009
Limestone (v) Wastewater Treatment	NY0029068	Minor	Rt 219 Railroad Street	Limestone	NΥ	14753	9/30/2012
Plan							
Portville (v) Wastewater Treatment	NY0020966	Minor	1 Main Street	Portville	NΥ	14770	9/30/2011
Plan							
Indeck-Olson Energy Center	NY0245089	Minor	140 Moore Avenue	Olean	NΥ	14770	5/31/2012
Olean (c) Wastewater Treatment	NY0027162	Major	174 South 19th Street	Olean	NΥ	14770	8/31/2011
Plant							
Olean (c) Water Treatment Plan	NY0258890	Minor	River Rioad & East Pine Street	Olean	NΥ	14760	4/30/2011
Cutco Cutery Corporation	NY0101583	Minor	116 East Street	Olean	NΥ	14770	11/30/2012
(Sources: U.S. EPA, 2009)							
ommon Name	Scientific Name						
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mphibitans							
bullfrog	Rana catesbeiana						
American toad	Bufo americanus						
eastern gray treefrog	Hyla versicolor						
eastern hellbender	Cryptobranchus alleganiensis alleganiensis						
four-toed salamander	Hemidactylium scutatum						
jefferson salamander	Ambystoma jeffersonianum						
longtail salamander	Eurycea longicauda						
marbled salamander	Ambystoma opacum						
mountain dusky salamander	Desmognathus ochrophaeus						
mudpuppy	Necturus maculosus						
northern two-lined salamander	Eurycea bislineata						
northern dusky salamander	Desmognathus fuscus						
northern green frog	Rana clamitans						
northern leopard frog	Rana pipiens						
northern red salamander	Pseudotriton ruber						
northern spring peeper	Pseudacris crucifer						
northern spring salamander	Gyrinophilus porphyriticus						
pickerel frog	Rana palustris						
redback salamander	Plethodon cinereus						
red-spotted newt	Notophthalmus viridescens						
slimy salamander	Plethodon glutinosus						
spotted salamander	Ambystoma maculatum						
Wehrle's salamander	Plethodon wehrlei						
wood frog	Rana sylvatica						

APPENDIX K. WILDLIFE LISTING

Birds

American crow	Corvus brachyrhynchos
American robin	Turdus migratorius
American woodcock	Scolopax minor
bald eagle	Haliaeetus leucocephalus
Baltimore oriole	Icterus galbula
barn owl	Tyto alba
barred owl	Strix varia
black-capped chickadee	Poecile atricapillus
black-throated green warbler	Dendroica virens
blue jay	Cyanocitta cristata
blue-gray gnatcatcher	Poliptila caerulea
bohemian waxwing	Bombycilla garrulus
broad-winged hawk	Buteo platypterus
brown thrasher	Toxostoma rufum
brown-headed cowbird	Molothrus ater
Canada goose	Branta canadensis

Common Name	Scientific Name	
Birds (continued)		
Carolina chickadee	Poecile carolinensis	
cedar waxwing	Bombycillus cedrorum	
cerulean warbler	Dendroica cerulea	
chestnut sided warbler	Dendroica pensylvanica	
common grackle	Quiscalus quiscula	
common yellow throat	Geothlypis trichas	
Cooper's hawk	Accipiter cooperil	
Dark-eyed junco	Junco hyemalis	
downy wood pecker	Picoides pubescens	
eastern bluebird	Sialia sialis	
eastern screech owl	Megascops asio	
eastern screech owl	Otus asio	
great blue heron	Ardea herodias	
great horned owl	Bubo virginianus	
green heron	Butorides virescens	
house finch	Carpodacus mexicanus	
house wren	Troglodytes aedon	
indigo bunting	Passerina cyanea	
killdeer	Charadrius vociferus	
mallard duck	Anas platyrhynchos	
mourning dove	Zenaida macroura	
mourning warbler	Oporonis philadelphia	
northern cardinal	Cardinalis cardinalis	
northern flicker	Colaptes auratus	
northern goshawk	Accipiter gentillis	
northern mocking bird	Mimus polyglottos	
northern saw-wheat owl	Aegolius acadicus	
osprey	Pandion haliaetus	
pileated wood pecker	Dryocopus pileatus	
purple finch	Carpodacus purpureaus	
red-bellied wood pecker	Melanerpes carolinus	
red-shouldered hawk	Buteo lineatus	
red-tail hawk	Buteo jamaicensis	
red-winged black bird	Agelaius phoeniceus	
ruby-throated hummingbird	Archilochus colubris	
ruffed grouse	Bonasa umbellus	
scarlet tanger	Piranga olivacea	
song sparrow	Melospiza melodia	
Swainson's Thrush	Catharus ustulatus	
tree swallow	Tachycineta bicolor	
tufted titmouse	Baeolophus bicolor	
turkey vulture	Cathartes aura	
white breasted nut hatch	Sitta carolinensis	
white throated sparrow	Zonotrichia albicollis	

Common Name	Scientific Name	
Birds (continued)		
wild turkey	Meleagris gallopavo	
Wilson's Snipe	Gallinago delicata	
wood duck	Aix sponsa	
yellow-bellied sapsucker	Sphyrapicus varius	

Fish

Lamprey: Family Petromyzontidae

American brook lamprey	Lampetra appendix
mountain brook lamprey	Ichthyomyzon greeleyi
Ohio lamprey	Icthyomyzon bdellium

Rocklings: Family Lotidae

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burbot			Lota lota

Pikes: Family Esocidae

muskellunge	Esox masquinongy
northern pike	Esox lucius
tiger muskellunge	Esox lucius cross Esox masquinongy

Catfish: Family Ictaluridae

channel catfish	Ictalurus punctatus

Minnows: Family Cyprinidae

bigmouth shiner	Notropis dorsalis
southern redbelly dace	Phoxinus erythrogaster

Perches: Family Percidae

channel darter	Percina copelandi
longhead darter	Percina macrocephala
yellow perch	Perca flavescens
walleye	Sander vitreus

Trout: Family Salmonidae

brook trout	Salvelinus fontinalis
brown trout	Salmo trutta
rainbow trout	Oncorhynchus mykiss

Sunfish: Family Centrarchidae

black crappie	Pomoxis nigromaculatus
bluegill	Lepomis macrochirus
largemouth bass	Micropterus salmoides
pumpkin seed	Lepomis gibbosus
rock bass	Ambloplites ruperstris
small mouth bass	Micropterus dolomieu

Common Name	Scientific Name
Fish (continued)	
Sunfish: Family Centrarchidae	(continued)
white crappie	Pomoxis annularis
Temperate Basses: Family Perc	ichthydae
white bass	Morone chrysops
Mammals	
American beaver	Castor canadensis
American black bear	Ursus americanus
American mink	Mustela vison
Appalachian Cottontail	Sylvilagus obscurus
big brown bat	Eptesicus fuscus
bobcat	Lynx rufus
boreal redback vole	Clethrionomys gapperi
coyote	Canis latrans
deer mouse	Peromyscus maniculatus
eastern chipmunk	Tamias striatus
eastern cottontail	Sylvilagus floridanus
eastern fox squirrel	Sciurus niger
eastern gray squirrel	Sciurus carolinensis
eastern pipistrel	Pipistrellus subflavus
Eastern small-footed bat	Myotis leibii
eastern woodrat	Neotoma floridana
elk	Cervus canadensis
gray fox	Urocyon cinereoargenteus
hairy-tailed mole	Parascalops breweri
hoary bat	Lasiurus cinereus
Indiana bat	Myotis sodalis
keen myotis	Myotis keenii
least shrew	Cryptotis parva
least weasel	Mustela nivalis
little brown bat	Myotis lucifugus
long-tailed shrew	Sorex dispar
long-tailed weasel	Mustela frenata
masked shrew	Sorex cinereus
meadow jumping mouse	Zapus hudsonius
meadow vole	Microtus pennsylvanicus
muskrat	Ondatra zibethicus
New England cottontail	Sylvilagus transitionalis
North American porcupine	Erethizon dorasatum
northern flying squirrel	Glaucomvs sabrinus
northern myotis	Myotis septentrionalis
northern raccoon	Procvon lotor
northern river otter	Lontra canadensis

ommon Name	Scientific Name	
lammals (continued)		
northern short-tailed shrew	Blarina brevicauda	
pine vole	Microtus pinetorum	
pygmy shrew	Sorex hoyi	
red bat	Lasiurus borealis	
red fox	vulpes vulpes	
red squirrel	Tamiasciurus hudsonicus	
short-tailed weasel	Mustela erminea	
silver-haired bat	Lasionycteris noctivagans	
smoky shrew	Sorex fumeus	
snowshoe hare	Lepus americanus	
southern bog lemming	Synaptomys cooperi	
southern flying squirrel	Claucomys volans	
star-nosed mole	Condylura cristata	
striped skunk	Mephitis mephitis	
Virginia opossum	Didelphis virginiana	
water shrew	Sorex palustris	
white-footed mouse	Perocyscus leucopus	
whitetail deer	Odocoileus virginianus	
woodchuck	Marmota monax	
woodland jumping mouse	Napaeozapus insignis	

Reptiles

1	
black rat snake	Elaphe obsoleta
common snapping turtle	Chelydraserpentina
eastern garter snake	Thamnophis sirtalis
eastern milk snake	Lampropeltis triangulum
eastern spiny softshell	Apalone spinifera spinifera
midland painted turtle	Chrysemys picta marginata
mountain earth snake	Virginia pulchra
northern coal skink	Eumeces anthracinus anthracinus
northern black racer	Coluber constrictor constrictor
northern brown snake	Storeria dekayi dekayi
northern redbelly snake	Storeria occipitomaculata occipitomaculata
northern ringneck snake	Diadophis punctatus edwardsii
northern water snake	Nerodia sipedon
queen snake	Regina septemvittata
ribbon snake	Thamnophis sauritus
shorthead garter snake	Thamnophis brachystoma
smooth earth snake	Virginia valeriae
smooth green snake	Opheodrys vernalis
timber rattlesnake	Crotalus horridus
wood turtle	Clemmys insculpta

Subwatarshad	Fish Community	Maeroinvertahrata Community	Mussel Community
Bell Run	Coolwater Stream Community	Common Large Stream Community	
Allegheny River-Knapp Creek	Warmwater Community	High Quality Small Stream Community	
East Branch Tunungwant Creek	Coldwater Community	High Quality Large Stream Community	
Potato Creek	Warmwater Community		spike mussel
Marvin Creek	Coolwater Stream Community	Common Large Stream Community	
Allegheny River-Fishing Creek	Warmwater Community	High Quality Small Stream Community	
Allegheny River-Allegheny Portage Creek	Large River Community		spike mussel
West Branch Tunungwant Creek	Coldwater Community		
Honeoye Creek	Coolwater Stream Community		
Elevenmile Creek	Coolwater Stream Community		
Oswago Creek-Elevenmile Creek	Coolwater Stream Community		
Cole Creek	Coolwater Stream Community		
South Branch Oswayo Creek	Large River Community		
Allegheny River-Annin Creek	Coldwater Community		
Sartwell Creek	Coolwater Stream Community		
Fishing Creek	Coolwater Stream Community		
Allegheny River-Mill Creek	Coolwater Stream Community		
Allegheny Portage Creek	Coolwater Stream Community	High Quality Large Stream Community	
Mill Creek	Coldwater Community	High Quality Small Stream Community	
Potato Creek-Walcott Brook	Coolwater Stream Community		
Potato Creek-Sackett Hollow	Coolwater Stream Community		
Oswayo Creek	Warmwater Community		spike mussel

APPENDIX L. Aquatic Community Classifications

APPENDIX M. SPECIES OF CONCERN

Plants

	Global	State	State	Proposed	Federal	Locat	ion
Common Name	Rank	Rank	Status	State Status	Status	McKean	Potter
American Fever-few	G5	S1	TU	PE		Х	
Appalachian Blue Violet	G3	S2	PT	TU			Х
Backward Sedge	G5	S1	PE	PE			Х
Case's Ladies'-tressers	G4	S1	PE	PE		Х	Х
Cranesbill	G5	S1	PE	PE			Х
Creeping Snowberry	G5	S3	PR	PR		Х	Х
Downy Willow-herb	G5?	S3	PE	PR		Х	Х
Great-spurred Violet	G5?	S3S4	Ν	PR		Х	Х
Highbush-cranberry	G5T5	S3S4	TU	PR		Х	
Large Toothwort	G5	S2	Ν	PT		Х	Х
Mountain Starwort	G5	S1S2	Ν	TU			Х
Northern Water-plantain	G5	S1	PE	PE		Х	Х
Oblong-fruited Serviceberry	G5	S1	PE	PE		Х	
Purple-fringeless Orchid	G5	S2	TU	РТ			Х
Queen-of-the-prairie	G4G5	S1S2	TU	TU		Х	
Red Currant	G5	S2	PT	PT		Х	Х
Roan Mountain Sedge	G3	S1		TU			Х
Soft-leaved Sedge	G5	S3	PR	PR			Х
Spike Sedge	G4	S2	Ν	РТ		Х	
Stalked Bulrush	G4	S1	PT	РТ		Х	Х
Strawberry Goosefoot	G5	SH	TU	PE			Х
Thread Rush	G5	S3	PR	PR		Х	
White Twisted-stalk	G5	S1	PT	PE		Х	X

Vertebrates

	Global	State	State	Proposed	Federal	Locat	ion
Common Name	Rank	Rank	Status	State Status	Status	McKean	Potter
American Bittern	G4	S1B	PE	PE			Х
American Brook Lamprey	G4	S3	PC	СР		Х	Х
Appalachian Cottontail	G4	SU				Х	Х
Bald Eagle	G5	S2B	PT	PT		Х	
Bigmouth Shiner	G5	S2	PT	PT		Х	Х
Burbot	G5	S1S2	PE	PE		Х	Х
Channel Darter	G4	S2		PT		Х	Х
Coal Skink	G5	S3				Х	Х
Great Blue Heron	G5	S3S4B,S4N				Х	Х
Longhead Darter	G3	S2S3		PT		Х	Х
Mountain Brook Lamprey	G3G4	S2	PT	PT		X	Х
Mountain Earth Snake	4	S3					Х

Vertebrates (continued)

	Global	State	State	Proposed	Federal	Locat	ion
Common Name	Rank	Rank	Status	State Status	Status	McKean	Potter
Northern Flying Squirrel	G5	SU	PE			Х	Х
Northern Goshawk	G5	S2S3B,S3N		CR		Х	Х
Northern Myotis	G4	S3B,S3N		CR		Х	
Ohio Lamprey	G3G4	S2S3	PC	СР		Х	Х
Osprey	G5	S2B	PT	PT		Х	
Shorthead Garter Snake	G4	S3				Х	Х
Silver-haired Bat	G5	SUB		CR		Х	
Smooth Green Snake	G5	S3S4				Х	
Southern Redbelly Dace	G5	S1	РТ	PT		Х	
Swainson's Thrush	G5	S2S3B,S5N		CR		Х	Х
Timber Rattlesnake	G4	S3S4	PC	CA		Х	Х
Water Shrew	G5T5	S3		CR		Х	Х
Wilson's Snipe	G5	S3B,S3N		CR		Х	

Invertebrates

	Global	State	State	Proposed	Federal	Locat	ion
Common Name	Rank	Rank	Status	State Status	Status	McKean	Potter
American Emerald	G5	S3S4				Х	
Atlantis Fritillary	G5	S3				Х	
Baltimore	G4	S3					Х
Black-tipped Darner	G4	S2S3				Х	
Blue-tipped Dancer	G5	S1				Х	
Bronze Copper	G5	S3				Х	
Brush-tipped Emerald	G5	S2				Х	
Creek Heelsplitter	G5	S2S3		CR		Х	
Elktoe	G4	S4		N		Х	
Eyed Brown	G4	S3				Х	
Forcipate Emerald	G5	S2				Х	
Green-striped Darner	G5	S3S4				Х	
Harpoon Clubtail	G4	S1S2				Х	Х
Harris' Checkerspot	G4	S3				Х	Х
Indian Skipper	G5	S3				Х	
Leonard's Skipper	G4	S3				Х	
Long-solid	G3	S1		PE		Х	Х
Maine Snaketail	G4	S3				Х	Х
Northern Bluet	G5	S3					Х
Northern Pygmy Clubtail	G4	S3S4				Х	Х
Ocellated Darner	G5	S3				Х	Х
Red-waisted Whiteface	G5	S2				Х	
Riffle Snaketail	G5	S2S3					Х
Round Pigtoe	G4G5	S2		PE		Х	Х

Invertebrates (continued)

	Global	State	State	Proposed	Federal	Locat	tion
Common Name	Rank	Rank	Status	State Status	Status	McKean	Potter
Sable Clubtail	G4	S1					Х
Silver Bordered Fritillary	G5T5	S3				Х	
Ski-tailed Emerald	G5	S2				Х	
Superb Jewelwing	G4	S2S3				Х	Х
Wavy-rayed Lampmussel	G5	S4		N		Х	
West Virginia White	G3G4	S2S3					Х
White-faced Meadowhawk	G5	S3S4				Х	
Zebra Clubtail	G4	S1				Х	

Geological Features

	Global	State	State	Proposed	Federal	Locat	tion
Common Name	Rank	Rank	Status	State Status	Status	McKean	Potter
Erosional Remnant	GNR	SNR				Х	
<i>Natural Communities</i> Common Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status	Locat McKean	tion Potter
Ephemeral/fluctuating Natural Pool	GNR	S3					Х
Hemlock Palustrine Forest	GNR	S3					Х
High-gradient Clearwater Creek	GNR	S3				Х	Х
White Pine Forest	GNR	SNR					Х

Basic Globa	l Rank	Codes	and	Definitions
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Rank Code	Description	Definition
GX	Presumed Extinct	Believed to be extinct throughout its range. Not located despite intensive searches of historic sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
GH	Possibly Extinct	Known from only historical occurrences. Still some hope of rediscovery.
G1	Critically Imperiled	Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000) or stream miles (<10).
G2	Imperiled	Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or stream miles (10 to 50).
G3	Vulnerable	Vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
G4	Apparently Secure	Uncommon but not rare, and usually widespread. Possibly cause for long-term concern. Typically more than 100 occurrences and more than 10,000 individuals.
G5	Secure	Common, typically widespread and abundant. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
G#G#	Range Rank	A numeric range rank (e.g., G2G3) is used to indicate uncertainty about the exact status of a taxon.
T	Infraspecific Taxon (trinomial)	The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A "T" subrank cannot imply the subspecies or variety is more abundant than the species= basic rank (e.g, a G1T2 subrank should not occur). A population (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T rank; in such cases a Q is used after the T rank to denote the taxon's questionable taxonomic status.

Global Rank Qualifiers

Qualifier	Description	Definition
?	Inexact Numeric Rank	Denotes inexact numeric rank.
Q	Questionable Taxonomy	Taxonomic status is questionable; numeric rank may change with taxonomy.
С	Captive or Cultivated Only	Taxon at present is extant only in captivity or cultivation, or as a reintroduced population not yet established.

State Rank Codes and Definitions

Rank Code	Description	Definition
SX	Extirpated	Element is believed to be extirpated from the "state" (or province or other subnational unit).
SH	Historical	Element occurred historically in the state (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would become SH without such a 20-year delay if the only known occurrences in a state were destroyed or if it had been extensively and unsuccessfully looked for. Upon verification of an extant occurrence, SH-ranked elements would typically receive an S1 rank. The SH rank should be reserved for elements for which some effort has been made to relocate occurrences, rather than simply ranking all Elements not known from verified extant occurrences with this rank.
S1	Critically Imperiled	Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically 5 or fewer occurrences or very few remaining
S2	Imperiled	Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. Typically 6 to 20 occurrences or few remaining individuals or acres.
S3	Vulnerable	Vulnerable in the state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically
S4	Apparently Secure	Uncommon but not rare, and usually widespread in the state. Usually more than 100 occurrences.
S5	Secure	Demonstrably widespread, abundant, and secure in the state, and essentially ineradicable under present conditions.
S?	Unranked	State rank is not yet assessed.
SU	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible, the most likely rank is assigned and a question mark added (e.g., S2?) to express uncertainty, or a range rank (e.g., S2S3) is used to delineate the limits (range) of uncertainty.

Rank Code	Description	Definition
S#S#	Range Rank	A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status of the Element. Ranges cannot skip more than one rank (e.g., SU should be used rather than S1S4).
HYB	Hybrid	Element represents an interspecific hybrid.
SE	Exotic	An exotic established in the state; may be native in nearby regions (e.g., house finch or catalpa in eastern U.S.).
SE#	Exotic Numeric	An exotic established in the state that has been assigned a numeric rank to indicate its status, as with S1 through S5.
SA	Accidental	Accidental or casual in the state (i.e., infrequent and outside usual range). Includes species (usually birds or butterflies) recorded once or only a few times. A few of these species may have bred on the one or two occasions they were recorded. Examples include European strays or western birds on the East Coast and vice-versa.
SZ	Zero Occurrences	Not of practical conservation concern in the state because there are no definable occurrences, although the taxon is native and appears regularly in the state. This rank will generally be used for long distance migrants whose occurrences during their migrations have little or no conservation value for the migrant as they are typically too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped, and protected. Typically, the SZ rank applies to a non-breeding population in the subnation for example, birds on migration. An SZ rank may in a few instances also apply to a breeding population, for example certain Lepidoptera which regularly die out every year with no significant return migration. Although the SZ rank typically applies to migrants, it should not be used indiscriminately. Just because a species is on migration does not mean it receives an SZ rank. SZ only applies when the migrants occur in an irregular, transitory, and dispersed manner.
SP	Potential	Potential that Element occurs in the state but no extant or historic occurrences reported.
SR	Reported	Element reported in the state but without a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the program hasn't yet received first-hand information; others are old, obscure reports.
SRF	Reported Falsely	Element erroneously reported in the state (e.g., misidentified specimen) and the error has persisted in the literature
SSYN	Synonym	Element reported as occurring in the state, but state does not recognize the taxon; therefore the Element is not ranked by the state.
*		S rank has been assigned and is under review. Contact the individual state Natural Heritage program for assigned rank.

State Rank Codes and Definitions (continued)

State Rank Codes and Definitions (continued)

Rank Code	Description	Definition
Not		Species is known to occur in this state. Contact the individual state
Provided		Natural Heritage program for assigned rank.

State Rank Qualifiers

Qualifier	Description	Definition
80	Breeding	Basic rank refers to the breeding population of the Element in the state.
N	Non-breeding	Basic rank refers to the non-breeding population of the Element in the
		state.
?	Inexact or Uncertain	Denotes inexact or uncertain numeric rank. For SE denotes uncertainty
		of exotic status. (The ? qualifies the character immediately preceding it
		in the SRANK.)
С	Captive or Cultivated	Element is presently extant in the state only in captivity or cultivation,
		or as a reintroduced population not yet established.
NOTE - A	breeding status subrank is	only used for species that have distinct breeding and/or non-breeding

Pennsylvania State Status - Invertebrates

Status	Description	Definition
Ν		No current legal status but is under review for future listing.

Pennsylvania Status Definitions - Plants

Status	Description	Definition
PE	Pennsylvania Endangered	Plant species which are in danger of extinction throughout most of their
		natural range within this Commonwealth, if critical habitat is not
		maintained or if the species is greatly exploited by man. This
		classification shall also include any populations of plant species that
		have been classified as Pennsylvania Extirpated, but which
		subsequently are found to exist in this Commonwealth.
PT	Pennsylvania Threatened	Plant species which may become endangered throughout most or all of
		their natural range within this Commonwealth, if critical habitat is not
		maintained to prevent their future decline, or if the species is greatly
		exploited by man.
PR	Pennsylvania Rare	Plant species, which are uncommon within this Commonwealth. All
		species of the native wild plants classified as Disjunct, Endemic, Limit
		of Range and Restricted are included within the Pennsylvania Rare
		classification.

Status	Description	Definition
PR	Disjunct	Significantly separated from their main area of distribution
	Endemic	Confined to a specialized habitat.
	Limit of Range	At or near the periphery of their natural distribution
	Restricted	Found in specialized habitats or habitats infrequent in Pennsylvania.
PX	Pennsylvania Extirpated	Plant species believed by the Department to be extinct within this
		Commonwealth. These plants may or may not be in existence outside
		the Commonwealth.
PV	Pennsylvania Vulnerable	Plant species which are in danger of population decline within
		Commonwealth because of their beauty, economic value, use as a
		cultivar, or other factors which indicate that persons may seek to
		remove these species from their native habitats.
TU	Tentatively Undetermined	A classification of plant species which are believed to be in danger of
		population decline, but which cannot presently be included within
		another classification due to taxanomic uncertainties, limited evidence
		within historical records, or insufficient data.
N		No current legal status exists, but is under review for future listing.

Pennsylvania Status Definitions - Plants (continued)

Pennsylvania State Status - Wild Birds and Mammals

Status	Description	Definition
PE	Pennsylvania Endangered	Species in imminent danger of extinction or extirpation throughout their
		range in Pennsylvania if the deleterious factors affecting them continue
		to operate. These are: 1) species whose numbers have already been
		reduced to a critically low level or whose habitat has been so drastically
		reduced or degraded that immediate action is required to prevent their
		extirpation from the Commonwealth; or 2) species whose extreme rarity
		or peripherality places them in potential danger of precipitous declines
		or sudden extirpation throughout their range in Pennsylvania; or 3)
		species that have been classified as "Pennsylvania Extirpated", but
		which are subsequently found to exist in Pennsylvania as long as the
		above conditions 1 or 2 are met; or 4) species determined to be
		"Endangered" pursuant to the Endangered Species Act of 1973, Public
		Law 93 205 (87 Stat. 884), as amended.

Status	Description	Definition
РТ	Pennsylvania Threatened	Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the organism are abated. These are: 1) species whose populations within the Commonwealth are decreasing or have been heavily depleted by adverse factors and while not actually endangered, are still in critical condition; 2) species whose populations may be relatively abundant in the Commonwealth but are under severe threat from serious adverse factors that have been identified and documented; or 3) species whose populations are rare or peripheral and in possible danger of severe decline throughout their range in Pennsylvania; or 4) species determined to be "Threatened" pursuant to the Endangered Species Act of 1973, Public Law 93205 (87 Stat. 884), as amended, that are not listed as "Pennsylvania Endangered".
Ν		No current legal status but is under review for future listing.

Pennsylvania State Status - Wild Birds and Mammals (continued)

Status	Description	Definition
PE	Pennsylvania Endangered	All species declared by: 1) the Secretary of the United States
		Department of the Interior to be threatened with extinction and appear
		on the Endangered Species List or the Native Endangered Species List
		published in the Federal Register; or 2) have been declared by the
		Pennsylvania Fish Commission, Executive Director to be threatened
		with extinction and appear on the Pennsylvania Endangered Species
		List published by the Pennsylvania Bulletin.
РТ	Pennsylvania Threatened	All species declared by: 1) the Secretary of the United States
		Department of the Interior to be in such small numbers throughout their
		range that they may become endangered if their environment worsens,
		and appear on a Threatened Species List published in the Federal
		Register; or 2) have been declared by the Pennsylvania Fish
		Commission Executive Director to be in such small numbers throughout
		their range that they may become endangered if their environment
		worsens and appear on the Pennsylvania Threatened Species List
		published in the Pennsylvania Bulletin.
PC		Animals that could become endangered or threatened in the future. All
		of these are uncommon, have restricted distribution or are at risk
		because of certain aspects of their biology.
Ν		No current legal status, but is under review for future listing.

Pennsylvania State Status - Fish, Amphibians, Reptiles, and Aquatic Organisms

Status	Description	Definition
<u>Status</u> PE	Description Pennsylvania Endangered	Definition Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania if the deleterious factors affecting them continue to operate. These are: 1) species whose numbers have already been reduced to a critically low level or whose habitat has been so drastically reduced or degraded that immediate action is required to prevent their extirpation from the Commonwealth; or 2) species whose extreme rarity or peripherality places them in potential danger of precipitous declines or sudden extirpation throughout their range in Pennsylvania; or 3) species that have been classified as "Pennsylvania Extirpated", but which are subsequently found to exist in Pennsylvania as long as the above conditions 1 or 2 are met; or 4) species determined to be "Endangered" pursuant to the Endangered Species Act of 1973, Public Law 93 205 (87 Stat, 884), as amended.
PT	Pennsylvania Threatened	Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the organism are abated. These are: 1) species whose populations within the Commonwealth are decreasing or have been heavily depleted by adverse factors and while not actually endangered, are still in critical condition; 2) species whose populations may be relatively abundant in the Commonwealth but are under severe threat from serious adverse factors that have been identified and documented; or 3) species whose populations are rare or peripheral and in possible danger of severe decline throughout their range in Pennsylvania; or 4) species determined to be "Threatened" pursuant to the Endangered Species Act of 1973, Public Law 93205 (87 Stat. 884), as amended, that are not listed as "Pennsylvania Endangered".
PR	Pennsylvania Rare Disjunct	Plant species which are uncommon within this Commonwealth. All species of the native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification. Significantly separated from their main area of distribution
	Endemic	Confined to a specialized habitat.
CD	Limit of Range	At or near the periphery of their natural distribution
CP	Candidate Proposed	(PBS) currently has substantial information on hand to support the biological appropriateness of proposing to list as Endangered or Threatened.
СА	Candidate at Risk	Species that although relatively abundant now are particularly vulnerable to certain types of exploitation or environmental modification.
CR	Candidate Rare	Species which exist only in one of a few restricted geographic areas or habitats within Pennsylvania, or they occur in low numbers over a relatively broad area of the Commonwealth.

Pennsylvania Biological Survey Suggested Status Definitions

Status	Description	Definition
CU	Condition Undetermined	Species for which there is insufficient data available to provide an
		adequate basis for their assignment to other classes or categories.
РХ	Pennsylvania Extirpated	Species that have disappeared from Pennsylvania since 1600 but still
		exist elsewhere.
DL	Delisted	Species which were once listed but are now cited for delisting.
N		No current legal status, but is under study for future listing.

Pennsylvania Biological Survey Suggested Status Definitions (continued)

Federal Status Codes and Definitions

Status	Description	Definition
LE	Listed Endangered	A species which is in danger of extinction throughout all or a significant portion of its range.
LT	Listed Threatened	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
LELT	Listed Endangered in part of range; listed Threatened in the remaining part.	
PE	Proposed Endangered	Taxa proposed to be listed as endangered.
PT	Proposed Threatened	Taxa proposed to be listed as threatened
PEPT		Proposed Endangered in part of range; proposed Threatened in the remaining part.
С	Candidate for listing.	
E(S/A)		Treat as Endangered because of similarity of appearance.
T(S/A)		Treat as Threatened because of similarity of appearance.
XE	Essential Experimental population	
XN	Nonessential Experimental population	
"xy"		Status varies for different populations or parts of range.
(mixed		
status)		
"x" NL		Status varies for different populations or parts of range with at least one part not listed.

Clas	s A Wild Trout Streams	Miles	Section Limits	Trout Fishery
Allegheny .	River			
Dingman	n Run	4	Headwaters to Mouth	Brown
Dwight (Creek	2.4	Headwaters to Mouth	Mixed
Mill Cre	ek	5.9	Bridge at Coudersport Country Club to mouth	Brown
Reed Ru	n	1.8	Confluence of Reed Run right fork downstream to	Brook
			mouth	

Allegheny Portage Creek

Allegheny Portage Creek	1.9	Brown Hollow to confluence with Scaffold Lick	Brown
		Run	

Oswayo Creek

Elevenmile Creek	4.5	Headwaters to Turkey Path Road	Brown
Oswayo Creek	5.5	Lower hatchery property line to confluence of	Brown
		Clara Creek	

Tunungwant Creek

Lewis Run	5	Headwater downstream to mouth	Brown
East Branch Tunungwant Creek	3	Confluence of Pigeon Run to main street	Brown
East Branch Tunungwant Creek	1	Bridge in Lewis Run downstream to 331 bridge at	Brown
		Howard	
East Branch Tunungwant Creek	3.5	Bridge at Howard to SR 4002 bridge	Brown

Approved Trout Waters

Allegheny River Headwaters to Route 155 bridge east of Port Allegany Allegheny River Headwaters to Route 155 bridge east of Port Allegany East Branch Fishing Creek Headwaters to mouth Fishing Creek Headwaters to mouth Unamed Tributary to Fishing Creek Headwaters to mouth Sartwell Creek Headwaters to mouth

Section Limits

Allegheny Portage Creek

Combs Creek	Headwaters to mouth
Skinner Creek	Headwaters to mouth

Potato Creek

Potato Creek	Marvin Creek to confluence of East Branch Potato Creek and Havens Run
Havens Run	Headwaters to mouth
West Branch Potato Creek	Headwaters to mouth
Brewer Run	Headwaters to mouth
Red Mill Brook	Headwaters to mouth
Marvin Creek	Headwaters to mouth
Hamlin Lake	Entire Reservoir

Approved Trout Waters	Section Limits
Oswayo Creek	
South Branch Oswayo Creek	Headwaters to mouth
Oswayo Creek	Clara Creek to Sharon Center Bridge
Elevenmile Creek	Turkey Path Road to mouth
Bell Run	Headwaters to mouth

Tunungwant Creek

Marilla Brook Reservoir	Entire Reservoir	

APPENDIX O. FUNDING SOURCES

Sponsoring Organization	Description / Restrictions	Contact
RMD		
State Conservation Commission-Dirt and	Available to local municipalities and state agencies for projects dealing with	www.pacd.org
Gravel Roads Maintenance	the BMPs for erosion and sedimentation control problems and fugitive dust in watersheds; dirt and gravel road jurisdiction required.	
Community		
Pittsburgh Foundation	Economic, community development and the environment. Activities that increase employment, build strong neighborhoods, and promote civic engagement by all segments of the population. Funds for quality of life.	www.pittsburghfoundation.org
Fnorav		
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	www.dep.state.pa.us
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	www.beldon.org
Ben & Jerry's Foundation	Grant applications need to demonstrate that the project will lead to environmental change, address the root causes of environmental problems, and must help ameliorate an unjust or destructive situation by empowering constituents and facilitating leadership	www.benjerry.com
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.	www.eddiebauer.com

Sponsoring Organization	Description / Restrictions	Contact
nvironmental (continued)		
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.	www.heinz.org
Raymond Proffitt Foundation	The foundation's purpose is to protect and restore the quality of the natural and human environment by informing and educating the general public about the impact of human endeavors upon the natural environment. The RPF strives to advance this understanding	www.rayproffitt.org
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.	www.surdna.org
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.	www.heinz.org
numerical/Watawahad		
EPA-Clean Water State Revolving Fund	May also contact: Beverly Reinhold (717) 783-6589. Infrastructure Investment Authority, Keystone Building 22 South Third Street, Harrisburg, PA 17101. email: breinhold@state.pa.us or Peter Slack, (717) 772-4054; DEP 400 Market Street Harrisburg PA 17105	(717) 772-4054
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.	www.pa.lwv.org/wren
River Network Watershed Assistance Grants	Watershed projects and group start-ups.	www.rivernetwork.org
Foundation for Pennsylvania Watersheds	Provides funding to grassroots organizations and watershed associations for specific watershed remediation in Pennsylvania.	

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Sponsoring Organization	Description / Restrictions	Contact
Environmental Education		
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.	www.turner.com/cpf
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	www.dep.state.pa.us
Education Mini Projects Program	Small grants for Pennsylvania-based grassroots educational projects that address non-point source watershed concepts.	(717) 236-1006
Emerson Charitable Trust	Strong emphasis on cultural aspects and youth education, also science and education.	(314) 553-3722
EPA Environmental Education Grants Region III	Grants awarded to small non-profit groups for various projects in Region III.	(215) 566-5546
National Environmental Education and Training Foundation	To increase environmental awareness, environmental education, partnerships, etc. May also be reached at (202) 261-6464. Proposal deadlines: Jan. 1, March 1, July 15, and Sept. 1	(202) 833-2933
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	www.pacd.org
Project Wild	Project Wild is an interdisciplinary supplementary environmental and conservation program for educators of children in grades K-12. Small grants only.	www.projectwild.org
The Dunn Foundation	Promote the issues of the negative effect that sprawl, visual pollution, and poorly planned development have on the visual environment of communities and the resulting loss of quality of life. Encourage dialogue within and between communities. Do not fund property acquisition, capital improvement projects, capital campaigns, endowments, individuals, religious groups, or political	www.dunnfoundation.org

Sponsoring Organization

Description / Restrictions

Contact

Environmental Education (continued)

The Pathways to Nature Conservation Fund	A partnership between the more than 270 Wild Birds Unlimited, Inc. franchises	www.nfwf.org
- National Fish and Wildlife Foundation	and the National Fish and Wildlife Foundation. The Pathways to Nature	
	Conservation Fund offers grants to enhance environmental education activities	
	and bird and wildlife viewing opportunities at significant sites.	
Water Resources Education Network -	Funding to develop education programs for water issues facing communities.	www.pa.lwv.org/wren
LWV	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	www.pa.lwv.org/wren
	protection or watershed education.	

Environmental Justice

EPA-Environmental Justice Small Grant	The program provides financial assistance to eligible affected local community-	(202) 564-0152
Program	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	www.ncf.org
	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	
	compaigns	
Norman Foundation	Support efforts that strengthen the ability of communities to determine their	www.normanfdn.org
	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	(717) 787-2316
	coldwater ecosystems, and for the development of watershed conservation	
	plans.	

Sponsoring Organization

Description / Restrictions

Contact

Environmental Planning (continued)

DEP Nonpoint Source Control	Grants for planning and non-point source pollution control projects.	(717) 787-5259
DCNR - Community Conservation	Available to organizations that conserve and enhance river resources. Planning	www.dcnr.state.pa.us
Partnership Program	grants are available to identify significant natural and cultural resources,	
	threats, concerns, and special opportunities, and the development of river	
NRCS Watershed Surveys and Planning	Providing assistance for planning in water and coordinated water and related	www.nrcs.usda.gov
	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	
lood Protection		
DEP Flood Protection Grant Program	Open to communities that need to perform non-routine maintenance or	(717) 787-7432
	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	
eneral		
Archer-Daniels-Midland Foundation	Proposals can be sent in letter form containing: 1) Description of the	www.admworld.com
	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	(412) 338-3466
	southwestern Pennsylvania and central New Hampshire.	
Eureka Company	No specific interest, but, general focus is on social services, health, and the	www.electrolux.se
	environment (wildlife, fisheries, habitat, and sustainable community	
	development)	
Henry Hillman Foundation	Preference is given to organizations in the Pittsburgh/southwestern	www.guidestar.org
	Pennsylvania area.	
Patagonia, Inc. Environmental Grants	Supports small grassroots organizations. Does not fund land acquisition.	www.patagonia.com
Program		

Sponsoring Organization	Description / Restrictions	Contact
General (continued)		
The Boeing Company	Provides contributions for capital campaigns, seed money (one-time grants) for	www.boeing.com/community
	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	www.efaw.org
	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	http://fdncenter.org/grantmaker
	protection in the northeastern region of the United States. Must have 501(c)3.	/prospecthill/
	The organization does not fund individuals, basic research, sectarian religious	
IS		
DEP-GIS Software Grant	The grants consist of the latest commercial release of ArcView GIS software;	www.dep.state.pa.us
	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	
labitat		
General Challenge Grant Program -Nation	al Requires non-federal match of 2:1. Address actions promoting fish and wildlife	www.nwf.org
Fish and Wildlife Foundation	conservation and habitat; should involve conservation and community interest;	
	leverage available funding and evaluate project outcomes.	
Keep the Wild Alive (KWA) Species	Fund on-the-ground projects that directly improve conditions for the	www.nwf.org/wildalive
Recovery Fund	endangered species highlighted in the KWA campaign. Current National	
j i i	Wildlife Federation employees are ineligible and applications must be	
	submitted in English	
Small Grants Program - National Fish and	Address priority actions promoting fish and wildlife conservation and the	www.nwf.org
Wildlife Foundation	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	

Sponsoring Organization	Description / Restrictions	Contact
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.	(202) 208-2836

Land Protection

DCNR Community Conservation	Conserve and enhance river resources by offering planning grants, technical	www.dcnr.state.pa.us
Partnership Program	assistance, implementation grants, development grants, and acquisition grants.	
Lowes Charitable Foundation	Environmental initiatives that support the continued enhancement of the	www.lowes.com
	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	http://michaeldfergusonfoundatio
	development.	n.com/
Nationals Parks Service - Land & Water	Provide federal grants for land acquisition and conservation to federal and state	(303) 969-2500
Conservation Fund	agencies.	
The Wilderness Society	To preserve wilderness and wildlife, protect America's prime forest, parks,	www.wilderness.org
	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	www.towncreekfdn.org
	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	

Sponsoring Organization	Description / Restrictions	Contact
oan		
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	www.envsc.org
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.	(717) 787-813
Iultiple		
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	www.commoncounsel.org/ pages/foundation.html

	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	www.scaife.com
	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 &	Fields of interest include education, social services, youth and child welfare,	(412) 234-1634
Educational Trust	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,	(214) 373-6039
	the environment, health, and social services.	
Ford Foundation	Interested in general/operating support, continuing support, endowment funds,	http://jefferson.village.virginia.
	program development, conferences/seminars, professorships, publication, seed	edu/readings/ford.html
	money, fellowships, internships, research, technical assistance, consulting	
	services and program-related investments	

Sponsoring Organization	Description / Restrictions	Contact
fultiple (continued)		
Max and Victoria Dreyfus Foundation	Consider support for museums, schools, educational and skill training projects,	(914) 682-2008
·	programs for youth, seniors, and the handicapped. Must be located in the U.S.	
National Fish and Wildlife Fund -Five Star	Projects must involve diverse partnerships of, ideally, five organizations that	www.nfwf.org
Restoration Challenge	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	www.nationalparks.org
	available change often. See the website for current funding opportunities.	
	Projects must connect with National Parks, be located on or next to National	
Native Plant Conservation Initiative -	Through this initiative, grants of federal dollars will be provided to non-profit	www.nfwf.org
National Fish and Wildlife Foundation	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	
Public Welfare Foundation	The Public Welfare Foundation supports organizations that address human	www.publicwelfare.org
	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	
Robert Shaw Charitable Foundation	Money to assist those organizations who work to enhance the educational,	(724) 832-7578
	health and welfare, cultural, youth development, social welfare, and	
	community development needs of the area. Only one grant per year will be	
Scaife Family Foundation	Grants awarded will support programs that strengthen families, address the	www.scaife.com
5 ••• •	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 Lawrence Foundation	The mission of The Lawrence Foundation is to make a difference in the world	wwwthelawrencefoundation.or
	by providing contributions and grants to organizations that are working to solve	
	pressing educational, environmental, health, and other issues.	

Sponsoring Organization	Description / Restrictions	Contact
Aultiple (continued)		
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	www.levinsonfoundation.org
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.	www.turnerfoundation.org
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	www.beneficiafoundation.org
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-	www.canaanvi.org
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	www.lindberghfoundation.org
Dana Corporation	Will consider funding air quality, environment, general, and water resources projects. Emphasis is given to areas where the corporation operates.	www.dana.com
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	www.homedepot.com
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	www.wajones.com

Sponsoring Organization

Description / Restrictions

Contact

Natural Resources (continued)

Leo Model Foundation	Grants for habitat conservation, watershed conservation, and species	(215) 546-8058
	preservation in the U.S.	
National Fish and Wildlife Fund Challenge	The foundation, in partnership with the NRCS and NACD (National	www.nfwf.org
Grants for Conservation	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	Grants to work with National Park Service to conserve land and river	(215) 597-1581
Program	resources, and provides funding for various projects dealing with the	
	conservation of these resources, including the development of trails and	
	oreenways	
The River Restoration - NOAA	Submittal by email whenever possible. Encourage contact to discuss project	www.amrivers.org/feature/
	prior to submitting application. Formal non-federal matches not required, but	restorationgrants.htm
	encouraged. Dam removal and fish passage. Available in northeast, Mid-	
	Atlantic and California	
The Watershed Protection and Flood	Plan development for natural resource concerns within a watershed area; cost	(717) 782-4429
Prevention Act	sharing available to carry out plan.	
The William C. Kenney Watershed	Protecting the remaining wild rivers of the west and ensuring the effectiveness	www.kenneyfdn.org
Protection Foundation	of small environmental organizations.	

Other

Charles Stewart Mott Foundation	The environmental program is devoted to reform of international lending and	www.mott.org
	trade policies. Projects must be part of a national demonstration when out of	
	the Flint. Michigan area.	
North American Fund for Environmental	Funds community based projects in Canada, Mexico and the U.S. to enhance	(514) 350-4357
Cooperation	regional co-operation, prevent environmental and trade disputes, and to	
PA DEP Brownfields Inventory	Grantees will be paid \$1,000 for each site registered into the PA Site finder.	(717) 783-7816
	Municipalities and economic development agencies may apply for the grant by	
	submitting an application.	
Retired and Senior Volunteer Program	Provides a variety of opportunities for people aged 55+ to volunteer in the	www.nationalservice.org/senior/i
(RSVP)	management of trails, rivers, and open space. Grants can be used for staff	ndex.html

Sponsoring Organization	Description / Restrictions	Contact
Plantings		
National 4-H Council	Grants are used to stimulate community tree planting and/or reforestation	www.fourhcouncil.edu
	projects. Awarded to communities in support of on-going community	
	planting/reforestation project or to stimulate new and creative youth-led	
	projects. Organization 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	www.kidsgardening.com
	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	(202) 720-8576
	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

Cinculation, Restoration		
Abandoned Mine Land Reclamation	Applications accepted anytime. Provides for the restoration of eligible lands	www.osmre.gov
Program - Office of Surface Mining	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	Must be a municipality, municipal authority or incorporated non-profit. AMD	(717) 787-7007
Mining and Reclamation	projects only.	
American Canoe Association CFS Grants	For grassroots organizations to improve waterways. Cleanups, riparian	www.acnet.org
	corridor, and water quality monitoring projects. Very flexible as long as it is	
	improving waterways and fish habitat. Can not be used to pay staff. However,	
	it can be used to pay a contractor. Must use volunteer help	
PA DEP - BAMR Abandoned Mine	Funds must be used for project development, design, construction, and directly	(814) 472-1800
Reclamation Grants	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	Supports on-the-ground habitat restoration projects that benefit native aquatic	www.nfwf.org
Wildlife Foundation	species in their historic range.	

Sponsoring Organization

Description / Restrictions

Foundation. These two groups share the common goals of actively pursuing the

protection, restoration and enhancement of fish and wildlife habitat, and developing creative and sustainable solutions to natural resource issues.

Contact

emediation/Restoration (continued)		
Community Foundation	Projects related to abandoned mine drainage remediation, alkaline discharges,	(814) 669-4847
	streambank preservation, removal of spoil piles, and other issues related to	
	water quality are of interest to the foundation's board of advisors.	
EPA - Nonpoint Source Implementation	Funds are provided to the state to carry out non-point source projects and	www.cfda.gov/static/p66460.htm
Grants	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	www.habitat.noaa.gov
Office of Surface Mining Clean Stream	This grant is used to treat AMD. Design and administration is covered but the	(717) 782-2285
Initiative	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	Provides assistance in an instance where a stream is posing a treat to structures,	(717) 783-7480
Reimbursements	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.	(814) 359-5158
Partnership with the U.S. Army Corps of	To foster cooperation on projects of mutual interest, such as fish and wildlife	www.nfwf.org
Engineers	habitat restoration, non-structural flood control opportunities, wetland	
	restoration, and endangered species protection.	
Pinellas County Environmental Foundation	A partnership between Pinellas County and the National Fish and Wildlife	www.nfwf.org

Re

National Fish and Wildlife Foundation

Sponsoring Organization	Description / Restrictions	Contact
Research		
Conservation & Research Foundation at	The conservation and enlightened use of the earth's resources to encourage	http://conservationresearch.word
Connecticut College	research to deepen the understanding of the intricate relationship between people and the environment. Will support higher education, individuals,	press.com/
	museums, non-profits, and research. Unsolicited proposals are not accepted; however, letters of inquiry including a budget may be sent.	
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	http://www.reeusda.gov/1700 /funding/ourfund.htm

Stormwater Management

<u> </u>			
	DEP Stormwater Management Program	Watershed planning for stormwater control and implementation of programs at	(717) 772-4048
		local levels.	

Streambank Fencing

Ducks Unlimited DA Stowardship	Provides strong incentives to lendowners to create wooded stream huffers	(014) 206 2450
Ducks Uninnited - PA Stewardship	Provides strong incentives to fandowners to create wooded stream burrers,	(814) 380-3438
Program	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	www.asafishing.org
	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	(724) 938-4215
	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	
	a a the second	
US Fish and Wildlife Service	Assists landowners in installation of high-tensile electric fence to exclude	www.fws.gov
	livestock from streams and wetlands. No buffer requirements.	

Sponsoring Organization	Description / Restrictions	Contact
Streambank Fencing		
USDA Conservation Reserve Program	Statewide costshare program for creating stream buffers. A 40 percent practice	Regional USDA office (see
	incentive as well as a \$10/acre incentive. Buffers of 35-180 feet per side of the	Appendix Q)
	stream. Land must have been pasture.	
USDA - Environmental Quality Incentives	A statewide program based on environmental problems. It addresses all	Regional USDA office (see
Program	environmental problems on a farm. They fund BMPs.	Appendix (0)
USDA Project Grass	A co-operative effort of local farmers, conservation districts, with assistance	Regional USDA office (see
	from USDA, to improve agriculture productivity in southwestern Pennsylvania.	Appendix Q)
	For local contacts see information brochure on file. Contact:	
	iames harrold@pasomerset fsc usda gov	
echnical Assistance		
Watershed Assistance Grants	Funding supports organizational development and capacity building for	www.rivernetwork.org
	watershed partnerships with diverse membership. Match requested but not	
	required. Non-profits, tribes, and local government only.	
Volunteers		
3M Foundation	3M sponsors a volunteer program called Community Action Retired Employee	www.mmm.com
	Service (CARES). Company favors projects that impact 3M communities.	
	Alternate Phone: 612-737-3061	
Vetlands		
U.S. Fish and Wildlife Service	For wetland Conservation projects. Must have 50 percent non-federal match in	www.fws.gov
	small-grant program with North American Wetlands Conservation Council.	
Wetlands Reserve Program USDA Natural	Restore and protect wetlands on private property; provide landowners with	Regional USDA office (see
Resources Conservation Service	financial incentives to enhance wetlands in exchange for retiring marginal	Appendix Q)

agricultural land

vation Plan
Conser
Watershed
Headwaters
River
Allegheny

APPENDIX P. USEFUL WEBSITES

Source	Data	Website
Project Area Characterisitics		
Bureau of Labor Statistics	Unemployment Rate	http://www.bls.gov/home.htm
Free Demographics	Population and Economic Data	http://www.freedemographics.com
Green Media Toolshed	Pollution in Your Community	http://www.scorecards.com
Natural Lands Trust	Conservation by Design	http://www.natlands.org
Pa. Department of Community and Economic Development	Zoning and Comprehensive Planning	http://www.elibrary.state.pa.us
Pa. Department of Education	School Report Cards	http://www.paprofiles.org
Smart Growth Partnership	Smart Growth	http://www.smartgrowth.org
United States Census Bureau	Population and Economic Data	http://www.census.gov

Land Resources

Conservation Reserve Enhancement Program	Conservation Practices	http://www.creppa.org
Natural Resources Conservation Service	Soil Characteristics	http://www.nrcs.usda.gov/technical/efotg
Pa. Department of Environmental Protection	Permits, Violations	http://www.dep.state.pa.us/efacts/default.asp
Pa. Geological Survey	Environmental Geology	http://www.dcnr.state.pa.us/topogeo/pub/environmental.aspx
Pa. Geological Survey	Geological Characteristics	http://www.dcnr.state.pa.us/topogeo/index.aspx
Pa. Geological Survey	Mineral Resources	http://www.dcnr.state.pa.us/topogeo/pub/mineral.aspx
Pa. Geological Survey	Environmental Geology for Land Use Planning	http://www.dcnr.state.pa.us/topogeo/education/landuse/landuseplan.aspx
Pa. Spatial Data Access (PASDA)	Geographic Information System Data	http://www.pasda.psu.edu/
United States Environmental Protection Agency	Brownfields	http://www.epa.gov/brownfields
United States Environmental Protection Agency	Superfund	http://www.epa.gov/superfund
United States Environmental Protection Agency - ECHO	Enforcement and Compliance History	http://www.epa-echo.gov/echo/
United States Environmental Protection Agency - Envirofacts	Federal Permits, Violations, Wastesites	http://www.epa.gov/enviro/

Water Resources

Center for Dirt & Gravel Road Studies		http://www.mri.psu.edu/centers/cdgrs/Index.html
Coldwater Heritage Partnership		http://www.coldwaterheritage.org/
Environmental Protection Agency	Surf Your Watershed	http://cfpub.epa.gov/surf/huc.cfm?huc_code=05030105
Federal Emergency Management Agency	National Flood Insurance Program	http://www.fema.gov/business/nfip/

Source	Data	Website
Vater Resources (continued)		
Keystone Chapter Soil and Water Conservation Society		http://www.keystoneswcs.com/index.html
League of Women Voters	Groundwater Primer for Pa.ns	http://pa.lwv.org/wren/pubs/primer.html
Pa. American Water		http://www.amwater.com/awpr1/paaw/default.html
Pa. Department of Environmental Protection	Stormwater Management Program	http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1437&Q=518 682&PM=1
Pa. Department of Environmental Protection	Water Resources Plan	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/WaterResources/ docs/WaterResourcesExecutiveSummary.htm
Pa. Department of Environmental Protection	Watershed Management	http://www.depweb.state.pa.us/watershedmgmt/site/default.asp
Pa. Department of Environmental Protection	State Water Planning Resource Center	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/act220/default.htm
Pa. Fish and Boat Commission	Wild Trout Waters	http://www.fish.state.pa.us/classa98.htm
Pa. Geological Survey:	Water Resources Reports	http://www.dcnr.state.pa.us/topogeo/groundwater/gwlist.aspx
Pa. Geological Survey:	Geology of Groundwater in Pa.	http://www.dcnr.state.pa.us/topoeo/education/es3.pdf
Pa. Geological Survey:	Hydrogeologic and well-construction characteristics of the rocks of Pa.	http://www.dcnr.state.pa.us/topogeo/pub/w69recent.aspx
Pa. Geological Survey:	Pa. Groundwater Information System	http://www.dcnr.state.pa.us/topogeo/groundwater/PaGWIS/PaGWISMenu.asp? c=t
Pa. Trout	Wilderness Trout Streams	http://www.patrout.org/wildernesstroutstreams.htm
Stroud Water Research Center		http://www.stroudcenter.org/
U.S. Geological Survey	Water Resources Links	http://water.usgs.gov/lookup/getwatershed?05030105
United States Environmental Protection Agency	Water Quality Trading	http://www.epa.gov/owow/watershed/trading.htm
University of Pittsburgh	Regional Water Management Task Force	http://www.iop.pitt.edu/water/index.htm

Biological Resources Biodiversity

Ecological Society of America	

Ecological Society of America	Biodiversity	http://www.esa.org/
NatureServe	Biodiversity	http://www.natureserve.org/
Pa. Biodiversity Partnership	Biodiversity	http://www.pabiodiversity.org/index.html
Pa. Biological Survey (PABS)	Biodiversity	http://alpha.dickinson.edu/prorg/pabs/index.htm
Pa. GAP Analysis Project	Biodiversity	http://www.orser.psu.edu/PAGAP/gappage.htm
Source	Data	Website
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Biological Resources (continued)		
Invasive Species		
Aquatic Invasive Species of Pa.	Invasive Species	http://www.pserie.psu.edu/seagrant/ais/
Common Invasive Plant in Riparian Areas	Invasive Species	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/streamreleaf/Doc s/Invasive%20Plants.pdf
Invasive Plants of Pa.	Invasive Species	http://www.dcnr.state.pa.us/forestry/wildplant/invasive.aspx
Invasive Plants of the Eastern United States	Plant Invaders of Mid-Atlantic Natural Areas	http://www.invasive.org/castern/midatlantic/intro.html
Invasive Species	Invasive Species	www.invasive.org
Invasive Species in Pa.	Invasive Species	http://www.biodiversitypartners.org/invasive/factsheets/PA.pdf
Mid-Atlantic Exotic Pest Plant Council		http://www.ma-eppc.org/
U.S. Department of Agriculture:	National Agricultural Library – Pa. Invasive Species Resources	http://www.invasivespeciesinfo.gov/unitedstates/pa.shtml
Native Plants and Landscaping		
American Chestnut Foundation	Pa. Chapter	www.patacf.org
Arbor Day Foundation	Backyard Woods	http://www.arborday.org/backyardwoods/guide.cfm
Arbor Day Foundation	Tree City U.S.A.	http://www.arborday.org/programs/treeCityUSA.cfm
Carnegie Library of Pittsburgh	Books on Native Plants	http://www.carnegielibrary.org/subject/gardening/nativeplants.html
Ernst Conservation Seeds	Native Plant Sales and Landscaping Information	www.ernstseed.com
Da Danartment of Concernation and Natural Decources	Da Community Forests	httn://www.donr.stata.na.us/forestrv/musfo/

American Chestnut Foundation	Pa. Chapter	www.patact.org
Arbor Day Foundation	Backyard Woods	http://www.arborday.org/backyardwoods/guide.cfm
Arbor Day Foundation	Tree City U.S.A.	http://www.arborday.org/programs/treeCityUSA.cfm
Carnegie Library of Pittsburgh	Books on Native Plants	http://www.carnegielibrary.org/subject/gardening/nativeplants.html
Ernst Conservation Seeds	Native Plant Sales and Landscaping Information	www.ernstseed.com
Pa. Department of Conservation and Natural Resources	Pa. Community Forests	http://www.dcnr.state.pa.us/forestry/pucfc/
Pa. Flora Database		http://www.paflora.org/Web3/Speciesbywatershed_search_form.asp
Pa. Native Plant Society	Useful Links and Information Regarding Native Plants	http://www.pawildflower.org/04_links/links.htm
Sylvania Natives	Native Plant Sales	www.sylvanianatives.com
U.S. Department of Energy	Energy Efficient Landscaping	http://www.eere.energy.gov/consumer/your_home/landscaping/index.cfm/myto pic=11910
Western Pa. Audubon Society	List of plants native to Allegheny County and surrounding region	http://www.aswp.org/files/allegheny_county_Panative_plants_aswp.pdf
Pa. Invertebrate Biodiversity Project		http://www.ento.psu.edu/home/frost/pinbiop/about.html
Pa. Natural Heritage Program		http://www.naturalheritage.state.pa.us/
U.S. Environmental Protection Agency	Ecoregions	http://www.epa.gov/wed/pages/ecoregions/reg3_eco.htm

Website

Source	Data	Website
Biological Resources (continued)		
Wildlife		
Animal Rescue League of Western Pa.	Wildlife Rehabilitation	http://www.pawildlifecenter.org/about-pwc.htm
Audubon Society	Important Bird Areas	http://pa.audubon.org/iba/maps.html
Carnegie Museum of Natural History	2nd Pa. Breeding Bird Atlas	http://www.carnegiemnh.org/atlas/about_book.htm
Carnegie Museum of Natural History	Pa. Mammals	http://www.carnegiennh.org/mammals/index.html
Field Guides		http://www.enature.com/fieldguides/index.asp
National Biological Information Infrastructure		http://www.nbii.gov/portal/server.pt
National Wildlife Federation		http://www.nwf.org/nationalwildlife/article.cfm?articleid=292&issueid=31
North American Pollinator Protection Campaign		http://www.nappc.org/
Pa. Audubon		http://pa.audubon.org/
Pa. Biological Survey	Important Mammal Areas	http://www.pawildlife.org/imap.htm
Pa. Department of Conservation and Natural Resources	Endangered and Threatened Species of Pa.	http://www.dcnr.state.pa.us/wrcf/contents.aspx
Pa. Fish and Boat Commission	Pa. Fishes	http://www.fish.state.pa.us/pafish/fishhtms/chapindx.htm
Pa. Wildlife Federation		http://www.pawildlife.org/
Species Profiles		http://www.fcps.edu/StratfordLandingES/Ecology/mpages/organism_menu.htm
The Wildlife Society		http://joomla.wildlife.org/?CFID=13824013&CFTOKEN=85052420
Wildbird Recovery	Songbird Rehabilitation Center	http://www.stormpages.com/wildbird/index.html
Cultural Resources		
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National Parks Service	National Register of Historic Places	http://www.nps.gov/history/nr/research/nris.htm
PA Roots	Historical Information	http://www.pa-roots.com/
Pa. Department of Education	Environment and Ecology Standards	http://www.pde.state.pa.us/k12/lib/k12/envec.pdf
Pa. Fish and Boat Commission	Fishing Regulations	http://www.fish.state.pa.us/regs_fish.htm

Appendix Q. Resource Guide

Conservation Groups

Alleghany Archery

22 Miller Lane Smethport, PA 16749 Phone: 814-887-5333

Allegheny Defense Project

117 West Wood Lane Kane, PA 16735 Phone: 814-221-1408

Allegheny Mountain Arrow Woods

106 Cherry Springs Road Coudersport, PA 16915 Phone: 814-274-2282

Allegheny Outdoors

509 Seaward Avenue Bradford, PA 16701 Phone: 814-368-8608

Allegheny Outdoor Club/Tuna Valley

Trail Association 1279 High Street Bradford, PA 16701 Phone: 814-368-6728

Black Forest Conservation Association

391 Nelson Run Lane Coudersport, PA 16915 Phone: 814-274-0424 Website: www.pottercountybfca.com

Canoe Place Fish & Game Club 311 E Arnold Ave Apt 1

Port Allegany, PA 16743 Phone: 814-642-7522

Coudersport Aboretum Committee Coudersport, PA16915 Phone: 814-274-8769

Eldred Conservation Club Barden Brook Road Eldred, PA 16731 Phone: 814-225-4924

Forestry Consultant

46 Tennessee Avenue Coudersport, PA 16915 Phone: 814-274-8561

God's Country Trout Unlimited

Duquesne University P.O. Box 421 443 West Branch Fishing Creek Road Roulette, PA 16746 Phone: 814-544-7174

Keating Sportsman Club

9737 Route 46 Smethport, PA 16749 Phone: 814-887-2271

Kinzua Valley Trail Association and Friends of Allegheny Wilderness

P.O. Box 407 Lewis Run, PA 16738 Phone: 724-456-3847

McKean County Conservation District

17137 Route 6 Smethport, PA 16749 Phone: 814-887-4003

Mount Jewett Sportsman Club RR 1

Division Street Extension Mount Jewett, PA 16740 Phone: 814-778-7323

North Central Forest Landowners Association 1550 East Second Street

Coudersport, PA 16915

Penn State Cooperative Extension P.O. Box 1504 Smethport, PA 16749 Phone: 814-887-5613

Potter County Bird Club 115 North Main Street Coudersport, PA 16915 Phone: 814-274-9825

Conservation Groups (continued)

Potter County Conservation District

107 Market Street Coudersport, PA 16915 Phone: 814-274-8411 Website: <u>www.pottercd.com</u>

Rainbow Paradise Trout Farm

1660 East Second Street Route 6 East Coudersport, PA 1691 Phone: 814-274-8309

Ruffed Grouse Society Allegheny Chapter

1016 Long Level Road Johnsonburg, PA 15845 Phone: 814-512-2101

Seneca Chapter Trout Unlimited

36 Hamilton Run Road Port Allegany, PA 16743 Phone: 814-642-9155

Seneca Nation

P.O. Box 231 Salamanca, NY 14779 Phone: 716-945-1790

Sierra Club, Pennsylvania Chapter

P.O. Box 663 Harrisburg, PA 17108 Phone: 717-232-0101 Website: www.pennsylvania.sierraclub.org

Smethport Borough; Potato Creek Trail Association

201 West Main Street Smethport, PA 16749 Phone: 814-887-5815

Tiadaghton Audubon Society (Tioga & Potter Counties) P.O. Box 605 Wellsboro, PA 16901

Tuna Valley Trail Association P.O. Box 1003 Bradford, PA 16701

Upper Allegheny Watershed Association P.O. Box 89 Roulette, PA 16746 Phone: 814-544-7365

Western Pennsylvania Conservancy

159 Main Street Ridgway, PA 15853 Phone: 814-776-1114

Wildflower Weekends

2912 Hickox/Ulysses Road Genesee, PA 16923 Phone: 814-848-9905

Historical Societies

Allegheny Arms and Armor Museum 505 ½ West Main Street Smethport, PA 16749

Phone: 814-887-0947

Bradford Landmark Society

45 East Corydon Street Bradford, PA 16701 Phone: 814-362-3906

Eldred World War II Museum

201 Main Street; P.O. Box 273 Eldred, PA 16731 Phone: 814-225-2220

McKean County Historical Society

502 West King Street Smethport, PA 16749 Phone: 814-887-5142

Potter County Historical Society

308 N Main Street Coudersport, PA 16915 Phone: 814-274-8124

Seneca Iroquis National Museum

814 Broad Street Salamanca, NY 14779 Phone: 716-945-1738

Smethport Memorial Recreation Center 100 West Willow Street Smethport, PA 16749 Phone: 814-887-5790

Historical Societies (continued)

Smethport Visitors Center 119 West Main Street Smethport, PA 16749

Zippo Case Museum 1932 Zippo Drive Bradford, PA 16701

Regional Planning Commissions

Northcentral Regional Planning and Development Commission 651 Montmorenci Road Ridgway, PA 15853 Phone: 814-773-3162 http://web2.ncentral.com/ncentral/index.html

State Agencies

DCNR/Bureau of Forestry

P.O. Box 673 3150 East Second Street (Denton Hill) Coudersport, PA 16915 Phone: 814-274-3600

DCNR – Region 4 – Northcentral – Williamsport Regional Office

330 Pine Street Suite 400 Williamsport, PA 17701 Phone: 570-326-3521

DCNR – Region 6 – Northwest – Erie Regional Office

230 Chestnut Street Meadville, PA 16335-3481 Phone: 814-332-6190

Department of Environmental Protection (DEP) Headquarters

Rachel Carson State Office Building 400 Market Street Harrisburg, PA 17101 Phone: 717-783-2300 Website: <u>www.dep.state.pa.us</u>

PA DCNR Bureau of Forestry

P.O. Box 673 Coudersport, PA 16915 Phone: 814-274-3600

Old Red Schoolhouse Wildlife and Nature Center Route 44 Shinglehouse, PA 16748

PA Department of Conservation and Natural Resources

Rachel Carson State Office Building 6th Floor, P.O. Box 8475 Harrisburg, PA 17105-8475

PA Fish and Boat Commission

P.O. Box 71 Smethport, PA 16749 Phone: 814-359-5250

PA Game Commission

466 Bloomster Road Smethport, PA 16749 Phone: 814-887-7739

PA Geological Survey

3240 Schoolhouse Road Middletown, PA 17057-3534 Phone: 717-702-2045

PA Senate

315 Second Avenue Suite 203 Warren, PA 16365 Phone: 814-726-7201

PA State Conservation Commission

2301 North Cameron Street Harrisburg, PA 17110 Phone: 717-787-8821 Fax: 717-705-3778 Website: <u>www.pascc.state.pa.us</u>

State Agencies (continued)

Pennsylvania Department of Education

333 Market Street Harrisburg, PA 17126 Phone: 717-783-6788 Website: <u>www.pde.state.pa.us/</u>

PA Department of Emergency

Management Eastern Area Office Hamburg Center Hamburg, PA 19526 Phone: 610 562-3003 Fax: 610 562-7222 Website: <u>www.pema.state.pa.us/</u>

PA Department of Labor and Industry

Room 1700 651 Boas Street Harrisburg, PA 17121 Phone: 717-787-5279 Website: <u>www.dli.state.pa.us/</u>

PA Department of Community and

Economic Development 400 Forum Building Room 357 Harrisburg, PA 17120 Phone: 717-783-8950 Website: <u>http://www.dced.state.pa.us/</u>

PA Department of Health

Health & Welfare Building 7th & Forster Streets Harrisburg, PA 17120 Phone: 1-877-PA-HEALTH Website: www.portal.state.pa.us/portal/server.../depar tment_of_health.../17457

PA Historical and Museum Commission

State Museum Building 300 North Street Harrisburg, PA 17120 Phone: 717-787-3362 Fax: 717-783-9924 Website: <u>www.phmc.state.pa.us/</u>

PennVEST

22 S. Third Street Harrisburg, PA 17101 Phone: 717-783-6798 Website: www.portal.state.pa.us/portal/server.pt/.../pe nnvest/9242

Susquehannock State Forest

P.O. Box 673 Coudersport, PA 16915 Phone: 814-274-3600

State Legislators

(Legislators in office 2010; see General Assembly website: www.legis.state.pa.us for current information)

House of Representatives - District 67 Hon. Martin T. Causer

107 South Main Street Room 1 Coudersport, PA 16915 Phone: 814-274-3631 Fax: 814-274-8159 Website: <u>http://www.repcauser.com</u>

House of Representatives - District 65 Hon. Kathy L. Rapp

404 Market Street Warren, PA 16365 Phone: 814-723-5203 Fax: 814-728-3564 Website: <u>http://www.reprapp.com</u>

Federal Agencies

Environmental Protection Agency (EPA) EPA Region 3 Regional Office 1650 Arch Street Philadelphia, PA 19103 Phone: 1-800-438-2474 Website: www.epa.gov

United States Army Corps of Engineers Baltimore District P.O. Box 1715 Baltimore, MD 21203-1715 Phone: 410-962-7608 Website http://www.nab.usace.army.mil/

Federal Agencies (continued)

United States Department of Energy

Pennsylvania Public Utility Commission Commonwealth Keystone Building 400 North Street P.O. Box 3265 Harrisburg, PA 17105 Website: www.puc.state.pa.us

United States Department of Energy National Energy Technology Laboratory

Pittsburgh Research Center 626 Cochrans Mill Road, P.O. Box 10940 Pittsburgh, PA 15236 Phone: 412-386-6569 Fax: 412-386-5917 Website: www.netl.doe.gov

United States Fish and Wildlife Service Pennsylvania Field Office

315 South Allen Street, Suite 322 State College, PA 16801 Phone: 814-234-4090 Fax: 814-234-0748 Website: www.fws.gov

U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) – Pennsylvania Wildlife Services P.O. Box 60827 Harrisburg, PA 17106

Phone: 717-236-9451 Website: www.aphis.usda.gov/wildlife_damage

USDA Farm Service Agency

Potter County Farm Service Agency 105 Market Street Coudersport, PA 16915 Phone: 814-274-8522 Website: <u>www.fsa.usda.gov</u>

USDA Farm Service Agency

Pennsylvania State Farm Service Agency 1 Credit Union Place Harrisburg, PA 17110 Phone: 717-237-2117 Website: <u>www.fsa.usda.gov</u>

USDA Natural Resources Conservation Service (NRCS) Pennsylvania State Office

One Credit Union Place, Suite 340 Harrisburg, PA 17110 Phone: 717-237-2100 Fax: 717-237-2238 Website: www.pa.nrcs.usda.gov

USDA-NRCS Coudersport Field Office

(**Potter and McKean County**) 105 Market Street Coudersport, PA 16915 Phone: 814-274-8166

USDA-NRCS Soil Survey Office

216 Spring Run Road Mill Hall, PA 17751 Phone: 570-726-3196 ext. 122

U.S. Forest Service Ranger Station

29 Forest Service Dr. Bradford, PA 16701 Phone: 814-362-4613

U.S. Forest Service-Allegheny National Forest 4 Farm Colony Drive

Warren, PA 16365 Phone: 814-728-6168

McKean County

Annin Township

P.O. Box 143 Turtlepoint, PA 16750 Phone: 814-642-7959

Bradford City

24 Kennedy Street Bradford, PA 16701 Phone: 814-362-3884 ext:11

Bradford Township

136 Hemlock Street Bradford, PA 16701 Phone: 814-368-3564

Ceres Township 12 Barbertown Road Shinglehouse, PA 16748 Phone: 814-697-6948

McKean County (continued)

Eldred Borough

3 South Bennett Street Eldred, PA 16731 Phone: 814-225-4777

Eldred Township

1834 West Eldred Road Eldred, PA 16731 Phone: 814-225-4704

Foster Township

1185 East Main Street Bradford, PA 16701 Phone: 814-362-4656

Hamlin Township

22 Park Road Kane, PA 16735 Phone: 814-778-5855

Keating Township

7160 Route 46 Ease Smethport, PA 16730 Phone: 814-887-9921

Lafayette Township

7534 Route 59 Lewis Run, PA 16738 Phone: 814-368-5030

Lewis Run Borough

P.O. Box 265 Lewis Run, PA 16738 Phone: 814-368-5030

Liberty Township

Portage Road Port Allegany, PA 16743 Phone: 814-642-2445

McKean County Commissioners

McKean County Commissioners 500 W. Main Street Smethport, PA 16749 Phone: 814.887.3200

McKean County Conservation District

17137 Route 6 Smethport, PA 16749 Phone: 814-887-4001

McKean County Recycling Program

Recycling Coordinator 17137 Route 6 Smethport, PA 16749 Phone: 814.887.4004

McKean County Planning Commission 17137 Route 6 Smethport, PA 16749 Phone: 814-887-2754

Mount Jewett Borough P.O. Box 7215 Mount Jewett, PA 16740

Phone: 814-778-5701 Norwich Township 3853 West Valley Road

3853 West Valley Road Smethport, PA 16749 Phone: 814-887-2732

Otto Township

695 Main Street Duke Center, PA 16729 Phone: 814-966-3553

Port Allegany Borough

45 West Maple Street Port Allegany, PA 16743 Phone: 814-642-2526

Sergeant Township

126 Circle Drive Mt. Jewell, PA 16740 Phone: 814-778-5525

Smethport Borough

201 West Main Street Smethport, PA 16749 Phone: 814-887-5815

Potter County

Alleghany Township

92 Cobb Hill Road Genesee, PA 16923 Phone: 814-848-5030

Clara Township

621 Clara Road Shinglehouse, PA 16748 Phone: 814-698-2217

Coudersport Borough

201 South West Street Coudersport, PA 16915 Phone: 814-274-9776

Eulalia Township

1160 East Second Street Coudersport, PA 16915 Phone: 814-274-8102

Genesee Township

120 Hickox Road Genesee, PA 16923 Phone: 814- 228-3366

Hebron Township

786 Baker Creek Road Coudersport, PA 16915 Phone: 814-274-7306

Hebron Township Supervisor

1854 SR 44 Shinglehouse, PA 16748 Phone: 814-698-2140

Homer Township

348 Southwoods Road Coudersport, PA 16915 Phone: 814-274-7629

Keating Township

P. O. Box 385 Austin, PA 16720 Phone: 814-642-2291

Oswayo Borough

115 Rumsey Street Oswayo, PA 16915 Phone: 814-698-2665

Oswayo Township

Eleven Mile Road Shinglehouse, PA 16748 Phone: 814-698-2745

Pleasant Valley Township

2324 Startwell Creek Road Port Allegany, PA 16743 Phone: 814-544-8892

Potter County Conservation District 107 Market Street

Coudersport, PA 16915 Phone: 814-274-8411 Website: <u>www.pottercd.com</u>

Potter County Planning Commission

24 Maple View Lane Coudersport, PA 16915 Phone: 814-274-8254

Commissioners Office of Potter County

Gunzburger Building One North Main Street Coudersport, PA 16915 Phone: 814-274-8290

Roulette Township

80 Railroad Avenue P.O. Box 253 Roulette, PA 16746 Phone: 814-544-7549

Sharon Township

RD 1 Box 96 Shinglehouse, PA 16748 Phone: 814-697-7316

Shinglehouse Borough

P.O. Box 156 Shinglehouse, PA 16748 Phone: 814-697-6711

Summit Township

3401 Big Moores Run Road Austin, PA 16720 Phone: 814-647-4381

Potter County (continued)

Sweden Township

121 Faith Street Coudersport, PA 16915 Phone: 814-274-8829

Tourism Promotion Agencies

Allegheny Recreational Rentals, LLC/Bottorf Embroidery 217 W. Washington St Bradford, PA 16701

Phone: 814-817-1283

Allegheny River Campground 1737 Route 6 W.

Roulette, PA 16746 Phone: 814-544-8844

Beechwood Camp

Brizze Hollow Shinglehouse, PA 16748 Phone: 814-698-2336

Black Bear Campground

4930 Route 59 Lewis Run, PA 16738 Phone: 814-362-1394

Bradford Creative and Performing Arts Center

P.O. Box 153 10 Marilyn Horn Way Bradford, PA 16701 Phone: 814-362-2522

Coudersport Country Club 839 Cherry Spring Road Coudersport, PA 16915 Phone: 814-274-9122

God's Country Visitors Association

118 North Main Street P.O. Box 245 Coudersport, PA 16915 Phone: 814-274-3365 Fax: 814-274-4334 Website: www.pottercountypa.org

Hemlock Springs

P.O. Box 421 Port Allegany, PA 16743 Phone: 814-545-1205 Website: www.hemlockscenter.org

Indian Echo Country Club Inc.

41 Indian Echo Drive Port Allegany, PA 16743 Phone: 814-642-7544

Kinzua East KOA Campground Kinzua Heights Bradford, PA 16701 Phone: 814-368-3662

Northcentral Regional Planning and Development Commission 651 Montmorenci Road

Ridgway, PA 15853 Phone: 814-773-3162 Website: web2.ncentral.com

Old Tee Pee Campground

RD 1 Box 255e Roulette, PA 16746 Phone: 814-544-7324

PA Route 6 Tourist Association

20 Bridge Street P.O. Box 180 Galeton, PA 16922 Phone: 814-435-7706

Penn Brad Oil Museum

50 Parkway Lane Bradford, PA 16701 Phone: 814-362-1955

Potter County Family Campground 3075 East Second Street

Coudersport, PA 16915 Phone: 814-274-5010

Potter County Snowmobile Association

P.O. Box 82 Coudersport, PA 16915 Phone: 814-274-9639

<u>Tourism Promotion Agencies</u> (continued)

Potter County Visitors Association

118 North Main Street P.O. Box 245 Coudersport, PA 16915 Phone: 814-274-3365

Saint Marys Area Chamber of Commerce

53 South Saint Marys Street Saint Marys, PA 15857 Phone: 814-781-3804 Fax: 814-781-7302

Seneca Highlands Snowmobile Club

361 Hamlin Street Smethport, PA 16749

Smethport Country Club 13065 Route 59 Smethport, PA 16749

Phone: 814-887-5641

Sunset Vue Campground

140 Sunset Vue Dr. Smethport, PA 16749 Phone: 814-887-2527

The Center for Rural Pennsylvania

625 Forster Street Harrisburg, PA 17120 Phone: 717-787-95553 Fax: 717-772-3587 Website: <u>www.ruralpa.org</u>

The Inn on Maple Street

115 East Maple Street Port Allegany, PA 16743 Phone: 814-642-5171

Willow Bay Campground

4001 West Washington Street Bradford, PA 16701 Phone: 814-368-4158

Woodhaven Campgrounds

3295 Route 59 Bradford, PA 16701 Phone: 814-368-6806

Schools

Austin Elementary School District

138 Costello Avenue Austin, PA 16720 Phone: 814-647-8603

Bradford Area High School

81 Interstate Parkway Bradford, PA 16701 Phone: 814-362-3845

Coudersport Area Junior & Senior High School 698 Dwight Street Coudersport, PA 16915 Phone: 814-274-8500

Coudersport Elementary School

802 Vine Street Coudersport, PA 16915 Phone: 814-274-8055

Floyd C Fretz Middle School

140 Lorana Avenue Bradford, PA 16701 Phone: 814-362-3508

George G. Blaisdell Elementary

265 Constitution Avenue Bradford, PA 16701 Phone: 814-362-6834

Oswayo Valley School District

277 South Oswayo Street Shinglehouse, PA 16748 Phone: 814-697-7175

Otto-Eldred School District

143 Sweitzer Drive Duke Center, PA 16729 Phone: 814-966-3214

Port Allegany Junior & Senior High School 20 Oak Street Port Allegany, PA 16743

Port Allegany, PA 16743 Phone: 814-642-2544

Schools (continued)

School Street Elementary

76 School Street Bradford, PA 16701 Phone: 814-368-3183

Smethport Elementary

414 South Mechanic Street Smethport, PA 16749 Phone: 814-887-5012

Smethport High School

412 South Mechanic Street Smethport, PA 16749 Phone: 814-887-5545

University of Pittsburgh at Bradford

300 Campus Drive Bradford, PA 16701 Phone: 814-362-7500

Media/Outreach

Black Forest Broadcasting 13 Atkins Road Roulette, PA 16746

Endeavor Media

P.O. Box 87 Coudersport, PA 16915

WBRR - FM Cool 100

1490 Saint Francis Drive P.O. Box 545 Bradford, PA 16701 Phone: 814-368-4141

WESB Inc. News Radio

1490 Saint Francis Drive P.O. Box 545 Bradford, PA 16701 Phone: 814-368-4141

WFRM Radio

9 South Main Street Coudersport, PA 16915 Phone: 814-274-8600

WPIG Radio

3163 NYSRT 417 Olean, NY 14760 Phone: 716-372-0161

WQRM

211 West Main Street Smethport, PA 16749 Phone: 814-887-1977

Zito Media

611 Vader Hill Road Coudersport, PA 16915 Phone: 814-260-9575

	APPENDIX R. NA	ATIV	/E P	LA	NT (JUL	DE												
Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
balsam fir	Abies balsamea																Х		
fraser fir	Abies fraseri																X		
box-elder	Acer negundo	X	X		X			X				X	X						
Norway maple	Acer platanoides																Х		
red maple	Acer rubrum				X											Χ	Х		
silver maple	Acer saccharinum		X	X		Χ	Χ		X			Χ							
sugar maple	Acer saccharum										Χ				X				
mountain maple	Acer spicatum			X	X	X		X	Χ		X		X						
maple	Acer spp											X					Х		
common yarrow	Achillea millefolium				X														
monkshood	Aconitum uncinatum										X								
sweetflag	Acorus americanus	X			X											X			
doll's eyes, white bugbane, white baneberry	Actaea pachypoda		X		X	X						X							
black cohosh, black bugbane, black	Actaea racemosa											X	X			X			
red baneberry	Actaea rubra									X									
northern maidenhair fern, maidenhair fern	Adiantum pedatum				X														
bottlebrush buckeye	Aesculus parviflora				X														
red buckeye, buckeye	Aesculus pavia	X			X	X				X			X	X		X			
false foxglove	Agalinis purpurea											X	Χ						

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
blue giant hyssop, anise hyssop	Agastache foeniculum	X			X							X		X					
yellow giant hyssop	Agastache nepetoides		X																
giant purple hyssop	Agastache scrophulariifolia	X			X			X					X	X	X	X			
white snakeroot	Ageratina altissima												X					\square	
small agrimony	Agrimonia parviflora				Х	X					X					X		\square	
red top	Agrostis alba	X			Х													\square	
hollyhock	Alcea rosea																Х	\square	
northern water plantain	Alisma triviale												X					\square	
nodding onion, wild onion/leek	Allium cernuum									Χ								\square	Χ
ramps, wild leeks	Allium tricoccum												Χ					\square	
speckled alder	Alnus rugosa									Χ							Х	\square	
smooth alder	Alnus serrulata								Х			X					Χ	\square	
azalea	Alnus serrulata																Χ	\square	
ragweed	Ambrosia																Χ		
downy serviceberry	Amelanchier arborea	X			Χ									Χ		X			
serviceberry, shadblow serviceberry, shadbush	Amelanchier canadensis														X			X	
allegheny serviceberry	Amelanchier laevis				X	X					X					X			
serviceberries, shadbush	Amelanchier spp.															X	X		
lead plant	Amorpha canescens			X	X		X		X			X				X			
Arkansas blue star flower	Amsonia hubrectii												X						
blue star, common blue star, eastern blue	Amsonia tabernaemontana						X					X						Χ	

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
big bluestem grass, turkeyfoot	Andropogon gerardii	X	X		X	X					X	X	X			X	X		
little bluestem grass	Andropogon scoparius	X			Х	X		X				X	Х	Х	Х	Х			
broom sedge	Andropogon virginicus				X								Χ				X		
meadow anemone, Canada anemone	Anemone canadensis		Χ									Χ						\square	
pasque flower	Anemone patens		X		X	X		X	Х		Χ	X	Χ			Χ			
wood anemone	Anemone quinguefolia												Χ			Χ			
thimbleweed, tall anemone	Anemone virginiana		Χ		X														
pussytoes, woman's tobacco, plantain- leaved pussytoes	Antennaria plantaginifolia		X																1
wild columbine, eastern columbine, Canadian columbine, indianhemp	Aquilegia canadensis										X						X	X	X
wild sarsaparilla	Aralia nudicaulis				X	Χ			Х		Χ							\square	
spikenard	Aralia racemosa					X									X	X	Х		
bearberry	Arctostaphylos uva-ursil				X														
redtop grass	Argostis gigantean	X	X	X	X								X						
jack-in-the-pulpit	Arisaema triphyllum					X													
dutchmans pipevine	Aristolochia macrophylla														X			Χ	
red chokeberry	Aronia arbutifolia				X														
black chokeberry	Aronia melanocarpa											X							
goatsbeard, bride's feathers	Aruncus dioicus									X									
wild ginger	Asarum canadense		X									X							
poke milkweed, tall milkweed	Asclepias exaltata		Χ								X		X					X	

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Renke	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
swamp milkweed, pink milkweed, white	Asclepias incarnata	Χ																X	
swamp milkweed	Asolonias purpurasoons	v			v	v		v										v	
common millswood	Asclepias purpurascens	A	v		л	Λ		Λ						v			v	A V	
butterflyweed butterfly flower	Asclepias tuberosa		Λ			v					v	-		Λ		v	Λ	A V	
whorled milkwood, horsetail milkwood	Asclepius tuberosu		v			Λ	v				Λ	v				Λ		A V	
whohed minkweed, horsetan minkweed	Asiming triloba	v	Λ		v		Λ					A V	v	v		v		A V	
pawpaw	Asplanium platun aunon	<u>А</u>			л v	v		v				Λ	л v	л v		Λ		Λ	
blue wood ester, wood ester	Asten conditating				А	A V		Λ			v		A V	Λ	v			v	
blue wood aster, wood aster	Aster coratjonus	v	v			Λ					A V	v	Λ		Λ		<u> </u>		
white wood aster	Aster divaricatus	<u> </u>	Λ		N7						A V	Λ							
neath aster	Aster ericoides				X						X						<u> </u>	X	
smooth aster	Aster laevis	<u> </u>						X					X				<u> </u>		
dark leaf calico aster	Aster lateriflorus		X								X						L	X	
stiff-leaf aster, flaxleaf whitetop aster	Aster linariifolius										X			X					
big leaf aster	Aster macrophyllus		Χ		X				X										
New England aster	Aster novae-angliae				X						Х		Χ			Χ	Χ	Χ	
New York aster	Aster novi-belgii					Х					Х							X	
aromatic aster	Aster oblongifolius		Х									X	Х					Χ	
purple-stemmed aster	Aster puniceus	X			X													Χ	
silky aster	Aster sericeus				X														
aster	Aster spp								X		X							Χ	
flat-topped aster	Aster umbellatus		X					Χ				X	Χ		X	Χ		Χ	

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
lady fern	Athyrium filix-femina				X	X					X								
white wild indigo	Baptisia alba		Χ				X					X							
blue false indigo, wild indigo, false blue indigo	Baptisia australis												X					X	
cream wild indigo	Baptisia leucophaea		X										X			Χ			
dwarf wild indigo	Baptisia minor		X									X						\square	
flare false indigo	Baptisia solar		X			X												Χ	
yellow wild indigo	Baptisia sphaerocarpa				Х													\square	
prairieblues wild indigo	Baptisia starlite		X									X	Χ	X		X		Χ	
yellow birch	Betula alleghaniensis																Χ	\square	
birch	Betula lenta															X	Χ		
river birch	Betula nigra															X	Χ	\square	
gray birch	Betula populifolia	X	X									X			Χ		Χ	\square	
cross Vine	Bignonia capreolata	X			Х			X					Χ	X		X		\square	
boltonia, false aster	Boltonia asteroides	X			X													\square	
sideoats grama	Bouteloua curtipendula												Χ				Χ	\square	
bluejoint reedgrass	Calamagrostis canadensis	X	X		Х								Χ					\square	
American beautyberry	Calicarpa americana															X		\square	
purple poppy mallow, winecups	Callirhoe involucrata							X										\square	
bottlebrush	Callistemon spp.				X						X								
marsh marigold, marsh yellow marigold, cowslip	Caltha palustris				X	X	X				X		X		X				

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sweetshrub, Carolina allspice	Calycanthus floridus		X		X											X			
tall bellflower	Campanula americana				X														
creeping bellflower	Campanula rapunculoides	Χ	Х		X	X						X	X			X		Χ	
trumpet vine, trumpet-creepe	Campsis radicans				X												Х		
cut-leaf toothwort	Cardamine concatenata											X							
creek sedge	Carex amphibola											X			X				
appalachian sedge	Carex appalachica	X	Х		X	X		X	X			X	X		X	X			
fringed sedge	Carex crinita	Χ	Х		X			X				X							
bristleleaf sedge	Carex eburnea														X				
blue wood sedge	Carex glaucoidea														X				
gray's sedge	Carex grayi					X					X								
Ohio sedge	Carex muskingumensis								Х										
Pennsylvania sedge	Carex pensylvanica				X	X					X								
plantainleaf sedge, seersucker sedge	Carex plantaginea				X														
silver sedge	Carex platyphylla					X					X								
broad-leaf sedge	Carex siderosticha	Χ			X								X	X					
sedges	Carex spp.				X												Х		
owl-fruit sedge	Carex stipata				X											X			
upright sedge, tussock sedge	Carex stricta		Х																
fox sedge	Carex volpinoidea		Х		X					X			X				Х		
American hornbeam, ironwood	Carpinus caroliniana		X		X		X					X	X		X				
hornbeam	Carpinus spp.				X													X	

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sweet pignut hickory	Carya glabra															X			
shagbark hickory	Carya ovata				Х	Х					X					Х	X	Χ	
hickories	Carya spp.		X	Х			Х					Х	Х		Х		Х		
mockernut hickory	Carya tomentosa		Χ									Χ						Χ	
blue cohosh, papoose root	Caulophyullum thalictroides															X			
wild lilac or New Jersey tea	Ceanothus americanus				Х													Χ	X
American bittersweet	Celastrus scandens		X	X	X	Χ			X		X	X	Χ				Х	Χ	
hackberry, sugarberry	Celtis occidentalis	Χ			X				X		X		Χ				Х	Χ	
buttonbush	Cephalanthus occidentalis		Χ		X	Χ		X	X		Χ		Χ	Χ		X	Χ	\square	
eastern redbud	Cercis canadensis				X								Χ				Х	\square	
partridge pea	Chamaecrista fasciculata											X						\square	
wild sensitive-plant	Chamaecrista nictitans				Х			X						Χ				\square	
atlantic white cedar	Chamaecyparis thyoides	Χ			X													\square	
leatherleaf	Chamaedaphne calyculata	Χ																\square	
river oats, northern sea oats, indian woodoats	Chasmanthium latifolium		X										X			X			
white turtlehead	Chelone glabra															X			Χ
pink turtlehead	Chelone lyonii		Χ	Χ			Χ					Х	X						
turtlehead	Chelone spp.	Χ			X	X		X	X		Χ		X		X				
fringetree	Chionanthus virginicus									X									
green-and-gold, gold star	Chrysogonum virginianum			X		Χ						X	X						
southern green and gold	Chrysogonum virginianum var. australe				X								X						

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Maryland golden aster, golden aster	Chrysopsis mariana		X								X	X	X						
hairy golden aster	Chrysopsis villosa											X							
chicory	Cichorium intybus		X		X	X				X			X	X		X			
mountain bugbane, American bugbane	Cimicifuga americanus	Χ	X					X	X					X					
fairy candles	Cimicifuga racemosa		X								Χ								
field thistle	Cirsium discolort		Χ									X	Х			X			
spring beauty	Claytonia virginica	X	X				X						X		X			Χ	
virgin's bower, devil's darning needles, clematis	Clematis virginiana											X							
summersweet, sweet pepperbush	Clethra alnifolia	X			X														
bluebeard-lily, corn-lily	Clintonia borealis	X																	
blue-eyed mary	Collinsia verna		Χ		X	X			X		X	X	X			X		Χ	
sweet-fern	Comptonia peregrina		X									X	X			X			
blue mistflower	Conoclinium coelestinum											X							
sand coreopsis, lanceleaf tickseed	Coreopsis lanceolata										Χ							Χ	
passion tickseed	Coreopsis limerock												X					Χ	
prairie coreopsis	Coreopsis palmata		X		X	X			X		X	X	X			X			
tickseed	Coreopsis pubescens												X			X		Χ	
pink coreopsis, pink tickseed	Coreopsis rosea										X								
tickseed	Coreopsis spp.										X					X			
coreopsis, tall tickseed	Coreopsis tripteris		X				X		X			X	X		X				

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threadleaf coreopsis, threadleaf tickseed,	Coreopsis verticillata															X			
whorled coreopsis																			
pagoda dogwood	Cornus alternifolia	X																	
silky dogwood	Cornus amomum	X			X								X				X		
flowering dogwood	Cornus florida												X				X		
swamp dogwood, stiff dogwood	Cornus foemina	X			X	X		Χ			X		Χ						
cornelian	Cornus mas																X		
gray dogwood, red panicled dogwood	Cornus racemosa		Χ									Χ	Χ			Χ	Χ		
red osier dogwood, redtwig dogwood	Cornus sericea	Х	Х				X				X	X	Х	X		Х	X		
dogwoods	Cornus spp.																X		
yellow harlequin	Corydalis flavula															Χ			
rock harlequin	Corydalis sempervirens															X			
American hazelnut, American filbert	Corylus americana															Χ			
cockspur hawthorn	Crataegus crusgalli															X			
Washington hawthrorn	Crataegus phaenopyrum	Χ			Χ											X			
dotted hawthorn	Crataegus punctata			X	X						X	X	X						
hawthorn	Crataegus spp.												Χ				Х		
crocus	Crocus spp.																Χ		
orchard grass	Dactylis glomerata																Χ		
white prairie clover	Dalea candida		Χ		X	X		X	X		X	Χ	Χ		X				
tall larkspur	Delphinium exaltatum															X			
dwarf larkspur	Delphinium tricorne								X		X								

Alleghenv	River	Headwaters	Watershed	Conservation Plan
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hayscented fern	Dennstaedtia punctilobula							X											
hairgrass	Deshampias flexuosa		X				X					X	X						
sweet william	Dianthus barbatus				X	X										X			
squirrel corn	Dicentra canadensis	X										Χ				Χ			
dutchmans breeches	Dicentra cucullaria	Χ			Х					Х						Х			
wild bleeding heart, turkeycorn, fringed bleeding heart	Dicentra exemia	X			X					X						X			
bush honeysuckle	Diervilla lonicera				X	X							X	X	Χ				
persimmon	Diospyros virginiana				X	X										X	X	Χ	
leatherwood	Dirca palustris				Χ	X					Χ		Χ			Χ			
shooting-star, American cowslips	Dodecatheon meadia	X													Х				
parasol whitetop aster	Doellingeria umbellata				X						X								
goldie's wood fern	Dryopteris goldiana										1	X							
leather wood fern, marginal wood fern, evergreen wood fern, eastern wood fern	Dryopteris marginalis	X			X								X					X	
shield fern	Dryopteris spp.				X								X			X			
pale coneflower	Echinacea pallida										1	X	Χ						
yellow coneflower	Echinacea paradoxa					X							Χ						
purple coneflower	Echinacea purpurea			X	X	X							X		X	X	X		
coneflower	Echinacea spp.	X															X	Χ	
wild millet	Echinochloa crus-galli															X			
Canada wildrye	Elymus canadensis				Χ								Χ						

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bottlebrush grass	Elymus hystrix	Χ			X	X		X					X	X					
riverbank wild rye grass	Elymus riparius		X									X			X				
wild rye	Elymus virginicus	Χ																	
fireweed	Epilobium angustifolium				X														
horsetail	Equisetum species	Χ			Х					X			Χ			X			
blue love grass	Eragrostis elliottii	X			X							X	X						
purple love grass, showy love grass	Eragrostis spectabilis										X							Χ	
daisy fleabane	Erigeron strigosus		X		X	X					X								
rattlesnake master	Eryngium yuccifolium				X	X		X			X	X	X			Х		Χ	
trout lily, dogtooth violet, yellow trout lily, adder's tongue	Erythronium americanum																	X	
strawberry-bush	Euonymus americanus					X			X		X		Х		Х			Χ	
joe-pye weed, trumpetweed	Eupatoriadelphus fistulosus		X															X	
mistflower, blue mistflower, hardy ageratum	Eupatorium coelestinum				X	X		X			X		X		X			X	
little joe-pye weed	Eupatorium dubium				X	X					Х		X		Х	Х		Χ	
hyssop-leaved boneset, thoroughwort	Eupatorium hyssopifolium	Χ			X			X						X				Χ	
gateway	Eupatorium maculatum											X							
spotted joe-pye weed	Eupatorium maculatum		X									X	X		X				
boneset, thoroughwort	Eupatorium perfoliatum												Х			Х			
purple joe-pyeweed, joe pye flower, sweetcented joe-pyeweed	Eupatorium purpureum		X		X	X							X			X			
snakeroot	Eupatorium rugosm		Х			Х					Х		X						

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joe-pye-weed	Eupatorium spp.		Χ				Χ					X					Χ	Χ	
flowering spurge	Euphorbia corollata	X			X	X			X				X	X	X				
white wood aster	Eurybia divaricata				X							X	X		Χ			Χ	
flat-top goldentop	Euthamia graminifolia	X					Χ					X	Χ			X			
American beech	Fagus grandiflora		Χ			X		X	X			X	X				X		
beech	Fagus spp.	X															X		
queen-of-the-prairie	Filipendula rubra	X	Χ									X	Χ	X					
dwarf fothergilla	Fothergilla gardenii				X								X			X			
wild strawberry	Fragaria virginiana					X					Χ								
white ash	Fraxinus americana				X												X		
black ash	Fraxinus nigra															X			
green ash	Fraxinus pennsylvanica		Χ		Χ											X			
ash	Fraxinus spp.	X			Χ		Χ						Χ						
wandflower, beetleweed	Galax urceolata		Χ			Χ										X		Χ	
wintergreen, eastern teaberry	Gaultheria procumbens				Χ	Χ		X			Χ	X	Χ			X			
windflower	Gaura lindheimeri		Χ					X				X	X						
huckleberry	Gaylussacia baccata												X			X			
boxhuckleberry	Gaylussacia brachycera	X			X	X						X							
evening trumpet flower, Carolina jessamine	Gelsemium sempervirens		X		X						X	X				X			

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bottle gentian, closed gentian, blind	Gentiana clausa				X	X										X			
gentian					X 7												┝──┦		
wild geranium, wild cranesbill, wood	Geranium maculatum				Х													X	
cranesbill geranium	Geranium sanguineum																Χ		
prairie smoke	Geum triflorum	X			X	X		X					X			X		Χ	
American ipecac	Gillenia stipulata		Χ	X								X	Χ			X			
honey locust	Gleditsia triacanthos			X	X	X					X		X		X			Χ	
fowl mannagrass	Glyceria striata																Χ		
downy rattlesnake plantain	Goodyera pubescens		Χ									X						Χ	
Carolina silverbell	Halesia caroliana	X	Х		X								X			X		Χ	
witchhazel, American witch hazel	Hamamelis virginiana				X											X		Χ	
english ivy	Hedera helix																X		
helen's flower; common sneezeweed, dog- tooth daisy	Helenium autumnale		X												X				
sneezeweed, purple-headed helen's flower	Helenium flexuosum		Х		X	X					X		X			X		Χ	
swamp sunflower	Helianthus angustifolius	X			X	X							X		X	X		Χ	
thin-leaf sunflower	Helianthus decapetalus	X														X		Χ	
woodland sunflower	Helianthus divaricatus	X	Χ		X		X					Χ		X		X			
tall sunflower, giant sunflower	Helianthus giganteus		Х									X	Χ						
small-headed sunflower	Helianthus microcephalus				X														
western sunflower	Helianthus occidentalis				X							X			X				
dwarf perennial sunflower	Helianthus salicifolius		Χ																

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sunflower	Helianthus spp.	Χ	X									X	X	X			Χ		
oxeye daisy, smooth oxeye, false sunflower	r Heliopsis helianthoides	Χ			X								Х			X		X	
swamp pink	Helonias bullata		X		X								X						
daylily	Hemerocallis																Χ	\square	
roundlobe hepatica, sharplobe hepatica	Hepatica acutiloba	X																\square	
alumroot, coral bells	Heuchera americana		Χ									Χ						\square	
hairy alum root	Heuchera villosa	X																	
shuttleworth's ginger	Hexastylis shuttewortii				X	Х			Х				X						
scarlet rose mallow	Hibiscus coccenius				X	Χ					X		X			Χ		\square	
swamp rose mallow, marsh hibiscus	Hibiscus moscheutos			X					Х	1	X	X	Х				Χ	\square	
rattlesnake weed	Hieracium venosum											X							
bluets	Houstonia caerulea				X						X								
wood hyacinth	Hyacinthoides hispanica																X		
wild hydrangea	Hydrangea arborescens				X											Χ			
oakleaf hydrangea	Hydrangea quercifolia		X																
goldenseal, yellow root	Hydrastis canadensis						X					X		Х					
maple-leaved waterleaf, broad-leaved waterleaf	Hydrophyllum canadense										X		X						
Virginia waterleaf, eastern waterleaf	Hydrophyllum virginianum		X						X			X	Χ					\square	
saint john's wort	Hypericum calycinum			X	X	Х					X		X	X		Χ			
dense hypericum	Hypericum densiflorum		X			Х							X			Χ			
shrubby saint john's wort	Hypericum prolificum		X	X		Χ					X		X			Χ			

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great saint john's wort	Hypericum pyramidatum		X				X	X				X	X						
yellow star-grass	Hypoxis hirsuta		Х	X	X				Х					X		Х			
inkberry	Ilex glabra				Х	X											Х		
American holly	Ilex opaca				X	X		Χ	Х		Χ		Χ	Χ			Χ		
winterberry	Ilex verticillata						X					Х	X				X		
jewelweed	Impatiens capensis														Χ				
pale jewelweed, touch-me-not	Impatiens pallida															Χ			
impatiens	Impatiens spp.																Χ		
crested iris	Iris cristata		Χ		Х						Χ	Χ				Χ			
white crested iris	Iris cristata alba	X			X								X						
slender blue flag	Iris prismatica	X			X								X	X		X			
iris	Iris spp.																X		
blue flag iris, northern blue flag	Iris versicolor										Χ								
Virginia sweetspire, tassle-white	Itea virginiana	X			X						Χ			X		X			
twinleaf	Jeffersonia diphylla				X	X			X	Χ	Χ					Χ			
butternut	Juglans cinerea																X		
black walnut	Juglans nigra	X	Χ									Χ							
Canada rush	Juncus canadensis			Χ	X				Χ						X				
soft rush	Juncus effusus	X																	
eastern red cedar	Juniperus virginiana				X											X	X		
mountain laurel	Kalmia latifolia				X											Χ			
june grass	Koehleria cristata	X								Χ									

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false boneset	Kuhnia eupatorioides				X														
flatpea	Lathyrus sylvestris	Χ			Χ	X									Χ				
rice cutgrass	Leersia oryzoides					X							Х			Х	Х		
round headed bush clover	Lespedeza capitata				Χ				X	X									
fetterbush	Leucothoe racemosa			X	X	X		Х	X		X							Χ	
rough blazing star	Liatris aspera	X			X								Χ						
cylindrical blazing star	Liatris cylindracea				Χ	Χ					Χ		Χ			Х			
meadow blazing star	Liatris ligulistylis		Χ	Χ								X	Χ					Χ	
appalachian blazing star	Liatris microcephala			X			X												
prarie blazing star	Liatris pycnostachya	X			X							X	X	X				Χ	
northern blazing star	Liatris scariosa														X				
dense blazing-star, gayfeather, spike gayfeather	Liatris spicata				X													X	X
blazing-star, gayfeather	Liatris spp.	Χ	Χ															Χ	
button blazing star, scaly blazing star, gayfeather	Liatris squarrosa											X							
wood lily	Lilium philadelphicum				X													Χ	
lily	Lilium spp.																Х		
turk's cap lily	Lilium superbum				X	X					X		X			X			
Canada lily, wild yellow	Lillium canadense			X					X							X		Χ	
spicebush	Lindera benzoin														X				
sweetgum	Liquidambar styraciflua	X			X		X						X	X					
tuliptree	Liriodendron tulipifera															X			X

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cardinal flower, red cardinal flower	Lobelia cardinalis														X		X		X
beechwood blend	Lobelia cardinalis x siphilitica	X	X									X	Χ					Χ	Χ
indian tobacco	Lobelia inflata	X																	
great blue lobelia	Lobelia siphilitica							X										\square	Χ
pale spiked lobelia	Lobelia spicata		X		X								Χ			X		\square	
trumpet honeysuckle, coral honeysuckle	Lonicera sempervirens					X			X	X	X					X	Χ	\square	Χ
birdsfoot trefoil	Lotus corniculatus																Χ	\square	
seedbox	Ludwigia alternifolia	X			Χ	Χ		X			Χ		Χ			X		\square	
wild lupine, indian beet, old maids bonnets, blue lupine, sundial lupine	Lupinus perennis	X		X		X									X				
hairy woodrush, woodrush	Luzula acuminata	X			X							X	Χ		X				
magnolia	Magnolia spp.		X													X		\square	
sweetbay magnolia	Magnolia virginiana	X																\square	
Canada mayflower	Maianthemum canadense	X	X				X					X	Χ			X			
feathery false lily of valley	Maianthemum racemosum		X		X											X		\square	
American crabapple	Malus glaucescens																X		
apple	Malus spp.																Χ	\square	
barbara's buttons	Marshallia grandiflora				X								Χ			X		Χ	
ostrich fern	Matteuccia struthiopteris		X		X	X			Х			X	Χ	Х				Χ	
meehan's mint, creping ground mint	Meehania cordata											X						Χ	
Virginia bluebells	Mertensia virginica				X													X	

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sharpwing monkeyflower, winged monkey	Mimulus alatus		Χ									X	X						
monkey flower, square-stemmed monkey flower	Mimulus ringens															X		X	
partridgeberry	Mitchella repens				X														
bishops cap, mitrewort	Mitella diphylla		Х		X						X			X					
basil balm	Monarda clinopodia	X			X														X
bee balm, oswego tea, bergamot, scarlet bee balm	Monarda didyma	X										X						X	X
wild bergamot, lavendar bergamot, bee balm	Monarda fistulosa		X	X	X	X				X	X		X	X		X			X
purple bergamot	Monarda media		Χ	Χ		X		Χ	X			X	Х						X
spotted bee balm	Monarda punctata				X	X			X		X		X						
beebalm, monarda	Monarda spp.	X															X		X
red mulberry	Morus rubra				X			X									X		
pink muhly grass	Muhlenbergia capillaris					X							X						
bayberry, northern bayberry	Myrica pennsylvanica		Χ								X	Χ					X		
black gum, tupelo, sour gum	Nyssa sylvatica	X															X		
sharp-leaved aster, whorled aster	Oclemena acuminatus		Χ	X			X					X	X						
evening primrose, common evening	Oenothera biennis											Χ							
sundrops, fireworks	Oenothera fruticosa				X				X	X									
stiff goldenrod	Oligoneuron rigidum				X											X			
sensitive fern	Onoclea sensibilis															X			

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pricklypear, eastern pricklypear cactus,	Opuntia humifusa				X				X		X		X			X			
devil's tongue																			
aniseroot	Osmorhiza longistylis	X			X	X	X					X	X	X				\vdash	
cinnamon fern	Osmunda cinnamomea				X														
interrupted fern	Osmunda claytoniana				X	X			X		X		Χ		X				
royal fern	Osmunda regalis	Χ				X							X						
hop-hornbeam	Ostrya virginiana											X				X			
sourwood	Oxydendrum arboreum															X			
allegheny pachysandra, allegheny spurge	Pachysandra procumbens				X														
goldenragwort	Packera aurea		Χ					X											
peony	Paeonia spp.																Χ		
American ginseng	Panax quinquefolius				X											X			
atlantic costal panic grass	Panicum amarulum															Х			
panic grass	Panicum spp.																Χ		
switch grass, panic grass	Panicum virgatum (amarum)				Χ	Χ											Χ		
wild quinine	Parthenium integrifolium	Χ	X																
Virginia creeper	Parthenocissus quinquefolia		Χ								Χ		X				X		
wild passion vine	Passiflora incarnata				Χ	Χ							X		X			X	
passionflower	Passiflora spp.		X															Χ	
arrow arum	Peltandra virginica																X		
talus slope penstemon																			

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hairy beardtongue	Penstemon hirsutus				X													Χ	X
small's beardtongue	Penstemon smallii	X	Χ						X			Χ	Χ						
beardstongue	Penstemon spp.		Χ																X
ditch stonecrop	Penthorum sedoides				X														
Carolina phlox	Phlox carolina															Χ			
woodland phlox, wild sweet william, meadow phlox, blue wood phlox	Phlox divaricata	X	X						X			X	X						
meadow phlox	Phlox maculata											X							
summer phlox, garden phlox, perennial phlox	Phlox paniculata															X			X
downy phlox	Phlox pilosa	X			X	X					X				X	X			X
phlox	Phlox spp.																X		
creeping phlox, summer phlox	Phlox stolonifera															X			
moss phlox, mountain phlox, moss pink	Phlox subulata												Χ						
ninebark	Physocarpus opulifolius				X	X					X			X		X			
obedient plant, false dragonhead	Physostegia virginiana			X					X			X	X						
pokeweed	Phytolacca dodecandra																X		
shortleaf pine	Pinus echinata				X	X					X				X				
pond pine	Pinus palustris						X					X			X				
pitch pine	Pinus rigida	X			X			X					X		X	X	X		
pines	Pinus spp.	X															X		
eastern white pine	Pinus strobus														X		X		
Virginia pine	Pinus virginiana							Х											

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American sycamore	Platanus occidentalis		X								X	X							
Kentucky blue-grass	Poa pratensis																Х		
roughstalk bluegrass	Poa trivialis										X								
mayapple, mandrake	Podophyllum peltatum		Χ					Χ				X	Χ				Χ		
greek valerian, jacob's ladder, greek valerian, spreading jacob's ladder	Polemonium reptans			X	X	X			X		X		X						
variegated native jacob's ladder	Polemonium spp.				X	X													
smooth solomon seal	Polygonatum biflorum				Χ														
solomon's seal, giant solomon's seal	Polygonatum canaliculatum		Χ		Χ				Χ		Χ		Х						
downy solomon's seal	Polygonatum pubescens	Χ														X			
Pennsylvania smartweed	Polygonum pensylvanicum																Х		
christmas fern	Polystichum acrostichoides															X			
tassel fern	Polystichum polyblepherum															X			
pickerelweed	Pontederia cordata															X		Χ	
aspen	Populus spp.																Х		
bowman's root, indian physic, American ipecac	Porteranthus trifoliata															X			
long-leaf pondweed	Potamogeton nodosus																Х		
sago pondweed	Potamogeton pectinatus																Х		
prairie cinquefoil	Potentilla arguta				X														
bush cinquefoil, shrubby cinquefoil	Potentilla fruticosa				X	X					X					X			
Norwegian cinquefoil	Potentilla norvegicia	X			X								Χ	X		X			
three-toothed cinquefoil	Potentilla tridentata		Χ								X		X					X	

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common selfheal	Prunella vulgaris			X					X			Χ							
wild plum	Prunus americana	Χ										X							
pin cherry	Prunus pensylvanica		X											X					
black cherry, wild cherry	Prunus serotina				Χ					X	Χ					X	Χ		
cherries	Prunus spp.			X			X		X			X	X				Χ		
choke cherry	Prunus virginiana		X										Χ			Х	X		
hoary mountain mint	Pycnanthemum incanum				X	X		X				X	X	X	X	X		\square	
showy mountain mint, clustered mountain mint, mountain mint	Pycnanthemum muticum									X									
slenderleaf mountain mint	Pycnanthemum tenuifolium		X										X			Χ			
Virginia mountain mint	Pycnanthemum virginianum				X														
white oak	Quercus alba				Χ	X											Χ		
swamp oak, swamp white oak	Quercus bicolor	X			Χ		X						X		Χ		Χ		
scarlet oak	Quercus coccinea					X											Χ		
bur oak	Quercus macrocarpa	X																	
pin oak	Quercus palustris												Χ				Χ		
willow oak	Quercus phellos															Х	X	\square	
chestnut oak	Quercus prinus																Χ		
red oak	Quercus rubra				Χ	Χ		Χ	X		Χ		Χ			Χ	Χ		
oaks	Quercus spp.																Х		
black oak	Quercus velutina															Χ			
prairie coneflower	Ratibida pinnata	X	X																
Maryland meadow beauty	Rhexia mariana				Χ					Ī					Χ				

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meadow beauty, handsome hairy	Rhexia virginica	X			Χ						Χ								
sweet azalea	Rhododendron arborescens					X					X								
rosebay rhododendron	Rhododendron maximum		X									X						Χ	
swamp azalea	Rhododendron viscosum	Х			X								X	X		X			
rhododendron	Rhododendron spp.																X		
swamp azalea	Rhododendron viscosum	Х			X								X	X		Χ			
rhododendron	Rhododendron spp.																X		
fragrant sumac	Rhus aromatica															X			
dwarf-winged sumac	Rhus copalina				X					X							X		
smooth sumac	Rhus glabra				X												X		
sumacs	Rhus spp.	X			Х			X						X		X	X		
staghorn sumac	Rhus typhina		X									X					X		
pasture rose, Carolina rose	Rosa Carolina		X		X		X					X	X	X	X		X		
swamp rose	Rosa palustris					Χ							X				Χ	Χ	
rose	Rosa spp.																X		
Virginia rose	Rosa virginiana	Х	Χ											X			X		
common blackberry	Rubus allegheniensis		Χ									X	X				X		
flowering raspberry	Rubus odoratus	X			X			X						X			X		
thimbleberry	Rubus parviflorus		Χ			Χ					X		X			X			
blackberry, raspberry	Rubus spp.																Χ		
eastern coneflower, organe coneflower	Rudbeckia fulgida		X																
black-eyed susan	Rudbeckia hirta		Χ	X					X		Χ	X	X			Х			

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green-headed coneflower, cutleaf	Rudbeckia lanciniata											X							
great coneflower	Rudbeckia maxima														X			┝──┦	
sweet coneflower	Rudbeckia subtomentosa	X	X		X		X					X	X	X				X	
brown-eyed-susan, three lobed coneflower	Rudbeckia triloba		X										X			Χ			
Carolina wild petunia	Ruellia caroliniensis										X								
fringe-leaved petunia, hairy wild petunia, wild petunia	Ruellia humilis		X				X		X		X	X	X		X				
limestone petunia	Ruellia strepens	X			X														
pussy willow	Salix discolor		X				X					X	X	X					
sandbar willow	Salix exigua		X					X				X	X			Χ			
black willow	Salix nigra			Х	X			X				X	X	X			Χ		
silky willow	Salix sericea									Χ	Χ				Χ		Χ		
willow	Salix spp.															Χ			
lyreleaf sage, purple knockout	Salvia lyrata				Χ											Χ			
elderberry, American elder, common elderberry	Sambucus canadensis	X	X		X		X	X				X	X	X	X	X	X		
red-berried elder	Sambucus racemosa ssp. pubens	X																Χ	
bloodroot	Sanguinaria canadensis		X																
swamp burnet	Sanguisorba canadense	X																	
sassafras	Sassafras albidum										Χ							Χ	
water dragon, swamp lily, lizards tail	Saururus cernuus	X			X							X							
swamp saxifrage	Saxifraga pensylvanica														X				
early saxifrage	Saxifraga virginiensis				X	X		X	X		X				X				
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little bluestem	Schizachyrium scoparium					X			X		X		X				X	X	
hardstem bullrush	Scirpus acutus		Х		X												X		
black bullrush, green bullrush	Scirpus atrovirens		Х									X							
wool grass, wool rush	Scirpus cyperinus				X														
three-square bullrush	Scirpus pungens											X					X		
softstem bullrush	Scirpus tabermontanii									X	X						X		
hoary skullcap, hyssop skullcap, skullcap	Scutellaria incana								X			X							
hyssop skullcap	Scutellaria integrifolia															X			
Allegheney skullcap	Scutellaria serrata				X	Х			X		X								
sedum	Sedum spp.																X		
wild stonecrop, woodland stonecrop, stonecrop	Sedum ternatum															X			
golden ragwort, golden groundseal, squaw- weed	Senecio aureus											X						X	
northern wild senna, wild senna, American	Senna hebecarpa	X	Χ									Χ	Χ		Χ				
Maryland senna	Senna marilandica	X																	
bristlegrass	Setaria spp.																X		
wild pink, pink campion	Silene caroliniana				X	X				X			X			X		Χ	
royal catchfly	Silene regia	Χ																Χ	
starry campion	Silene stellata		Χ	X	X						X	X	Χ						
fire pink	Silene virginica		X									X	X						
compass plant	Silphium laciniatum												X						
cup plant	Silphium perfoliatum	Χ	Χ		X								Χ						

Alleghenv	River	Headwaters	Watershed	Conservation Plan
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prairie dock	Silphium terebinthinaceum														X				
whorled rosenweed	Silphium trifoliatum				X											Х		Χ	
blue-eyed grass, select blue-eyed grass	Sisyrinchium angustifolium	Χ										X							
false solomon's seal	Smilacina racemosa						X					X						Χ	
greenbriar	Smilax spp.																Х		
silverrod, white goldenrod	Solidago bicolor				Χ												Х		
bluestem goldenrod, wreath goldenrod	Solidago caesia				X											Х	X		
zigzag goldenrod	Solidago flexicaulis		X		X											X	X	Χ	
flat top goldenrod	Solidago graminifolia	X	Χ	Χ	Χ							X	Χ		Χ	Χ			
early goldenrod	Solidago juncea												Χ						
gray goldenrod	Solidago nemoralis				X														
anisescented goldenroad	Solidago odora		Х				X												
roughleaf goldenrod	Solidago patula				X													Χ	
riddell's goldenrod	Solidago reddellii												Χ						
stiff goldenrod	Solidago rigida					X							Χ					Χ	
wrinkleleaf goldenrod, rough-stemmed goldenrod	Solidago rugosa				X												X		
seaside goldenrod	Solidago sempervirens												Χ						
blue-stemmed, grey, or showy goldenrod	Solidago speciosa			X			X					X							
short-pappus goldenrod, autumn goldenrod	Solidago sphacelata	1	Χ			Ī						X	X						
goldenrod	Solidago spp.	X			X								X				X	Χ	
American mountain ash	Sorbus americana	1				Ī											Χ		
indian grass	Sorghastrum nutans	1				Ī										X	Χ		

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American bur-reed	Sparganium americanum			X								X	Χ			X			
giant bur-reed	Sparganium eurycarpum									X							Χ		
prairie cord grass	Spartina pectinata		Х	Х							Х	Х	X		X	Х			
indian pink	Spigelia marilandica				Χ				X		Χ								
meadowsweet	Spiraea alba		X									X							
steeplebush	Spiraea tomentosa	X																	X
nodding ladies tresses	Spiranthes cernua										Χ								
fragrant lady's tresses	Spiranthes cernua var. odorata	X			X									X	X			Χ	
lady's tresses orchid	Spiranthes odorata	X	X		X	X	Χ			X		X	X	X	X	X		Χ	
narrow-leaved meadowsweet	Spirea alba				Χ	X					X			X		Х		Χ	
broad-leaved meadowsweet	Spirea latifolia		X																
tall dropseed, rough dropseed, meadow	Sporobolus compositus				X								Χ						
dropseed																			
prairie dropseed	Sporobolus heterolepis															X		X	
American bladdernut	Staphylea trifolia															X			
porcupine grass	Stipa spartea				Χ											Х			
stokes' aster	Stokesia laevis								Х	Χ	Χ								
wood poppy, celandine poppy	Stylophorum diphyllum				X														
snowberry	Symphoriacarops	X			Χ							X		X					
coralberry	Symphoricarpos orbiculatus		Χ									Χ					Χ		
blue heart-leaved aster	Symphotrichum cordifolium				X											X			
crooked-stem aster	Symphotrichum prenanthoides				X											X		X	
purple-stemmed aster	Symphotrichum puniceum	X			X														

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short's aster	Symphotrichum shortii					X					Χ	Χ		Χ	X	X			
reclining aster	Symphyotrichum ericoides									X									
calico aster	Symphyotrichum lateriflorum														X				
white or frost aster	Symphyotrichum porteri											X	Χ					\square	
skunk cabbage	Symplocarpus foetidus				X	X			X	Χ						X			
bald cypress	Taxodium distichum	X			Χ							X						\square	
yew	Taxus spp.																Χ		
meadow rue	Thalictrum aquilegifolium																Χ		
early meadow rue	Thalictrum dioicum				Х						X								
tall meadow rue	Thalictrum pubescens				Χ											X			
rue anemone	Thalictrum thalictroides										Χ							\square	
New York fern	Thelypteris noveboracensis	Х			Χ								Χ		X	X			
foamflower, creeping foamflower	Tiarella cordifolia					X													
American linden or basswood	Tilia americana					X											Х		
Mexican sunflower	Tithonia rotundifolia																Х		
poison ivy	Toxicodendron radicans																Χ	\square	
Ohio spiderwort, spiderwort	Tradescantia ohiensis				Χ											X			
spiderwort, Virginia spiderwort, common	Tradescantia virginiana				X														
spiderwort	_																		ļ
tassel rue	Trautvetteria caroliniensis		X																ļ
blue curls	Trichostema dichotomum	X	X		X		X			X			X	X					
purple-top	Tridens flavus		X		X											X			
red clover	Trifolium pratense																Х		1

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white dutch clover	Trifolium repens																X		
southern trillium	Trillium cuneatum	X										X							
purple trillium, red trillium, wake robin, stinking benjamin, squawroot	Trillium erectum				X							X	X			X		X	
declined trillium, white wake-robin, drooping trillium	Trillium flexipes															X			
showy trillium, large flowering trillium	Trillium grandiflorum	X	Χ		Χ		Х						Χ	Χ					
yellow trillium, southern	Trillium luteum			X								Х							
prairie trillium, bloody noses	Trillium recurvatum		Χ			X					X	Х	Х			X			
toadshade, toad trillium	Trillium sessile	X	X		X	X		X			X		Х	X	X	X		Χ	
trillium	Trillium spp.				X				Χ	Χ							X		
spreading globeflower	Trollius laxus	X														Χ			
eastern hemlock	Tsuga canadensis				Χ											X	X		
hemlock	Tsuga Carrière																X		
tulip	Tulipa spp.																X		
showy merrybells, large-flowered bellwort, wild oats	Uvularia grandiflora		X															X	
bellwort, merrybells	Uvularia perfoliata	X		X	X	X										X		Χ	
wild oats	Uvularia sessilifolia				X								X						
lowbush blueberry	Vaccinium angustifolium				X								X				X		
highbush blueberry	Vaccinium corymbosum				X								X			X	X		
blueberries	Vaccinium spp.												X				X		
deerbery	Vaccinium staminium				X	Х					X					X	X		

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
regal lingonberry	Vaccinium vitiis-idaea										X								
wild celery	Vallisneria Americana																Х		
purple vervain	Verbena canadensis				X					X	Χ					X			
blue vervain, simpler's joy, swamp verbena, blue verbena	Verbena hastata			X									X		X				
hoary vervain	Verbena stricta															Х			
tall ironweed	Vernonia gigantea				Χ						Χ					X			
tawny ironweed, upland ironweed	Vernonia glauca											X							
New York ironweed, broadleaf ironweed	Vernonia noveboracensis												Χ					\square	
culver's root	Veronicastrum virginicum															X			
giant ironweed	Verononia gigantea														Χ	Χ			
mapleleaf viburnum	Viburnum acerifolium		Χ													Χ			
witherod, wild raisin	Viburnum cassinoides				Χ								Χ						
arrowood viburnum, southern arrowwood	Viburnum dentatum		Χ														Χ		
nannyberry viburnum	Viburnum lentago										X								
possumhaw, witherod viburnum	Viburnum nudum		X									X						\square	
blackhaw viburnum, black haw	Viburnum prunifolium												Χ			Х	Х	\square	
viburnums	Viburnum spp.		Χ			Χ										Х	Χ		
cranberry bush, highbush cranberry	Viburnum trilobum			X	Χ							X					Х	\square	
white violet, Canada violet	Viola canadensis					X					X	X	Χ				Х	Χ	
marsh blue violet	Viola cucullaria																	X	
halberdleaf yellow violet	Viola hastata																	X	
labrador violet	Viola labradorica																	Χ	

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
common blue birdfoot violet	Viola pedata																	Χ	
smooth yellow violet	Viola pensylvanica																	Χ	
downy yellow violet	Viola pubescens																	X	
long-spurred violet	Viola rostrata																X	Χ	
wild blue violet	Viola sororia																	X	
pansy	Viola spp.																Χ		
creamy violet	Viola striata																Χ	Χ	
grape, wild grape	Vitis spp.																Χ		
barren strawberry	Waldsteinia fragarioides																	X	
Virginia chain fern	Woodwardia virginica																	X	
yellow root	Xanthorhiza simplicissima																	X	
golden alexanders, zizia	Zizia aurea																	X	

APPENDIX S: ENHANCING FISH HABITAT

Habitat is defined as the place where an organism lives or is naturally found. Enhancing habitat in an aquatic ecosystem improves the over all health and quality of a given waterway. By doing so, it in turn benefits everyone who enjoys outdoor recreation weather it be fishing, boating, or just an outdoor enthusiast.

Aquatic habitat enhancement can be constructed in both streams and lakes and is designed to improve habitat for everything from fish to various reptiles. As well as having a wide range of organisms that habitat enhancement structures benefit there is also a diverse variety of artificial habitat purposes and designs that Pennsylvania Fish and Boat Commission (PFBC) has come up with to suit the needs of Pennsylvania's wildlife. In order to perform a Fish Habitat improvement project the proper permits must first be required from Pennsylvania's Department of Environmental Protection (PA DEP). Once the permits are acquired grants are applied for to provide funding.

The primary objective of artificial fish habitat is to use resources such as wood and rock rubble to increase the abundance of submerged native habitat using designs engineered to mimic Pennsylvania's naturally occurring resources. Artificial fish habitat also provides excellent fishing opportunities for anglers if they are aware of the locations of the structures.

PFBC offers Lake Habitat Improvement Maps for all the state and federal owned lakes where habitat improvement projects have been completed. These maps show the general shape of the lake and indicate where all man made structures are located along with how many are present and the depth of their location. If read correctly these maps provide a very efficient way for anglers to navigate the structures and ultimately find fish (PFBC²).

Habitat Enhancing Structures for Cover

Man-made aquatic habitat structures are designed to serve several different purposes for aquatic life, each one being necessary for a successful aquatic environment. One purpose for artificial habitat is to provide smaller prey fish with cover from predators where preexisting cover is nonexistent. Most needs for this type of habitat structure is in the early man made lakes that can be found scattered across Pennsylvania. This is because in earlier years when many lakes were being formed it was thought that the lake bottom should be bare, therefore all debris was cleared from the area leaving little to no cover remaining for aquatic organisms. There are many variations for this form of habitat that use all types of materials ranging from wooden poles to large sandstone rocks. Examples of this type of habitat structure are the Porcupine Crib, Porcupine Crib Jr., Post Stump, Post Stump Plus, Post Cluster, Post Cluster Plus, Rock Star, Vertical Plank Structure, Spider Hump, Stake Tree, Felled Shoreline Tree, and Rock Rubble Humps.

Porcupine Crib and Porcupine Crib Jr.

Porcupine Crib and Porcupine Crib Jr. are two habitat structures that are very alike in their design. They are constructed using 4ft. 2×2 pieces of rough timber, $8\times8\times16$ concrete blocks, nails, and a nylon banding strap with steel buckle. The 4 ft. pieces of wood are nailed to one another while slowly steeping inward in the shape of a pyramid with the concrete blocks placed at the bottom for weights and the nylon banding strap used for added strength. Once completed the cribs are placed at the bottom of the lake at a minimum depth of about 10 ft. and are normally placed in clusters. Once submerged the Porcupine Crib and Crib Jr. form what serves as a wooden cage like structure with openings between the boards allowing smaller bait fish to swim in and out ultimately providing them with cover. At the same time the Porcupine Crib provides places for predatory fish to hunt due to the large amounts of bait fish that are drawn to

them. Porcupine cribs serve as excellent areas for fishermen seeking various species of pan fish as well as the larger game fish species that are drawn in too feed on them $(PFBC^1)$.

Post Stump and Post Stump Plus

The Post Stump and Post Stump Plus have a simple design which involves nothing more that two to three 4ft. sections of 6 inch wide aquatic posts and are normally placed at a depth of about 4ft. of water. The Post Stump is made by pounding two sections the aquatic posts into the lake bottom until they are submerged about two feet below the surface. The two pieces of post can be placed straight up and down or at an angle depending on preference. The Post Stump Plus is constructed the same way as the plain Post Stump but involves a laterally positioned post that is bolted to the vertical posts underneath the waters surface for added cover. This Habitat structure is designed to benefit an array of aquatic organisms. The submerged posts act as artificial submerged stumps providing cover for predatory and prey fish alike. Being that this type of habitat structure is placed in shallower waters it creates fishing sites for anglers that are accessing the lakes from shore banks (PFBC¹).

Post Cluster and Post Cluster Plus

The Post Cluster and Post Cluster Plus are very similar in design and purpose to the Post Stump and Post Stump Plus. This type of habitat is made with 8ft. long sections of 6 inch wide aquatic posts and normally involves the use of heavy equipment to build. The Post Cluster is placed in about 4ft. of water and is constructed by inserting the 8ft. sections of aquatic posts about two feet into the lakes bottom allowing the tops to protrude from the waters surface. The Post Cluster can include as many poles in each cluster as preferred and can be arranged in any shape that is desired. The Post Cluster Plus is constructed the same as The Post Cluster except it involves laterally positioned posts that are bolted to the vertical posts underneath the waters surface for added cover. Once completed the clusters of protruding posts replicate what acts as submerged woodland. This habitat structure is designed to benefit an array of aquatic organisms. As well as providing cover for fish of all sizes the exposed post above the surface of the water serve as excellent perch sites for fish hunting birds. Also the Post Clusters exposed portions tend to eventually attract aquatic plant growth such as lily pads which in turn attracts organisms like frogs and dragonflies that fish and other organisms can feed on. This type of habitat structure draws in all types of fish species thus providing favorable fishing for boating and shore fishermen alike. The post clusters also act as a barrier between the shore and open water by breaking up waves decreasing shore line erosion $(PFBC^{1}).$

Rock Star

The Rock Star is a man made habitat structure that involves the use of both rough cut timber and sandstone rocks. To construct this type of structure you need seven tons of sand stone, seven eight ft. 2×6 sections of rough cut timber, and nails. A rock star consists of a two ton pile of sandstone encircled by five surrounding one ton piles of sandstone that is connected by five sections of 2×6 rough timber in the general shape of a star. The connecting pieces of rough cut timber should be buried in the rock piles and elevated from the lakes bottom for aquatic organisms to use for cover. After the star shaped structure is completed the last two sections of eight ft. 2×6 are nailed into the others that are already placed connecting any two of the pieces of boards for additional cover. These structures can be placed at any depth and are designed to provide cover for all types of aquatic organisms. Rock Stars can also double as spawning sites for some species of fish (PFBC¹).

Vertical Plank Structure

The vertical Plank Structure is a wooden box designed to provide cover for large and small fish alike. The structure consists of 59 sections of rough cut timber that rang from $1 \times 4 \times 24$ to $2 \times 3 \times 48$, nine concrete blocks to allow it to sink to the bottom, and nails. Small conifer trees may also be placed in the box once built to add additional cover. This habitat structure is used much the same as the Porcupine crib.

Placement is normally at a minimum depth of 10ft. and more often then not they are placed in clusters. The main difference being the Vertical plank structure has openings that are much larger in size allowing larger fish and other aquatic organisms to enter them. If located the Vertical Plank structure is an excellent place for anglers to try their luck for not only does it provide cover for bait fish but larger sized fish as well (PFBC¹).

Spider Hump and Rock Rubble Hump

The Rock Rubble Hump is the simplest artificial habitat structure there is as far as its general design is concerned. It consists of a pile of sandstone rock that stands anywhere from one to three ft. high and can be placed at any depth that is preferred. The Spider Hump is a more complex modification of the Rock Rubble Hump that is constructed using sandstone rocks, spikes, and 8ft. aquatic posts. A square is built with 8ft. posts then fastened down with spikes. Then 16 more evenly spaced posts are laid in the square and fastened down with all of the bottoms meeting in the center of the box. Once the posts are all placed three tons of rock is dumped onto the center of the structure to form a rock pile with wooden posts protruding providing excellent cover for all types of aquatic organisms. These habitat enhancement structures also provide excellent areas for fish species that prefer spawning in rocky areas (PFBC¹).

Stake Tree

The Stake Tree is constructed using a five gallon plastic bucket, 2×2 wooden stakes (varying in length), and concrete. To create a Stake Tree simply arrange 6 to 8 wooden stakes in any random order in the bucket then pour in concrete to harden and hold them in place. When completed place it anywhere where it's deep enough for it to become totally submerged and once placed it will replicate a submerged tree with branches. The Stake Tree can be placed in level or slightly steeping areas and in normally situated in groups of 10 to 30 structures or 50 to 60 per acre in a circular arrangement. These structures are excellent for attracting pan fish such as crappie and bluegill and are sure to provide fishing hot spots (PFBC¹).

Felled Shoreline Tree

The Felled Shoreline Tree habitat enhancement uses trees surrounding a lake or other body of water, a chain saw, and a steel cable to create ideal aquatic habitat. A Felled Shoreline Tree is formed but cutting down a tree along the edge of a body of water and angling it so it falls into the water. Once cut down the tree is fastened to the stump that is remaining with the steel cable to keep it in place. Although this is already a naturally occurring process among aquatic ecosystems it speeds up the process and allows the person creating the habitat to place the downed trees in favorable locations. The Felled Shoreline Tree structure is to be placed where the tree will fall into water that has a steep droop off and has a minimum depth of 10ft. towards the where the top of the tree will fall. These structures provide habitat for fish of all species and sizes (PFBC¹).

Habitat Enhancing Structures for Spawning and Nesting

Another purpose that Habitat enhancement structures are designed to improve is spawning and nesting sites available to aquatic organisms. There are several types of structures that are designed to provide nesting areas for specific types of fish species in Pennsylvania. These types of structures include the Black Bass Nesting Structure, Fathead Minnow Spawning Cover, and Channel Catfish Spawning Box. These three types of habitat structures all are designed to enable specific species of fish to reproduce efficiently buy building them the necessary habitat for each of their unique forms of breeding or nesting habits.

Black Bass Nesting Structure

The Black Bass Nesting Structure is built from wood, nails, and concrete blocks and when completed forms a table looking structure. It's constructed by building a base out of 4ft. pieces of 2×2 rough cut timber to place the concrete blocks in just as you would a porcupine box. Once the Blocks are in place for weights to make the structure sink to the bottom five 8ft. pieces of 1×8 rough cut timber are laid across the top with equal lengths of over hang on each side and nailed in place. The structures are placed in depths of about 5ft. and will provide ideal nesting sites for black bass species including the much sought after large mouth bass. The overhanging edges on opposing sides of the structure are about 14 inches from the bottom allowing bass to nest and lay their eggs underneath the cover it provides (PFBC¹).

Fathead Minnow Spawning Cover

The Fathead Minnow Cover habitat structure is very simple to construct and consists of nothing more then a 2ft. long 1×8 with one end being pointed and the other flat. To build Fathead Minnow Spawning Cover you use a sledge to pound the piece of 1×8 into the bank of a lake or other body of water at a depth of 1 to 2ft. The structure is to be driven into the substrate 3 to 6in. at a slight upward angle. For ideal success the recommended density of this structure is six per acre. Like most other fish species Fathead Minnows spawn seasonally occurring during the month of June therefore the structures may be removed once the spawning time period has expired (PFBC¹).

Channel Catfish Spawning Box

The Channel Catfish Spawning Box has one of the more complex structural designs, among the materials need to build this structure are 8ft. 1×8 boards, 16×16 concrete blocks, nails, and lag screws with washers. Using the boards a rectangle is constructed that is 32in. long 16in. wide and 10in. high. The box has a entrance hole 6in in diameter and two $\frac{1}{2}$ in. air release holes on the top of the box towards the entrance hole. Two 16×16 concrete blocks are fastened to the bottom of the structure for anchors using the lag screws. Once completed the Channel Catfish Spawning Box is placed in 3 to 5ft. of water. When placed the structure will provide the Channel Catfish with a place to spawn or simply use for cover (PFBC¹).

Habitat Enhancing Structures for Basking

These types of structures are designed primarily for reptile species and are essentially small floating dock like structures anchored down to provide organisms like turtles with an island refuge from the water. Basking structures benefit more then just the organisms that use them for retreat form the water. They also provide cover for fish just the same as a boat dock would. There is one main type of basking structure design in Pennsylvania and it's called the Turtle Basking Platform.

Turtle Basking Platform

The Turtle Basking Platform involves quite a variety of materials to construct. Materials needed to build this structure are 2ft. and 4ft. 1×8 rough cut lumber, 4ft. 4×4 rough cut lumber, various screws and bolts, stainless steel rope wire and cable clamp, PVC pipe and caps, sealer, conduit hangers, and $8\times8\times16$ cement blocks. A 4ft. \times 4ft. dock like structure is constructed form the rough cut timber and two capped PVC pipes serving as floats. The steel cables are then attached to opposing sides of the structure and the cement blocks are attached to the steel cables acting as anchors. These structures are placed in about 5ft. of water and can be placed alone or in clusters (PFBC¹).

Habitat Enhancing Structures for Erosion Control

These types of structures are designed to eliminate shoreline erosion and act as wave deflectors. They also deplete the amount of sediment eroded into the water and create a buffer zone for nutrient saturation. This is accomplished by laying seeded jute matting above the banks where the habitat enhancement is constructed. Jute Matting will reinforce the shoreline and add plant growth to absorb nutrients. Along with the water quality benefits this type of habitat enhancement offers it also provides more desirable cover for fish that prefer shallow waters along the shoreline. Therefore these structures benefit anglers that fish from shore as well as the aquatic organisms that live there. There are two types of erosion controlling or deflecting habitat enhancement designs in Pennsylvania, the Saw-Toothed Deflector and the Stone Framed Deflector.

Saw-Toothed Deflector and Stone Framed Deflector

These two types of structures are not only very similar in design and appearance but involve the use of all the same materials. Both are constructed using large sandstone or limestone boulders to form an outline and smaller sandstone or limestone rocks to fill in the interior of the structures. Also pre-seeded jute matting is used in the construction of these structures along the shore where rock meets dirt for accelerated plant growth and bank stability. The Saw-Toothed Deflector uses the rocks to form an irregular pattern along the shore where erosion is occurring. The Stone Framed Deflector places rocks in a triangular pattern consisting of a 30 degree angle from shore that meets a 90 degree angle coming back towards shore. The long face of the triangle should be facing the direction in which the wind and waves are coming from. Stone Framed Deflectors extend further out into the lake then Saw-Toothed Deflector thus provide more availability in the relation to fish habitat. Along with the construction of these habitat structures riparian buffers are often put in place where stone deflectors are located (PFBC¹).

Habitat Enhancement Structures for Streams

All of Pennsylvania's Rivers and streams are ever changing as the years go on. These changes develop naturally and can occur over the course of several years or just a couple days if flooding is sever enough. Changes among rivers and streams are caused by the systems natural urge to find equilibrium or the most stable direction of flow. This natural urge can cause the river or stream to wind back and forth and ultimately ruin the systems livability for more demanding aquatic organisms like trout. This is because constant bends and breaks in a running waterway causes it to become shallow, slow moving, and can in turn limit livable space for aquatic organisms. For this reason the Pennsylvania Fish and Boat Commission along with other conservation groups have developed ways to improve the course of a moving system while respecting the desired course of the waterway at the same time. These improvements often involve the use of heavy equipment and are constructed from natural materials such as wood and rock. A common solution that man made habitat enhancement structures provide for a moving aquatic ecosystems is straightening of its natural flow. By straightening the systems flow the river or stream will eventually move faster and deepen over the span of several years in turn providing more livable space and desirable habitat. Many of the created habitat structures also serve a double purpose for aquatic organisms by offering cover for them to hide amongst (Lutz, 2007).

There are various aquatic enhancements and habitat structures that are installed in Pennsylvania's streams and river systems. Sometimes they just involve stream bank stabilization or placement of woody debris for fish cover, but there are several man made habitat structures that involve quite elaborate designs and a lot of work to construct. All habitat structures require proper permits to build and place just as the habitat structures constructed for lakes. The most common types of structures that are constructed within streams are deflectors and Vanes. Both are mainly constructed to divert channel flow. There are also channel blocking structures that are made to block off side channels that drain from the main flow. And lastly there structures designed to provide habitat cover for aquatic organisms. These consist of Water Jacks, Cribs, and random rock or log structures (Lutz, 2007).

Channel Deflecting Structures

Deflectors are triangular structures of all different sizes that serve several purposes and can be constructed from all sorts of materials ranging from rocks to brush and even tree roots. One thing that a deflector does for a stream is adjust the main current back to the center of the waterway. While doing so the deflector narrows the channel of flow and collects substrate and debris along the bank below the structure which also deepens the waterway. Deflectors also provide some habitat cover for aquatic species such as fish. Another type of habitat structure designed for streams are Vanes. A Vane serves the same purpose as a Deflector and is constructed from basically the same materials. Types of Vane and Deflector structures include Saw-Toothed Deflector, Stone Deflector, Stone Deflector, Brush Deflector, Root Wad Deflector, Single Log Vane, Single Log Vane with Root Wad, Multi-Log Vane, Rock Vane, Rock Vane, Rock Vane, Rock Cross Vane.

Saw-Toothed Deflectors, Stone Deflectors, and Stone Deflector with Single Log

Saw-Toothed Deflectors are made form stone and are the simplest of the deflectors to construct. This habitat structure is made by dumping rock in the formation of triangles along the stream bank with a 30 degree angle facing the upstream end to center the current. They are to extend 5ft. out into the stream and are placed in groups of anywhere from three to as many needed. Stone Deflectors are built the same as the Saw-Toothed but tend to be larger and are placed alone instead of in groups. The Stone Deflector with Single Log is modified slightly from the others having a log buried in the rock pile that protrudes out from the tip of the deflector angling upstream against the flow. This is just to provide additional cover for fish and other aquatic organisms (PFBC¹).

Log framed Deflector, Overhead Deflector, Log Faced Stone Deflector, and Stacked <u>Deflector</u>

The Log Framed Deflector is designed to server the same purpose as the Stone Deflector and is constructed the same way just with a triangular frame built from logs. The main log is placed along the face against the flow at a 30 degree angle and the brace log is put along the back side. The two logs are buried in the bank on the shore side and are pinned down at the tip with rebar. The Overhead Deflector is the same design but uses planking to fill in the deflector before the rock place as filler. As for the Log Faced Stone Deflector it's nothing more then a Stone Deflector one or two logs placed on the 30 degree face of the structure that diverts the current. The face log or logs are fastened to sill logs that are buried under the stone inside the structure. All three of these habitat enhancement structures are designed for current diversion and can double as cover for fish and other organisms like macro invertebrates (PFBC¹).

Brush Deflector and Root Wad Deflector

The Brush Deflector is a type of deflector that has many benefits. It's constructed from wooded stakes and brushy debris. This type of deflector is built by pounding the stakes into the bottom of the stream leaving about $2\times2ft$. square spaces in between. The stakes should form a triangle pointing towards the middle of the stream and each stake should protrude about 6 inches from the streams surface. Once the stakes are in place the spaces between stakes are stuffed with bundles of brush until it's built up to above normal water level. This structure will eventually develop growth over of the brush pile and become land that can be walked on forming a permanent deflector. The Root Wad Deflector is simply a root wad or lower portion of a tree that is placed with the root mass in the water and the trunk buried within the streams bank. This habitat structure acts as a deflector for current but server more as a cover provider. Aquatic Organisms use the entangled mass of roots for cover from predators (PFBC¹).

Single Log Vane, Single Log Vane with Root Wad, and Multi-Log Vane

The Single Log Vane and Single Log Vane with Root Wad are current deflecting structures and are designed to center the streams flow, prevent stream bank erosion, and provide cover for aquatic organisms. These habitat structures are constructed from logs and rock. A Single Log Vane is built by burying a log in the stream bank then pouring stone over the end that is stuck in the back to hold it in place. A larger stone is also placed behind the tip of the log in the stream for added strength. The log is to be pointed upstream against the flow at a 20 to 30 degree angle. Single Log Vane with Root Wad is the same structure with a root wad deflector added on the downstream side of the structure for added cover and current deflection. The Multi-Log Vane is another similar structure that is built the same as the single log vane but as the name states multiple logs are placed in the stream bank to protrude into the stream instead of a single log. This structure may be used when there are stronger currents or larger streams for added stability (PFBC¹).

Rock Vane and Rock Vane with J Hook

The Rock Vane and Rock Vane with J Hook are two other vane structures that are constructed from only rock. A Rock Vane is built by making a line of larger stone out into the stream at a 90 degree angle. Then the upstream side of the structure is filled in with smaller rock forming a triangle. The Rock Vane with J Hook is the same structure just with a hook made from stone coming off the tip of the vane that curves downstream. These structures tend to deflect the current and form deep slow pools for aquatic habitat (PFBC¹).

Log Cross Vane and Rock Cross Vane

The Log Cross Vane and Rock Cross Vane are designed to center flow and create a deepened pool with a fast moving current on the down stream end of the structure. These can form damming barriers in low water conditions but when water levels are normal to high the water is carried over the structure and cuts into the bottom forming deep holes that are desirable for anglers. These structures are nothing more then two vanes built on opposing sides of a stream with their tips meeting in the middle to be fastened down. Log Cross Vane being made up of two opposing Single Log Vanes and the Rock Cross Vane being made up of two opposing Rock Vanes (PFBC¹).

Channel Blocking Structures

Channel blocking structures are habitat structures that are constructed to divert the flow of a stream back to its main channel. Over time streams can develop side channels from flooding that can deplete the amount of water as well as strength of current from the main channel. This can cause poor habitat for fish and other organisms that desire cool fast flowing waters and at the same time can impact the health of the stream. Channel blocking structures use natural materials to block these side channels off and correct the flow. There are two types of channel blocking structures these being the Stone Channel Block and The Log Frame Channel Block.

Stone Channel Block and Log Frame Channel Block

The Stone Channel Blocker is simply a wall build from piling rock to block off side channels. A pile of larger rock is dumped right where the side channel flows out then a layer of smaller rock and another layer of the larger rock. The rocks are piled slightly higher then the normal water level and should not be piled higher then the surrounding stream banks. The Log Framed Channel Blocker is built in the same way but involves log frame for added strength. The log frame consists of 2 logs placed across the side channel perpendicularly that are connecter by several brace logs that are fastened down with rebar. Once the frame is in place large rocks are poured over the edged and along the structures down stream face in the side channel. Then smaller filler rocks are dumped on to fill in the frame and other remaining space.

These structures keep the main flow of the stream going in the proper direction improving the overall quality of the stream (PFBC¹).

Cover Providing Structures

There are several different variations of habitat structures that provide aquatic organisms with cover. The simplest forms of these structures are the Random Boulder Placement and the Half Log Structure. Both are quick and easy to construct and their soul purpose is to provide cover for organisms such as fish. Another type of habitat structure that is designed to provide cover is the cribbing structure. There are several different types of these structures including Bank Cover Cribbing, Bank Cover Cribbing with Root Wad, Mud Sill Cribbing, and Modified Mud Sill Cribbing all of which including the same basic design. These structures are designed to be placed along stream banks to allow fish and other organisms to swim under them for cover while also doubling as bank stabilizers.

Random Boulder Placement and Half Log Structure

Random Boulder structures are just as they sound. The Structures consist of boulders that are large enough to withstand flooding conditions being placed in the middle third of the wetted width of a stream. The boulders should protrude from the water's surface and should not be placed in a way that they would deflect the current of the stream towards the bank causing erosion. These habitat structures are very basic and easy to construct. The Half Log Structure consists of rebar, two 6 to 8 inch spacer logs, and a 3 to 4 foot long half log to be placed as the top. To construct this habitat structure the spacers and top are put in place and then fastened into place by pounding rebar through the top piece and spacer right into the stream bottom using preexisting drilled holes. The structure is to be placed parallel to the flow of the stream with the top slightly protruding from the water's surface. Both of these habitat structures are excellent for providing fish cover as well as cover for other aquatic organisms (PFBC¹).

Brookie Water Jack and Water Jack

The Water Jack and Brookie Water Jack are similar structures that basically serve the same purpose. Both are designed to dam up and center stream flow eventually creating a deepened pool on the down stream side of the structure for organisms to live in. The Brookie Water Jack is smaller and a little simpler to construct because it is designed to be built in small fast moving streams that inhabit brook trout thus giving it the name. These structures are built from logs, rock, and a sheet of hemlock planking. A single log is placed across the stream and buried in the ground on both sides for strength. Then the sheet of planking is placed on the upstream face of the structure forcing the water to flow up and over. A notch is also to be cut in the middle of the sheet of planking so that water is still able to flow in low water conditions and when high will center the streams flow. On each side of the log along the bank rock deflectors are placed over the log to center the flow and add strength. The Basic Water Jack is a more elaborate habitat structure designed to be placed in larger streams yet is designed to serve the same purpose. It consists of the same materials the Brookie Water Jack does but it uses more logs. At the center two logs are placed along the stream perpendicular to the flow and another is placed up stream in the same way. Then the piece of wooden planking is placed over the logs at an upward steeping angle connection the gap to force the flow of water up and over the structure. Once this part is completed wing logs are placed along the sides forming structures similar to Log Framed Deflectors that keep the flow of the stream centered and the stream banks from eroding. The water jack structures provide deep pools of cold fast moving water for all sorts of aquatic organisms to thrive in. these structures also server as bank erosion controllers and channel deflecting structures. Overall they are very beneficial to a streams habitat and are very beneficial (PFBC¹).

Bank Cover Cribbing and Bank Cover Cribbing with Root Wad

Cribbing structures are made from logs rock and planking boards. A Bank Cover Crib is constructed along the bank of the stream and is designed to act as an undercut bank for fish to hide under. This habitat structure is build by taking planking boards and driving them into the stream bank in a row to form a platform that extends out over the stream about 2 feet. With the platform in place a logs are fastened to the top and bottom of the platforms edge that hangs over the stream. The portions of the logs that extend further then the platform are buried in the ground for added support. Once there is a sturdy overhanging platform structure completed rocks are dumped over the plank platform to build it up to level with the stream bank. The Bank Cover Cribbing with Root Wad is build the same way as the Bank Cover Cribbing but has root wads protruding from under the structure for added cover. The root wads are buried in the stream bank and extend out from underneath the providing excellent habitat for aquatic organisms to hide amongst (PFBC¹).

Mud Sill Cribbing and Modified Mud Sill Cribbing

The Mud Sill and Modified Mud Sill Cribbing are similar I design to Bank cover Cribbing structures. The Mud Sill Cribbing is built in 8ft. sections and is made from oak planking, logs, and rock. To construct this type of habitat structure you must first dig ditches in the stream bank for the logs to lie in. Once the logs have been laid a platform is built over the part of the structure that hangs over the stream using the oak planking. When the platform is completed rocks are dumped over the top of the structure at an angle leveling it off with the stream bank. The Modified Mud Sill Cribbing it constructed in the same fashion but instead of being designed so the current can freely flow underneath the structure the up stream and down stream ends of the structure are brought down all the way to the bottom of the stream just leaving an undercut that can be gotten under from the front. Also a log is placed protruding into the water on the downstream end of the structure to deflect the current back under the structure and create an undercut. These habitat structures are very efficient in creating cover for organisms like trout and other fish species serving as good fishing spots for anglers. The Mud Sill and Modified Mud Sill Cribbing structures also prevent stream bank erosion and provide bank stability (PFBC¹).

References:

- Lutz, K.J. (2007). *Habitat improvement for trout streams*. Retrieved August 24, 2010 from Pennsylvania Fish and Boat Commission website: http://fishandboat.com/water/streams/ habitat_improve_trout.pdf.
- Pennsylvania Fish and Boat Commission¹. (n.d.).Habitat improvement. Retrieved August 24, 2010 from Pennsylvania Fish and Boat Commission website: http://fishandboat.com/habitat.htm.
- Pennsylvania Fish and Boat Commission². (n.d.). PFBC cooperative fish habitat management programs for lakes. Retrieved August 24, 2010 from Pennsylvania Fish and Boat Commission website: http://fishandboat.com/water/habitat/mgmt_plans/lake/intro_lake_hab.htm.

APPENDIX T. SUMMARY OF HYDRAULIC FRACTURE SOLUTIONS-MARCELLUS SHALE

		SUMM	ARY OF HYDRAULIC FRACTUR	E SOLUTIO	NS - MARCE	LLUS SHALE		
Product Vendor	Application Sequence	Product Name	Hazardous Components (From MSDS)	Hazardous Ingredient Weight %	Pounds of hazardous ingredient / pound water	Gallons of Frac solution per stage	Concentration in Frac Solution (ppm)	EPA Risk Based Concentration - Residential Tapwater (ppm)
BIS	1	HCI	Hydrachloric Acid	8%	0.015834	2000	83.68	
	· · · · · · · · · · · · · · · · · · ·	CI-14	Proparavl Alcohol	5%	0.00004327	2000	0.00	0.073
	1		Methanol	68%	0.000588472	2000	3 11	18
		Ferrotrol 300L	Citric Acid	70%	0.0035	2000	18.50	

	2	XLW-32	Methanol	90%	0.001593	42000	176.79	18
			Boric Oxide	20%	0.000354	42000	39.29	
		GW-3LDF	Petroleum Distaliate Blend	60%	0.00321	42000	356.24	
			Polysaccharide	60%	0.00321	42000	356.24	
		GBW-20C	no hazardous ingredients	0%	0	42000	0.00	
-		BF-7L	Potassium Carbonate	100%	0.0005725	42000	63.53	
		GBW-15L	Sodium Chloride	14%	0.000154	42000	17.09	
	3	FRW-14	Hydrotreated light distillate	40%	0.000424	334000	374.20	
			Ethoxylated Alcohol	5%	0.000053	334000	46.77	
		Alpha 125	Glutaraldehyde	30%	0.0000798	334000	70.43	
Fractech	1	HCL	Hydrochloric Acid	8%	0.0168896	2000	89.26	
		40 HTL	Methanol	10%	0.0002	2000	1.06	18
		NE100	Methanol	5%	0.0000485	2000	0.26	18
		FE100L	no hazardous ingredients	0%	0	2000	0.00	
	2	HVG-04	no hazardous ingredients	0%	0	42000	0.00	
		B9	Potassium Hydroxide	20%	0.000206	42000	22.86	
		BXL-2	Potassium Hydroxide	10%	0.000117	42000	12.98	

TABLE 1

		SUMM	ARY OF HYDRAULIC FRACTUR	E SOLUTIO	NS - MARCE	LLUS SHALE		
								EPA Risk Based
					Pounds of		Concentration	Concentration -
				Hazardous	hazardous	Gallons of Frac	in Frac	Residential
Product	Application		Hazardous Components (From	Ingredient	ingredient /	solution per	Solution	Tapwater
Vendor	Sequence	Product Name	MSDS)	Weight %	pound water	stage	(ppm)	(ppm)
					-	-	<u> </u>	
	3	ICI-3240	Dazomet	24%	0.0000696	334000	61.42	
			Sodium Hydroxide	4%	0.0000116	334000	10.24	
		ICI-150	Glutaraldehyde	50%	0.00014125	334000	124.66	
		19.92 m 19.92 m 19.92 m	Methanol	5%	0.000014125	334000	12.47	18
		FRW-50	Diesel (use discontinued)	20%	0.000194	334000	171.21	1
		FRW-25	no hazardous ingredients (used in place of FRW-50)	0%	0	334000	0.00	-
Universal	1	Iron Check	no hazardous ingredients	0%	0	2000	0.00	1917 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
		HCI	Hydrochloric Acid	8%	0.0168896	2000	89.26	
					11			
	2	Unilink 8.5	Ethylene Glycol	40%	0.00111	42000	123.19	73
			Boric Acid	7%	0.00019425	42000	21.56	
		GBL-8x	n/a	0%	0	42000	0.00	
		Unigel 19XL	no hazardous ingredients (guar gum)	0%	0	42000	0.00	· · · · · · · · · · · · · · · · · · ·
	3	FRP-21	no hazardous ingredients	0%	0	334000	0.00	
		Bioclear 200	2,2-Dibromo-3-Nitrilopropionamide	20%	0.0000625	334000	55.16	
			Polyethylene Glycol Mixture	60%	0.0001875	334000	165.48	
Halliburton	1	HAI-OS	Methanol	60%	0.001068	2000	5.64	18
			Propargyl Alcohol	10%	0.000178	2000	0.94	0.073
		FE-1A	Acetic Acid	60%	0.001235042	2000	6.53	
			Acetic Anhydride	100%	0.002184454	2000	11.54	
		HCI	Hydrochloric Acid	8%	0.0168896	2000	89.26	
	2	K-34	Sodium Bicarbonate	100%	0.001271735	42000	141.13	
		BC 140	Monoethanolamine	30%	0.000523988	42000	58.15	
			Ethylene Glycol	30%	0.000566485	42000	62.87	73
			Boric Acid	30%	0.000608982	42000	67.58	
		Delta Frac 140	no hazardous ingredients	0%	0	42000	0.00	

		SUMM	ARY OF HYDRAULIC FRACTURI	E SOLUTIO	NS - MARCE	LLUS SHALE		
								EPA Risk Based
					Pounds of		Concentration	Concentration -
				Hazardous	hazardous	Gallons of Frac	in Frac	Residential
Product	Application		Hazardous Components (From	Ingredient	ingredient /	solution per	Solution	Tapwater
Vendor	Sequence	Product Name	MSDS)	Weight %	pound water	stage	(mqq)	(ppm)
	1			-	•			
	3	FR-46	Ammonium Bisulfate	30%	0.000375	334000	330.95	
		Aldacide G	Glutaraldehyde	30%	0.0000798	334000	70.43	
							-	
			Glycol Ether (ethylene glycol					
Superior	1	AI-2	monobutylether)	30%	0.000291	2000	1.54	18
			Propargyl Alcohol	30%	0.000291	2000	1.54	0.073
			Isopropyl Alcohol	30%	0.000291	2000	1.54	
			Proprietary Component	7%	0.0000679	2000	0.36	
		IC-100L	Cirtic Acid	100%	0.00154	2000	8.14	а.
		OB-Fe	Propylene Glycol	40%	0.000452	2000	2.39	730
			Ferrous Sulfate, Heptahydrate	30%	0.000339	2000	1.79	
		Super OW-3	Isopropyl Alcohol	40%	0.00018	2000	0.95	
			Methanol	13%	0.0000585	2000	0.31	18
		Super Pen 2000	Ethylhexanol	70%	0.000322	2000	1.70	
			Proprietary Component	30%	0.000138	2000	0.73	
		Super 100NE	Isopropyl Alcohol	30%	0.00015525	2000	0.82	
			Glycol Ethers	7%	0.00007245	2000	0.38	18
		HCI	Hydrochloric Acid	8%	0.0168896	2000	89.26	
	3	Bioclear 200	2,2-Dibromo-3-Nitrilopropionamide	20%	0.0000625	334000	55.16	
			Polyethylene Glycol Mixture	60%	0.0001875	334000	165.48	
		SAS-2	Hydrotreated Light Distillate	30%	0.000306	334000	270.06	
			Mineral Spirits	25%	0.000255	334000	225.05	
			Propylene Glycol	25%	0.000255	334000	225.05	730
			Ethoxylated Alcohols	4%	0.0000408	334000	36.01	

Source: http://www.dep.state.pa.us/dep/deputate/minres/oilgas/FractListing.pdf

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APPENDIX U. INTERVIEW AND SURVEY QUESTIONS

Interview Questions

- 1. How has the area changed in the past 10 years in terms of...? Were these changes good, bad, indifferent?
- 2. How do the following meet the needs of the community? (Are the quantities sufficient, insufficient, or satisfactory? Are they in good condition or in need of repair/improvement?) Do you have any proposed solutions or management recommendations?
 - a. Transportation –area roads, public transportation, availability or ease of using alternative transportation (biking, walking trails, etc.) to get around the area
 - b. Infrastructure water and sewer lines, communications (cell phone reception, Internet service, etc.)
 - c. Employment opportunities
 - d. Educational opportunities
 - e. Land-use ordinances & zoning
- 3. Do the recreational opportunities currently meet the needs of the community and visitors?

(Are there too many, not enough, or a sufficient number? What condition are they in? Are they easy to access?) Do you suggest any improvements or additions to the recreational opportunities throughout the area?

- a. Parks/Picnic Sites
- b. Hiking/Biking Trails
- c. Off- Road Vehicle Riding
- d. Scenic Vistas/Photography
- e. Wildlife/Bird Watching

- f. Hunting/Fishing
- g. Boating/Swimming
- h. Historical Sites/Structures
- i. Other
- j. Winter Recreation
- 4. What are some of the positive features of the watershed/area? (Please consider both ecology and social/community features in your answer, from water quality to economics.) What is one of the strongest or most attractive features/characteristic of the watershed area?
- 5. What impacts (positive or negative) are currently affecting the land, water, and biological resources? What positive/negative impacts are affecting the community character of the region? What impacts are affecting the local economy?
- 6. Do you have any specific projects or type of projects you would like to see identified in the plan? (Examples: Stream access locations for fishing/paddling; Erosion control projects; Trail development or linkages; Dirt and gravel road improvements; Restoration

of a particular site or area affected by abandoned mines or mine refuse; Illegal dumpsites to be cleaned-up; Invasive plant infestations to control; Important natural areas to protect.)

- 7. What must the watershed conservation plan include to be successful?
- 8. Do you have any other concerns that we have not discussed?
- 9. Do you know of any other people we should ask to interview?
- 10. Do you have any questions or comments before we conclude this interview?

Survey Questions

Municipal Surveys

- 1.) Does your municipality have a comprehensive plan? **YES or NO** If yes, what is the name of the plan(s) and when was it adopted?
- 2.) Does your municipality currently utilize zoning? YES or NO Does your municipality currently utilizing subdivision ordinances? YES or NO Does your municipality have floodplain ordinances? YES or NO
- 3.) Are there any municipal parks in your municipality? If yes, please list them?
- 4.) a. Does your municipality have any public water services in the project area? **YES or NO** Supplier_____

b. Do you foresee the need to upgrade or establish a public water supply in your municipality in the project area within the next ten years? **YES or NO**

5.) a. Does your municipality have any public sewage systems in the project area? **YES or NO** Treatment System ______

b. Do you foresee the need to upgrade or establish a public sewage system in your municipality in the project area within the next ten years? **YES or NO**

6.) Who provides emergency services, such as:

Police _	
Fire	
EMS _	

7.) Is there anything unique, or well known about your municipality that you would like to have highlighted in the plan?

8.) Comments

Public Surveys

Residents & Visitors

Continued

* Please use the following scale for the next three questions, each number can be used more than once.

- 5 = Very Important
- 4 = Somewhat Important
- 3 = Neutral
- 2 = Not very Important
- 1 = Not Important

3. Please indicate the importance of the following watershed values.

- Attractive Natural Settings Community Activities Educational Opportunities New Business/Jobs Preserving History/Culture
- Recreation Opportunities
- Residential Development
- Water Quality
- ____ Other _____

4. Please indicate the importance of the following recreational activities in the region.

ATV Riding Biking Bird/Wildlife Watching Boating Canoeing/Kayaking Fishing Hiking Horseback Riding Hunting Organized Sports Photography Picnicking Snowmobiles Swimming Visiting Public Parks Visiting Public Vistas Other



5. Please indicate the importance of addressing the following issues in this plan.

- Preserving Agricultural Lands ATV/Snowmobile Conflicts Infrastructure (roads, water/sewage, etc.) **Economic Development Environmental Education Erosion & Sedimentation** Flooding Forestry Techniques Historical & Cultural Heritage Illegal Dumping & Litter **Invasive Species** Mine Drainage/Mine Lands Storm Water Runoff **Tourism Impacts** Waste Sites/Hazardous Spills Water Quality/Quantity Wildlife/Fisheries Habitats Other

2. 3.

7. Other comments or concerns.

Thank you for completing this survey.

<u>Return Instructions</u>: You may cut off and keep the informative panel with our contact information. Next, please refold the pamphlet, tape (do not staple), and place it in the mail with proper postage (one first class stamp).





Complete a Survey and You Could Win!

Prize package includes donated items from local project partners

The goal of the Allegheny River Headwaters Watershed Conservation Plan is to engage the public to educate and encourage stewardship of natural resources and to foster cooperation between local conservation partners and communities to improve the quality of life throughout the region.

sident

Only individuals with permanent residence within the

project area (see map on left)

Please Mark One

- 1. In what county and municipality do you reside? County County _____ Municipality _____
- 2. Near what part of the Allegheny River watershed do you reside?
- Allegheny River \diamond
- Oswayo Creek \diamond
- Potato Creek \Diamond
- Tunungwant (a.k.a. Tuna) Creek \Diamond
- \Diamond Don't Know
- Other _____ \Diamond

How long have you lived in the area? 3.

\diamond	Less than 1 year	\diamond	31-40 years
\diamond	1-10 years	\diamond	41-50 years
\diamond	11-20 years	\diamond	51-60 years
\diamond	21-30 years	\diamond	60+ years

4. How far do you travel to work?

- Less than 1 mile \Diamond
- 1-15 miles \Diamond
- 16-30 miles
- 31-45 miles \Diamond
- 46-60 miles \Diamond
- \Diamond N/A
- Farther \Diamond

Please continue with "Residents & Visitors" at far right





- 1. Do you own property in the Allegheny River headwaters region?
- \diamond Yes ♦ No
- How far did you travel to visit? 2.
- Less than 1 mile \Diamond \diamond 91-120 miles 1-30 miles 121-150 miles \Diamond \Diamond 31-60 miles 151-180 miles \diamond \Diamond
- 61-90 miles \diamond

5-6 days

4.

 \diamond

 \Diamond

How long did you stay on this trip? 3.

- Less than one day \diamond One week \Diamond 1-2 days \Diamond A week and a half \Diamond 3-4 days \Diamond ♦ Two weeks
 - \diamond Longer

Approximately how much money did you spend?

 \diamond

- Less than 100 dollars \diamond
- \Diamond 100-500 dollars
- \Diamond 3,000-5,000 dollars 5.000+ dollars \diamond

2,000-3,000 dollars

♦ Farther

- 500-1,000 dollars 1,000-2,000 dollars

What were your two biggest expenses? 5.

- Travel/Gas \diamond
- Food/Lodging \Diamond
- Recreation/Supplies \diamond
- Souvenirs \Diamond
- \Diamond

What was your reason for visiting? 6.

Business \Diamond

 \Diamond

 \diamond

 \Diamond

- Recreation/Vacation ♦ Other
- Family/Friends Passing through
- 7.
- \Diamond First time
- Seasonal \diamond
- Yearly \diamond
- Occasionally (every 2-5 years) \diamond
- Every 5+ years \diamond

Do you plan to return to this area? 8.

Yes

 \Diamond No



(Optional)

1.	What is your gender?		
\diamond	Male	\diamond	Female
2.	What is your age?		
\diamond	17 & under	\diamond	46-65
\diamond	18-25	\diamond	66 & up
\diamond	26-45		



1. What do you think are the two most important land uses in the Allegheny Headwaters region?

\diamond	Agricultural	\diamond	Industrial
\diamond	Commercial	\diamond	Recreation
\diamond	Forested	\diamond	Residential
\diamond	Other		

2. Where did you obtain this survey?

- \Diamond Business/Restaurant \diamond Watershed group
 - Event

 \Diamond

 \Diamond

- \diamond Website
- State park/state forest \diamond Other

Please continue with "Residents & Visitors" on reverse

prize e the ceived
-

- Others _____
 - \diamond
- How often do you visit?

APPENDIX V. PUBLIC COMMENTS

Issue, concern, or comment

Action taken

Public Meetings

Add Sierra Club, Pennsylvania chapter to Appendix Q.	Added
Address radioactivity of Marcellus shale gas extraction.	Marcellus shale sections in
	Chapter 2 and Chapter 3 were
	amended
Distinguish between active, abandoned, and Marcellus shale gas	Map revised
wells on map 2-4.	
Address further concerns related to Marcellus shale gas	Marcellus shale sections in
exploration, including wastewater management, inter-basin	Chapter 2 and Chapter 3 were
transfer of water, lack of a river basin commission to regulate Ohio	amended
Basin, water quantity/availability, etc.	
Reword Management Recommendation Goal 2-7, Objective 1	Objective reworded
from "'redevelop' golf course" to "'restore' golf course	
area to a more natural open space setting.	
Page 5-2, Andy Pantuso Memorial Ball Field misspelled	Corrected
Appendix G. illegal dumpsite #29 Hedghog Lane misspelled in	Corrected
two places	
Appendix R. page 21 forward, table extends to next page causing	Corrected
formatting errors	
Page 6-15 Pantuso misspelled again	Corrected
Page 6-21 section header for Land-use Ordinances and Zoning	Corrected
separated from body of text below.	
Add "frack" to Appendix A. Glossary.	Added
Add gridlines to Appendix H to make it easier to read	Reformatted
corresponding designation.	
Amphibians is misspelled in Appendix K.	Corrected
Emphasize education in management recommendations	Recommendations specifically
	related to education and funding
	are included throughout chapter 7

Inc

Individual (Bill Knight)	
Chapter 1 – Project Area Characteristics – Socioeconomic Profile – Transportation and Safety: please expand the Public Transportation section to detail services offered by the Area Transportation Authority of North Central Pennsylvania (ATA) http://www.rideata.net and Fullington Trailways (FT) http://www.fullingtontours.com. Currently, the ATA has limited fixed route and/or call a bus service within all counties of the Allegheny River Headwaters Conservation Plan. One daily round trip from Pittsburgh to Buffalo, via route 219 is scheduled by FT.	Section amended to include this additional information
Chapter 3 – Water Resources – Location – Tunungwant Creek: please include the warm water fisher (WWF) tributary of Kendall Creek within the Tunungwant Creek summary paragraph.	Kendall Creek was added to the summary

P.O. Box 253 Roulette, PA 16746

Issue, concern, or comment	Action taken
Pennsylvania Department of Conservation and Natural Resources – Bureau of Recreation and Conservation	
Please check the captions in the text for consistency regarding the use of periods and capitalization	All captions reviewed and
Priorities need to be listed for the goals and objectives listed in the Management Recommendations chapter.	Management recommendations were prioritized by the public during the draft review period
Please list the contact information for all of the funding sources listed in Appendix M.	Contact information was included for all funding sources
Roulette Township	
Our correct address is: Roulette Township 80 Railroad Ave.	Address corrected in Appendix Q and on distribution list for final plan mailing



Conservation Guidance for Landowners on Natural Gas Development June 2010

Natural gas exploration and extraction activity have increased significantly across western Pennsylvania in recent years. Extraction of natural gas, much like any extractive activity, can have negative effects including serious environmental impacts. Western Pennsylvania Conservancy believes that conservation of the landscape and landowner management goals should be carefully considered prior to entering into a natural resource extraction lease agreement. Conservation features on the property that may need additional protection measures include but are not limited to the following: any water features such as streams, springs, seeps, and wetlands; steep slopes (generally those having a slope of 20% or greater); intact forests; wildlife habitat; native flora and fauna; natural vegetation and floodplain areas; recreational activities and scenic vistas.

It is important for the landowner to be aware of any potential negative impacts, as well as their rights as a landowner to control and guide any potential extractive use on their land. More specifically, in order to conserve the landscape, landowners should work with the land agent to carefully establish guidelines and develop an addendum to the lease agreement that permits recovery of this resource while at the same time promoting protection of ecologically-sensitive landscapes that include natural communities and species habitat.

Site visit

Upon request for a lease, the landowner should meet with the interested party and conduct a site visit on the property to identify potential impacts to the ecological resources on the land. This evaluation should consider:

- Conservation of natural communities, wildlife habitat, species of special concern
- Impacts to recreational opportunities and scenic vistas
- Degree of landscape fragmentation
- Potential effects upon hydrology, water quality, air and noise pollution
- Ability to significantly improve or restore degraded natural resources

The developer should use available data to locate plant and animal species of special concern (including without limitation searches or surveys the developer otherwise may be required to conduct pursuant to applicable environmental laws, or any searches or surveys conducted by a governmental entity). The site visit should occur prior to the start

of seismic work. A seismic plan should be submitted to the landowner which includes a map showing all proposed seismic lines and test hole locations, as well as conservation values and features as identified in the site visit.

For Marcellus gas development, one well pad can now be used with directional drilling technology to extract natural gas from more than one square mile of shale that is located over a mile underground. Therefore, a landowner may decide to sign a lease but not allow any surface drilling or other infrastructure such as roads and pipelines on the property, but allow the gas to be extracted from another property nearby. This may result in lower payments from the developer, but it may better protect ecological resources on the property. The remainder of these conservation considerations focuses mostly on leases where drilling or other surface activities are permitted on the land owners' property.

If a significant gas source is found and a project moves forward, the developer should coordinate with the landowner as to the location of all proposed development including placement of a well or wells, access roads and pipelines and any other facility or equipment that will support the proposed operation. If the developer proceeds with extraction, the landowner should make sure the following details are addressed:

- Indicate parameters where no drilling is to occur;
- Identify maximum number of wells drilled per site;
- Require lease to include erosion and sediment control plan to be completed by developer and approved by the landowner prior to any earthmoving activity including well site clearing, well pad construction, pipeline construction and access road enhancement; and
- Require submission of a restoration and re-vegetation plan to be completed by developer and approved by landowner which identifies specific steps taken to minimize site disturbance, and addresses any alterations in the land associated with the extraction or transmission activities.

Lease Agreement

All new leases should obtain a comprehensive insurance provision, indemnification and hold harmless clause to protect the landowner against degradation of ecological resources. Leases with an insurance provision should be enforced by the landowner (i.e. both proof of insurance and the landowner listed on the policy as an additional insured). The landowner should also require a performance bond to ensure the developer meets the terms of the agreement. All activities and operations must be in accordance with the laws of the Commonwealth of Pennsylvania. The developer must obtain and follow the appropriate permit application process, and secure a performance bond to ensure parameters for drilling are met.

Specific recommendations for items to include in the addendum to the lease agreement:

Master Site Plan – The developer should submit a master site plan to the landowner which would include the following:

(a) a map or plat indicating the location of each and every well drilled or proposed for drilling;

(b) a map or plat indicating the location of each existing potable and non-potable water well;

(c) a map or plat indicating the location of each potable and non-potable water well drilled or to be drilled;

(d) a route map indicating the location of each pipeline laid or to be laid;

(e) a map or plat indicating the location of each existing road proposed for use; (f) a map or plat indicating the location of each bridge, drain pipe or culvert pipe

to be constructed;

(g) a plat, diagram and/or schematics indicating the location, design, construction of each slush pit to be constructed together with a corresponding maintenance plan for each such pit;

(h) a map or plat indicating the location of stream, creek, brook, or wetland together with the location of each proposed drilling site and proposed clearing site near each such stream, creek, brook, or wetland; and

(i) a map or plat that contains information regarding locations of plant and animal species of special concern, as well as locations of natural communities.

Erosion and Sedimentation Control Plan – This plan should include the following:

(a) existing topographic features of the site;

(b) contours, ditches and other excavations;

(c) water bars or diversion channels for surface runoff to prevent siltation;

(d) settling basins;

- (e) spreading of gravel or shale on intercepting dips;
- (f) installation of silt fences;
- (g) stabilization of cut slopes;
- (h) stabilization of highwalls; and

(i) restoration and revegetation of the property as described in a restoration and re-vegetation plan.

Wells – To reduce fragmentation and invasive plant pathways, the developer should locate wells closer to previously disturbed or developed footprint (such as landings, roads, barrow pits, pipelines and wells). Such wells should be camouflaged or screened with native plants to reduce aesthetic impacts.

Water – Water quality and quantity should be carefully considered and monitored prior to and following the extraction activity. The developer should not contaminate or pollute springs, brooks, streams, wetlands, vernal pools or other waters on the property. Any water well usage should be restricted to drilling processes only. Water well usage should not be used for frac, stimulation or completion processes. The developer or its contractors and subcontractors should not construct earthen dams across any stream to obtain a water supply for its operations. Developer should remove all water used in drilling and fracing processes from the property including water developed from the well. In addition, the developer must supply the landowner with a plan to address water source pollution in the event of a leak.

Well Plugging – At its own expense, developer should properly and effectively plug all wells on the leased premises before abandoning, in accordance with the regulations of the Department of Environmental Protection's Bureau of Oil and Gas Management and all applicable laws of the Commonwealth. A copy of the Certificate of Well Plugging showing the plugging procedure used and submitted to the Bureau of Oil and Gas Management should be supplied to the landowner for each well plugged and abandoned. Parameters should be established to determine acceptable production rates. If production falls below the rate and is determined to be uneconomic (i.e., not in paying quantities) to maintain and operate, then developer should (a) plug and abandon the well and (b) restore the well site and access road to the satisfaction of landowner within a specified timeframe.

At the end of production, whether or not oil or gas is produced, the developer is required to cover all costs to plug the wells (according to Section 601.210 of the Oil and Gas Act) and restore all disturbed acres. All wells no longer in use should be plugged by the operator(s).

Pipelines – Where possible, pipelines should be laid within the boundaries of existing roads or rights of way, such as existing pipelines and transmission lines. Developer should submit a route map for each pipeline to the landowner for review and approval as to location prior to the laying of any line. Developer should keep the pipeline and right-of-way in good repair and appearance.

Drilling – It is best to limit the number of wells and number of disturbed acres. It is recommended that a buffer area (e.g. 300 feet) be included for all water sources (rivers, creeks, streams, wetlands, etc.) to prohibit drilling in certain areas. Clearing on steep slopes (those greater than 20%) should also be restricted.

Pits – Developer should prevent access of wildlife to pits or excavations dug for Developer's operations by erecting and maintaining fences. Developer should have thirty (30) days from date of completion of a well to reclaim the pit. Pits must be lined with an impervious liner, not merely clay. When drilling is complete, pit liner and its contents should be properly disposed offsite. Developer should ensure that each slush pit will consist of two (2) compartments; one to contain fluids materials from the drilling operations and the second to contain surface runoff from the drilling site. Appropriate buffers should be established for pits as well.

Roads – All road locations and grades must be identified in the Master Site Plan. The landowner should limit the size of all new roads (e.g., determine an appropriate road width to be 20 feet). The location of drilling operations should be close to existing roads to prevent further fragmentation of the property. Developer should construct access roads to drilling sites along existing pipeline rights-of-way, provided that a ten percent

(10%) grade can be maintained, as described in the Erosion and Sedimentation Control Plan. Road drainage structures should conform to the Environmental Sensitive Maintenance Principles of Penn State's Center for Dirt and Gravel Roads program.

Erosion Sedimentation and Grading – Topsoil disturbed during construction shall be stored on uphill side of disturbed area, saved and put back during reclamation. Developer should regrade and refill to contour any areas of land cleared for construction and infrastructure placement within ten (10) working days following disturbance and should reseed according to the restoration and revegetation plan. Temporary seedling should be required, in addition to permanent revegetation. Further, the developer should, at its own expense, secure, plant and maintain native species (consisting of grasses and/or trees or shrub seedlings) on all well sites, retired access roads, pipeline rights-of-way and other cleared areas.

Use of Department of Conservation and Natural Resources Gas Lease – The landowner may need to enter into a lease agreement that has more stringent terms than the standard lease agreement provided by the developer. WPC recommends using DCNR's 2007 gas lease as a guiding document.

Nothing in this document constitutes legal advice. Western Pennsylvania Conservancy recommends that any landowner considering entering into a natural gas lease agreement should obtain the advice of an attorney and a consultant specializing in natural gas leasing. In addition, many resources are available online that can provide basic information and education.

Penn State College of Agricultural Sciences Cooperative Extension: http://extension.psu.edu/naturalgas/publications

DEP, Bureau of Oil and Gas Management, Marcellus Shale http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/marcellus.htm

DEP, fact sheet *Landowners and Oil and Gas Leases in Pennsylvania* http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-44185/5500-FS-DEP2834.pdf

DCNR, Marcellus Shale research in Pennsylvania http://www.dcnr.state.pa.us/topogeo/oilandgas/marcellus.aspx