

# Allegheny River Headwaters Conservation Plan



Final Plan June 2011



Western Pennsylvania  
Conservancy



**pennsylvania**

DEPARTMENT OF CONSERVATION  
AND NATURAL RESOURCES



water, land, life.

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*This project financed in part by a grant from the Community Conservation Partnerships Program  
Environmental Stewardship Fund, under the administration of the Department of Conservation and  
Natural Resources, Bureau of Recreation and Conservation.*

The Pennsylvania Rivers Conservation Program

# Allegheny River Headwaters Conservation Plan

*June 2011*

Prepared for:

Upper Allegheny Watershed Association

Prepared by:

Western Pennsylvania Conservancy



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Ridgway, PA 15853



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## ACKNOWLEDGEMENTS

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A sincere acknowledgement and thank-you goes out to all the organizations, agencies, and individuals who dedicated their time and resources to make this project a success. Our apologies to anyone inadvertently omitted.

### *Allegheny River Headwaters Watershed Conservation Plan Steering Committee*

- Jim Clark
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- Linda Devlin
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- Pete Mader
- Matt Marusiak
- Sally Newton
- Ross Porter
- Jennifer Smith
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- Bradford Public Library
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- God's Country Chapter Trout Unlimited  
McKean County Conservation District
- McKean County Planning Commission
- 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
- Port Allegany School District
- Port Allegheny Veterans Memorial,  
Incorporated
- Potter County Conservation District
- Potter County Planning Commission
- Seneca Chapter Trout Unlimited
- Smethport School District
- Upper Allegheny Watershed Association

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## ACRONYMS

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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

MSWLF	Municipal Solid Waste Landfills
NASS	National Agricultural Statistic Service
NFIP	National Flood Insurance Program
NISIC	National Invasive Species Information Center
NOMA	Nutrient and Odor Management Act
NO <sub>x</sub>	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Pollutant List
NRCS	Natural Resource Conservation Service
OH-	Hydroxide Ions
PASDA	Pennsylvania Spatial Data Access
PDA	Pennsylvania Department of Agriculture
PDE	Pennsylvania Department of Education
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
PM	Particulate Matter
PNHP	Pennsylvania Natural Heritage Program
PNMP	Pennsylvania Nutrient Management Program
POWR	Pennsylvania Organization for Watersheds and Rivers
QDM	Quality Deer Management
RCRA	Resource Conservation Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SFHA	Special Flood Hazard Areas
SGL	State Game Lands
SMCRA	Surface Mine Conservation Recovery Act
SRBC	Susquehanna River Basin Commission
SSO	Sanitary Sewer Overview
TMDL	Total Maximum Daily Loads
TSF	Trout Stocked Fishery
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WNS	White Nose Syndrome
WPC	Western Pennsylvania Conservancy
WWF	Warm Water Fishery

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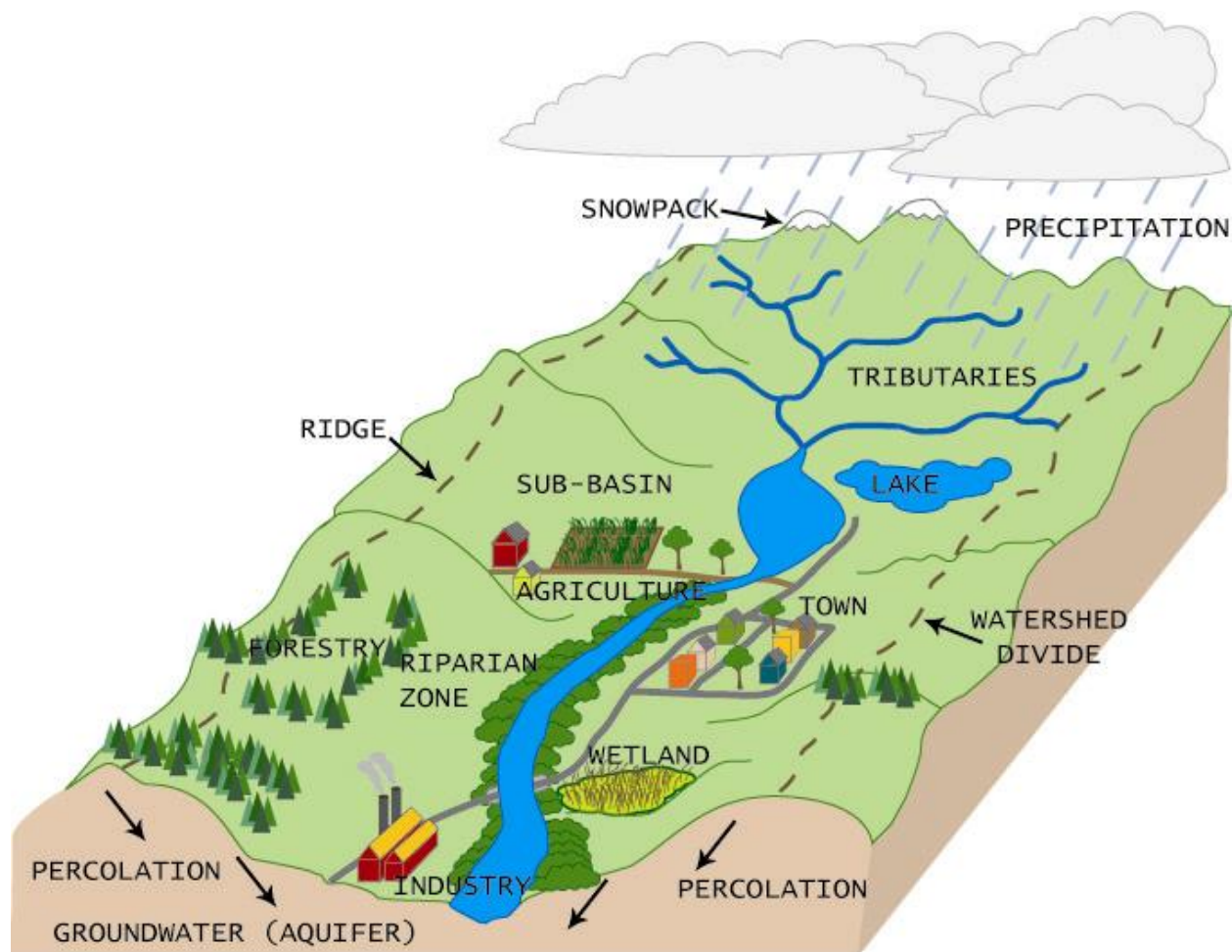
## WATERSHED DEFINITION

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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.



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## EXECUTIVE SUMMARY

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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.



*Eldred, Pa.*

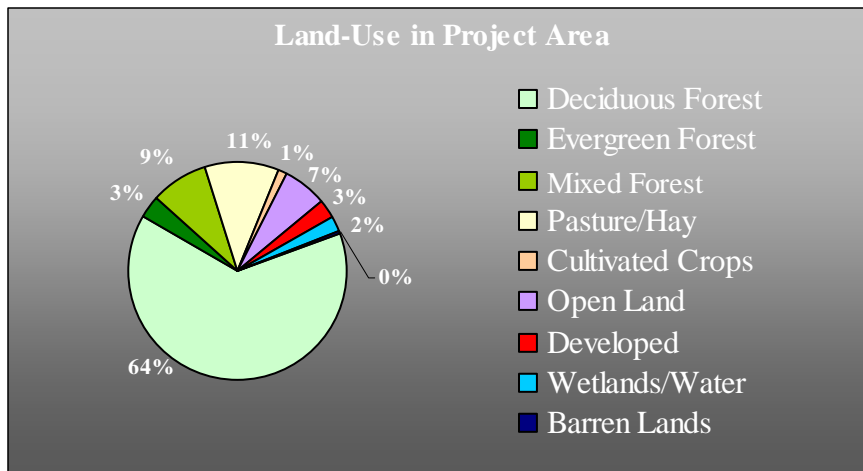
Bradford Regional Airport provides commuter services to Cleveland Hopkins International Airport.

- 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.

### Land Resources

- 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.

#### Species of Concern include:

- |                                 |                 |
|---------------------------------|-----------------|
| ○ 23 plants                     | ○ seven birds   |
| ○ 18 dragonflies or damselflies | ○ five mammals  |
| ○ nine butterflies              | ○ five reptiles |
| ○ eight fish                    | ○ five mussels  |

### **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.
- 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.



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

#### Recreational facilities include:

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

### **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:
  - Project Area Characteristics—infrastructure, employment, legal and political, dirt and gravel roadways
  - Land Resources—stone quarries and natural gas drilling
  - Water Resources—brine usage and stormwater management
  - Biological Resources—habitat destruction and decreased wildlife populations
  - Cultural Resources—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.

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**Table ES-1. Management Recommendation Goals**

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#### **Project Area Characteristics**

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- 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.

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**Table ES-1. Management Recommendation Goals (continued)**

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**Land Resources**

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- 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.

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**Water Resources**

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- 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.

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**Table ES-1. Management Recommendation Goals (continued)**

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**Biological Resources**

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- 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.

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**Cultural Resources**

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- 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.

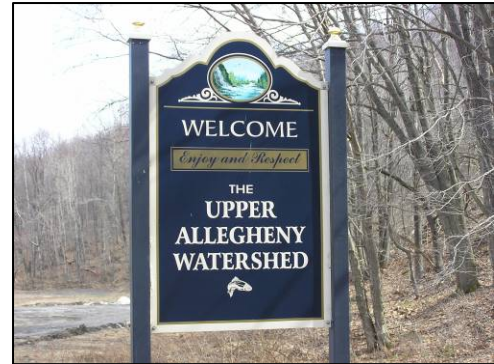
## CHAPTER 1. PROJECT AREA CHARACTERISTICS

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
<b><i>McKean County</i></b>			<b><i>Potter County</i></b>		
Annin Township	33.83	3.79%	Allegheny 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%	<b><i>Cameron County</i></b>		
Sergeant Township	27.74	3.11%	Shippen Township	2.85	0.32%
Smethport Borough	1.75	0.20%			

#### Major Tributaries

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

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*

Township, and flows north through Smethport Borough and 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.

### Climate

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 25<sup>th</sup> 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 Allegheny State Park just a few miles north of the Bradford region (Pennsylvania Department of Conservation and Natural Resources (DCNR<sup>2</sup>); 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 (DEP<sup>9</sup>).

Potter and McKean counties are among the cleanest counties within Pennsylvania, ranking in the 0<sup>th</sup> and 10<sup>th</sup> percentiles. They are also among the cleaner counties when compared to other counties within the U.S., ranking in the 30<sup>th</sup> and 50<sup>th</sup> percentiles. A percentile is a descriptive statistic that indicates the percent of a distribution; i.e. a rank in the 50<sup>th</sup> 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 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.

#### Lead

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 (DEP<sup>9</sup>).

#### Nitrogen Oxides

Fossil fuels burned at temperatures that exceed 1,200 degrees Fahrenheit produce nitrogen oxides (NO<sub>x</sub>). Automobiles, trucks, buses, airplanes, industries, and power plants emit NO<sub>x</sub> 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<sub>x</sub> enter the lungs, making it more difficult to breathe (DEP<sup>9</sup>).

Compared to other counties within the U.S., Potter and McKean counties are ranked in the 50<sup>th</sup> and 60<sup>th</sup> percentiles, respectively. However, within Pennsylvania they are ranked in the 20<sup>th</sup> and 30<sup>th</sup> 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).

#### Ozone

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<sub>x</sub> combines and reacts with volatile organic compounds in the presence of sunlight and warm temperatures (DEP<sup>9</sup>). 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 (DEP<sup>9</sup>).

**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 (DEP<sup>9</sup>). Neither federal nor state air quality standards exist for total suspended particulates.

**Particulate matter 10 (PM<sub>10</sub>)** 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 0<sup>th</sup> percentile, meaning that Potter County's PM<sub>10</sub> pollution is greater than or equal to zero percent of the counties in the U.S. for PM<sub>10</sub>. McKean County is ranked in the 20<sup>th</sup> percentile in the U.S. and Pennsylvania. Within McKean and Potter counties, 4,598 tons of PM<sub>10</sub> 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<sub>2.5</sub>)** 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<sup>9</sup>). When compared to other counties in the U.S., Potter County ranked in the 20<sup>th</sup> percentile, while McKean County ranked in the 30<sup>th</sup> percentile. Among Pennsylvania counties, Potter County ranked in the 0<sup>th</sup> percentile and McKean in the 30<sup>th</sup> percentile. In McKean County, 1,055 tons of PM<sub>2.5</sub> 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 (DEP<sup>9</sup>). 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 10<sup>th</sup> percentile. McKean County, on the other hand, is among the more polluted counties, being ranked in the 70<sup>th</sup> percentile. In Pennsylvania they rank in the 0<sup>th</sup> percentile and 40<sup>th</sup> 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 recreationally-caught 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 eight-ounce 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

<b>Municipality</b>	<b>Comprehensive Plan</b>	<b>Zoning Ordinance</b>	<b>Subdivision Ordinance</b>	<b>Floodplain Ordinance</b>
<b>Potter County</b>	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
<b>McKean County</b>	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

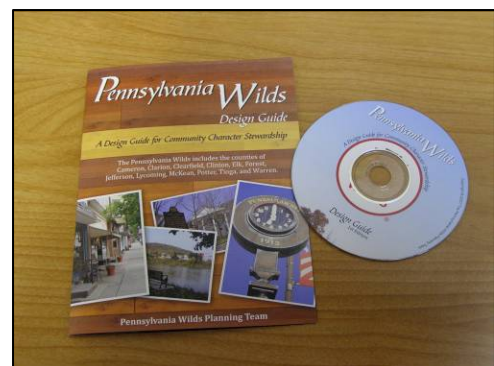
Zoning is a legal mechanism by which government bodies, in order to protect public health, safety, morals, and general welfare, can limit the use of the land and/or designate development restrictions through land-use ordinances. Ordinances divide all land within a municipality into districts and create 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](http://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 town-centered, 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**

<b>Population</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>Percent Change 1980-1990</b>	<b>Percent Change 1990-2000</b>	<b>Percent Change 1980-2000</b>
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%
<b>Total</b>	<b>50,362</b>	<b>47,321</b>	<b>47,119</b>	<b>-6.0%</b>	<b>-0.4%</b>	<b>-6.9%</b>

(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—0.3 percent. Table 1-4 displays the comparison of population by sex and age. Six categories are identified—preschool-aged, school-aged, college-aged, post collegiate-aged, midlife-aged, and retirement-aged.

**Table 1-4. Population by Sex and Age**

<b>Years</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<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
≥62	3,825	5,171	8,996
<b>Total</b>	<b>23,639</b>	<b>23,480</b>	<b>47,119</b>

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

of 8,429 residents (U.S. Census Bureau, 2000; U.S. Census Bureau, 2007).

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

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 <sup>2</sup> )	Population per mile <sup>2</sup>	Percent of Municipality in Project Area
<b><i>Cameron County</i></b>				
Shippen Township	2,495	157.15	16	2%
<b><i>McKean County</i></b>				
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%
<b><i>Potter County</i></b>				
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



*Eldred Borough, PA*

**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 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 on-lot 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**

<b>Authority</b>	<b>Service Area</b>	<b>Capacity (millions of gallons per day)</b>	<b>Service (number of facilities)</b>	<b>Receiving Waters</b>
Bradford City Sanitary Authority	Bradford City, Lewis Run Borough, and Bradford, Foster, and Lafayette Townships	6.300		Tunungwant 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 (DEP<sup>8</sup>). 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.

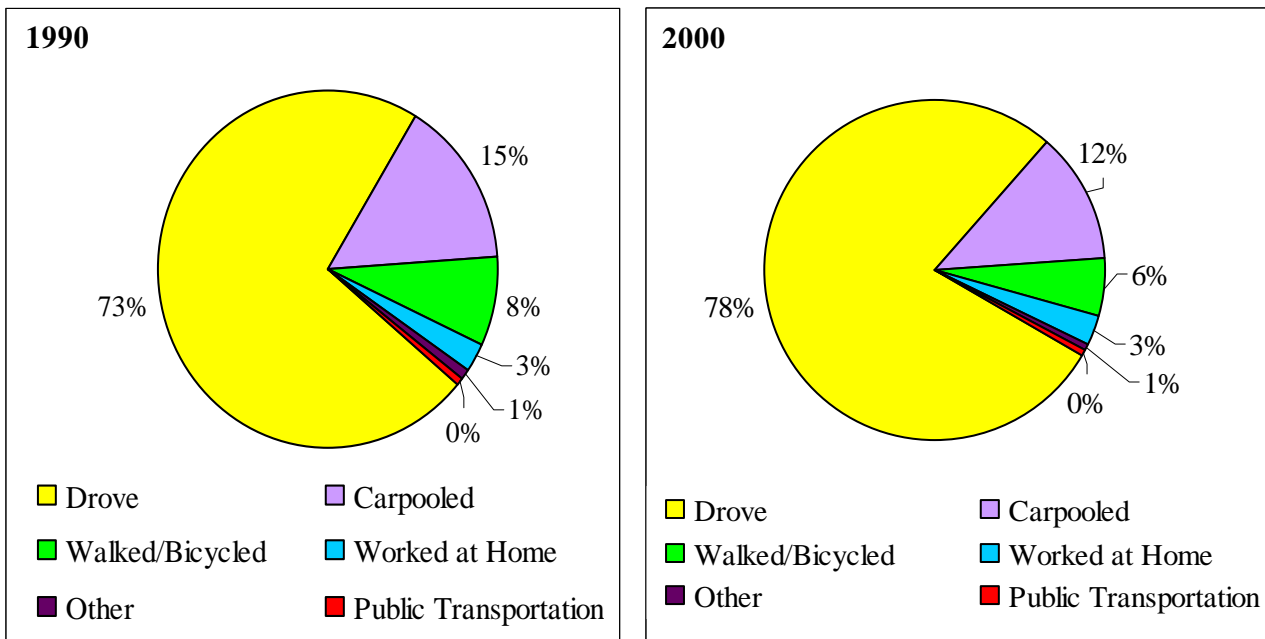
**Table 1-7. Public Water Systems**

<b>Authority</b>	<b>Service Area</b>	<b>Capacity (gallons per day)</b>	<b>Service (number of facilities)</b>	<b>Source</b>
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](http://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](http://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 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 Lambertson 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,



*Rail line passing under Route 6 in Port Allegany*

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 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 hydrant located along an area waterway*

### 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 Comparison**

Year	Allegheny Headwaters Watershed	Pennsylvania	New York	U.S.
<b>Average Household Income</b>				
1980	\$16,668	\$19,744	\$20,552	\$20,382
1990	\$27,817	\$36,675	\$44,225	\$38,464
2000	\$42,560	\$52,682	\$64,856	\$56,643

**Unemployment Rate (Not Seasonally Adjusted)**

1990	8.3%	5.4%	5.3%	5.6%
2000	7.2%	4.2%	4.4%	4.0%
2008	Data not available	5.4%	5.4%	7.6%
2009	Data not available	8.3%	8.7%	9.5%

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

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.

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.

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



**Table 1-9. Breakdown of Employment by Industry**

Industry	Allegheny Headwaters		Pennsylvania		U.S.	
	Absolute Employment	%	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%
<b>TOTAL</b>	<b>19,423</b>		<b>5,654,564</b>		<b>129,728,865</b>	

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

**Table 1-10. Major Employers**

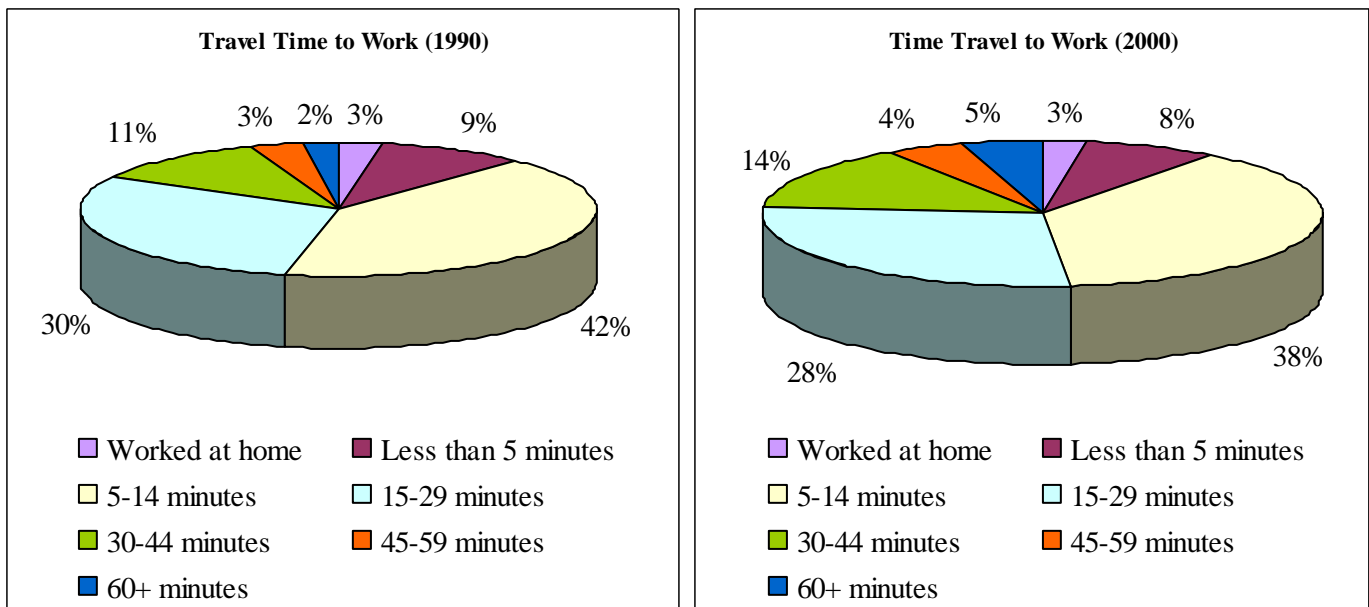
Facility	Number of Employees	Location	Facility	Number of Employees	Location
Zippo Manufacturing Co., Inc.	750	Bradford, Pa.	W R Case & Sons Cutlery Co.	365	Bradford, Pa.
Bradford Hospital	580	Bradford, Pa.	Sunoco, Inc.	350	Bradford, Pa.
Olympus Communications, LP	539	Coudersport, Pa.	Wal-Mart Stores, Inc.	350	Bradford, Pa.
Zipcorp, Inc.	494	Bradford, Pa.	Bureau of Prisons	316	Bradford, Pa.
Charles Cole Memorial Hospital	468	Coudersport, Pa.	American Refining Group, Inc.	300	Bradford, Pa.
Saint Gobain Container, LLC	440	Port Allegany, Pa.	Children's Center For Treatment & Education	300	Custer City, Pa.
Pittsburgh Corning Corp	375	Port Allegany, Pa.	Bradford Forest Products Inc.	210	Bradford, Pa.
			University of Pittsburgh	200	Bradford, Pa.

*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.

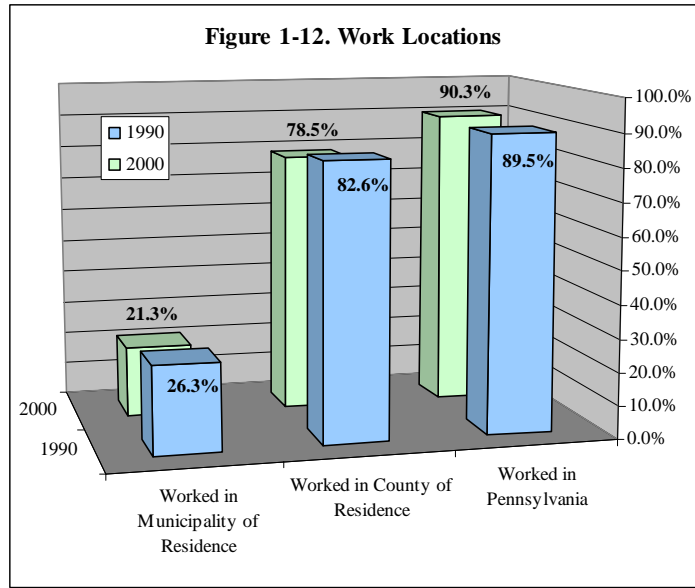
**Figure 1-11. Time Travel to Work Comparison (1990-2000)**



**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.



**Table 1-10. School Districts and School Enrollment**

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

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

School	Grade	Enrollment	Watershed Municipalities in District
<b>Port Allegany School District</b>		<b>1,051</b>	
Port Allegany Elementary School	K-6	500	Port Allegany Borough & Annin, & Liberty townships
Port Allegany Junior-Senior High School	7-12	551	
<b>Oswayo Valley School District</b>		<b>533</b>	
Oswayo Valley Elementary School	K-5	239	Sharon, Clara, Oswayo & Ceres townships & Shinglehouse & Oswayo boroughs
Oswayo Valley Middle School	6-8	128	
Oswayo Valley High School	9-12	166	
<b>Otto-Eldred Area School District</b>		<b>787</b>	
Otto Eldred Elementary School	K-6	396	Eldred Borough & Eldred, Otto, & Ceres townships
Otto Eldred Junior-Senior High School	7-12	391	
<b>Smethport Area School District</b>		<b>972</b>	
Smethport Area Elementary School	K-6	496	Smethport Borough & Hamlin, Keating, Norwich, & Sergeant townships
Smethport Area Junior-Senior High School	7-12	476	
<b>Vocational Schools</b>		<b>325</b>	
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
<b>Private Schools</b>			<b>Location</b>
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.

\*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)

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## CHAPTER 2. LAND RESOURCES

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### 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.

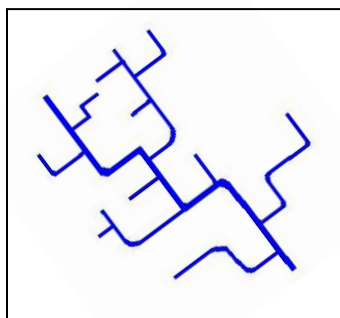
More than 300 million years ago, the entire Allegheny headwaters region was covered with sandy, silty, clayey, limy sediment and organic material. The elevation of the region was raised, causing extreme pressure and weight on the sediments. Over a long period of time, the sediments consolidated into 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 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.



*Angular drainage pattern*

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 Unglaciaded Allegheny High Plateau subregion, while a small portion is located within the Glaciaded Allegheny High Plateau subregion. Both subregions are deeply dissected highlands composed of plateau remnants, rounded hills, low mountains, and narrow valleys.

#### **Unglaciaded Allegheny High Plateau**

The Unglaciaded 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 19<sup>th</sup> 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).

#### **Glaciaded Allegheny High Plateau**

The Glaciaded 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 Glaciaded and Unglaciaded Allegheny High plateaus are similar in rock types, elevation, relief, natural vegetation and prevailing land-use. However, the Glaciaded 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**

#### **Level I**

Northern Forests

#### **Level II**

Atlantic Highlands

#### **Level III**

North Central Appalachians

#### **Level IV**

Glaciaded Allegheny High Plateau  
Unglaciaded 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*

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).

### Agriculture Security Areas

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 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 2-1. Current Land Use**

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

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

	McKean	Potter
<b>General Statistics</b>		
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
<b>Economic Contributions</b>		
# Forestry and Wood Product Industries	39	18
# Employees in Forestry and Wood Product Industries	1,106	295
Annual Economic Contribution from Forestry and Wood Product Industries (in millions)	93.43	38.91
Annual Economic Contribution from Agricultural Industries (in millions)	5.23	7.49

(Jacobson & Kovach, 2009)

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.

Only seven percent of the landscape within McKean and Potter counties is used for agricultural endeavors. Among Pennsylvania's 67 counties, Potter County ranked 41<sup>st</sup> and McKean County ranked 62<sup>nd</sup> 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%

(Source: NASS, 2004; NASS, 2009)

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

## **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 (DEP<sup>6</sup>).

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; DEP<sup>7</sup>).

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**

County & Year		Gas	Oil	Combined	Other	Total
McKean County	2009	55	291	2	1 unknown	348
	2008	62	959	54	1 test well	1,076
	2007	108	952	91	----	1,151
	2006	71	766	108	----	945
	2005	72	743	140	----	955
Potter County	2009	19	3	0	----	22
	2008	83	73	15	1 storage well	172
	2007	58	44	5	2 storage wells	109
	2006	54	35	31	----	120
	2005	40	8	13	1 injection well	62

Note: All sites in each county may not be located within the project area; however all sites are located within one of the watershed’s municipalities.

(Source: DEP; DEP; DEP; DEP, 2008; DEP, 2009a; DEP, 2010a)

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.

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 is 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 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).

### 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*



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](http://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 Landslide Hazards: A National Threat, 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.

#### **Floodplains**

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.

### Wetlands

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 (DEP<sup>10</sup>).

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**

### *Landfills*

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 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 (DEP<sup>4</sup>).

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**Table 2-5. Brownfield Sites**

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<b>Brownfield Site</b>	<b>Address</b>	<b>Zoning Type</b>
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<sup>4</sup>)

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## CHAPTER 3. WATER RESOURCES

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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:

Region 05: Ohio River basin, excluding the Tennessee River basin

Sub-region 01: Allegheny River basin, Pennsylvania and New York

Basin 00: Allegheny River basin, Pennsylvania and New York

Sub-basin 01: 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 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.

**Tunungwant Creek**

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.

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

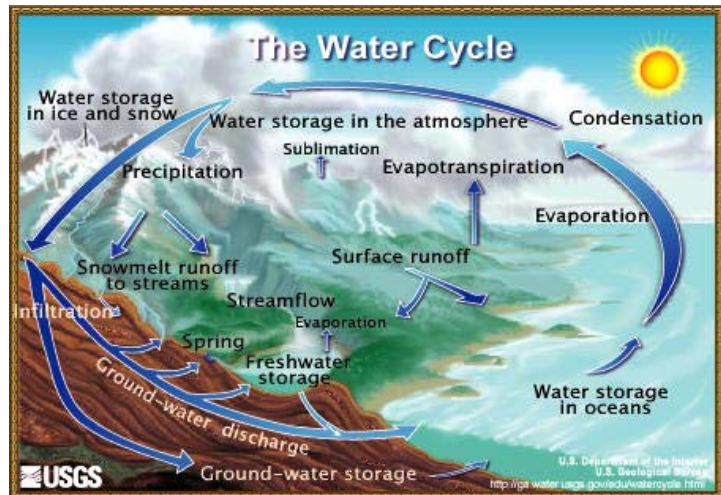
East Branch Potato Creek
West Branch Potato Creek
Brewer Run
Wernwag Hollow
Colegrove Brook
Robbins Brook
Bayer Brook
Daly Brook
Sherman Run
Santeen Run
Warner Brook
Stanton Brook
Blacksmith Run -Source to Smethport Water Intake

**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*

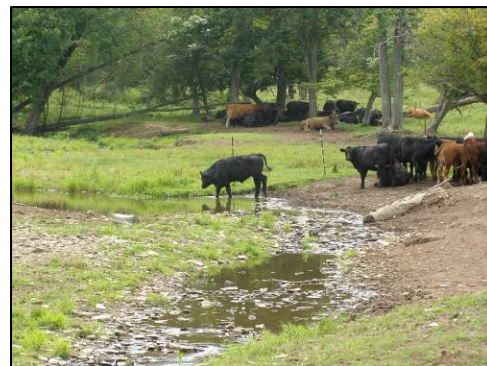
Groundwater is stored in empty spaces and cracks between soil, sand particles, gravel and rock. As previously mentioned, rain causes some water to permeate the ground and replenish the supply. When all the empty spaces and cracks have been filled, the water table has reached the upper surface of the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

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.



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

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 landslides can also create lakes and ponds, but these events are unlikely within the Allegheny River headwaters region (U.S. EPA<sup>1</sup>, 2007; Spring Creek Aquatic Concepts).



*Marilla Spring Reservoir near Bradford, PA*

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 woody 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 soft-stemmed 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. EPA<sup>2</sup>).

**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<sup>2</sup>).

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. EPA<sup>2</sup>).

**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. EPA<sup>2</sup>).

### **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.

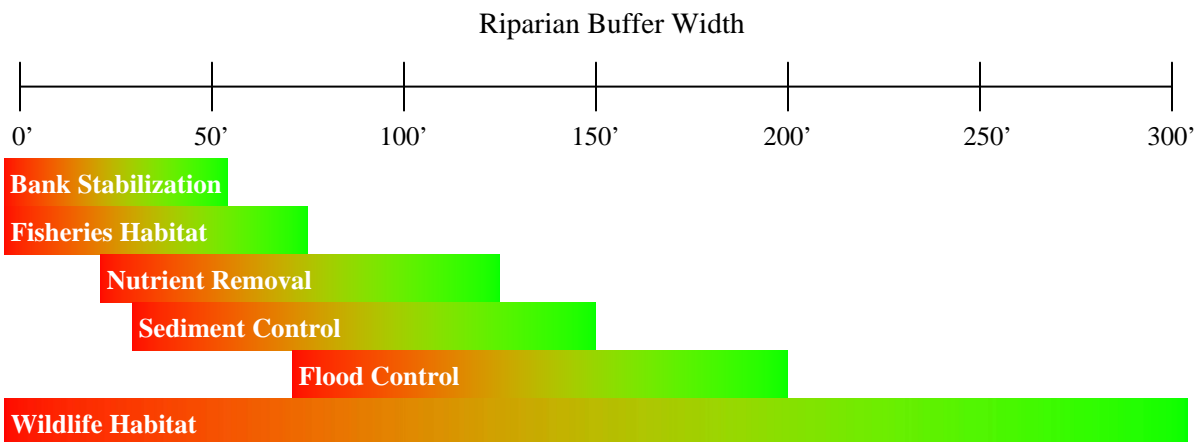
### **Riparian Zones**

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](http://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 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.



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

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 these 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, 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



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



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 herd 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. EPA<sup>1</sup>).
- 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 silt-like solids, and coat stream bottoms. High levels of iron and aluminum can poison fish and threaten drinking water supplies (Fripp, Ziemkiewicz, & 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 and Assessment Report as impacting 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 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.



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



### **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**

Year	Groundwater			Surface			Total		
	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

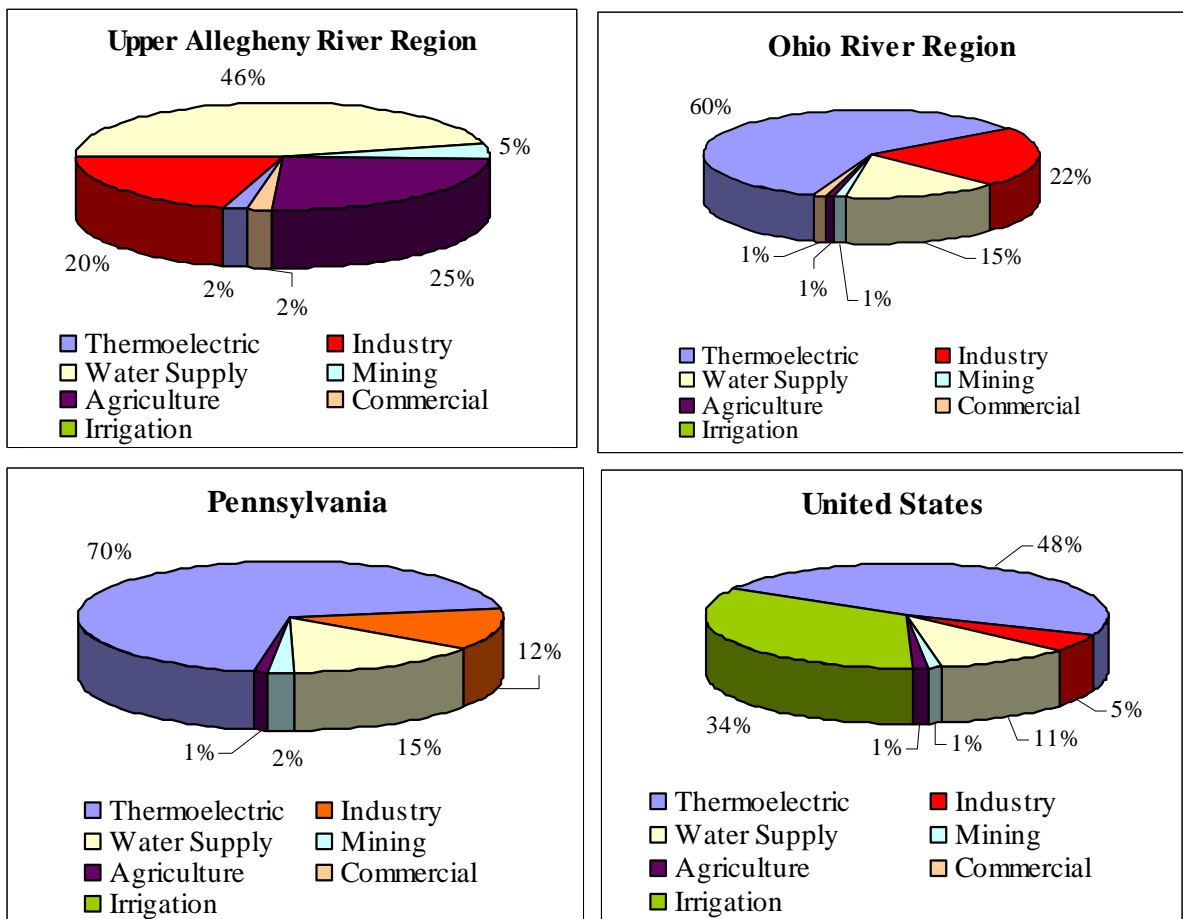
All values are in millions of gallons per day

(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**



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## CHAPTER 4. BIOLOGICAL RESOURCES

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### 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.

#### **Wetlands**

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 these 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 flowing 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 19<sup>th</sup> 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 DEC<sup>4</sup>).

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 1<sup>st</sup> and after August 15<sup>th</sup>, 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 DCNR<sup>1</sup>; NY DEC<sup>2</sup>).

#### Beaver

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, red-spotted 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.

### Timber Rattlesnake

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 DCNR<sup>3</sup>).

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)*

numbers. Snakes are often killed by those who encounter 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).

### Birds

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 20<sup>th</sup> 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. Over-use 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, ephemereid 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, redbreast 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, tongue-tied 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, flathead 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-of-ways, 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**

<b>ALLEGHENY RIVER AT REED RUN BIOLOGICAL DIVERSITY AREA</b>	
<b>Description:</b>	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.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Eulalia and Roulette townships, Potter County
<b>Rare Occurrences:</b>	American brook lamprey, species of concern not identified at request of jurisdictional agency, palustrine hemlock forest
<b>Threats:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. Maintaining suitable aquatic habitats is key to continued success of these species of concern.</li> <li>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.</li> <li>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.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Land management decisions should account for potential impacts, such as alterations to light, temperature, and hydrologic regimes.</li> <li>2. Periodic monitoring for invasive species, particularly the hemlock woolly adelgid.</li> <li>3. Periodic surveys or monitoring to document amphibian and insect species located within this wetland habitat.</li> <li>4. Timbering, road development, and other construction activities should avoid riparian buffers in order to avoid degrading important aquatic and riverside habitats.</li> </ol>



**ALLEGHENY RIVER AT TURTLEPOINT CONSERVATION AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Annin Township, McKean County
<b>Rare Occurrences:</b>	American brook lamprey, elktoe mussel, round pigtoe mussel, sensitive species 2, sensitive species 3, sensitive species 5
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Siltation within the riffle and run habitats.</li> <li>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.</li> <li>3. Loss of forest cover in riparian zones may increase water temperatures and distribution of natural nutrient cycling linked to streams.</li> <li>4. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. A high degree of forest cover should be maintained for additional protection of water quality and ecological integrity.</li> <li>3. Landowners engaged in timber harvesting should implement best management practices.</li> </ol>

**INDIAN CROSSING SWAMP CONSERVATION AREA**

<b>Description:</b>	Adjacent to the Lower Knapp Biological Diversity Areas, this area contains 71 acres and is 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.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Eldred Township, McKean County
<b>Rare Occurrences:</b>	Black ash, downey willo-herb, stalked bulrush, Wilson's snipe, sensitive species #8
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Hemlock woolly adelgid poses a potential threat to hemlock trees in the region.</li> <li>2. Canopy removal in the vicinity of the wetland may increase temperatures in the wetland potentially altering its habitat quality and species composition.</li> <li>3. Over-browsing deer eliminate tree seedling, sapling, shrub layers, and greatly reduce herbaceous species diversity in large areas.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. Periodic monitoring for invasive species, including the hemlock woolly adelgid.</li> <li>3. Surveys of monitoring to document amphibian and insect species within the wetland should be conducted.</li> </ol>

**OSWAYO CREEK AT SHINGLEHOUSE BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Sharon Township, Potter County
<b>Rare Occurrences:</b>	round pigtoe, long-solid
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Pollution that lowers dissolved oxygen and increases ammonia levels and siltation, as well as dredging threaten native freshwater mussels.</li> <li>2. Removal of forest cover on steep slopes may be problematic, increasing the potential for runoff and erosion following storm events.</li> <li>3. Runoff from dirt and gravel roads in close proximity to the stream can contribute to physical degradation of the site.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Implement best management practices to minimize and prevent water pollution.</li> <li>2. Support and engage in research of degraded surface and groundwater resources.</li> <li>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.</li> </ol>

**OSWAYO CREEK CONSERVATION AREA**

<b>Description:</b>	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 marshes, 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.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Ceres Township, McKean County
<b>Rare Occurrences:</b>	Elktoe mussel, Ohio lamprey, round pigtoe mussel, wavy-rayed lampmussel
<b>Threats:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. Loss of forest cover in riparian zones may increase water temperatures and disruption of natural nutrient cycling linked to streams.</li> <li>3. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. A high degree of forest cover should be maintained for additional protection of water quality and ecological integrity.</li> <li>3. Implement agricultural best management practices that are suitable for reducing or minimizing water quality impacts, as part of a watershed approach to management.</li> </ol>

**OSWAYO CREEK BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	This area provides habitat for the American brook lamprey, an aquatic animal species of concern that requires cool, clear water and inhabits large creeks and small to medium sized rivers.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Clara, Hebron, and Sweden townships, Potter County
<b>Rare Occurrences:</b>	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.
<b>Threats:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Preserve forested river and stream corridors to maintain high water quality.</li> <li>2. Timbering, road development, and other construction activities should avoid riparian buffers in order to avoid degrading important aquatic and riverside habitats.</li> <li>3. Forest cover should be maintained to protect water quality and ecological integrity of the aquatic ecosystem.</li> <li>4. Landowners conducting timbering activities should implement best management practices to minimize impacts.</li> </ol>

**POTATO CREEK CONSERVATION AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Keating and Norwich townships, McKean County
<b>Rare Occurrences:</b>	American brook lamprey, Ohio lamprey, sensitive species #2, sensitive species #3
<b>Threats:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. Loss of forest cover within riparian zones may also result in increased water temperatures and disruption of natural nutrient cycling linked to streams.</li> <li>3. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Preserve forested stream corridors to maintain high water quality.</li> <li>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.</li> <li>3. A high degree of forest cover should be maintained for additional protection of the water quality and ecological integrity of the aquatic ecosystem.</li> <li>4. Landowners engaged in timbering operations should implement best management practices.</li> </ol>

**POTATO CREEK-COLE CREEK CONSERVATION AREA**

<b>Description:</b>	Encompasses a section of Potato Creek and two of its largest tributaries—Cole Creek and Marvin Creek.
<b>Significance:</b>	Exceptional
<b>Location:</b>	Keating and Norwich townships, McKean County
<b>Rare Occurrences:</b>	American brook lamprey, creek heelsplitter mussel, elktoe mussel, round pigtoe mussel, sensitive species 2, sensitive species 3, sensitive species 5
<b>Threats:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. Loss of forest cover within riparian zones may also result in increased water temperatures and disruption of natural nutrient cycling linked to streams.</li> <li>3. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Preserve forested stream corridors to maintain high water quality.</li> <li>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.</li> <li>3. A high degree of forest cover should be maintained for additional protection of the water quality and ecological integrity of the aquatic ecosystem.</li> <li>4. Landowners engaged in timbering operations should implement best management practices.</li> </ol>

**ALLEGHENY RIVER AT EULALIA BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	High
<b>Location:</b>	Eulalia Township, Potter County
<b>Rare Occurrences:</b>	American brook lamprey, species of concern not identified at the request of the jurisdictional agency
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Maintaining suitable aquatic habitats is key to continued success of these species of concern.</li> <li>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.</li> <li>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.</li> <li>4. Removal of forest cover on steep slopes due to increased potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Preserve forested river corridors maintaining high water quality.</li> <li>2. Keep timbering road development and other construction activities away from riparian corridors in order to avoid degrading important aquatic and river ecosystems.</li> <li>3. Maintain a high degree of forest cover throughout the watershed to protect water quality and ecological integrity of aquatic ecosystems.</li> <li>4. Minimize impacts from timber harvesting through the implementation of best management practices.</li> </ol>

**ALLEGHENY RIVER AT LARABEE CONSERVATION AREA**

<b>Description:</b>	Aquatic habitat along the Allegheny River that supports a mussel, damselfly, and butterfly species.
<b>Significance:</b>	High
<b>Location:</b>	Eldred Township, McKean County
<b>Rare Occurrences:</b>	Blue-tipped dancer damselfly, Elktoe mussel, Long dash butterfly
<b>Threats:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. Loss forest cover within riparian zones may result in increased water temperature and disruption of natural nutrient cycling linked to streams.</li> <li>3. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. A high degree of forest cover should be maintained for additional protection of the water quality and ecological integrity of the aquatic ecosystems.</li> <li>3. Landowners active in timbering operations should implement best management practices.</li> </ol>

**BROWN VALLEY CONSERVATION AREA**

<b>Description:</b>	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).
<b>Significance:</b>	High
<b>Location:</b>	Bradford Township, McKean County
<b>Rare Occurrences:</b>	Swainson's thrush
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Hemlock woolly adelgid infestation resulting in high levels of mortality in hemlock trees and habitat for the Swainson's thrush and other species.</li> <li>2. Loss of canopy cover and shrub understory from timbering may negatively affect the thrush's habitat until dense regrowth appears.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Preserve forest within riparian zones.</li> <li>2. Periodic monitoring for invasive species, including the hemlock woolly adelgid.</li> <li>3. Proposed treatments for insect outbreaks should consider impacts to aquatic and forest animals.</li> <li>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.</li> </ol>

**BULLIS MILLS CONSERVATION AREA**

<b>Description:</b>	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.
<b>Significance:</b>	High
<b>Location:</b>	Eldred Township, McKean County
<b>Rare Occurrences:</b>	Wilson's snipe, sensitive species #7

**BULLIS MILLS CONSERVATION AREA (continued)**

<b>Threats:</b>	1. Toxic chemical concentrations with lower trophic levels and accumulated toxins. 2. Human intrusion, particularly during the breeding season and maturing of young.
<b>Recommendations:</b>	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.

**CORYVILLE RAILROAD GRADE CONSERVATION AREA**

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

**DUTCHMAN HILL BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	High
<b>Location:</b>	Eulalia Township, Potter County
<b>Rare Occurrences:</b>	West Virginia white
<b>Threats:</b>	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.
<b>Recommendations:</b>	1. Monitoring and removing garlic mustard in known West Virginia white habitats and in stands of toothworts. 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**

<b>Description:</b>	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.
<b>Significance:</b>	High
<b>Location:</b>	Clara and Roulette townships, Potter County
<b>Rare Occurrences:</b>	American brook lamprey, species of concern not identified at jurisdictional agency's request.

**FISHING CREEK BIOLOGICAL DIVERSITY AREA (continued)**

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

**FRINKS BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	High
<b>Location:</b>	Eulalia, Hebron, and Sweden townships, Potter County
<b>Rare Occurrences:</b>	creeping snowberry, palustrine hemlock forest
<b>Threats:</b>	<p>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.</p> <p>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.</p>
<b>Recommendations:</b>	<p>1. Activities greater than foot traffic should be avoided due to sensitivity of the habitat.</p> <p>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.</p> <p>3. Periodic monitoring for the invasive species, including the hemlock woolly adelgid.</p> <p>4. Any proposed treatment for insect outbreaks should consider impacts to aquatic and forest organisms.</p>

**HAVENS RUN CONSERVATION AREA**

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

**HAVENS RUN CONSERVATION AREA (continued)**

<b>Threats:</b>	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.
<b>Recommendations:</b>	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**

<b>Description:</b>	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.
<b>Significance:</b>	High
<b>Location:</b>	Eldred Township, McKean County
<b>Rare Occurrences:</b>	American brook lamprey, Leonard's skipper butterfly
<b>Threats:</b>	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.
<b>Recommendations:</b>	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**

<b>Description:</b>	Upland forest that supports a species of concern that is not identified at the request of the jurisdictional agency.
<b>Significance:</b>	High
<b>Location:</b>	Keating Township, McKean County
<b>Rare Occurrences:</b>	Sensitive species #4
<b>Threats:</b>	1. Timber harvesting is a serious potential threat to nesting colonies of sensitive species #4.
	2. Human disturbances, including casual visitation within approximately 330 feet.
	3. Removal of trees (living or dead) may eliminate valuable habitat.
<b>Recommendations:</b>	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.



**UPPER KNAPP CREEK CONSERVATION AREA**

<b>Description:</b>	A section of Knapp Creek that supports a sensitive species that is not identified at the request of the jurisdictional agency.
<b>Significance:</b>	High
<b>Location:</b>	Otto Township, McKean County
<b>Rare Occurrences:</b>	Sensitive species #2
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Runoff from roads in close proximity can contribute to physical degradation of stream channels, erosion, and sediment pollution.</li> <li>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.</li> <li>3. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. A high degree of forest cover should be maintained for additional protection of the water quality and ecological integrity of the aquatic ecosystem.</li> <li>3. Landowners engaged in agricultural operations should implement best management practices.</li> </ol>

**WEST BRANCH TUNUNGWANT CREEK CONSERVATION AREA**

<b>Description:</b>	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.
<b>Significance:</b>	High
<b>Location:</b>	Bradford Township, McKean County
<b>Rare Occurrences:</b>	American brook lamprey
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Runoff from roads in close proximity can contribute to physical degradation of stream channels, erosion, and sediment pollution.</li> <li>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.</li> <li>3. Removal for forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. A high degree of forest cover should be maintained for additional protection of the water quality and ecological integrity of the aquatic ecosystem.</li> <li>3. Landowners engaged in timbering operations should implement best management practices.</li> </ol>

**ALLEGHENY PORTAGE CREEK BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Notable
<b>Location:</b>	Liberty Township, McKean County and Keating Township, Potter County
<b>Rare Occurrences:</b>	American brook lamprey
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Runoff from roads in close proximity can contribute to physical degradation of stream channels, erosion, and sediment pollution.</li> <li>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.</li> <li>3. Removal of forest cover on steep slopes is especially problematic because of the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Preserve forested river corridors maintaining high water quality.</li> <li>2. Keep timbering, road development and other construction activities away from riparian corridors in order to avoid degrading important aquatic and river ecosystems.</li> <li>3. Maintain a high degree of forest cover throughout the watershed to protect water quality and ecological integrity of aquatic ecosystems.</li> <li>4. Minimize impacts from timber harvesting through the implementation of best management practices.</li> </ol>

**ALLEGHENY RIVER AT COUDERSPORT BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Notable
<b>Location:</b>	Eulalia Township, Potter County
<b>Rare Occurrences:</b>	American brook lamprey, species of concern not identified at the request of the jurisdictional agency
<b>Threats:</b>	<ol style="list-style-type: none"> <li>1. Maintaining suitable aquatic habitats is key for continued success of these species of concern.</li> <li>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.</li> <li>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.</li> <li>4. Removal of forest cover on steep slopes increases the potential for increased runoff and erosion following storm events.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Preserve forested river corridors maintaining high water quality.</li> <li>2. Keep timbering road development and other construction activities away from riparian corridors in order to avoid degrading important aquatic and river ecosystems.</li> <li>3. Maintain a high degree of forest cover throughout the watershed to protect water quality and ecological integrity of aquatic ecosystems.</li> <li>4. Minimize impacts from timber harvesting through the implementation of best management practices.</li> </ol>

**CARMEN HILL BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Notable
<b>Location:</b>	Allegheny and Hebron townships, Potter County
<b>Rare Occurrences:</b>	Cranesbill
<b>Threats:</b>	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.
<b>Recommendations:</b>	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.

**ELLISBURG COMPLEX BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Notable
<b>Location:</b>	Genesee Township, Potter County
<b>Rare Occurrences:</b>	Ephemeral/fluctuating natural pond
<b>Threats:</b>	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.
<b>Recommendations:</b>	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.

**PEET BROOK BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Notable
<b>Location:</b>	Allegheny Township, Potter County
<b>Rare Occurrences:</b>	Hemlock palustrine forest
<b>Threats:</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. Gas pipeline right-of-ways alter the local hydrology.</li> </ol>
<b>Recommendations:</b>	<ol style="list-style-type: none"> <li>1. Land management decisions should account for potential impacts, such as alterations to light, temperature, and hydrologic regimes.</li> <li>2. Periodic monitoring for the invasive species, particularly the hemlock woolly adelgid.</li> <li>3. Periodic surveys or monitoring to document amphibian and insect species located within this wetland habitat.</li> </ol>

**EAST BRANCH FISHING CREEK SLOPES BIOLOGICAL DIVERSITY AREA**

<b>Description:</b>	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.
<b>Significance:</b>	Local
<b>Location:</b>	Hebron Township, Potter County
<b>Rare Occurrences:</b>	Eastern white pine forest
<b>Threats:</b>	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.
<b>Recommendations:</b>	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 17<sup>th</sup> 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 accidentally 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.

#### **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.

**Table 4-2. Noxious Weeds of Pennsylvania**

<b>Noxious Weed</b>	<b>Located in Project Area</b>
bull or spear thistle ( <i>Cirsium vulgare</i> )	<input checked="" type="checkbox"/>
Canada thistle ( <i>Cirsium arvense</i> )	<input checked="" type="checkbox"/>
giant hogweed ( <i>Heracleum mantegazzianum</i> )	<input checked="" type="checkbox"/>
goatsrue ( <i>Galega officinalis</i> )	
jimsonweed ( <i>Datura stramonium</i> )	
Johnson grass ( <i>Sorghum halepenses</i> )	
kudzu ( <i>Pueraria Montana v. lobata</i> )	
marijuana ( <i>Cannabis sativa</i> )	
mile-a-minute ( <i>Polygonum perfoliatum</i> )	<input checked="" type="checkbox"/>
multiflora rose ( <i>Rosa Multiflora</i> )	<input checked="" type="checkbox"/>
musk or nodding thistle ( <i>Carduus nutans</i> )	
purple loosestrife ( <i>Lythrum salicaria</i> )	<input checked="" type="checkbox"/>
shattercane ( <i>Sorghum bicolor</i> )	

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.

#### Cheatgrass

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 effective. 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 (photodermatitis) 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 photodermatitis. 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.

#### Mile-A-Minute

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.

#### Multiflora rose

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 one-year-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 in 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 starling is a shiny 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-shaped 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 accidentally 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 through 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  $\frac{1}{8}$  to  $\frac{3}{8}$  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.

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## CHAPTER 5. CULTURAL RESOURCES

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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.



*Children on the playground at Roulette Township Park*

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 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.

### Parks

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.



*Hamlin Township Community Park*

**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.

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.

#### Trails

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 one-mile interpretive nature trail through the 57-acre Saulter Watershed Preserve.



*Hikers enjoying the scenery along the Marilla Bridges Trail*

### Tuna Valley Trail System

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 2007-2035 North Central Pennsylvania Long Range Transportation Plan 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 Allegheny 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, on-site 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 (PFBC<sup>1</sup>). 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.

#### 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



*Trophy trout section of Tunungwant Creek in Lewis Run, PA*

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*

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**

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](http://www.fish.state.pa.us).

**Hunting**

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**

<b>Year</b>	<b>Licenses</b>
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](http://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 year-round, 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 Allegheny 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 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.



*Saulter Watershed Preserve is a 57-acre mixed pine and hardwood forest near Colesburg, PA*

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**

#### *Settlement*

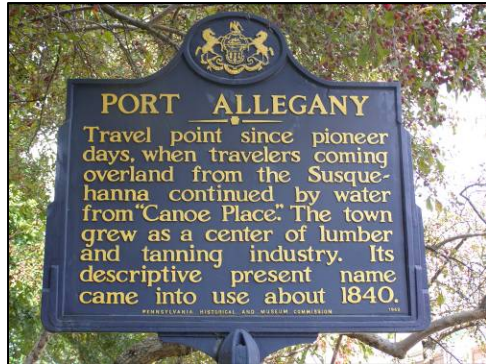
Prior to 1784, the vast wilderness of the project area was occupied by Native Americans. Members of the Mohawk, Oneida, Onondaga, Cayuga, and Seneca nations joined forces during the 16<sup>th</sup> century. The Tuscarora nation joined them in the 18<sup>th</sup> century, forming the Iroquois League known 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 “Allegheny 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 “Alligewinck,” 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.”

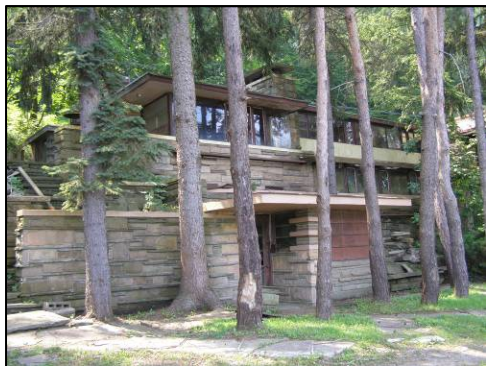
### *Significant People*

**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 Woolly 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 Woolly 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, 16<sup>th</sup> 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*

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.

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

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>.



*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*

**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 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>.

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## CHAPTER 6. ISSUES AND CONCERNS

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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.

#### **Brine Usage**

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.

#### **Stone Quarries**

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 year-round 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
- 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.”

#### **Land Resources**

- Abundance of public land
- Lots of forested land
- Large areas of open farmland
- Sustainable agriculture and forestry
- High number of dairy and grazing farms
- Mineral assets

#### **Water Resources**

- Natural growth along streams
- Exceptional value streams
- High quality aquatic resources
- Many high quality trout streams
- High quality water

#### **Biological Resources**

- Abundant flowers/plant life
- Abundant wildlife
- 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:
  - Tuna Valley
  - Potato Creek
  - Kinzu Trail Club
- Available recreation opportunities that currently exist and are adequate in or near the watershed include, but are not limited to:
 

<ul style="list-style-type: none"> <li>◦ Fishing</li> <li>◦ Hunting</li> <li>◦ ATV riding</li> <li>◦ Biking</li> <li>◦ Skiing</li> <li>◦ Snowmobile riding</li> </ul>	<ul style="list-style-type: none"> <li>◦ Hiking</li> <li>◦ Bird watching/wildlife viewing</li> <li>◦ Geocaching</li> <li>◦ Canoeing/kayaking</li> <li>◦ Boating</li> </ul>
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- 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

**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
  - 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
  - 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)
  - 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
  - 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.

## 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.

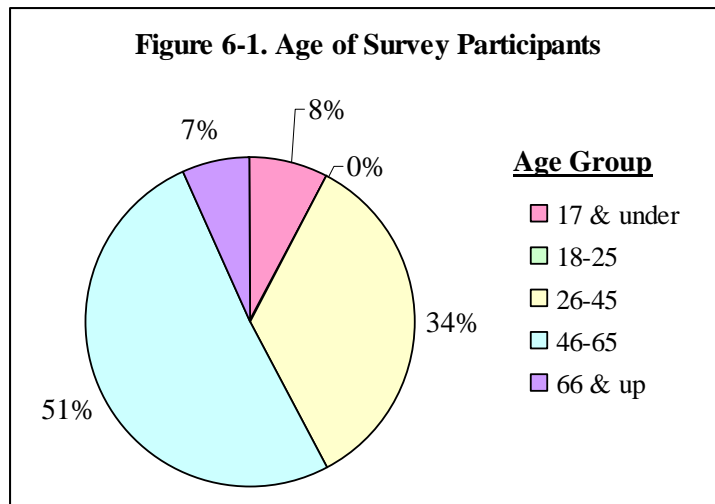
### Public Survey

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%
McKean	Hamlin	2%	Potter	Olean	1%
McKean	Hazlehurst	1%	Potter	Ulysses Township	1%
McKean	Keating Township	17%	Potter	Other	6%
McKean	Mt Jewett	2%			

**2. In what part of the Allegheny River headwaters do you reside?**

43	Potato Creek	14	Tunungwant Creek	4	Other
31	Allegheny River	1	Oswayo Creek	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.

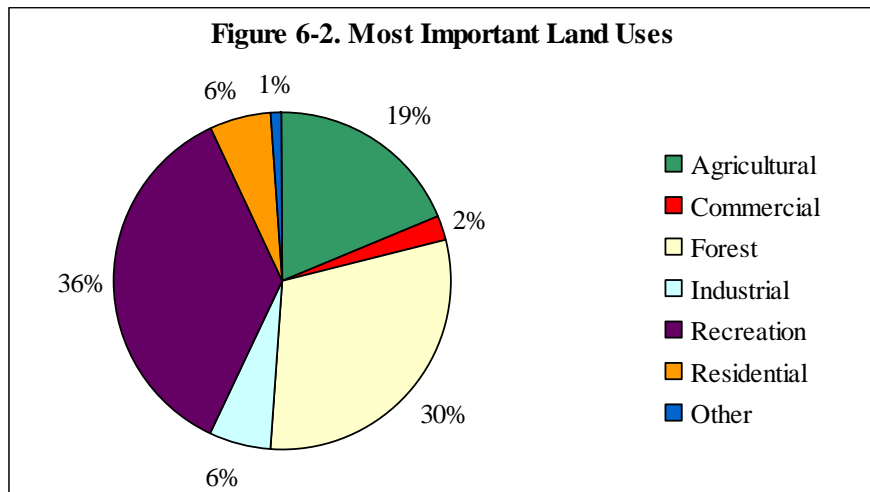
**5. How often do you visit and do you plan to visit again?**

The participants visit this region seasonally and plan to visit again.

General Questionnaire

**1. What do you think are the two most important land uses in the Allegheny headwaters watershed area?**

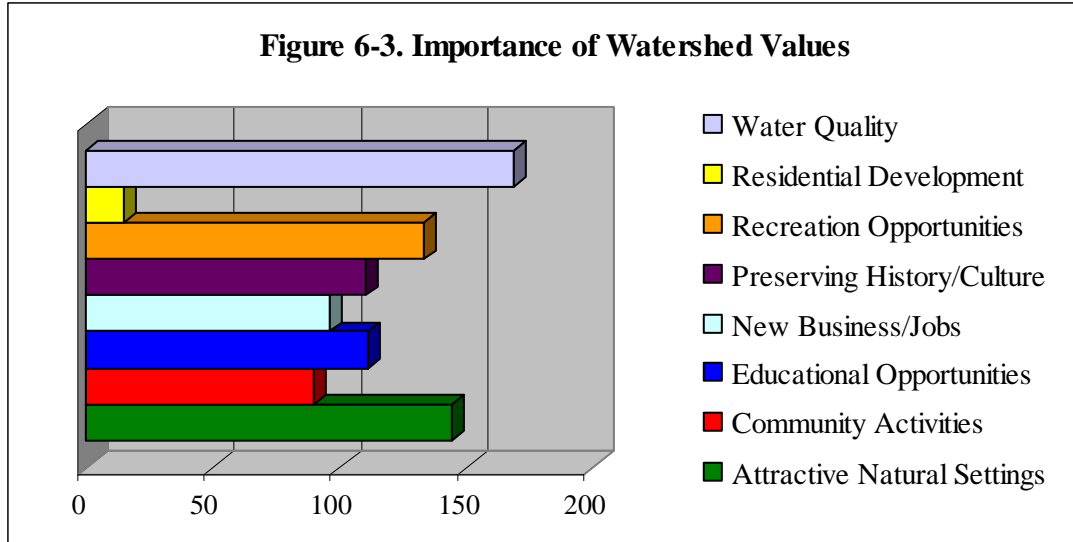
65	Recreation
57	Forested
36	Agricultural
12	Residential
11	Industrial
4	Commercial
2	Other



**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 Rotary
- 1 Headwaters RC&D
- 1 State Park/state forest
- 1 WCP Public Meeting
- 1 Website

**3. Please indicate the importance of the following watershed values.**



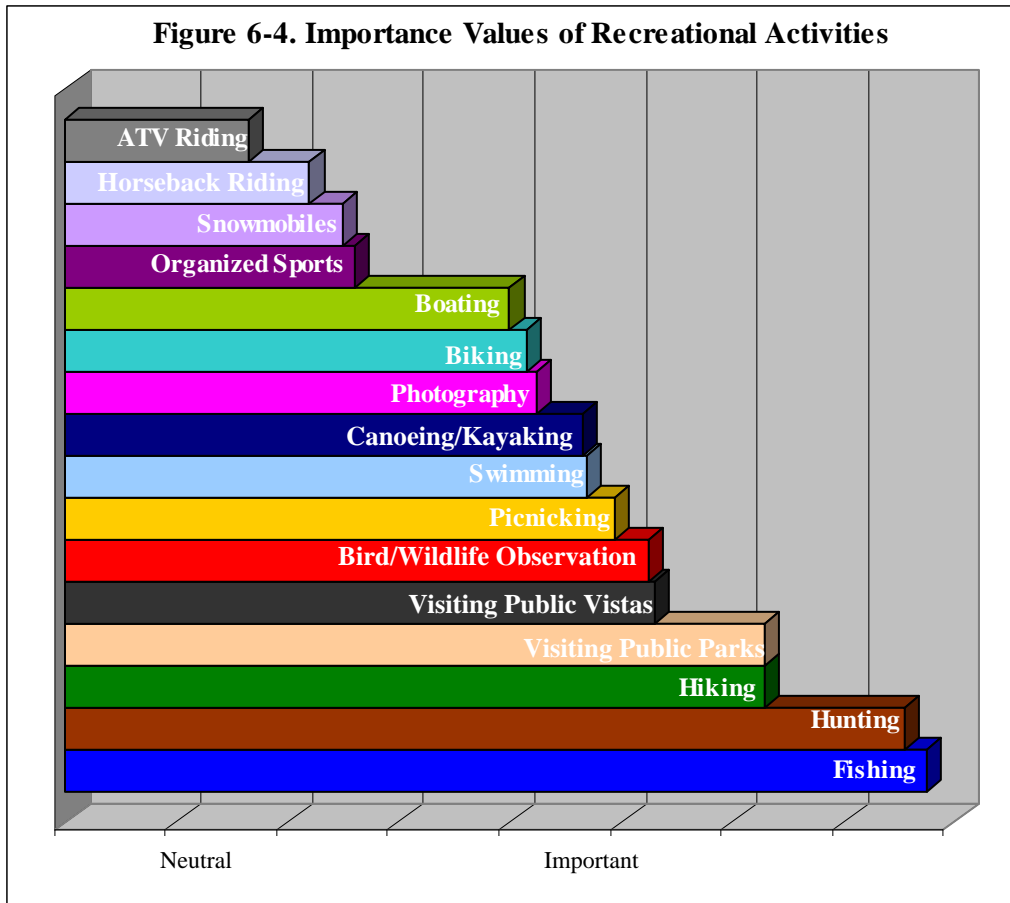
**Table 6-2. Importance of Watershed Values**

	Very Important 2 points	Somewhat Important 1 point	Neutral 0 points	Not Likely Important (-1 point)	Not Important (-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.



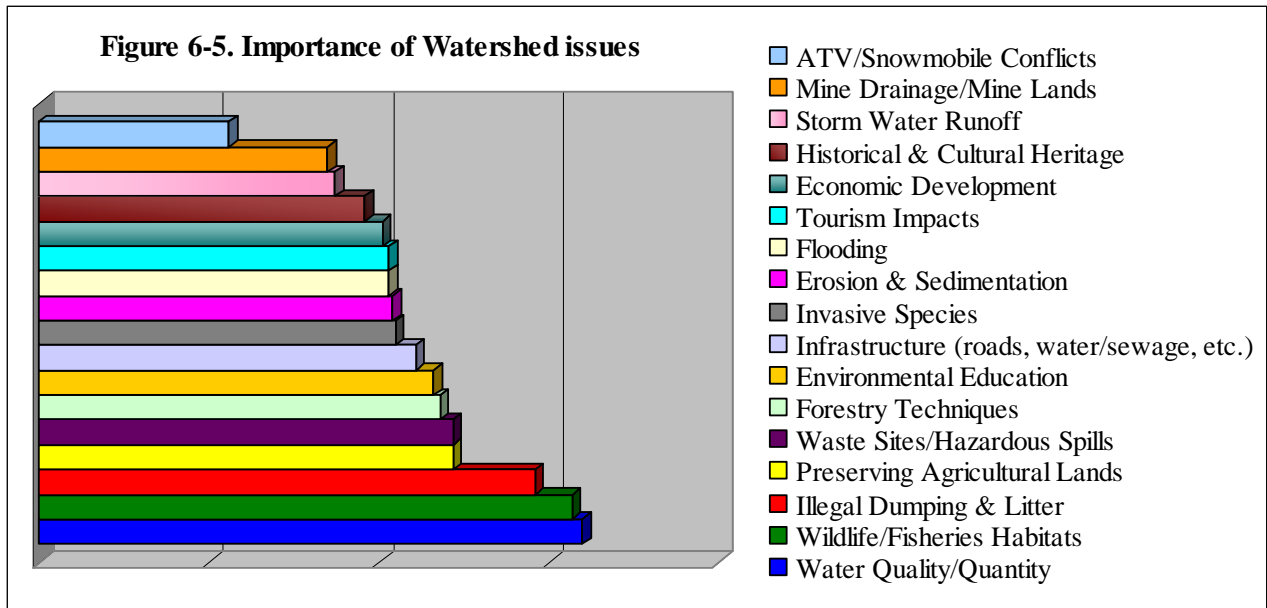
**Table 6-3. Importance Values of Recreation Activities**

	Very Important (2 points)	Somewhat Important (1 point)	Neutral (0 points)	Not Likely Important (-1 point)	Not Important (-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)**

	<b>Very Important (2 points)</b>	<b>Somewhat Important (1 point)</b>	<b>Neutral (0 points)</b>	<b>Not Likely Important (-1 point)</b>	<b>Not Important (-2 points)</b>	<b>Totals</b>
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**

	<b>Very Important (2 points)</b>	<b>Somewhat Important (1 point)</b>	<b>Neutral (0 points)</b>	<b>Not Likely Important (-1 point)</b>	<b>Not Important (-2 points)</b>	<b>Totals</b>
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



**Table 6-4. Importance of Watershed Issues (continued)**

	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

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 from 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
- 6 of the 29 responded no
- 1 did not know

#### 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
- 2 did not know

**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

**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**

		Provider of Emergency Services		
Municipality	Police	Fire	EMS	
Potter County	Allegheny 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.
	Genesee Township	State police	Genesee Volunteer Fire Dept.	Genesee Vol. Fire Dept.
	Hebron Township	State police	Coudersport Vol. Fire and Shinglehouse Vol.	Coudersport Vol. and Shinglehouse Vol.
	Keating Township	State police	Austin Vol. Fire	Austin Vol. Fire
	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	
McKean County	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
	Eldred Township	State police	Eldred Vol. Fire	Eldred Borough Ambulance
	Foster Township	Foster Township Police	Foster Township. Vol. Fire	Bradford City Ambulance
	Hamlin Township	State police	Hazelhurst Vol. Fire	Mt. Jewett Ambulance
	Keating Township	State police	Smethport Borough Vol. Fire Dept. or Hilltop Vol. Fire	Priority Care Ambulance
	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

**Table 6-5. Emergency Service Providers (continued)**

	Municipality	Provider of Emergency Services		
		Police	Fire	EMS
McKean County	Otto Township	State police	Otto Vol. Fire	Otto Vol. Fire
	Port Allegany Borough	Port Allegany Police Dept.	Port Allegany Vol.	Port Allegany Vol.
	Sergeant Township			
	Smethport Borough	Borough Police	Smethport Vol. Fire	Priority Care

**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<sup>st</sup> 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\*
- 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

**What type of recreational activities do you enjoy?**

- Hunting\*
- Fishing\*
- Jogging
- Skiing\*
- Snowboarding\*
- ATV riding\*
- School sports\*
- Paintball
- Shopping
- Swimming\*
- Canoe/Kayak\*
- Hiking\*
- 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
- Stream bank constructions
- Highway clean ups
- School recycling program

Negative Impacts

- Litter\*
- Agriculture runoff
- Logging\*
- Air pollution
- Natural gas industry
- Glass factory
- Carbon plants
- Water pollution
- Erosion (stream bank and farming)\*
- Burning garbage
- 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
- Job (Veterinarian)
- Like the summer
- Limited natural disasters
- Peaceful
- Stay to help the 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\*
- 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 dredged 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 Adelpia 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.

#### Landscape

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. Do the recreational opportunities currently meet the needs of the community and visitors?**

#### 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. What impacts 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?**

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. Do you have any specific projects or type of projects you would like to see identified in the plan?**

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.

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## CHAPTER 7. MANAGEMENT RECOMMENDATIONS

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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.

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**Table 7-1. Acronyms used in Management Recommendations Matrix**

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

## 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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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

### Objective 2: Enhance transportation infrastructure.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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, Municipalities	Foundations, Private Sources, PennDOT, DEP, EPA	Medium

**Objective 3. Enhance public and private sewage treatment facilities.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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 replacement.	Conservation Groups, Municipalities, DEP, PENNVEST	Foundations, Private Sources, DEP, PENNVEST	Medium

#### Objective 4: Enhance public and private water services.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
1. Conduct an acid neutralization project to determine if such treatment could decrease acidity to the land and water.	Conservation Districts, Conservation Groups, DEP, EPA	Foundations, Private Sources, DEP, EPA	High

## Land Resources

## GOAL 2-1: DEVELOP A STRATEGIC PLAN TO PRIORITIZE AND PROTECT AGRICULTURAL AND ECOLOGICALLY SIGNIFICANT AREAS.

### Objective 1: Establish incentives for land protection and conservation practice implementation.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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

### Objective 2: Protect agricultural and ecologically significant lands through acquisitions, conservation easements, or enrollment into conservation programs.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
1. Increase the acreage of land enrolled in cost-incentive programs, such as the Environmental Incentive Program, Conservation Reserve Enhancement Program, Conservation Reserve Program	Conservation Groups, Conservation Districts, Cooperative Extensions, PDA, NRCS, USDA	Foundations, Private Sources, DEP, NRCS, PGC	High

## 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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
1. Promote strict enforcement of erosion and sedimentation regulations and dust control plans on active mining sites.	Conservation Districts, DEP, EPA	DEP, EPA	High



## 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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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 Reformation Initiative on active mine sites.	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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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

**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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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, and enforcement.	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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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 commercial 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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
1. Conduct a detailed flood-prone area assessment that includes mapping to determine risk levels of flooding and establish a dedicated flood-control program and discourage development in floodplain areas.	Conservation Groups, Municipalities, PEMA	Foundations, Private Sources, FEMA, PEMA, DCED, DEP	Medium

**GOAL 3-1: REDUCE THE RISK OF FLOODING (CONTINUED).****Objective 1: Minimize potential flooding damages by taking a proactive approach to managing floodplains (continued).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
1. Incorporate environmentally sensitive construction and maintenance techniques on dirt and gravel roadways and install best management practices to minimize erosion and sedimentation from 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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
4. Modify or establish municipal ordinances to protect wetland areas of biological importance.	Conservation Groups, Planning Commissions, Municipalities, DEP	Private Sources, DEP, DCED	Medium

#### Objective 2: Investigate wetlands and their functions.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
4. Establish monitoring sites near withdrawal and discharge sites and analyze water samples for bacteria and biochemical oxygen demand.	Conservation Districts, Conservation Groups, Community Groups, School Districts, Water Authorities, Wastewater Plants	Foundations, Private Sources, DEP, EPA	High

**Objective 2: Access conditions at lakes and ponds.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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 diverse 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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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

#### Objective 2: Increase the use of native plants.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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, USFS	Foundations, Private Sources, DCNR, USFS	Low

**GOAL 4-4: CONTROL WILDLIFE POPULATIONS.****Objective 1: Increase opportunities for hunting.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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 exlosures 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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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	TPA	Low

#### Objective 2. Develop an educational campaigns encouraging good sportsmanship while protecting private property owner's rights.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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 motorists 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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
4. Host community events or festival commemorating local historical events, places, and cultures.	Historical Societies, Municipalities, Civic Groups	Foundations, Private Sources	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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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.**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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).**

<i>Method to achieve objective:</i>	<i>Potential Partners</i>	<i>Potential Funding</i>	<i>Priority</i>
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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