Connoquenessing Creek Watershed Conservation Plan

Final Report

October 2008

Western Pennsylvania Conservancy

water, land, life.

Western Pennsylvania Conservancy
Freshwater Conservation Program
246 South Walnut Street
Blairsville, PA 15717
Phone: 724-459-0953
Fax: 724-459-4721
www.waterlandlife.org

The Pennsylvania Rivers Conservation Program

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October 2008

Prepared for:

Connoquenessing Watershed Community and the
Connoquenessing Watershed Alliance

Prepared by:

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ACKNOWLEDGEMENTS

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Connoquenessing Creek Watershed Conservation Plan Steering Committee

Dave Andrews
Dave Barensfeld
Megan Gahring
Heath Gamache
Ryan Harr
David Johnston
Bruce Kemp
Dave Lamperski
Matt Montag
John Ruch
Marty Warchol

Connoquenessing Creek Watershed Conservation Plan Advisory Committees

Donnell Andrus
John Ball
Bob Barr
Everett Bleakney
Jack Cohen
Sheree Daugherty
Margie Davies
Bob DeVenny
Hannah Hardy
Ely Heferle
Sheryl Kelly
Fred Lochner
JoAnne McBride
Dennis McCandless
Amy McKinney
Gary Pinkerton
Natalie Price
Carl Robertson
Denise Sheets
Jerry Zona

Connoquenessing Creek Watershed Conservation Plan Key Individual Interviewees

Dave Andrews
John Ball
Dave Barensfeld
Bob Barr
Joy Bray
Chester Buquo
Dorothy Buquo
Bob Cichra
Margie Davies
Bob DeVenny
Donna Druga
Megan Gahring
Heath Gammache
Frank Gingras
Patti Griest
Kevin Herge
Terri Herge
Bruce Kemp
Rich Kowalski
Dave Lamperski
Fred Lochner
Scott Lowe
Dennis McCandless
Gary Pinkerton
William Reese
Ron Rice
John Ruch
Merle Schilling
Beth Speicher
John Walliser
Marty Warchol
Jerry Zona

Allegheny County Chief Executive Dan Onoroto's Office
Lynn Heckman and Howard Schubel

Western Pennsylvania Conservancy provided all of the photographs unless otherwise noted.

ACRONYMS

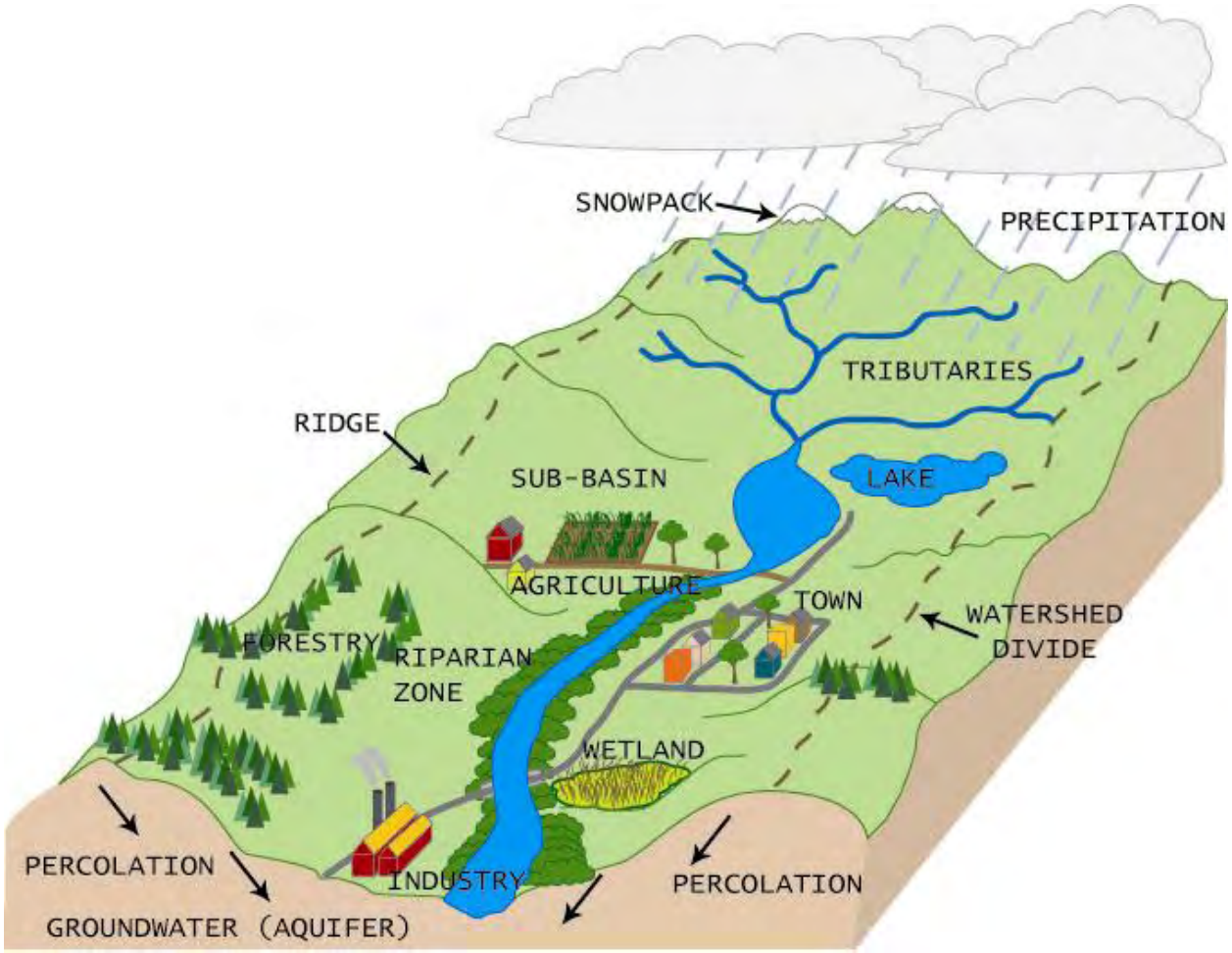
ACB	Alliance for the Chesapeake Bay
ACC	Aquatic Community Classification
AMD	Abandoned Mine Drainage
AMR	Abandoned Mine Reclamation
APHIS	Animal and Plant Health Inspection Service
AQI	Air Quality Index
ASA	Agricultural Security Areas
ATV	All Terrain Vehicles
BASA	Butler Area Sewer Authority
BAT	Brownfield Action Team
BDA	Biological Diversity Area
BMP	Best Management Practices
CAFO	Concentrated Animal Feeding Operation
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CREP	Conservation Reserve Enhancement Program
CSO	Combined Sewage Overflow
CWA	Clean Water Act
CWA	Connoquenessing Watershed Alliance
CWF	Cold Water Fishery
DA	Dedicated Areas
DCNR	Department of Conservation and Natural Resources
DEP	Department of Environmental Protection
DMAP	Deer Management Assistance Program
EAB	Emerald Ash Borer
ECOZ	Ecologically Concerned of Zelienople
EPA	Environmental Protection Agency
EQB	Environmental Quality Board
EV	Exceptional Value
FEMA	Federal Emergency Management Agency
GFCC	Government Financed Construction Contract
HQ	High Quality
HUC	Hydrologic Unit Code
IBA	Important Bird Area
IMAP	Important Mammal Area
IPM	Integrated Pest Management
KARE	Keystone Aquatic Resource Education
LCA	Landscape Conservation Area
LEEP	Lutherlyn Environmental Education Program
MF	Migratory Fishes
MSWLF	Municipal Solid Waste Landfills

NFIP	National Flood Insurance Program
NISIC	National Invasive Species Information Center
NHI	Natural Heritage Inventories
NOMA	Nutrient and Odor Management Act
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Pollutant List
NRCS	Natural Resource Conservation Service
OLDS	On-lot Disposal Systems
PASS	Pennsylvania Archaeological Site Survey
PDA	Pennsylvania Department of Agriculture
PDE	Pennsylvania Department of Education
PEC	Pennsylvania Environmental Council
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
PNHP	Pennsylvania Natural Heritage Program
POWR	Pennsylvania Organization for Watersheds and Rivers
RCRA	Resource Conservation Recovery Act
SAC	Sewage Advisory Council
SARA	Superfund Amendments and Reauthorization Act
SEO	Sewage Enforcement Officer
SFHA	Special Flood Hazard Areas
SMCRA	Surface Mine Conservation Recovery Act
TMDL	Total Maximum Daily Loads
TSF	Trout Stocked Fishery
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WPC	Western Pennsylvania Conservancy
WWF	Warm Water Fishery

WATERSHED DEFINITION

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

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



Executive Summary

Connoquenessing Creek, a tributary of the Beaver River, flows 54.1 square miles and encompasses 830 square miles in Allegheny, Beaver, Butler, Lawrence, Mercer, and Venango counties. The focus of this report includes 430 square miles and six of the seven tributaries. Slippery Rock Creek, although a major tributary to the Connoquenessing watershed, has been omitted due to its dissimilar characteristics with the remainder of the Connoquenessing Creek watershed. A separate plan focusing on its specific characteristics is being prepared for the Slippery Rock Creek watershed, therefore it is not included in this study.

Connoquenessing Creek from its confluence with the Beaver River

The Connoquenessing Creek Watershed Conservation Plan is a comprehensive study of the natural and cultural resources within the Connoquenessing watershed. The plan compiles broad-based data about recreational, historical, socio-economic, and natural resources throughout the region, and involves a strong community participation element through the identification of local needs and concerns.

This is a non-regulatory document, and serves as a reference and educational tool promoting the conservation of natural resources, monitoring and improvement of water quality, and advocates 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.

In 2005, Western Pennsylvania Conservancy (WPC), in cooperation with Connoquenessing Watershed Alliance (CWA), received funding for the Connoquenessing Creek Watershed Conservation Plan from Pennsylvania Department of Conservation and Natural Resources (DCNR).

The Pennsylvania Rivers Conservation Program aids groups in accomplishing local initiatives through planning, implementation, acquisition, and development activities. As part of the program, DCNR has 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 purpose of this study is to document the current conditions and identify additional initiatives aimed at improving the livability and attractiveness of the region. Local stakeholders were actively involved in developing a vision for the future through public meetings, interviews, surveys, and project committees. A goal of this plan is to develop a strategy to make the vision for the future a reality. Practical solutions, action steps, and resources have been identified to assist stakeholders in achieving the vision set forth. This plan can and should be used to assist groups and citizens working and/or living within the region to improve the quality of life. It should also be used in planning for long-term growth.

Project Background

In February 2006, the watershed conservation planning process was initiated with the establishment of the local project steering committee comprised of representatives from various community and conservation groups, residents, businesses, and agencies. The steering committee was the local driving force guiding the plan's development. The mission of the Connoquenessing Watershed Conservation Plan

Project steering committee discussing the status of the project

is: "to actively engage the watershed community while addressing water quality concerns, promoting planning, and protecting the cultural and historical resources of this diverse rural-urban watershed through educational and recreational opportunities, highlighting positive attributes, and by acknowledging the relationship between humans and their environment."

Outreach to the community, a key component of the planning process, had begun by June 2006 with the development of brochures, surveys, and a traveling display. In September of that year, a series of public meetings were held in Butler, Harmony, Ellwood City, and Mars to engage participation from area residents. Individuals were given additional opportunities for involvement through personal interviews and/or participation on advisory committees. Municipalities were asked for their involvement through a phone questionnaire and follow-up survey.

In February 2008, with the completion of the draft plan, area residents were given another opportunity to participate by reviewing the plan at a series of public meetings. Comments about the draft plan were collected for 30 days following the public meetings, and were then incorporated into the final plan. A copy of the plan is available on the WPC website at http://www.paconserve.org/rc/wac-rcp.html.

Report Summary

Project Area Characteristics

- A diversity of lifestyles and a variety of impacts and attributes exist within the Connoquenessing Creek watershed. As the waterway progresses from its headwaters as a calm, slow-flowing stream mostly surrounded by rural landscapes, it enters into urbanized areas where impacts and attributes change.

- Thirty-three municipalities compose the watershed, of which 55 percent have completed municipal comprehensive plans, 37 percent utilize subdivision regulations, and 67 percent utilize zoning.

- Between 1990 and 2000 the watershed population increased by 10,803 people to a total population of 149,910 people.

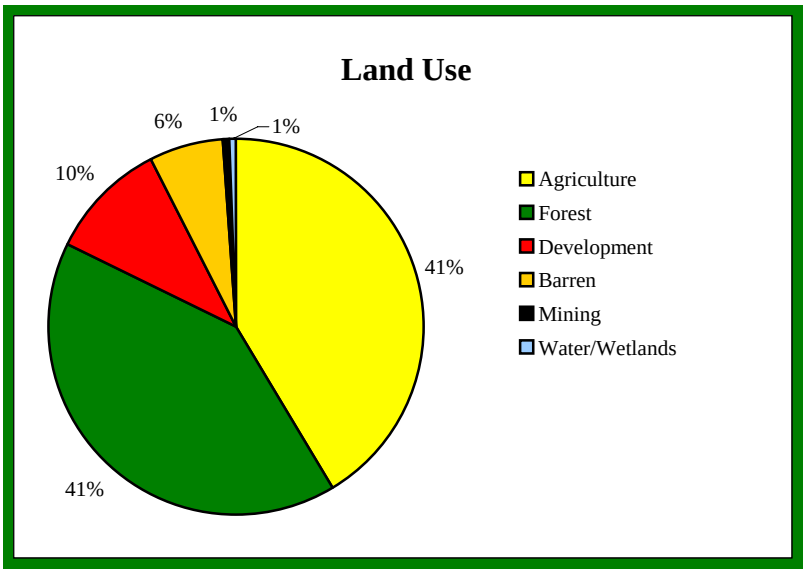
- Transportation through the region is sufficient, with two interstates, two U.S. Routes, 11 state highways, and numerous state, township, and private roadways. Five active railroads and four airports also exist.

- Forty-two emergency service facilities exist, including four hospitals, 15 police departments, 20 fire departments, and three ambulance service centers.

- The average household income is $60,020, and manufacturing leads the employment industries.

Seneca Landfill

Land Resources



- Agricultural and forests dominate the land cover, with 82 percent.
- Approximately 178 square miles are used for agricultural purposes. Identified within this area are 13 soil associations, 31 prime agricultural soils, and 108 soils classified as farmland of statewide importance.
- Enrolled in agricultural security areas are 252 parcels.
- Approximately 176 square miles of forestland exist, of which the majority—79 percent—is deciduous forest.
- A variety of potential hazardous areas exist, including 13 auto salvage yards, 409 Resource Conservation and Recovery Act sites, two Superfund sites, two active landfills, four inactive landfills, seven brownfield sites, 90 inactive coal mines, and four abandoned coal mines.

Water Resources

- Connoquenessing Creek provides local residents with drinking water, businesses with water for their operations, outdoor recreation enthusiasts with a place to paddle or fish, and wildlife with an essential element of their habitat needs.
- Surface water, groundwater, floodplains, riparian zones, stormwater, dams, and wetlands are important components to water quality.

Table ES-1. Major Tributaries

Tributary	Percent Area	Drainage Area (square miles)	
Upper Connoquenessing Creek			**136.43**
Thorn Run	1.63	7.69	
Bonnie Brook	4.33	20.44	
Middle Connoquenessing Creek			**147.99**
Thorn Creek	8.95	42.22	
Glade Run	8.65	40.79	
Breakneck Creek	8.83	41.64	
Lower Connoquenessing Creek			**187.21**
Little Connoquenessing Creek	13.67	64.49	
Camp Run	3.14	14.8	
Brush Creek	11.89	56.1	
Slippery Rock Creek (subwatershed)		*366.12*	

Biological Resources

- The Connoquenessing region is home to a diversity of plants and animals, including 101 species of concern, 42 state listed threatened or endangered species, three federally listed threatened or endangered species, including the clubshell (endangered mussel), bog turtle (endangered), and bald eagle (threatened).

Garlic mustard, an invasive plant species located along Connoquenessing Creek

Shore spider

- Habitat loss, fragmentation, and degradation; urban sprawl; pollution; and invasive species are the main threats to biodiversity.

- There are many benefits to protecting biological diversity and natural areas, including recreational opportunities; public health and safety; economic sustainability; and land, air, and water quality.

Cultural Resources

- A variety of recreational opportunities are available, including: 98 park sites, 24 golf courses, two trails, four campgrounds, three camps, four approved trout water streams, two special regulation areas, and one state game land.

- The region possesses a rich history, including the assassination attempt of George Washington and first settlement of the Harmonie Society. The National Register of Historic Places identifies eight historical structures and three historical districts within the region. One historic district, Harmony Historic District, is identified as a National Historic Landmark.

Issues and Concerns

- Visions and goals identification 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 a traveling display, educational brochure, public meeting workshops, student workshops, public surveys, municipal surveys, key individual interviews, personal communication, community events, and project website.

- Survey and interview participants identified priority concerns, including development, stormwater, septic and sewage, farmland protection, illegal dumping, industrial pollution, environmental education, flooding, public access, municipal cooperation, and all-terrain vehicles.

Management Recommendations

- Management recommendations are suggestions to maintain or improve the conditions that affect many aspects of life within the region. The recommendations were compiled from municipal and public surveys, public meeting workshops, and key individual interview comments.

- The recommendations cover a broad range of topics, but should not be considered all encompassing. The suggestions are non-regulatory in nature, and best used as a guide to conserving, restoring, or improving important watershed characteristics.

- Creativity in implementing the identified recommendations or developing additional suggestions is highly encouraged.

Identified Goals

Project Area Characteristics

1. Identify impacts of acid precipitation to minimize or remediate these impacts.
2. Enhance transportation infrastructure.
3. Carefully plan development to ensure economic enhancement while preserving community character without adversely affecting quality of life.
4. Encourage economic growth with minimal impacts to the environment.
5. Establish economic stability needed to maintain a balanced workforce.
6. Enhance marketability of the region to prospective businesses.
7. Increase communication and cooperation among municipalities and counties within the region to promote sharing of services and improve conditions collectively affecting the watershed.
8. Proactively plan for the future.
9. Enhance financial support and services to prepare and train emergency response providers.

Land Resources

1. Work with agricultural community to implement best management practices on their property.
2. Maintain agricultural uses on lands.
3. Encourage environmental responsibility in industrial farming operations.
4. Promote local agricultural products, producers, markets, and related programs.
5. Establish or enhance incentives for land protection and conservation practice implementation.
6. Protect agricultural and ecologically significant lands.
7. Promote management practices on active mine sites to minimize impacts, prevent mine drainage, and improve conditions where possible.
8. Reclaim abandoned wells, mines, and quarries.
9. Minimize damages and financial hardship caused by mine subsidence.
10. Encourage remediation and removal of refuse piles.
11. Prevent future dumping activities by providing alternative methods of disposal and cleaning up existing dumpsites.

Water Resources

1. Minimize potential flooding damages by taking a proactive approach to managing floodplains.
2. Encourage non-structural approaches to floodplain management.
3. Reduce industrial and sewage waste discharges.
4. Install, maintain, or upgrade public and private water and sewage treatment facilities.
5. Minimize impacts from stormwater through planning.
6. Decrease the amount of impervious cover by 10 percent.
7. Utilize riparian corridors to improve water quality and wildlife habitat.
8. Protect wetlands.
9. Further investigate wetlands and their functions.
10. Reduce the amount of erosion and sedimentation entering waterways.
11. Monitor water quality to ensure demand does not exceed water supply.
12. Investigate the need and effectiveness of establishing a water quality trading program within the Connoquenessing Creek watershed.
13. Develop a monitoring plan for the watershed or completed project areas, integrating quality assurance/quality control standards into the plan.
14. Establish and implement water conservation practices to reduce water consumption.
15. Conduct an assessment of natural and man-made impoundments, and implement recommendations to enhance their ecosystems.
16. Reduce impacts caused by point and non-point source impairments.
17. Investigate methods to reduce impacts of acid precipitation.

18. Identify, study, and treat abandoned mine drainage discharges.
19. Monitor the use and effectiveness of dams.

Biological Resources

1. Develop, adopt, and implement management plans to protect forest and wildlife resources.
2. Implement best management practices to protect forest resources.
3. Identify Important Bird and Mammal Areas.
4. Identify and protect biologically diverse areas.
5. Enhance aquatic habitats.
6. Protect rare, threatened, and endangered species and their habitats.
7. Identify and protect important habitats for plant and animal species.
8. Monitor and control invasive species.
9. Implement strategies to conserve rare and unique plant and animal communities.
10. Promote the use of native plants.
11. Implement wildlife management practices to protect biodiversity.

Cultural Resources

1. Increase awareness of recreational resources through marketing and outreach.
2. Enhance recreational opportunities for sportsmen and outdoor enthusiasts.
3. Establish recreational programs for youth.
4. Improve recreational facilities and ensure availability and access.
5. Establish additional recreational facilities.
6. Establish, expand, and improve area trails.
7. Convert abandoned rail lines into trails and tours.
8. Link recreational facilities to each other.
9. Encourage environmentally sound practices when operating recreational vehicles, and enforce existing laws to minimize intrusions on private lands.
10. Establish recreation facilities and programs for senior citizens and youth.
11. Expand awareness, appreciation, and support for the arts.
12. Highlight and preserve local history within the region.
13. Promote appreciation for the local history.
14. Promote community involvement in conservation and educational initiatives.

Education and Funding

1. Educate stakeholders on how land-use planning can be affective.
2. Educate stakeholders about impacts associated with poor air quality.
3. Increase awareness about practices to assist agricultural and forest landowners in managing their lands effectively.
4. Increase awareness about impacts from litter, illegal dumps, and abandoned vehicles.
5. Increase awareness about the benefits of riparian corridors.
6. Educate stakeholders about the value and importance of wetlands.
7. Increase awareness about water quality issues affecting communities.
8. Establish ongoing environmental education programs.
9. Increase awareness about water quality, quantity, and conservation practices.
10. Educate stakeholders about the importance of wildlife and natural resources.
11. Increase awareness of the importance of biodiversity and protecting wildlife habitats.
12. Educate recreation users about proper and safe practices.
13. Increase funding to address issues important to the Connoquenessing Creek watershed communities.
14. Increase funding to create, maintain, and enhance existing recreational facilities and opportunities.

Chapter 1. Project Area Characteristics

Project Area

An overview of the Connoquenessing Creek watershed

Located in Allegheny, Beaver, Butler, and Lawrence counties, the Connoquenessing Creek watershed flows 54.1 miles from its headwaters in Concord Township, Butler County to its confluence with the Beaver River, approximately one mile west of Ellwood City, Lawrence County. Converging with the Beaver River, the waters become part of the Ohio and Mississippi Rivers until ultimately emptying into the Gulf of Mexico.

The Connoquenessing Creek watershed encompasses 830 square miles and has seven major tributaries (Figure 1-1). The largest of those tributaries is Slippery Rock Creek. Although a major tributary to the Connoquenessing, with approximately 400 square miles, Slippery Rock Creek was not included in this study because both watersheds are better served through the development of separate plans specific to each's unique character.

Connoquenessing Creek and its six named tributaries will be the focus of this report. The project covers an area of 430 square miles and includes four counties and 33 municipalities. Figure 1-2 indicates the study area for this report, while Table 1-1 identifies the municipalities with jurisdictions within the project area.

A diversity of landscapes from rural to urban exists, with each possessing its own impacts and attributes. Connoquenessing Creek begins in its headwaters as a calm, slow-flowing stream, mostly surrounded by rural landscapes. Tributaries join, and the stream grows and increases speed ever so slightly. It enters into more urbanized areas where impacts and attributes change. The Connoquenessing remains a generally docile stream until it nears Ellwood City, where Slippery Rock Creek enters. There the channel narrows, the substrate becomes rocky, and the flow increases drastically, transforming the stream into class III white water rapids, more typical of the Slippery Rock Creek subwatershed. This rapid flow is maintained until its confluence with the Beaver River.

Major Tributaries

Six major tributaries flow into Connoquenessing Creek. Bonnie Brook flows through Donegal, Oakland, and Summit townships, and East Butler Borough before it enters Connoquenessing Creek just upstream of the City of Butler (Butler County). Thorn Creek begins in the southeastern potion of Summit Township, and flows through Jefferson and Penn townships (Butler County). Glade Run flows through Richland Township (Allegheny County), Clinton, Middlesex, Adams, and Forward townships (Butler County). Breakneck Creek begins in Richland Township (Allegheny County), and flows through Valencia Borough, Adams Township, the Borough of Mars, Callery Borough, Forward Township, Evans City Borough, and Jackson Township in Butler County. Little Connoquenessing Creek, the only major tributary other than Slippery Rock Creek to enter on the north side of the creek, flows through Center, Butler, Connoquenessing, Lancaster, and Jackson townships (Butler County). Brush Creek begins in Pine Township (Allegheny County), and flows through Marshall Township (Allegheny County), Cranberry Township (Butler County), and New Sewickley, Marion, and North Sewickley townships (Beaver County) before it enters Connoquenessing Creek.

Climate

The climate follows that of a typical temperate climate with hot, dry summers and cold winters. The average high temperature ranges from 34 to 85 degrees Fahrenheit, while the average low temperature ranges from 16 to 60 degrees Fahrenheit (McNab & Avers, 1994). Historically the coldest day on record was negative 29 degrees Fahrenheit in January 1930. The warmest day on record, 103 degrees Fahrenheit, occurred in July 1988 in Zelienople (The Weather Channel, 2006).

Accumulation of rain or snow averages 35 to 45 inches per year. For the most part, the summers are dry and have a low humidity, giving the region a growing season between 120 to 180 days (McNab & Avers, 1994).

Table 1-1. Municipalities

Municipality	Square Miles	Percent of Watershed
Allegheny County		
Bradford Woods Borough	0.342	0.10
Marshall Township	6.093	1.71
Pine Township	4.55	1.27
Richland Township	3.04	0.85
West Deer Township	0.08	0.02
Beaver County		
Daugherty Township	1.633	0.46
Franklin Township	16.199	4.54
Marion Township	10.368	2.90
New Sewickley Township	18.359	5.14
North Sewickley Township	11.1	3.11
Lawrence County		
Ellport Borough	0.502	0.14
Ellwood City Borough	2.487	0.70
Perry Township	7.23	2.02
Shenango Township	1.31	0.37
Slippery Rock Township	0.546	0.15
Wayne Township	6.424	1.80
Butler County		
Adams Township	22.323	6.25
Butler City	2.578	0.72
Butler Township	21.678	6.07
Callery Borough	0.451	0.13
Center Township	22.732	6.36
Clay Township	1.737	0.49
Clearfield Township	1.093	0.31

Municipality	Square Miles	Percent of Watershed
Butler County		
Clinton Township	4.855	1.36
Concord Township	10.899	3.05
Connoquenessing Borough	1.351	0.38
Connoquenessing Township	23.132	6.48
Cranberry Township	22.797	6.38
Donegal Township	1.427	0.40
East Butler Borough	1.034	0.29
Evans City Borough	0.727	0.20
Forward Township	23.489	6.58
Franklin Township	7.526	2.11
Harmony Borough	0.408	0.11
Jackson Township	21.333	5.97
Jefferson Township	18.422	5.16
Lancaster Township	23.219	6.50
Mars Borough	0.453	0.13
Middlesex Township	20.643	5.78
Muddy Creek Township	10.947	3.07
Oakland Township	22.68	6.35
Penn Township	24.132	6.76
Portersville Borough	0.446	0.12
Prospect Borough	3.062	0.86
Saxonburg Borough	0.615	0.17
Seven Fields Borough	0.856	0.24
Summit Township	20.028	5.61
Valencia Borough	0.374	0.10
Zelienople Borough	2.02	0.57

Topography

The project area is within the boundary of the Appalachian Plateaus Province, the largest physiographic province in Pennsylvania. A physiographic province is a region that contains similar terrain and has been shaped by geologic history. Characterized by elevation, relief, and geologic structure, each physiographic province can be subdivided into sections based on the distribution patterns of historic rock formations, deformation, erosion, specific landforms or other geologic features (Radford University, 2005).

Characterized as a highland eroded by streams to create deep valleys and hilly topography, the Appalachian Plateaus Province is further divided into 10 sections. Connoquenessing Creek is located in the Pittsburgh Low Plateau section. The smooth to irregular undulating surface, the narrow and relatively shallow valleys, strip mines, and reclaimed lands of shale, sandstone, siltstone, limestone, and coal are evident in this region. Streams follow a dendritic, or branching, drainage pattern. The elevation ranges from 660 to 2,340 feet above sea level.

In addition to being located in the Appalachian Plateaus geomorphic province, the area is also located in the Humid Temperate Domain ecoregion. An ecoregion is the name given to an area having a distinctive composition and pattern of plant and animal species distribution (Washington State Department of Natural Resources, 2003). Other features such as climate, landform, soil, and hydrology are important in the development of an ecosystem and thus help define ecoregions. The relationship between species and their physical environments are in essence alike. Province and ecoregion delineations frequently overlap, because the presence or absence of plant and animal species relates to the geology. However, the difference is that ecoregions also view the distribution of species and ecosystems across the landscape.

Each ecoregion is subdivided into divisions and subregions. The project area is located within two of these subregions. The majority of the area lies within the Southern Unglaciated Allegheny Plateau subregion covering the Allegheny, Beaver, and Butler portions of the watershed. The remainder of the study area in Lawrence County is located within the Western Glaciated Allegheny Plateau subregion.

The Southern Unglaciated Allegheny Plateau

High hills, sharp ridges, and narrow valleys characterize the Southern Unglaciated Allegheny Plateau subregion, as it is part of the Appalachian Plateau geomorphic province. Due to extensive mining of coal layers, strip mined lands are a notable landform.

The Western Glaciated Allegheny Plateau

Modified by glaciations, the Western Glaciated Allegheny Plateau geomorphic province is a maturely dissected upland characterized by rounding hills, ridges, and broad valleys (NcNab & Avers, 1994). Being located on the edge of the Western Glaciated Allegheny Plateau, the project area shows very little evidence of the glacial features that are evident in other areas of this subregion.

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 (DEP, 2003). Any substance in the air that causes damage to life, ecosystems, or property is an air pollutant. Natural and synthetic processes can lead to air pollution. Over 90 percent of the pollutants originate from industry, power plants, vehicles, and other human influences. In 1970, the Clean Air Act was passed, setting a national goal to have clean and healthy air for everyone. The act was amended in 1977, and again in 1990.

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

Air quality impacts are caused by airborne pollutants discharged hundreds of miles away

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

Atmospheric Deposition

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

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

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

Critical Pollutants

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

Carbon Monoxide

Carbon monoxide is a poisonous compound that results from the incomplete burning of fuels, such as motor vehicle exhaust, industrial processes, and wood stoves. It can impair vision, alertness, and other mental and physical functions when inhaled. Individuals suffering from cardiovascular disease are at the highest risk, but healthy individuals can also be affected. Carbon monoxide poisoning can be fatal when high enough levels are present, because it replaces the oxygen in blood and inhibits the delivery of oxygen to body tissues (DEP[5]).

Lead

Lead is emitted into the atmosphere through the burning of leaded fuel and industrial processes, such as battery manufacturers and lead smelters. Metal processing is the major source of lead emissions. Lead poisoning reduces mental abilities; damages blood, nerves, and organs; and raises blood pressure when ingested or inhaled (DEP[5]). Lead is highly toxic and accumulates in the body; even small doses are harmful.

Nitrogen Oxides

Nitrogen oxides (NO_x) are produced when fossil fuels are burned at temperatures greater than 1,200 degrees Fahrenheit. Automobiles, trucks, buses, airplanes, industries, and power plants emit NO_x into the atmosphere. They contribute to the deposition of nitrogen in soil and water through acid rain and play a major role in the formation of ground-level ozone. Human health is impacted when NO_x enters the lungs and makes breathing more difficult (DEP[5]).

Ozone

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

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

Particular Matter

Particulates are tiny drops of liquid or small particles of dust, metal, or other materials that float in the air. A mixture of these particles is known as particular matter. Four different types and sizes of particular matter exist. These particles travel into the lungs and become trapped. They can cause respiratory ailments and can carry cancer-causing chemicals, producing greater health problems (DEP[5]).

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

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

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

Sulfates and nitrates are classified together as a critical pollutant. Sulfates are one of the key components in the formation of acid rain. Nitrates are currently being studied to determine if they have an impact on the formation of acid rain. Both sulfates and nitrates have a role in reducing visibility.

Sulfur Dioxide

Sulfur dioxide is emitted into the atmosphere by industrial processes such as burning coal or oil containing sulfur. Trees, plants, and agricultural crops are damaged by sulfur dioxide and it can accelerate the corrosion of materials, such as monuments, buildings, and iron-containing metals (DEP[5]). Sulfur dioxide is the main component of acid rain, joining with water vapor in the atmosphere to form sulfuric acid. Children, the elderly, and individuals with asthma, chronic lung disease, and cardiovascular disease, are more susceptible to negative health effects from this pollutant.

Mercury

Although mercury is not identified as a national critical pollutant, it is an important one. Mercury occurs naturally in air, water, and soil. Many rocks, including coal, release mercury into the atmosphere when burned. It is estimated that half of all mercury deposition within the U.S. comes from sources within the U.S. (EPA, 2005). Approximately 40 percent of the domestic mercury released is from coal-burning power plants. Of the mercury emissions from coal-burning power plants, only one-third is deposited in the U.S.

Mercury emitted into the atmosphere eventually settles into water or onto land, where it can be carried to water by runoff. Once deposited, certain microorganisms can change it into methylmercury, a highly toxic form that builds up in fish, shellfish, and animals that eat fish (EPA, 2005). Some species of fish and shellfish build up more methylmercury than others and, depending on what they eat, how long they live, and where they are located in the food chain, the level of methylmercury varies.

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

EPA, U.S. Food and Drug Administration, and individual states work together to establish local fish advisories for certain types of commercially harvested fish and shellfish. 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 also issued when appropriate. Advisories for Pennsylvania are updated annually and can be accessed on the DEP's website, keyword: fish advisories.

Impacts of Air Pollution

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

Air Quality Partnership, a public/private coalition of volunteers, is working to improve the air quality in the four most populous areas of Pennsylvania. The majority of the Connoquenessing watershed, with the exception of Lawrence County, is located within the Pittsburgh Region. The goals of the partnership include: increasing public understanding of impacts of air pollution, provide alerts for days with high air pollution, provide health effect information and guidelines to prevent and reduce exposure, and encourage voluntary action to reduce air pollution emission (Air Quality Partnership).

Utilizing EPA's standard air quality index (AQI) the partnership alerts communities when the air is unhealthy to breath. The index utilizes a four-staged color system to alert communities. When the AQI is green the air is considered to be in a healthy or good condition. A yellow AQI occurs when the air quality is in fairly good condition and recommends individuals that are extremely sensitive to limit exposure to the outdoors. A ranking of orange is considered unhealthy for sensitive individuals and recommends limited exposure to the outdoors, especially in elderly and extremely young individuals. An AQI of red is unhealthy for everyone to be exposed to the outdoors for any period of time.

Socioeconomic Profile

Land-Use Planning and Regulation

Pennsylvania municipalities in the watershed are only utilizing a portion of the land-use regulation control powers granted to them by the state legislature in the Pennsylvania Municipalities Planning Code. Granted land-use regulation control powers include comprehensive planning, subdivision regulation, and zoning. Unwanted land uses may result from uncontrolled industrial, commercial, or residential development. Table 1-2 and Figure 1-4 identify land use regulations being utilized in the watershed.

Comprehensive Plans

Comprehensive plans are created to serve as a guide to public and private actions and decisions to ensure the appropriate development of public and private property (Allegany County Maryland Planning Department, 2002). Many municipalities and counties recognize that, without formal plans, they may be vulnerable to undesirable land uses through uncontrolled industrial, commercial, or residential 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 that may relate to the plans. According to the Municipalities Planning Code, counties in Pennsylvania are required to review and update their comprehensive plans every 10 years.

Allegheny, Beaver, Butler, and Lawrence counties have comprehensive plans. Majority of the municipalities within the watershed—71 percent— have municipal comprehensive plans. All watershed municipalities in Allegheny and Beaver counties have completed comprehensive plans. Fifty percent of the watershed municipalities in Lawrence County and 67 percent of the watershed municipalities in Butler County have comprehensive plans. Municipalities that do not have plans and municipalities whose plans are older than 10 years should consider conducting or updating their plan.

Subdivision Regulations

Only 43 percent of the municipalities utilize subdivision regulations. Subdivision regulations limit the number of times that a parcel can be split into two or more smaller parcels; and therefore, represent an important tool in controlling sprawl. Subdivision regulations can ensure that new developments do not overburden local roads, facilities, and services; new roads and infrastructure are integrated with existing and planned roads and facilities; and provide adequate provisions for stormwater management, erosion control, water, wastewater, and traffic access (Vermont Conservation Education Fund, 2002). Municipalities currently not utilizing subdivision regulations should consider establishing them to assist in managing the growth of the region.

Zoning and Land-Use Ordinances

Zoning is a legal mechanism by which government bodies, for the sake of protecting public health, safety, morals, and general welfare, can limit a landowner's right to use privately owned land. This is done through the development of zoning ordinances. Zoning ordinances divide all land within a governing body's area into districts, and create regulations that apply generally to the governing body as a whole, as well as specifically to individual districts.

The majority of municipalities (67 percent) utilize zoning and land-use ordinances. Municipalities not using zoning and land-use ordinances are susceptible to unwanted and undesirable land uses that could degrade the quality of life of their residents. Municipalities should consider establishing land-use ordinances to protect the character of their communities and the watershed.

Table 1-2. Land-Use Ordinances

Municipality	Comprehensive Plan	Zoning Ordinance	Subdivision Ordinance	Floodplain Ordinance
Allegheny County				
Bradford Woods Borough	Yes	Yes	NA	NA
Marshall Township	Yes	Yes	Yes	NA
Pine Township	Yes	Yes	NA	NA
Richland Township	Yes	Yes	NA	NA
West Deer Township	Yes	Yes	NA	NA
Beaver County				
Daugherty Township	Yes	Yes	Yes	NA
Franklin Township	Yes	No	Yes	NA
Marion Township	Yes	No	Yes	NA
New Sewickley Township	Yes	Yes	Yes	NA
North Sewickley Township	Yes	No	Yes	NA
Lawrence County				
Ellport Borough	No	Yes	NA	NA
Ellwood City Borough	Yes	Yes	Yes	Yes
Perry Township	No	No	NA	NA
Shenango Township	Yes	Yes	NA	NA
Slippery Rock Township	Yes	No	Yes	Yes
Wayne Township	No	No	NA	NA
Butler County				
Adams Township	Yes	Yes	Yes	Yes
Butler City	Yes	Yes	NA	Yes
Butler Township	Yes	Yes	NA	Yes
Callery Borough	No	Yes	NA	NA
Center Township	Yes	Yes	Yes	NA
Clay Township	Yes	No	Yes	NA
Clearfield Township	No	No	NA	Yes

Municipality	Comprehensive Plan	Zoning Ordinance	Subdivision Ordinance	Floodplain Ordinance
Butler County				
Clinton Township	Yes	No	Yes	Yes
Concord Township	No	No	NA	NA
Connoquenessing Borough	Yes	Yes	Yes	No
Connoquenessing Township	Yes	No	Yes	Yes
Cranberry Township	Yes	Yes	Yes	NA
Donegal Township	No	No	NA	NA
East Butler Borough	Yes	Yes	NA	NA
Evans City Borough	No	Yes	NA	NA
Forward Township	Yes	No	NA	NA
Franklin Township	Yes	Yes	Yes	Yes
Harmony Borough	Yes	Yes	Yes	Yes
Jackson Township	Yes	Yes	Yes	Yes
Jefferson Township	Yes	Yes	NA	NA
Lancaster Township	No	Yes	NA	NA
Mars Borough	No	Yes	NA	NA
Middlesex Township	Yes	No	NA	Yes
Muddy Creek Township	Yes	No	Yes	NA
Oakland Township	No	Yes	Yes	NA
Penn Township	Yes	Yes	Yes	NA
Portersville Borough	Yes	Yes	NA	NA
Prospect Borough	No	Yes	NA	NA
Saxonburg Borough	Yes	Yes	NA	NA
Seven Fields Borough	No	Yes	NA	NA
Summit Township	Yes	Yes	NA	Yes
Valencia Borough	No	No	NA	NA
Zelienople Borough	Yes	Yes	NA	NA

(Sources: Andrus, personal communication, 2007; Cichra, personal communication, 2008; Municipal surveys; Pennsylvania Center for Local Government Services, 2005; Smith, personal communication, 2008)

Conservation by Design

Conservation by Design is an approach used to conserve open spaces, greenways, and natural resources while also addressing development issues. Conservation by Design utilizes conservation through local zoning and subdivision ordinances. When utilizing Conservation by Design strategies, the development is rearranged to decrease the amount of buildable space on each individual parcel by at least half, setting aside community open space. Conservation by Design is a four-step process that follows a formalized procedure (Natural Lands Trust, 2001). The general process includes:

Step 1 – Identify land that should be permanently protected. These lands become the community open space and can include natural features such as floodplains and steep slopes, historical sites, farmland, etc.

Step 2 – Locate sites of homes so that their views of the open space are maximized.

Step 3 – Identify the locations where roads and trails should go. This is the reverse of the conventional development process where roads are the first things to be identified.

Step 4 – Determine the boundaries of the lots.

For more information, visit Natural Lands Trust website at www.natlands.org.

Smart Growth

Municipalities and counties should consider implementing cooperative land-use strategies to improve their quality of life. They also should consider initiating Smart Growth practices when development issues are being addressed. Some strategies to consider are (Smart Growth Network, 2006):

- Mixing land uses
- Taking advantage of compact building designs
- Creating a range of housing opportunities and choices
- Creating walkable neighborhoods
- Fostering distinctive, attractive communities with a strong sense of place
- Preserving open space, farmland, natural beauty, and critical environmental areas
- Strengthening and directing development toward existing communities
- Making development decisions predictable, fair, and cost-effective
- Encouraging community and stakeholder collaboration in development decisions

Utilizing downtown areas for housing and business is one way to mix land uses and create walkable communities

Demographics and Population Patterns

Utilizing census block group data from the 1990 census and the 2000 census, the population of the study area was calculated. Table 1-3 displays the population change by county between 1990 and 2000. Over that time, the overall population increased by 10,803 people to a total population of 149,910. Butler County experienced the greatest increase of residents, while Lawrence County experienced the only decrease.

The watershed population in 2000 is displayed on Figure 1-5, while Figure 1-6 displays the population change from 1990 to 2000.

Eighty-four percent of the total population in 2000 was native residents to Pennsylvania, while in 1990, the total population native to Pennsylvania was 88 percent.

Table 1-3. Watershed Population

County	1990	2000	Change	% Change
Allegheny	11,406	16,187	4,781	41.90%
Beaver	8,929	9,405	476	5.30%
Butler	104,650	115,152	10,502	10.04%
Lawrence	14,122	9,166	-4,956	-35.09%
Total	**139,107**	**149,910**	**10,803**	**7.66%**

(Sources: Free Demographics, 2005; U.S. Bureau of Census, 1990; U.S. Bureau of Census, 2000)

Table 1-4. Population by Sex and Age

Years	Male	Female	Total
<5	51.60%	48.40%	6.23%
5-17	47.60%	52.40%	19.75%
18-24	52.14%	47.86%	6.11%
25-40	48.84%	51.16%	19.38%
40-61	49.70%	50.30%	29.29%
≥62	50.86%	49.14%	19.25%

(Sources: Free Demographics, 2005; U.S. Bureau of Census 2000)

Among the municipalities within the project area, Cranberry Township has the largest population, with 23,625 residents. Butler Township and the City of Butler are the second and third largest with 17,185 and 15,121 respectively.

The ratio of males to females is approximately one to one, with females holding a slight edge of two percent (Free Demographics, 2005). Table 1-4 displays the percentage of the population by sex and age. Six age classes were selected and include pre-school aged, school aged, college aged, post collegiate aged, midlife aged, and retirement aged.

Infrastructure

Infrastructure is a set of interconnected structural elements that provide the framework supporting an entire structure. Although, the term has diverse meanings it typically refers to municipal infrastructure, such as roadways, public transit, airports, sewage, and public water supply, as in this instance. The existence of infrastructure is important in the development and redevelopment of communities. Sanitary sewer systems and public water supplies usually determine how much development a given area can support. A lack of clean water and proper sewage treatment and disposal can hinder the development process, and therefore send potential jobs to other locations. Planning for development and redevelopment are key to the future of the area.

Sanitary Sewer Systems

There are eight public sewage systems. However, not all residents have access to public facilities. Many rural residents cannot connect to public sewage systems, nor is it economically feasible to do so. These individuals utilize septic systems and other alternatives to public sewage. Table 1-5 identifies the public sewage systems and their service areas.

Public Water Supply

There are eight public water systems that provide drinking water to area residents. The majority of public water systems are located in urbanized areas around the population centers. Many residents rely on springs and wells to provide them with drinking water. Table 1-6 identifies the public water suppliers.

Transportation and Safety

The primary method of transportation in the watershed is through the usage of area roadways. There are two interstates, two U.S. routes, 11 state highway routes, and numerous state, township, and private roads. In addition there are five active railroad lines. Figures 1-8 and 1-9 display transportation and safety features.

Table 1-5. Public Sewage Systems

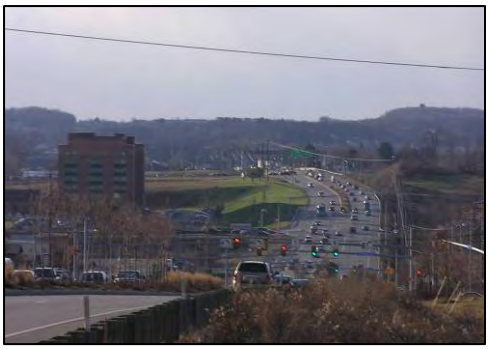
Treatment System	Daily Average (gallons per day)	Service Area
Breakneck Creek Region Authority	900,000	Mars Borough, Valencia Borough, Seven Fields Borough, Adams Township, Pine and Richland Townships Allegheny County, and a portion of Cranberry Township
Butler Area Sewer Authority	6.118 million	City of Butler, Butler Township, Center Township, Summit Township, East Butler Borough, and portions of Connoquenessing Township, Oakland Township, and Penn Township
Cranberry Municipal Authority	2.46 million	Cranberry Township, Marshall Township, and Pine Township
Evans City Breakneck Creek Plant	69 % of capacity	Evans City Borough and Callery Borough
McCandless Sanitary Authority	NA	Bradford Woods Borough
Prospect Borough	123,450	Prospect Borough
Saxonburg	375,000	Saxonburg Borough
Western Butler County Authority	1.02 million	Harmony Borough, Jackson Township, Zelienople Borough, and Lancaster Township

Table 1-6. Public Water Systems

Treatment System	Source	Daily Average (gallons per day)	Service Area
Borough of Mars	Wells	195,000	Mars Borough
Butler Area	Lake Oneida and Thorn Run Reservoir	7,250,175	NA
Center Township Municipal Water Authority	Pennsylvania American Water	215,994	Center Township
Connoquenessing	Pennsylvania American Water	97,240	Connoquenessing Borough and Connoquenessing Township
Cranberry Township Authority	Brush Creek and wells	1,917,673	Cranberry Township and Evans City Borough
Evans City Borough	Licken's Run Reservoir	237,874	Evans City and portions of Forward Township and Jackson Township
Harmony Borough	Little Connoquenessing Creek	132,954	Harmony Borough
Richland Township Municipal Authority	NA	NA	Richland Township
Saxonburg	NA	NA	Saxonburg
West View Water Authority	NA	100,000-130,000	Seven Fields Borough, Adams Township, Marshall Township, Pine Township, and Bradford Woods Borough
Zelienople Borough	Scholar's Run	479,947	Zelienople Borough

Roadways

Roads traversing the region can be categorized as primary routes, secondary routes, tertiary routes, and unnamed township, state, and local roads. Primary routes are typically four-lane routes that link larger towns or boroughs to one another, such as Butler, Cranberry, Ellwood City, and Zelienople. Secondary routes are typically two-lane routes that link communities to one another, while tertiary routes are two-lane routes within communities.



Route 19 in Cranberry Township

The primary routes include Interstate 79, Interstate 76, U.S. 19, U.S. 422, and PA Route 8. Secondary routes include Route 38, Route 65, Route 68, Route 228, Route 308, Route 351, Route 356, Route 488, Route 528, and Route 588. There are numerous tertiary routes that are state, township, or local unnamed roads.

- **Interstate 79** traverses the western border of Butler County traveling from north to south.
- **Interstate 76**, also known as the Pennsylvania Turnpike, travels east to west across the southern portion of the watershed in Pine and Marshall townships in Allegheny County and Cranberry Township in Butler County, where it follows Brush Creek through New Sewickley and Marion townships in Beaver County.
- **U.S. Route 19** parallels Interstate 79 in the watershed traveling north to south through the western portion of Butler County.
- **U.S. Route 422** travels east to west across the northern portion of the watershed crossing through Butler on its way to New Castle.
- **State Route 8** travels north to south through the eastern portion of the watershed. This route is a major corridor for traffic to and from the City of Butler.
- **State Route 38** travels north from Butler and follows along Lake Oneida and Connoquenessing Creek.
- **State Route 65** travels north to south across the western edge of the watershed through Ellwood City.
- **State Route 68** travels west to east from Unionville through Zelienople, Evans City and Butler.
- **State Route 228** travels east to west across the watershed from the Glade Mills area to Cranberry Township.
- **State Route 308** travels north from State Route 8 through the headwaters of Connoquenessing Creek.
- **State Route 351** follows Connoquenessing Creek west from Ellwood City where it turns south, just short of the confluence with the Beaver River.
- **State Route 356** travels in a northeastern direction through the eastern portion of the watershed into Butler.
- **State Route 488** travels from Ellwood City northeast through Perry Township, Lawrence County and follows the northern boundary of the watershed to Prospect, Butler County.
- **State Route 528** travels north from Interstate 79 in Jackson Township, Butler County through Evans City to Prospect where it continues north into the Slippery Rock Creek watershed.
- **State Route 588** traverses the watershed in a western direction from Zelienople to just beyond Fombell, where it makes a southern dip to Barrisville and continues west out of the watershed.

Airports

Four airports are located within the study area. They include Zelienople Municipal Airport, Butler Farm Show Airport, Butler County Airport, and the Lakehill Airport. The Zelienople Municipal Airport is a public airport owned by the Borough of Zelienople and operated by the municipal authority. It is located on 240 acres of a rehabilitated strip mine from the 1940s. The Butler Farm Show Airport is located five

miles east of Butler and is classified as a general service airport. The Butler County Airport is located five miles southwest of Butler. The Lakehill Airport is located one mile northwest from the Borough of Mars.

Also located within close proximity are four regional airports. They include Beaver County Airport, New Castle Municipal Airport in Lawrence County, McVille Airport in Armstrong County, and Rock Airport of Pittsburgh. The Pittsburgh International Airport is the closest major airport providing passenger service.

Zelienople Airport, one of the regional airports in the area

Railroads

There are 86 miles of active railroad lines among five rail service providers. There are also two inactive lines. Figure 1-9 identifies the active and inactive railroads.

The longest active line is the CXS, which travels the P&W Subdivision from Allegheny County to Lawrence County. The Main Line of the Bessemer and Lake Erie is the second longest line traveling from Mercer County to Allegheny County. The other two railroads are part of the Buffalo and Pittsburgh lines. The Main Line, the larger of the two lines, travels from Eidenau to Armstrong County. The Northern Subdivision travels form Wadesworth to Burin. The final active line is a part of the Western Allegheny Line of the Bessemer and Lake Erie Railroad. It travels from Butler to Armstrong County.

Methods of Transportation

The most popular method of transportation used by residents is the automobile. Within the project area, 93 percent of the working population drives a personal vehicle to work. Approximately nine percent of those who drive participate in a carpool.

Between 1990 and 2000, the number of people utilizing public transportation and walking to work had decreased, while the number of people bicycling to work had doubled. Figure 1-8 shows the percentages and methods people used to get to work, according to the 1990 and 2000 censuses.

Emergency Services

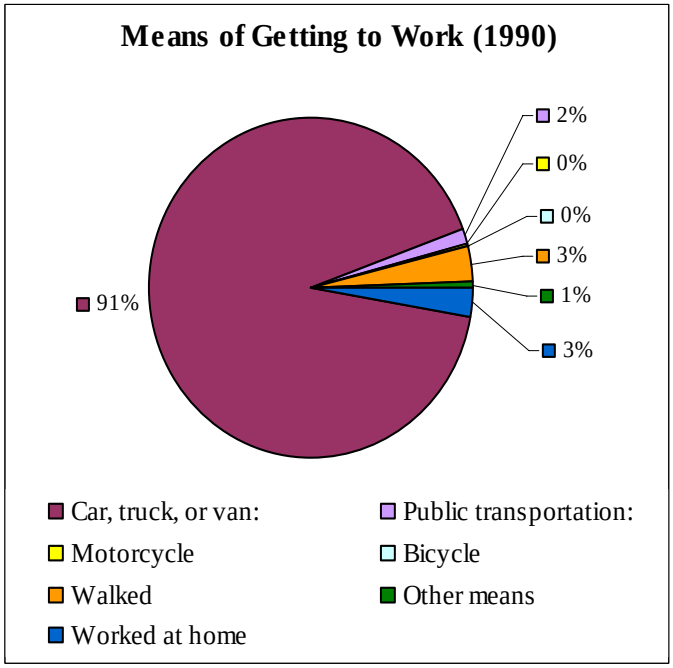
Having access to emergency services is essential. Emergency services and facilities are typically found in centralized population areas, where responders can quickly reach emergency situations. Ambulance, police departments, fire departments, and hospitals are examples of emergency services and facilities. Services to communities outside the population centers also are available, but with possible delays. There are 42 facilities available to respond in case of an emergency. They include four hospitals, 15 police departments, 20 fire departments, and three ambulance service centers. Figure 1-13 displays the locations of emergency service facilities.

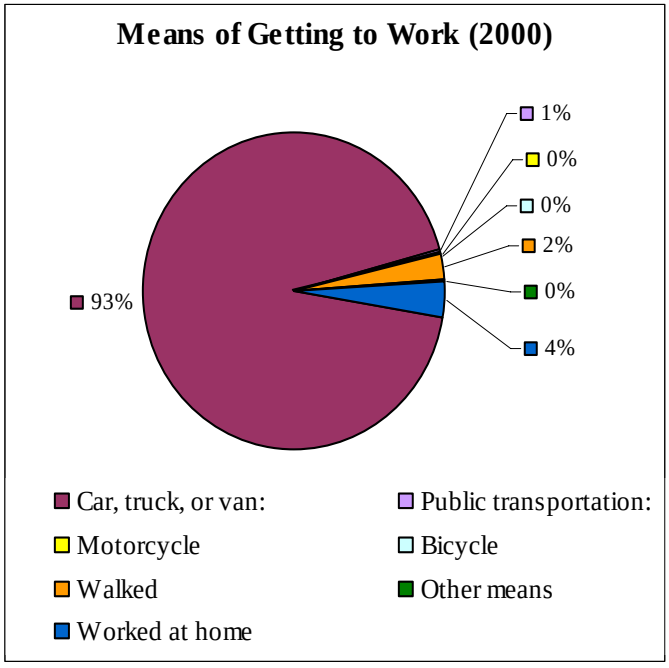
Economy and Employment

The economy is constantly changing. Various tools are used to monitor the economic conditions, including average household income and unemployment rate. Table 1-7 compares the average household income and the unemployment rate within the watershed to that of Pennsylvania and U.S.

In 1980, the average household income was $21,015, and in 2000 it increased to $60,020, an increase of 186 percent. Some of the increase can be attributed to the inflated cost of living. Another influence on the average household income could be the average household income is rising population in the area.

Figure 1-8. Method of Transportation Comparison 1990 to 2000





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

Table 1-7. Economic Comparison

Year	Connoquenessing Watershed	Pennsylvania	U.S.
Average Household Income			
1980	$21,015	19,744	$20,382
1990	$36,874	36,675	$38,464
2000	$60,020	52,682	$56,643
Unemployment Rate (Seasonally Adjusted)			
1990	5.2%	5.9%	6.2%
2000	3.7%	5.7%	5.7%
Oct 2007	Data Not Available	4.50%	4.70%

(Source: Bureau of Labor Statistics 2007, Free Demographics 2005, U.S. Census Bureau 2000, U.S. Census Bureau 1990)

Historically, the local unemployment rate has been below the national rate. As of February 2006, for the most part, that pattern had not changed. The unemployment rate in Allegheny and Butler counties, at 3.5 percent, was below the 4.5 percent (not seasonally adjusted) unemployment rate. Beaver County, at 4.4 percent, was also below the national rate as well. Lawrence County, at 4.7 percent, was slightly above the national average. The local unemployment rate for 2007 could not be calculated due to a lack of data available.

Major Employers

There are 44 major employers within the project area. A major employer is designated as one who employs 200 or more people. Table 1-8 identifies the top ten major employers. A listing of all major employers is located in Appendix C.

Employment Industry

Consistent with the U.S. and the Commonwealth of Pennsylvania, manufacturing was the leading employment industry represented by 18 percent of the employed workers. Retail trade was the second leading industry accounting for 13.5 percent of the workforce. The third leading industry was healthcare and social services. Table 1-9 displays the breakdown of employment by industry for the U.S., Pennsylvania, and the Connoquenessing Creek watershed.

Table 1-8. Top 10 Major Employers

Employer	Location	Employees
AK Steel Corporation	Butler	4,000
Butler Memorial Hospital	Butler	1,200
Three Rivers Aluminum Co. Inc.	Cranberry Township	900
Butler Area School District	Butler	850
Lutheran Affiliated Services	Cranberry Township	800
Penn United Technology, Inc.	Saxonburg	675
Spang and Co. Inc.	Butler	600
Manheim's Pennsylvania Auction	Cranberry Township	595
Wal-Mart Supercenter	Cranberry Township	550
Mine Safety Appliance Co.	Cranberry Township	500

(Source: Harris Infosource, 2005)

Table 1-9. Breakdown of Employment by Industry

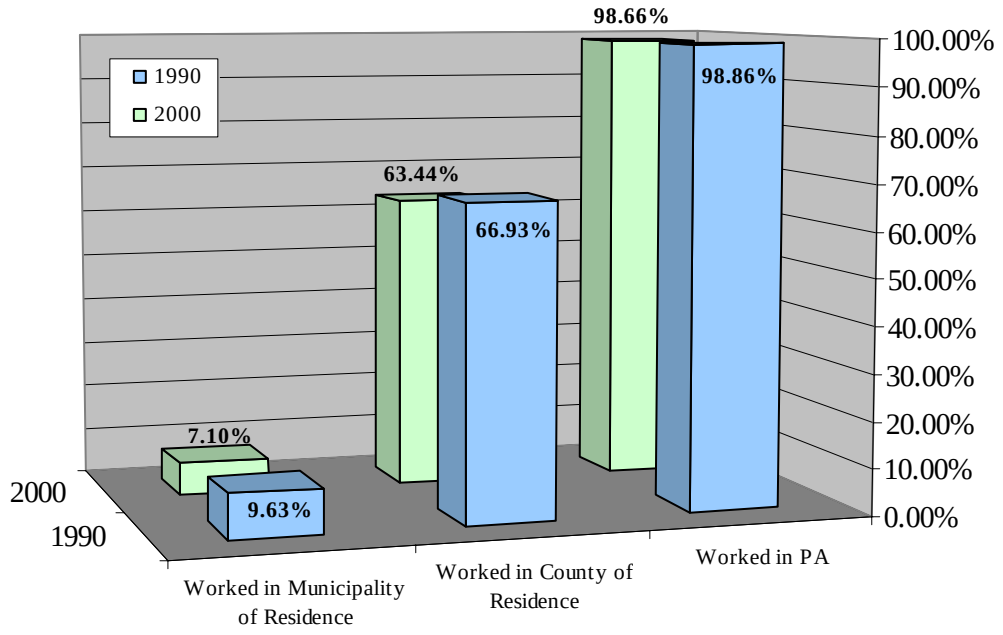
Industry	Connoquenessing Absolute Employment	%	Pennsylvania Absolute Employment	%	U.S. Absolute Employment	%
Accommodation and food services	4,471	5.83%	324,035	5.72%	7,902,849	6.09%
Administrative and support and waste management services	1,936	2.53%	167,338	2.95%	4,395,117	3.39%
Agriculture, forestry, fishing, and hunting	665	0.87%	56,904	1.00%	1,931,064	1.49%
Arts, entertainment, and recreation	809	1.06%	73,855	1.30%	2,306,263	1.78%
Construction	5,233	6.83%	339,680	6.00%	8,811,981	6.79%
Educational services	5,544	7.23%	497,026	8.78%	11,364,630	8.76%
Finance and insurance	3,534	4.61%	293,969	5.19%	6483758	5.00%
Health care and social assistance	9,870	12.88%	739,803	13.06%	14,459,058	11.15%
Information	1,745	2.28%	148,845	2.63%	3,996,594	3.08%
Management of companies and enterprises	151	0.20%	4,140	0.07%	70,434	0.05%
Manufacturing	14,110	18.41%	906,901	16.01%	18,295,669	14.10%
Mining	144	0.19%	16,566	0.29%	496,771	0.38%
Other services (except public administration)	4,131	5.39%	274,059	4.84%	6,320,480	4.87%
Professional scientific and technical services	4,271	5.57%	307,537	5.43%	7,597,636	5.86%
Public administration	188	0.25%	235,866	4.16%	6,212,425	4.79%
Real estate and rental and leasing	1,098	1.43%	78,123	1.38%	2,448,199	1.89%
Retail trade	10,376	13.54%	684,296	12.08%	15,222,240	11.73%
Transportation and warehousing	3,998	5.22%	248,936	4.40%	5,569,629	4.29%
Utilities	661	0.86%	55,528	0.98%	1,174,876	0.91%
Wholesale trade	3,718	4.85%	210,136	3.71%	4,669,192	3.60%
Total	**76,653**		**5,663,543**		**129,728,865**	

(Sources: Free Demographics, 2005; U.S. Bureau of Census, 2000)

Work Location and Time Traveled to Work

Only seven percent of the local workforce worked within the municipality where they reside, while 63 percent worked within the county in which they reside. Less than 1.5 percent of residents worked outside the boundaries of Pennsylvania in 2000. Figure 1-11 shows the work location of residents in 1990 and 2000.

Figure 1-11. Work Locations



The amount of time people travel to work has increased due to urban sprawl, which is very common in the region. Many people have moved to the region while maintaining employment in Pittsburgh. Between 1990 and 2000, there was an eight percent increase in the number of people living within the study area and commuting more than 30 minutes to work. Figure 1-12 shows a comparison of how long people traveled to get to work in 1990 and 2000.

Education

Primary and secondary educational facilities exist. There are seven major school districts that maintain 41 schools. There are 10 private schools. Beaver, Butler, and Lawrence counties also have county-wide vocational technical schools.

Secondary educational opportunities are available. Butler County Community College is the only secondary school located within the project area; however six other institutions are located close by. Table 1-10 identifies the schools and their enrollments.

Figure 1-12. Travel Time to Work Comparison 1990-2000

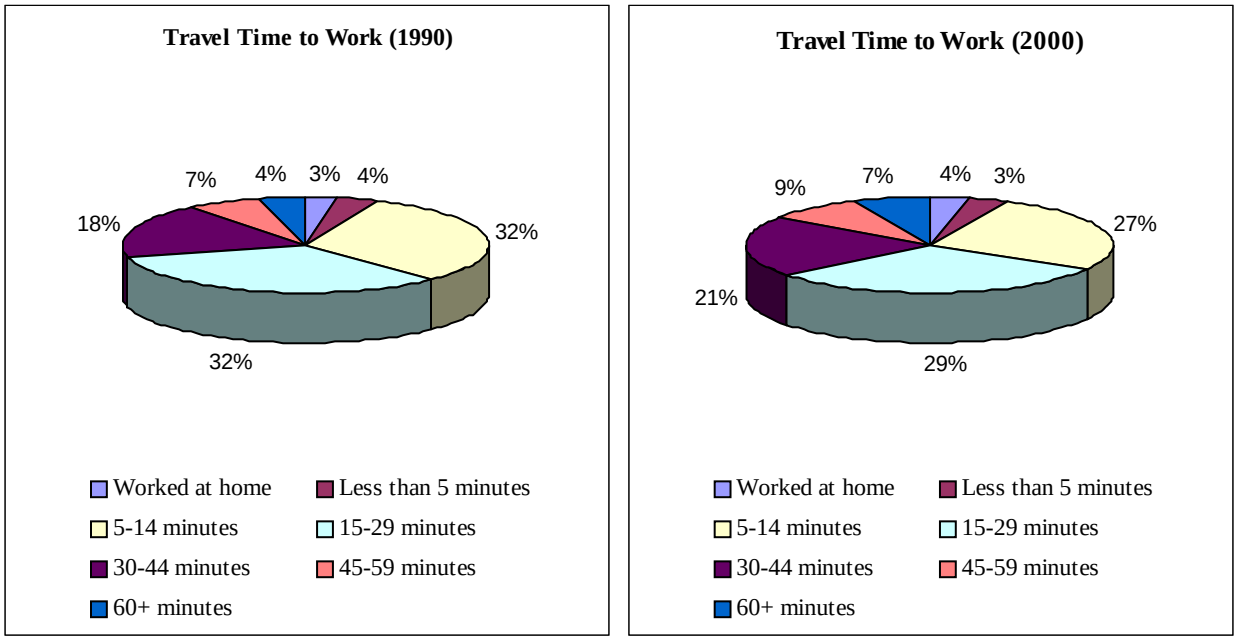


Table 1-10. School Districts and School Enrollment

School	Grades	Enrollment
Butler Area School District		
Broad Street School	K-6	314
Butler Area Intermediate High School	9-10	1,407
Butler Area Junior High School	7-8	1,291
Butler Area Senior High School	11-12	1,317
Center Avenue School	K-6	243
Center Township School	K-6	757
Clearfield Elementary School	K-6	273
Connoquenessing Elementary School	K-6	314
Emily Brittain Elementary School	K-6	441
McQuistion Elementary School	K-6	544
Meridian School	K-6	427
Northwest School	K-6	451
Oakland Township School	K-6	334
Summit Elementary School	K-6	268
Mars Area School District		
Adams Elementary School	3-5	388
Mars Area Middle School	6-8	654
Mars Area Senior High School	9-12	872
Mars Primary Center	K-2	570
Middlesex Elementary School	3-5	223

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

School	Grades	Enrollment
Seneca Valley School District		
Connoquenessing Valley Elementary School	K-4	769
Evans City Elementary School	K-4	619
Evans City Middle School	5-6	530
Haine Elementary	K-4	690
Haine Middle School	5-6	626
Rowan Elementary School	K-4	837
Seneca Valley Intermediate High School	9-1 0	1,176
Seneca Valley Middle School	7-8	1,207
Seneca Valley Senior High School	11-12	1,091
South Butler County School District		
Knoch High School	9-12	1,014
Knoch Middle School	6-8	739
South Butler Intermediate Elementary School	4-5	386
South Butler Primary School	K-3	778
Private Schools		
Butler Catholic School, Butler	K-8	317
Butler County Children's Center, Butler	PK-K	60
Butler Wesleyan Academy, Butler	PK-12	25
Butler Montessori School, Butler	NA	50
Calvary Academy, Butler	NA	NA
First Baptist Christian School, Butler	PK-12	119
His Kids School, Butler	PK-3	NA
Holy Redeemer School, Ellwood City	PK-6	184
Holy Sepulcher Elementary School, Butler	K-8	192
Home Acre Christian Academy, Butler	Ungraded	38
Living Word Academy, Butler	3-12	9
Lutheran Youth-Family Services	2-12	80
Montessori Preschool of Merida	PK-12	42
North Main Christian School	K-7	101
Penn Christian Academy, Butler	K-6	NA
Portersville Christian School, Portersville	K-12	326
Purification BVM School	PK-6	186
St. George Elementary School	K-8	199
St. Gregory School, Zelienople	K-8	207
St. Stephens Lutheran Academy, Zelienople	Ungraded	130
St. Wendelin Elementary School, Butler	PK-8	140
Vision Christian Academy	PK-K	22
Slippery Rock Area School District		
Moraine Elementary School	K-5	511

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

Ellwood City Area School District

Hartman Elementary School	K-6	314
Lincoln Junior Senior High School	7-12	1,080
North Side School	K-6	380
Perry Township School	K-6	294
Walnut Ridge School	K-6	138

Riverside Beaver County School District

Riverside High School	9-12	675
Riverside Intermediate Center	5-8	622
Riverside KDG Center	K	113
Riverside Primary Center	1-4	519

Colleges and Universities	***Part Time***	***Full Time***
Butler County Community College	1,653	1,923
Community College of Allegheny County	10,736	7,374
Community College of Beaver County	1,244	1,272
Geneva College	268	1,696
Penn State University /University Coll-Beaver	130	600
Slippery Rock University	917	7,313
Westminster College	151	1,357

(Sources: Butler Eagle, 2006; Pennsylvania Department of Education; Pennsylvania Department of Education, 2007; Private school review)

CHAPTER 2. LAND RESOURCES

This chapter provides a comprehensive overview of the land resources within the Connoquenessing Creek watershed, including physical characteristics, a description of present land uses, and a discussion of natural and manmade threats to the resources.

A scenic overlook of the Connoquenessing Creek watershed

Geology

Geology is the science that deals with the study of the earth, its history, and its natural processes and products. Geology may also refer to the names and descriptions given to natural features on our planet. Geological investigations of an area can yield insights to the land's history, composition, structure, and natural resources.

Geology is an important component of a watershed, because it influences the region. Soils, plants, animals, groundwater, and topography that grow in a region are dictated by the geology. Geology plays a role in determining quality and quantity of groundwater and surface water available within a region.

Today's landscapes reflect millions of years of natural events. Because forces acting on the land have had varying effects, vast arrays of landscapes exist. In order to categorize landscapes and land forms with similar features and help distinguish between them, geologists have divided the earth into various physiographic provinces. Pennsylvania is divided into six physiographic provinces, each with a particular type of landscape and geology. The project area is located completely within the Appalachian Plateaus Province, which stretches from Alabama to New York, and encompasses a significant amount of western Pennsylvania (Sevon and Barnes, 2002).

The Appalachian Plateaus Province is divided into ten physiographic sections. The project area is located within the Pittsburgh Low Plateau section. It is characterized by a smooth to irregular, undulating surface, with narrow and relatively shallow valleys (Sevon and Barnes, 2002). Local relief in the section is low to moderate—ranging from 101 to 600 feet—with the elevation ranging from 660 to 2,340 feet. Underlying rock types include shale, siltstone, sandstone, limestone, and coal. Current and former strip mines have significantly altered a portion of the region's topography.

The bedrock geology is from the Carboniferous period that occurred during the Paleozoic Era approximately 290 to 354 million years ago. The Carboniferous period was named after the rich deposits of coal deposited throughout northern Europe, Asia, and midwestern and eastern North America (University of California Museum of Paleontology). The Carboniferous period was divided into two sub-periods, the Pennsylvanian and Mississippian, in order to distinguish between the coal-bearing layers of the Pennsylvanian from the mostly limestone layers of the Mississippian.

The bedrock geology in the study area is that of the Pennsylvanian. It is estimated that the Pennsylvanian subperiod occurred 290-330 million years ago and currently underlies 35 percent of Pennsylvania, for which it is named. Cyclic sequences of sandstone, red and gray shale, conglomerate, clay, coal, and limestone are associated rock types (Sevon and Barnes, 2002).

Beyond physiographic provinces, an area can also be categorized by geologic formations. Geologic formations of a region are continuous rock units with a distinctive set of characteristics that make it

possible to recognize and map. Four geologic formations exist in the region including Casselman, Glenshaw, Allegheny, and Pottsville.

The Casselman formation is located in the southern border of the project area. It is composed of cyclic sequences of shale; siltstone; sandstone; red beds; thin, impure limestone; and thin, nonpersistent coal. Red beds are associated with landslides. The base is on top of Ames limestone (Berg et al., 1980).

Of the formations, the Glenshaw is the most dominant formation found throughout the project area. Cyclic sequences of shale, sandstone, red beds, and their limestone and coal comprise the formation. It also includes four marine limestone or shale horizons. Base is on top of Upper Freeport coal (Berg et al., 1980).

The Allegheny formation is primarily found along waterways and floodplains. It is composed of cyclic sequences of sandstone, shale, limestone, clay, and coal, including valuable clay deposits and Vanport limestone. Also present are the commercially valuable Freeport, Kittanning, and Brookville-Clarion coals. The base of the formation is at bottom of Brookville-Clarion coal (Berg et al., 1980)

The Pottsville formation is located in the western portion near the mouth of Connoquenessing Creek in Beaver and Lawrence counties. It is predominately comprised of gray sandstone and conglomerate, but it also contains thin beds of shale, clay stone, limestone, and coal. Thin marine limestone is present in Beaver and Lawrence counties. Commercially valuable minable coals and high-alumina clays are present (Berg et al., 1980).

Soil Characteristics

According to Soil Society of America, soil is, “The unconsolidated mineral or organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.” There are over 20,000 soils in the U.S. alone. Soils are named and classified on the basis of physical and chemical properties. The development of soil relies on several factors: climate, plant and animal organisms, parent material, time, and differences in elevation. The influence of each factor varies, creating the diversity of soil associations both locally and regionally. The type of soil should determine the use of land.

Soil Associations

Soil associations are comprised of two or three major soil types and a few minor soil types. There are 13 associations in the region. Descriptions of each of the associations are located in the text below (Smith et al., 1982; Smith et al., 1989: Newbury, et al., 1981).

1. **Canfield-Ravenna Loudonville** soil association occupies smooth to hilly uplands and associated drainage ways in northwestern Beaver County and in areas throughout Lawrence County. Many areas in the association are used for farming activities, including beef, grain, dairy, corn, hay, and pasture. The potential is good for farmland, woodland, and wildlife habitat. For non-farm uses, its potential is fair to poor. Major limitations are seasonal wetness, slow permeability, depth to bedrock, and slope.

2. **Cavode-Wharton-Gilpin** soil association occupies smooth to rolling uplands and associated drainage ways in all but the northwest part of Butler County. Most areas in the association are used for farmland and woodland. Dairy farming is the main farming enterprise, with corn, small grain, hay, and pasture being the major crops.

Artificial drainage is usually required. This association's potential is fair for farmland, good for woodland and wildlife habitat, and fair to poor for urban uses. The major limitations are seasonal wetness, unstable soil material, slow permeability, depth to bedrock, and slope.

3. **Gilpin-Weikert Atkins** soil association is found on mainly steep and very steep sides of valleys, but also includes nearly level flood plains. This association is mostly wooded, and has severe limitations for other uses, due to the hazard of flooding on the flood plains and the steep slopes.

4. **Gilpin-Wharton-Upshur** soil association is located on undulating to hilly uplands and is highly dissected by small streams and drainage ways. Gently sloping ridgetops are generally long and narrow, and high rounded knobs are scattered throughout the area. Most of the association has been cleared and farmed, and is under continuing suburban development.

5. **Gilpin-Wharton-Weikert** soil association is located on undulating, broad and narrow ridgetops, side slopes, and hillsides of highly dissected uplands. It is found in the southeast corner of Lawrence County and in a majority of the northern two-thirds of Beaver County. Ridgetops in the association are primarily used for urban and suburban development, farmland, and woodland. Hillsides and steep drainage ways are generally wooded. Beef, grain, and dairy farming comprise the major farm enterprises and corn, small grain, hay, and pastures comprise the major crops. The potential is good for farmland, woodland, and wildlife habitat. For non-farm uses, its potential is fair to poor. Major limitations are seasonal wetness, slow permeability, depth to bedrock, and slope.

6. **Hazelton-Buchanan-Gilpin** soil association occurs near the major streams and their tributaries in all but the northwest corner of Butler County. The association is located on ridges, hills, benches, foot slopes, and associated flood plains. The majority of areas in the unit are woodland and brushland, with a few areas of farmland on the ridgetops. In general, the association is too steep and stony for farmland, but has good potential for woodland and wildlife habitat. Its potential for urban uses is poor. The major limitations of the soil are slope, the presence of many large stones on the surface, seasonal wetness, and depth to bedrock.

7. **Hazelton-Cookport-Buchanan** soil association is found in all but the northwest part of Butler County. Most of the areas in the unit are used for farmland and woodland. The major farm enterprises are dairy, potato, and orchards. The major crops are corn, potatoes, small grains, apples, hay, and pasture. This association has good potential for farmland, woodland, and wildlife habitat. It has good to poor potential for urban uses. The major limitations of the soils are seasonal wetness, slow permeability, and slope.

8. **Hazelton-Gilpin-Wharton** soil association is located throughout all but the northwest part of Butler County. The unit is undulating to rolling on uplands, in depressions, and in drainage ways. The majority of land in the association is used for farmland and woodland. The major farm enterprises are raising beef, potatoes farming, and dairy. The major crops are corn, potatoes, small grains, hay, and pasture. The potential for farmland, woodland, and wildlife habitat is good. For

urban uses, the potential is good to poor. The major limitations are seasonal wetness, slow permeability, depth to bedrock, and slope.

9. **Monongahela-Atkins-Caneadea** soil association is located on smooth to rolling terraces, flood plains, and small areas on adjacent uplands and foot slopes along Connoquenessing Creek and its tributaries including Brush Creek. The majority of areas in the unit are used for farmland and woodland. Near Zelienople, some areas are used as urban land. The unit has fair potential for farmland and good potential for woodland and wildlife habitat. Its potential for urban uses is fair to poor. The major limitations are seasonal wetness, slow permeability, slope, and frequent flooding.

10. **Ravenna-Canfield-Frenchtown** soil association occupies smooth to rolling uplands and associated drainage ways in Lawrence County. The majority of areas in the association are farmed for beef, dairy, corn, small grain, hay, and pasture. Generally, artificial drainage is required. The potential is fair to good for farmland, good for woodland and wildlife habitat, and fair to poor for most non-farm uses. The major limitations are seasonal wetness, slow permeability, and slope.

11. **Tilsit-Brinkerton-Gilpin** soil association is located throughout the southern half of Butler County. This association is smooth and undulating on uplands, in depressions, and in drainage ways. The majority of areas in the unit are used for farmland. A few areas of woodland are on lowlands and on slopes near drainage ways. The potential for farmland is fair or good, good for woodland and wildlife habitat, and fair to poor for urban uses. The major limitations are seasonal wetness, slow permeability, depth to bedrock, and slope.

12. **Udorthents-Wharton-Hazelton** soil association is located throughout Butler County, but is mainly found in the northern half. Most areas are in native vegetation and woodland, with only small areas used for farming. The potential of the unit for farming is poor, for woodland and wildlife habitat it is fair to poor, and for urban uses, it is poor. The major limitations of the soils are low available water capacity, slope, many small stones on the surface, and seasonal wetness.

Green Turf Farm, located along Route 68 in Forward Township, is one of the many sod farms in the region

13. **Urban Land-Monongahela-Tyler** soil association occupies smooth to rolling terraces and flood plains and some adjacent uplands. Urban land is occupied by buildings and structures or is covered by asphalt, concrete, and other impervious surfaces. It is dominantly nearly level to moderately steep. This association is generally urban or industrial areas interspersed with woodland, cropland, pasture, and idle land. The potential is fair to poor for farmland, fair to good for woodland and wildlife habitat, and fair to poor for most non-farm uses. The major limitations are seasonal wetness, slow permeability, and flooding.

Prime Agricultural Soils

Soils that meet certain physical, chemical, and slope characteristics are identified as prime agricultural soils or prime farmland (Farmland Protection Policy Act Annual Report FY 2000, 2001). These soils are important in meeting the country's short-term and long-term needs for food. Ultimately these soils will produce the highest yields with minimal input of energy and economic resources. Based upon a predetermined set of criteria, they are designated by U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in each county. The criteria typically includes level to nearly level slopes, 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 areas that have prime agricultural soils or farmland of statewide importance. There are 31 prime agricultural soils. A listing of these by county is located in Appendix D (USDA, 2003).

Farmland of Statewide Importance

Important soils that are distinguished for agricultural uses, but that do not meet the criteria for prime agricultural soils, may be designated as "farmland of statewide importance." When managed properly, these soils produce high yields of crops, making farmland of statewide importance and prime agricultural soils essential to the region's agriculture production. Some of these areas may even produce yields as high as areas in prime farmland when conditions are favorable (Farmland Protection Policy Act Annual Report FY 2000, 2001). Farmland of statewide importance is designated by State Rural Development Committee and may include tracts of land that have been designated for agriculture by state law. Within the four counties that comprise the project area, 108 soils have been designated as farmland of statewide importance. They are listed by county in Appendix D.

Agricultural Land Preservation

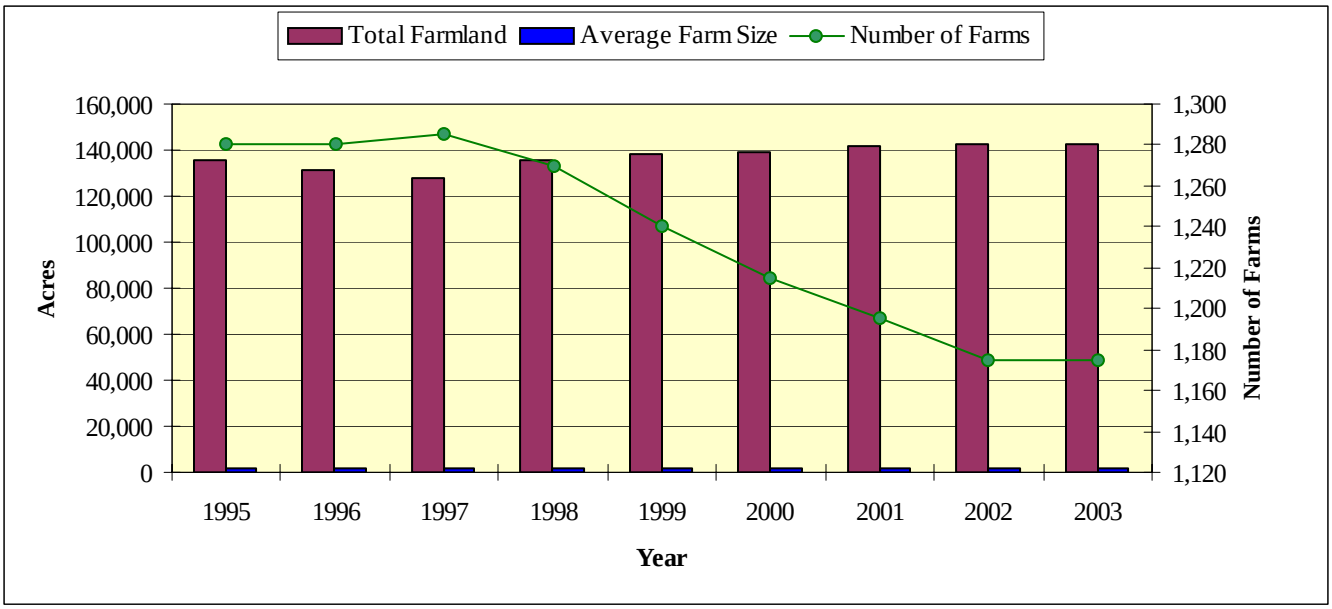
Agriculture, along with forested lands, is the major land use and economic component in the region. But similar to many areas, agricultural uses are under increasing pressure to convert to residential development and other land uses. According to USDA's Natural Resources Inventory, conducted between 1992 and 1997, more than 11 million rural acres in the country were converted to a developed use, and over half of that acreage was agricultural land (NRCS, 2006). That conversion translates into a loss of over one million acres of agricultural lands each year, or more than 3,250 acres every day.

Pennsylvania's farmland, in quantity and in 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 percent of farmland declines, the average farm size has increased, which is in line with national trends of fewer, larger farms, with an overall reduction in farmland. In the 17 years between 1982 and 1997, over 420,000 acres of farmland, and 767,000 acres of pasture in Pennsylvania, have been lost to development or other land uses (PA Game Commission, 2005a). In Butler County, recent statistics from 1997 to 2003 reveal that while the number of farms has decreased, and the average farm size has slightly increased, the overall amount of farmland has actually increased, as demonstrated in Figure 2-3 (USDA, 2006). However, the contemporary growth is modest and has only occurred in recent years. There is still a great need to protect farmland, especially in the wake of considerable growth and sprawl in areas like Cranberry Township, which experienced a 62 percent increase in population from 1990 to 2000 (U.S. Census Bureau, 2006).

Pennsylvania has been aggressively pursuing farmland preservation since 1988, when the Farmland Protection Program was formed by the state legislature. Since its inception, the program has preserved over 300,000 acres through more than 2,500 conservation easements. With these impressive numbers, Pennsylvania leads the nation in both acres and number of farms preserved. Through the passage of the Growing Greener II referendum in 2005, an additional $80 million will be available through the program.

To qualify for the Farmland Protection Program, farms must first be designated in agriculture security areas (PDA, 2007a).

Figure 2-3. Change in Number of Farms, Average Farm Size, and Total Farmland, Butler County



Agricultural Security Areas

The Agriculture Security Area (ASA) program was created by the Pennsylvania legislature, and is administered at the municipal level. ASAs are rural, agricultural areas that are 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, 2006).

Within the project area there are 252 parcels enrolled in agricultural security areas. These 49.8 square miles account for 11.6 percent of the land use. Figure 2-4 identifies the agricultural security areas.

The benefits to the landowner are: 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 (Farmland Preservation).

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

Purchase Conservation Easement Program (PACE)

If a landowner enrolled in the ASA program purchases a conservation easement, it is done through the PACE program. This program authorizes the state to purchase conservation easements from willing farmers who are already within an ASA. This program allows agricultural operations to continue. Farmers who participate in this program receive economic benefits in return for the conservation easement. The PACE program has not been active in the Connoquenessing Creek watershed, or is mistakenly viewed as part of the ASA program.

Clean and Green Program

Pennsylvania administers the Clean and Green program, which provides incentives to landowners for the preservation of agricultural lands and forestland. The program provides real estate tax benefits by taxing land based on its "use value" rather than its market value. The program is available to landowners who either own 10 or more acres of qualifying land or earn an annual gross income of more than $2,000 from farming.

Conservation Reserve Enhancement Program (CREP)

CREP is a voluntary, federal program designed to reward landowners for implementing conservation practices on portions of their land. PA Ohio River watershed CREP is administered by USDA Farm Service Agency and implemented by NRCS, and in Pennsylvania, is supported by many conservation partners, such as Pennsylvania Department of Environmental Protection, Pennsylvania Game Commission and Western Pennsylvania Conservancy.

Landowners receive reimbursement for the installation of CREP practices, annual rental payments, and additional cash awards over a 10 or 15-year period. CREP practices include funding for streambank fencing, livestock watering systems, and native tree and grass plantings. The Environmental benefits of CREP are multiple, and focus on improving water quality, strengthening and developing wildlife habitat, and encouraging landowners to be actively involved in conservation efforts (PA CREP, 2006).

Land Use

Forests account for 41 percent of the land use

Analyzing land use within a specific region is an important tool that can reveal a significant amount about that area. Land uses can provide clues about major economic catalysts and offer a glimpse into how the past has created present-day conditions. Examining a region's land use can even identify future trends or explain existing conditions that are not recognized from casual 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 guide decision-making regarding planning and natural resource protection.

The predominant feature of the local landscape is open space. Urban development comprises only 10 percent, and is generally concentrated in a handful of population centers dispersed throughout the area, which includes Butler, Connoquenessing, Saxonburg, Evans City, Zelienople, Mars, Cranberry Township, and Ellwood City. Forestry and agriculture are the two major and dominant land uses, each with about

41 percent coverage. Barren lands, which are usually comprised of inactive and abandoned mine areas, and transitional areas together comprise slightly fewer than seven percent of land use. Wetlands are sparse, representing only one tenth of one percent of the project area.

Forestry

In 1630, an estimated 95 percent of Pennsylvania was covered with forest. Harvesting the timber to support a growing nation reduced the coverage of Pennsylvania to an amazing 30 percent by 1907. Over the past century, the number has rebounded, and today 58 percent of the land area in Pennsylvania is forested. Among the forests throughout the state, private interests hold 69 percent, while 31 percent are owned by public agencies (DCNR, 2004b).

Forests provide a variety or resources including timber, wildlife habitat, water filtration, aesthetics, recreation, and jobs. Over 90 percent of the nation's threatened and endangered species have some or part of their habitat on private forestlands (Koehn, 2005).

Nationally, Pennsylvania ranks number one in hardwood production (Bureau of Forestry). Seventeen million of Pennsylvania's 28 million acres are covered by forest (Bureau of Forestry). Private landowners own the majority of the forest in Pennsylvania, with 12.5 million acres or 71 percent. State forest and state game lands make up 22 percent of Pennsylvania's forests, and three percent is national forestland.

Table 2-1. Current Land Use

Land-Use Type	Square Miles	% of Land Area
Agriculture	**177.40**	**41.29**
Pasture/Hay	79.62	18.53
Row Crops	97.78	22.76
Wetlands	**0.04**	**0.01**
Woody Wetlands	0.03	0.01
Emergent Herbaceous Wetlands	0.01	0.00
Barren	**26.47**	**6.16**
Transitional	26.47	6.16
Development	**44.31**	**10.31**
Low Density Urban	36.20	8.42
High Density Urban	8.11	1.89
Forest	**176.16**	**41.00**
Deciduous Forest	139.94	32.57
Coniferous Forest	19.58	4.56
Mixed Forest	16.64	3.87
Water	**2.29**	**0.53**
Open Water	2.29	0.53
Mining	**3.02**	**0.70**
Quarries	2.88	0.67
Coal Mines	0.14	0.03
Total	**429.69**	**100%**

There are 176 square miles of forestland within the project area, with deciduous forests comprising the majority at 79 percent. Coniferous forests account for four and a half percent of forestlands. Mixed forests, which contain combinations of both deciduous and coniferous trees, comprise close to four percent of forestlands. Within the project area, no state forests exists, which helps to explain why the percentage of private landowners who own forestlands is significantly higher than the state's average, with 97 percent private landowners in Butler County (Jacobson and Seyler, 2004).

Many livelihoods are based on the forestry industry. Butler County has 24 forestry and wood product establishments, which employ 174 people. The value of Butler County's standing timber is valued at $159.34 million, while the annual economic contribution of the forestry sector is $16.9 million. The annual timber harvest's value is $8 million and an additional $7 million is generated by wood products and paper production (Jacobson and Seyler, 2004). More information about forests is available in Chapter 4, Biological Resources.

Forest Management

Forest management is the art and science of developing a forest to promote a desired outcome. Skilled foresters use silviculture (the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands) to meet the diverse needs and values of landowners and society on sustainable basis (Helms, 1998). The type of management used may differ depending on these goals. Common types used in Pennsylvania often fall under the categories of "even-aged" versus "uneven-aged" management.

Even-aged management methods harvest all trees in a stand at one time or in several cuttings over a short time to produce stands of all or nearly the same age. This management method is commonly applied to achieve a forest comprised of shade-intolerant trees, such as black walnut, cherry, poplar, oak, Virginia pine, and table mountain pine. Typical management practices include clear-cutting, seed tree, and shelterwood.

1. **Clear-cutting:** The removal of all trees and most, if not all, woody vegetation from an area, leaving maximum growing space and resources available for the next generation. If done in an appropriate area, it can allow for rapid seedling growth and recolonization.

2. **Seed Tree:** A heavy removal of a forest where trees are left for regeneration purposes.

3. **Shelterwood:** A heavy removal in which some trees are left uncut to provide a seed source for regeneration. Once regeneration is established, multiple cuttings removing remaining trees may occur.

Uneven-aged management is used to maintain a stand with trees of varying ages—from seedlings to mature. Trees are harvested selectively to maintain shaded conditions. It is most often used to promote stands comprised largely of shade-tolerant species, such as sugar maple and beech (DCNR, 2007b). Typical management practices include individual selection cutting, group selection cutting, and high-grading.

1. **Individual Selection Cutting:** Cutting of scattered individual trees, including both large, economically valuable trees and weak trees, in order to maintain the health of the forest and multi-dimensional forest structure.

2. **Group Selection Cutting:** Similar to individual selection cutting, but involves cutting small groups of trees.

3. **High-Grading:** Involves cutting of only the biggest, most profitable trees in a stand; this is not a good forestry management practice because only smaller, weak trees remain. Some foresters also view this as an even-aged management technique, but rarely recommended it as a sustainable management technique. High-grading is also referred to as selective cutting or diameter limit cutting.

Though specific management practices may be favored, these practices may not be appropriate for all types of stands. Forest management needs to be specific for each individual forest. No one practice can be recommended as the best or worst practice because of the varying characteristics and factors that exist for each forest. However, it is recommended that forest landowners work with a professional forester to manage their land to its greatest potential.

Forest Management Assistance

The Pennsylvania Bureau of Forestry, administered by Pennsylvania's Department of Conservation and Natural Resources, offers a cost-free Forest Stewardship Program. Landowners can receive forestry management advice and develop a Forestry Management Plan for their properties.

Agriculture

Along with forestry, agriculture is a dominant land use. However, the agricultural industry in all four counties has a greater annual economic contribution than the forestry industry (Jacobson and Seyler, 2004). Many livelihoods are based on the agricultural industry. There are two management types of farms—family farms and factory farms. As estimated by the Butler County Farm Service Agency, there are approximately 700 to 800 family farms within the study area (Fritz, personal communication, 2006).

There are a variety of local farms, including dairy, beef, horse, llama, sod, tree, and field crop

Family farms are typically smaller farms that have been in operation for several generations. For the most part, owners of family farms manage and work on their farms following sustainable agricultural practices.

Factory farms are larger, corporate-based industries. Many of these farms control production from animal breeding, processing, and to the market shelf. Factory farms emphasize high volume and profit. Several different types of farming operations are considered factory farms. They include Concentrated Animal Feeding Operation, Confined Animal Feeding Operation, Conventional Farming, Industrial Agricultural Operation, and Industrial Livestock Operation. Although, currently no factory farms exist in the project area, the potential for their establishment exists.

Agricultural Management Practices

In managing agriculture, best management practices (BMP) are utilized. BMPs are a series of sustainable principles and recommendations. Implementation of these practices minimizes the impacts to the land and water, and can improve heard health and crop yields.

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

2. A **Cropland Protection Cover**, or cover crop, is usually grown for a year or less. A crop of close-growing grasses, legumes, or small grains 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 for the application of 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 and handling, disposal, and application of pesticides, including the rate, method, and timing of application to minimize

pesticides entering surface and groundwater. This practice includes integrated pest management scouting and planning.

5. **Rotational Grazing** is an intensive grazing management practice that divides pastures into multiple cells that receive a short but 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 the practice of summer dry-lots results in water quality degradation, it should be replaced by this practice.

6. **Livestock Fencing** encloses or divides an area of land with a suitable 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. **Channel Crossings** are stable surfaces installed on the bottom of streams to provide a crossing for equipment or livestock. They are typically used to coincide with streambank fencing.

8. A **Manure Storage Facility** is a structure used to store manure until it can be applied to the land. The facility is needed to properly store manure, so that it does not become a non-point source of pollution.

9. **Field Diversion** is a shallow channel 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.

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

11. **Grassed Waterways** are a natural or constructed channel shaped, graded, and established with suitable cover as needed to prevent erosion by runoff waters.

12. An **Agricultural Sediment Basin** is a structure designed to reduce the transport of sediment, agricultural waste, and other pollutants transported from agricultural fields and barnyards to surface waters, closed depressions, and wetlands.

13. **Shoreline and Streambank Protection** is the stabilization and protection of stream and lake banks against erosion, and the protection of fish habitat and water quality from impacts caused by livestock. Methods include fencing, shaping, and seeding of vegetation, rock, riprap, bioengineering, or structures to stabilize shorelines and/or provide fish habitat.

14. **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.

15. **Streambank Fencing** excludes livestock from the near shore area to prevent trampling and grazing, protecting the riparian habitat.

16. A **Remote Watering System** is a system of portable tanks, pumps, and pipes designed to bring water to livestock in all grazing cells rather than allow the animals to have direct access streams where erosion can occur.

17. **Shoreline Buffers** are permanent vegetated areas immediately adjacent to lakes, streams, channels, and wetlands designed and constructed to manage critical non-point sources or to filter pollutants from non-point sources.

18. **Wetland Restoration** is the construction of berms or destruction of the function of tile lines or drainage ditches to create conditions suitable for wetland vegetation.

19. **Barnyard Runoff Management** includes the structural measures to redirect surface runoff around the barnyard and collect, convey, or temporarily store runoff from the barnyard. Management includes measures such as 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 suitable site to minimize the amount of pollutants from the lot to surface or groundwater.

Oil and Gas Exploration

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 the 1900's when oil fields were discovered in Texas, western Pennsylvania generated over half of the world's petroleum supply. Today, Pennsylvania's annual contribution to the national petroleum production is less than one percent, but is still notable due to the distinguishing lubricating properties of Pennsylvania crude oil (Shultz, 1999).

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 2005, Pennsylvania Department of Environmental Protection (DEP) issued 6,046 oil and gas well-drilling permits, which represents a 32.4 percent increase over the record 4,567 permits that were issued in 2004 (DEP, 2004b). In contrast, the Connoquenessing Creek watershed region has seen a sharp decline in the amount of permits issued, as demonstrated in Table 2-2, with only 18 permits issued since 1990.

All of the wells are shallow wells—that is they do not infiltrate the boundary between the Middle and Upper Devonian Series and have an average depth range of 500 to 5,000 feet deep. Shallow oil and natural gas reserves in Pennsylvania are primarily found in the Western portion of the state, where it forms a scattered band that runs diagonally from Greene and Fayette Counties in the south to Warren, McKean and Potter Counties in the north (Shultz, 1999).

Since the late 1800s, 1,402 permits have been issued for wells in the watershed region. Oil wells, totaling 858, are by far the most dominant type permitted. Gas wells comprise a much smaller presence, with 217 permits issued. Additionally,

Table 2-2. Oil and Gas Well Permits by Decade

Decade	Number of Well Permits
Unknown	31
Prior to1909	1085
1910–1919	38
1920–1929	21
1930–1939	27
1940–1949	47
1950–1959	29
1960–1969	25
1970–1979	34
1980–1989	47
1990–1999	9
2000–2006	9

there are 109 permits issued for wells that produce a combination of both oil and gas. A significant number of wells, 187, are considered "dry," meaning there is not enough gas or oil present to warrant extraction in an economically feasible manner. The remaining 31 wells fall into categories, such as junked, observation, storage, and unknown (DEP, 2004b).

Mining

As previously mentioned in the geology section of this chapter, there are significant reserves of coal found. The majority of mining that occurs is located in the outcrop areas of the Allegheny geologic formation, which tends to be located in the northern portion of the region.

Currently, there are 11 active coal mine sites, according to permits received through the DEP. Of those 11 active mines, nine are surface mines, and two are mineral preparation plants. Associated with the active coal mine sites are seven discharge points. As shown in Figure 2-6, the active mine sites are associated with inactive coal mine sites, in the area of Ellwood City, and in Butler County's Muddy Creek, Lancaster, Jackson, Oakland, and Concord Townships.

Land Ownership

The majority of the watershed (99.4 percent) is privately owned. In addition to the numerous amounts of municipal parks there are five publicly managed areas. They include Brush Creek Park, ECOZ Park, Almeda Park, Rock Point Natural Area, and State Game Lands 164. Figure 2-7 displays the public and managed lands within the Connoquenessing Creek watershed.

Critical Areas

Critical areas are areas that have constraints that limit development and various other activities. Critical natural areas contain rare, threatened, or endangered species; natural communities of special concern; or significant ecological and geological landscapes worthy of protection. Steep slopes, ridgetops, floodplains, streambanks, and wetlands are examples of critical natural areas. Figure 2-8 displays the environmentally sensitive areas.

Landslides

Ground movements, such as rock falls, slope failures, and shallow debris flows that change the stability of slope from stable to unstable are landslides. Most landslides occur in areas of steep slopes where loose colluvial soils exist. Gravity eventually forces this rock and debris down the slope in a gradual or sudden, flashy manner. Typically, landslides occur along road cuts having unstable bank conditions (Delano and Wilshusen, 2001).

Landslides are caused by natural or human causes. Groundwater pressure can destabilize the slope making it susceptible to landslides. A lack of vegetation, soil nutrients, and soil structure increase vulnerability of a slope. Erosion, permeability after precipitation, and earth quakes can also trigger landslides. Vibrations from machinery or traffic, blasting, earth moving activities, vegetation removal, and construction activities are examples of human influences on landslides. Any activity which changes the amount of water that infiltrates into the soils, natural or man-made can increase the likelihood of landslides (Wikipedia Free Encyclopedia, 2008).

Landslides occur throughout the state, and are heavily concentrated in southwestern Pennsylvania. The entire region has a high to moderate risk of landslides; however areas containing the Casselman and Glenshaw geologic formations are more prone to landslides.

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 while planning any development project. Proactively avoiding a landslide is much cheaper in the long run than the clean up and repair that is required after a landslide. If development within a landslide-prone area is ultimately chosen, additional precautionary measures during development, such as additional drainage features and proper site planning are essential to minimize the risk of a landslide (Delano and Wilshusen, 2001).

Subsidence Areas

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 occurs locally as a result of underground mining, excessive pumping of groundwater, or subsurface erosion due to the failure of existing utility lines (Kochanov, 1999). Subsidence usually occurs slowly over a long period, but can happen rapidly. The development of a sinkhole, for example, occurs when the support of the land is gradually removed, causing the land surface to sag and finally collapse, leaving a hole or cavity (Kochanov, 1999). Although subsidence is not common in the watershed, the potential for it exists because of numerous abandoned coal mines located in the study area.

Sinkholes

A sinkhole can be defined as a subsidence feature that can form rapidly. It is characterized by a distinct break in the land surface and the downward movement of the surface materials into the resulting hole or cavity. Sinkholes only occur in certain parts of Pennsylvania underlined by carbonate bedrock, typical in central and eastern parts of the Commonwealth. This region is generally not affected by sinkholes unless mine subsidence causes them.

Mine Subsidence

Mine subsidence is the movement of ground surfaces as a result of the collapse or failure of underground mine workings. In active underground mining operations using longwall mining or high extraction pillar recovery methods, subsidence usually occurs concurrently with the mining operation in a predictable manner.

In abandoned mines where rooms and unmined coal pillars are often left in various sizes and patterns, it may be impossible to predict if and when subsidence will occur. Mine subsidence resulting from abandoned room and pillar mines can generally be classified as either sinkhole subsidence or trough subsidence.

Sinkhole subsidence occurs in areas overlying shallow room-and-pillar underground mines. The majority of sinkholes usually develop where the amount of cover is less than 50 feet. They are typically associated with abandoned mines. DEP will no longer authorize underground mining beneath structures where the depth of overburden is less than 100 feet, unless the subsidence control plan demonstrates that the proposed mine working will be stable and that overlying structures will not suffer irreparable damage. This type of subsidence is fairly localized and is recognized by an abrupt depression evident at the ground surface as overburden materials collapse into the mine void.

Subsidence troughs over abandoned mines usually occur when the overburden sags downward due to the failure of remnant mine pillars. The resultant surface effect is a large, shallow, yet broad, depression in the ground, which is usually elliptical or circular in shape. The flow of streams may be altered or disrupted and surface cracks may occur, particularly near the edges of the trough.

Researching areas where mining occurred in the past to determine the risk of subsidence is needed. Homeowners should check with DEP to determine if their property is susceptible to mine subsidence and secure insurance through the PA Mine Subsidence Insurance Fund, if necessary.

Erosion and Sedimentation

Erosion is the transfer of soil particles through air or water. The relocation of these particles is known as sedimentation. Erosion and sedimentation are natural earth-moving processes, but the extent of this movement can be greater than normal due to poor land-use practices. Erosion is common along streambanks, steep slopes, and ridgetops.

DEP and Pennsylvania Code regulate the disturbance of earth materials leading to erosion and sedimentation. Disturbances include any earth moving activities, such as timber harvesting, construction activities, agricultural plowing and tilling, etc. Disturbances less than 5,000 square feet are required to minimize the potential for accelerated erosion and sedimentation through the implementation and maintenance of erosion and sediment control BMPs. A written erosion and sediment control plan is required for any disturbance 5,000 square feet or greater, if the disturbance has the potential to discharge to a high quality or exceptional value waterway, or is required under DEP regulations.

Siltation fences, as depicted in the photo, are a best management practice used to contain loose soil at construction sites

Any disturbance of one acre or more, except for agricultural plowing or tilling, timber harvesting, or road maintenance activities, requires a general or individual National Pollutant Discharge Elimination System (NPDES) permit. Timber harvesting or road maintenance activities involving 25 acres or more require an erosion and sedimentation control permit.

To help combat erosion, there are seven erosion and control permits located within the project area. Erosion and sedimentation are discussed in greater detail in the Water Resources chapter.

Groundwater Recharge Areas

Water that comes from surface water or precipitation, such as rain or snowmelt that is stored underground is groundwater. Within the U.S., groundwater supplies approximately one-third of public water supplies and 95 percent of rural domestic water supplies. Groundwater is pumped to the surface where it is brought into homes through public water providers or private wells (Robson).

Replacing the water depends on the grounds ability to absorb water from precipitation or surface waters, such as lakes and streams is a natural hydrologic process called recharging. The rate of recharge can be influenced by different factors, such as soil, plant cover, water content of surface materials, and rainfall intensity. Groundwater recharge may also occur from surface water bodies in arid areas. More information about groundwater and groundwater recharge is available in the Water Resources chapter (Robson).

Natural Resource Extraction

The process of removing minerals, such as coal, oil, and gas is done through natural resource extraction. Oil and gas are removed through the drilling of wells as discussed earlier in this chapter. Coal, limestone, and other industrial minerals are extracted by mining. The natural resources that underlie the region are dictated by the geological formations present in the region, which was also discussed earlier in this chapter.

Fish and Wildlife Habitat

Habitats are the natural environments in which animals and plants reside. Healthy habitats are important to maintaining a diversity of biological resources. Interferences and changes to habitat affect

the variety of plants and animals living there. Habitats where rare, threatened, and endangered species reside are critical in nature. 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. More specific information about riparian corridors is located in the Water Resources chapter.

Floodplains

A floodplain is the level land along the course of a river or stream that is formed by the deposition of sediment during periodic floods. Floodplains contain features such as levees, back swamps, delta plains, and oxbow lakes. These areas are critical to the waterway. These areas often contain a unique diversity of plant and animal species. Floodplains are discussed further in the Water Resources chapter.

Wetlands

Wetlands are, "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (U.S. Army Corps of Engineers, 2002). Wetlands are delineated according to hydrology, soil type, and vegetation. Whether constructed or naturally occurring, wetlands have a variety of appearances. Standing water, inundated soils, or an apparently dry field can be a wetland.

Wetlands are a vital component to a healthy watershed as they provide many unique and critical functions. More information about wetlands is discussed in the Water Resources chapter.

Hazardous Areas

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

Comprehensive Environmental Response Compensation and Liability Act

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

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

There are two sites identified under the Superfund program—Keystone Aluminum Manufacturing and Spang & Company Manufacturing and Tool Division. Specific information about the sites is limited because neither site is currently listed on the NPL.

Spang & Company manufactures magnetic cores and power electronics, and is headquartered in Pittsburgh, Pennsylvania. East Butler is the home to one of Spang & Company's magnetic division production facilities, which is comprised of five buildings located on a 200-acre site. Ferrite, powder cores, and strip wound products are assembled at the East Butler location. Thus far, the only action that has been taken is the discovery of the site, meaning that U.S. EPA has been alerted to the presence of the potentially hazardous waste.

Resource Conservation and Recovery Act

The **Resource Conservation and Recovery Act** (RCRA), a federal statute, regulates the transportation, handling, storage, and disposal of solid and hazardous materials. Regulatory responsibilities, include obtaining permits, identifying and listing hazardous waste, adhering to proper procedures when transporting or disposing of waste, developing risk management plans, and maintaining records, may be controlled by federal facilities (U.S. EPA, 2002). Requirements for underground storage tanks, including cover tank design, operation, cleanup, and closure, are also contained in RCRA. There are 409 RCRA sites in the area; they are listed in Appendix F.

Illegal Dumpsites

In remote areas, streambeds, hillsides, back roads, and old coal mines are often inundated with old tires, appliances, and other items that people no longer want. These illegal dumps grow with continued use over time and can cause a variety of environmental and health impacts. Currently, it is the responsibility of each municipality to identify and clean up illegal dumpsites. Within Allegheny County and Butler County portions of the watershed, 103 illegal dumpsites have been identified through PA CleanWays Illegal Dump Surveys (PA CleanWays, 2005; PA CleanWays, 2007). The Lawrence County Survey will be released in 2008. No survey is currently scheduled for Beaver County.

Illegal dumpsites, in addition to being unsightly, can cause health and environmental impacts. Pictured above is an illegal dumpsite along Palmer Road north of Butler

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

Two associations of PA CleanWays operate in the watershed—the Allegheny County affiliate and the Butler-Lawrence Counties affiliate. Since 1993, the Butler-Lawrence County affiliate has facilitated 44 cleanups, removed 215 tons of trash, recycled over 50 tons of trash, removed over 5,000 tires, and completed an illegal dump survey for Butler County. Since 2003, the Allegheny County affiliate has facilitated nine cleanups, removed 89.5 tons of trash, removed 1,127 tires, and completed an illegal dump survey (PA CleanWays, 2006). Beaver County is currently without a chapter or an affiliate of PA CleanWays.

Auto Salvage Yards

Auto salvage yards are also commonly referred to as junkyards or wrecking yards, and serve as locations for decommissioned and wrecked vehicles that are usable for parts and materials. Environmental impacts of auto salvage yards are related to fluids that result from salvage yard operations, including, crankcase oil, hydraulic oil, brake fluid, oil recovered from steam cleaning, gasoline, antifreeze,

transmission fluid, window cleaner, and wastewater recovered from steam cleaning. In addition, tires, and lead acid batteries, must be properly stored or disposed of. All generated wastes and associated products must be managed in compliance with municipal ordinances, DEP and EPA regulations. Twenty-four known auto salvage yards are as listed in Table 2-3.

Table 2-3. Auto Salvage Yards

Company	City	County
A-1 Auto Salvage	Evans City	Butler
A&B Salvage	Harmony	Butler
Best Rebuildable	Evans City	Butler
Bob's Auto Salvage	Butler	Butler
Dawson's Auto Wrecking	Butler	Butler
Ed Wagner Pickup & Van Parts	Harmony	Butler
Edward Donawitz Auto Wrecking	New Brighton	Beaver
Elliotts Auto Salvage	Butler	Butler
Gjs Auto Service and Sales Inc	Prospect	Butler
Greenberg Auto Parts	Ellwood City	Butler
John Wagner & Sons Foreign	Harmony	Butler
Lockaton Auto Wreckers	Butler	Butler
Milich Auto Wrecking	Butler	Butler
Noland's Auto Salvage	Renfrew	Butler
Novak's Auto Parts	New Brighton	Butler
Offstein Denny Auto Sales and Towing Service	Butler	Butler
Offstein, Marshall Auto Sales	Butler	Butler
Petry Auto Salvage	Zelienople	Butler
Reges Auto Wrecking	Butler	Butler
Saxonburg Blvd Auto Parts Inc.	Saxonburg	Butler
Soose Auto Wrecking	Butler	Butler
Tatko's Auto Wrecking	New Brighton	Beaver
Unionville Auto Wrecking	New Brighton	Beaver
Walters Auto Wrecking	Evans City	Butler

Auto salvage yards can have major impacts on local streams

Landfills

Landfills continue to be the chief method of solid waste disposal in Pennsylvania. A landfill is simply a disposal site for various types of waste, which may be discarded into or onto the land. In the past, landfills were sited for convenience, and did not utilize any measures to control leachate, which is the liquid formed when water infiltrates into the waste and draws out chemicals, metals, and other materials. Without proper and now federally mandated measures, leachate can easily infiltrate and contaminate groundwater sources.

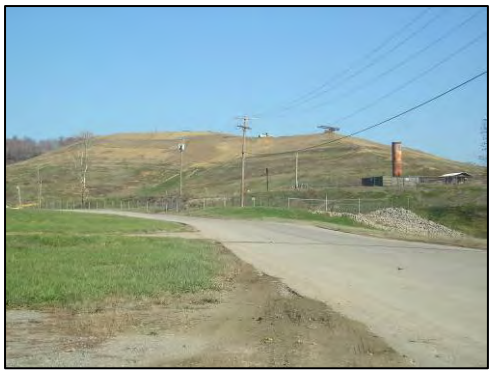
Federal regulations for municipal solid waste landfills (MSWLFs) mandated by U.S. EPA falls under Subtitle D (Part 258) of RCRA, which was last revised in 1991. The eight main components of the regulations are listed below (U.S. EPA, 2006b):

- **Location restrictions**—ensure that landfills are built in suitable geological areas away from faults, wetlands, flood plains, or other restricted areas.
- **Composite liners requirements**—include a flexible membrane (geomembrane) overlaying two feet of compacted clay soil lining the bottom and sides of the landfill; protect groundwater and the underlying soil from leachate releases.
- **Leachate collection and removal systems**—sit on top of the composite liner and removes leachate from the landfill for treatment and disposal.
- **Operating practices**—include compacting and covering waste frequently with several inches of soil helps reduce odor; control litter, insects, and rodents; and protect public health.
- **Groundwater monitoring requirements**—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**—controls and cleans up landfill release and achieves groundwater protection standards.
- **Financial assurance**—provides funding for environmental protection during and after landfill closure (i.e., closure and post closure care).

Landfills and landfill regulations are of particular importance in Pennsylvania due to the fact that since 1992, the state has been the nation's lead importer of waste (Action PA, 2005). Pennsylvania can attribute this title to its geographical proximity to Megalopolis—the dense urban band that stretches from Washington D.C. to Boston—and that it has large amounts of inexpensive, rural land.

Two active landfills—Seneca Landfill and Brunner's Landfill— are located in the area. Seneca Landfill is approved to accept residual waste, fuel contaminated soils, sewage sludge, asbestos containing waste, infectious/chemotherapeutic waste incinerator ash, and autoclaved infectious waste. Seneca receives 3,000 tons per day. They majority of their waste is generated in their service area, which partially extends into Ohio. Brunner's receives an average of 425 tons of waste per day. Neither landfill accepts waste from outside of Pennsylvania.



Seneca landfill is one of two active landfills in the area

There are four inactive landfill sites, which may be of concern, as they may have been built previous to federal and state regulations, and could be a source of groundwater contamination (DEP, 2004a).

Table 2-4. Landfills

Site Name	Status	Location	Municipality	County
Brunner's Landfill	Active	Zelienople	New Sewickley	Beaver
Dreher Landfill	Inactive	Vogleyville	Summit	Butler
James R. Soda Inc. Waste Area	Inactive	Ellwood City	Ellwood Borough	Beaver
Neiper Landfill	Inactive	Middle Lancaster	Lancaster	Butler
Seneca Landfill	Active	Mars	Adams	Butler
Townsend-Div of Townsend Co.	Inactive	Ellwood City	Ellwood Borough	Beaver

Recycling

Recycling starts with community collection of approved materials, which generally includes 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. Materials recovery facilities buy the materials and remanufacture the recyclables into new products.

The benefits from recycling are numerous and can have a positive impact on a community. Recycling materials keeps them out of municipal landfills, and therefore reduces their need. Recycling also limits the amount of raw materials required to produce products, which reduces the need for resource extraction activities, reduces emissions, and saves a significant amount of energy in the process.

Recycling programs also create numerous jobs—in Pennsylvania alone, 81,322 jobs are the result of recycling programs (DEP, 2006d).

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

In 1992, Butler County became the first county in Pennsylvania to offer curbside collection of recyclable materials to every municipality throughout the entire county. Since that time, all of Butler County's municipalities have had curbside recycling service. Additionally, all five of Allegheny County's municipalities, two municipalities in Beaver County—Franklin Township and North Sewickley Township and two municipalities in Lawrence County—the Borough of Ellwood City and Shenango Township—have curbside recycling programs.

Curbside recycling programs are supplemented by drop-off centers, which are mainly used by residents of smaller communities. Within the project area, there are currently four drop-off locations in the Beaver County, one drop-off location in Butler County, and one drop-off location in Lawrence County. County solid waste departments administer drop-off recycling programs. The various locations accept a variety of items to be recycled ranging from everyday household items, such as cans and bottles, to potentially hazardous items such as batteries and used motor oil (DEP, 2006d).

Brownfields

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

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

DEP also developed a joint program with U.S. EPA called the "One Cleanup Program" in 2004. The purpose of the program is to ensure that brownfields recovered under Pennsylvania brownfields program also satisfy requirements under federal regulations. According to DEP, there are seven brownfields sites within the region (DEP, 2006c). Those brownfields are listed in Table 2-5.

Table 2-5. Brownfield Sites

Site Name	City	Municipality	Zoning
Callery Chemical Property	Evans City	Forward Township	Unavailable
JDS Building	Butler	City of Butler	Manufacturing
Pullman Cafeteria & Office Building	Butler	City of Butler	Commercial
Pullman Center Business Park Expansion Parcel #1	Butler	City of Butler	Unavailable
Pullman Center Business Park Expansion Parcel #2	Butler	City of Butler	Unavailable
Pullman Locker Room & Dispensary Bldg	Butler	City of Butler	Manufacturing
Victory Road Business Park	Saxonburg	Clinton Township	Industrial, light manufacturing, commercial

Abandoned Mines

Once all the economically recoverable coal is removed from a mine, the mine is shut down, and the mine operator moves on to the next site. The story of the coal mine, however, often lives on long past the closing of the mine. Abandoned coalmines are a significant hazard throughout western Pennsylvania. Prior to 1971, reclamation of closed coalmines was not required.

As shown on Figure 2-7, significant coal mining has primarily occurred in the northern region. The southeast corner of the study area is completely free of coal mining, past or present. Due to the geological composition of the Casselman and Glenshaw geologic formations it will likely remain un-mined. The Casselman and Glenshaw formation typically do not have economic coal. Mining activities within the region have and will continue to occur in outcrop areas of the Allegheny geological formation.

In total, there are 90 inactive coalmines and four abandoned coalmines. Associated with these mines, there are also 63 inactive discharge points and two abandoned discharge points. Of the 90 inactive coalmines, three are mineral preparation plants, 86 are surface mines, and one is an underground mine. Of the four abandoned coalmines, three are surface mines and one is an underground mine.

All of the inactive mines are in the stage of "reclamation complete." Mine Reclamation is the process of restoring an inactive mine site to a useful or productive purpose through cleaning up environmental pollutants and safety hazards associated with the site. All of the abandoned coalmine sites are "bond forfeited," which means the operator of the mine failed or refused to comply with state and federal requirements, and the bond for the mine was forfeited. The earnings from the forfeited bond can then be used to reclaim the site. These abandoned mines may or may not be reclaimed.

Some of the most potent legacies of abandoned mines are the discharges of polluted water that significantly degrade nearby waterways. The discharges can contain metals, sulfates, and/or acids. Abandoned mine discharges are located in close relationship with the inactive coal mining sites.

Early coal mining gave little thought to the long-term environmental impacts that would occur from the practice. But as awareness of the environmental harm that was caused by the mining increased, regulations to address the issue improved. In 1971, Pennsylvania enacted the Surface Mining Conservation and Reclamation Act, and in 1977 the federal government passed the Surface Mining Control and Reclamation Act, which closely modeled the Pennsylvania regulation. With the creation of these regulations, mining activities had guidelines to follow and state and federal oversight of the projects (DEP, 2005).

To address the abandoned mine problem, the state created its Reclaim PA initiative. The four objectives of the initiative are:

- To encourage private and public participation in abandoned mine reclamation efforts
- To improve reclamation efficiency through better communication between reclamation partners
- To increase reclamation by reducing remining risks
- To maximize reclamation funding by expanding existing sources and exploring new sources

To accomplish these goals, Reclaim PA includes a set of policy, management, and legislative initiatives geared toward erasing the abandoned mine problem in the state. With more than a quarter-million acres of abandoned mines throughout the state, the initiative is ambitious and necessary (DEP, 2005).

Overall, Pennsylvania has created numerous programs available to tackle all types of abandoned mine problems. These available programs include: Operation Scarlift, Surface Mining Control and

Reclamation Act (SMCRA), U.S. Department of Interior Office of Surface Mining (OSM) Emergency Reclamation Program, Bond Forfeiture Program, Mine Subsidence Insurance Fund, reclamation in lieu of civil penalties, surety reclamation, Landowner Reclamation Program, EPA Section 319 grants, and Government Financed Construction Contract program (GFCC).

Chapter 3. Water Resources

Water resources provide a vital lifeline for communities throughout western Pennsylvania. Historically, communities formed near these sources to sustain their needs for drinking water, provide transportation of goods, power mills, and irrigate agricultural lands. As time went on and the railroad industry enabled the transportation of goods and people, waterways gave way to recreation, but still maintain the purpose of providing drinking water. Throughout the Connoquenessing area, creeks and streams still provide local residents with drinking water, businesses with water for their operations, outdoor recreation enthusiasts with a place to paddle or fish, and wildlife with an essential element of their habitat needs. This chapter will cover the basic elements of water resources, their purpose, function, and the challenges facing the Connoquenessing community in conserving this crucial natural resource.

Connoquenessing Creek looking upstream from the mouth

Location

Drainage

The Connoquenessing Creek watershed is located within the 203,940-square-mile Ohio River drainage basin. The headwaters of Connoquenessing Creek, along with the headwaters of the Slippery Rock Creek subwatershed, originate in Butler County, encompassing a majority of its land area. Connoquenessing Creek flows into the Beaver River, west of Ellwood City in Lawrence County, western Pennsylvania. The Beaver River continues on its southern course to Rochester, Pennsylvania, where it enters the Ohio River. The Ohio River, flowing southwest, drains parts of 11 states before it joins the Mississippi River, which ultimately empties into the Gulf of Mexico.

Watershed Address

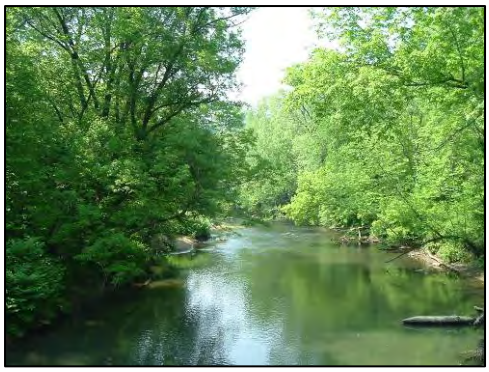
The United States Geological Survey (USGS) has developed a system in order to better catalog and describe the location of surface water resources in the United States. This system divides and subdivides the U.S. into successively smaller units of water drainage, with the result being a specific Hydrologic Unit Code (HUC) that is essentially a watershed's address. Major watersheds in the U.S. are described as one of eighteen Water Resource Regions by the USGS. Each is given a name and two-digit number (Seaber et al., 1987). Pennsylvania is drained by three of these regions: Great Lakes, Ohio, and Mid-Atlantic. The USGS further divides these regions into subregions, then accounting units, and finally into cataloging units. The HUC code for the Connoquenessing Creek watershed, including the Slippery Rock Creek portion, is **05030105**, which can be described as follows:

Region 05: All waterways draining into the Ohio River Basin, excluding the Tennessee River Basin
Subregion 03: Upper Ohio
Accounting Unit 01: Upper Ohio-Beaver
Cataloging Unit 05: Connoquenessing

The Pennsylvania Department of Environmental Protection (DEP) uses a different cataloging system, which delineates six drainage basins within the state that are further divided into watersheds, each named for their major streams. The Connoquenessing Creek watershed (referred to as the Slippery Rock Creek watershed by DEP) is located in the Ohio sub-basin (20), which comprises the Pennsylvania

portion of the Ohio River. Within this sub-basin, the Connoquenessing Creek, including Slippery Rock Creek is considered to be watershed C. Therefore, DEP classifies it as watershed 20C.

Major Tributaries



Thorn Creek

Upper Connoquenessing Watershed

The headwaters of the Connoquenessing Creek originate about 10 miles northeast of Butler, Pa. The upper portion of the mainstem of the Connoquenessing Creek generally flows south until it reaches the city of Butler. Route 38 runs adjacent to this upper portion of the mainstem for the majority of its length. The Oneida and Boydstown dams, which control flow, can be found along this stretch of the creek. Bonnie Brook, a headwater tributary, originates near the small town of North Oakland, Butler County, and flows through East Butler before entering the Connoquenessing Creek upstream of Butler.

Middle Connoquenessing Watershed

Thorn Creek stems from two reservoirs near Herman, Pa. It flows south to a bend around Frazier Mill, then continues in a northwest direction until it enters the mainstem slightly upstream of Renfrew, Pa. Glade Run, Breakneck Creek, and Little Connoquenessing Creek, respectively, spill into the Connoquenessing before its waters flow through Zelienople, Pa. Glade Run begins near the Glade Mill Airport, is impounded to form Glade Run Lake, then continues northwest until it enters the Connoquenessing Creek downstream of Ribold. The headwaters of Breakneck Creek originate just across the county line in Allegheny County. It then flows north through Valencia, Mars, and Evans City, before entering the Connoquenessing Creek upstream of Harmony.

Lower Connoquenessing Watershed

While all of the major tributaries to this point have entered from river-left, the Little Connoquenessing Creek enters from river-right. The Little Connoquenessing flows southwest from the area about one mile south of Unionville, and enters the Connoquenessing Creek at Harmony Junction (formerly Eidenau), just downstream of where Breakneck Creek enters. The Connoquenessing Creek then borders Harmony and Zelienople, primarily traveling west. Brush Creek, which begins near Interstate 76 on the border of Butler and Allegheny counties, flows northwest, traveling through Brush Creek Park and under a historic covered bridge before entering the Connoquenessing Creek on river-left near the town of Hazen. Through its final six-mile portion, the Connoquenessing Creek drops 100 feet in elevation down a gorge between the Frisco Railroad Bridge and its confluence with the Beaver River at Rock Point. This entire stretch winds through Ellwood City and provides up to Class III rapids for whitewater enthusiasts to enjoy. One mile below the Frisco Bridge, the Slippery Rock Creek subwatershed merges in Ellport, typically doubling water flows for the final five-mile run.

Little Connoquenessing Creek

Table 3-1. Major Tributaries

Tributary	% Area	Drainage Area (square miles)
Upper Connoquenessing Creek		**136.43**
Thorn Run	**1.63**	**7.69**
Bonnie Brook	**4.33**	**20.44**
Middle Connoquenessing Creek		**147.99**
Thorn Creek	**8.95**	**42.22**
Glade Run	**8.65**	**40.79**
Breakneck Creek	**8.83**	**41.64**
Lower Connoquenessing Creek		**187.21**
Little Connoquenessing Creek	**13.67**	**64.49**
Camp Run	**3.14**	**14.80**
Brush Creek	**11.89**	**56.10**
Slippery Rock Creek (subwatershed)		*366.12*

Important Components of Water Resources

Hydrologic Cycle

In order to understand the components of water resources within the watershed, one must first understand the hydrologic cycle, or the cycle of water. The continuous cycle consists of five basic processes: condensation, precipitation, infiltration, runoff, and evapotranspiration or evaporation. As air temperature drops, water vapor in the air condenses to a liquid, forming clouds in the atmosphere. Precipitation occurs when the clouds can no longer hold the moisture within them. Precipitation reaches the surface of the Earth and may be contributed directly to a body of surface water, infiltrate into the ground contributing to groundwater, evaporate back into the atmosphere, or run off the land into a surface waterbody. If precipitation occurs faster than the water can infiltrate a particular surface or if the surface is impermeable, the water will shed off the land or surface as runoff into streams, lakes, or other surface waters. Simultaneously, water may evaporate (the change of liquid to vapor) directly from the surface or be taken up by plants, transpired, and evaporated back into the atmosphere where the process of condensation occurs; and the cycle continues.

Groundwater

Water that seeps into the ground and is stored beneath the land surface in pores and openings of soil and rock formations is referred to as groundwater. Although groundwater is commonly considered a separate entity from surface water found in streams and lakes, the two are constantly interchanging and are actually a single resource. In fact, the majority of freshwater in Pennsylvania is found underground, and that groundwater supplies wells, streams, and reservoirs on which we depend for drinking water, industries, and other necessities of life.

Groundwater moves with the forces of gravity. It may move through the earth until it emerges at the surface as a discharge (springs or seeps) or is stored within areas of rock and soil, called aquifers. Groundwater discharge is a major contributor to surface waters. The average percentage of stream flow from groundwater is around 60–70 percent. Therefore, stream flow and surface water availability is heavily dependent on the quantity of groundwater. As a result of this dynamic, the quality of streams and lakes can be directly impacted by the quality of groundwater (Fleeger, 1999).

Sources of contamination that may leach into the groundwater system, including sewage waste, industrial chemicals, agricultural nutrients, metals and acidic compounds from mines, and many others, not only affect groundwater, but affect surface water and drinking supplies as a result of being transported with the moving groundwater. Many public water suppliers and private homeowners rely on wells for drinking water and everyday use, and are therefore also directly impacted by the quality of groundwater.

The pattern of water movement in the Connoquenessing watershed is controlled primarily by topography, which is highly dissected by major and minor valleys into isolated bedrock "islands." Water moves from areas of high elevation to lower elevation and from shallow to deeper aquifers. Water levels are affected by precipitation patterns, evapotranspiration, land use, human consumption (drinking water supply, household uses, commercial uses, industrial operations, etc.). Evapotranspiration, a major factor in the maintenance of water levels, is typically greater during the warm summer months when deciduous trees have leaves (Fleeger, 1999).

The yields of wells depend upon the ease of groundwater movement through rock and the level of the water table, or depth at which the soil is completely saturated. Groundwater is found in two types of openings in rock—primary and secondary. Primary openings are spaces between fine mineral grains. Though the space between unconsolidated grains may be small, cumulatively they are capable of generating large amounts of water. In contrast, secondary openings occur from fractures in rocks. Types of deposits that generate the most water are alluvial deposits, which are formed from the movement of rivers.

Since groundwater is the single largest source of surface water, the quality of groundwater in an area can generally be determined by sampling streams at base flow, which are flows low enough that all of the flow can be considered to come from groundwater. In streams that are greatly affected by mine drainage, sulfates and metals, such as iron and manganese, can be found at unnaturally high levels, particularly at base flows. Similar to abandoned mine drainage (AMD), acid from precipitation is able to dissolve the metals found in bedrock, causing those metals to be leached out into groundwater and streams.

The majority of residents throughout the Connoquenessing watershed get their water from public water suppliers. Most of the public water is obtained from streams and reservoirs. Therefore, these public water sources are affected by groundwater quality and quantity. Water suppliers within the project area may struggle to find clean drinking water free of contamination from AMD and other pollutant sources. Thus, treatment costs increase in order to meet drinking water standards, which translates to higher water costs for the municipalities and consumers.

Surface Water

Surface water refers to water found about the land surface, in rivers, streams, lakes, reservoirs, ponds, wetlands, and seeps. Surface water is in constant interaction with groundwater, which is stored below the surface within openings in rock material. Therefore, it is influenced by the quality of the groundwater, as well as inputs from land-use practices associated with farming, forestry, mining, and other activities.

Streams and Rivers

As water drains from ridges and higher-elevation wetlands that are created from depressions in the topography, tributaries form and grow in size and volume as the water flows to lower elevations. Larger streams are influenced by the water quality of these wetlands and tributaries from which they originate, as well as pollution from acid precipitation and land-use activities.

One human practice affecting water flow and quality is stream **channelization**. For a variety of reasons, humans have altered natural stream channels to straighten, widen, deepen, divert, and otherwise

modify the physical characteristics of the stream. Streams may be channelized to purposefully drain wetlands, improve navigation, control flooding or divert the flow to a reservoir for agricultural use or construction of a road, dam, bridge, or other structure. The negative consequences of stream channelization include aquatic and terrestrial habitat alteration, wetland loss, streambank destabilization, erosion, and sedimentation. In urban areas, the city of Butler for example, where the floodplains have already been developed, streams may be channelized to increase the volume of water it is capable of holding to aid in flood control. However, when the stream channel is straightened, the velocity of the water flowing within it greatly increases, scouring the stream bed and eroding streambanks. The sediment is carried downstream to deposit and accumulate once the flow slows down sufficiently, which then can lead to increased flooding in downstream areas, causing the opposite effect for which it was originally intended.

Not all streams flow year-round. Because surface water flowing in streams is primarily contributed to from groundwater, it is important to understand the relative position of the stream bottom with respect to the water table in order to define a perennial, intermittent, or ephemeral stream.

Although not all streams flow year-round, all streams within Pennsylvania are protected under the Pennsylvania Clean Streams Law of 1931, which gave the state of Pennsylvania the power to enact legislation and regulations pertaining to the protection of streams.

According to the Pennsylvania Code (1997), 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 local water table and obtains its flow from both surface runoff and groundwater discharges." Streams that do not flow year-round are intermittent streams.

Dry phase of an intermittent stream

An **ephemeral** stream is a "water conveyance which 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 which is always above the local 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 which are large enough to be seen by the unaided eye and live at least part of their life cycles within or 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.

Point discharge limits (as described later in this chapter) are estimated at the point where the stream supports a benthic macroinvertebrate community characterizing a "perennial stream." In the past, mining operations in Pennsylvania could get streams to be reclassified as intermittent or ephemeral, classifications requiring no special protections under state mining regulations. However, DEP has recently begun shifting its policy to require detailed biological assessments before approving such operations. Under this new policy, non-permanent intermittent and ephemeral streams are receiving similar protection as permanent, perennial streams before mining can proceed.

Protection of intermittent and ephemeral streams is also included for logging and other earth-moving activities, although permitted activities may differ from those involving perennial streams. In cases where

Thorn Run Reservoir

there is some question over what protections are in place for an activity, DEP's Northwest or Southwest Regional Office should be consulted.

Lakes, Ponds, and Reservoirs

Lakes are inland bodies of water that form through natural processes. These processes include geologic events, such as the movement of tectonic plates, which disrupt the flow of a river to form a lake. In the United States, most natural lakes were formed by glaciations thousands of years ago, when the advance of the glaciers caused great depressions to form and fill with water. Natural lakes are uncommon in Pennsylvania, and occur only in the northwestern and northeastern parts of the state. Lakes differ from ponds in that they have more visible waves, are deeper, have rooted plants that are only able to grow close to the shore, and have water temperatures that vary with depth. Ponds, natural and man-made, are present throughout the state, though their locations are not well documented.

Reservoirs, or impoundments, are common throughout Pennsylvania. Reservoirs are created when a body of water is detained by a structure, such as a dam. These reservoirs of water behind the dams, sometimes referred to as "lakes," are often utilized for recreational activities, such as fishing, swimming, and boating. They also may provide flood control or water supply for nearby communities. Some industries create reservoirs to contain waste water, which often contains pollutants, discharged after use in their operations. Several notable reservoirs exist within the watershed, including Glade Run Lake, Lake Oneida, Thorn Run Reservoir, and the Hereford Manor Lakes.

Along with the reservoir of water impounded by a dam, wetlands are often formed on the marginal areas surrounding them. Some tree species within those wetlands die and remain standing when inundated with the backed-up water. These wetlands provide valuable wildlife and fisheries habitats, and the dead, standing trees provide nesting habitat for waterfowl, such as wood ducks, and other wildlife. More will be discussed on wetlands later in this chapter.

Floodplains

The area of land adjacent to a river, stream, or lake that absorbs the occasional overflow of water beyond the banks of those waterbodies is known as the floodplain. Floodplains and wetlands dually act to absorb flood waters during high-flow events. When structures, houses, buildings, and impervious surfaces impact a floodplain or eliminate a natural wetland, the ability of those areas to dissipate flood waters is diminished. In addition, the likelihood of property damage and human health and safety risk increases when development occurs within a floodplain area susceptible to occasional flood events. Figure 2-8 (Chapter 2) shows significant floodplain areas.

The National Flood Insurance Program (NFIP), administered through the Federal Emergency Management Agency (FEMA, 2002), was established in 1968 with the National Flood Insurance Act. Property owners can purchase insurance as a protection against flood loss if communities agree to adopt ordinances that reduce flood damage, including limiting building in floodplain areas. Ordinances must meet minimum regulatory standards of NFIP and the PA Floodplain Management Act (PA Act 166). Residents from non-

Houses built in the floodplain

participating communities can still purchase insurance, but at a much higher rate (FEMA, 2002).

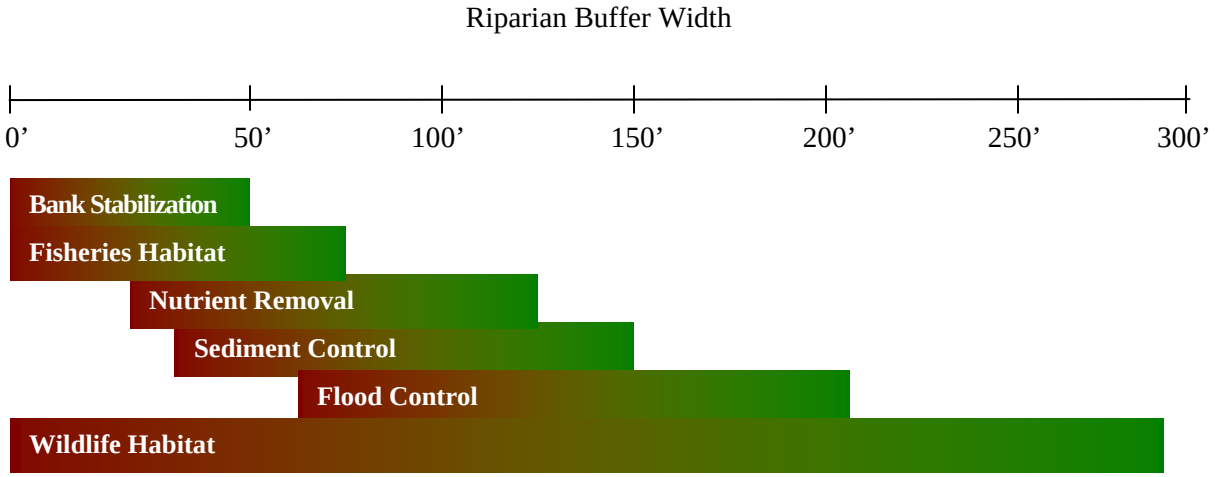
In communities that adopt such ordinances, building in Special Flood Hazard Areas (SFHA) may occur only if the owner agrees to purchase flood insurance. SFHAs are areas within the 100-year flood zone, which means that there is a one percent chance of a flood reaching this zone each year. Special subsidies are available for existing structures built before the adoption of ordinances. Future structures built in 100-year floodplains must meet certain requirements. During declared national disasters, FEMA may also make grants and loans available to those not participating in the program (FEMA, 2002). Many communities in Pennsylvania have adopted a riparian buffer approach to floodplain management. These "total prohibition" ordinances encourage the reduction of construction and development in the floodplain.

Floodplains can be considered "sensitive" areas because they are both inappropriate for building purposes and important for protection of streams and wildlife. Currently, most municipalities have floodplain ordinances, though these provisions may not always be adequately enforced. Harmony, Ellwood City, and Zelienople have been identified as areas particularly prone to flooding occurrences. Special attention to these issues should be addressed when development projects are being considered.

Riparian Zones

Riparian zones or buffers are vegetated areas along streams, rivers, and lakes that filter pollutants and sediment from runoff and provide a transition between water and land. A functioning riparian zone can reduce flooding and erosion by retaining water, slowing its velocity, and stabilizing soil. This also promotes groundwater retention during dry periods. Riparian zones also provide important corridors for wildlife, regulate water temperature, enhance recreational activities, and create fish habitat. Studies have shown that the wider and more substantial a riparian zone is, the better it can perform these functions (Klapproth, 2000). Some of the agricultural streams and developed areas of the watershed do not have adequate riparian zones. This has created severe bank erosion in some areas, as well as the introduction of invasive species, which thrive in disturbance. Figure 3-5 shows recommended riparian zone widths for bank support, fisheries habitat, nutrient removal, sediment control, flood control, and wildlife habitat.

Figure 3-2 Recommended Riparian Buffer Widths



Retaining existing buffers is a cost-effective method of protecting waterways from sedimentation, streambank erosion, and flooding. A number of tools are available in Pennsylvania for landowners and

communities to protect and enhance these important riparian zones and other important green areas, such as:

- Pennsylvania Stream ReLeaf Plan (DEP, 1997) and forest buffer tool kit (Alliance for the Chesapeake Bay [ACB] & DEP, 1998)
- Stream corridor restoration: principles, processes, and practices (Federal Interagency Stream Restoration Working Group, 1998)
- Chesapeake Bay riparian handbook: A guide for establishing and maintaining riparian forest buffers (Palone & Todd, 1997)
- Riparian forest buffers: function and design for protection and enhancement of water resources (Welsch)
- Pennsylvania's Conservation Reserve Enhancement Program (U.S. Department of Agriculture Farm Service Agency)

Land Purchase

There are several avenues a community may pursue to protect, restore, and conserve riparian corridors. A municipality or conservation organization may seek the outright purchase or donation of land in a high quality riparian zone to protect it for future use, or they may seek to obtain areas in need of restoration. The municipality or conservation group then has control of the land and is responsible for all financial and maintenance obligations. Pennsylvania Department of Conservation and Natural Resources (DCNR) offers funds for land acquisition projects to protect and restore natural areas. Land acquired with these funds must be available for public use. Another option for financing the purchase of the riparian land is to subdivide the area and sell the less sensitive sections to offset the costs.

Conservation Easements

Another way to protect riparian land is through the purchase of a conservation easement, a legal agreement between a landowner and land trust or local government that permanently restricts the type of land use for that property to allow for the conservation of natural resources. The landowner maintains ownership of the land, but gives up some of the development rights. The conservation easement compensates the landowner for the economic loss resulting from these restrictions, such as limited timber harvesting or grazing. The landowner may also receive a tax credit for the reduced value of the property. Within Pennsylvania, municipalities may hold conservation easements and use various taxing schemes to raise money for the acquisition of open space and agricultural land. The Recreation Use of Land and Water Act (# 586) and the Rails to Trails Act (#188) limit liability for property owners with easements or adjoining trails (ACB, 2004).

Municipal Planning

Municipalities have several options in regards to land use planning. County Comprehensive Plans are documents that address the timing and character of development. Although non-regulatory, the Municipalities Planning Code states that zoning ordinances must be consistent with comprehensive plans, which should contain planning for natural and historic preservation (Pennsylvania Municipalities Planning Code).

An Official Municipality Map designates existing and proposed open space reservations. If a municipality wishes to set aside a landowner's property for open space purposes, then the municipality has a legal obligation to buy the land within 12 months of the landowner's decision to develop it.

Ordinances can restrict activities within a certain distance of a stream, based on stream size, slope of the land, wetlands, etc. This may include limiting the building of structures prone to flooding, the removal of streamside vegetation, and the amount of earth disturbance in this zone. Typically, several zones are

delineated next to a stream, and restrictions increase in zones that are the closest. Structures present before the ordinance is enacted are often exempt from these restrictions. Municipalities in Pennsylvania that have riparian ordinances and can be contacted for more information include Salford and Horsham Township, Montgomery County; Kennett Township, Chester County; Warwick Township, Lancaster County; and Radnor Township, Delaware County (ACB, 2004).

Transferable Development Rights

This tool, which is discussed further in the Biological Resources Chapter, compensates property owners in areas where development is restricted, by allowing them to sell development rights to increase development densities in other areas.

Density Bonuses

This tool awards 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 buffer helps reduce 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 (ACB, 2004).

Stormwater

The water running off impervious surfaces, such as streets, buildings, and parking lots, as well as land during storm events is referred to as stormwater. Besides flooding, stormwater contributes a significant amount of pollution to waterways. Much of the unhealthy bacteria that enter streams from manure lots and faulty sewage systems do so during storm events.

Persistent stormwater

In urban areas, impervious surface area is often linked to stream impacts, with significant impacts occurring at only 10 percent impervious surface according to some studies (Schueler, 1995). Impervious surfaces are areas on the landscape where water cannot pass through to be absorbed by the soil. Examples of impervious surfaces include hard surfaces, such as asphalt, concrete, rooftops, and highly compacted soils. Highly compacted soils often result from a lack of vegetation in an area, which as mentioned before, also leads to water quality degradation.

Water runs off the land until it infiltrates the soil, or it is incorporated into man-made systems that funnel it to a body of water. This leads to increased volume and velocity of water flowing into the stream, less groundwater flowing through the soil, and erosion of the stream bed. These changes result in flooding, loss and degradation of habitat, erosion, sedimentation, and physical changes in the stream. Small floods may increase by up to 10 times with increases in imperviousness from urbanization (Hollis, 1975), and research in Pennsylvania has shown that brook trout are absent from streams in watersheds with just four percent impervious surface.

Minimizing the amount of impervious surface is one approach to water resource protection, by using such tools as performance zoning, residential design, and open space subdivision. Reducing impervious surface not only has environmental benefits, but reduces social, economic, and development costs as well.

Pennsylvania's Stormwater Management Act of 1978 requires each county in Pennsylvania to develop stormwater management plans for each of its watersheds, though some counties have yet to

comply. DEP provides model stormwater management ordinances and funding options for stormwater management plans on its website, http://www.dep.state.pa.us (Keyword: Stormwater). Essentially, the management of stormwater can be viewed as the management of a "man-made tributary system."

Dams

Historically, dams were often installed along streams and rivers to harness the natural power of water for operating mills of varying sorts, including saw, grist, and paper mills. Dams also are utilized on rivers for navigation purposes and transportation of goods. The natural power of stream currents is still utilized for some industries today, and it can be harnessed for hydroelectric power generation. A dam along the Connoquenessing Creek mainstem in Butler is currently being utilized to retain water for use by AK Steel for its manufacturing operations. Several abandoned dams exist throughout the watershed, and residents and municipalities are weighing the options of whether or not to remove them (Figure 3-3).

Breached dam on Connoquenessing Creek

Often times, 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 to humans, 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.

It must be determined, based on maintenance costs, safety, and potential uses of the dams, whether or not to remove it. If a community decides to leave a dam in place, a portage trail may be constructed around the dam to allow water recreation. If it is determined that a dam be removed, a plan must be developed for the removal process and to restore the stream and its habitat afterwards.

There are a few organizations responsible for the oversight of dam maintenance, regulation, and removal in western Pennsylvania, including the U.S. Army Corps of Engineers, DEP, Pennsylvania Fish and Boat Commission (PFBC), 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, is the *Citizen's Guide to Dam Removal and Restoration*, which can be obtained from the Pennsylvania Organization for Watershed and Rivers (POWR) at www.pawatersheds.org.

Wetlands

In order for an area to be considered a wetland, it must have three components: anaerobic or hydric soils, wetland vegetation, and indications that it has been covered with water at least part of the year (Mitsch & Gosselink, 2000). Anaerobic or hydric soils include those that form under conditions of flooding long enough in the growing season to not contain oxygen in the upper part. It is important to note that an area does not have to be covered with water during the entire year to be considered a wetland. Wetland areas may be permanently flooded by shallow water, permanently saturated by

Lake Oneida wetland

groundwater, or periodically saturated for varying periods during the growing season. These characteristics of wetlands are due to the fact that wetlands occur where the water table is at or very near to the surface. Seasonal fluctuations of the water table result in the wetland being wet or dry.

Wetlands retain water, which is slowly released to surface water streams. Depending on the level of the water table in relation to the wetland, water may be absorbed into the ground from wetlands if the water table is lower than the wetland. The absorption quality of a wetland or network of wetlands helps to reduce the severity of flooding by retaining excess water flow and slowly discharging the water as the water table or water levels recede.

Wetlands filter water by a variety of mechanisms. Wetland vegetation slows the velocity of water running through them, allowing more time for suspended sediment to settle out. Pollutants, such as chemicals and metals, which are bound to the sediment particles also settle and separate from the flowing water. Nutrients from fertilizers, manure, and sewage are utilized by the plants growing in the wetland, and are removed from the water.

Wetland systems often support a variety of living organisms, termed biodiversity. The nutrient rich sediment that collects in a wetland provides abundant nutrients and food resources for plants and wildlife. The emergent vegetation and dead, standing timber provide excellent breeding and nesting habitat for insects and wildlife, especially waterfowl. Many migratory species depend on wetlands for rest and recharge during their long migratory treks.

Vernal pools are one type of wetland, where isolated ponds are created during the spring from rainwater and snow melt that has collected in depressions in the ground. These critical habitats provide breeding grounds for woodland frogs and salamanders. Vernal pools also support a variety of other floodplain, meadow, shrub lands, and woodland species.

Wetland Loss

More than half of all wetland habitats that once occurred in Pennsylvania have been lost. The major causes of wetland loss have been impoundment, drainage for agriculture and development, and conversion to other uses. The reduction of wetlands in any given area can drastically impact health and human safety by leading to increased occurrence and severity of flooding, decreased natural water quality revitalization, and exacerbated drought conditions. Loss of wetland habitats also negatively impacts wildlife by increasing the distance between remaining wetlands, which reduces the ability of animals to move from one wetland to another and to recolonize.

The stricter environmental regulations existing today prevent major wetland drainage and impoundment. However, recent federal court decisions have reduced the protections given to smaller, isolated wetlands under the Clean Water Act. Although smaller wetlands still receive some protection under Chapter 105 of the Pennsylvania Code, permits can often be acquired for their alteration or destruction (Pennsylvania Game Commission, 2005b).

In Pennsylvania, the U.S. Army Corps of Engineers has issued permitting regulation authority to DEP, where one acre or less of wetlands is impacted. A general permit form must be obtained from the county conservation district or regional DEP office to change, expand or diminish the course, current or cross section of a watercourse, floodway or waterbody, including wetlands. In addition, the local municipality and county must be notified of the applicant's intent to obtain a general permit (DEP, 2006b).

DEP, in conjunction with the National Fish and Wildlife Foundation, has established a fund, called the "Pennsylvania Wetland Replacement Project," to help permit applicants meet the wetland replacement

requirements identified in Chapter 105. If, after DEP consultation, wetland replacement onsite is not feasible or deemed unnecessary, the permit applicant may contribute to the fund, based on the size of the disturbance. With the fund, DEP will support restoration projects throughout the state that restore wetlands, riparian corridors, and other aquatic systems (DEP, 2007).

It is critical to protect and maintain an abundance of wetlands in any watershed for flood protection, water quality improvement, and wildlife habitat protection. Often artificially constructed wetlands do not perform to same quality as natural wetlands, but in any case, it is important to maintain as much wetland area as possible. Ideally, wetlands that are threatened by development or conversion should be protected with a buffer surrounding them to reduce the secondary impacts.

Wetlands in Connoquenessing Watershed

Figure 3-2 delineates wetlands and hydric soils found throughout the Connoquenessing watershed. Wetlands only comprise 0.01% of the land area (Table 2-1, Chapter 2) of the Connoquenessing landscape. Swamp forests are a recognized community of the Southern Unglatiated Allegheny Plateau ecoregion (McNab & Avers, 1994). The Redwing Valley Swamp biological diversity area (BDA) is one example of the high level of biodiversity contributed by wetland habitats (Figure 4-1, Chapter 4).

Wetlands can be constructed to serve a specific purpose related to improving water quality. Wetlands can be constructed to control stormwater runoff in developed areas, remediate AMD, and treat wastewater. Several small, artificial wetlands exist throughout the study area to serve those purposes.

Passive treatment systems to abate the effects of AMD, often include a system of settling ponds and wetlands to allow metals and pollutants to drop out of the water, incorporating alkaline additions when necessary, as well. These treatment sites and wetlands offer a unique opportunity for a variety of educational workshops to teach citizens about the effects of pollution, environmental remediation techniques, water quality, and biodiversity. Lutherlyn has an effort in the Semiconon subwatershed to remediate AMD with a passive treatment system, and they offer a variety of educational programs in association with the project.

Watershed Protection Laws

Clean Water Act

The 1977 amendments to the federal Water Pollution Control Act became known as the Clean Water Act (CWA). This act establishes the basic structure for regulating discharges of pollution into waterbodies of the United States. The CWA gives the United States Environmental Protection Agency (EPA) the authority to regulate pollution discharges and set water quality standards. It also makes it unlawful for any person to discharge pollution from a "point source" into navigable waters without a permit. The CWA funds construction of sewage treatment plants and recognizes the need for planning to address "non-point source" pollution problems, as well (Elder et al. 1999).

Connoquenessing flowing under Route 422

Point versus Non-point Source Pollution

Point source pollution refers to discharges, or pollution inputs, that enter a stream or lake directly via a pipe, culvert, container, or other means. One of the ways the Clean Water Act is enforced is through the National Pollutant Discharge Elimination System (NPDES), whereby DEP issues permits for point source discharges (DEP[4]). In Pennsylvania, the DEP

and local conservation districts are responsible for issuing point source permits to industrial operations, municipal wastewater treatment plants, concentrated animal feeding operations, and households. In addition, any disturbance of land from one to five acres requires an NPDES permit, even if it is a non-point source. The exceptions are for tilling and agricultural practices that are not part of a concentrated animal feeding operation (CAFO), and most logging disturbances that are less than 25 acres. However, many of these activities still require a soil and erosion control permit (DEP[4]).

Non-point source pollution is pollution that enters a waterbody through an undefined source, usually in the form of polluted groundwater discharge or runoff from places, such as agricultural fields, logging operations, lawns, and streets. Non-point sources comprise the majority of pollution, mainly because they cannot be as easily regulated. Usually, AMD is considered a non-point source because it is created in large, poorly-defined areas, often discharging into a stream in a diffuse manner. Efforts to reduce non-point source pollution are often conducted on a state or local level through programs to implement best management practices (BMPs) offered by conservation districts and other agencies and organizations. This will be discussed later in this chapter.

Impaired Waterbodies

In order to satisfy the requirements of the CWA, states must report to the EPA every two years on the status of its waterways, and provide a list of waterways not meeting water quality standards. A water quality standard is a combination of a designated use for a particular waterbody and the water quality criteria to protect that use. Typically, states now report on the status of all assessed waterbodies and this list is referred to as the Integrated Waterbody List (Pennsylvania). Streams are assigned to one of five categories based on their status on this list and are required to develop a Total Maximum Daily Load (TMDL) for streams in Category 5. These streams include those that are not meeting their designated uses, excluding those where point source pollution controls can alleviate the problem.

Thorn Creek

In Pennsylvania, the Integrated Waterbody List is developed based on the Surface Water Assessment Program. Impaired streams in the project area are shown in Figure 3-4 and described further in the "Water Quality" section of this chapter.

NPDES Permits

As mentioned above, one of the ways that the CWA is executed is through the NPDES, whereby DEP issues permits for point source discharges. DEP and local conservation districts are responsible for issuing point source permits to industrial operations, municipal wastewater treatment plants, concentrated animal feeding operations, and households. A list of current permits can be found in Appendix G.

In Pennsylvania, an earth disturbance activity from one to five acres requires an NPDES permit if a point source exists at the site. Any disturbance over five acres requires a permit regardless of whether or not there is a direct point source to a waterway. Farmers do not need to obtain an NPDES permit unless the farm meets the criteria to be considered a concentrated animal feeding operation (CAFO). However, they must complete a conservation plan. Timber operations fewer than 25 acres are also exempt from NPDES permits, but must complete Erosion and Sediment Control Plans. Active NPDES permits may be found at the EPA Envirofacts website (http://www.epa.gov/enviro/index.html).

Erosion and Sedimentation Control

Soil erosion is the natural process of removing soil from the land by wind or water. Though erosion is a natural process, it can be greatly worsened by a lack of vegetation, poor farming practices, stream channelization, and stormwater runoff. Sedimentation is the process by which the bottom of the stream becomes covered with eroded material from streambanks and land. This occurs if more sediment enters a stream than can be transported downstream or if hydrologic alterations reduce the capacity of the stream to transport the sediment.

Silt fence to control sediment entering stream near a construction site

In Pennsylvania, any disturbance over 5,000 square feet must have an Erosion and Sediment Control Plan on site. Earth disturbance permits must be obtained for activities disturbing an area over 25 acres, including timbering and development activities. Most agricultural operations do not need to have an earth disturbance permit, but must have a conservation plan if the farmer wishes to take part in incentive programs. Both earth disturbance permits and conservation plans require provisions for sediment control. A separate permit is required for stormwater from construction activities. Local county conservation districts assist in the development of Erosion and Sediment Control Plans and conservation plans (PA Code, 1997c). They also help fill out paperwork for earth disturbance permits. However, all permits in High Quality and Exceptional Value watersheds must be approved by DEP. It is not clear whether soil and erosion control regulations in the project area are being adequately implemented. Any efforts to improve the effectiveness of soil and erosion control measures in the project area should involve local conservation districts and state agencies responsible.

Pennsylvania's Clean Streams Act and regulations under the Pennsylvania Code create a role for local governments in protecting streams by developing Erosion and Sediment Control Plans, which include sediment control BMPs. These practices protect the quality of land and the environment by preventing erosion and pollution. They include agricultural practices such as utilizing contour farming and filter strips; sustainable forestry practices like limited harvesting in riparian zones and steep slopes; and wise development practices, such as maintaining vegetated zones around parking lots and buildings.

Contour farming: Tilling and planting that follows the slope of the land, creating ridges that slow the run of water, allowing increased infiltration and groundwater recharge

Silt fences: A temporary barrier designed to retain sediment in a construction site by slowing water flow and promoting deposition on the uphill side of the fence, also decreasing the velocity of run-off

Strip cropping: Partitioning a field into alternate bands of different crops, such as row crops, hay, and small grains; when combined with contour farming methods, it allows increased infiltration and filtering of sediment

Filter strips: Areas of grass planted next to cropland to filter out sediment, organic matter, nutrients, and chemicals carried in run-off

Nutrient Management Program

The Pennsylvania State Conservation Commission, formed through the Pennsylvania Nutrient and Odor Management Act (NOMA), administers the Pennsylvania Nutrient Management Program (PNMP).

The program is controlled by the commission and county conservation districts with approved delegated authority. Concentrated Animal Operations are required to participate in the program, as well as any operation that wishes to gain liability protection under the act, or has received financial assistance through NOMA for BMP installation. In addition, any agricultural operation in violation of the Pennsylvania Clean Streams Law may be required to submit a nutrient management plan that meets NOMA requirements (PNMP).

Farmers participating in NOMA must develop and implement approved nutrient management plans. Nutrient management planning is a series of BMPs designed to reduce nutrient pollution by balancing nutrient inputs with nutrient requirements. Plans must be developed by a certified Pennsylvania Department of Agriculture (PDA) Nutrient Management Specialist. The intent of NOMA is to address water quality issues from such activities as animal number and density, nutrient losses from manure storage and handling areas, nutrient runoff from animal concentrated areas, and manure fertilization. Questions about the program should be directed to the appropriate county conservation district. Financial and technical assistance is available (PNMP).

Pennsylvania Sewage Facilities Act

Sewage is a major cause of pollution in western Pennsylvania streams. Sewage pollution can come from municipal and non-municipal sewage treatment plants, as well as from private septic systems. This pollution can occur from plants that have inadequate capacity due to population growth or poor design and private systems that are not properly built or maintained. In some cases, both sewage waste and stormwater enter a municipal system through the same infrastructure, and the plant is not capable of handling all of this waste at once. The overflow waste is deposited directly into the stream. When this happens, it is called a combined sewage overflow (CSO) event.

Constructing the new Saxonburg sewage treatment facility, summer 2007

The main type of pollution entering streams from sewage treatment plants and septic systems is inorganic and organic nutrients, sediment, and bacteria. Nutrients can lead to excessive plant growth, which depletes the oxygen levels of streams. Sediment is responsible for clogging the gills of aquatic organisms and affecting in-stream hydrology and habitat. Bacteria can be harmful, and sometimes fatal, to both stream life and humans. Elevated bacteria levels were found in Brush and Breakneck creeks by a study conducted by the Connoquenessing Watershed Alliance, which will be discussed in further detail later in this chapter.

Stream impacts caused by AMD can sometimes mask the effects of other pollutants, such as septic systems and agricultural runoff. In fact, these other pollutants can add pH and alkalinity to a stream, canceling some of the harmful effects of acidic mine drainage. Few streams in the watershed have a HQ or EV designation, which can put limitations on the types of pollutants entering a stream. Nonetheless, sewage pollution can have a significant negative impact on stream ecosystems and can affect the use of the stream for recreation and water supply. Over 15 sewage treatment plants have permits to discharge treated wastewater to local streams. Depending on the age, condition, infrastructure, capacity of the system, and treatment methods used, the amount of waste matter entering streams from each of these plants may vary greatly.

Sewage treatment systems can affect groundwater storage quantity depending on the source of the water supply used for sewage disposal. If water entering a sewage treatment plant was obtained from sources of public water derived from wells, and thus groundwater, the water budget for that source will

decrease, because the treated water is typically discharged to a surface body of water. Conversely, private on-lot septic systems return treated water to the groundwater storage area, and therefore don't disrupt the natural hydrologic budget.

The Pennsylvania Sewage Facilities Act (Act 537) was enacted in 1966 to repair existing sewage disposal problems and to inhibit future problems. Defective sewage disposal systems can create a grave hazard to public health and the environment. They pose a risk of pollution to public and private drinking water sources, as they frequently can be directly discharged into the groundwater, and can expose various bacteria, viruses and parasites to humans and animals. The contaminated groundwater also pollutes surface water supplies as it discharges into those streams and reservoirs.

The major provisions of Act 537 are (DEP[1]):

1. All municipalities must develop and implement an official sewage plan that addresses their present and future sewage disposal needs.

2. Local agencies are required to employ both primary and alternate Sewage Enforcement Officers (SEO), who are responsible for implementing the daily operation of that agency's onlot disposal systems (OLDS) permitting program.

3. Local agencies, through their SEO, approve or deny permits for construction of onlot sewage disposal systems prior to installation.

4. DEP provides grants and reimbursements to municipalities and local agencies for costs associated with the Act 537 planning and permitting programs.

5. An Environmental Quality Board (EQB) must adopt regulations establishing standards for sewage disposal facilities.

6. A Sewage Advisory Committee (SAC) reviews existing and proposed rules, regulations, standards, and procedures, and then advises the Secretary of the DEP.

Abandoned Mine Drainage Legislation

The Federal Surface Mining Control and Reclamation Act (SMCRA) of 1977 established mandatory uniform standards for coal mining activities on state and federal lands, including environmental performance protection standards to reduce adverse effects of fish, wildlife, and other environmental values. An important component of this legislation is that mining companies are required to conduct remediation efforts for environmental degradation caused after the Act's passage (mine discharges, coal refuse, etc.) It gives companies an incentive to reduce environmental impacts in order to avoid the high costs of remediation. The Act also created the Abandoned Mine Reclamation (AMR) fund to help pay for the clean up of mine lands abandoned before 1977, which are not covered by the new standards and regulations (Environmental Literacy Council, 2002).

AMD on Semiconon Run

This Act, along with the Clean Water Act, has important implications for mining activities throughout Pennsylvania. Future mining activities in the Connoquenessing watershed must comply with

SMCRA, as well as the anti-degradation component of the Clean Water Act (Environmental Literacy Council, 2002).

Water Quality

Water Quality Monitoring

The Connoquenessing Watershed Alliance has a volunteer water quality monitoring program that is active throughout the watershed, including the Slippery Rock Creek subwatershed. In 2001, the Alliance was awarded $8,305 through Pennsylvania's Growing Greener program to purchase equipment and supplies necessary to expand the program (White, 2001). The monitoring of surface waters is regular, systematic, and ongoing. Tests are conducted for pH, specific conductivity, dissolved oxygen, alkalinity, sulfates, nitrates, temperatures, flow volume, and macroinvertebrates.

Water quality monitoring of groundwater should also be conducted, since a majority of the surface water is derived from groundwater discharge. Detection of pollution in the groundwater before it is discharged to surface water sources would enable proactive treatment exploration. This may also aid in the identification of pollution sources through early detection, and allow for prioritized treatment and remediation strategies to be implemented.

Major Sources of Impairment

Abandoned Mine Drainage

AMD is a significant cause of impairment throughout the watershed, but in Little Connoquenessing subwatershed in particular. Unlike many other sources of pollution, AMD does not result from the addition or introduction of a chemical pollutant or foreign material into the water system. AMD is formed when mining activities fracture bedrock that is situated 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 resulting in contamination of the water with the dissolved metal byproducts of those reactions, including iron, manganese, and aluminum. Acid is formed when sulfur-oxidizing bacteria in the rock helps convert inorganic sulfur to sulfate and sulfuric acid. If there are insufficient neutralizing compounds, the water will become acidic. The 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 will precipitate, or drop out of the solution as solids, creating even more acid and coating stream bottoms with silt-like metals. High levels of iron and aluminum can poison fish and threaten drinking water supplies (Fripp, Ziemkiewicz, & Charkavorki, 2000). The siltation from the metals and the altered pH can also affect the survivability of aquatic macroinvertebrates, which form the base of the food chain, and thus the basis of a healthy, functioning stream ecosystem.

Passive AMD treatment system at Lutherlyn

Underground mining refers to practices that extract coal by tunneling into the earth. The most common underground mining method utilized is the room and pillar method. Using this method, an opening at the surface is used to reach the coal seam. Rooms are cut into the coal bed, leaving a series of pillars or columns of coal to help support the mine roof. Surface mining involves extracting deposits of mineral resources close to the surface. A common surface mining method is strip mining, which removes the layers of rock, or overburden, directly over the coal seam.

Remediation refers to activities undertaken or treatment methods used to minimize or remove pollution from a contaminated area. Regarding reducing water pollution from AMD, the goals are to reduce metal loadings and water acidity, or raise water pH to acceptable levels. AMD treatment falls into two broad categories, active and passive. Active treatment involves the physical addition of a neutralizing agent, such as chemicals and lime, to the source of the AMD or directly into the stream. Passive treatment includes a variety of techniques to raise the pH and reduce metal loading that involve a constructed treatment or containment project, such as a wetland or limestone drain. While initial costs for passive treatment can be higher, passive treatment generally requires less maintenance and attention once constructed (Turner et al.).

The type of treatment system used is highly dependent on the concentrations of metals present in the AMD and site conditions. Chemical treatment is typically implemented through passive and active methods, such as the addition of lime or the use of limestone-lined ponds. If it is necessary to reduce metal concentrations and raise the pH, then a variety of passive treatments may be used, including an anaerobic wetland, aerobic wetland, or combination of systems (Pennsylvania State University).

Previously mined areas can also be dangerous, with unstable portals and roofs associated with underground mining and dangerous high walls and spoil banks associated with surface mining. In some cases, reclamation techniques, such as removal of refuse and/or regrading and re-vegetating, can be used to make a site safer and reduce mine discharges in surface mined areas. Once an area is surface mined, its suitability for different land uses may change, because mined material can have a lower pH and different soil composition.

Some funding for mine reclamation is available through the Office of Surface Mining and other state and federal programs. See the Land Resources chapter for information about the impacts of mining on the landscape and for funding opportunities. Underground and surface mining continue to be utilized. As more profitable coal seams are mined in Pennsylvania, the reclaiming of old areas and targeting of once unprofitable coal seams may become more cost effective.

Nitrates

Nitrates are commonly used in fertilizers and in industrial applications. Nitrates are easily soluble, and do not attach to soils, so their probability to migrate to groundwater is likely. Once in water, nitrates do not evaporate, and so remain in place until ingested by plants or other organisms. High levels of nitrates in a waterbody can result in eutrophication and algal blooms, which disrupt oxygen levels when the material decays, causing the death of aquatic life (EPA, 2006b).

AK Steel Corporation Butler Works

Nitrates have also been found to contaminate unprotected wells (U.S. Agency for Toxic Substances and Diseases Registry, 2001). Other than fertilizers and industrial processing chemicals, nitrates are also found in rodenticides (pesticides used to kill rodents) and food preservatives, particularly those used for lunch meats and hot dogs (EPA, 2007). Nitrates also are a component of animal (including humans) waste.

Nitrates can pollute streams by direct discharge of industrial effluent, runoff from agricultural lands, and faulty septic and municipal sewage systems. The biggest contributor of nitrates to Connoquenessing waterways is by industrial discharge.

A water sample in October 1999, revealed that the Connoquenessing Creek was found to have particularly high levels of nitrates, especially downstream of the Butler Works Plant of AK Steel

Corporation. Nitrate levels of 175 parts per million were found (ppm), well above the national health standard of less than 10 ppm for drinking water (Hopey, 2001). The borough of Zelienople, 21 miles downstream of the AK Steel discharge, utilizes water from the Connoquenessing Creek as a backup water supply in times of drought. The elevated nitrate levels caused significant concerns among residents of the borough, who rallied together with CWA to bring their concerns to EPA.

The AK Steel Corporation Butler Works Plant was responsible for most of the point source release of nitrates into the Connoquenessing Creek. Upon an EPA order to reduce nitrate discharge and provide a safe alternative of drinking water to the residents of Zelienople, AK Steel undertook efforts to greatly reduce their discharge of nitrates to the creek by limiting production and converting their pickling procedures to utilize hydrogen peroxide rather than nitric acid. They also worked with EPA and DEP to install a reverse osmosis water filtration system at the Zelienople intake on the Connoquenessing Creek, which reduced nitrate levels to an acceptable amount (Gerwig, 2002).

Infants, pregnant women, and nursing mothers are particularly at risk of adverse health effects in association with high levels of nitrates in drinking water. Methemoglobinemia, also known as “blue baby syndrome” is the most-likely adverse health effect to occur to humans. This syndrome most often occurs in infants less than four months of age, due to the unique difference between the methods by which the body metabolizes nitrate in respect to age. In an infant’s system, nitrate is readily metabolized into nitrite, which robs blood cells of oxygen, thus creating a blue coloration in body tissues. The most serious consequences of this condition are coma and death (Knobeloch et al., 2000). Nitrates also have been linked to certain types of cancer in young children and adults, though research continues.

Acid precipitation

The term pH is used to quantify whether a solution is an acid or a base. 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.

Rainwater is already acidic, generally having a pH of around 5.6, from the reaction of carbon dioxide with oxygen in the atmosphere to form carbonic acid. However, acidity from non-natural sources has caused rainwater in some areas to have a 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, these pollutants fall as dry deposition, or acidic gases and particles that are blown onto buildings, cars, etc. When it rains, the particles are washed from objects and increase the pH of the rain. The sources of this pollution include vehicles and industrial 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.

The 1990 Clean Water Act 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 the Midwest. The portion of the Midwest including western and central Pennsylvania has the highest levels of nitrogen-containing compounds in precipitation in the United States (Driscoll et. al., 2001).

Acid precipitation can have additional effects on water quality, besides the impacts of low pH. Toxic metals that have been deposited in soils are 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. It is possible that some of these impacts are occurring in the project area. Aluminum is another common metal that amplifies 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 can recover from acid precipitation impacts. 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 (Driscoll et. al., 2001). A visible lowering of sulfuric acid in streams of the project area 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. As a result, 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. The active addition of alkalinity-producing chemicals to streams is a tactic that can be taken, but this is a temporary solution that often causes 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 more fuel-efficient cars and using less energy. Additionally, constituents should encourage their legislators to support stricter regulations that would further reduce the pollution from smokestacks and cars that is the source of acid precipitation.

Local farm

Although evidence points to a significant decrease in water quality of the project area 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.

Agricultural Practices

Agricultural pollution is the second-leading cause of water quality degradation in Pennsylvania, after AMD. Dairy and beef operations comprise a large number of farms within the project area (U.S. Census, 2000). Pollution loading increases with improper management of nutrients, such as manure and fertilizers, as well as inadequate stormwater runoff controls. These problems represent some of the most serious issues related to agricultural pollution (Swope, personal communication, 2006). BMP initiatives focus on nutrient reduction and proper storage of manure. Farmers that develop nutrient management plans can participate in cost-incentive programs, such as Environmental Quality Incentives Program and Conservation Reserve Enhancement Program (see Land Resources chapter), which provide reimbursement for up to 75 percent or more of incurred costs. Recent efforts have also focused on no-till or reduced-till practices, which greatly reduce erosion and fuel costs associated with plowing (Swope,

personal communication, 2006). Increased funding for any of these programs is always needed. The local Natural Resources Conservation Service (NRCS), located in Butler, can be contacted for more information.

Forestry Practices

The amount of water running off a forest during a rainstorm depends in large part on the forest age and proportion affected by timber harvesting. Following a cut, there is an increase in the amount of water running off a forest patch because fewer trees exist to intercept rainfall or to transpire water. Most of the water infiltrates into soil or carries sediment and nutrients to streams. High-grade cuts (which remove the best-quality trees and leave little for regeneration) and other practices leaving few standing trees can increase the amount of runoff to streams. The filtering function of forests can be maintained through a number of practices, such as dispersing harvesting operations so that only a small percentage of any watershed is affected at any one place and time, utilizing forestry methods that leave an appropriate amount of trees to prevent sediment and erosion, leaving enough streamside forest to filter sediment from surface runoff, utilizing thinning practices to maximize filtering capacity and forest health, and implementing additional sediment and erosion control BMPs (Klapproth & Johnson, 2000). These are discussed further in the Land Resources chapter.

Development Practices

Land ordinances can be tailored to protect water resources. One of the biggest impacts is development on floodplains, which are natural features of a stream that dissipate water during flood events. Even smaller-scale development along floodplains reduces their effectiveness. Removing riparian vegetation can also increase the amount of streambank erosion, causing stream widening and a buildup of sediment on the stream bottom. Effective land ordinances restrict building in these and other sensitive areas, or allow building if certain requirements are met (Klapproth & Johnson, 2000).

Calgon ledge along Connoquenessing Creek near Butler

Stormwater runoff is also an issue that should be adequately addressed in ordinances. During storm events, large amounts of water runs off paved surfaces and other impervious areas, rapidly increasing the amount of pollution and water entering streams. Some of these issues can be avoided by preventing certain types of building in sensitive areas, and encouraging building options to allow rainwater to percolate into soils instead of into roadways and drains.

The elimination and draining of wetlands for development can exacerbate flooding occurrences and severity, reduce a watershed's filtering capacity, and lead to increased sediments entering streams. Stream channelization, another root cause of increased erosion, sedimentation, and flooding, often occurs during construction practices and in heavily developed areas.

Road Maintenance

Municipal and state road maintenance can impact waterways by contributing chemical pollutants, as well as sediments and minerals to area waterways. Residual materials left from the use of salt and cinder to improve safety during wintery conditions may be pushed into storm drains or directly dumped into streams and wetlands during winter maintenance activity. This practice may have a direct, negative impact on fisheries and water quality. In addition, excess salt, cinder, and other related debris may be removed from roadways, including bridges that span the waterways, by washing the materials into stormwater drains and over the sides of bridges. Municipalities and Pennsylvania Department of

Transportation (PennDOT) road maintenance crews should be encouraged to utilize dry sweeping methods of debris removal to avoid contaminating waterways.

Sewage Waste

Contamination from both public sewage treatment and private on-lot systems is a potential concern. Public services are available in a small geographic area but are concentrated in boroughs, which are more populated than townships. All of these systems have a DEP point discharge permit to discharge treated sewage waste, which may contain some amount of nutrients and bacteria. These discharges have the potential to impact stream health and public water supplies, particularly if they are malfunctioning. This could cause drinking water contamination and increased drinking water treatment costs, because improperly treated effluent can enter surface water and groundwater.

Rural, on-lot systems typically contribute an even greater amount of sewage waste into streams when they are not maintained properly. Conventional systems consist of a large tank designed to hold about two days of wastewater and allow solids to settle out, and a drain field that distributes wastewater so that it can be slowly absorbed into the underlying soil. These systems remove much of the bacteria but are not very effective at removing nitrogen. They often "fail" when the drain field becomes clogged, causing raw sewage to back up out of the tank or through the ground, and end up in streams and groundwater. The systems must be pumped out every few years to prevent buildup and clogs (BF Environmental Consultants, 2004).

More advanced on-lot systems are designed to remove nitrogen by moving effluent through a series of chambers containing different kinds of microbes, which uptake the nitrogen. These systems have pumps, moving parts, and other components that need to be inspected every few years. These more advanced systems can remove twice the amount of nitrogen as conventional systems, but are more expensive and can have higher environmental impacts if not pumped out (BF Environmental Consultants, 2004).

Brush Creek

Nutrients and organic matter from sewage effluent can cause an increase in alkalinity and conductivity of water. It is believed that these inputs may actually mitigate the impacts of AMD by raising the pH in streams that would otherwise be acidic.

Monitoring Bacteria in the Streams of the Connoquenessing Watershed

This study was initiated by Connoquenessing Watershed Alliance in 2004 to determine the suitability of the Coliscan® Easygel® system for volunteer monitoring of Escherichia coli (E. coli) bacteria as an indicator of health risk to humans in recreational waters. In addition, the study established a set of protocols for watershed organizations utilizing volunteers to monitor bacteria.

Findings from the initial study show the bacteria levels at selected sites along Connoquenessing Creek, Thorn Creek, Little Connoquenessing Creek, Glade Run, Breakneck Creek, Brush Creek, Muddy Creek, and Slippery Rock Creek. Sampling occurred initially at 10 sites and at a total of 18 sites after the first sampling revealed elevated E. coli levels in some areas. The study occurred between August 31, 2004 and December 29, 2004.

Though late summer hurricanes affected weather and precipitation after the initial sampling date, causing a flushing effect, which temporarily decreased the levels of E. coli recorded, levels rose again once time passed. Preliminary findings of the study indicated elevated levels of bacteria in Brush and Breakneck creeks, and to a lesser degree in Slippery Rock Creek and Glade Run. This led to the addition of eight sites along those stretches, in an attempt to identify the source of bacteria pollution.

In general, suspected causes of bacteria level spikes included malfunctioning septic systems at recreational camps, hurricane damaged sewer lines, periodic release of chlorinated sewage treatment plant effluent, and sewage overflow. Streams that showed inconsistent findings or elevated levels of impairment were recommended for further study.

Pennsylvania's State Water Plan

Act 220, passed in December of 2002, requires that DEP update Pennsylvania's State Water Plan within five years to determine the quantity of water in Pennsylvania, the amount of water used, and how much will be available in the future (DEP[3]).

The State Water Plan has not been updated in more than 25 years and, as a result, we do not know which areas have critical water needs until water supplies are dry. Pennsylvania has experienced serious water droughts in the last ten years and water use has increased dramatically.

Starting in March 2004, DEP required any commercial, industrial, agricultural, or individual withdrawing 10,000 or more gallons of water per day, averaged over a 30-day period, to register and report their water use to DEP. Those using less than 10,000 gallons may choose to register voluntarily help DEP get a more complete picture of water use (DEP[2]).

To carry out the planning provisions of the law, a Statewide Water Resources Committee was formed to help guide the plan. Six regional water resource committees were also created to facilitate the development of regional components of the plan. Among their responsibilities is carrying out a public participation process to ensure that people with an interest in water resource issues have adequate opportunities to provide input. A series of meetings was held in 2005 at each of the six regional planning areas to better define local water resource problems and opportunities (DEP[2]).

Glade Run

During the development of the plan, areas were identified where demand exceeded available supplies. These Water Planning Areas will serve as planning boundaries for the creation of detailed water budgets to be used in Critical Area Resource Plans. These will be submitted for review and comment to the official planning agency and governing body of each municipality in the identified area prior to recommendations (DEP[2]).

The act also establishes a formal program to promote voluntary water conservation and water use for all water users. A Water Resources Technical Center will be created to promote the use and development of water conservation and efficiency education and programs (DEP[2]).

The Connoquenessing Creek Watershed is located in the Ohio River Basin. Five regional priorities have been developed by the Ohio Regional Water Resources Committee. These include:

- Maintaining water supply (loss prevention), considering the impacts of mining, loss of residential water, groundwater/stormwater recharge/old infrastructure and malfunctioning sewage systems, and contingency plans
- Implementing appropriate, applied technologies, including remediation and conservation technologies
- Identifying and planning for economic development opportunities, including how to replace water used, developing positive incentives for economic growth, and defining intended water uses
- Conducting public education and outreach on water resources, including obtaining feedback and providing information
- Balancing multi-purpose uses, including protecting existing uses, water budgeting, and developing a balance between different uses under both regular and emergency conditions

Water Quality Trading

Water quality trading is when facilities with higher pollution control costs, called "buyers" purchase the right to pollute from "sellers", or other companies that have reduced their pollution output below their required limits. This can enable polluters to reduce pollution at a lower cost than it would be to make reductions at their facilities. For instance, it may be cheaper for a polluter that discharges nitrates to buy credits from a polluter that can reduce its nitrate discharges more easily. Or, it may be cheaper for a polluter to pay for the installation of BMPs on a farm than to develop technologies to reduce pollution from nitrates. If the same pollution reduction goal can be achieved through trading, then it is a benefit to both the company and the farmer.

Connoquenessing Creek drains into the Beaver River just beyond the railroad bridge

Generally, certain criteria must be met for a Water Quality Trading program to work. There must be a "driver," or reason why pollution reductions are being sought. This is usually a TMDL, which requires point-source polluters to reduce their level of pollution by a certain amount in order for water quality standards to be met. The water quality trading will be most effective if the sources within the watershed have different costs to control their pollution, making it more economically profitable to trade. Also, the levels of pollution must be such that not all sources in the watershed must reduce their inputs. This provides a reason to bargain. Finally, watershed stakeholders and state regulatory agencies must be willing to try an innovative approach and to engage in trading design and implementation issues. Water Quality Trading should be conducted within a legal, regulatory framework, such as the NPDES Program, which requires point source polluters to obtain permits to discharge pollutions in waterways of the United States.

Proponents of trading think that it can help achieve improvements at the lowest cost to society. It provides incentives for companies to lower their amount of pollution. Ideally, a regulatory agency or appointed committee controls the transfer of pollution credits between polluters. If a company lowers its amount of pollution below its "target" limit, it will be paid for these credits by the regulatory agency. Other companies that go over this limit can purchase these credits from the regulatory agency. If non-point pollution is present in the watershed, there is the potential for a company to pay for the implementation of BMPs in exchange for polluting over its target amount. The type of program used depends on the pollution issues in the watershed.

All water trading activities must comply with the requirements of the Clean Water Act as well as state and local requirements, including public notification of transfers of trading credits. One potential problem with water quality trading is localized impacts. For example, all of the credits purchased may discharge into the same small stream. Because of these possible complications, it is important that the trading program be designed so that localized impacts do not occur. For instance, the amount of credits that can be purchased by certain polluters can be set by the regulatory agency. Water quality trading is usually most successful in developed areas, and it is unclear whether such mechanisms would be effective in the project area.

CHAPTER 4. BIOLOGICAL RESOURCES

Ecosystems are groups of plants and animals that live and interact together. Not only are plants and animals essential to healthy ecosystems, biological resources sustain and enhance our quality of life. Wood products, crops, and livestock offer economic income to the Connoquenessing region. Wild game and fish species offer opportunities for hunting, fishing, and wildlife watching. Trees, wildflowers, birds, and butterflies enhance our outdoor experiences. Bees, bats, and other pollinators ensure sufficient crop yields and beautifully blooming gardens. Having a diversity of living creatures and community interactions is termed biodiversity. Even humans are a biological component of watersheds and ecosystems. In this chapter, biological resources, habitats, and threats to those resources will be discussed.

Natural Setting

Deshon woods is a designated conservation area along Route 68 between Butler and Evans City

Ecoregion Characteristics

In addition to being located in the Appalachian Plateaus geomorphic province (as described in chapters 1 and 2), the area also is located in the Humid Temperate Domain ecoregion. As defined by the World Wildlife Federation (2005), an ecoregion is an area of land or water that contains geographic characteristics and species that interact ecologically to enhance their longevity. Although both province and ecoregion delineations consider the geology of the area, the difference is that an ecoregion also considers climate, ecology, and the interactions between animal and plant species.

Each ecoregion is subdivided into divisions and subregions. The project area is located within two subregions of the Humid Temperate Domain ecoregion. The majority of the area lies within the Southern Unglaciated Allegheny Plateau subregion covering the Allegheny, Beaver, and Butler counties' portions of the watershed. The remainder of the study area in Lawrence County is located within the Western Glaciated Allegheny Plateau subregion (McNab & Avers, 1994).

In general, the subregions within the watershed are characterized by mixed mesophytic (adapted to moderately moist conditions) forest and Appalachian oak forest. Varying mixed forest types can be found throughout these subregions, including mixed oak forest, oak-hickory-chestnut forest, oak-pine forest, hemlock forest, beech forest, floodplain forest, swamp forest, beech-maple forest, northern hardwood, oak-hickory forest, maple-ash-oak swamp forest, wet beech forest, beech-sugar maple forest, and oak-maple forest (McNab & Avers, 1994).

Common mammals that inhabit these ecoregions include the whitetail deer, red fox, gray fox, woodchuck, raccoon, opossum, gray squirrel, white-footed mouse, striped skunk, cottontail rabbit, fox squirrel, eastern chipmunk, short-tailed shrew, and meadow jumping mouse. Less common mammals include the hairy-tailed mole, porcupine, smoky shrew, masked shrew, and the rare eastern woodrat. Other mammals, such as the bison, elk, black bear, mountain lion, timber wolf, and bobcat, were once abundant throughout the area. Many of these species have been extirpated—locally extinct throughout a portion of their range—as a result of over-harvest, human encroachment and influence on their habitat, and pollution. In the cases of black bears, mountain lions, and wolves, social fears lead to varying degrees of elimination of those species under the pretense of protecting children and humans from being attacked by vicious creatures. Today, small populations of black bears, beaver, and bobcats may still exist, and

these species are rebounding from the devastating effects humans have had on their species (McNab & Avers, 1994).

American robin

Typical bird species found within these ecoregions include the wild turkey, ruffed grouse, barred owl, pileated woodpecker, red-bellied woodpecker, eastern phoebe, blue-gray gnatcatcher, Acadian flycatcher, white-eyed vireo, ovenbird, Kentucky warbler, yellow-breasted chat, summer tanager, red-tailed hawk, great-horned owl, belted kingfisher, northern flicker, great crested flycatcher, white-breasted nuthatch, red-breasted nuthatch, eastern bluebird, gray catbird, American redstart, scarlet tanager, chipping sparrow, ruby-throated hummingbird, screech owl, and wood duck, to name a few. Many migrating birds nest in the region during the spring and summer months, and offer spectacular displays for bird watchers to enjoy. Also, wild turkey and ruffed grouse are important game species for hunters. Peregrine falcons and bald eagles, once devastated by pollution and adverse effects of DDT and other pesticides in the food chain, are rebounding and returning to western Pennsylvania. These species are high profile examples of nature's resiliency and serve as good educational tools in teaching the youth about environmental responsibility.

Amphibians and reptiles typically found within these ecoregions include the red-spotted newt, dusky salamander, fence lizard, American toad, wood frog, spring peeper, box turtle, snapping turtle, painted turtle, ringneck snake, northern water snake, black rat snake, copperhead, smooth green snake, and milk snake. Many amphibians, particularly lungless salamanders, can be studied as indicators of ecosystem quality. Reptiles, such as snakes, turtles, and lizards, help to keep populations of pests, such as mice, voles, and insects, under control.

Fish species vary depending on the size, temperature, and degree of pollution in a particular stretch of stream. Species common in smaller, cold-water streams include trout, southern redbelly dace, creek chub, barred fantail darter, and greenside darter. Smallmouth bass, bluegills, channel catfish, and crappies can often be found in the warmer, larger waters of man-made reservoirs and larger, slower moving sections of the creek.

Natural Habitats

Backyard Habitat

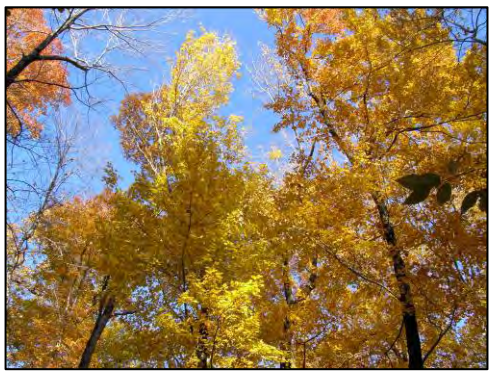
Even small wooded lots may host a diverse array of plants and animals

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. Not only are the rural forest blocks and riparian buffer areas we typically envision 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 may control erosion and help manage stormwater. Trees can be utilized to reduce energy costs and improve property values. Trees in urban settings will also improve the air quality of the city, improve a community's sense of pride, and enhance business and economic development. Pennsylvania Community Forests (2007) and Pennsylvania Department of Conservation and Natural

Resources (DCNR) Bureau of Forestry (2007) are able to assist municipalities and commissions in organizing and implementing urban and community forestry management programs (Appendix N).

If a town or city, regardless of size, meets four standards set forth by the Arbor Day Foundation, it may become certified as a Tree City USA. To meet the requirements, a community must have: a tree board department, tree care ordinance, community forestry program with an annual budget of $2 per capita, and an Arbor Day observance and proclamation. There are many benefits associated with becoming certified as a Tree City USA, including an action framework set-up to ensure the community success in implementing its forestry program, educational opportunities, improved public image and sense of community pride, preferences for financial assistance, and publicity (Arbor Day Foundation, 2007).

Developing or maintaining a woodlot and natural habitat in your yard attracts a variety of wildlife, such as songbirds, butterflies, toads and other amazing creatures, which may help to reduce stress and anxiety at the end of a long work day or commute. These species also help to rid your yard of pests, and reduce or eliminate the need for chemical pesticides.



Fall foliage at Deshon Woods

Forests, woodlots, and backyard habitats offer opportunities for families to learn and bond together while enjoying their own little ecosystem. Backyard habitats and nearby natural areas also encourage outdoor recreation, which helps to combat the childhood obesity epidemic sweeping the nation, as more and more children are accustomed to sitting in front of the television and playing video games. Having even a small backyard habitat or nearby woodlot offers opportunities for exploration of nature and self, while children remain close to home in a safer area.

Private property owners are encouraged to consider natural landscaping with native wildflowers, trees, and shrubs versus mowing their entire lawn, especially areas adjacent to water sources. Native plant species that are adapted to the local weather conditions are best, as they require minimal watering and maintenance. They are often preferred by native wildlife for food and cover, as well. Reducing the amount of “lawn” on your property will also save money in maintenance costs for gasoline powered equipment and it will save energy used for electrical equipment, which both reduce the amount of pollutants that are released into the air. Carefully planning your landscaping to include a variety of aesthetically pleasing plants that bloom and provide color

Planting trees on your property will help to manage stormwater runoff and erosion. When planted according to a specific scheme, one can create windbreaks using evergreen trees and native shrubs to protect their homes from harsh winter winds, which may help to reduce home heating bills. In addition to planting wind breaks, shrubs planted close to a home create “dead air” space, which essentially adds another insulating layer to your home. Shade trees also can be utilized to reduce energy bills. During summer months when deciduous trees have a full crown of leaves, shade on the house will lower the temperature naturally, reducing cooling costs. It has also been shown that shading the cooling unit itself can result in a 10 percent increase in efficiency. In the winter, when the tree crown is bare, sunlight is permitted through to warm the home and reduce heating costs (U.S. Department of Energy, 2007).

Forest Habitat

Forests 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. When plants

Native sassafras trees have been utilized for timber, medicines, tea, and dying fabrics; they also provide food for a variety of wildlife species; note the non-native hosta in the lower left corner, a commonly used landscaping plant

"breathe," the process of photosynthesis converts 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, or sequestered, in the plant components (leaves, stems, branches, roots, etc.) 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), contributes to the "greenhouse effect."

In the absence of greenhouse gases, the earth would be a cold, desolate planet that harbors no life. Excess greenhouse gases contribute to the opposite effect, global warming. Human activities, such as deforestation, poor agricultural practices, vehicle exhaust, and the burning of fossil fuels have greatly increased the contribution of carbon dioxide to the atmosphere. The preservation of forests, maintenance of riparian forest buffers, and forest management practices that leave residual trees to grow at a faster rate aid in the storage of carbon from the atmosphere into plant and soil materials. In the grand scheme of things, this will contribute to the prevention or hindrance of global warming.

Protecting and maintaining available woodlots and "green" space throughout the watershed is especially important in this rapidly developing region north of the city of Pittsburgh. Few large, contiguous (uninterrupted) forest blocks remain in the watershed. Most of the forest tracks of the Connoquenessing are fragmented by roads, urban and residential development, and different land uses. It will be imperative to protect what remains for the continued health, livability, and community appeal of the region.

Sustainable forestry practices and the use of Best Management Practices (BMPs) when utilizing forest resources will ensure the future health of forest ecosystems throughout the watershed. Often, foresters and landowners desire the quickest and greatest monetary return from a timber harvest, resulting in poor forestry practices. Clear-cuts eliminate all vegetation in a cut area, while high-grading removes the largest, most valuable timber in the lot. While both of these practices will provide a substantial return, they are neither ecologically or economically sensible, and the return is a one-time gain. A forest of economic value may take 20 years or more to regenerate. In addition, all of the best potential seed sources are eliminated from the area. 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 (DCNR Bureau of Forestry, 2007).

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 higher quality of wood. As tree leaves continue to fall to the ground each autumn, the soil is amended with organic matter and nutrients, which also contribute to better growth rates. Erosion and sedimentation are reduced by leaving trees to stabilize the soil.

Pruning and other maintenance activities will improve the quality of the timber in the forest lot. Selectively eliminating diseased and infested trees will improve the overall health of the forest. Wildlife should also be considered when harvesting a forest area. Brush piles made of cut limbs and saplings 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. Although, 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 for creatures of the forest floor, such as amphibians, spiders, insects, etc.

Maintaining a diversity of tree species in a forest is important to protect the forest from the devastating effects of insect and disease outbreaks. Plantation-style monocultures (an area consisting primarily of one species) are particularly vulnerable to invasive pest species that attack one species or family of trees, such as the emerald ash borer. More will be discussed on invasive species later in this chapter.

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

Successional Forest Habitat

When a disturbance occurs in a forest, such as a logging, or perhaps a natural event, such as a tornado, or as the edge of a forested area transitions over time, the process called "succession" occurs. Succession is the natural process of forest regeneration overtime. For example, if an area adjacent to a forest once occupied by croplands laid fallow, herbaceous vegetation, like wildflowers and grasses, would occupy the area. As time went on, shrubs and small woody vegetation, tree seedlings and saplings, would grow. Eventually, trees would establish, and a mature forest habitat would again occupy the land. The entire process may take a very long time, and can occur at varying scales from several hundred acres to very small areas, such as that created when an old tree falls in a forest and opens a gap of canopy.

The period in the process when the ecosystem is referred to as "early-successional" habitat, is when the land is primarily occupied by grasses, herbaceous vegetation, and small shrubs and tree saplings. This type of edge habitat is critical for certain species of birds, mammals, amphibians, reptiles, etc. During this time, grasses, seeds, berries, and twigs provide abundant forage, and shrubs and dense vegetation offer cover and safety for birds and small mammals. A variety of wildlife species prefer this stage of succession, such as rabbits, warblers, and American woodcock (Rodewald, 2006).

Grassland bordered by forest near Harmony is in early succession

During the middle-successional stage of forest regeneration, otherwise known as the pole timber stage, trees are growing and dominate the landscape. The understory is still relatively dense, with seedlings and some shrubby species that are more tolerant of shade. Some trees may still be competing for light with more-dominant canopy trees. Salamanders and interior-forest birds may prefer this type of transitional habitat (Pennsylvania Envirothon, 2007).

Once trees mature, the habitat is referred to as a mature forest habitat. During this stage, trees that have been overtopped by competing, faster-growing, or longer-lived trees tend to die and form "snags"

that provide food, perches, and opportunities for cavity nesters, such as owls, woodpeckers, raccoons, and even bats. Retaining downed wood on the forest floor also serves to provide habitat for invertebrates, reptiles, amphibians, etc. There is a greater abundance of mast-producing trees in a mature forest that offer acorns, nuts, and soft or fleshy fruits and seeds. Species, such as wild turkey, black bear, and pileated woodpeckers, prefer mature forest habitats (Pennsylvania Envirothon, 2007).

Landowners and forest land managers should promote differing stages of succession to offer a variety of 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, and cutting in a meandering fashion to avoid abrupt transitions between habitats, which may lead to higher incidents of predation.

Grassland Habitat

As mentioned above in the forestry section, reducing the percentage of mowed-grass lawn on one's property will reduce energy use, fuel consumption, and pollution emissions, as well as save the landowner money on maintenance of the lawn. As with forest habitats and tree plantings, native wildflowers, grasses, forbs, and prairie-type habitats can be used to beautify the property, enhance ecological interactions, and overall reduce the amount of lawn to be maintained. Native grassland habitats, small or large, may provide food, cover, and nesting material for a diversity of wildlife. Many of these native species that will be attracted to the grassland may offer pest control of insects, weeds, and vermin, free of charge. Not only does this reduce costs associated with controlling these pests, but it also is more environmentally friendly compared to harsh chemical pesticides and inhumane traps.

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (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 will provide shelter and forage for wildlife, help improve soils, and will require little maintenance. When maintaining a warm-season grassland, it is very important to schedule hay harvest around the nesting season for ground-nesting birds, generally before May 1st and after August 15th, which will allow enough time for grass regrowth to provide cover throughout the winter months (USDA-NRCS, 2007). Snake mortality in association with mowing is another concern, especially when relating to species of special concern, such as the eastern massasauga rattlesnake. If possible, mowing should occur in the colder months when snakes and other reptiles and amphibians are overwintering (December through March).

Wetlands

Wetlands are very functional ecological components of a watershed. Some species of plants can only grow in wetlands—defined as having anaerobic or hydric soils, wetland vegetation, and evidence of the area being inundated with water (permanently or seasonally). Though the Connoquenessing watershed is experiencing rapid development in some areas, which threatens the existence of wetlands and other natural areas, many of these important landscapes still exist in the watershed, and are worth noting and protecting. 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. Wetlands harbor a multitude of plants and animals, making them biodiversity hot spots of the watershed as well.

Wetland near Hereford Manor Lakes

Wetland vegetation plays an important role in filtering water, slowing the flow of water to allow sediments to drop out, and allowing groundwater recharge. Wetland vegetation also pr

ovides a variety of food sources, cover, and nesting material for insects, birds, mammals, and other forms of wildlife. Invertebrates and other lower-order forms of wildlife build the basis of the food chain, upon which many other species depend. Protecting wetland areas will, therefore, protect a variety of plant and animal species along with them.

Forested wetland and floodplain areas are unique features found in the Connoquenessing watershed. These areas provide critical habitat for species of waterfowl, warblers, turtles, and an assortment of other wildlife. They also play an important role in filtering water supply, controlling flood waters, groundwater recharge, and offering recreation potential. Forested wetlands are threatened by deforestation, hydrology alterations, and damming of associated streams.

Conserving wetlands and riparian buffers on agricultural lands is essential to maintaining wetlands and water quality throughout the watershed. Farmers may enroll their marginal lands in the Conservation Reserve Enhancement Program (CREP), fence riparian areas adjacent to streams, create stabilized stream crossings, and restrict access to streams for cattle and other livestock. A number of benefits can be realized from these actions. Cleaner water improves the overall health of the surrounding ecosystem and livestock herds. Riparian area buffers improve water quality and bank stabilization, and host a variety biological species. Pollinators attracted to the farm enhance the benefits to the farmer by increasing productivity of crops. Birds, bats, and predatory insects offer natural pest reduction services to further aid in the protection of crops. In addition, the variety of life and activity adds to the aesthetic appeal and property value. Farmers and other landowners are encouraged to protect or create wetlands and riparian areas on their property, not only for the ecological benefits, also for the direct benefits to the property owner.

Rivers and Streams

Many of the biological organisms that live in rivers and streams indicate the quality of water in which they live. These creatures are called **bio-indicators**. Freshwater mussels, aquatic macroinvertebrates, and lungless salamanders are all natural indicators of water quality and ecosystem health. Groups like Connoquenessing Watershed Alliance (CWA) sample and study these organisms to gain a better understanding of the overall health of the ecosystem. Trout Unlimited has local chapters of citizens and professionals who may be available for education, instruction, and conservation project assistance, as well. Contact information for these groups can be found in Appendix N.

Looking downstream on the Connoquenessing Creek from Calgon ledge near Ellwood City

Headwater streams are smaller and shallower, versus the larger order streams that they flow into, which tend to be wider and deeper. Streams throughout the Connoquenessing drainage vary greatly from slow, calm waters, to fast rushing rapids. With these varying characteristics comes a variety of plants and animals that inhabit each section of stream. Smaller, headwater streams are home to small fry (young fish) and aquatic macroinvertebrates. Small and fast flowing streams, especially those with an intact riparian forest buffer tend to have cold water, and host species of fish, such as trout and dace. Streams that may be slightly warmer, but still have “coolwaters,” are host to species of fish, such as chubs, shiners, and suckers. These fish provide 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 the stream, and in streams with little or no riparian vegetation to shade and cool the water, fish that thrive in warmwater, such as bass, bluegills, and sunfish, thrive. More information on the aquatic

organism communities that may be found in the Connoquenessing watershed may be found in Appendix M. Aquatic Community Classification.

Wildlife

In order to manage for a diversity of wildlife, a diversity of quality habitats must be preserved to support various wildlife communities. Wildlife depends on the availability of food in all seasons, clean water, cover (for protection from predators and the elements), and space (to forage, raise young, and expand territory). Both year-round residents and migratory species depend on the resources of the Connoquenessing. By conserving natural areas, improving soil and water quality, and restoring degraded habitats, wildlife populations will benefit.

Table 4-1. Top 10 Most Popular Recreation Activities in DCNR Region 10

1. Walking
2. Sightseeing
3. View nature
4. Swimming
5. Visit wild areas
6. Picnicking
7. Nature walks
8. Hiking
9. Fishing
10. Jogging

Wildlife species are a critical component in all ecosystems. Every living thing, from the worms in the ground to eagles flying high above, plays an integral role in the continuation of life on Earth and quality of life for humans. The continued balance of nature depends on the existence of biodiversity. Each species and wildlife community provides ecosystem benefits, some of which include: food for other wildlife and humans, pollination, clean water, decomposition, nutrient cycles, clean air, and soil improvements.

A diversity of wildlife and fisheries benefits recreation potential for the area, which in turn improves the local economy and quality of life and health of watershed residents. According to *Pennsylvania's Recreation Plan 2004-2008* (DCNR, 2004a), walking, nature watching, wilderness and natural areas, nature walks, fishing, hiking, camping, wildlife watching, bird watching, and hunting were all among the top 20 favorite recreational activities of Pennsylvanians. All of those activities also are enhanced by the presence of biodiversity, high quality habitats, and clean air and water.

Locally, the majority of survey participants from DCNR Region 10, which includes all of the counties of the watershed except Lawrence County, ranked the ten most popular recreational activities in the region, which are listed in Table 4-1 (DCNR, 2004a). Results from DCNR Region 9, which includes Lawrence County, were very similar. The major difference was the inclusion of camping and bicycling in Region 9, instead of hiking and jogging. Most of these activities inherently include the preservation and conservation of wildlife, fisheries, and their associated habitats. The report also acknowledged a growing trend in bird and wildlife watching.

Great blue heron in flight, this species has been spotted in the watershed and nesting nearby

The Connoquenessing region has experienced a great deal of stress on its natural resources over the past few decades, from development and habitat fragmentation to resource extraction and pollution. Despite all of the environmental degradation, there are diverse natural areas, rebounding species, and an abundance of wildlife in many areas. Wildlife that is more adaptable to ever-changing human-altered landscapes will continue to endure. Those species that are less tolerant of change will need additional protection and consideration to ensure their survival.

A sampling of some of the wildlife resources that can be found throughout the watershed are highlighted in this section. While some of these species may actually occupy neighboring watersheds, such as the Slippery Rock Creek subwatershed, they still depend on the high quality habitats of the Connoquenessing to support their population and allow for expansion of their range.

Birds

Bald Eagle

Once, bald eagle populations were ravaged by the secondary effects of excessive hunting and pesticide pollution in the environment; now bald eagles are on the rebound. In the 1980s, breeding pairs in Pennsylvania had dwindled to three pairs. Reintroductions of juveniles 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. Pennsylvania Game Commission (PGC[4]) manages this important bird species in the state.

As a symbol of our nation, this regal creature is a top predator on its food chain, and it is one of the largest birds of prey, weighing up to 17 pounds with a wingspan of seven feet (PGC[4]). Bald eagles primarily feed upon fish, other birds, and small mammals, but they have often been observed stealing prey from other birds. As of 2002, two successful sites were confirmed in Butler County slightly north of the watershed (PGC[4]). At least one unconfirmed nest sighting has been reported in the Connoquenessing watershed (Kemp, personal communication). Several sightings of adult and juvenile bald eagles visiting the watershed have also been reported.

The greatest threat to the continued successful recovery of bald eagle populations in the state 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[4]).

Osprey

The osprey, also known as the "fish hawk," has greatly recovered in the state since 1979, when they were thought to be extirpated (locally extinct in the state of Pennsylvania). Like the bald eagle, osprey populations were reduced by the effects of pesticides, such as DDT, and habitat destruction. In 1986, there was believed to be one nesting pair, and in 2004, 65 pairs were found to be nesting throughout the state. This astounding recovery was due in large part to a management program initiated in 1980 that continued for 16 years, reintroducing nestlings throughout the state, including a reintroduction program at Moraine State Park, which borders the Connoquenessing watershed to the north (PGC[5]).

Osprey nest at Moraine State Park adjacent to the Connoquenessing Creek watershed

Ospreys nest near large bodies of water, and they prey primarily on fish. They build large stick nests atop large trees or other tall structures. Migratory in nature, they fly to South America and other points south for the winter, and return to nest in Pennsylvania in the spring. The osprey is currently listed as threatened in Pennsylvania.

Short-eared Owl

The short-eared owl is listed as endangered in Pennsylvania. Some owls have tufts of feathers on their heads that are commonly referred to as "ears." The short-eared owl lacks these tufts upon its head, hence the name. Short-eared owls are migratory, and spend most of their time in Pennsylvania during

winter. These owls prefer open spaces, and have been found to inhabit reclaimed mine areas in the region (PGC^2).

Unlike most nocturnal owls that are active at night, the short-eared owl is active at dusk and dawn, a behavior called crepuscular. All owls are beneficial to farmers for their pest control capabilities, feeding on mice and other rodents that damage crops. Agricultural lands comprise a majority of the large, open areas throughout the watershed that this species prefers. Conservation programs on agricultural lands may help to sustain this species, when tall grasses are left on fields over the winter (PGC^2).

Amphibians and Reptiles

Eastern Massasauga Rattlesnake

This reptile was once abundant throughout western Pennsylvania, but after decades of habitat destruction and human disturbance, the species is now endangered throughout the state. The eastern massasauga (also know as the "swamp rattler") is a small, venomous snake that may reach 20–30 inches in length, leading to another of its pseudonyms, the "pygmy rattler."

This snake hibernates over winter, typically in crayfish burrows, and may eat up to nine pounds of rodents per year. As a natural pest control, they are beneficial to farmers of crops typically affected by mice, voles, and other rodent pests.

Like most venomous snakes, the eastern massasauga will only use its precious venom, which it needs to obtain prey for sustenance, as a last resort of self defense against humans. The snake will typically avoid human interaction by utilizing camouflage to hide and its rattle to warn potential encroachers of its location. It may strike if stepped upon or if it feels cornered. One should be vigilant and attentive when hiking or traveling through rattlesnake territory.

Eastern massasauga rattlesnake

If you happen to encounter an eastern massasauga rattlesnake, do not harm the animal, as its endangered status in Pennsylvania makes it illegal to catch, harm, or kill the species. If possible, document your specimen with a photograph, note the location of your encounter, and report your findings to Pennsylvania Fish and Boat Commission (PFBC) and Western Pennsylvania Conservancy (WPC). WPC is conducting studies to document existing populations of eastern massasaugas. See Appendix N. Resources Guide for contact information.

If your property is inhabited by massasaugas, be mindful of your land management techniques, and avoid mowing during the summer months when massasaugas are most active. This species reproduces only once every two to three years, so the loss of one individual may have a significant impact on the entire population. Avoid any habitat disturbance between April and November.

Mammals

Mammal diversity, in general, is low throughout the region encompassing the study area. Mammal diversity is typically associated with large, intact tracks of forest, which are not prevalent in the Connoquenessing watershed. Small mammals and game species, such as the whitetail deer, squirrels, rabbits, and foxes, do exist in many of the natural areas. These species, among others, provide opportunities for hunting and trapping recreation and wildlife viewing.

Whitetail deer

Proper management of whitetail deer populations may help to keep the impacts associated with the 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 the overabundant deer population is having a huge impact on songbird populations, especially woodland warblers. Many of the birds impacted 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 occurs at the state level through hunting permit allocations by PGC.

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 now enroll in a program through PGC called the Deer Management Assistance Program (DMAP), which provides hunters with additional permits to hunt antlerless deer on registered properties and help reduce deer populations (PGC[1]).

Evidence of beaver activity in the watershed

Beaver

Beavers were once trapped to extirpation throughout the state for their prized furs. Reintroductions occurred in several locations in Pennsylvania in the early 1900s. Those parent populations reproduced and expanded their territory to include approximately 15 counties. Evidence suggests that beavers exist within a portion of the study area.

These small mammals are capable of extraordinary feats, like downing trees several feet in diameter, though they more commonly use small saplings and trees 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 of reservoirs and lakes. Beaver-proof cages can be constructed around drainage pipes to deter clogging by this unique species.

Bats

Bats are common throughout Pennsylvania, and despite myths and common misperceptions, they do not readily spread rabies or entangle hair. On the contrary, bats are very beneficial creatures to humans and the environment. Bats control pests, pollinate plants, and disperse seeds. They are both economically and environmentally beneficial. Two important bat species that utilize resources of the Connoquenessing watershed are the northern myotis and Indiana bat**.**

Depending on the species, bats may roost and/or hibernate under the bark of trees, in cavities, or in caves. These habitats are most vulnerable to degradation. Forestry and mining activities, especially, can disrupt and displace an entire colony of bats. If the species utilizing an abandoned mine, for instance, was an endangered or threatened species, such as the two listed above, disturbances to those habitats could have damaging implications to the species as a whole. Gates constructed at the entrance of abandoned mines and caves allow for the passage of bats and exclusion of humans to limit disturbance to the habitat.

Fish and Freshwater Mussels

Two previously conducted studies occurred in the Connoquenessing to document the species of mussels that exist in the streams of the watershed and to infer the communities of fish and freshwater mussels that may inhabit the streams based on scientific research and data analysis. More information

about fish and freshwater mussels of the Connoquenessing watershed can be found in the previous studies section at the end of this chapter.

Species of Special Concern

Jack in the pulpit flower is native to Pennsylvania

Species of plants and animals are given rankings at the state and global levels based on the number of times the species has been documented in that 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 "special 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 a species that is considered to be in danger of becoming extinct throughout its range. A threatened species is a species at risk of becoming endangered unless special action is taken. 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, the 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 Connoquenessing Creek watershed, 101 species of concern have been identified, including 66 plants, 17 birds, seven invertebrates, six mussels, three reptiles, one fish, and one mammal species. For protection purposes, the location of individual species cannot be provided. Appendix H lists state and global rankings for species of concern identified within the project area.

Connoquenessing Creek at Connoquenesssing Park

Conservation Areas

Natural Heritage Areas

County Natural Heritage Inventories (CNHIs) are being conducted by PNHP for every county in the Commonwealth. These inventories identify and map the most significant natural

places in a county for rare, threatened, and endangered species, as well as unique natural communities. Additionally, landscape level elements, such as large contiguous blocks of forest and high-quality watersheds, are also identified. The final product of the CNHI is a report highlighting specific areas and giving detailed management recommendations for their protection. The report should be utilized by local municipalities, counties, utility companies, and groups involved with comprehensive planning, zoning, review of development proposals, and other objectives.

The PNHP is a collaborative organization dedicated to the collection, tracking, and interpretation of information regarding Pennsylvania's biodiversity. PNHP partners include WPC, DCNR, PGC, and PFBC. PNHP is a member of NatureServe, which coordinates natural heritage efforts in all 50 U.S. states, Canada, Latin America and the Caribbean.

The Connoquenessing Creek watershed is located in Allegheny, Beaver, Butler, and Lawrence counties. All of the counties have completed CNHIs. PNHP is currently conducting an update on the Butler County CNHI, which was originally completed in 1991. The anticipated completion of the Butler County updated CNHI is 2009, and should be referenced at that time for the most up to date conservation areas and recommendations for their protection (for more information contact PNHP at 412-288-2777 or visit their website at http://www.naturalheritage.state.pa.us/).

Forget-me-nots are just one of the beautiful wildflowers that grow in the Connoquenessing watershed, though native and non-native varieties look very similar

Generally, any intact floodplain forest or wetland is significant to the watershed, and will likely have at least county significance in the Butler update. All undeveloped, forested areas within the watershed should be considered significant on the watershed level or county level due to their ability to buffer water flowing into the rivers.

The natural areas identified in CNHIs are termed:

Biological Diversity Area (BDA):
An area of land recognized as supporting populations of state, nationally, or globally significant species or natural communities; high-quality examples of natural communities or ecosystems; or natural exceptional native diversity. These areas are typically small, and contain a buffer that protects the natural community or habitat that is needed to support the site.

Landscape Conservation Area (LCA):
A larger area of land compared to a BDA that contains minimal human disturbance, and allows ecosystems to function on a landscape level. These areas often contain multiple BDAs.

Dedicated Area (DA):
An area of land recognized by an owner's specific intention to protect it, which could result in the site becoming a BDA in the future, or a high-quality area within an already designated BDA. Numerous areas within the watershed could be DAs in the future through landowner agreements, special programs, or other methods.

Table 4-2. Significance Rankings for BDAs

Significance Rank	Description
Exceptional	Sites are of exceptional importance for the biological diversity and ecological integrity of the county or region, containing one or more occurrences of state or national species of special concern or a rare natural community of adequate size, condition, and extent. These areas deserve complete and strong protection.
High	Sites are highly important for biological diversity of the county or region, and just like exceptional sites, contain species of special concern or natural communities that are highly ranked. Typically large and primarily undisturbed, these sites deserve strong protection.
Notable	Sites contain occurrences of species of special concern or natural communities that are either more common or of smaller size and extent than exceptional or high rank areas, or have activity and disturbance. These sites deserve special protection within the context of their characteristics, degree of disturbance, and place in the community.
County	Sites have great potential for protecting biodiversity in the county, but have not yet been found to contain species of special concern or state significant natural communities. Because of their size, undisturbed character, or proximity to other significant areas, these sites deserve further study and investigation as possible high or exceptional sites.

The following section describes BDAs located within the Connoquenessing Creek watershed (Figure 4-1). Specific names and exact locations of rare species are omitted from CNHIs and this report to protect those species. Complete CNHIs can be downloaded from the PNHP website at: www.naturalheritage.state.pa.us.

Butler County

Connoquenessing Creek Nature Reserve BDA

Significance: High

Location: Jackson Township and Zelienople Borough

Description: One of the last remaining natural areas near Zelienople, this area is located directly north of the town along Connoquenessing Creek. The Ecologically Concerned of Zelienople (E.C.O.Z.) own and manage this forested natural area. A silver maple floodplain forest community exists along the creek, and is dominated by maturing silver maple and American basswood. A variety of herbaceous species are supported by the rich, moist soils in the floodplain. To the north of this floodplain, lies a mature, sugar maple-basswood forest community of red oak, white oak, American basswood, yellow poplar, and sugar maple along the steep, wooded slopes and into the upland areas. Any vernal wetlands and oxbows existing at this site create important habitat for wetland plant and animal species.

Rare Occurrences: This site contains two significant natural features, a silver maple floodplain forest community and a sugar maple-basswood forest community.

Threats and Stresses: Loss of suitable buffer zone surrounding the entire area to allow for the expansion of the forest communities is the only present threat to the reserve. Commercial development to the east and west may also impact the quality of the resources within the area. Invasive plant species also are a threat to this site. Many invasives, such as privet, honeysuckle,

garlic mustard, barberry, multiflora rose, tree-of-heaven, Norway maple, dame's rocket, and lily of the valley, were found in and around this BDA.
Recommendations: Protect the site by maintaining a forested buffer surrounding the entire site to allow the forest to mature and sustain itself. Control invasive species where possible.

Connoquenessing Floodplain BDA

Significance: High
Location: South of the Semiconon Valley LCA in Connoquenessing Township
Description: This site is located on the southeast side of Little Connoquenessing Creek along the floodplain. Most of the canopy is oak and hickory and their associates. The surrounding land tends to be intact forest with some residential housing.
Rare Occurrences: A plant species of concern exists within this site.
Threats and Stresses: Some minor logging occurred close to the stream. Fragmenting features, such as small power lines and roads, occur in and around the site. Lands near the stream also are fenced for livestock, and gypsy moth damage appears to be high at this site.
Recommendations: Logging in the habitat should be avoided, as it could remove the rare plant from the site or make the habitat inhospitable for the species of concern. Agricultural practices should be monitored to avoid impacts to downstream water quality. Gypsy moth management may increase suitable habitat for the rare species, as well.

Muddy Creek BDA (small portion touches watershed)

Significance: High
Location: Clay and Center townships
Description: This site is unique in that it is one of the largest wetland systems in the county and contains a variety of wetland types. Located east of Moraine State Park, the dominant wetland community within it is the alder-ninebark wetland. This large ecosystem is important for supporting a variety of wetland plants and animals.
Rare Occurrences: A significant natural community, alder-ninebark wetland, exists within this site.
Threats and Stresses: Road and railroad construction throughout the site impact water flow and have altered the original vegetative composition. Farmlands on adjacent lands jeopardize the quality of this BDA. Grazing on the edge of the habitat could lead to the elimination of certain plant species. Runoff and pollutants, such as fertilizers and pesticides, may affect the water quality at the site. Any physical or chemical alterations, such as mining, logging, and development that occur upstream or upslope of the wetlands could pose a threat.
Recommendations: Carefully review activities that pose a threat to the wetlands area to address how they might affect water quality, water level, flow rates, or otherwise cause potential detrimental effects. Protect the site by maintaining a forested buffer that will help protect the water quality in Muddy Creek and its tributaries.

Shore spiders, commonly found near streams in the watershed, prey upon small fish, tadpoles, and aquatic insects

Redwing Floodplain Swamp BDA

Significance: High
Location: Forward Township
Description: Redwing Floodplain Swamp is an area of high quality habitat remaining in the Connoquenessing watershed, containing a state significant forested floodplain swamp dominated by white oak trees, and characterized by several vernal floodplain pools. The edges of these pools are one of the few known sites in

western Pennsylvania for a Pennsylvania endangered plant. Only a small area in the southwest corner of the floodplain shows evidence of logging, but the majority of the wetland is in a pristine condition.
Rare Occurrences: A forested floodplain swamp and one Pennsylvania endangered plant species exist at this site.
Threats and Stresses: The use of ATVs and horses on a pipeline at the southeastern edge of the floodplain has resulted in an erosion and sedimentation problem. Another issue is invasion of the pipeline right-of-way by native plants.
Recommendations: A forested buffer should be maintained along the entire perimeter of the swamp to protect it from invasive species and hydrological alterations. ATV use should be restricted, and impacts from horseback riding and corralling should be mitigated. Any developments, logging, or damming of the creek which could change the water table should be avoided.

Thorn Reservoir BDA

Significance: High
Location: Oakland Township
Description: Wetlands at the northernmost end of Thorn Reservoir provide habitat for many plant and animal species, including a species of special concern found within relatively undisturbed wet meadows and open canopy wetland areas.
Rare Occurrences: These sites provide habitat for one animal species of special concern.
Threats and Stresses: Large fluctuations in the water level of Thorn Reservoir, as well as development and coal mining, are activities that could destroy habitat for the species of special concern.
Recommendations: Development should be guided away from these sites, and activities such as strip mining for coal or clearing of land for development should be carefully monitored. Any disturbance between April and November should be avoided. Also, as with the Oneida BDA, authorities should be advised to limit the fluctuation of water levels in the impoundment.

Buhls Channel BDA

Significance: Moderate
Location: Forward Township
Description: Buhls Channel is a remnant oxbow lake formed in an abandoned stream bend, which has become separated from Connoquenessing Creek by a change in the course of the creek. A natural pond community has formed along with a robust emergent marsh, providing habitat for aquatic animals and plants, as well as breeding habitat for waterfowl. The oxbow pond located at the base of the steep hillside appears to have been cut by the forces of Connoquenessing Creek. The dry oak-heath forest community on the hillside is composed primarily of old growth red oak, white oak, and chestnut oak. Acidic rock outcrops that line the hillside also characterize the community.
Rare Occurrences: This site contains two significant natural communities, a natural pond community and a dry oak-heath forest community.
Threats and Stresses: The forest community on the hillside is considered to be in an overall pristine condition and is one of the few relatively intact natural areas in Butler County. However, the oxbow has been somewhat impacted by development pressures along its western edge. Forest has been cleared and summer homes have been built in the area between the oxbow and Connoquenessing Creek. Although it remains a significant community, it is not well buffered and erosion and sedimentation have occurred in areas where the land is being cleared for construction. Additionally, part of the wetland has been drained at its northern end. This community is vulnerable to the impact of the gypsy moth since oak is a preferred food. Although the potential for alteration of this forest exists, spraying pesticides is not recommended.

Recommendations: A forested buffer should be maintained around the entire site so that communities can continue to function as an ecologically pristine forest and associated wetland. Drastic disturbances, such as logging, that cause erosion or physical disturbance should be avoided.

Connoquenessing Creek LCA

Significance: Moderate
Location: Forward and Penn townships
Description: A variety of habitats including second growth deciduous forests, remnant oxbow ponds, old growth floodplain forests, and old growth hillside forests occur within this conservation area along the Connoquenessing Creek. The high degree of biodiversity and presence of significant sites that are the only representatives of such habitat in Butler County warrant the protection of this conservation area.
Rare Occurrences: See the Redwing Floodplain Swamp BDA, which is included in this LCA.
Threats and Stresses: This site is subject to rapid growth and development spreading northward from the city of Pittsburgh, which could lead to habitat degradation and fragmentation.
Recommendations: Protect this site and the entire Connoquenessing Creek Valley from development pressures. Maintain a forested buffer, and mitigate any disturbance which may lead to diminished habitat or water quality.

Greece City #1 & #2 BDAs

Significance: Moderate
Location: Concord Township
Description: These two areas around the town of Greece City provide suitable habitat for an animal species of special concern. Relatively undisturbed, wet meadows and open canopy wetland areas are some of the habitat requirements for this species.
Rare Occurrences: These sites provide habitat for one animal species of special concern.
Threats and Stresses: Habitat destruction, primarily through activities, such as mineral extraction and residential development threaten the resources upon which this animal species of special concern depends.
Recommendations: Protect sites that function as habitat for the animal species of special concern.

Sprouting ferns

Harmony Junction Wetland BDA

Significance: High
Location: Jackson Township
Description: A small site containing an oxbow wetland and robust emergent marsh community that is relatively undisturbed, except for a culvert under a railroad bed at the southern end. There is a silver maple floodplain forest community associated with the oxbow wetland along its northwestern edge. The wetland, dominated by large, mature red oaks, is also inhabited by a variety of wetland plant and animal species. The site is rich and moist, with vernal pools, and a high diversity of herbaceous species. Bordering the site are active railroads, second-growth upland forest, and a disturbed robust emergent marsh community.

Rare Occurrences: This site contains two significant natural communities, a robust emergent marsh community and a silver maple floodplain forest community.
Threats and Stresses: The construction of the railroad near the southern end has caused some erosion and filling of the wetland. Active railroad tracks border both communities causing disturbance and erosion concerns. Farms and other land-use practices in the vicinity threaten to limit expansion of the wetland and encroach upon the habitat.
Recommendations: These communities represent a significant level of biodiversity and should be protected. A buffer zone around the site should be maintained to aid in that protection. Upslope activities should be evaluated for their potential to pollute the site or disturb the wetland and its hydrology.

Frogs are common inhabitants of wetlands and they consume a multitude of flying insects

Oneida Lake #1, #2, & #3 BDAs

Significance: Moderate
Location: Oakland Township
Description: Oneida Lake is an artificial lake formed by the damming of Connoquenessing Creek. Wetlands formed at the northernmost end that provide habitat for many species of plants and animals, including one species of special concern. This species requires relatively undisturbed, wet meadows, and open canopy wetland areas.
Rare Occurrences: These sites provide habitat for one animal species of special concern.
Threats and Stresses: Habitat destruction is the biggest threat to the habitat and species of special concern. Unusual fluctuations in water level could result in flooding or drying out of habitat. Mineral extraction and residential development, both of which occur in the area, could also destroy habitat for this species.
Recommendations: Development should be guided away from these sites and activities should be monitored to limit activities, such as strip mining for coal and other minerals and clearing land for development and farming. Further monitoring of this species is recommended. Also, authorities should avoid large fluctuations in lake level that may be detrimental to its survival. All disturbances should be limited, especially between April and November.

Wetlands, like this area of Lake Oneida, host a diversity of biological species year round

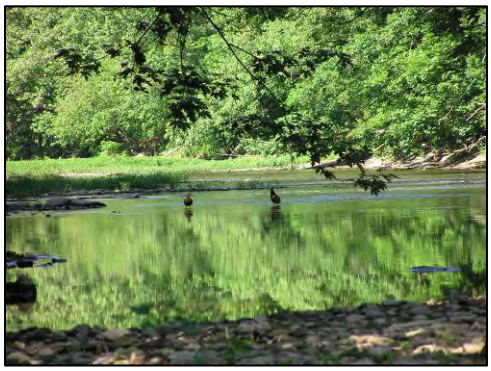
Vic-nor Valley BDA

Significance: Moderate
Location: Forward Township
Description: Downstream from Buhls Channel on Connoquenessing Creek, this valley is characterized by a high diversity of vegetation and a mesic central forest community of maturing second growth that occupies the valley and slopes. An intermittent stream that is bordered by sandstone outcrops adds to the diversity of the site. An unusual geologic feature referred to as a "hogback" forms the valley's southern slope. The side facing the creek has been recently logged

and is composed of a young second growth mixed deciduous community. The valley community extends onto a floodplain, adding to the diversity of the site.
Rare Occurrences: This site contains a significant mesic central forest community.
Threats and Stresses: Land use practices upslope from the valley pose a potential threat. A majority of the upland has been planted for sod, which requires continuous removal of the sod and part of the topsoil leading to erosion concerns.
Recommendations: A forested buffer should be established and maintained upslope of the valley and stream to reduce impacts associated with the farming practices occurring on the land above.

Waddell Floodplain BDA

Significance: Moderate to High
Location: Forward Township
Description: West of Vic-nor Valley, along the Connoquenessing Creek, lies this forested floodplain community with a high level of biodiversity. The site is characterized by an abundance of vernal pools and herbaceous vegetation, along with rich, mesic soils. Red oaks, red maples, and black cherry trees dominate this maturing second-growth mixed deciduous forest. Other than past logging and occasional flooding, this high quality wetland is relatively undisturbed.
Rare Occurrences: A floodplain forest community of significance occurs at this site.
Threats and Stresses: There seem to be no apparent threats to the site at the time of the study. Lying adjacent to the creek on one side and a contiguous upland forest on the other, the site is somewhat protected from surrounding land uses.
Recommendations: Maintain the forested buffer, both upland and along the creek and limit logging to within 100 meters of the floodplain.



A pair of mallard ducks wade in a stream

Wahlville Hillside BDA

Significance: Moderate
Location: Jackson and Forward townships
Description: This steep slope community along Connoquenessing Creek is a significant natural feature of Butler County that has not been disturbed by logging due to the inaccessibility of the site. The old growth trees occurring in this red oak-mixed hardwood forest community seem to be stunted due to harsh conditions, and therefore are not accurately representative of their age. The community is dominated by white oak, sugar maple, and shagbark hickory. The hillside has moist seepage areas and downed trees offer a variety of habitat and opened the canopy up to allow natural succession to occur.
Rare Occurrences: A red oak-mixed hardwood forest community occurs at this site.
Threats and Stresses: Logging, the biggest threat to this BDA, and ATV usage have impacted the upland forest area. A scarcely used road traverses the bottom edge of the hill, but doesn't pose a major threat; and cottages occupy the floodplain between the road and the creek.
Recommendations: Maintain a forested buffer around the hillside community, so it may expand and continue to be self-sustaining.

Semiconon Valley LCA

Significance: Low
Location: Connoquenessing and Franklin townships
Description: This Land Conservation site is located south of Moraine State Park. It is owned by Lutherlyn and managed as a church camp for educational and recreational purposes. It is forested

with second growth northern hardwoods in the mid-successional stage of regeneration. It provides open space and habitat for wildlife, as well as recreational opportunities for visitors.
Rare Occurrences: No rare occurrences were noted for this site.
Threats and Stresses: Strip mining to the south of this site poses a threat to the integrity and quality of the natural resources contained within it.
Recommendations: This area should be protected from mining activities that may threaten its resources.

Trillium Hill LCA

Significance: Low
Location: Jackson, Lancaster, and Connoquenessing townships
Description: Located along the south shore of the Little Connoquenessing Creek, this area contains maturing second growth woodland, despite having been logged in the past. Steepness at the top of the hill along Swain Hill Road has limited development in that area. Maturing northern hardwood forest communities occupy the hillside and valleys along the creek, and display stunning wildflower blooms in the springtime. Wildlife and recreation depend on the open space provided by Trillium Hill, which is important due to its short distance from the highly developed areas of Butler County and the Pittsburgh suburbs.
Rare Occurrences: No rare occurrences were noted for this site.
Threats and Stresses: Horseback riding and ATV usage throughout the site have caused erosion and sedimentation impacts.
Recommendations: Reduce the harmful effects of the abovementioned activities through landowner education. A forested buffer should be maintained around the site to reduce the amount of sedimentation entering the stream, and to protect and improve the qualities of the site.

Twelve-spotted skimmer, this dragonfly was "spotted" in the watershed

Beaver County

Camp Kon-o-kwee Floodplain BDA

Significance: High
Location: Franklin and Marion townships
Description: This area occurs along Connoquenessing Creek, and provides special habitat to a plant species of special concern that is rare in the state. A floodplain forest dominated by silver maple, green ash, swamp white oak, American elm, and silky dogwood is another important feature of this BDA. While recovering from past disturbance, this floodplain is characterized by maturing trees and a diversity of herbaceous plants. The small (less than 15 acres) natural community is restricted by development occurring in the floodplain.
Rare Occurrences: One plant species of special concern and an important floodplain forest natural community exist at this site.
Threats and Stresses: Maintenance of the area, use of the resources, and expansion of recreation areas including a boathouse and archery/shooting range threaten the overall area, especially the rare plant species and important floodplain community contained within. A mowed path through the floodplain connecting two developed areas fragments that forest community. Road construction and maintenance jeopardize the survival of the rare plant species in particular, as those activities and stormwater runoff associated with the impervious surface can impact the plant species. Road salt, roadside weeds, and trampling also may affect the vitality of this plant population.

Recommendations: Avoid expanding developed areas adjacent to the floodplain, as well as upland areas that extend to the edge of the floodplain. Impacts associated with mowing, development, road construction or expansion, etc., should be evaluated to determine their potential impacts on the BDA, and in particular the rare plant population. Reduce the width of the mowed trail through the floodplain to four feet and maintain it with non-mechanical maintenance methods, such as hand trimming, so it can be utilized for nature study. Herbicide usage along the road to control weedy vegetation should be avoided or eliminated to avoid potential impacts to the rare plant species. Tree growth near the road could be encouraged, as that would naturally impede weedy growth and provide canopy cover, a habitat requirement, for the plant species of special concern.

Brush Creek Floodplain BDA

Significance: Notable
Location: New Sewickley Township
Description: This BDA contains a small stand of mature trees and an associated recovering shrub wetland, along a pattern of oxbow ponds and a small tributary stream where Brush Creek once flowed, but appears to have been cut off by the construction of the Pennsylvania Turnpike (Rt. 76). The mature trees serve as nesting habitat for the animal species of special concern, which depends on old-growth trees and wetlands or floodplains for nesting habitat. Approximately 30 nests have been reported, making this the largest nesting site of the species in Beaver County.

This ebony jewelwing is a predatory damselfly that helps to keep insect populations under control

Rare Occurrences: One animal species of special concern inhabits this site.
Threats and Stresses: The small size of the stand of mature trees limits the availability of suitable nesting sites for the animal species of special concern. The site is bordered on one side by a major road, the turnpike, and on the other by a pasture and another road. Therefore, it lacks a buffer and the potential for expansion of the habitat, which threatens the nesting habitat.
Recommendations: Attempts should be made to limit human access and disturbance to the site, especially during the nesting period from early spring to mid summer. Development of the land in the immediate area of the site should be evaluated for potential impacts to the animal species of special concern. The Pennsylvania Turnpike Commission should also be made aware of the site, and efforts should be made to avoid impacts to the species as a result of activities along Route 76.

Big Knob

Significance: This is the highest point in Beaver County at an elevation of 1,383 feet.
Location: New Sewickley Township
Description: Residential development occupies the base and lower slopes of the knob, while much of the forest has been cleared. One of two geological features recognized in the Natural Heritage Inventory of Beaver County occurs at Big Knob; this site is a remnant of the glacial period.
Rare Occurrences: No rare occurrences were noted on this site.
Threats and Stresses: Residential development expansion.
Recommendations: No recommendations were noted for this site.

Brush Creek County Park

Significance: Managed land
Location: Marion and North Sewickley townships
Description: This park, established in the 1970s, sits atop 645 acres, making it the second largest county park in Butler County, while providing recreational outlets for the citizens in the northeastern part of the county. The park offers mowed picnic areas, baseball and soccer fields, tennis courts, paved roads, and a man-made pond. Brush Creek flows through the area; its floodplain is occupied by the above amenities. Some areas along the stream are forested with second growth trees, though a large portion of the upland and floodplain areas are in an unnatural state due to the development of park facilities. Some forested areas remain in the floodplain, representing a recovering mesic central forest community dominated by sugar maple and black cherry; bridges and hiking trails have been established to promote the use of this and other natural areas within the park.
Rare Occurrences: No rare occurrences were noted in the park.
Threats and Stresses: Utility right-of-ways cross the park in several areas fragmenting some of the forested resources and restricting them to small areas. Further development and maintenance of recreational areas within the park impact the natural resources. Abandoned mine drainage (AMD) pollution impacts Brush Creek, though the creek is recovering.
Recommendations: Encourage the expansion and recovery of the natural areas within the park, and attempt to acquire land adjacent to the forested areas to allow ample space for buffers and encourage natural succession. Discourage any further development that would decrease the amount and size of natural areas within the park.

Green Valley Park

Significance: Managed land
Location: New Sewickley Township (own and manage the site)
Description: This park is located south of the turnpike (Rt. 76) along Brush Creek, and it has been cleared and developed for recreational uses. The areas along the stream offer ball fields, picnic pavilions, swing sets, and other recreational amenities for citizens of the area. Some forested areas remain along the slopes and in tributary valleys, representing a second growth Dry Mesic Acidic Central Forest community.
Rare Occurrences: No rare occurrences were noted at this particular site.
Threats and Stresses: There could be impacts associated with construction activities, noise, and pollution stemming from the nearby turnpike. The developed areas of the park limit the possibility for expansion of the natural, forested areas and buffer zones.
Recommendations: Properly manage the forested areas, so that their natural qualities may improve. Provide buffer zones in the uplands and bottomlands surrounding the forest. Permit adjacent areas that have cleared to revert back to forest to provide this buffering zone. Expand the park by acquiring private lands bordering to the south, southeast, and northwest of the park.

Improving biodiversity enhances recreation at sites like Hereford Manor Lakes

Hereford Manor Lakes

Significance: Managed land
Location: Franklin Township
Description: Consisting of two impoundments and their associated wetlands, this property is owned by the Pennsylvania Fish and Boat Commission (PFBC), and has resulted from the reclamation of a strip-mined

area. Second growth forests occupy the upland area surrounding the lakes. High walls and AMD in some of the tributaries still exist as a result of the past mining activity on the land. The site is utilized by fishermen and for outdoor recreation.
Rare Occurrences: No rare occurrences have been noted on this site.
Threats and Stresses: The remaining high walls in the area could pose a hazard to human safety, and the AMD in tributary streams affects water quality and the health of the natural ecosystem.
Recommendations: Using a "hands-off" management approach, the natural areas around the lakes could recover and improve. Reclamation of high walls would reduce the safety hazard and allow more recreational opportunities. Treatment of AMD impacted waters is needed to improve the overall water quality and health of the ecosystem.

Steifel Park Mine BDA

Significance: Notable
Location: North Sewickley Township, Ellwood City Borough
Description: A rare natural community that supports sensitive species of concern.
Rare Occurrences: Supports a sensitive species of concern, a rare natural community, and a Pennsylvania threatened plant species
Threats and Stresses: Human disturbance is the greatest threat to this BDA.
Recommendations: Activity should be limited around this site, and human disturbance should be kept at a minimum.

Lawrence County

Rock Point BDA

Significance: Notable
Location: Wayne Township and New Beaver Borough in Lawrence County and North Sewickley Township in Beaver County.
Description: Located at the confluence of Connoquenessing Creek and Beaver River, this large, contiguous forest area is surrounded by a variety of non-forest land uses. Steep sandstone cliffs and whitewater rapids characterize the area. With an intact canopy and mixture of scrub and open areas in the understory, the area is described as a red oak-mixed hardwoods forest. It is dominated by red maple, sugar maple, American beech, white oak, and red oak. A variety of herbaceous species, native and exotic, can be found in the understory.

Wooded, rocky area at Rock Point

Rare Occurrences: No rare occurrences were noted at this site during the survey, but several rare species occurrences have been reported, yet unconfirmed. Carolina willow had previously been recorded in the site's history, though subsequent field visits did not reveal its presence. The site provides valuable foraging and nesting habitat for a federally endangered animal species of concern. Rock Point possesses outstanding botanical diversity, evident by an unsurpassed spring floral display. A series of rare upland vernal pools have also been found at this site.
Threats and Stresses: Invasive exotic plant species, such as multiflora rose, Japanese barberry, and Amur honeysuckle, can compete with native species for space and resources. While Japanese knotweed, another invasive species, was found to be present upstream. Therefore, knotweed has the potential to be transported to the site and compete with native species. Unpermitted ATV

activity, primarily on the steep south bank of the creek, and unregulated recreation could cause erosion, pressure sensitive species, and lead to further development of the site.
Recommendations: This large, unfragmented forest, along with an unfragmented Slippery Rock Creek gorge, provides a corridor for migrating birds and other wildlife. Protecting this forested area will serve to maintain that corridor for those species. Control of invasive species is also recommended to curtail the negative effects they have on the habitat and native species found in the area.

Conservation Lands

State Parks

Moraine State Park is primarily situated within the Slippery Rock Creek subwatershed, though a small portion of it does abut the Connoquenessing watershed near the headwaters of Crab Run in Muddycreek Township, Butler County. Muddy Creek, the primary stream feeding Lake Arthur, also abuts the Connoquenessing watershed near Route 308 in the southeast corner of Clay Township, Butler County. Moraine State Park has been identified as an Important Bird Area (IBA) by Pennsylvania Audubon, the state chapter of the National Audubon Society. Lake Arthur and other areas of the park host a variety of wildlife and habitats. It also serves as an important nearby recreational facility for the residents of the Connoquenessing watershed. Moraine State Park is habitat for rare plant and animal species, contains part or all of four BDAs, and also is part of two LCAs.

State Game Lands

A portion of the 456-acre **State Game Lands (SGL) 164** is within the watershed. It lies within portions of Donegal, Clearfield, Oakland, and Summit townships, Butler County. SGL 164 is public land managed by PGC. Food plots exist within the area, and the land is open for hunting, fishing, and recreation (PGC[5]).

Important Bird Areas

Areas that support critical habitat for a diversity of birds species or species of special concern are designated as IBAs by the National Audubon Society Pennsylvania Chapter. Site conservation plans are developed to guide conservation initiatives and management activities based on the specific needs of the area. While no IBAs exist within the project area, several nearby IBAs surround the region. IBAs are designated at Moraine State Park, McConnell's Mill State Park, The Glades – SGL 95, and Buffalo Creek Valley (Audubon Pennsylvania). Conserving critical habitats within the Connoquenessing watershed will support bird migration, and allow for population expansion supporting those IBAs.

Bald eagles, like this adult from elsewhere in Pennsylvania, have been reported in and near the watershed

Important Mammal Areas

Similar to IBAs, Important Mammal Areas Project (IMAP) designates areas that support mammal species of special concern and a diversity of mammal species. IMAP is a partnership of sportsmen, scientists, and conservation groups and professionals. Two IMAs exist near the watershed, CS & M Mine in Lawrence County, north of Ellwood City, and Latadomi Environmental Education Center near Wexford, Allegheny County (IMA). Conserving habitats and connecting natural corridors to these IMAs will help to sustain those mammal species that depend on the resources of the region.

Invasive Species

A Japanese knotweed infestation dominates the banks of Connoquenessing Creek near Butler

A non-native invasive species can be defined as a plant, animal, or other organism introduced to an ecological system that causes economic or environmental harm, or harm to human health. Invasive species are one of the most significant threats to wildlife conservation in Pennsylvania. Not all non-native species are harmful to other species or to wildlife, but some exotic species may have severe impacts. Invasive plant species can impact agricultural activities and inhibit forest regeneration in areas where disturbance (by deer, erosion, or human activities) gives them a competitive advantage. They may outcompete native, preferred species, causing cascading effects throughout the food chain, and reducing food availability and quality for species, such as turkey, bear, and birds.

Exotic species may have been introduced for a specific purpose or inadvertently. For example, autumn olive, an invasive shrub species, was introduced to many state parks by PGC for food and cover for wildlife and soil stabilization. Alternatively, invasive insects may burrow into the wood pallets of packing material to emerge in another country, and invade that ecosystem unbeknownst to anyone involved in the shipping of that product.

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

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 that information are USDA National Invasive Species Information Center (NISIC) at: www.invasivespeciesinfo.gov and the Global Invasive Species Database: www.issg.org/database.

Small, isolated populations should be contained to control spreading. Once established, invasive pests may be controlled by mechanical (physically pulling or cutting weeds, for example), chemical (pesticides), or biological (utilizing another living species to control the invasive target) means. Often, for well-established invasive species, a combination of control methods is necessary to effectively and efficiently control the invasive. When chemical means are necessary to control an invasive pest (weed, insect, or animal) the person(s) applying the pesticide must be certified by the State 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. Fact sheets on invasive species can be downloaded at the U.S. Forest Service website: http://www.fs.fed.us/invasivespecies/speciesprofiles/index.shtml. Other useful resource links can be found in Appendix O. Useful Websites.

Plants

Invasive species pose the most significant threat in areas that have been altered by disturbances, such as impoundment, development, mining, oil and gas extraction, poor forestry, and poor agriculture management practices; or those that border development with invasive plants in the landscaping. In disturbed areas, invasive species can displace native plants intolerant to the changing conditions. To make matters worse, native wildlife often prefers native species, and thus tend to avoid feeding on invasive plants, which allows the invasive to proliferate. When a non-native species establishes itself in a foreign habitat, it usually escapes its natural predators and pathogens, allowing it to spread and multiply with little natural controls.

Table 4-3. Noxious Weeds of Pennsylvania That Have Legal Controls and Penalties

marijuana (*Cannabis sativa*)
Canada thistle (*Cirsium arvense*)
multiflora rose (*Rosa multiflora*)
Johnson grass (*Sorghum halepense*)
mile-a-minute (*Polygonum perfoliatum*)
kudzu (*Pueraria Montana v. lobata*)
bull or spear thistle (*Cirsium vulgare*)
musk or nodding thistle (*Carduus nutans*)
shattercane (*Sorghum bicolor*)
jimsonweed (*Datura stramonium*)
purple loosestrife (*Lythrum salicaria*)
giant hogweed (*Heracleum mantegazzianum*)
goatsrue (*Galega officinalis*)

Some invasive plants pose a threat to health and human safety, and 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, 2007b). Giant hogweed, one of the state listed noxious weeds, can cause chemical burns to skin that comes in contacts with its sap. A complete listing of the state noxious weeds is found in Table 4-3.

A good source of information on invasive plants which are not addressed below, but that may already be found within the watershed or that pose a potential risk of invading the area, can be found in *Plant Invaders of Mid-Atlantic Natural Areas*, a guide produced by the National Park Service and U.S. Fish and Wildlife Service (Swearingen et al., 2002).

Japanese knotweed

One invasive exotic plant species that was found within the project area, and could pose serious threats to the native biodiversity of the area is Japanese knotweed. Japanese knotweed has been reliably identified in disturbed areas on the banks Connoquenessing Creek and some of its tributaries. It spreads mainly through its root system, and one plant can grow to encompass miles of streambank. Very small root and stem fragments are capable of sprouting to generate new growth, and streambank erosion can transport these plant parts downstream to take root in new areas. In urbanized areas, such as Butler, this species can cause major destruction to flood walls, pavement, and even buildings.

On trails and natural areas, knotweed is unsightly, and may be considered a safety hazard. Knotweed monocultures (an area dominated by one species) can encroach upon trails, inhibit growth of trees in riparian areas, cause increased erosion, and offer little habitat value to native species. Knotweed grows and spreads aggressively, making it very costly to control once established.

The best control method for well-established knotweed monocultures is to cut the stalks close to the base throughout the spring and summer to prevent flowering and seeding. Cutting also encourages regrowth and expenditure of stored energy, which weakens the plant's reserves. Do not mulch any cut vegetation, as regrowth can occur from each fragment. An herbicide application may be applied before the first killing frost in the fall, which will carry herbicide from the leaves to the roots, resulting in more effective control. A certified herbicide applicator should be contracted to ensure appropriate application procedures and regulations are followed. As with any control strategy for invasive species, persistence is the key to success.

Multiflora rose

Multiflora rose was first introduced to the U.S. as rootstock for ornamental plants in 1866. The U.S. Soil Conservation Service and PGC later promoted it for purposes, such as living fence around livestock pastures, and as wildlife habitat for small game and bird species. The tenacious growing behavior of the plant enables it to quickly dominate large areas and consume resources that would otherwise benefit native shrubs and herbaceous species. The thickets formed by multiflora rose are dense, and it can completely overtake pastures, excluding livestock from grazing large portions of pasture. The large monocultures decrease biodiversity, as the variety of food and nesting habitat available to native birds and wildlife is decreased. Furthermore, the fruits do not contain the proper fat ratio migrating birds need to survive. Larger mammals, including humans, are often excluded from areas occupied by multiflora rose, as the thorny plant weaves tight, impenetrable assemblage of stems.

To control multiflora rose, bushes may be pulled, but ensure that all of the root system was removed, otherwise regrowth will occur. Herbicides may be effective in controlling this persistent species. A naturally occurring virus spread by mites called rose rosette disease, is one example of a biological control for multiflora rose. However, this disease also affects cultivated roses, and may be considered undesirable by some.

Animals

Invasive animal species include forest pests, such as the emerald ash borer, gypsy moth, and hemlock woolly adelgid, and aquatic species, such as the zebra mussel. The gypsy moth is prevalent throughout Pennsylvania and the hemlock woolly adelgid has been identified in many counties, including those within the Connoquenessing Creek watershed.

Some biological controls, like this multi-colored Asian lady beetle that was introduced to the U.S. to control aphids and other crop pests, became pests themselves; swarms can encroach upon homes in autumn seeking winter shelter in homes

Emerald Ash Borer

The emerald ash borer (EAB), an invasive insect, was first positively identified in Pennsylvania on June 21, 2007 in Cranberry Township, Butler County. The EAB has already defoliated millions of trees throughout the country, and now threatens Pennsylvania's forests. An immediate ban on the import of firewood to State Parks and State Forests was relayed throughout the state to suppress the spread of the species. Because it is difficult for the average person to tell what species of tree the firewood was derived from, the ban includes all hardwoods. In addition, PDA has quarantined Allegheny, Butler, Beaver, and

Lawrence counties. The quarantine restricts or prohibits the transport and sale of ash wood products and plants that may harbor the pest (DCNR, 2007a).

It is not the adult emerald ash borer beetles that cause the devastating effects of girdling and killing trees, but rather their larvae that feed under the bark. As the larvae eat paths under the bark, called "galleries," they disconnect the cells that carry nutrients and water to the limbs and leaves of the tree. Over time, usually within three years of the infestation, the tree dies as a result of stress and inability to circulate life-sustaining nutrients and water throughout the plant.

EAB presence is most easily identified by the D-shaped exit holes bored into the wood of a tree. Adult beetles are approximately a half inch long and slender with dark green metallic coloration. If you suspect the presence of EAB in your area, notify your regional DNCR Bureau of Forestry, PDA, Penn State Cooperative Extension, or the EAB hotline: 1-866-253-7189.

Gypsy Moth

The gypsy moth was introduced to the U.S. from Europe in the 1980s. It feeds while in the larval, or caterpillar, stage. Eggs are deposited in July, and overwinter on bark and stones. Gypsy moth caterpillars hatch and begin feeding from mid- to late-April in southern Pennsylvania, and in early-to mid-May in the northern part of the state. Oaks, sugar maple, beech, and aspen trees are preferred food sources for this caterpillar's voracious appetite. Large gypsy moth populations may strip entire trees of their foliage, leaving them weakened and susceptible to disease, drought, and attack by other pests. A tree begins to suffer when 30 percent or more of its leaf surface is lost (Purdue Research Foundation, 2004).

According to the 2006 Pennsylvania Annual Pest Conditions Report compiled by DCNR, Bureau of Forestry, Division of Forest Pest Management (2006), "Gypsy moth defoliated more acres of forest than any other pest or pathogen in 2006, and is considered to be at outbreak levels." The state of Pennsylvania initiated a suppression program in 2006, which included the cooperation of five counties, four forest districts, one state park, the PGC, and two stewardship landowners. Gypsy moth populations are expected to continue to increase and the suppression program will expand in the year 2007 to include at least 14 counties on 45,474 acres of land, though those estimates are expected to change.

Gypsy moth populations are typically highest following wet, more temperate winters, while cold, dry winters cause the death of egg masses. Private landowners with forested land containing 250 or more egg masses per acre may be eligible for insecticide applications administered through the DCNR Bureau of Forestry. However, the biggest factor controlling populations is a natural fungus, which grows on most hardwoods, and adversely affects the gypsy moth (Purdue Research Foundation, 2004). Gypsy moths pose a particular threat to areas predominately composed of oak species, such as the Buhls Channel BDA, because oak is one of their preferred foods.

Hemlock Woolly Adelgid

This tiny, fluid-feeding insect was introduced from Japan in the early 20th century, and was first discovered in Pennsylvania in 1969. Forty-four counties in Pennsylvania have been infected, including Allegheny County within the Connoquenessing Creek watershed. Infestation is currently heaviest in southcentral and eastern Pennsylvania, and low in the western portion, which includes the project area. Cold weather may contribute to high mortality, and will likely prevent expansion of this pest, unless global warming eventually defeats very cold weather in the area. The hemlock woolly adelgid most commonly affects hemlocks, but can also affect spruce trees (DCNR).

The species prefers mild conditions, and is most active from October to June. Eggs hatch in February or March. Damage is inflicted when an immature nymph or adult sucks sap from twigs, which causes hosts to lose needles, and possibly die. Biological control agents include a beetle, which was released by

DCNR in 2004 on affected hemlock trees in central and southern Pennsylvania. DCNR is also in the process of establishing sites for chemical applications against the hemlock woolly adelgid (Spichiger, 2004).

Zebra Mussel

Zebra mussels were brought to the U.S. in the 1980s in the ballasts of European ships. Since that time, they have colonized many lakes and streams in the Great Lakes region and also the entire stretch of the Mississippi River. These thumbnail-size mussels impose damage by removing all of the microscopic food, including plankton and zooplankton, depriving other organisms, and altering the food chain (Pennsylvania Sea Grant, 2003).

The Pennsylvania Zebra Mussel Monitoring Network was established in 1990–1991 to monitor the spread of zebra mussels in the state. Volunteer personnel from a variety of agencies report sightings of the species to DEP. Due to its ecological requirements; the species is restricted to slow-flowing rivers, impoundments, reservoirs, and lakes. For instance, it has been identified in the Monongahela, Ohio, and Allegheny rivers, and in French Creek above an impoundment (Shaw, personal communication, 2006).

The zebra mussel is most commonly transported in ship ballasts and on recreational boats that utilize multiple waterways. Boaters should always clean their vessels thoroughly before transporting to another waterbody to prevent the spread of mussels, invasive aquatic plants, and other nuisances. According to the *Connoquenessing Creek Watershed Mussel Survey* (Lang, 2002) report, no zebra mussels were detected within the watershed, although the species has been detected in the Ohio River drainage.

Exotic Asiatic clam shells scattered along the bank of Connoquenessing Creek represent a large invasive population which may be outcompeting native freshwater mussels in the watershed

Asiatic Clam

It is unknown, exactly where and when this exotic, bivalve mollusk was introduced to the U.S. or Pennsylvania. The Asiatic or Asian clam has a yellow show with pronounced ridges and can reach lengths of 55 mm. Although this species is native to Asia and Africa, it adapts well to the stream bottoms of the Connoquenessing watershed. Immature Asiatic clams are very small and hard to see, and unlike many native species, they do not require host dependency for dispersal. These factors, combined with its higher tolerance to pollutants, enable the species to reproduce and spread aggressively. Because of their nature, Asiatic clams can out-compete native freshwater mussels for resources and space.

The shells from hundreds, even thousands, of dead clams can litter the stream bottom and streambanks of local waterways. As the organisms decompose, ammonia byproducts may kill other freshwater organisms, this is particularly threatening in lake environments. The main consequence of the presence and abundance of this invasive species is its tendency to clog pipes and cause disruption of industrial processes and water treatment plants.

In order to prevent further spreading of Asiatic clams, boots, boats, and other watercrafts should be thoroughly rinsed with hot water after use in Asiatic clam infested waters. Bait buckets should also be cleaned and thoroughly dried before transporting to another stream or watershed (Aquatic Invasive Species of Pennsylvania).

Previous Studies

Connoquenessing Creek Watershed Mussel Survey, 2002

A survey was conducted along Connoquenessing Creek, Thorn Creek, Little Connoquenessing Creek, Glade Run, Brush Creek, Bonnie Brook, Breakneck Creek, and Camp Run to gather baseline data on mussel populations within the watershed. Fourteen species of freshwater mussels and clams (one of which is an exotic species) were found through the study. Species were more diverse and individuals more abundant in the downstream third of Connoquenessing Creek, downstream of Zelienople. Several of the species' populations were or were believed to be reproducing (fluted shell, plain pocketbook, fat mucket, creeper, giant floater, spike, the invasive-exotic Asiatic clam, and pea clams), while others were present, but not reproducing (mucket, black sandshell, and rainbow, which is a Pennsylvania endangered species), and dead shells of some species (threeridge, kidneyshell, and round pigtoe) were found, though no live specimens were recorded.

Bruce Kemp, a member of CWA and the watershed conservation plan steering committee, searches Connoquenessing Creek for mussels

Humans have contributed to the historic decline of mussels throughout the watershed. Activities, such as industrial pollution, rechannelization from road and railroad corridors, erosion and sedimentation, pollution from abandoned mines, sewage, nutrient runoff, urban sprawl, timber harvest, and dams have adversely affected freshwater mussels in the Connoquenessing Creek. Mussels are intolerant of pollution, certain water temperatures, slow flow, and sedimentation, making them habitat-specific. Therefore, streams impacted by AMD, erosion and sedimentation, industrial pollution, damming, and poorly forested riparian zones are less likely to support a thriving population of mussels. In addition, generally sedentary mussels depend of specific host fish species for their reproductive cycle and for dispersal. This dependency also hinders the survival of mussels when those fish species are confined by dams or affected by pollution and water temperature.

The presence, diversity, and abundance of freshwater mussels are some of the best indicators of the health of a stream and watershed. Therefore, an important comparison is one of the species originally present to those present today, and if possible, some analysis of the health of each species' population considering abundance, reproduction, etc. Results of this study will serve as baseline data, by which to compare changing conditions of the mussel populations and water quality over time. It is important to continue to monitor this group over time to determine how the watershed is improving or where portions are becoming more degraded.

Aquatic Community Classification

A biological community represents a group of organisms that occur together in a particular habitat. These organisms require similar habitats, may be dependent on each other for food or other resources, and may be dependent on similar processes in their environment.

The aquatic communities report refers to two types of organisms found in streams: mussels and fish. The community types described here are restricted to flowing water habitats, such as rivers and streams. As a statewide project of PNHP, WPC researchers working on the Pennsylvania Aquatic Community Classification (ACC) project collected aquatic datasets from state and federal agencies, interstate basin commissions, and universities. The biological, habitat, and water chemistry data was first centralized into

a large database. The information was then analyzed with standard statistical methods in order to identify biological community types and stream habitat associations.

In some places, the most common community type in each stream reach was chosen to represent typical watershed organisms and habitats. Although other community types may exist in a particular reach, the major community type is described. Both types of organisms hold unique niches in Pennsylvania's streams and rivers. Food resources and spawning habitats can be specific for different species of fish as different species will have different habitat requirements and habitat needs. Fish are influenced by stream quality and the condition of the watershed. For example, sediment from erosion at a mismanaged construction site near a stream may cover substrates that are necessary for fish, such as brook trout, to lay their eggs. Layers of fine particles from sedimentation, such as this, can smother the habitats that developing fish require, preventing them from reaching adult life stages.

As filter feeders, which siphon water to extract particles of food, mussels also require relatively clean water to survive. They are particularly sensitive to industrial discharge, abandoned mine drainage, and urban runoff pollution. Mussels generally require gravelly, sandy, or muddy habitats where they can burrow into the stream bottom. They typically occur in larger streams and in rivers that contain sufficient nutrient levels to supply them with food.

Many factors influence the occurrence of aquatic communities, including natural variations in stream environments. Fast-flowing, cold streams flowing from ridge tops provide different habitat types than slow, warmer rivers meandering through valleys. Aquatic communities reflect these differences in stream type and environment. Geology also varies across Pennsylvania, and flowing water may have unique chemical compositions based on the types of rocks that it contacts.

Human alterations to aquatic environments can exert much stronger effects than any type of natural variation discussed above. Many changes within a watershed can be detected within its streams and rivers. If implemented improperly, timber harvest, agriculture, urban development and road management are among some watershed alterations that may cause changes in water quality and stream habitats from nonpoint source pollution. Additionally, a number of pollutants can enter aquatic systems from point sources, such as discharges from sewage treatment plants, abandoned mines, and other industrial sources.

Species of conservation concern (considered state or globally rare) that may occur with each community type are listed (Appendix H. Species of Concern). State rankings refer to an animal's rarity status in Pennsylvania, and the Global rankings refer to an organism's rarity on the global scale. NatureServe, the parent organization of Natural Heritage programs, works with Heritage biologists to assign these rankings to each species individually and use these rankings as a way to quantify the rarity, and therefore conservation priority, of all organisms.

How does the ACC compare to other classifications of Pennsylvania's streams? The state of Pennsylvania protects aquatic life using a "designated use" classification system of waters in the Commonwealth under the federal Clean Water Act. Four types of aquatic life should be propagated and maintained based on their designation in Pennsylvania (PA Code, 1997):

- **Cold Water Fishes (CWF):** Fishes and associated aquatic flora and fauna preferring colder waters (trout species are included in the cold water fishes).

- **Warm Water Fishes (WWF):** Fishes and associated aquatic flora and fauna preferring warmer waters.

- **Trout Stocked Fishes (TSF):** Stocked trout species (maintained from Feb 15 to July 31) and warm-water flora and fauna.

- **Migratory Fishes (MF):** Fishes (those having anadromous, catadromous or similar life histories) which must migrate through flowing waters to their breeding habitats.

Additionally, some waterbodies receive additional special protections as "Exception Value" or "High Quality" waters because they are especially valued for aquatic life, water quality, and/or recreation. Meeting relatively high water quality and other standards qualify the water bodies for additional protections from degradation beyond the aquatic life uses (PA Code, 1997).

The purpose and meanings differ between the classes defined in Pennsylvania aquatic life use/special protection designations and aquatic fish assemblages from the ACC. The similar nomenclature of both classifications may be confusing, but in both cases it is meant to relatively define the organisms and aquatic habitats along a gradient of water temperatures (and associated stream size). The PA stream designations broadly encompass habitats occupied by several ACC fish assemblages, and are used in water quality regulation. More information regarding the ACC and individual communities within Connoquenessing Creek is available in Appendix M.

Chapter 5. Cultural Resources

Recreation

Wood Street Park, located along Connoquenessing Creek in Harmony, is one of the many recreational facilities available to area residents

Recreation is big business in Pennsylvania, being the second-leading industry. It influences a region's economy, bringing in tourists who often need food, lodging, and mementos of their visit. Recreation is not only beneficial to the economy, but a healthy endeavor as well. According to findings from Panorama Recreation (2004), a commission of municipalities from the Saanich Peninsula in Canada whose objective is to provide recreation and leisure activities and facilities to all citizens regardless of age, gender, religion, or economic status, the following are benefits of having recreational opportunities in communities:

- Recreation and active living are essential to personal health.
- Recreation is key to balanced human development.
- Recreation and parks are essential to quality of life.
- Recreation reduces self-destructive and anti-social behavior.
- Recreation and parks are significant economic generators.
- Parks, open space, and natural areas are essential to ecological survival.

Recreation Facilities

There is a diversity of public and private recreational facilities for residence and visitor to the region, including active, passive, indoor, and outdoor. These recreational facilities provide opportunities for residents and visitors alike including running, bicycling, fishing, hunting, camping, boating, wildlife viewing, bowling, golfing, horseback riding, sled riding, cross-country skiing, and off-road vehicle riding.

Parks

Parks can be classified into five categories, based upon size, service population, and intended use. Within the project area, 98 park sites have been identified and classified into these categories. Locations identified on Figure 5-1 and listed in Appendix I.

Larger parks, typically 100 acres or more, are considered *regional parks*. These parks are usually located within 30 to 60 minutes from the population they serve. Six sites –Moraine State Park, Brush Creek Park, Alameda Park, Butler Farm Show grounds, Glade Lake, and Hereford Manor Lakes—have been identified as regional parks.

Moraine State Park lies mostly within the Slippery Rock Creek watershed with the southern portion touching into the Connoquenessing watershed in Muddy Creek Township. The park is a regional asset that area residents within the Slippery Rock and Connoquenessing watersheds utilize. The park surrounds Lake Arthur and offers picnic areas, swimming, fishing, boating, hiking, and bicycling opportunities.

Brush Creek Park is a Beaver County park located in New Sewickley Township. The park features active and passive recreational opportunities with a number of athletic fields and courts for baseball, softball, soccer, tennis, and basketball in addition to the picnic areas, trails, and a covered bridge.

Community parks are those within one to two miles of its users, and contain at least 25 acres. Ten parks—Adams Township Park, Saw Mill Run Park, Green Valley Park, Butler Memorial Park, Cranberry

Community Park, R.C. Stiefel Park, Portersville Community Park, Ewing Park, North Boundary Park, and Zelienople Community Park—have been identified as community parks.

Smaller parks, generally between five to 25 acres and within three-quarters of a mile of residents, are considered *neighborhood parks*. These are intended to provide recreational opportunities close-to-home. With more than 50 parks sites identified the common category of the parks have been recognized as neighborhood parks, which include: playgrounds, athletic fields, picnic pavilions, and community pools.

The smallest parks, generally less than an acre in size, that service residents within their immediate vicinity are considered *play lots*, or *mini parks*. Eighteen facilities—Aderhold Park, Brandon Park, Circle Playground, Connoquenessing Elementary Play Area, Cranberry Play Areas, Daniel Lohr Park, Diamond Park, Fifth Street Park, Franklin Township Elementary Play Area, Green Acres Park, Harmony Play Lot, Lion Park, Merritt Book Park, SS Play Area, Swampoodle Park, Woodbury Estates Park Lot, Wood Street Park, and Zelienople Main Street Park—have been identified as mini parks.

Linear parks are the fifth park classification. Linear parks, sometimes referred to as ribbon parks, typically (consist of – or have) walking or biking trails. Two linear parks—Butler Freeport Trail and Harmony Hike-Bike Trail— have been identified.

Trails

Links among communities, trails provide alternative transportation, recreation, and educational opportunities. Trails can be used for a variety of activities including hiking, bicycling, horseback riding, off-road vehicle riding, environmental education, cultural and historic cultivation. A variety of benefits to having trails within a community exist including health, transportation, conservation, economic, and community identification (Rails-to-Trails Conservancy, 2006).

One of the many hiking trails available at Lutherlyn, a Lutheran church camp located near Prospect

Trails provide opportunities for physical activity and exercise that can even be built into daily routines. They connect neighborhoods, and can even create a network of recreational areas by connecting parks and playgrounds to one another. In addition, trails can preserve natural landscapes, link fragmented habitats, and protect plant and animal species.

With increasing fuel prices and traffic congestion, more people are exploring alternative methods of transportation. Particularly in many urban areas, people are utilizing trails to get to and from work. Even when selecting a community in which to live or establish a business, people increasingly consider the availability of recreational opportunities.

A variety of types of trails exist including nature trails, rail-trails, bike trails, hiking trails, and exercise trails. As identified in the Beaver County Comprehensive Plan, there is a shortage of trail facilities and services (Beaver County Planning Commission, Beaver County Planning Department, and Gannett Fleming Inc., 1999). Establishment of additional trails throughout the region is recommended.

The Butler Freeport trail opened in 1992 and is still in the developmental phase. This trail follows approximately 20 miles of State Route 356 from Freeport, Armstrong County, to the city of Butler. Approximately, 16 miles are completed, but legal issues and damage from Hurricane Ivan in 2004 have held up the completion of the trail (Butler Freeport Trail). The trail is suitable for non-motorized uses, such as walking, bicycling, hiking, jogging, and cross-country skiing. A listing of trails is located in Appendix I.

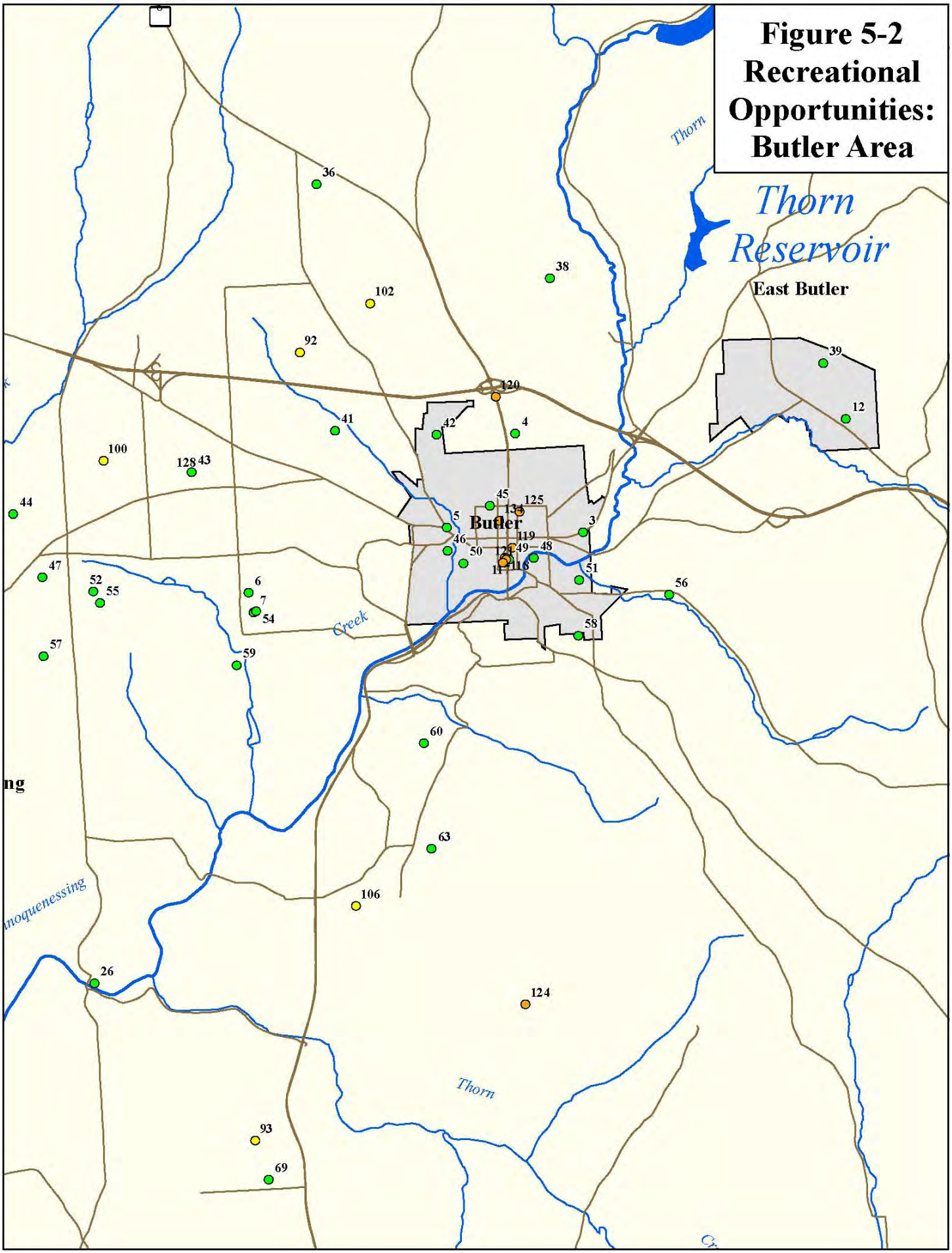


Figure 5-2
Recreational
Opportunities:
Butler Area
Thorn
Reservoir
East Butler
Butler
Thorn
Creek
Thorn
36
38
102
92
39
12
120
41
42
4
100
128
43
44
45
125
134
5
3
119
46
50
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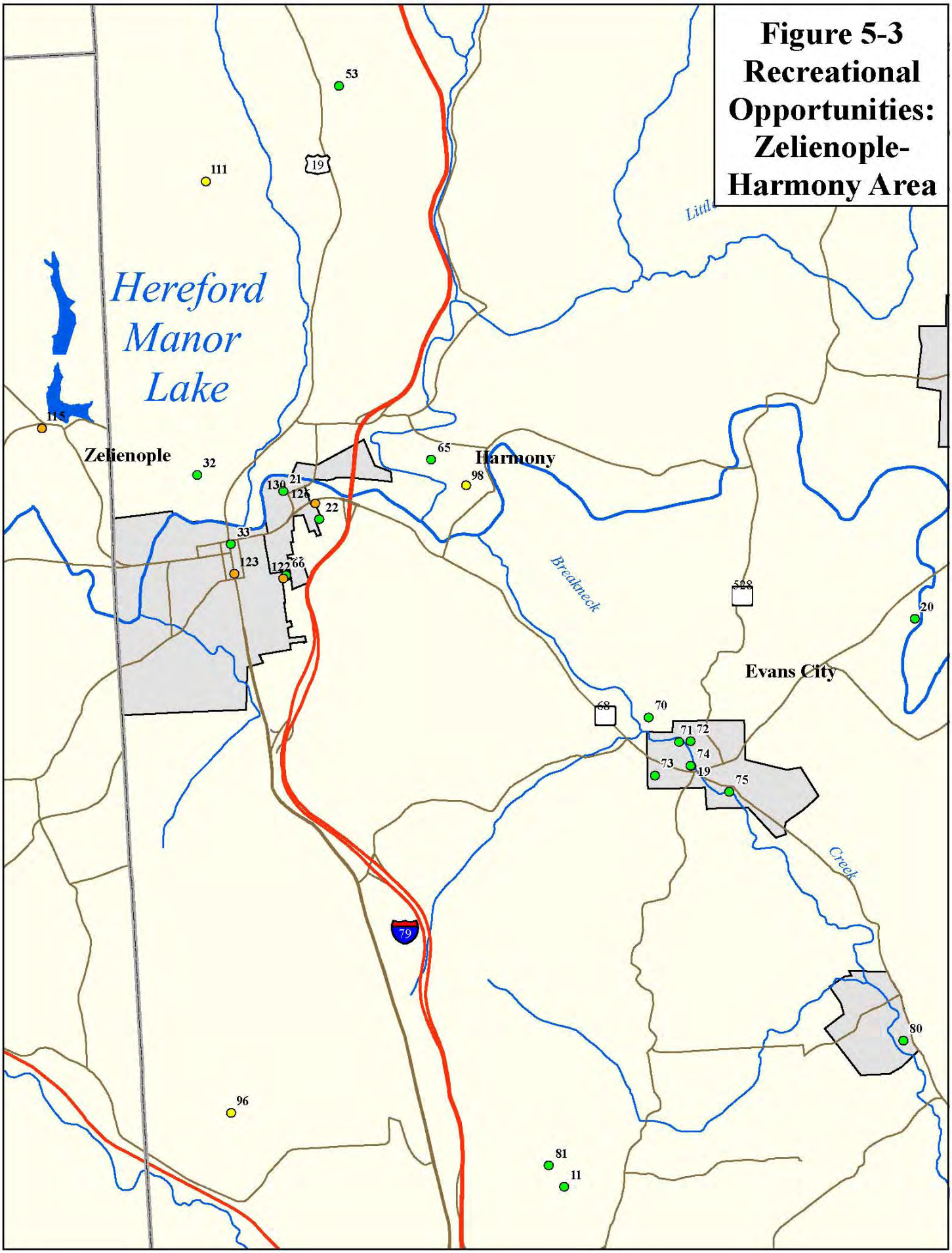
Figure 5-3
Recreational
Opportunities:
Zelienople-
Harmony Area
Hereford
Manor
Lake
Zelienople
Harmony
Evans City
Breakneck
Creek
53
111
19
115
32
65
98
130
21
125
22
33
123
122
66
528
20
68
70
71
72
74
73
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75
79
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96
81
11

All-terrain Vehicles

A popular recreational activity is riding all-terrain vehicles (ATVs). 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. The use of ATVs in the region and throughout Pennsylvania is on the rise. With the lack of public facilities available, improper or illegal use by some riders has given ATVs a bad reputation.

In 1985, Chapter 77 of the Pennsylvania Vehicle Law established regulations for the uses of ATVs. Pennsylvania Department of Conservation and Natural Resources (DCNR) regulates the use of ATVs within the commonwealth. In 2001, Act 68 modified the law, requiring owners and operators to register their vehicles. Registration fees are invested into developing and maintaining trails on public lands, encouraging trail development on private lands, teaching safety and trail riding etiquette, and enforcing the law (DCNR, 2002).

Efforts to educate riders about recreating in an environmentally sound manner should be encouraged. The establishment of public facilities exclusively for the use of ATVs is needed. Environmentally sound public trails or an ATV park would provide riders with opportunities to ride legally, thereby reducing damage to private property and increasing rider safety.

Currently, there are no trails for ATV riders within the project area. The closest recreational parks specifically for ATVs are the Shenango River Lake Off Road Vehicle Area and Allegheny National Forest.

Golfing

Golf is a popular recreational activity that originated from a game played in Scotland during the 15th century. There are 24 golf courses within the project area, which are identified in Table 5-1. Miniature golf or putt-putt courses are also available for recreation. Currently there are 23 facilities available for residents and visitors. They include:

Table 5-1. Golf Courses

Recreational Facility	Location	Description
Aubrey's Dubbs Dred Golf Course	Butler Township	18-hole semi-private course
Butler Country Club	Penn Township	18-hole private course
Conley Resort Inn	Penn Township	18-hole public course
Connoquenessing Country Club	North Sewickley	18-hole private course
Cranberry Highlands	Cranberry Township	18-hole public course
Del Mar Golf Course	Wayne Township	18-hole semi-private course
Hartmann's Deep Valley Golf Course	Jackson Township	18-hole public course
Hiland Golf Course	Summit Township	18-hole public course
Krendale Golf Course	Butler Township	Three nine-hole courses played as 18-hole course open to the public
Lake Arthur Country Club	Franklin Township	18-hole public course
Lake Vue North Golf Club	Penn Township	18-hole public course
Mars-Bethel Golf Course	Adams Township	Nine-hole public course
Mount Chestnut Driving Range and Golf Course	Franklin Township / Center Township	Nine-hole public course

Table 5-1. Golf Courses (continued)

Recreational Facility	Location	Description
Old Stonewall Golf Club	North Sewickley Township	18- hole course
Pine Needles Par 3	Butler Township	Nine-hole public course
Pittsburgh North Golf Course	Richland Township	27-hole public course
Rittswood Golf Course	Middlesex Township	18-hole public course
Serene Valley Golf Course	Summit Township	Nine-hole public course
Stoughton Acres Golf Course	Center Township	18-hole public course
Strawberry Ridge Golf Course and Driving Range	Lancaster Township	18-hole public course
Suncrest Golf Course	Penn Township	18-hole public course
Treesdale Golf and Country Club	Adams Township	9-hole private course
Venango Trails Golf Club	Marshall Township	18-hole private course

Campgrounds

Four campgrounds are located within the region—Buttercup Woodlands Campground, Indian Brave Campground, Smith Grove Campground, and Hart's Content Campground. They offer a variety of services including recreational activities, hookups, showers, and stores.

Buttercup Woodlands Campground, near Renfrew, is one of the largest campgrounds within the project area. Amenities include over 300 sites, full hookups, tenting, cabins, a rental unit, laundry, propane, store, recreation and dance hall, playground, swimming pool, trolley rides, and a basketball court.

Indian Brave Campground, at Harmony, is among the largest campgrounds with 250 sites. Amenities include a recreation hall, game room, swimming pool, laundry, and cabin rentals.

Smith Grove Campground is southeast of Butler. Amenities at the site include full hookups, convenience store, heated showers, swimming pool, and a lake for fishing.

Hart's Content Campground is near Brush Creek Park between Zelienople and Beaver Falls. Recreational opportunities near the site include whitewater paddling, swimming, golf, and fishing.

Camps

In addition to campgrounds, there are three camps within the project area—Lutherlyn, Camp Spencer, and Camp Redwing.

Lutherlyn is a year-round ministry of the Evangelical Lutheran Church of America. Located in the natural setting of Connoquenessing Township, there are 640 acres, two lakes, and 17 miles of trails that support a variety of recreational opportunities. Some of them include rock climbing, canoeing, ropes courses, fishing, swimming, volleyball and basketball, camping, and horseback riding. Programs offered include weekly summer camps, day camps, family camps, environmental education programs, and horseback riding lessons and programs.

Cabins at Lutherlyn used to host attendees of camps and conferences

Camp Spencer, also known as Camp Kon-O-Kwee, owned and operated by the YMCA occupies 500 acres of fields and woodlands along Connoquenessing Creek in Fombell. It provides one-to-two week camping experiences for children ages seven to 15. Recreational opportunities include boating, archery, riflery, tennis, basketball, baseball, soccer, softball, volleyball, swimming, fishing, hiking, nature study, rappelling, ropes courses, backpacking, and rock climbing.

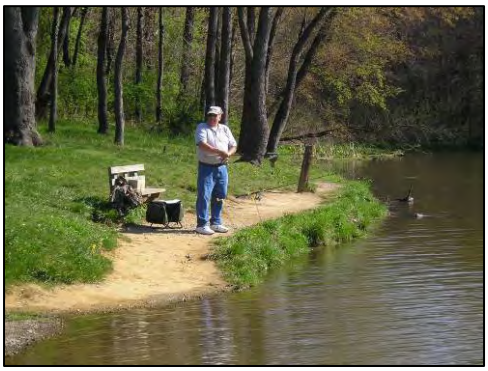
Camp Redwing is a Girl Scout camp located on 123 acres of woodlands near Renfrew. Owned and operated by the Trillium Council of the Girl Scouts of America, the camp has been in existence since 1922. Recreational opportunities include horseback riding, swimming, and boating. A swinging suspension bridge crosses Connoquenessing Creek at the site.

Recreational Opportunities

According to the U.S. Fish and Wildlife Service, in 2000 there was an estimated 272,000 youth anglers in Pennsylvania (PFBC). This is a decline of six percent from 1995, according to statistics from the National Survey of Hunting, Fishing, and Wildlife Recreation. Over the past ten years, statistics show a declining trend of recreational sports participation.

Fishing

Since 1866, the protection and management of the commonwealth's waterways for recreational purposes has been the responsibility of the Pennsylvania Fish and Boat Commission (PFBC, 2005). Managing fishery resources and regulating recreational fishing and boating are primary responsibilities of PFBC. Nearly two million people fish in Pennsylvania each year, and it is estimated that anglers have an economic impact of $1.65 billion (PFBC, 2006a).



Glade Run Lake is a popular destination for local anglers

The first Pennsylvania fishing licenses sold in 1922 for one dollar. This was the first time that PFBC was a self-sustaining organization, with an annual income of $207,425 from fishing licenses (PFBC, 2005). By 1995, the income from license fees, fines, penalties, and other exceeded $32 million. More than 821,000 licenses sold and 500,000 trout stamps purchased; a decrease of 9.4 percent from 2004. The cost of a fishing license in 2007 was $21, and an additional $8 for a trout stamp (PFBC, 2006c).

The Connoquenessing watershed is primarily a Warm Water Fishery (WWF). Of the 21 named tributaries entering Connoquenessing Creek, all but three are designated as WWF. Little Connoquenessing Creek and Thorn Creek (Penn Township) are identified as Cold Water Fisheries (CWF). The headwaters of Connoquenessing, source to the Oneida dam, and the headwaters of another stream called Thorn Run (Oakland Township) to the Thorn Run Reservoir/Dam are designated as High Quality WWF (Pennsylvania Code, 1997).

Approved Trout Waters include streams, lakes, ponds, and reservoirs that meet criteria qualifying them to be stocked with trout by PFBC. Four streams, or portions of them, have qualified as Approved Trout Waters; they include Bonnie Brook, Connoquenessing Creek, Little Connoquenessing Creek, and Thorn Creek, which are all stocked with brown and rainbow trout (PFBC, 2006c). In addition, Glade Run Lake and both the lower and upper Hereford Manor Lakes are classified as Approved Trout Waters and stocked with rainbow trout. For more information on stocking schedules and locations, please visit the PFBC website (http://www.fish.state.pa.us).

Two **Special Regulation Areas** exist – Glade Run Lake and lower Hereford Manor Lake. The sites participate in the Early Season Trout-Stocked Waters Program and the Big Bass Program.

The **Early Season Trout-Stocked Waters Program** offers an early trout season from March 1 to March 31. During this season, anglers are limited to three fish per day, and fish must be at least seven inches in length. Waterways participating in this program are stocked with a portion of the spring's trout allotment (PFBC, 2006c). The lower Hereford Manor Lake and Glade Run Lake are Early Season Trout-Stocked Waters stocked with rainbow trout.

Lakes participating in the **Big Bass Program** are closed to all fishing from March 1 to the opening day of trout season unless the lake is also a participant in the Early Season Trout Stocked Waters Program. When a lake is enrolled in both programs the lake is closed to all fishing beginning April 1 to opening day of trout season. As a participant in the program, anglers can only keep largemouth bass, smallmouth bass, and spotted bass that are over 15 inches long. The catch is limited to four fish per day. Between April 1 and June 16, waterways regulated in the Big Bass Program are catch and immediate release only (PFBC, 2006c).

Hunting

Hunting is a popular recreational activity throughout western Pennsylvania. The Pennsylvania Game Commission (PGC) manages and regulates hunting in Pennsylvania. An individual can begin hunting at 12 years of age following the successful completion of a hunter safety course. The number of hunters in many states has been rapidly declining, but Pennsylvania has seen a leveling of participation. 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 (PGC, 2004).

Only one State Game Lands is within the project area, providing public land for hunting. State Game Lands 164 includes 456 acres, and is managed for bear, deer, grouse, squirrel, and rabbit.

Programs, such as Cooperative Farmland and Cooperative Forestland Game Programs, provide additional acres to the public for hunting. These programs involve individual landowners willing to allow public hunting on their private property.

The Cooperative Farmland Program was established in 1936 to protect farm property against acts of vandalism and increase hunting opportunities. It provides landowners with advice and incentives to conserve soil, increase wildlife habitats, and implement other beneficial practices. The Cooperative Farmland Program, includes the safety zone and farm game programs. The safety zone program involves individual landowners, with a minimum of 50 acres, opening their land for public hunting, while the farm game program includes several safety zone locations blocked together. Having land enrolled in the farm game program provides better incentives for the landowners. Safety zone participants can receive seedlings each spring and pheasant stocking, while farm game participants (in addition to incentives for safety zone participants) are eligible for additional habitat improvement projects.

The Cooperative Forestland Game Program opens up additional hunting opportunities by working with individual forestland owners, with parcels greater than 1,000 acres, who are willing to allow public hunting on their property.

Boating

Boating recreation is also regulated under the jurisdiction of the PFBC. It is estimated that more than 2.5 million people boat on the 83,000 miles of rivers and streams in Pennsylvania each year. In 2005, approximately 350,600 boats were registered. It is estimated that boating within the commonwealth

generates a $1.7 billion impact to the economy each year. In 2005, revenue to the PFBC from boating through licenses, fines, penalties, and others was $11,147,689 (PFBC, 2006a).

The canoe launch at the Butler soccer fields in its early development stage

PFBC manages 250 public access areas to Pennsylvania's waterways; In addition, many other access points are managed by organizations and municipalities. In 2005, in an effort to increase public access to waterways for boating, the Boating Facility Grant Program was initiated. This program provides funding to public entities for the establishment of 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.

Pennsylvania Environmental Council (PEC) and local residents are working to establish a water trail for Connoquenessing Creek. The water trail when completed will be a map and guide for paddling along the creek. The production of the water trail is in its infancy, with current efforts surrounding the identification of potential access points. Before the trail guide can be developed, an adequate number of public launch sites will need to be established. The Boat Facility Grant Program would likely be a good source of funding to establish access points identified by the Connoquenessing Creek Water Trail.

Four initial areas have been identified as potential access locations. They include sites in Ellwood City, Harmony, Forward Township, and Butler.

- In Ellwood City, the area behind the sewage treatment plant has been identified as a potential site for a public access. The Borough of Ellwood City owns the property and is interested in establishing public access.

- Within the borough of Harmony, the PFBC has a lease agreement to establish a canoe launch at the end of Jackson Street.

- The ball fields in Forward Township would be an ideal location for a public launch. The land is publicly owned, utilized for recreation, and has parking available. Installation of the launch area is all that would be needed for this site. According to PEC, development of this site could be completed before the 2007 paddling season begins.

- In Butler, the first public launch has been developed at the Athletic Fields, property owned by the Butler School District. It was a combined effort between Butler School District, Connoquenessing Watershed Alliance, and the city of Butler. The partnership was awarded a Growing Greener II grant for stream and streambank improvements at the site. However, increased marketing of the site, including signage and public awareness, are still needed and could be obtained with the completion of the Connoquenessing Water Trail.

Other potential launch areas discussed include the park along Glenwood Way, Renfrew Park, Camp Redwing, and Country Club Golf Course.

Environmental Education

Environmental education is a learning process that increases knowledge and awareness of the environment and associated challenges (National Environmental Education Advisory Council, 1996). It develops skills and expertise to address challenges; and fosters attitudes, motivation, and commitment to make informed decisions and take responsible action.

Heath Gamache explains the mine drainage system at Lutherlyn's Semicon Run treatment site

The agricultural community was the first to utilize environmental education through the teaching of conservation practices. Early practices expanded to include land-use problems, preservation of natural resources, water quality improvements, and protection of native plant and animal species. Educating the public about important environmental challenges and developing knowledgeable citizens actively participating in addressing these challenges is critical to sustaining the balance between environmental and human activities; ensuring the health and welfare of the watershed, protecting human health, advancing quality education, expanding employment opportunities, promoting sustainable development, and protecting our natural heritage (Pennsylvania Department of Education, 2002).

With rapid changes occurring in our environment, education of watershed stakeholders is an essential and ongoing process. Several organizations and agencies provide environmental education to landowners, students, and other stakeholders.

Pennsylvania Game Commission (PGC) provides a variety of educational programs. Wildlife Conservation Officers provide educational programs in schools. The programs are designed to be appropriate for each grade level. They also provide two teacher workshops—Project WILD and Pennsylvania Songbirds. Project WILD trains educators about the environment, the outdoors, and their interactions. This program is designed to assist educators of grades K–12. It evaluates activities and cross-references them with Pennsylvania Department of Education's (PDE) environment and ecology standards developed in 2002. Pennsylvania Songbirds, a similar program, provides teacher workshops and lesson plans. It is co-sponsored by the Audubon Society, PGC, and DCNR. In addition to workshops and programs, PGC has reference materials available to all educators.

Pennsylvania Fish and Boat Commission (PFBC) provides several workshops for educators, including the Keystone Aquatic Resource Education (KARE) teacher workshop and Pennsylvania Amphibian and Reptile educator workshop. These workshops provide educators with curricula to meet environmental standards required by PDE. PFBC can provide numerous educational videos, brochures, and fact sheets for students and educators on a variety of topics.

Pennsylvania Department of Conservation and Natural Resources (DCNR) provides educational programs through its various divisions. The Bureau of Forestry is a leader in educating people about forestry and native wild plant conservation and management. Audiences include school-aged children, educators, organizations, local governments, private landowners, consulting foresters, industry, and the general public. The Office of Wild Resource Conservation produces a variety of education materials: posters, activity books, and videos for the state's conservation agencies, PDE, and conservation groups.

Watershed education programs are offered through Pennsylvania State Parks, a part of DCNR. Programs provide school-aged children with field-learning experiences through hands-on activities. Moraine State Park, although not located in the project area, provides these programs for the greater region.

Pennsylvania Department of Environmental Protection (DEP) provides a range of environmental education opportunities. DEP hosts several workshops and conferences, attend community festivals, provide resource information, and educational programs. It is just one of the many groups that assist with the Envirothon competitions, locally and statewide. An Envirothon is an environmental competition that is designed to cultivate a desire to learn more about the natural environment. Not only do Envirothon competitions teach environmental facts and concepts, but they also instill an understanding of the ecological and community factors that are involved in environmental decisions and actions.

County Conservation Districts are active in educating citizens about the environment. They work with local landowners, the agricultural community, industries, local governments, and other agencies to implement best management practices. Conservation districts provide educational programs to school-aged children through school programs, community events, and Envirothon competitions. Allegheny, Beaver, Butler, and Lawrence County Conservation Districts serve the watershed.

Penn State Cooperative Extension works with individuals, families, businesses, communities, and schools through informal educational opportunities. Local offices provide residents with easy access to the resources and expertise of Pennsylvania State University through educational programs, publications, and events. There are offices in each county in Pennsylvania along with regional offices over seeing nine to 16 county offices. The project area is located within two different regional offices. Allegheny and Beaver counties are under the jurisdiction of the southwest region, while Butler and Lawrence counties are under the jurisdiction of the northwest region.

PA CleanWays is a non-profit organization empowering people to eliminate illegal dumping and littering in Pennsylvania. Within the project area, there are two chapters – Allegheny County chapter and Butler-Lawrence counties chapter. Chapters work to identify and clean-up illegal dumpsites and educate area residents about the effects of illegal dumping and proper waste disposal. As of 2007, Beaver County does not have a chapter.

Connoquenessing Watershed Alliance attends various community festivals and events to educate residents about the watershed in their backyards. In addition to encouraging community members to get involved with their extensive monitoring program, the group has been working with local school districts to engage students in watershed efforts.

Lutherlyn Environmental Education Program (LEEP) provides a variety of high quality environmental educational programs. LEEP provides field trips, teacher workshops, scouting programs, group outings, and maple sugaring trips. At its facility near Prospect, a three-story nature center encourages learning about the environment.

The Eberly Environmental Education Center, at Lutherlyn encourages environmental learning in a natural setting

Hereford Manor Lakes Conservancy works with the PFBC to manage the Upper and Lower Hereford Manor Lakes. Educational efforts are geared toward the preservation of the lakes, dams and fishing in the region. As quoted on the group's Website, "Many people are not aware of the danger of losing this delicate watershed ecosystem. If the dams are breached

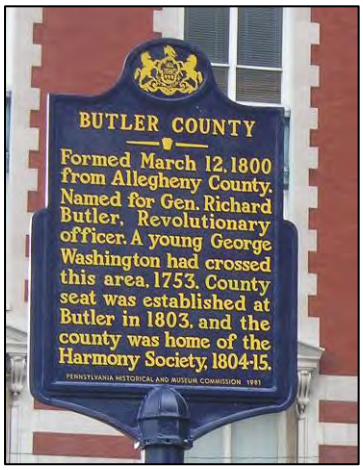
we lose the lakes, if we lose the lakes we lose the fish and waterfowl, and the area becomes an ugly strip-mined scar" (Hereford Manor Lakes Conservancy and Watershed Group, Inc).

Archaeological Resources

Artifacts could be found anywhere people worked, lived, or recreated documenting their history, as long as these materials survived over time. Artifacts are archaeological evidence, such as bits and pieces of objects that were made, used, discarded, or lost through daily activities. This evidence often represents the only surviving record of an era, and can provide new information about where, when, and how people lived (Society for Pennsylvania Archaeology, Inc., 2004).

Collecting and preserving artifacts requires certain procedures for identification and documentation. Knowing the exact location where each artifact was found is essential. All collectors, amateur and professional are encouraged to register their findings. The Pennsylvania Historic Museum Commission (PHMC) maintains a statewide registration program for archaeological discoveries known as the Pennsylvania Archaeological Site Survey or PASS.

Historical Resources



Historical marker located at the Butler County Courthouse

Historical Overview

Allegheny County was created on September 24, 1788, from Westmoreland and Washington counties, and named for the Allegheny River, which flows through it. Then, on March 12, 1800, portions of the county were split to form Butler and Beaver counties. Butler County, named for General Richard Butler, comprises Donation and Depreciation Lands granted to compensate Revolutionary War veterans. Beaver County created from portions of Washington County named for the Beaver River (Pennsylvania State Achieves).

On March 20, 1849, Lawrence County formed from portions of Beaver and Mercer counties. For the first flagship of Commodore Oliver Hazard Perry, the USS Lawrence, named in honor of Captain James Lawrence, Lawrence County was named (Pennsylvania State Achieves).

Prehistoric Period

The prehistoric period, the time before European contact, is named that because there is no written record for historians to study. This period of time is also referred to as the pre-contact or pre-Columbian period.

Before European settlers first stepped foot in Pennsylvania, Native Americans were common throughout the commonwealth. As Europeans came, they brought with them many new technologies and goods, such as copper kettles, sharpened iron tools, and European woven cloths. Native Americans would trade animal pelts and land for these goods, becoming dependent on European trade (Burkett).

However, not all European influences were beneficial to Native Americans. Diseases and alcohol had devastating results on Native American communities and on their physical and social well-being. By the 1800s, the majority of Native Americans had been forced from Pennsylvania to Ohio, Canada, or further west. Those who remained tried to blend in by changing their names, religion, customs, and jobs.

The earliest inhabitants in Pennsylvania were known as the Paleo Indians. They resided here during the **Paleo Indian Period,** or final glacial period, approximately 10,000 to 20,000 years ago. Artifacts, such as tools and arrowhead points, are rare and scattered, suggesting a nomadic lifestyle. They are believed to have lived in small communities of 20 to 30 individuals within natural rock shelters and were frequently moving. They hunted game species common within the area including elk, turkey, and whitetail deer (Burkett).

As the climate warmed during the **Archaic Period** coniferous forests covered the region. The presence of humans was rare until edible plants, nuts, and modern game species became evident around 6500 B.C. Native Americans that inhabited the area during this period were much like their predecessors, functioning as hunters and gatherers (Burkett).

During the **Woodland Period**, 1000 B.C. to 1500 A.D., the Native Americans lifestyle had changed considerably. They were learning to cultivate crops, and for the first time were able to produce a surplus of food. They began following an annual cycle of planting, hunting, and fishing that sometimes required them to commute between villages and seasonal encampments. This new lifestyle led to the development of work patterns and a division of labor between genders. While the men were out hunting and fishing, the women tended to the crops. In order to store excess food pottery was developed (Burkett).

European Settlement

Europeans arrived in Pennsylvania during the 1600s to find that Native Americans already inhabited the region; evident by their villages, fields, camps, and paths, they had been here for some time. The Iroquois Confederacy controlled the land in 1753, when the French came to the western Pennsylvania region. From 1784-1785, the commonwealth of Pennsylvania purchased the region from the Iroquois through the Treaty of Fort Stanwick. The area remained largely unsettled until 1795 when the Treaty of Greenville was signed.

Early European settlements within western Pennsylvania were established for transportation purposes along the larger watercourses, such as the Allegheny and Beaver rivers. Smaller streams and tributaries, like those within the Connoquenessing valley, did not meet the needs of early settlers, and remained relatively undisturbed.

The earliest known settlers within the area were James Glover and Peter Kinney, or McKinney. James Glover is credited as the earliest settler in Butler County. Glover was a blacksmith, Revolutionary soldier, and an avid hunter who was living in Pittsburgh. During one of his hunting trips through the region he discovered a deer lick in what is now known as Adams Township. That fall, a few years prior to the settlement of the country, he built a cabin near the site where he later established his primary residence.

Peter McKinney, who also had been a Revolutionary soldier, always claimed that he and his family located in Butler County in 1792. His “squatter” improvement was located within what is now Forward Township. He became a noted hunter and the founder of Petersville, later to become Connoquenessing.

There were a number of other hunters, explorers, and squatters in the region since 1790. But it was not until 1796, and the assurance of safety from the Native Americans, that settlement of the region began in earnest.

The majority of pioneer settlers were of Irish, Scotch, or Scotch-Irish decent (History of Butler County, 1883a). There were also some settlers of German and other descents. For the most part, the settlers were scattered about, with a few stronghold communities. As the name suggests, the area around Donegal was an Irish community. The Scotch decedents concentrated in the area between Little

Connoquenessing Creek and Connoquenessing Creek. Germans, following the influence of Detmar Basse, came into the region around what is now Jackson Township in 1802. He founded Zelienople in 1803 and named it after his daughter, Zelie.

Another German settler, George Rapp, entered the region in 1804. He and his religious followers established Harmony. Within 10 years, they developed a prosperous community. By 1814, the society had built 130 buildings including factories and mills. Exhausting their markets and resources, the group known as the Harmonie Society, sold the land to a Mennonite blacksmith and moved to the Wabash River in southwest Indiana. Mennonites led the area's resettlement.

Industrial

Agriculture was the earliest industry in the region. The abundance of available land and the desire for untilled land expanded the Pennsylvania frontier westward. The golden age for farming in the commonwealth, between 1770 and 1840, saw millions of acres of forestland converted to farmland. By 1820, more than 90 percent of the working population was involved in the agricultural industry.

Mining within the watershed began in the early 1800s with the opening of the Murtz and Kearns mines during the 1810s. The Harmonie Society operated mines through the region beginning in 1815. Mines within the region started as small mines and as demand increased they expanded into the big producers common in western Pennsylvania today.

Coal was in demand before, during, and after the oil and gas boom. The establishment of the railroads increased its demand. Coal was used for industry, businesses, and homes and became a basic commodity. Majority of the mining remaining in the region today is not for coal but other commodities such as limestone.

By the 1860s the industrial revolution was in full swing, making it harder for Pennsylvania farms to compete with out-of-state farms. The small family operations had transformed from manual operations to a highly specialized, mechanized, and scientific industry. New technologies and equipment decreased workloads and increased productivity and yields. After the 1840s, Pennsylvania farmers had lost their political advantage, and the booming industries of oil, steel, coal, railroads, and manufacturing took over.

The Harmonie Society played an important role in the commerce and industry of western Pennsylvania. Their products were sold as far away as New Orleans, and their investments into the railroad, canals, oil fields, lumber industry, and banks were a catalyst for the region's economy. In 1824, the Society returned to Pennsylvania establishing the town of Economy in Beaver County, later renamed Ambridge.

From 1860 to 1869, there were many attempts in drilling for oil. On February 11, 1860, the Butler Oil Company was organized, and it focused its drilling near Butler. Several people had made claims of successfully drilling for oil, but the first serious success story occurred on September 7, 1860. It occurred on the land of Archibald McMillen, approximately four miles southwest of Portersville. The well drilled to a depth of eight feet below creek level (History of Butler County, 1895b).

More companies were founded after the success on the McMillen property, such as Butler Pioneer Oil Company. On February 5, 1861 it made its first attempt drilling 800 feet at a location southwest of Butler. It was unsuccessful.

In 1865 the Butler Oil Company was dissolved. However, in 1868, many of the original Butler Oil Company founders reunited to form Jacob's Oil Company. The group found success in February 1869. After drilling 100 feet below the producing sand, the drill was slowly lifted until a flow of three barrels

per day was obtained. Once all the tools had been removed, the well's output increased to sixty barrels a day, proving that Butler County did have oil fields worth cultivating (History of Butler County, 1895b).

After World War I (1918), the oil and gas industry declined and manufacturing operations slowed, leading to the end of the population growth in the region.

In 1854, a private bank was opened in Butler by Campbell, Bredin, and Company. It operated for 10 years, until the organization of the First National Bank of Butler. Then in 1868, the Butler Savings Bank was formed, and was very prosperous. Between 1870 and 1873, a number of private banks opened and closed. In 1879, after 15 years of banking, the First National Bank of Butler failed and was closed.

In 1890, a group of oil investors founded Butler County National Bank. During the 1910s and 1920s, banking services expanded to include investments and other services that were aided by the expansion of the stock market. In 1929, the Butler County National Bank expanded services into foreign and agricultural markets hiring more employees. It even purchased several smaller banks in the region. Then, with the stock market crash of 1929, the Butler County National Bank joined Mellbank Group, an affiliation of Mellon Bank, to mitigate effects of the crash. The bank struggled through the 1930s, as did many financial institutions, and after the founder and President's death in 1937, it became the Butler Branch of Mellon Bank in 1948.

In the early 1900s, residents of the region realized they needed to transition from resource extraction industries to value-added or manufacturing activities. As a first phase in the Industrial Revolution the production of railroad cars, and steel bridges were needed. In 1902, the Pullman Standard plant was built needing a year-round workforce leading to the development of housing in Butler and the railroad.

Postal Delivery

In colonial times, communications depended on friends, merchants, and Native Americans to carry messages between colonies. However, most correspondence ran between the colonies and England. William Penn established Pennsylvania's first post office in 1683 (U.S. Postal Service).

In May 1775, as the colonies began to separate from England, a Continental Congress was organized to establish an independent government. One of the first questions before its delegates was how to convey and deliver the mail. Benjamin Franklin was appointed chairman of the committee to establish a postal system and was later appointed as the first Postmaster General (U.S. Postal Service).

The present postal service descends from the system planned by Benjamin Franklin, and history rightfully accords him major credit for establishing the basis of the postal service for the American people (U.S. Postal Service).

In the days prior to telephones, radios, and televisions, communication from the outside world could only be obtained through mail and newspapers. Mail was delivered to the post office and then picked up by recipients. Many families, particularly agricultural families, waited days, weeks, or months before picking up their mail. They had to coordinate trips for supplies, food, or equipment to pick up mail.

In 1796, a privately operated mail service began operating between Pittsburgh and Erie. Mail was carried every two weeks and transported by horseback. Leaving from Pittsburgh, the route traversed Cranberry Township and Evans City on its way to Erie. Depending on weather conditions, the trip took three to five days. By 1801, the U.S. Postal Service took control of the route and mail was delivered to the nearest tavern or store once a week. With the opening of the Pittsburgh-Mercer road in 1805, the route was changed, eliminating Evans City and adding Zelienople (Cranberry Township Historical Society, 1989a). A second route was established, from Pittsburgh to Franklin by way of Evans City.

In 1818, the frequency by which mail was delivered increased to twice a week. Sometime before 1827, the delivery method changed from horseback to stagecoaches carrying passengers and packages, in addition to mail. Daily mail service was initiated in 1827.

In the early days, the cost to send a letter varied depending on the destination. Letters traveling less than 40 miles cost eight cents, 40-60 miles 10 cents, and 25 cents for anything over 500 miles.

The first post office in the region was established in Whitestown in 1831. Edward White was the first postmaster from 1831 to 1839. Post offices were established throughout the region until 1893, when Postmaster General John Wanamaker from Pennsylvania introduced rural delivery (U.S. Postal Service).

With rural delivery, farmers and other settlers would no longer have to wait days or weeks to get mail. The mail would be delivered directly to them. Farmers were delighted with the new service, although there were people against it, because of safety and cost. As a result, many of the smaller post offices were closed. Rapidly growing Cranberry Township did not have a post office until 1994 when the mail became too much for neighboring post offices (Cranberry Township Historical Society, 1989a)

As mail delivery evolved from foot to horseback, stagecoach, steamboat, railroad, automobile, and airplane, infrastructure was needed. A byproduct of postal delivery was the development of good roads. Local governments began extending and improving existing highways after the postal service refused rural delivery on routes because of poor road conditions.

Historical markers identify the route George Washington followed in 1753

Transportation

Early forms of transportation routes were well-worn paths created by Native Americans. These paths provided a means for travel and trade among distant and diverse Native American communities. The most famous within the project area is the Venango Path. It traveled from the forks of the Ohio River (Point State Park in Pittsburgh) to Franklin (Venango County) (History of Butler County Pennsylvania, 1883l).

Washington Trail is the route George Washington followed in 1753 to deliver a message from Virginia's governor Robert Dinwiddie to the French, ordering them to evacuate the region (Washington's trail through Butler County). On this dangerous expedition, Washington was shot at by a "French Indian ally" below Murdering Town approximately eight to 10 miles northeast of Mars (Robertson, personal communication, 2007). He endured excessive rains and snow, and nearly drowned in the Allegheny River. His journey marked the beginning of the French and Indian War.

With the increasing number of settlers entering the region, more transportation improvements were needed. In the early days, packsaddles were used to transport goods and commodities from one place to another. They followed mere paths over hills, and through the woods. In the early 1800s, the establishment of roadways was just beginning. A network of roads and canals were being built in order to transport agricultural products and raw materials to market.

Local roads were authorized by the Court of Quarter Sessions. In 1804, local residents petitioned for several new roads: Butler to Freeport, Butler to the Armstrong County line, Butler to the Venango County line, Butler to Mercer, and Mercer to the Butler County line through Zelienople (History of Butler County Pennsylvania, 1883b).

In 1796, the Venango Trail was widened to become the first wagon road leading north from Pittsburgh. By 1806, a state road from Pittsburgh to Mercer had been laid out, as well as a road traveling south from Butler.

One obstacle to the development of area roadways was numerous creeks and streams. During most of the year, the flow of streams would not permit safe crossing. Early efforts were taken to build bridges spanning the larger streams. The first bridge built to cross Connoquenessing Creek was petitioned to the Court of Quarter Sessions in 1805. The cost of the bridge was $500 (History of Butler County Pennsylvania, 1883b).

By the mid 1800s, railroads were well established throughout the region, revolutionizing land transportation, and transforming the standard of living. Manufacturing was beginning to flourish, with coal and lumber being transported to consumers, raw materials to foundries and mills, and finished products to market. Railroads were used to transport goods and materials over long distances quickly and cheaply, connecting regions that were once isolated. Railroads even led to the establishment of today's standardized time zones.

When the Erie Canal linked New York City's ports to the Midwest market, Pennsylvania, in order to compete, established the Main Line of Public Works. The Main Line utilized a patchwork of canals, railroads, and incline planes to transport goods. Although this system worked well for transportation within Pennsylvania, it took three and a half days to travel between Pittsburgh and Philadelphia.

In 1878, the Pittsburgh and Western Railroad established tracks along Breakneck Creek. Developments along the railroad corridor lead to the establishment of Mars, Callery, and Valencia. This railroad later became part of the Baltimore and Ohio Railroad.

Trains were utilized for passenger and mail services. Passenger services were used for daily transportation and long distance travel. During times of war, railroads were used to transport soldiers and supplies to and from the front lines. Many railroads were established along waterways because of their even grades, leading to the industrialization of factories and plants near rivers for access to the rail lines.

Railroad use steadily diminished with improvements in automobiles, truck transportation, and highway infrastructure. During the 1960s and 1970s, railroad companies struggled to stay in business, and many failed. Remaining within the project area are 86 miles of active railroad lines.

By 1927, there was a worldwide demand for automobiles. Recognizing this demand Sir Herbert Austin, designer of the Austin Seven, opened the American Bantam Car Company in Butler. Debuting the American Austin in 1930, the factory was producing approximately 100 cars a day. However, the Great Depression caused the factory to close in the spring of 1932, but only for a short time. Roy Evans, a large automobile dealer, acquired the factory and production was operating again by fall. By 1935, over 20,000 vehicles were produced at the factory and Evans had purchased the assets of the company from its shareholders (Butler County Historical Society[1]).

In 1940, responding to a request from the military for designs of a military vehicle, Evans contracted Karl K. Probst to work with plant manager Harold Crist and Bantam's military sales representative Commander C.H. Payne. The prototype was delivered on September 23 where it was rigorously tested and exceeded expectations. However, the government felt the Bantam's facility in Butler was too small and granted the contracts elsewhere (Butler County Historical Society[1]).

Despite the set back the Bantam Car Company continued development with the introduction of the Reconnaissance car, an all-purpose military vehicle. This vehicle was the first jeep invented, and is the ancestor of four-wheeled drive vehicles (Butler County Historical Society[1]).

Education

Many pioneer settlers had limited education and wanted more for their children. The first schools were subscription schools, which required fees for students to attend. In 1790, a school law was passed relating to subscription schools, increasing the number of schools.

Passing of the Schools Act in 1802, lead to the organization of the first public school in 1804. In 1805, the first schoolhouse was built in Adams Township. Early school buildings were constructed from logs, similar to early homes. In 1810, The Butler Academy was the first building erected for the sole purpose of education in Butler.

Little red schoolhouse historical site in Butler is an eligible property for listing in the national registry

In 1821, Johnson McKnight, a local farmer, became the first teacher from Muddy Creek Township. Denied entrance to the school because of his gender, he returned home, borrowed his wife's clothes, then returned to the school and was granted admission (History of Butler County, 1883c).

In 1834, the Common Schools Act was passed to establish a general system of education. There was a great deal of resistance to the new act. The new system provided free education for all students at a cost to landowners in the form of taxes. By 1854, much of the resistance within Butler County had subsided, and there were 175 school buildings. The new schools evolved from the original log cabin structures; with better buildings, better teachers, and a better system of instruction (History of Butler County, 1895a).

Important People

General Richard Butler, Butler County's namesake, was a Revolutionary War hero. He was a friend of George Washington and Marquis de Lafayette. In 1800, when Allegheny County was divided into eight counties, the county directly north was named in his memory.

Barbara (Hall) Feldon, known as Agent 99 from the television show "Get Smart," had lived in Butler County as a child.

United States Senator Walter Lowrie**,** from Butler**,** served from 1812 to 1818. He was elected Secretary of the Senate in 1819, an office he maintained until 1836.

George Rapp**,** a German weaver and vine tender, founded the Harmonie Society and the town of Harmony.

John Roebling, founded Saxonburg and devised a technique to use wire ropes as a safety improvement for inclined planes, and later adapted the use for suspension bridges. This adaptation made it possible for the Brooklyn Bridge and others to cross previously unspanable waters.

In 1895, Ralph C. Stiefel, a Swiss-born engineer, invented a rotary piercing process used in making steel tubing. In addition, he helped establish the Ellwood Weldless Tube Co., which later became the core of the National Tube Division of U.S. Steel.

George "Rube" Wadell, a professional baseball player who pitched for the Philadelphia Athletics, was raised in Prospect, Pa. In 1946, he was named to the baseball Hall of Fame.

Interesting Tidbits

Filming for the movie, "Night of the Living Dead" occurred around Evans City and at the Evans City Cemetery in Jackson and Forward townships.

September 1940, the jeep was invented in Butler, Pa. It was a small four-wheel drive vehicle developed by a team under the direction of Karl Probst. Originally produced by the American Bantam Car Company in Butler, it was a World War II prototype.

Cranberry Township was named after the wild cranberries that once grew along Brush Creek. Cranberries typically grow on shrubs or vines in moist areas with spongy soil, such as swamps or marshes, also known as bogs. When preparing land for agriculture, early settlers drained much of the marshy habitat needed for the cranberries to grow. In 1989, members of the Cranberry Township Historical Society, in efforts to recreate the Cranberry Bog, planted cranberry cuttings in a marshy, undeveloped area of Cranberry Community Park (Cranberry Township Historical Society, 1989b).

Breakneck Creek, originally named Big Beaver Run by the Native Americans, got its name because of a horse that allegedly fell and broke its neck on a stony path next to the creek.

Connoquenessing Creek and Connoquenessing Borough were named from a Native American word meaning, "for a long way straight."

Historic 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. A listing in the register honors historic properties, but does not interfere with the property owner's rights. Private property owners have no obligation to maintain or manage their property, and can dispose of their property as they see fit. Sites located within the project area are listed in Table 5-2 and Figure 5-2.

Diamond Street West Log Building is a property eligible for listing on the National Register

The Pennsylvania Historical Museum Commission manages the register for Pennsylvania. The state historic preservation officer submits nominated properties to the state review board. If the property owner, or the majority of the owners (if the property is owned by more than one person), objects to the nomination, it is sent to the National Park Service for a determination of eligibility without formally listing the property in the National Register (National Park Service, 2001).

Historic Structures

Eight historic structures identified within the project area are listed on the national register; an additional 38 sites are identified as eligible for listing. The seven listed sites played a significant role in military, architecture, politics and government, commerce and trade, domestic, education, landscape, recreation, culture, religion, and social history of the region. A majority of the sites retain their historically significant use.

The **James Beach Clow House,** a well-preserved Greek revival farmhouse built in 1830, is situated in a rural setting that offers a 180-degree panoramic view of its natural surroundings. The structure maintains its set–back, rural location today.

The **Butler Armory**, listed in 1991, was utilized for defense, and continues that use today. Built in 1922 for the 112th infantry of the Pennsylvania National Guard by W.G. Wilkins Company and Joseph F. Kuntz of Pittsburgh, the armory was one of 37 laid out on a "T plan" design.

Built in 1855, the **Butler courthouse** was built on the site of two previous courthouses. The site had been the focal point for local government since shortly after the creation of Butler County. The structure has a high Victorian gothic style with Romanesque accents.

Butler's first "skyscraper", **Butler County National Bank**, was built in 1902 and 1903. It is a six-story structure. From the legacy of the oil, gas, and industrial boom in the region, Butler County National Bank was founded in 1890 by prominent oil investors.

Elm Court, the estate of Benjamin Dwight Philips, features a 40-room residence built around an enclosed central court. Completed in 1930, the structure was the headquarters for Mr. Philips' philanthropic endeavors. Built by Mr. Philips, a scion of the T.W. Philips family owners of a large natural gas and oil company in Butler, the building was one of two buildings in Butler designed by Benno Janssen.

Senator Walter Lowrie House, (also known locally as the Lowrie-Shaw House) built in 1828, home of United States Senator Walter Lowrie, is an early western Pennsylvania vernacular architecture style structure. Senator Lowrie served from 1812 to 1818, and was elected Secretary of the United States Senate in 1819, an office he maintained until 1836.

John Roebling House, built between 1832 and 1835, is not a historic architectural structure. However, it is the location where Roebling discovered the stranded steel cable. Also located at the site is a second structure, built in 1841, known as the Roebling Shop where the steel cable was manufactured.

The **Passavant House,** built in 1809, is the oldest house in Zelienople. It was a wedding present for Zelie Basse Passavant and her husband. Her father, "Baron" Frederick William Detmar Basse, the town's founder, named the town of Zelienople after Ms. Passavant.

Historic Districts

Three historical districts identified in the region are listed on the national register. They include the Butler Historic District, Saxonburg Historic District, and the Harmony Historic District, (locally known as Harmony National Historic Landmark District). Four districts eligible for listing include Butler Industrial Historical District, South Butler Historic District, Pittsburgh Circle Historic District, and Secular Harmony Historic District.

The center diamond of the Harmony National Historic Landmark District

The Harmony National Historic Landmark District in Harmony and Jackson Township is among a small percentage of historical places that have national significance. The Secretary of the Interior has identified it as a National

Historical Landmark (NHL), being that it possesses exceptional value or quality in illustrating or interpreting the heritage of the United States. Fewer than 2,500 historic places currently bear this national distinction (National Parks Service).

Harmony is recognized as the first home of the Harmonie Society. More than 50 principal structures were built by the society in the district between 1805 and 1814. The town was laid out around a central square that remains today. The Harmonie Society was one of the most successful early American communal groups, with its high degree of commercialization and the important role it played in the development of western Pennsylvania

The Harmony Museum is located within the Harmony National Historic Landmark District. The museum interprets all periods of the areas history, including relics from the days of the Harmonie Society. Tours of the site are available Tuesday through Sunday from 1:00 p.m. to 4:00 p.m (Historic Harmony, 2001).

Table 5-2. Historic Sites, Structures, and Districts

Site	Location	Status	Date
Allegheny County			
No sites in the watershed			
Beaver County			
James Beach Clow House	North Sewickley Township	Listed	5/17/1989
Butler County			
Miles Covert Farm	Adams Township	Eligible	4/14/2004
George Ebert House	Adams Township	Eligible	4/14/2004
Galletta's Winter Haven	Adams Township	Eligible	4/14/2004
The Baltimore & Ohio Railroad	Adams Township	Eligible	4/14/2004
Treesdale Farms	Adams Township	Eligible	8/8/1991
United Presbyterian Orphan's Home	Adams Township	Eligible	9/17/2004
Butler Industrial Historic District/ Butler Industrial Corridor	Butler Township/City of Butler	Eligible	5/5/1994
Atlas Hotel	City of Butler	Eligible	4/6/1994
Butler Armory	City of Butler	Listed	7/12/1991
Butler County Courthouse	City of Butler	Listed	9/15/1977
Butler County National Bank	City of Butler	Listed	11/7/1995
Butler High School	City of Butler	Eligible	6/12/1987
Butler Historic District	City of Butler	Listed	5/29/2003
Diamond Street West Log Building	City of Butler	Eligible	7/18/1984
Elm Court	City of Butler	Listed	12/6/1979
Institute Hill School Hill	City of Butler	Eligible	5/23/1983
Little Red Schoolhouse	City of Butler	Eligible	6/9/1992
Senator Walter Lowrie House *(Locally known as Lowrie-Shaw House)*	City of Butler	Listed	3/1/1979
Pullman Standard Railcar Company	City of Butler	Eligible	9/27/1988
Ferdinarnd Reiber House	City of Butler	Eligible	1/22/1993

Table 5-2. Historical Sites, Structures, and Districts (continued)

Site	Location	Status	Date
Butler County (continued)			
W.H.H. Riddle House	City of Butler	Eligible	6/29/1988
South Butler Historic District	City of Butler	Eligible	5/5/1994
Wayne Street Viaduct	City of Butler	Eligible	5/5/1994
Nicholas Dambach Farm	Cranberry Township	Eligible	1/27/1998
Frederick Meeder Farm/ Drovers' Inn	Cranberry Township	Eligible	1/27/1998
Clyde R. Sauers Trucking Company	Cranberry Township	Eligible	1/27/1998
Valley Farms	Cranberry Township	Eligible	4/14/2001
Miller House Hotel	Evans City Borough	Eligible	2/19/1988
Harmony Historic District *(Locally known as Harmony National Historic Landmark District)*	Harmony Borough	NHL	5/30/1974
P. Otto Residence/ Thomas Murray	Harmony Borough	Eligible	6/14/1994
Alfred Pierce House / Hotel Ziegler	Harmony Borough	Eligible	1/16/1994
Secular Harmony Historic District	Harmony Borough	Eligible	6/30/1994
David M Zeigler Farmstead	Jackson Township	Eligible	7/22/2005
Ziegler Farm	Jackson Township	Eligible	6/14/1994
Gillespie Farm	Middlesex Township	Eligible	4/14/2004
Evans-Park House	Middlesex Township	Eligible	4/14/2004
William Hays Farm	Middlesex Township	Eligible	4/14/2004
Park-Raisley-Lisman House	Middlesex Township	Eligible	4/14/2004
William M. Wicks Farm	Oakland Township	Eligible	12/14/1993
John Roebling House	Saxonburg Borough	Listed	11/13/1976
Saxonburg Historic District	Saxonburg Borough	Listed	2/14/2003
Eagle Coal Company Tipple	Summit Township	Eligible	2/17/1988
Joseph Allen House	Zelienople Borough	Eligible	12/19/1994
Cooper Apartments	Zelienople Borough	Eligible	9/26/1994
Robert Ift House	Zelienople Borough	Eligible	12/12/1994
Henry Muntz House	Zelienople Borough	Eligible	10/28/1992
Passavant House	Zelienople Borough	Listed	4/11/1977
Strand Theatre	Zelienople Borough	Eligible	3/7/2002
Lawrence County			
Ellwood City U.S. Post Office	Ellwood City Borough	Eligible	5/22/1984
Pittsburgh Circle Historic District	Ellwood City Borough	Eligible	5/8/1991
Shelby Tube Bridge	Ellwood City Borough	Eligible	3/11/1996
Trefoil Lodge	Ellwood City Borough	Eligible	6/29/2000

(Source: Pennsylvania Historic Museum Commission, 2007; National Park Service, 2006, Pennsylvania Historic Architecture and Archaeology)

Local Attractions

These sites enhance the cultural "sense of place" within the region. The museums, historical sites, and structures play an important role in the culture of the region and western Pennsylvania. Although not listed on the national register, other significant historical sites and structures exist.

Woolslayer Bridge extends 75 feet across Brush Creek in New Sewickley Township, Beaver County

Providence Plantation is a 44-acre farm near Evans City that is being recreated into an 18th century plantation. The plantation is to become a living-history interpretation and educational resource demonstrating what living on the frontier was like. Once a month, between April and December visitors can visit the plantation and partake in a re-creation of the 18th century, which includes entertainment and cuisine (Wills, 2007).

Woolslayer Bridge, the only covered bridge, remaining in the project area, is located at Brush Creek Park. No longer utilized for vehicular traffic, it is a central landmark for Brush Creek Park. Originally built in 1890 and then rebuilt in 1976, the bridge spans 75 feet over Brush Creek.

The *Maridon Museum* is located in downtown Butler, Pa. It is the only museum in western Pennsylvania that focuses on Chinese and Japanese art and culture. The museum is open Tuesday through Sunday.

Remnants of Bassenheim Furnace, the first charcoal-fired blast furnace in western Pennsylvania

Remnants of *Bassenheim Furnace* are located just off Route 228 in Franklin Township. This is the only iron furnace site remaining in Beaver County.

Pullman Park, built in 1934, was the former home of the New York Yankees (minor league team), Cleveland Indians (Pennsylvania State Association league), Detroit Tigers (Mid-Atlantic League), and the 1951 Pittsburgh Pirates. Located in Butler, Hall of Fame players Joe Di Maggio and Whitey Ford played at Pullman Park. Renovations at the site to upgrade the facility and possibly bring professional baseball back to Butler County are ongoing (Butler County Historical Society[2]).

Chapter 6. Issues and Concerns

A fundamental element of watershed conservation planning is providing ample opportunities for open and direct communication between plan developers and local citizens. Stakeholders were given the chance to provide their unique perspective on topics affecting the region and everyday life. Western Pennsylvania Conservancy (WPC), Connoquenessing Watershed Alliance (CWA), and Connoquenessing Creek Watershed Conservation Plan steering committee hosted a series of public meetings and met with groups and individuals to ascertain these views. Public meeting workshops, public and municipal surveys, and stakeholder interviews were used to identify the issues and concerns of area residents, which are presented in this chapter. The expressed views and opinions represent those of the stakeholders, and do not necessarily reflect the views and opinions of WPC, CWA, or project steering committee.

Meeting Summaries

Community members prioritize issues and concerns that were identified during the initial public meetings

Initial Meetings

In September 2006, WPC, along with CWA and steering committee, hosted a round of four public meetings in Ellwood City, Harmony, Mars, and Butler. During these meetings, the process used to develop the Connoquenessing Watershed Conservation Plan was introduced to the community. Background information about Pennsylvania Department of Conservation and Natural Resources (DCNR) planning process was presented. Attendees were given their first opportunity to identify important local issues and concerns.

Advisory Committees

In March 2007, a group of local residents, identified by the project steering committee as individuals with expertise or knowledge of the area and watershed resources, were invited to serve on advisory committees. Five committees were formed, one for each resource category (land, water, biological, cultural, and socio-economics). Committee members were asked to review the plan for consistency, accuracy, and missing information prior to public release. Members also were involved in the prioritization of the management recommendations.

Student Workshops

In May 2007, local school students from Butler Junior High School participated in a workshop designed to obtain the youth perspective regarding the watershed and its future. During the workshop, students identified future projects and discussed opportunities for student involvement in the management of the watershed. The results of these workshops will be identified later in this chapter.

Draft Presentation

In February 2008, another series of public meetings were held to announce the draft of the plan. Stakeholders were given the opportunity to review the plan and provide comments (Appendix K). Public comments were collected for 30 days and incorporated into the final plan.

Surveys and Interviews

Public and municipal official surveys were conducted, as well as key individual interviews. Both surveys and interviews identified how stakeholders use and perceive the area and its resources. Public

surveys were conducted anonymously, and distributed at public meeting workshops, community events and festivals, and were available on WPC's website.

Municipal official surveys were conducted in two parts. The first part consisted of a five minute phone interview with a representative of the municipality. During this phase of the survey, information regarding municipal planning and zoning, water and sewage services, and recreational facilities was collected. During the second phase, a follow up survey similar to the public survey was distributed to analyze the importance of certain issues and to document future projects the municipalities were planning or would like to have incorporated into the plan. Results of these surveys will be identified later in this chapter.

Approximately 56 individuals had been contacted for an interview, of which 32 participated. Interviews were conducted via telephone, unless otherwise requested by the interviewee. The purpose of conducting individual interviews was to delve more in-depth into the topic areas of the plan with individuals who were longtime watershed residents or possessed a wealth of knowledge in one or more of those topic areas. This method of public input allowed us to discuss concerns, cherished qualities, and management recommendations with those who are most familiar with the area. A copy of the interview questions is located in Appendix L, and results of the interviews will be identified later in this chapter.

Issues and Concerns

Many issues and concerns addressed by the watershed community are interconnected and cannot be addressed separately. Projects should be designed to address the issues collectively whenever possible. Issues identified by watershed stakeholders are summarized in the following sections.

Urban Sprawl and Development

City dwellers are expanding out of urban areas and turning the rural countryside of Butler County into suburbs of the city of Pittsburgh. Allegheny County has been experiencing a steady population decrease since the 1960s, with the largest decrease occurring between 1970 and 1980 (USA Counties). Meanwhile, neighboring Butler County has experienced a population change of 51.9 percent since the 1960s, increasing by more than 59,000 residents (USA Counties). This expansion from the city to neighboring rural areas is commonly referred to as urban sprawl.

Many stakeholders were concerned about urban sprawl and the implications that development may have on their communities, natural resources, social services, and economy. Development will occur; however, it can be done attentively and wisely through the implementation of cooperative land-use strategies and proper planning. Utilizing planning and Smart Growth principals, redeveloping industrial and brownfield sites, and improving existing infrastructure can ease some concerns about potential developments.

Residential development project

Smart Growth principals promote the use of sound land-use planning, including mixing land uses; making development decisions predictable, fair, and cost effective; strengthening and directing development toward existing communities; fostering distinct, attractive communities with a strong sense of place; and preserving open space, farmland, natural beauty, and critical environmental areas (Smart Growth Network, 2005).

Most participants recognized the economic benefits of a growing community, but were also alarmed by the associated effects on the environment and quality of life. They acknowledged that well-planned developments with precise controls could be positive additions to the community, but that proper planning is the key to positive development. Redeveloping abandoned industrial sites and brownfields, as opposed to developing farmland and open spaces, was preferred by many participants.

Improve infrastructure

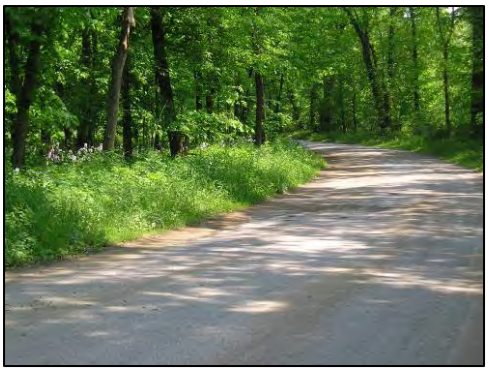
Infrastructure discussions frequently come entwined with development debates. The selection of a business location often correlates to the infrastructure and resources available. Areas lacking sufficient infrastructure will often be overlooked, even if prior industrial sites utilized the location. As development increases, infrastructure also must increase in order to be sufficiently capable of supporting community and business growth. Where infrastructure does not grow simultaneously with development, demand exceeds capacity, resulting in (for example) sewage overflows and/or a lack of services.

In northern Butler County, development is considered dependent upon installation of water and sewer infrastructure. Some respondents prefer minimal infrastructure, believing the deficit will discourage further development. Many had mixed feelings, desiring both better infrastructure and limits to residential development. The cost of infrastructure maintenance and upgrades is an additional concern for some.

Infrastructure critiques focused mostly on sewage overflows, which were blamed primarily on increased water runoff due to changing land uses and the connection of stormwater drains to sewage lines. Both contribute to water flows higher than sewage plants can handle, resulting in "overflows" of untreated water entering streams. Groundwater infiltration and illegal hook-ups to sewage lines also are considered to be contributing factors of overflows.

Malfunctioning private septic systems also attracted much criticism. Butler area summer homes, in particular, were critiqued for septic failures. In some areas, public sewage systems are replacing private septic systems, while in rural areas, rapid residential growth is fueling installation of new independent sewage systems. Several participants feel that inspections are too infrequent and regulations are frequently limited to new systems. Old systems are commonly "grandfathered," and thus exempt from new ordinances.

Maintaining and improving older infrastructure, as well as providing infrastructure in targeted growth areas, is important in controlling development.



In addition to the major routes that traverse the area, there are numerous secondary roadways

Transportation

According to participants, area roadways, for the most part, are in good condition. However, it was noted that many of the roadways are highly congested. Safety improvements, such as additional traffic signals, better exit and entrance ramps, frequent maintenance, bridge and culvert replacements, and wider shoulder margins, could be implemented. Commercial trucks in downtown Zelienople concern some participants, who suggested a bypass around Zelienople. Improvements to Routes 8, 68, and 228; connector roads to small towns from major highways; along with storm drains and grass swales to minimize water damage and runoff were additional suggestions.

Public transportation is lacking and insufficient according to the majority of interview participants. The lack of public transportation contributes to excess noise,

pollution, and congestions. Commuters to Pittsburgh, elderly residents, and other area residents could benefit from a public transportation system. Minimal public transportation services are available through Butler Transit Authority and New Castle Area Transit Authority. There are several other transportation options available for medical needs and senior assistance. Interested citizens may contact the local Area Agency on Aging for more information. A transit system is proposed between the City of Butler, Cranberry, and Pittsburgh.

Floodwaters in Harmony after heavy rains resulting from Hurricane Ivan drenched the area in September 2005. (Photo courtesy of Historic Harmony)

Flooding

Historically, flooding has been the most common natural disaster in the U.S. causing severe property damage and economic hardship (King, 2005). Flooding events, such as those following Hurricane Ivan and Hurricane Katrina, impact both rural and urban communities. Although the devastation of large events attracts the national spotlight, many smaller, more frequently flood-prone areas get little to no attention.

In 1968, National Flood Insurance Program (NFIP) was developed to identify flood hazards, conduct floodplain management, and offer insurance protection. The first step included the completion of floodplain maps to identify areas at risk for flooding. Participants believe that, within the watershed, these maps are out-dated and need to be redeveloped. Creating specialized maps for the local area is needed in addition to flood insurance maps produced by NFIP. In some areas, any period of prolonged precipitation cause the streams to overfill their banks. Although much of the area is prone to flooding, the areas in the lower section of Connoquenessing Creek, below Harmony, seem to endure greater impacts. Residents identified a need for a localized flood warning system.

Floodplains–the flat, low-lying area of land adjacent to rivers, streams, and lakes–are intended to allow the excess flow to spill over during storm events. Trees and other vegetation in these floodplain areas help to reduce the velocity of the water's flow, thereby decreasing the intensity of the floodwaters and degree of streambank erosion further downstream. Encroachment and development in floodplains not only increases the likeliness of flooding, but it increases damages. The establishment of structures and impervious surfaces, such as houses, buildings, and parking lots, in these areas remove natural vegetation and impede the water's movement into the floodplains, redirecting floodwaters, increasing erosion, impounding water, and increasing damages to life and property during storm events.

Many defend dredging as a viable solution to lessen frequent, low-level flooding under the concept of creating a deeper, wider stream channel capable of holding a larger volume of water. Dredging is the removal, displacement, and disposal of unconsolidated earth materials, such as sand, silt, gravel, or other submerged materials, from the bottom of waterbodies, ditches, or other natural wetlands (Mason County, 2006). Dredging of small streams has little to no effect during high-flow flooding events. Dredging can be expensive, and it is only a temporary solution to the problem. Its effectiveness is limited, and the process of dredging can reek havoc on in-stream and riparian ecology. United States Army Corps of Engineers (USACE) provides 50 percent of the cost for dredging operations, requiring local municipalities to provide the other 50 percent. Once the dredging is complete, the local municipalities are then responsible for the frequent maintenance and upkeep required to retain the dredged area. The deepened channel can lead to bank instability, which increases erosion and sedimentation. In time, the stream bottom will fill in with sediment again due to natural events, negating the process's temporary benefits.

An alternative to dredging is natural stream channel design. Natural stream channel design utilizes techniques to reshape and support streambanks through the installation of in-stream structures and vegetated streamside or riparian corridors, which better control floodwater and sediment. Reshaping the

streambanks sometimes creates a wider floodplain that is capable of handling higher storm flows. In-stream structures, such as rock vanes, redirect the stream flow away from the banks toward the center of the channel, minimizing erosion and stabilizing the streambank, allowing sediment to move downstream or collect at in-stream structures in ways that it improves rather than inhibits flow. Vegetation in the riparian areas holds soils in place during flood events and filters pollutants from runoff before entering the stream.

FEMA, through NFIP, has instituted the Repetitive Loss Program. The purpose of the Repetitive Loss Program is to buy frequently flooded properties that are straining the NFIP Fund, and assist residents in relocating to safer properties outside of the floodplain. The Hazard Mitigation and Relocation Assistance Act of 1993 clarified conditions for purchasing damaged structures, and stated that purchased properties must be dedicated for open space uses.

A repetitive loss property is any insurable building that, since 1978, has received two claims of $1,000 or more within a 10-year period. Repetitive loss properties are considered severe if four claims over $5,000 have been filed, in which two of these claims occurred within any 10-year period, and the cumulative claim amounts exceed $20,000. Properties can also be considered severe if two separate claims have been made for the building portion that exceeds the value of the property (King, 2005). Several properties within the Connoquenessing watershed have already been purchased under this program.

Water Quality

A primary goal identified by stakeholders was to maintain clean and healthy waterways. According to results from the municipal officials and public surveys, water quality improvements were identified as the most important watershed attribute. Some contributors believed Connoquenessing Creek has improved. Others noted that fishing had improved and that mussels can be found in some reaches, indicating fairly high water quality. Participants were particularly concerned with industrial pollution, stormwater management, septic and sewage control, erosion and sedimentation, E-coli breakouts, impaired waterways, and drinking water.

Porter's Cove Dam, one of several dams Wild Waterways Conservancy has proposed for removal reestablishing Connoquenessing Creeks natural flow

Industrialized areas, such as Butler and Ellwood City, raised concerns among stakeholders about industrial pollution and its affects on Connoquenessing Creek. A majority of these concerns were raised from historical issues, such as the pickling liquors discharged from AK Steel between 1995 and 2000 that caused a rise in the level of nitrates in the creek and impacted the drinking water for Zelienople residents (EPA Environmental News, 2000). Breakneck Creek Regional Authority wastewater treatment plant has caused some concern for area residents. Results from water sampling conducted before and during construction indicated negative impacts to the water quality and aquatic life (Kemp, personal communication, 2007).

Stormwater management was a reoccurring theme by a large number of participants. It involves planning for surface runoff into stream and river systems during rain or snowmelt events. Many noted that problems occur when there is a large amount of impervious surfaces—areas where water cannot infiltrate into the ground, such as buildings and paved surfaces—yielding more runoff. Specific concerns related to impervious surfaces and runoff were that water travels too quickly, increasing erosion and sedimentation. Stakeholders also felt that the hastened passage of pollutants to waterways lessened their absorption by

soil and vegetation. In addition, the increased volume of water added to sewage treatment plants stressed systems' holding capacities. Finally, stakeholders were concerned that the excess surface runoff increases the likelihood of flooding.

Saxonburg Area Sewage Treatment Plant

Some participants felt that sewage treatment is a growing concern, and others saw it as a declining threat. Municipal official survey participants felt there was adequate and comprehensive wastewater treatment available, with many areas receiving upgrades to their systems by 2007. Only a small portion, 35 percent, felt there would be some need for expansion or upgrading within the next ten years (2007–2017).

Septic and sewage control can be a challenging issue, and it varies depending on where you live. The majority of the public's concern regarding sewage control was the malfunctioning and nonexistent septic systems that allow nutrients and bacteria to enter water sources, which can cause contamination of streams and groundwater. This type of contamination can pose potential health hazards. Private septic systems concerned several participants. These participants noted that soils throughout the area are ill-suited for the purpose, and ordinances frequently ignore private septic systems, particularly older systems that are more likely to fail.

In urbanized areas, homes are connected to wastewater treatment plants. Sewage is pumped into these plants, where it goes through a three-step process to remove solid waste and treat the water. Once treatment is complete, the water is released back into a nearby waterway. Older wastewater treatment plants were designed to collect both wastewater and stormwater. When severe stormwater events occur and cause the system to exceed capacity, bypass valves often divert the excess water around the treatment system. These combined sewage overflows, or CSOs, allow raw sewage, nutrients, and bacteria to flow, untreated, to the streams and contaminate waterways. Designing wastewater treatment systems to adequately serve the communities is necessary. Separating stormwater from wastewater systems can ease the occurrence of combined sewage overflows.

When water is not treated properly or thoroughly, either through combined sewage overflows or malfunctioning on-lot septic systems, E-coli bacteria (*Escherichia coli*) can be released into waterways. Many municipal water supplies draw their water from the local streams, which could contain E-coli bacteria. Breakneck Creek and Brush Creek, in particular, were found to have elevated levels of E-coli present, according to the 2004 E-coli study performed by CWA (CWA, 2006). In addition to Breakneck and Brush creeks, Thorn Creek and Glade Run were identified for additional investigation.

A resident of the Brush Creek watershed noted that thousands of gallons of sewage were released in Brush Creek in 2006 due to a valve malfunction. Cranberry Township's sewage treatment plant is said to be "maxed out," as it cannot keep pace with surrounding development. Others reported that Cranberry experiences, on average, one sewage release per year. Ellwood City was known for excessive overflows, but a new treatment plant, which began operations in 2007, will reduce those occurrences. Another wastewater treatment plant, operated by the Saxonburg Area Sewage Authority, also was completed in 2007 at the mouth of Thorn Creek on the Connoquenessing. This should reduce future problems of failing septic systems, but one local resident fears sewage troubles elsewhere will now be concentrated at this new location. Marshall Township (Allegheny County) was praised for sewer system planning.

Erosion and sedimentation were identified as important issues. Erosion can result from a number of land-use practices, including construction activities, poor agricultural practices, and poor logging

techniques. Soils lacking vegetation are susceptible to extensive erosion, allowing large amounts of silt to enter the stream, especially during storm events. The sediment is then deposited on the streambed, often filling or blocking the channel. Erosion occurs on streambanks where little or no vegetation is present, because there are no roots to hold the soil in place. On streambanks lacking vegetation, native species could be planted to limit the amount of erosion and sedimentation in the streams and protect streambanks.

One of the major causes of soil erosion comes from one of the most controversial issues within the watershed, the use of all-terrain vehicles (ATVs). Drivers who prefer to ride on areas of steep slopes and streambeds, rip up vegetation, and allow additional sediment to enter streams. With the increasing interest in ATVs, keeping riders off private lands and unauthorized trails is difficult. Enforcement and strengthened regulations are needed within the project area. Establishing designated areas for ATVs and utilizing proper trail design could help control erosion and sedimentation and eliminate some of the trespassing issues.

Abandoned mine drainage from Semiconon Run entering treatment

Impaired waterways are streams in which designated uses have not been obtained. Designated uses are identified through historic and current uses of the waterbody. Impaired waters are listed in the Integrated Water Quality Monitoring and Assessment Report. More information about impaired waterways is available in the Water Resources Chapter.

Biodiversity

This region is fortunate to have a diversity of plants, wildlife, and natural communities within its boundaries. Biodiversity is, simply, the variety of life in an area. One component of biodiversity is habitat. High-quality, diverse habitats are needed for plants and animals to survive and thrive. High-quality biodiversity in an area also contributes certain intrinsic values, such as water and air purification, to improve the quality of life of humans living there.

Several people noted that declining bird species were returning to the region, including eagles, blue and green herons, ospreys, and songbirds. Improved water quality and overall environmental health is believed to have contributed to this return. On the flip side, some participants felt the diversity, overall numbers, and health of fish had declined. The suspicion was that habitat loss and degraded water quality were responsible. A few respondents said they had seen fewer anglers in recent years, possibly due to poor water quality, or at least the reputation the area had for poor water quality. The plight of songbirds and protection of their habitat was of concern for some participants. It was believed that excessive deer populations were competing for resources, and invasive exotic European starlings were out-competing native species as well.

Japanese knotweed is one of the invasive species prevalent along Connoquenessing Creek

One component of protecting biodiversity involves controlling invasive species. Invasive species, which are foreign to an area, can spread quickly and become difficult to eradicate. When invasives become dominant, they out-compete native species for resources, such as food, water, soil nutrients (in the case of plants), or places to reproduce and raise their young (in the case of animals). Not only do invasive species affect wildlife and plants, but multiple impacts to humans may result as well, including degraded aesthetics and property values, reduced timber value, and degraded water quality, just to name a few.

Wetlands, which provide critical habitat for wildlife, also control erosion, sedimentation, and pollutants from entering area streams. Wetlands also play an integral part in flood protection, groundwater recharge, and climate regulation. Vernal pools, one type of wetland, provide breeding habitats for some species of salamanders and frogs. Agriculture, industrial, commercial, and residential development, and other human activities have had significant detrimental effects on wetlands. It is estimated that over half of the nation's original wetlands have now been destroyed. As the understanding of the importance of wetlands increases, so does the interest in preserving them. It is important to understand how the loss of wetlands affects fish, wildlife, humans, and the environment. The preservation of wetlands was identified as an important issue during public meetings and surveys.

Riparian zones are important corridors for wildlife. They can enhance recreational activities, improve water quality, and provide habitat for aquatic species. These vegetated areas along streams, rivers, and lakes filter runoff and provide a transitional zone between land and water. By retaining water in the vegetation, riparian corridors can reduce flooding and erosion as well. Continued efforts to protect riparian corridors are needed.

Illegal dumping

In addition to being unsightly, illegal (or unauthorized) dumps pose direct health threats and have a high potential to contaminate waterways. Waste containing hazardous materials soaked by rainfall may cause contaminants to leach through the soil or run off the land surface, contaminating ground or surface water. Trash and debris can directly enter the stream during heavy rainstorms, affecting water quality, safety of humans and wildlife, and stream aesthetics. Debris can collect in the stream, clogging it, which raises water levels and causes flooding.

A combination of insufficient waste disposal opportunities, general disrespect for natural areas, and increased water runoff were listed as contributing factors. Route 19 was mentioned as a common litter corridor. One respondent noted that municipalities' well-intentioned requirement of using specific trash providers may encourage dumping, as residents lack the resources to use these outlets as intended.

Remote areas are prime locations for illegal dumpsites

Locating and cleaning up illegal dumpsites was an important issue for community residents. Reducing the number of illegal dumpsites can be accomplished through cleanups, education, and alternate disposal methods. Clean-up days along roadways or waterways were strongly supported, as was the development of a plan to help those who want to clean up, do so without spending exorbitant time and/or financial resources. Active participation by residents and local government officials is needed to address illegal dumping issues. In addition, educating the public about the threats of illegal dumping is an important step in battling the epidemic. PA CleanWays chapters and volunteers work to clean up illegal dumps across the state by adopting roadways and trails where dumping occurs. For more information about illegal dumping and what you can do to help, contact Butler/Lawrence counties chapter of PA CleanWays.

Increased recycling programs that are convenient for area residents could alleviate some of the illegal dumping activities. Curbside programs or community drop-off locations provide residents with alternative methods of disposing items. Hosting drop-off days for items that are costly and difficult to dispose of, such as tires, refrigerators, and computers, would provide area residents with an alternative to illegal dumping.

Recreation

The region possesses a variety of recreational facilities, both public and private. Having a variety of recreational opportunities for varying interests can help reduce drug and alcohol use and abuse by youth and adults.

Residents expressed an interest in capitalizing on recreational opportunities that exist or could be developed. Public access to area streams is limited. Pennsylvania Environmental Council (PEC) has been working with area residents to develop the Connoquenessing Water Trail. Through the development of the water trail, stream access points, canoe launches, map guides, and signage will be established.

The sledding area at North Boundary Park in Cranberry Township is a popular winter recreation destination

Another organization active in providing access to area streams is Wild Waterways Conservancy (WWC). They have been working with PEC on the development of the Connoquenessing Water Trail. One of the challenges to the trail is the number of dams along Connoquenessing Creek. WWC purchased one inactive dam with the intentions of removing it. Participants would like to see other inactive dams removed and portages built around active dams to ease passage for paddlers. Removing a dam also restores natural stream channel and flow patterns, allows aquatic species to migrate, and regulates water temperature.

Connecting recreational facilities to one another and enhancing amenities would be beneficial. Developing, extending, and linking trails were something that area residents said they would like to see. Establishing trails and paths near streams could provide additional public access to area waterways, in addition to connecting facilities.

Area residents also identified railroad corridor protection as a need for the watershed. The establishment of rails-to-trails along abandoned and inactive railroad lines could preserve these corridors for future use, while providing hiking and biking opportunities that area residents desired.

Environmental Education

Education is the key to getting citizens actively involved in improving the environment, communities, and quality of life for residents. Educating residents and municipal officials to understand the economic benefits and importance of watershed protection is essential to realizing improvements within the watershed. Environmental education is typically targeted to school-aged children. Adult environmental educational programs are limited. Implementing education programs to target adults and help landowners understand the importance of the watershed could be a first step in getting them more involved. Stakeholders have identified a need to make the public more aware of environmental issues affecting the local communities, such as illegal dumping, water conservation, flooding, and environmentally friendly development.

The Pennsylvania Department of Education (PDE) established environment and ecology standards, requiring educators and students to become more involved in watersheds. Educators often look to local organizations, such as watershed groups, to assist them in educating the youth. Reaching out to help the local school districts teach students about watershed issues may inspire kids to become more involved in their local communities.

Public Meeting Results

During the first round of public meetings, a visioning session was held to provide attendees with the opportunity to identify issues facing the watershed. The section below is a comprehensive list of all comments identified at those meetings.

1. **What do you like most about living in the area? What are the positive things about the watershed?**

Reply (# of votes)

- Rural characteristics of the small town environment and the privacy it provides (43)
- Variety of recreational opportunities, including state and local parks, that host different activities at each park (33)
- Natural Resources, including the diversity of the stream, the beauty of waterways, and the scenery (27)
- Good wildlife with rebounding bird populations (21)
- Kayaking and canoeing along the Connoquenessing and its tributaries; the development of the water trail; the last five miles are excellent for rafting (17)
- Interconnected trail systems with rail-trails, walking trails, and bike paths. (13)
- Organizations are involved in conservation; annual trash cleanups are held (9)
- Connoquenessing Creek is cleaner than in the past (9)
- There is community support of local initiatives and good local government; municipal supervisors are concerned about the area and consider impacts before acting (8)
- Good mix of land uses (Little Connoquenessing watershed is 55% forested) (8)
- Price of land (7)
- Air quality is better than city (6)
- Agriculture is a viable industry (6)
- Recreation value of the stream and the awareness of the value (6)
- History of the area is a resource, and is being highlighted and supported, such as the Washington Trail (6)
- Good commercial/retail activities, and in certain areas industry is growing (4)
- Riparian zones are mostly intact, and there is an increased effort of restoring riparian corridors (CREP) (3)
- Lots of possibility for change in the region (2)
- Good transportation (2)
- Mercer Street Bridge project—lessons used, recognizing the community as the driving force towards the bridge design (1)
- Agricultural preservation (added after voting)
- Rivers of Steel Heritage Area—in the process of adding Butler County to the region (added after voting)
- Drinking water source (added after voting)

2. **If you could change something about the area, what would you like to change and why? What improvements are needed?**

Reply (# of votes)

- Illegal dumping and junk cars; need stronger ordinances and enforcement; there is litter in stream corridors, mostly coming from specific areas (20)
- Industrial pollution and the reduction of industrial waste (18)

- Flood control—improve flood retention by controlling development and eliminate encroachment into floodplains (17)
- More funding, volunteers, and large dumpsters are needed for cleanup, as well as cooperation from the community (17)
- A need for more focus and education on waterways with stormwater affecting streams and the water trail that is being established (15)
- Wetland destruction—need wetlands restoration (15)
- Better, quicker alert to flooding; localized flood warning system (13)
- Debris from Hurricane Ivan and other sources needs to be removed to prevent damage, in addition to eyesores; financial incentives are needed (13)
- Better septic and sewage control; extension of sewage systems by municipality rather than small development systems (12)
- Flooding (12)
- Joint municipal entity efforts, working together for betterment of creek (11)
- Lack of communication between municipalities (10)
- Improper dirt and gravel road management - berming and dumping into the creek (9)
- Provide more stream access (9)
- Teach conservation earlier and as students get older; keep it interesting; try to get away from the "what is in it for me" mentality; also educate adults and parents to be role models for their children (7)
- Sewage overflows into streams; establish detention ponds for sewage waste as a back up when systems malfunction (7)
- Riparian tree plantings; better streamside vegetation (7)
- Instill recycling as an important community activity; have recycling bins available at community events and encourage churches to get involved; improve the process by creating incentives to increase recycling, such as pay-per-bag, rebates, and incentives for small business; explain Act 220 and the incentives to municipalities; better marketing of incentives to the general public (6)
- Need more pride in local environment (6)
- Creek silted-in, needs dredged (5)
- Clean the entire length of Breakneck Creek (5)
- Address the growing drug problem (5)
- Need conservation policing—someone to enforce existing ordinances (5)
- Power line spraying—herbicide (5)
- Fishing debris, more responsibility (4)
- Siltation and sediment in area streams (4)
- Higher level of municipal involvement (4)
- ATV illegal use and trespassing (4)
- Provide recreation opportunities as area grows, and increase funding (4)
- Continue improving water quality (3)
- Better oversight of municipal budgeting (3)
- Impacts from incinerator in East Liverpool, seems to be a lack in reptile and amphibians since the incinerator was established; needs a study (3)
- Improve streams to meet designated use (3)
- More finances and commitment to state routes (2)
- Identify and provide resources to protect critical habitats (2)
- Continue school environmental programs, encouraging hands on education (1)
- More activities related to youth interest and more advertising or marketing of these activities (added after voting)

Debris washed downstream during flooding events increases flooding potential and damages

- Connoquenessing Creek and Breakneck Creek have filled with debris after flooding (added after voting)
- Be progressive with maintaining history (added after voting)
- Less development (added after voting)
- Better zoning protection in Jackson Township (added after voting)
- Municipal land development planning (added after voting)
- Resources protected (added after voting)
- Railroads; maintain culverts and corridors, etc. (added after voting)
- Revitalize existing infrastructure; use abandoned buildings for new business as opposed to developing green areas (added after voting)
- Reduce E-coli in Breakneck Creek (added after voting)
- Improve impaired stream segments and identify solutions (added after voting)
- Soil conservation (added after voting)

3. What would you like to see for the future of the watershed in five, ten, twenty, or fifty years?

Reply (# of votes)

- Permanent public access to stream corridor (19)
- Watershed-based environmental advisory council or councils of government (18)
- Proper dredging (17)
- Local municipalities to take into account impacts to the watershed and streams when considering development projects (15)
- Improve stream sides, increasing attractiveness for new businesses (14)
- Establish creek-side paths; Pullman Park to rail trail along streams; lighted paths for night use (13)
- Removal of the dam at Hartman Road (Porter's Cove Dam) for boating and fish passage; or establish a portage around the dam (12)
- Expand public sewage, using alternative methods in rural areas (11)
- Remove repetitively flooded structures from floodplain; Repetitive Loss Program—purchasing of frequently flooded properties in the floodplain (9)
- Disaster plan for railroad along river (8)
- Education of youth about the local environment; Butler Jr. High as an example, but spread throughout watershed (8)
- Better in-stream habitat (7)
- Smart Growth Plan needs developed and enacted (7)
- Restore and improve areas in the city, such as the south side viaduct (7)
- Control invasive species (7)
- Increase programs educating residents about the watershed, both school programs and community programs for adults (7)
- Stream corridors preserved as is (7)
- Watershed to stay in present condition (6)
- Re-erecting dam (6)
- More flexible/less costly projects for Army Corps of Engineers involvement (3)
- More balanced transportation, including public service and state roads (3)
- Better and updated information and studies from FEMA about the floodplain (3)
- More water in the stream for recreation (3)
- Name-the-Tributary program to enhance local awareness (3)
- Adopt-a-Highway section expanded (2)
- Municipal drop-off day (2)
- Open access at Rock Point (1)

- Dam at Hartman Road: establish hydro-electric power to provide alternative energy for the region (1)
- Increased recreational use and appreciation of natural resources (added after voting)
- Less "flashy" character when it rains (added after voting)
- More cooperation and responsibility from railroad companies (added after voting)
- More authority to Fish and Boat Commission officers for litter, increase fines (added after voting)
- Less development (added after voting)
- Economic stability (added after voting)
- Good quantity of clean air and water (added after voting)
- Better drinkable water quality (added after voting)

Survey Results

Two types of public input surveys—general public and municipality—were conducted to gather information on the issues and concerns of watershed stakeholders. A comparison of results from public participants and municipal officials provided an interesting trend. Although the surveys were slightly different, for the most part, the results were the same. When asked what they thought the two most common land uses in their area were, both selected residential and agricultural.

When asked about watershed attributes and values, once again both groups agreed. Water quality improvements topped the list, with attractive natural settings and preserving historical sites coming in second and third respectively. The two groups only differed on the topic of new business and jobs. While the public ranked it seventh, municipal officials tied it for third.

Participants were asked to indicate the importance of recreational interests within the watershed from a list of 15 recreational opportunities. Choices included: very interested, somewhat interested, neutral, not-likely interested, and not interested. The results for this section varied due to different interests and opportunities being limitedly available in certain portions of the watershed. Participants did agree that hiking was the most popular recreational activity, and the use of all terrain vehicles was the least popular recreational activity. Combining the public participant and municipal official results provided the recreational opportunities of importance identified in Table 6-1.

Public Survey Results

Public surveys were distributed from June 2006 to July 2007. Surveys were available at public meetings, community events, and on the Internet. A total of 35 completed public surveys were returned. The results of the surveys were utilized to identify and prioritize the management recommendations within this plan.

Table 6-1. Recreational Opportunities of Importance

Recreational Opportunities	Public Total	Municipal Officials Total	Total Score
Hiking	49	24	73
Fishing	38	18	56
Visiting Scenic Vistas	43	12	55
Bird Watching	36	18	54
Picnicking	30	21	51
Canoeing/Kayaking	44	3	47
Biking	22	23	45
Photography	25	18	43
Visiting Public Parks	29	12	31
Boating	22	1	23
Hunting	8	10	18
Swimming	9	2	11
Horseback Riding	-5	6	1
Organized Sports	-9	10	1
All Terrain Vehicles	-38	-5	-43

1. In what county and municipality do you reside?

Marshall Township, Allegheny County – 1
Moon Township, Allegheny County – 1
Franklin Township, Beaver County – 2
Marion Township, Beaver County – 3
New Sewickley Township, Beaver County – 2
North Sewickley Township, Beaver County –2
Adams Township, Butler County –2
Butler Township, Butler County – 6
Center Township, Butler County – 2
City of Butler, Butler County – 3
Forward Township, Butler County – 1
Franklin Township, Butler County – 1
Harmony Borough, Butler County – 4
Jackson Township, Butler County – 1
Lancaster Township, Butler County – 1
Portersville Borough, Butler County – 1
Prospect Borough, Butler County – 1

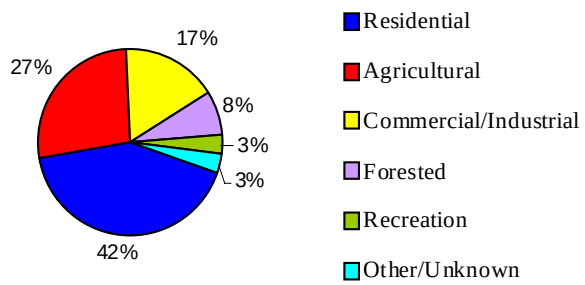
2. In what watershed do you reside?

19 Lower Connoquenessing Creek (Mainstem) –Little Connoquenessing Creek to mouth and including Brush Creek
4 Middle Connoquenessing Creek (Mainstem) –Thorn Creek to Little Connoquenessing Creek and including Glade Run, Breakneck Creek, and little Connoquenessing Creek
6 Upper Connoquenessing Creek (Mainstem) –Headwaters to Thorn Creek including Bonnie Brook and Thorn Creek
6 Don't Know
3 Other - Slippery Rock, Flaugherty Run

3. What do you think are the two most common land uses in your area?

29 Residential
22 Agricultural
11 Commercial
4 Forested
3 Recreation
3 Industrial
3 Other/Unknown

Figure 6-1. Common Land Uses as Viewed by Watershed Stakeholders and Municipal Officials



4. Please indicate the importance of the following watershed values.

Scores were weighted to their importance with very important receiving two points, somewhat important receiving one point, neutral receiving no points, not likely important receiving a negative one point and not important receiving a negative two points and multiplied by the number of responses.

	Very Important	Somewhat Important	Neutral	Not likely Important	Not Important	Total
Water Quality Improvement	2*29=58	1*9=9	0*0=0	-1*0= 0	-2*0=0	= 67
Attractive Natural Settings	2*29=58	1*8=8	0*1=0	-1*0= 0	-2*0=0	= 66
Preserving Historic Sites	2*20=40	1*14=14	0*4=0	-1*0= 0	-2*0=0	= 54
Educational Opportunities	2*18=36	1*11=11	0*6=0	-1*2= -2	-2*0=0	= 45
Recreation Opportunities	2*15=30	1*16=16	0*6=0	-1*1= -1	-2*0=0	= 45
Community Activities	2*7=14	1*18=18	0*10=0	-1*1= -1	-2*1=-2	= 29
New Business/Jobs	2*8=16	1*12=12	0*9=0	-1*3=-3	-2*5=-10	= 15
Residential Development	2*7=14	1*12=12	0*8=0	-1*3=-3	-2*8=-16	= 7

	Very Important	Somewhat Important	Neutral	Not likely Important	Not Important	Total
Other: Farmland Preservation	2*2=4	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 4
Other: Riparian Corridors	2*1=2	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 2
Other: Agriculture	2*1=2	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 2
Other: Fishing	2*1=2	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 2
Other: Flood Mitigation	2*1=0	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 2
Other: Open Space Preservation	2*1=2	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 2
Other: Water Powered Dam	2*1=2	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 2
Other: Water Purity	2*1=2	1*0=0	0*0=0	-1*0=-0	-2*0=-0	= 2
Other: Wildlife Conservation	2*1=0	1*0=0	0*1=0	-1*0=-0	-2*0=-0	= 2

5. Please indicate the importance of the following recreational activities in the watershed.

Scores were weighted to their importance with very important receiving two points, somewhat important receiving one point, neutral receiving no points, not likely important receiving a negative one point and not important receiving a negative two points and multiplied by the number of responses.

	Very Important	Somewhat Important	Neutral	Not likely Important	Not Important	Total
Hiking	2*22= 44	1*9=9	0*0=0	-1*0= 0	-2*2=-4	= 49
Canoeing/Kayaking	2*16= 32	1*14=14	0*0=0	-1*2=-2	-2*0= 0	= 44
Visiting Scenic Vistas	2*15= 30	1*15=15	0*1=0	-1*0= 0	-2*1=-2	= 43
Fishing	2*18= 36	1*8=8	0*0=0	-1*4=-4	-2*1=-2	= 38
Bird Watching	2*14= 28	1*10=10	0*1=0	-1*2=-2	-2*0= 0	= 36
Picnicking	2*10= 20	1*13=13	0*1=0	-1*1=-1	-2*1=-2	= 30
Visiting Public Parks	2*10= 20	1*15=15	0*3=0	-1*2=-2	-2*2=-4	= 29
Photography	2*11= 22	1*9=9	0*1=0	-1*2=-2	-2*2=-4	= 25
Boating	2*7= 14	1*14=14	0*1=0	-1*2=-2	-2*2=-4	= 22
Biking	2*7= 14	1*14=14	0*1=0	-1*2=-2	-2*2=-4	= 22
Swimming	2*7= 14	1*8=8	0*1=0	-1*5=-5	-2*4=-8	= 9
Hunting	2*10=20	1*5=5	0*0=0	-1*5=-5	-2*6=-12	= 8
Other: Trapping	2*1=2	1*0=0	0*0=0	-1*0= 0	-2*0= 0	= 2
Other: Snowmobiling	2*1=2	1*0=0	0*0=0	-1*0= 0	-2*0= 0	= 2
Other: Skateboarding	2*0=0	1*0=0	0*0=0	-1*0= 0	-2*0= 0	= 0
Other: Skating	2*0=0	1*0=0	0*0=0	-1*0= 0	-2*0= 0	= 0
[#]Golfing	2*0= 0	1*0=0	0*1=0	-1*1=-1	-2*1=-2	= -3
Horseback Riding	2*3= 6	1*1=6	0*1=0	-1*3=-3	-2*7=-14	= -5
Organized Sports	2*2= 4	1*5=5	0*2=0	-1*4=-4	-2*7=-14	= -9
ATV Riding	2*1= 2	1*3=3	0*1=0	-1*5=-5	-2*12=-38	= -38

[#] *not all surveys contained this recreational activity*

6. Things participants like about the watershed:

- Recreational opportunities (17)
- Scenic/natural beauty (12)
- Small community/rural character (11)
- Diversity of wildlife and wildlife habitats, including sizeable natural areas, riparian corridors, and plant life (11)

- Water quality and restoration efforts (5)
- History (4)
- Diversity of land uses (3)
- Accessibility (4)
- State Parks (2)
- Adams Township supervisors care (1)
- Animals and livestock (1)
- Area of land development buy-outs (1)
- Being able to walk around town/safe community (1)
- Close proximity of cultural activities (1)
- Educational opportunities (1)
- Good roads and transportation (1)
- Living between little and big upper waters (1)
- Potential for growth (1)
- Stressing value of watersheds to the environment (1)
- Close to home (1)
- Inexpensive to use the watershed (1)
- Slippery Rock University is nearby (1)
- Employment is local (1)

7. Things participants don't like about the watershed:

- Pollution (13)
- Development/urban sprawl (11)
- Illegal dumping/trash/debris (10)
- Flooding (6)
- Limited access (6)
- Indifferent people/limited progress/uncaring property owners (5)
- Water quality pollution (5)
- Deteriorated buildings (2)
- Lack of recreational opportunities (2)
- Transportation and traffic (2)
- Channelized streams (1)
- Drugs (1)
- Invasive species (1)
- Landowner rights violations (1)
- Not enough wetland protection (1)
- Scenic value is underestimated (1)
- Stormwater (1)
- Excessive siltation pollution (1)
- Water temperature becomes to warm in summer months (1)
- Some parts are in urban areas (1)
- More medical access is needed (1)
- More jobs are needed (1)

Connoquenessing Creek below AK Steel in Butler is channelized and tainted with invasive species

8. Suggestions to improve conditions in the watershed:

- Identify, monitor, and clean-up contamination sources, including remediation efforts, increasing funding, repairing malfunctioning on-lot systems, enforcing violations, increasing penalties for causing impacts, improve infrastructure, and manage stormwater (10)

- Increase recreational opportunities and green space, such as new trails, parks, fishing, and canoeing opportunities (8)
- Increase public education, including watersheds and pollution impacts (7)
- Watershed-wide cleanup to remove trash and debris, clean up illegal dumpsites, and remove remnants from Hurricane Ivan by providing a legal mechanism for trash removal, such as public dumpster locations (7)
- Protect wetlands and swamps through restoration efforts, replacement, not altering existing sites, and prohibiting developments in floodplains and wetlands (5)
- Control sprawl (4)
- Increase public access to streams, possibly through landowner programs (4)
- Establish flood control through the updating of floodplain maps, involving FEMA, and removing repeatedly flooded structures (3)
- Recycling (3)
- Dredge sections of the creek (2)
- Identify "natural areas," and encourage protection by allowing these areas to flourish (2)
- Preserve creek conditions, and amend land development ordinances to protect streams (2)
- Protect riparian corridors through increasing their size and number, and encourage the purchase of conservation easements protecting them indefinitely (2)
- Develop and improve wildlife habitat (2)
- Educate the public about how rivers naturally work and why dredging is not needed (1)
- Control invasive species (1)
- Establish a tax to improve recreation (1)
- Organize interested parties (1)
- Publicity (1)
- Purchase right-of-ways (1)
- Main Street revitalization (1)
- Multiple municipal cooperation (1)
- Support farming (1)
- Stream improvement projects (1)

Breached dam on Thorn Creek below Saxonburg Water Treatment Facility

9. Other comments or concerns:

- Consult with Pennsylvania Department of Environmental Protection and Pennsylvania Fish and Boat Commission to see how several unneeded dams can be removed
- Clean water, any endangered species at risk, flooding and the costs to the communities
- Are you aware of the plant list for the watershed available from Morris Arboretum of PA flora on-line
- Connoquenessing water trail inclusion, Wild Waterways Conservancy-local land trust in Zelienople, PEC-natural infrastructure mapping, Lawrence/Butler County Scenic byway plans
- Reducing flood damage to property owners and to ensure that recommendations and regulation do not restrict growth; we dislike mandates
- Private property owners/verify if Connoquenessing is navigable
- Butler County is fairly conservative and is often reluctant to get behind anything that could infringe on private property owner rights
- Farmers need to stop erosion
- A private property near Ellwood City has been filled in and changed the natural topography and wildlife of the community, this should be restored
- Educational possibilities in environment, limited building permits in floodplains and wetlands; allow for meandering streams

- We need to maintain our natural areas and redevelop some of our older areas to enhance the use and care of our waterways and forests, and encourage their use on both short and long term bases—close areas for lunch, study, walks, etc…
- Abuse of private property owner rights by people using the creek; we find the more people you let in, the more problems you create for the owners of properties along the creek; the rights and privacy of property owners must be protected
- Consumptive uses are important
- People lack a sense of ownership, i.e., a connection to the watershed where they live; how can this be addressed; when there is a perceived connection, responsible land uses and ownership are more likely to occur
- Need improvements on Route 422 and Interstate 79 Interchange in Muddy Creek Township, Butler County; make it a true clover leaf
- Need to find a way to preserve access to the streams

Municipal Survey Results

1. What county and municipality do you represent?

Allegheny County – Bradford Woods Borough, Pine Township, Richland Township
Beaver County – New Sewickley Township
Butler County – Callery Borough, Center Township, City of Butler, Clay Township, Clearfield Township, Clinton Township, Connoquenessing Borough, Connoquenessing Township, East Butler, Franklin Township, Harmony Borough, Jefferson Township, Middlesex Township, Oakland Township, Portersville Borough, Saxonburg Borough
Lawrence County – Ellport Borough, Ellwood City Borough

2. In what watershed(s) is your municipality located?

6 Lower Connoquenessing Creek (Mainstem) –Little Connoquenessing Creek to mouth and including Brush Creek
6 Middle Connoquenessing Creek (Mainstem) –Thorn Creek to Little Connoquenessing Creek and including Glade Run, Breakneck Creek, and little Connoquenessing Creek
4 Upper Connoquenessing Creek (Mainstem) –Headwaters to Thorn Creek including Bonnie Brook and Thorn Creek
6 Don't Know
2 Other – Pine Creek and Muddy Creek

3. What do you think are the two most common land uses in your area?

23 Residential	8 Commercial/Industrial	1 Water/Wetlands
11 Agricultural	6 Forested	1 Recreational

4. Please indicate the importance of the following watershed values.

Scores were weighted to their importance with very important receiving two points, somewhat important receiving one point, neutral receiving no points, not likely important receiving a negative one point and not important receiving a negative two points and multiplied by the number of responses.

	Very Important	**Somewhat Important**	**Neutral**	**Not likely Important**	**Not Important**	**Total**
Water Quality Improvement	2*17=34	1*6=6	0*1=0	-1*0=0	-2*0=0	= 40
Attractive Natural Settings	2*13=26	1*10=10	0*1=0	-1*0=0	-2*0=0	= 36
Preserving Historic Sites	2*12=24	1*4=4	0*6=0	-1*2=-2	-2*0=0	= 26
New Business/Jobs	2*10=20	1*7=7	0*5=0	-1*1=-1	-2*1=-2	= 24
Educational Opportunities	2*9=18	1*8=8	0*4=0	-1*2=-2	-2*1=-2	= 22
Recreation Opportunities	2*8=16	1*8=8	0*6=0	-1*2=-2	-2*0=0	= 22
Community Activities	2*6=12	1*11=11	0*5= 0	-1*1=-1	-2*1=-2	= 20
Residential Development	2*6=12	1*9= 9	0*8= 0	-1*0=0	-2*1=-2	= 19
Other: Non-Residential Development	2*0= 0	1*0= 0	0*1= 0	-1*0=0	-2*0= 0	= 0
Other: Tourism	2*0= 0	1*0= 0	0*1= 0	-1*0=0	-2*0= 0	= 0
Other: Stormwater Management	2*0= 0	1*0= 0	0*1= 0	-1*0=0	-2*0= 0	= 0

5. Please indicate the importance of the following recreational activities in the watershed.

Scores were weighted to their importance with very important receiving two points, somewhat important receiving one point, neutral receiving no points, not likely important receiving a negative one point and not important receiving a negative two points and multiplied by the number of responses.

	Very Interested	Somewhat Interested	Neutral	Not-likely Interested	Not Interested	Total
Hiking	2*11=22	1*5=5	0*8=0	-1*1=-1	-2*0=0	= 26
Biking	2*7=14	1*10=10	0*7=0	-1*0=0	-2*0=0	= 24
Picnicking	2*10=20	1*4=4	0*8=0	-1*1=-1	-2*0=0	= 23
Bird Watching	2*8=16	1*6=6	0*8=0	-1*0=0	-2*1=-2	= 20
Fishing	2*10=20	1*3=3	0*8=0	-1*1=-1	-2*1=-2	= 20
Photography	2*6=12	1*8=8	0*8=0	-1*0=0	-2*0=0	= 20
Visiting Public Parks	2*4=8	1*9=9	0*7=0	-1*2=-2	-2*1=-2	= 13
Visiting Scenic Vistas	2*6=12	1*5=5	0*8=0	-1*4=-4	-2*0=0	= 13
Organized Sports	2*4=8	1*5=5	0*10=0	-1*3=-3	-2*0=0	= 10
Hunting	2*8=16	1*4=4	0*4=0	-1*3=-3	-2*4=-8	= 9
Canoeing/Kayaking	2*6=12	1*4=4	0*7=0	-1*3=-3	-2*4=-8	= 5
Horseback Riding	2*4=8	1*4=4	0*9=0	-1*5=-5	-2*1=-2	= 5
Swimming	2*3=6	1*5=5	0*9=0	-1*4=-4	-2*2=-2	= 3
Boating	2*5=10	1*3=3	0*9=0	-1*3=-3	-2*4= 8	= 2
ATV Riding	2*4=8	1*1=1	0*9=0	-1*2=-2	-2*7=-14	= -7

6. Does your municipality have a comprehensive plan? YES or NO

16 of the 23 responded yes 6 of the 23 responded no 1 municipality did not know

7. Does your municipality currently utilize zoning and subdivision ordinances? YES or NO. If yes, what types of ordinances do you have?

Zoning – 18 yes, 5 no
Subdivision – 18 yes, 5 no

**Please note the 18 that said yes for zoning are not necessarily the same 18 that said yes for subdivision.

8. Does your municipality have floodplain ordinances? YES or NO

14 of the 23 responded yes 7 of the 23 responded no 2 of the 23 were not sure

9. What are the three most critical needs or challenges in your county or municipality that affect the Connoquenessing Creek watershed?

- Flood prevention (4)
- Potential development – residential, business and economic (4)
- Funding for any type of project along the creek
- Sanitary sewer project/failing septic systems (3)
- Streambank restoration along Brush Creek
- Transportation and roadway improvement
- Limited access to creek for recreation (2)
- Improve water quality of Brush Creek
- Effects of farming along Brush Creek
- Industrial pollution
- Nature
- Fishing
- Mining
- Illegal dumping
- Providing green space
- Recreational activities (2)
- Environmental education
- Safe drinking water supply
- Controlling stormwater runoff
- Retaining rural nature of area/scenic

10. Are there any municipal parks in your watershed? If yes, please list them?

Bakerstown Community Park, Richland Township, Allegheny County
Clay Township Park, Clay Township, Butler County
Connoquenessing Park, Connoquenessing Borough, Butler County
Ewing Park, Ellwood City, Lawrence County
Father Marinaro Park, City of Butler, Butler County
Green Valley Park, New Sewickley Township, Beaver County
Harmony Walking Trail, Harmony Borough, Butler County
Institute Hill Playground, City of Butler, Butler County
Island Playground, City of Butler, Butler County
Jackson Street Canoe Launch, Harmony Borough, Butler County
Karrington Woods, Pine Township, Allegheny County
Memorial Park, City of Butler, Butler County
Middlesex Community Park, Middlesex Township, Butler County
North Park, Pine Township, Allegheny County
Pine Park, Pine Township, Allegheny County
Pine Haven Park, Pine Township, Allegheny County
Portersville Community Park, Portersville Borough, Butler County
Prospect Boys and Girls Club, Franklin Township, Butler County
Ritts Park, City of Butler, Butler County
Rodgers Memorial Park, Ellport Borough, Lawrence County
Roebling Park, Saxonburg Borough, Butler County
Rotary Park, City of Butler, Butler County
Spring Valley Park, Clinton Township, Butler County
South Hills Playground, City of Butler, Butler County
Stiegel Park, Ellwood City, Lawrence County
Swampoodle Park, Harmony Borough, Butler County
Wood Street Park, Harmony Borough, Butler County

Children playing at Pine Park in Pine Township, Allegheny County

11. a. Does your municipality have any public water services in the Connoquenessing Creek watershed area? YES or NO If yes, please list the name and capacity of each facility.

14 of the 23 responded yes 9 of the 23 responded no

b. Do you foresee the need to upgrade or establish a public water supply in your municipality in the Connoquenessing Creek watershed area within the next ten years? YES or NO

5 of the 23 responded yes
11 of the 23 responded no
7 of the 23 did not know

**Please note: many of the municipalities are supplied drinking water from Pennsylvania American Water, and any upgrades will be at their discretion.

12. a. Does your municipality have any public sewage systems in the Connoquenessing Creek watershed area? YES or NO If yes, please list the name and capacity of each facility.

14 of the 23 responded yes
9 of the 23 responded no

** Please note the 14 that said yes to public water may not be the same 14 that said yes to public sewage.

b. Do you foresee the need to upgrade or establish a public sewage system in your municipality in the Connoquenessing Creek watershed area within the next ten years? YES or NO

8 of the 23 responded yes 9 of the 23 responded no 5 of the 23 did not know

13. What projects would you like to see implemented in the area that you represent that could be included in the Connoquenessing Creek Watershed Conservation Plan? Please list short-term and long-term projects and goals.

a.) Land Use/Land Resources (farmland preservation, development, planning, etc.)

- Farmland preservation (3)
- Complete mapping of floodplain/floodway of Connoquenessing Creek to aid in the prevention of future flooding
- Establish ordinances to control and monitor residential growth
- Balanced development – balance of farms, residential, commercial, and recreation properties
- Ensure that development does nothing to increase flooding potential
- Preservation
- Educational Resources
- Multi-municipal cooperation
- Trash cleanup

b.) Water Resources (quality, quantity, etc.)

- Preservation of existing resources
- Potable water in stressed areas
- Stormwater planning
- Stormwater ordinances
- Prohibit small sewer plants on the Little Connoquenessing upstream from the water plant
- Prevent septic drainage into streams
- Streambanks should be kept clear of trees and other vegetation, which obstruct water flow and may lead to damming and flooding

- Combine streambank restoration and establishment of buffer area to a community education project along Brush Creek through the New Sewickley Township's Green Valley Park area; coordinate with township recreation board, schools, churches, and civic organizations
- Residents are concerned about degradation of Brush Creek from Cranberry Township's new sewage treatment facility, which discharges into Brush Creek

c.) Biological Resources (plant, animal, terrestrial, aquatic, areas of concern, etc.)

- Education
- Implementation of conservation and environmental tools
- Ensure sustainable ecosystems to maintain indigenous species
- Elimination of the Canada goose
- We do not wish to see restricted human activity for the sake of the "listed" interests – short or long term
- Conduct biological surveys of plant and animal species
- Restore fish population to encourage fishing
- Create habitat for birds/animals to encourage bird watching
- Make Harmony Walking Trail more interesting

d.) Cultural Resources (historical, recreational, environmental education, etc.)

Steering committee members visiting the site of the proposed Harmony canoe launch

- We are limited by our "big-ticket" historical resources working on the recreational, and believe the environmental education will grow with education in the township
- Environmental education
- Create walking and biking trails, picnic areas, canoe launches, etc.
- Establish more access to the creek (2)
- Coordinate with local schools to use the creek for various educational studies
- There is some interest to start a historic walking tour along the creek
- Completion of Harmony canoe launch
- Development of the Connoquenessing Water Trail
- Develop a walking trail
- Develop area-wide resource guides identifying historical, recreational, and environmental sites

e.) Other (roads/other transportation, economy/jobs, population & demographic trends)

- Victory Road upgrade project; this project entails a re-profiling in the area from Davis Run to Golden City Road. The bridge above Davis Run, although passing inspections, will need addressed because of the increased traffic on this dangerous stretch of road. The Victory Road Business Park and Spring Valley Recreation Park are located along this route adding to the increased traffic flow.
- Demographics have many people moving to the area from urbanized areas where there are different public services than those typically found in rural areas; recreational facilities have become important; Clinton Township is addressing this with a phased development of Spring Valley Park
- Greenways are key to keeping a healthy balance in the area: educate residents about this important quality and provide exceptional opportunities in these areas
- Human needs and activities should outweigh others
- Flood prevention is very important

Interview Results

Interviews were conducted with 32 individuals and representatives from the following organizations: Hereford Manor Lake Conservancy, Brush Creek Watershed Association, Butler County Commissioners, Lutherlyn Environmental Center, Lawrence County Planning Department, CWA, Forward Township, Wild Waterways Conservancy, Butler County Parks & Recreation, North Country Trail Association, Beaver County Conservation District, PA Cleanways, Allegheny County Executive Office, and Seneca Valley Intermediate High School. The results of the interviews are summarized in the following section.

1. How has the watershed changed in the past 10 years?

The most commonly noted watershed change was a growth of development, particularly residential development, noted by 20 of 32 respondents. Changes related to development included rising land values, including farmland; more housing opportunities; increased runoff from impervious surfaces; sewage overflows and septic tank malfunctions; loss of farmland and natural "green spaces"; more litter, sprawl, traffic congestion, and noise; school expansions; higher taxes; and poor enforcement of land-use ordinances.

Many participants noted that paved surfaces yielded more runoff, which has increased streambank erosion and streambed sedimentation, hastened the passage of pollutants to waterways, and contributed to flooding and sewage overflows. Increased frequency and damage of flooding had concerned residents. On a related note, one participant reported lower average water levels with higher depth spikes after storms.

Another significant problem of the last ten years was sewage and septic treatment. Sewage overflows were a growing concern for some, while others saw them as a persistent, but declining, threat. The overflows were attributed to development growth and greater runoff volumes. Septic system failure has reportedly increased due to construction of new systems, deterioration of older systems, and weak municipal ordinances.

The loss of farmland was an important issue. Rising property values and increased interest in the land for development purposes were prevalent. Farmland reverting to natural conditions had been observed, and some participants viewed it as a positive change, in that more natural areas were created.

Illegal refuse dumps and roadway trash were said to have increased in frequency and volume. Stream litter also purportedly increased, as heavy rains washed the rubbish to streams.

Other issues that participants mentioned included industrial plant discharges and cleanups, decreasing business, crime deterring recreational use, improved water quality, increased interest and work in water quality, increased recreational use of resources, declining fisheries, and increased environmental education.

2. How do the following currently meet the needs of the watershed community?

Transportation

The majority of respondents rated most area roads as satisfactory, calling for improvements only in a few trouble spots. About 20 percent regarded the roads as generally poor. Many mentioned highly trafficked roads that consequently require more traffic signals, better exit and entrance ramps, more frequent maintenance, bridge and culvert replacements, and wider shoulder margins. There was greater concern in areas of rapid development, where road wear and traffic congestion exceed maintenance and enforcement means. For example, a few participants felt Route 228's 10-15 year expansion plan was

already outdated. Other requests included a commercial bypass around downtown Zelienople; improvements to Routes 8, 228, 68, and the Route 8 bypass in Butler City; and better linkages from small towns to the region's major highways. Storm drains and grass swales to minimize runoff and water damage were also desired.

Downtown Butler is one of the major transportation arteries in the region

Almost half of respondents stated that public transportation options were insufficient. As the population increases and residences are more widely spaced, a lack of public transportation fuels independent vehicle usage, which contributes to noise, pollution, and traffic congestion problems. Commuters to Pittsburgh and other area cities could benefit from strong public transportation, as could elderly people who cannot drive themselves. Butler Area Regional Transit and New Castle's Area Transit Authority offer some services, but these were mostly described as "minimal" and primarily for medical transportation. Currently, the Route 488/I-79 park-and-ride lot is expanding, and a system is under way to connect Butler City, Cranberry, and Pittsburgh. Development of walking and biking paths in and between communities was suggested. A few felt that current public transportation was sufficient. They either saw little need for it or found the current system effective.

Infrastructure

Feelings were mixed concerning the adequacy of water and sewage infrastructure. Some believed their communities were well provided, while others saw infrastructure as significantly lacking. Some supported infrastructure expansion, and others opposed it.

Infrastructure improvement was requested specifically in Middlesex Township, Saxonburg, Beaver Falls, Prospect, and Cranberry, due to increased development. North Sewickley (Beaver County) and Ellwood City (Lawrence County) sewage systems have expanded significantly, marked by doubled sewage prices in North Sewickley. Butler Area Sewer Authority (BASA) expanded their system in 2007 Some felt infrastructure was thus keeping up with development, albeit with significant effort, while others believed the sewage overflow threat remains high. Saxonburg Area Sewage Authority expanded to replace failing private septic systems, but overflow threats to Thorn Creek worry residents.

Employment Opportunities

Although a few reported employment opportunities as "abounding," especially in Cranberry Township, most said options were adequate to poor elsewhere. Although the residential population has increased, job growth was not following proportionately. Many noted that numerous jobs were available within reasonable commuting distance outside the watershed. Many residents commute to Pittsburgh, and some new residents have relocated to the Connoquenessing watershed to take advantage of lower property prices, while maintaining higher-wage jobs elsewhere. Within the watershed, employment declines were reported, particularly in manufacturing. Of the jobs available, most were low to middle income jobs concentrated in retail, construction (especially in rapidly growing areas), small industry, and the service sector. Ongoing efforts to attract new businesses with low taxes and advertisement of connectivity to other regions were supported. Unfortunately, several participants felt many such job encouragement efforts have failed. One respondent used the example of the Forsystems campus of multi-story office buildings to encourage economic development. Without companies to fill them, however, the buildings sat vacant.

Several participants noted that few professional positions were available, forcing many persons with higher degrees to move from the area, frequently to eastern Pennsylvania or out-of-state. Many graduates from the area's colleges and universities also left to seek professional job opportunities.

Improvement suggestions included attracting "high-tech industries that are environmentally safe," revitalizing downtown Butler City and other cities to draw businesses and enhance the appeal of city neighborhoods, boosting recreational opportunities, and developing attractive natural and manmade environments. It was suggested that, where feasible, revitalization and recreation efforts focus on the Connoquenessing Creek. Problems contributing to the employment decline included sewer problems, said to have "stifled housing and commercial development" in Butler City, and downtown "blight," blamed partially on the withdrawal of downtown businesses to peripheral shopping malls. One respondent opposed efforts to improve jobs, as he feared greater employment opportunities would encourage further development.

Educational Opportunities

In general, respondents felt positively about the educational opportunities of the Connoquenessing watershed and nearby region, both in quality and accessibility. Most were pleased with the public school system, as well as the higher education options, including Butler County Community College, satellite campuses of various four-year universities in Cranberry Township (Robert Morris, Chatham, etc), Regional Learning Alliance facility in Cranberry Woods, and numerous technical schools. Also in close proximity are Slippery Rock University, Geneva College, Indiana University of Pennsylvania, and Pittsburgh schools. Furthermore, a summer educational program for inner-city children was quite active, and Butler County public schools partnered with local businesses to offer students internships and job experience.

Land-Use Ordinances

Opinions of land-use ordinances varied considerably due to the number of municipalities present in the watershed and the variety of their ordinances. Critiqued most were weak and/or uncoordinated ordinances, blanket ordinances that fail to account for geographical differences, and poor enforcement of ordinances.

In Butler County, ordinances were found generally adequate, although development of a multi-municipal plan for Butler City, Butler Township, and Penn Township was ongoing. Also named as positive in Butler County was a "land development buyout program," in which the government can pay landowners not to develop land. This respondent said the strategy was helping to concentrate development and keep rural areas open. Muddy Creek Township was considered in need of more or better ordinances. Here, contention arose between property-rights and the goals of zoning and land ordinances.

Those who felt ordinances were inadequate cited insufficient consideration of residential development needs, water runoff/retention, and preservation of green spaces, agricultural land, and wildlife habitat. One participant described "helter-skelter development" in Marshall (Allegheny County) and Cranberry (Butler County) townships without sound or visual barriers between Route 19 and developments or between commercial and residential areas. The townships "just build, build, build, without a master plan to follow." Marshall Township was criticized for backing down on its approximately 35-year-old land-use plan. Overall, participants revealed concern about protection of natural areas and unique habitats. For example, one participant mentioned an old DEP-protected limestone mine near Ellwood City, where the Indiana bat dwells in winter months. CEMEX, Inc. had expressed desire to reopen the mine, and the resident feared permission may be given without obliging the animal's habitat needs.

In Perry Township (Lawrence County), Marshall Township (Allegheny County), and Cranberry Township (Butler County), better ordinances or better enforcement of existing ordinances was requested. Several participants expressed their viewpoints, stating, "You can get away with almost anything in Connoquenessing and Franklin townships," Marshall has "helter-skelter development," and "Cranberry is a zoo." One of the same said, "Those that have ordinances, need stronger ones. Those that don't have them, need them." While one praised Cranberry Township for good ordinances, another criticized its poor development planning. Several participants requested more and/or stronger ordinances to control development and preserve open space. As one respondent said, "I hate to see the almighty dollar ruling. Land is bought, trees cut, and houses built at costs that ordinary people can't afford."

In areas with strong ordinances, several noted that zoning prevents constructing buildings between homes and roads, requires neighbor notification when new buildings are proposed, limits the types of buildings that can be erected on a piece of property, and designates areas for particular uses, such as agricultural and residential.

Many felt that the effectiveness of ordinances depended on the attention of municipal officials. They noted that established ordinances were not always followed. For example, a respondent was recently dismayed when a permit was granted to develop a wetland. While the usual ordinance overseer was out-of-town, another official granted the permit, despite existing ordinances prohibiting wetland development. Lax adherence to ordinances, leading to wetland conversion and poorly planned developments, was mentioned repeatedly.

3. Do the recreational opportunities currently meet the needs of the watershed community?

Parks/Picnic Sites

Overall, parks and picnic areas were found favorable, but underutilized. Respondents, for the most part, felt parks were well-used by those who knew about them, but were overlooked by a large percentage of the populace. A few participants noted that in general fewer children are seen outside. Most participants approved of creating more parks and picnic areas, improving current parks (by adding shelters, gardens, etc), and stepping up advertising.

Connoquenessing Park provides recreational opportunities for youth and adults

Additionally, there was concern that the region's growing population will soon require more parks and enhanced maintenance. An Adams Township park was cited as an example. Although new, it was said to have already fallen short of residents' demands. In addition to maintenance difficulties, park funding was of concern for some participants. They feared or had already noticed park deterioration, due to insufficient funds. Given this realization, one participant suggested focusing funds on better upkeep of existing parks rather than the creation of new ones.

Hiking/Biking Trails

Overall, the trail situation was seen positively, and some saw no need for more trail work. Most, however, supported more trail development and better maintenance of existing trails. Again, there was concern that trails could not accommodate the rising demand of residential development growth. Furthermore, generating volunteers to build and maintain trails was reportedly difficult. One respondent noted that as properties have developed, some trails were no longer usable. Other concerns included

inadequate signage and disputes about the Butler-Freeport Trail, where some landowners opposed to the trail were discouraging its use.

Trails were said to be generally lacking in Beaver County, Cranberry and Beaver townships, and the City of Butler. A Butler resident, however, said the number of trails was adequate, while maintenance was not.

Off-Road Vehicle Riding

According to participants, no authorized off-road vehicle, or ATV, trails exist within the watershed. ATV riders were purported to frequently ride on private property without acquiring permission. This annoyed landowners and can damage sensitive soils and vegetation. One resident called the ATVs "devastating." Some said the prevalence of posted property signs in the watershed was due, in large part, to ATV trespassing. Contention between landowners and ATV riders was reported as severe in the Ellwood City area.

Several participants were generally opposed to the sport and had no desire to see designated areas established. Others felt that designated ATV-riding areas (not on traditional hiking/biking trails) may alleviate the private-property infringement problem; and, if carefully placed, may minimize environmental damage and noise pollution. Of those who indicated little to no personal interest in riding ATVs, many still supported an established ATV-riding area. One participant said, "Rather than stringing piano wire [across trails], we should work together [to develop an ATV facility]." Among supporters, though, concern remained that the watershed lacked sufficient space for an ATV trail system.

Scenic Vistas/Photography

Although a few participants thought scenery was sparse, most asserted that the watershed abounded with scenic vistas, although many probably have gone unnoticed. Accessing some vistas requires long walks, so accessibility depended on one's effort and physical strength. Several respondents hoped to keep such vistas somewhat difficult to access, so as to preserve them and the resulting experience for visitors. Still, most supported advertising and better trail maintenance to draw attention to the region's scenery.

Wildlife/Bird Watching

Most participants felt that wildlife viewing opportunities were plentiful, although few places were designated for that purpose. Many felt the community could benefit from greater advertisement of these locations and creation of more wildlife sanctuaries and protected "open spaces." Others feared that more attention to these sites would detract from the habitat value and, thus, diminish the resource.

Signs like this one at Camp Kon-O-Kwee, while encouraging traffic to beware it alerts hikers and wildlife watchers to potential wildlife viewing areas

Several people noted that a number of recently declining bird species are returning to the region, including eagles, blue and green herons, ospreys, and songbirds. Improved water quality was believed to have contributed to this return. The plight of songbirds was still of concern for some participants. It was believed that excess deer and European starlings are out-competing native songbirds for habitat and resources.

Moraine State Park was highlighted as a well-known bird watching area, which could still benefit from advertising. The park maintains an osprey hatching facility and nesting houses for other species. Connoquenessing Creek itself also was noted for bird watching, with the advice that viewing is best done from a canoe. The local Audubon Society was noted as active

and a good source for information, as were historical societies and chambers of commerce. The Beaver County portion of the watershed is rural and said to teem with wildlife, but was not well known for those attributes.

Hunting/Fishing

Almost all participants acknowledged that hunting and fishing opportunities existed on public and private lands, but that private lands were used most. General consensus was that public lands should continue to be available for these purposes, and that the amount of private land available for hunting remained sufficient. However, many respondents also noted that these resources and their accessibility were threatened. Residential development was consuming private lands, and trespassing troubles have led more landowners to "post" their properties, making them unavailable. Habitat degradation and poor water quality also threatened the resources. For example, poor water quality, due to insufficient sewage treatment, was noted in Glade Run and Thorn Creek.

Despite these challenges, area streams, supporting stocked and native fish populations, were valued for a variety of fishing opportunities. Connoquenessing Creek (rated five years ago as the 2nd best smallmouth bass fishery in Western PA), Slippery Rock Creek, Mud Creek, Hereford Manor Lake (trout-stocked), Glade Run/Mills Lake, and Lake Arthur were all mentioned as good fishing sites. Moraine State Park was named for fishing, as well as hunting. Brush Creek Park in Beaver County offers an archery hunting site, and two sportsmen's clubs in the county have trapshooting ranges.

Boating/Swimming

Most participants reported boating and swimming opportunities as generally adequate, but under-utilized, due to insufficient advertising and poor accessibility. Several noted that water quality has improved, so areas that were recently too polluted for swimming were now pleasant. Some accessible Connoquenessing Creek natural pools were considered adequate for swimming, but were poorly marked. One individual said polluted water still deters him from swimming in Connoquenessing Creek. Alameda and North parks were praised for their swimming pools, while Knob Hill and Butler City residents requested pool facilities. Good boating/paddling sites mentioned include Barr's Area (New Brighton), Slippery Rock Creek, Connoquenessing Creek, and Lake Arthur (with sailboat and pontoon boat opportunities), providing a range from flat water on the lakes to American Whitewater class II and III rapids on the Slippery Rock and Connoquenessing creeks. Rock Point Boat Club, at the confluence of the Connoquenessing and Beaver rivers, offers boating services. Smaller streams were said to accommodate canoes and kayaks. The lack of public access points remained a deterrent to both boating and swimming.

Anglers on Glade Run Lake

Historical Sites/Structures

Responses to historical sites varied from "plenty but not well known" to "non-existent." It thus can be concluded that better advertising may benefit the region's historical sites, as several participants suggested. Enhanced preservation efforts were also supported.

Golf Courses and Other

Almost all participants said golf courses were abundant, and no more were needed. Some opposed the courses, while others valued their economic importance. One hoped for a new course in Mars to replace the recently closed Mars-Bethel Golf Course. Another noted that most courses were prohibitively expensive for local residents. A few desired use of environmentally conscious practices, such as limited chemical and water usage on courses. Strawberry Ridge Golf Course was cited as a good model.

Other recreational opportunities available in the watershed included tennis courts, ball fields, YMCA camps in North Sewickley and Franklin townships, campgrounds, flying and hot-air ballooning sites, and a Butler City skateboarding park, which attracts both local youth and out-of-state tournament competitors. Popular community events mentioned were the Butler County Fair, Butler Farm Show, and classic car cruises.

4. What are some of the positive features of the watershed?

Natural Resources

- Rural landscape: farms and forests abound
- Sense of community; a small-town Americana feel
- Quiet surroundings
- Appealing natural features and scenic views: forests, lakes, streams, waterfalls, gorges, hills, and the glaciated Beaver River Valley
- Good quality air and streams, although vigilance is essential to maintaining quality
- Much wildlife, including migratory birds and a population of the rare Indiana bat
- Rare plant populations along Connoquenessing and in camps Kon-o-kwee and Spencer
- Increased awareness of land-use impacts on the watershed: for example, NRCS is promoting no-till farming
- Active watershed organizations and concerned citizens: promotion of watershed protection and public environmental/watershed education is valued; groups mentioned: Connoquenessing Creek Watershed Alliance, ECOZ, Wild Waterways, and Brush Creek Watershed Association

Recreational Resources

- Connoquenessing Creek: the creek is varied with deep gorges and boulders at the mouth and a slower pace upstream; this diversity offers a range of recreational options
- Angling and hunting sites: state and local parks, state game commission lands, and private properties offer a range of good-quality fishing and hunting opportunities
- Water trails: trails advertise access points and nice places to fish and boat
- Hiking trails: hiking opportunities abound
- Easily accessible sites for sports and nature-oriented recreation

Community Qualities

- Diverse communities: rural, agricultural, suburban, town, and small city communities exist within the watershed; several respondents prized close proximity to both rural landscapes and the conveniences of towns; as one said, “It’s a mosaic. I can go to Olive Garden and Red Lobster or I can walk along a stream to watch the herons. It’s the best of both worlds.”
- Strong sense of community
- Accessibility to Pittsburgh, a major metropolitan area
- Connectivity to other regions through interstates and major highways
- Economic growth: in southwest portion of watershed and in some other areas, economic growth has yielded community improvements and a higher quality of life
- Diversity of housing opportunities (from $50,000 to $5 million houses)
- Solid tax base.
- Quality of government, which is generally “clean” and “un-politicized”
- Good schools
- Low crime rate
- Citizens with positive attitudes and a broad range of interests
- Community-Involvement potential: several respondents said community interest is strong, but residents don’t know how to get involved or how to be most effective

5. What are some of the negative impacts currently affecting the land, water, and biological resources?

Land-Use Impacts

- Housing development and suburban expansion: loss of open spaces, "viewshed" pollution by hilltop structures and lights that diminish quality of scenery, noise, runoff, and non-point source pollution
- Logging: erosion, runoff, and habitat loss are possible consequences
- Loss of streamside vegetation: increases erosion, pollution, and water temperature
- Agricultural pollution: nutrient, pesticide, herbicide, and fertilizer pollution
- Impervious Surface: roads, parking lots, and buildings contribute to runoff and erosion
- Abandoned mine drainage: reclamation needed
- Poor land use ordinances: contribute to environmentally-insensitive land uses

Impervious surfaces, such as parking lot, increase stormwater runoff because precipitation cannot penetrate concrete; therefore, it cannot recharging the groundwater

Stream Health Decline

- Loss of fish habitat
- Connoquenessing listed as one of Top 10 most-polluted streams
- Loss of species diversity
- Stormwater runoff: runoff is a common complaint
- Poor ordinances: for example, Beaver County has no Act 167 Stormwater Plan
- Pollution: erosion, chemicals, nutrients, litter, etc.

Pollution/Solid Waste

- Sewage: overflows from treatment plants and defective private septic systems
- Litter and dumps: rain washes litter into streams; Ellwood City area suffers much from litter
- Landfills: leaching and/or litter blowing from landfills were of concern for some
- Industrial discharges: although dwindling, industrial pollution remained a concern
- Nitrate loads: Connoquenessing was recently rated as 2nd most nitrate-polluted stream
- Canada geese: high populations of Canada geese along streams threaten water quality

Community Concerns

- Flooding: damage and debris deposition were problematic; Beaver County suffers particularly
- Deteriorating downtowns: empty commercial buildings, absentee landlords, and unattractive towns discourage business and community pride
- Poor employment opportunities
- Lack of recreation funding: recreational areas were declining, while more options were desired
- Poor transportation options: diminished "connective" potential of area communities and increased number of cars, which inflate noise and pollution, diminishing appeal of downtowns
- Crime/drug use: mostly a Butler City concern; attributed to downtown "blight"
- Miss-matched zoning: for example: trailer park next to "nice neighborhood;" develop planning for areas to be consistently developed (said he or she didn't want to sound discriminatory, but wanted consistency)

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

Land/Watershed Conservation

- Reclaim gas and oil wells and abandoned mine lands
- Establish and protect open space; "Grow more grass and less cement"
- Encourage preservation of large tracks of natural land to prevent fragmentation
- Offer tax incentives for land conservation/preservation, in addition to simple praise (The "Clean & Green" program was mentioned as a model)
- Protect biologically diverse areas (BDAs)
- Protect important bird habitat areas

Government Planning & Land Management

- Manage land use, especially in highly development-pressured areas
- Train planning and zoning boards in dealing with development pressures
- Encourage farmland preservation (offer tax and other incentives)
- Support land conservation with conservation easement assistance, tax incentives, and praise
- Regulate development, and reduce it in sensitive areas
- Encourage "green" design of developments
- Establish development ordinances to reduce negative impacts on land, streams, and communities; ordinances should include tougher sewage regulations and erosion prevention efforts
- Establish stormwater best management practices
- Better regulate active mines to reduce negative environmental impacts
- Educate residents about waste management (especially tire disposal)
- Address property trespass issues (light, sound, physical, visual)
- Balance economic and environmental needs; look for compromises where both can benefit
- Create more employment options
- Improve roads

Stream Improvement

- Protect more riparian buffers, floodplains, steep slopes, and wetlands
- Develop instream habitat and bank stabilization structures, where necessary
- Address upstream problems first: downstream clean- ups are ineffective if pollution originates upstream
- Establish rain barrels and rain gardens to minimize runoff
- Reduce flooding: prevent runoff and sedimentation with better land-use practices
- Increase stream and litter clean-ups: a member of PA CleanWays said 215 dumps were found in Butler County in 2006, many of them near the Connoquenessing Creek
- Remove unused dams from Connoquenessing Creek for fuller migratory potential
- Increase fish stocking of local streams
- Revitalize the Brush Creek Watershed Association

Waste Disposal

- Make disposal easier and more affordable: consider giving each household a landfill coupon for one trash load per year; provide collection sites for large and/or hazardous materials like tires, appliances, and electronics
- Provide mandatory trash collection
- Step-up enforcement and education to minimize littering
- Sponsor road and stream clean-ups

*Recreation**

- Improve access to parks and other recreational sites
- Improve access to boating, swimming, and fishing sites
- Take strong safety measures on any construction projects, like boat ramps
- Build more footpaths at the Connoquenessing Creek and Beaver River confluence
- Construct more foot and bike paths in southern Butler County for transportation purposes
- Make Hereford Manor Lakes an established park and advertised portion of the watershed
- Restore Rock Point Park, an 1800s-era resort fueled by the railroad and Pittsburgh vacationers
- Work with Ellwood Historical Society to learn about Rock Point Park and other historical sites
- Develop Brush Creek Park for winter sports
- Create public ATV trails
- Make a Connoquenessing Creek Water Trail
- Revive Butler City Park: restore the bridge in Butler City Park, paying tribute to the Connoquenessing and connecting the city to the Athletic Oval, a popular recreation spot; add informative signs, trash bins, and lighting to encourage use of the resource; offer open-air concerts, plays, and other events

Deshon Woods Conservation Area located along Route 68 in Butler Township

** Improved recreational options are expected to foster a greater sense of community pride and to therefore encourage people to care about the watershed and work to protect it.*

Environmental Education

- Inform the public about riparian buffer projects, erosion, litter, and water quality issues
- Educate youth about quality and protection of natural resources
- Mark prominent park or path trees with plaques showing their common and scientific names
- "Approach watershed education like a marketing plan. Get them young, and keep at it. Show people their connection to the land and water."

7. What must the watershed conservation plan say to be successful?

- Include numerous types of projects, representing the region's diversified interests
- Identify *specific* problems: use growth rates, income statistics, etc. to make points
- Seek realistic, practical solutions; forget "pie in the sky" ideas where concrete plans are needed
- Identify how suggestions can be executed: offer methods, personnel, and funding sources
- Project implementation cannot rely on volunteers alone
- Give feedback on projects
- Include a guiding ordinance to provide ways to work with private and public partners
- Focus on stream health and instream work (habitat development, riparian buffer restoration, etc.)
- Convey the message that "the Connoquenessing is our neighborhood's life blood"
- Explain the negative consequences of dredging
- Educate readers about rivers and their behavior
- Keep streams emphasized with clean-ups
- Encourage ordinances that protect streams
- Include safety and success-ensuring measures; use symbols on signs to help multi-lingual users
- In construction projects, use good-quality materials for improved longevity
- Keep mechanized equipment off of recreational trails

- Incorporate interests of as many groups as possible. Show how all benefit from the watershed's resources (environmental health, recreation, economics, etc.) and how they can help to protect the resources and their respective interests
- Show how an individual's impact on the environment comes back to impact that very person
- Encourage municipal and county governments to act; find projects that arouse their enthusiasm
- Improve communication: get community input, and work diplomatically with many organizations
- Educate people to stop littering/pouring chemicals into streams with simple messages, like "Keep it Clean, Don't Litter"
- Encourage greater access to streams, trails, and other resources so all people can access resources
- Present the Conservation Plan to community leaders, like local businesses and township officials
- Be objective; the plan should evolve, rather than present a pre-conceived message
- Be positive: emphasize the region's scenery and rural, cultural, and historical assets, as well as the importance of preserving these qualities
- Tie to economics: point out positive and negative economic impacts, like tourism and business prospects or the infrastructure demands of suburban housing developments
- Money talks: people want returns on investments and will not be motivated only by environmental ideals
- Plan for the future: make recommendations based upon expected future trends and conditions
- Include enough verifiable information that officials can use the plan in decision-making
- Make recommendations to leaders, not mandates; present messages positively
- Present challenges as opportunities for community improvement to assure politicians of gaining public support
- Be upfront and precise about challenges, but take care not to offend or frighten readers (for example, any land acquisition issues are going to meet resistance)
- Inform readers, in a compelling and positive way, how their actions impact others and the environment
- Readers should know the consequences (positive or negative) of what they do and be told how they can improve; most people are willing to change, but are ignorant of their actions or how to improve them
- Make the Conservation Plan document easy to navigate
- Use short mission statements, and seek clarity with fewer, easier words
- Be honest that the plan's purpose is to assist the State in determining how to allocate grant money

8. What must the watershed conservation plan *not* say to be successful?

- Cannot present "requirements," but only suggestions
- Should not sound like a government mandate
- Should not advocate (or appear to advocate) use of tax money on a "liberal" idea that represents the interests of only a single group
- Should avoid involving politics
- Do not point fingers/lay blame, as this will make enemies and stall progress
- Don't pressure local businesses, as they are needed for the region's economy
- Do not present issues as economic VERSUS environmental; to achieve economic and environmental viability, the needs of both must be met
- Should not promote taking/purchasing of private land
- Should not be presented as massive jobs that will require much work; this will discourage action; instead, should be seen as projects that everyone can participate in by doing a little bit
- Should not be called a "plan." "It is an assessment and a wish-list" of the directions the participants wish their communities to take; "That's fine and worthy, but it's not a 'plan'"

High School Workshops

* Indicates response was identified by both student sessions

1. **What do you like about the area?**

- Limited development
- Basketball courts
- Fishing*
- Cranberry
- Restaurants/fast food
- Biking
- Open space*
- Recreation
- Landscaping
- Running through the woods
- Recreation centers
- Parks and sports complex
- Woods
- Mall
- Fishing
- Hiking/Biking trails
- Moraine State Park
- Swimming pool
- Elemntary school
- Outdoor recreation
- Sports

2. **What could be improved?**

- Too much development in Cranberry
- Boring—limited options
- Pollution
- More open space
- Horseback riding opportunities
- Flooding
- Local businesses—not many big companies other than AK Steel.
- Community pools—more are needed
- Skate parks
- Baseball fields—maintenance of fields
- Winter skiing and snowboarding opportunities
- Legal dirt bike riding opportunities
- Ice hockey rink is needed
- Timing of traffic lights
- Larger mall so you don't need to drive; the Butler Mall is small and stores are limited*
- Smaller playgrounds for toddlers—opportunities need enhanced
- Tennis courts—maintenance of courts
- Trash
- Trail maintenance

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

- Baseball—enough fields and leagues; possibilities of bring a minor league team to Butler
- Basketball*—enough opportunities
- Volleyball*—both indoor and outdoor courts needed
- Soccer*
- Lacrosse
- Tennis*
- Football
- Hockey
- Wrestling
- Golfing
- Fishing*—opportunities are not well advertised
- Hunting—limited property available
- Hiking
- Camping
- Horseback riding
- Rock climbing/rappelling
- Biking*—more opportunities are needed bike trails and bike lanes
- Boating
- Running*/cross-country courses—more opportunities are needed
- Swimming*—more community pools are needed
- Ice skating
- Quad riding—legal opportunities are needed
- Dirt bikes
- Dancing*
- Cheering*
- Paintball
- Skiing/snowboarding
- Archery range
- Trap shooting
- Video games

4. What local historical sites are you aware of?

- Pullman Park Area
- First Jeep built in Butler
- Old Red School House
- Moved a cemetery to add onto the school
- Matt Clement – a professional baseball player is from Butler*
- Christine Aguilera went to North Allegheny High School
- Butler Jr. High, built in 1919 *
- Pullmen Headquarters
- Little Red Schoolhouse
- WWII Memorial
- George Washington Trail*
- Alameda Park was an old amusement park—remove dam at park
- Old Stone House – in Slippery Rock Creek watershed
- Alameda Park was developed to alleviate impacts of the depression by creating jobs
- Abandoned Jeeps
- Hospital
- Courthouse
- Saul Brothers—Professional football players from Butler; one played for Pittsburgh
- Iverson
- Terry Hanrattay—quarterback for the Steelers is from Butler
- Jake Cuffman—minor league pirates

5. What are some positive and negative impacts currently affecting land, water, and biological resources within the Connoquenessing Watershed?

Land

- Forest fragmentation*
- Housing developments*
- Litter
- Abandoned coal mines
- Air pollution (steam)

Steering committee and Watershed Alliance member Bruce Kemp searches for mussels

Water

- Trout fishing
- Nitrate levels decreasing
- Pollution
- Debris/litter
- Abandoned mine drainage
- Too many chemicals are used to treat public drinking water
- Watershed Alliance and their efforts to improve and persevere the watershed
- Good water quality on unnamed tributary of Little Connoquenessing Creek
- Groundwater contamination

Biology

- Deforestation
- Hunting limits to minimize over harvesting of the deer herd
- Fish hatchery is needed
- More landscaping and vegetation needed in urban areas and main streets
- Remodel old buildings impacted by acid rain

6. What changes would you like to see within the next ten years?

- Fishing at the Pennsylvania American Water dams (fishing has not been permitted at the sites since 9/11/2001)
- More trees
- More game wildlife
- Less pest bugs, such as mosquitoes
- More parks and trails
- Park planning
- Ice skating rink
- Dodge ball court
- Dirt bike/ATV park
- Increased number of ball fields and parks
- Historical building preservation
- Indoor public tennis court
- More volleyball

Preservation and marketing of local historical sites is needed

7. Can you suggest any projects or types of projects that students, like yourselves, could be involved in or would be interested in being involved in?

- Clean up Main Street
- Trash clean-ups
- Tree plantings
- Macro surveys
- Planning of parks and trails

Chapter 7. Management Recommendations

This section highlights recommendations to improve the quality of life. These management recommendations are non-regulator 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 Connoquenessing Watershed Alliance, Wild Waterways Conservancy, and Pennsylvania Organization for Watersheds and Rivers, 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 L. Listed in Table 7-1 are acronyms used in the management recommendations.

Acronyms used in Management Recommendations Matrix

BAMR	Pennsylvania Department of Environmental Protection Bureau of Abandoned Mine Reclamation
DCED	Pennsylvania Department of Community and Economic Development
DCNR	Pennsylvania Department of Conservation and Natural Resources
DEP	Pennsylvania Department of Environmental Protection
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
HUD	Housing and Urban Development
LWV	League of Women Voters
NRCS	United States Department of Agriculture Natural Resources Conservation Service
OSM	United States Department of Interior Office of Surface Mining
PABS	Pennsylvania Biological Survey
PACD	Pennsylvania Association of Conservation Districts
PALMS	Pennsylvania Lake Management Society

PASA	Pennsylvania Association for Sustainable Agriculture
PDA	Pennsylvania Department of Agriculture
PEMA	Pennsylvania Emergency Management Agency
PennDOT	Pennsylvania Department of Transportation
PENNVEST	Pennsylvania Infrastructure Investment Authority
PGC	Pennsylvania Game Commission
PNHP	Pennsylvania Natural Heritage Program
PSAB	Pennsylvania State Association of Boroughs
PSATS	Pennsylvania State Association of Townships
RWA	Rural Water Authority
SEO	Sewage Enforcement Officer
USACE	United States Army Corps of Engineers
USDA	United State Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WPCAMR	Western Pennsylvania Coalition for Abandoned Mine Reclamation
WREN	Water Resources Education Network

Project Area Characteristics

Goal 1-A: Identify impacts of acid precipitation to minimize or remediate these impacts.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Support state and national initiatives to reduce critical pollutants emissions from industries.	Conservation Groups, Conservation Districts, DEP, EPA	DEP, EPA, Private Sources, Foundations	Low
2.	Map and identify acid precipitation patterns to determine negative impacts to aquatic life.	Conservation Groups, Conservation Districts, DEP, EPA	DEP, EPA, Private Sources, Foundations	Low
3.	Lobby for stricter requirements for sulfur dioxide and nitrogen oxide emissions in order to reduce the impacts of acid rain.	Conservation Groups, Conservation Districts, DEP, EPA	DEP, EPA, Private Sources, Foundations	Low
4.	Develop a network of volunteers to identify acid precipitation impaired waterways by collecting rainwater and measuring its pH.	Conservation Groups, Conservation Districts, DEP, EPA	DEP, EPA, Private Sources, Foundations	Low
5.	Conduct an acid neutralization project to determine if such treatment could decrease acidity to the land and water.	Conservation Groups, Conservation Districts, DEP, EPA	DEP, EPA, Private Sources, Foundations	Low

Goal 1-B: Enhance transportation infrastructure.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Improve Routes 8, 68, and 228 by providing connections from local towns to major highways and installing storm drains and grass swales.	PennDOT, Municipalities, Counties	PennDOT, Private Sources, Foundations	Medium
2.	Implement best management practices that protect water resources when improving and upgrading dirt and gravel, secondary, or rural roadways.	DEP, Conservation Groups, PaGS, Municipalities, Road Masters	PennDOT, Private Sources, Foundations, DCED	Medium
3.	Support municipal participation in the Dirt and Gravel Roads Program to reduce erosion and sedimentation.	Municipalities, DEP, Conservation Groups, Conservation Districts	PennDOT, Private Sources, Foundations, DCED	Medium
4.	Install safety improvements such as, additional traffic signals, better exit and entrance ramps, bridge and culvert replacements, wider shoulder margins, and frequent maintenance.	Municipalities, PennDOT, Counties	PennDOT, Private Sources, Foundations	Medium
5.	Include sound geologic investigation and best management practices during maintenance and construction of roadways to minimize impacts.	Road Masters, PennDOT, PaGS, Conservation Groups	PennDOT, Private Sources, Foundations, DCED	Low

Goal 1-B: Enhance transportation infrastructure (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Conduct impact studies on highway and industrial developments to minimize threats to the resources of the watershed.	Municipalities, PaGS, PennDOT, DEP, Conservation Groups	PennDOT, Private Sources, Foundations, DCED	Low
7.	Increase maintenance on roadways, especially those used heavily by the trucking industry.	Municipalities, PennDOT	PennDOT, Private Sources, Foundations, DCED	Low
8.	Conduct a feasibility study determining the possibility of establishing a truck bypass around downtown Zelienople.	Zelienople, PennDOT, Citizens, Businesses, Trucking Companies	PennDOT, Private Sources, Foundations	Low

Goal 1-C: Carefully plan development to ensure economic enhancement while preserving community character without adversely affecting quality of life.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage 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.	Planning Departments, Municipalities, NRCS, DEP, Conservation Groups, HUD, PaGS	DCED, Private Source, Foundations	High
2.	Revitalize downtown areas to encourage the establishment of new businesses that preserve historic architecture and compliment community character.	Planning Departments, Municipalities, DEP, Conservation Groups, Historical Societies, HUD	DCED, Private Sources, Foundations	High
3.	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 decisions, water quantity, soil type, etc.	Planning Departments, Municipalities, NRCS, DEP, Conservation Groups, USGS, HUD, PaGS	DCED, Private Sources, Foundations	Medium
4.	Conduct a demonstration project utilizing low-impact, Smart Growth principals, and Conservation by Design practices at a local site for educational purposes.	Planning Departments, Municipalities, NRCS, DEP, Conservation Groups, HUD	DCED, HUD, Private Source, Foundations	Medium
5.	Form a regional economic development or Smart Growth plan.	Municipalities, Counties, Planning Commissions, Businesses	DCED, DCNR, Private Sources, Foundations	Medium

Goal 1-D: Encourage economic growth with minimal impacts to the environment.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote the inclusion or preservation of open space in community development programs.	Conservation Groups, Conservation Districts, Planning Commissions	DCNR, Private Sources, Foundations	High

Goal 1-D: Encourage economic growth with minimal impacts to the environment (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
2.	Incorporate Natural Heritage Inventories into county and municipal comprehensive plans.	Conservation Groups, PNHP, Municipalities, Counties	DCED, Private Sources, Foundations	High
3.	Establish a greenway plan for economic revitalization of downtown areas, and surrounding communities.	Municipalities, Counties, DCNR, Planning Commissions, Businesses, PNHP	DCED, DCNR, Private Sources, Foundations	High
4.	Conduct feasibility studies and demonstration projects designed 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, PaGS	DEP, EPA, Private Sources, Foundations	Medium
5.	Determine what impact salt and ashes, utilized to remove snow and ice on roadways, have on the water quality, and investigate alternative practices.	Conservation Groups, DEP, PennDOT, EPA, Universities, PaGS	DEP, PennDOT, Private Sources, Foundations	Medium
6.	Study impacts new businesses have on local communities, streams, groundwater, and their effects downstream.	Conservation Groups, PaGS, Planning Commissions	DCED, DCNR, DEP, Private Sources, Foundations	Medium
7.	Conduct a countywide greenway plan for Butler County.	Municipalities, Conservation Groups, PennDOT, Planning Commissions	DCED, DCNR, Private Sources, Foundations	Medium

Goal 1-E: Establish economic stability needed to maintain a balanced workforce.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Increase economic stability that promotes sustainable natural resource use, such as establishing local resource-oriented sustainable industries like value-added products, farmers' markets, and community supported agriculture.	Businesses, DCNR, PDA, Planning Commissions, Chambers of Commerce, PaGS	DCNR, Private Sources, Foundations	Medium
2.	Support value-added agriculture processing to provide income opportunities for small agricultural producers.	PDA, USDA, Conservation Groups	Private Sources	Medium
3.	Utilize nature-based tourism opportunities to increase revenue.	Tourist Bureaus, Conservation Groups	Private Sources	Low

Goal 1-E: Establish economic stability needed to maintain a balanced workforce (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
4.	Develop a website promoting local businesses.	Businesses, Chambers of Commerce, Planning Commissions	Private Sources	Low
5.	Develop a local business directory.	Businesses, Chambers of Commerce, Planning Commissions	Private Sources	Low
6.	Forge an alliance or network among local business owners to support each other's businesses.	Businesses, Chambers of Commerce, Planning Commissions	Private Sources	Low
7.	Create an employment registry.	Businesses, Chambers of Commerce, Planning Commissions	Private Sources, Foundations	Low

Goal 1-F: Enhance marketability of the region to prospective businesses.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote sustainable industries to keep young adults in the region and improve economic viability.	Municipalities, Counties, Planning Commissions	DCED, Private Sources, Foundations	Medium
2.	Promote alternative energy practices, increasing job markets and decreasing dependency on gas and oil.	DEP, Conservation Groups, EPA	DEP, EPA, Private Sources, Foundations	Low
3.	Offer incentives to help keep young adults in the area following the example of the Pittsburgh Urban Magnet Project.	Municipalities, Counties, Businesses	DCED, Private Sources, Foundations	Low
4.	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	DCED, Private Sources, Foundations	Low
5.	Diversify the local job market by developing and offering incentives and tax breaks to attract new businesses.	Municipalities, Counties, Planning Commissions	DCED, Private Sources, Foundations	Low

Goal 1-G: Increase communication and cooperation among municipalities and counties within the region to promote sharing of services and improve conditions collectively affecting the watershed.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage municipalities to establish an environmental advisory council encouraging local communities and governments to work together.	Municipalities, Conservation Groups, Counties	DCED, Private Sources	High
2.	Encourage communication and collaboration amongst environmental groups, including the development and support for more groups.	Conservation Groups, Conservation Districts	Private Sources, Foundations	Medium

Goal 1-G: Increase communication and cooperation among municipalities and counties within the region to promote sharing of services and improve conditions collectively affecting the watershed (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
3.	Establish joint planning commission to facilitate regional planning initiatives, and monitor development activities.	Municipalities, Counties, Planning Commissions	DCED, Private Sources	Medium
4.	Establish memorandums of understanding between municipalities and public entities to share equipment to clean up after local disasters, such as flooding and tornados.	Municipalities, Counties, DEP, DCNR, DCED	Private Sources	Medium
5.	Foster communication and cooperation between municipalities, counties, and states.	Municipalities, Counties	DCED, Private Sources	Medium
6.	Establish regional or county-based planning and zoning, in addition to municipal zoning.	Municipalities, Counties, Planning Commissions	DCED, Private Sources	Medium
7.	Establish joint or shared management of non-road issues among municipalities.	Municipalities, Counties	DCED, Private Sources	Medium

Goal 1-H: Proactively plan for the future.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Utilize responsible zoning to protect agricultural lands, without significantly impeding landowner rights.	Municipalities, Counties, Planning Commissions, Conservation Groups, Conservation Districts	DCED, Private Sources, Foundations, PDA,	High
2.	Establish individual or joint municipal comprehensive plans for municipalities that currently do not have plans.	Municipalities, Counties, Planning Commissions	DCED, Private Sources, Foundations	High
3.	Update comprehensive plans that are 10 years or older.	Municipalities, Counties, Planning Commissions	DCED, Private Sources, Foundations	Medium
4.	Develop land-use ordinances or subdivision regulations in accordance with municipal and county comprehensive plans to protect the character of communities and valuable resources from undesirable land uses.	Municipalities, Counties, Planning Commissions	DCED, Private Sources, Foundations	Medium
5.	Build partnerships with municipal officials, businesses, developers, and other stakeholders to enforce existing ordinances and alter negative perceptions of zoning through education and awareness programs.	Municipalities, Counties, Planning Commissions	DCED, Private Sources, Foundations	Medium

Goal 1-H: Proactively plan for the future (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Encourage municipalities to utilize and enforce regulation control powers available to them, including zoning, to preserve and improve quality of life for watershed residents.	Municipalities, Planning Commissions	DCED, Private Sources, Foundations	Medium
7.	Strengthen the regulation and enforcement of land-use ordinances, so they are not easily changed.	Municipalities, Counties, Planning Commissions	DCED, Private Sources, Foundations	Medium

Goal 1-I: Enhance financial support and services to prepare and train emergency response providers.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish or update emergency management plans for dealing with railroad disasters along Connoquenessing Creek.	Municipalities, DEP, Railroad Companies, Emergency Services	Homeland Security, Railroad Companies, Private Sources, Foundations	Medium
2.	Improve emergency services through additional funding, upgraded equipment, and training for volunteer or professional responders.	Police Departments, Fire Departments, Paramedics, Hospitals, Emergency Call Operators	DCED, Private Sources, Foundations	Low
3.	Install dry hydrants in rural areas of the watershed where public water supply is limited.	Conservation Districts, Fire Departments, DEP	DEP, DCED, Private Sources, Foundations	Low
4.	Develop a maintenance program for dry hydrants.	Conservation Districts, Fire Departments, DEP	DEP, DCED, Private Sources, Foundations	Low

Land Resources

Goal 2-A: Work with the agricultural community to implement best management practices on their property.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote conservation practices, such as cover crops, crop residue, contour strips, grassed waterways, riparian buffers, streambank fencing, and responsible pesticide/herbicide use.	Conservation Districts, Conservation Groups, PDA, NRCS, PASA, Cooperative Extension	DEP, NRCS, Private Sources, Foundations	High
2.	Encourage agricultural landowners to develop nutrient management plans to boost productivity and protect water resources.	NRCS, Conservation Districts, Conservation Groups	DEP, EPA, Private Sources, Foundation, Cost Share Programs	High

Goal 2-A: Work with the agricultural community to implement best management practices on their property (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
3.	Implement a riparian restoration program to install streambank fencing to exclude livestock from streams, stabilize stream crossings, provide alternative watering sources to livestock, enhance riparian corridors with native vegetation, and minimize nutrients and sediments entering waterways.	Conservation Districts, Conservation Groups, PDA, NRCS, Cooperative Extension	DEP, NRCS, PGC, Private Sources, Foundations	High
4.	Stabilize barnyard and livestock areas to properly manage runoff.	Conservation Districts, Conservation Groups, PDA, NRCS, Cooperative Extension	DEP, Private Sources, Foundations, USDA, PDA	Medium
5.	Encourage extensive use of pasture on animal-dependent farms (e.g. dairy and beef) to minimize the concentration of animals in feedlots.	PDA, NRCS, PASA, Cooperative Extension	USDA, DEP, EPA, PDA, Private Sources, Foundation	Medium
6.	Encourage agricultural producers to utilize organic sources of nutrients for crop production, including bioenergy crop production, as a component of nutrient management planning.	Conservation Districts, Conservation Groups, Cooperative Extension, PDA, NRCS, PASA	DEP, NRCS, Private Sources, Foundations	Medium
7.	Develop a model farm to demonstrate agricultural best management practices and offer educational tours for agricultural producers, agencies, and other interested parties.	Conservation Districts, Conservation Groups, PDA, NRCS, PASA, Cooperative Extension	DEP, Private Sources, Foundations, USDA, PDA	Low

Goal 2-B: Maintain agricultural uses on lands.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish a program to offer incentives to landowners who purchase conservation easements to protect riparian corridors.	NRCS, Conservation Districts, Conservation Groups, Cooperative Extension	DEP, NRCS, PGC, Private Sources, Foundations	Medium
2.	Encourage landowners to enroll in cost-incentive programs, such as the Environmental Quality Incentives Program, Conservation Reserve Enhancement Program, Conservation Reserve Program, and Wildlife Habitat Improvement Program.	NRCS, Conservation Districts, Conservation Groups, Cooperative Extension	DEP, NRCS, PGC, Private Sources, Foundations	Medium

Goal 2-C: Encourage environmental responsibility in industrial farming operations.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Work with legislatures and local, state, and federal departments of agriculture to enforce regulations placed on industrial agriculture.	Legislators, USDA, PDA, NRCS, PACD, Cooperative Extension, Conservation Groups	DEP, EPA, USDA	Medium
2.	Manage industrial agriculture through the establishment and implementation of environmentally sound zoning and land-use ordinances to protect area resources.	Legislators, USDA, NRCS, Municipalities, Cooperative Extension, Conservation Groups, PDA	DEP, EPA, USDA	Medium
3.	Support a regional strategy for the production of bioenergy crops utilizing excess nutrients from animal waste.	NRCS, Cooperative Extensions, PDA, Conservation Districts, Conservation Groups	DEP, Private Sources, Foundations	Low

Goal 2-D: Promote local agricultural products, producers, markets, and related programs.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage community support of small "family" farms through "Buy Local" campaigns and farmer's markets.	Cooperative Extensions, PDA, USDA, PASA	Private Sources, Foundations	Medium
2.	Promote the importance and economic viability of small farms through marketing, education, and creation of avenues for adding value to locally produced agriculture commodities.	Cooperative Extension, Conservation Districts, Conservation Groups, PASA	Private Sources, Foundations	Medium
3.	Promote the establishment and support of local farmers markets.	NRCS, Cooperative Extensions, PDA, PACD, PASA	Private Sources, Foundations	Medium
4.	Establish periodic peer-to-peer tours highlighting best management practices utilized at local farms.	Conservation Districts, Conservation Groups, PDA, NRCS, PASA, Cooperative Extension	DEP, Private Sources, Foundations, USDA	Medium

Goal 2-E: Establish or enhance incentives for land protection and conservation practice implementation.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage laws to protect surface owners' rights and property from damage caused by subsurface mineral rights owners' access and resource extraction operations.	Conservation Groups, Conservation Districts, Legislators, DEP, DCNR	Legislature, Private Sources, Foundations	High
2.	Work with elected officials to create a tax reform to assist landowners in being able to maintain their property for conservation purposes.	Conservation Groups, NRCS, DCNR, DEP, Legislators	DEP, DCNR, EPA, Private Sources, Foundations, Legislature	High

Goal 2-E: Establish or enhance incentives for land protection and conservation practice implementation (continued).

	Method to achieve goal:	*Potential Partners*	*Potential Funding*	*Priority*
3.	Establish tax incentives to keep large tracts of lands unfragmented.	Conservation Groups, NRCS, DCNR, DEP, Legislators	DEP, DCNR, EPA, Private Sources, Foundations, Legislature	High
4.	Encourage farmland/forestland tax matching programs to provide incentives to keep land in agriculture/forest and not convert it to residential use.	Conservation Groups, Conservation Districts, Legislators, Counties, DEP, DCNR, NRCS	Legislature, Private Sources, Foundations	High
5.	Create tax incentives for private landowners who implement conservation practices.	Conservation Groups, NRCS, DCNR, DEP, Legislators	DEP, DCNR, EPA, Private Sources, Foundations, Legislature	High
6.	Encourage the Pennsylvania legislature to expand "Clean and Green" to protect open space along with agricultural and forest lands.	Conservation Groups, Conservation Districts, Legislators, Counties, DEP, DCNR	Legislature, Private Sources, Foundations	Medium

Goal 2-F: Protect agricultural and ecologically significant lands.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	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, Landowners, DCNR, Municipalities, PNHP, Planning Commissions	DCNR, Private Sources, Foundations	High
2.	Encourage townships to participate in the Agricultural Security Area Program, to protect agriculture lands.	Municipalities, Planning Commissions, Conservation Groups	NRCS, Private Sources, Foundations	High
3.	Develop a strategic plan to prioritize and protect ecologically significant areas through acquisition, conservation easement purchases, or other conservation practices.	Conservation Groups, Municipalities, DCNR, PNHP	DCNR, Private Sources, Foundations	High
4.	Protect prime farmlands from conversion to other uses by purchasing conservation easements, assisting in the multi-generation transfer of ownership, or utilizing farmland preservation programs.	Conservation Groups, Landowners, DCNR, Municipalities, Planning Commissions	NRCS, Private Sources, Foundations	High
5.	Purchase conservation easements at select prime habitat areas.	Conservation Groups, Municipalities, Landowners	DCNR, Private Sources, Foundations	High

Goal 2-F: Protect agricultural and ecologically significant lands (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Ensure that the tax advantages of granting conservation easements remain as an encouragement to landowners.	Conservation Groups, Legislators, DEP, NRCS, PDA, EPA, USDA	Legislature, Private Sources, Foundations	Medium
7.	Develop a program or means through which landowners can obtain conservation easements for biologically diverse areas on their properties.	Conservation Groups, Legislators, DEP, NRCS, PDA, EPA, USDA, Landowners	Legislature, Private Sources, Foundations	Medium

Goal 2-G: Promote management practices on active mine sites to minimize impacts, prevent mine drainage, and improve conditions where possible.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage Pennsylvania Department of Environmental Protection to establish and enforce requirements for sealing core-drillings preventing the contamination of water sources.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	High
2.	Promote strict enforcement of erosion and sedimentation regulations on active mine sites.	Conservation Districts, DEP, EPA	DEP	High
3.	Encourage high-value hardwood tree plantings as one method to reclaim abandoned mine lands, and support the Pennsylvania Department of Environmental Protection and United States Department of Interior's Office of Surface Mining Reforestation Initiative on active mine sites.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	High
4.	Encourage active mine sites to utilize management techniques, such as land liming, alkaline addition in backfill, and filling mine voids with flyash to prevent future mine drainage discharges.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	Medium

Goal 2-H: Reclaim abandoned wells, mines, and quarries.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Expand current reclamation programs, as well as implement higher quality reclamation techniques.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	High
2.	Reduce hazards, such as highwalls and mine drainage, on active and abandoned mine sites.	Conservation Districts, Conservation Groups, DEP, BAMR, OSM	DEP, EPA, OSM, Private Sources, Foundation	High
3.	Promote redevelopment of abandoned sites through programs similar to brownfield redevelopment.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	Medium

Goal 2-H: Reclaim abandoned wells, mines, and quarries (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
4.	Support programs that encourage grassroots organizations to implement reclamation projects.	Conservation Districts, Conservation Groups, DEP, Legislators	DEP, EPA, Private Sources, Foundation	Medium
5.	Gate abandoned and inactive mine entrances to eliminate unauthorized access.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	Medium
6.	Inventory abandoned wells and mines, and plan for remediation.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	Medium
7.	Continue support for industry reclamation incentives.	Conservation Districts, Conservation Groups, DEP	DEP, EPA, Private Sources, Foundation	Medium

Goal 2-I: Minimize damages and financial hardship caused by mine subsidence.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage homeowners to determine if they are at risk for mine subsidence, and if so to purchase insurance from the Mine Subsidence Insurance Fund.	Landowners, DEP	DEP, Private Sources, Foundations	Low
2.	Develop web-based abandoned mine mapping database.	DEP, BAMR, OSM, WPCAMR	DEP, EPA, OSM, Private Sources, Foundations	Low

Goal 2-J: Encourage the remediation and removal of refuse piles.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Prioritize refuse pile remediation; giving those located along riparian areas a higher priority.	Conservation Districts, Conservation Groups, DEP, OSM	DEP, OSM, EPA, Private Sources, Foundations	Medium
2.	Evaluate refuse piles for value and possible re-use by cogeneration or reprocessing plants.	Conservation Districts, Conservation Groups, DEP, OSM	DEP, OSM, EPA, Private Sources, Foundations	Medium

Goal 2-K: Minimize impacts caused by exploration, production, retirement, and abandonment of wells.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Remove leaking underground fuel storage tanks.	Conservation Groups, Conservation Districts, DEP	DEP, Private Sources, Foundations	High
2.	Develop, enforce, and implement best management practices specific to gas and oil exploration.	Conservation Groups, Conservation Districts, DEP	DEP, Private Sources, Foundations	High

Goal 2-K: Minimize impacts caused by exploration, production, retirement, and abandonment of wells (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
3.	Plug abandoned gas wells in the watershed to prevent brine water and abandoned mine drainage from entering the streams and potable water supplies.	Conservation Groups, Conservation Districts, DEP	DEP, Private Sources, Foundations	High
4.	Institute closer governmental oversight on gas-well exploration and production, including the impacts to the natural resources.	Conservation Groups, Landowners	DEP, Private Sources, Foundations	Medium
5.	Monitor the cumulative impacts of oil and gas wells to protect watershed resources and the rural character.	Conservation Groups, Conservation Districts, DEP	DEP, Private Sources, Foundations	Medium
6.	Encourage cooperation between surface and subsurface rights owners to minimize conflicts and impacts to the natural resources.	Conservation Groups, Conservation Districts, DEP	DEP, Private Sources, Foundations	Medium
7.	Organize third-party moderated discussions between surface and subsurface rights owners prior to beginning exploration, construction, and production activities to address and resolve issues.	Landowners, Subsurface Rights Owners, DEP	Private Sources, Foundations	Medium

Goal 2-L: Prevent future dumping activities by providing alternative methods of disposal and cleaning up existing dumpsites.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish a hotline or other means to report illegal dumping activity.	PA CleanWays, State Police, Municipalities	Private Sources, Foundations	High
2.	Establish recycling programs in watershed municipalities providing curbside pickup where applicable.	Municipalities, Counties, Conservation Groups, Conservation Districts, Solid Waste Authorities	DEP, Private Sources, Foundations	High
3.	Host annual cleanups to eliminate illegal dumpsites and establish surveillance, and monitoring to decrease the re-occurrence of dumping.	PA CleanWays, Conservation Groups, Civic Groups, Citizens, Municipalities	DEP, Private Sources, Foundations	High
4.	Provide convenient and affordable alternative disposal options, such as offering special collection days and drop-off locations for appliances and household hazardous wastes.	PA CleanWays, Municipalities, Conservation Groups, Solid Waste Authorities	Private Sources, Foundations	Medium
5.	Conduct an inventory and map of illegal dumpsites in the watershed and include strategies to cleanup and protect the area.	PA CleanWays, Municipalities, Conservation Groups	DEP, Private Sources, Foundations	Medium

Goal 2-L: Prevent future dumping activities by providing alternative methods of disposal and cleaning up existing dumpsites (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Work with local landowners, businesses, and community groups to sponsor, adopt, or cleanup trash along roadways, streambanks, and dumpsites.	PA CleanWays, Conservation Groups, Civic Groups, Citizens, Municipalities	DEP, Private Sources, Foundations	Medium
7.	Develop stronger ordinances and increase enforcement of ordinances dealing with illegal dumping and littering.	Municipalities, Counties, PA CleanWays, Conservation Groups	Private Sources, Foundations	Medium
8.	Establish a regional sanitary or solid waste authority.	Solid Waste Authorities, Municipalities	Private Sources, Foundations	Low

Water Resources

Goal 3-A: Minimize potential flooding damages by taking a proactive approach to managing floodplains.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Conduct a detailed flood-prone area assessment, and update floodplain maps.	PEMA, Municipalities, Conservation Groups	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	High
2.	Discourage further development and encroachment in floodplains and wetlands to decrease the occurrence and severity of flood events, and encourage non-structural approaches to floodplain management.	DEP, EPA, USACE, Municipalities, Counties	DEP, EPA, FEMA, PEMA, DCED, Private Sources, Foundations	High
3.	Develop, update, and/or strengthen the enforcement of municipal floodplain ordinances.	Municipalities, DEP, EPA, USACE	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	High
4.	Develop an education program about flood prevention and recovery and floodplains and wetland protection, focusing outreach to flood-prone areas and developers, businesses, municipalities, and communities of urban/suburban areas, which contribute to increased stormwater runoff.	Municipalities, Citizens, Businesses, USACE, Developers, Conservation Groups	FEMA, PEMA, DCED, USACE, DEP, Private Sources, Foundations	High
5.	Acquire properties frequently impacted by serious flooding and convert them to public open space, such as parks and natural areas.	PEMA, Municipalities, Conservation Groups	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	Medium
6.	Consult a hydrologist to discuss potential uses of natural stream channel design to decrease the risk of flooding.	PEMA, Municipalities, Conservation Groups	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	Medium

Goal 3-A: Minimize potential flooding damages by taking a proactive approach to managing floodplains (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
7.	Discourage the development of businesses and primary and secondary residences in floodplain areas.	PEMA, Municipalities, Conservation Groups	FEMA, PEMA, DCED, DEP	Medium
8.	Establish a dedicated flood-control program to minimize the risk and severity of flooding.	PEMA, Municipalities, Conservation Groups	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	Medium
9.	Partner with community organizations and landowners to maintain culverts free of debris to alleviate flooding.	Municipalities, Civic Groups, Conservation Groups	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	Medium
10.	Partner with the U.S. Army Corps of Engineers to be more flexible and cost efficient in designing floodplain management options and projects.	USACE, Municipalities, Conservation Groups, Counties, DEP, EPA	FEMA, PEMA, USACE, DCED, DEP, Private Sources, Foundations	Medium
11.	Establish a localized flood warning system to quickly alert residents.	Municipalities, Emergency Responders, Emergency Operators	FEMA, PEMA, DCED, Private Sources, Foundations	Medium

Goal 3-B: Encourage non-structural approaches to floodplain management.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Identify areas where the floodplain can be re-established for flood control purposes.	PEMA, FEMA, DEP, Conservation Groups, Municipalities	PEMA, FEMA, DEP, Private Sources, Foundations	High
2.	Establish adequate riparian area vegetation and floodplain integrity to limit degradation of water quality and biological resources.	Landowners, Conservation Groups, Municipalities, DEP	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	High
3.	Create and maintain projects that promote alternative methods of flood control, reserving dredging as a last resort.	Conservation Groups, Conservation Districts, DEP	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	Medium
4.	Implement channel improvement projects that use bioremediation techniques to limit flooding.	Conservation Groups, Conservation Districts, DEP	FEMA, PEMA, DCED, DEP, Private Sources, Foundations	Medium
5.	Improve dirt and gravel roads management programs to include strategies to eliminate berming and dumping into creeks, which can lead to increased flooding.	DEP, Municipalities, Penn State, Conservation Groups	DEP, EPA, Private Sources, Foundations	Medium

Goal 3-B: Encourage non-structural approaches to floodplain management (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Improve best management practices for land-use activities to reduce flooding and water quality degradation.	DEP, EPA, PEMA, Conservation Groups	DEP, FEMA, PEMA, DCED, Private Sources, Foundations	Medium
7.	Provide financial incentives to citizens and municipalities to remove remnant debris from past flooding events, and to reduce the aesthetic degradation of risk of future flood events.	DEP, EPA, PEMA, Conservation Groups	DEP, FEMA, PEMA, DCED, Private Sources, Foundations	Low

Goal 3-C: Reduce industrial and sewage waste discharges.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage municipalities with older Act 537 Sewage Facility Plans to update their plans to prepare for future development.	Municipalities, DEP, DCED, Conservation Groups, Municipal Authorities	DEP, DCED, Private Sources, Foundations	High
2.	Provide authorities with the increased capacity to regulate and enforce sewage laws.	Municipal Authorities, Municipalities	Private Sources	Medium
3.	Meet with industries to discuss ways to reduce industrial waste and pollution entering the streams.	Businesses, DEP, EPA, Municipalities, Conservation Groups	DEP, EPA, Private Sources, Foundations	Medium
4.	Continue offering trainings for sewage and water treatment plant personnel to better equip them to avoid and handle malfunctioning systems.	DEP, SEO, EPA, Plant Operators, Municipal Authorities, Municipalities	DEP, EPA, Private Sources, Foundations	Low

Goal 3-D: Install, maintain, or upgrade public and private water and sewage treatment facilities.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Design wastewater treatment systems to adequately serve communities, by separating stormwater from wastewater systems, in order to ease the occurrence of combined sewage overflows.	Municipalities, SEO, Conservation Groups, DEP, DCED, Municipal Authorities	DEP, DCED, Private Sources, Foundations	High
2.	Work with municipalities and landowners to install proper septic tanks, wastewater treatment systems, or other alternatives to reduce the amount of untreated sewage entering the streams.	Municipalities, Landowners, SEO, Conservation Groups, DEP, DCED, Municipal Authorities	DEP, DCED, Private Sources, Foundations	High
3.	Repair failing water and sewage lines, and add new infrastructure in growth areas as identified in county and municipal comprehensive plans and watershed wide assessments of water systems.	Municipalities, Municipal Authorities	DEP, DCED, Private Sources, Foundations	High

Goal 3-D: Install, maintain, or upgrade public and private water and sewage treatment facilities (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
4.	Upgrade antiquated water service lines to eliminate wasteful leaks.	Municipal Authorities, Water Companies	DEP, EPA, Private Sources, Foundations	Medium
5.	Work with public sewer authorities and management companies to encourage and/or expedite sewage facility upgrades and expansion to accommodate population growth and development, Cranberry Township Wastewater Treatment Plant in particular.	Municipal Authorities, Municipalities, Counties, DEP, EPA	DCED, PENNVEST, Private Sources, Foundations	Medium
6.	Encourage municipalities to maintain sewage infrastructure.	Municipalities, SEO, Conservation Groups, DEP, DCED, Municipal Authorities	DEP, DCED, Private Sources, Foundations	Medium
7.	Work with state and federal agencies to address current water and wastewater issues.	DEP, EPA, Municipalities, Water Authorities	DEP, EPA, Private Sources, Foundations	Medium
8.	Improve capacity of existing sewage treatment plants.	Municipalities, SEO, Conservation Groups, DEP, DCED, Municipal Authorities	DEP, DCED, Private Sources, Foundations	Medium
9.	Establish detention ponds as a back-up for malfunctioning systems.	Municipal Authorities, Municipalities, DEP	DEP, EPA, Private Sources, Foundations	Medium
10.	Update and improve wastewater treatment in urbanized areas and expand wastewater treatment availability into rural areas.	Municipalities, SEO, Conservation Groups, DEP, DCED, Municipal Authorities	DEP, DCED, Private Sources, Foundations	Medium
11.	Identify if additional public water supplies are necessary.	Municipal Authorities, Water Companies, Municipalities	DEP, EPA, Private Sources, Foundations	Low

Goal 3-E: Minimize impacts from stormwater through planning.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop and implement a watershed-wide stormwater management plan.	Conservation Districts, Conservation Groups, Counties, Planning Commissions, Municipalities	DEP, DCED, Private Sources, Foundations	High
2.	Incorporate water quality design and pollution reduction in stormwater management.	Conservation Districts, Conservation Groups, Counties, Planning Commissions	DEP, DCED, Private Sources, Foundations	High

Goal 3-E: Minimize impacts from stormwater through planning (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
3.	Enhance and enforce regulations for run-off and stormwater management for new developments.	Municipalities, Counties, DEP, Conservation Groups	Private Sources, Foundations	High
4.	Develop a demonstration area of stormwater best management practice that incorporates water quality improvement techniques.	Conservation Districts, Conservation Groups, Counties, Planning Commissions	DEP, DCED, Private Sources, Foundations	Medium
5.	Develop commercial and residential stormwater management plans.	DEP, Conservation Groups, Conservation Districts, Businesses	DEP, Private Sources, Foundations	Medium
6.	Address the current drainage issues by consulting with state management agencies.	Conservation Districts, Conservation Groups, Counties, Planning Commissions, Municipalities	DEP, PENNVEST, DCED, Private Sources, Foundations	Medium

Goal 3-F: Decrease the amount of impervious cover by 10 percent.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Minimize the amount of impervious cover by implementing stormwater best management practices recommended by the Center for Watershed Protection's *Eight Tools of Watershed Protection*.	Conservation Districts, Conservation Groups, Municipalities	DEP, Private Sources, Foundations	High
2.	Demonstrate and initiate community programs to promote alternative methods of reducing stormwater run-off with rain barrel programs, rain gardens, bio swales, green roofs, and home irrigation plans.	Conservation Districts, Conservation Groups, Cooperative Extensions, Citizens	DEP, Private Sources, Foundations	Medium
3.	Protect those watersheds with 10 percent or less impervious cover.	Conservation Districts, Conservation Groups	DEP, Private Sources, Foundations	Medium
4.	Employ pollution remediation techniques in urbanized areas containing over 60 percent impervious cover.	Conservation Districts, Conservation Groups	DEP, Private Sources, Foundations	Medium
5.	Inventory individual watersheds 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	DEP, Private Sources, Foundations	Low

Goal 3-G: Utilize riparian corridors to improve water quality and wildlife habitat.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Protect and enhance existing riparian buffers to achieve maximum protection of water resources.	Conservation Groups, Conservation Districts, DEP, Landowners	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	High
2.	Encourage streamside property owners to maintain an adequate vegetative buffer from the edge of the stream.	Conservation Groups, Conservation Districts, DEP, Landowners	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	High
3.	Encourage the establishment and maintenance of riparian vegetation and implementation of best management practices using smart growth practices as a cost-effective means of non-point source pollution reduction.	Conservation Groups, Conservation Districts, DEP, Landowners	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	High
4.	Conduct an assessment of streambanks and riparian areas, and prioritize areas in need of restoration.	Conservation Groups, Conservation Districts, DEP, Landowners	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	High
5.	Preserve current stream corridors and discourage unnecessary stream channelization.	Conservation Groups, Conservation Districts, DEP, PFBC, USACE	DEP, PFBC, Private Sources, Foundations	High
6.	Protect natural areas in buffer zones through land acquisition, conservation easements, and riparian restoration initiatives.	Conservation Groups, Conservation Districts, DEP, DCNR, Landowners	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	High
7.	Work with the Saxonburg Area Authority to restore riparian habitat along the Thorn Creek corridor.	DEP, PFBC, Saxonburg Area Authority, Conservation Groups	DEP, PFBC, Private Sources, Foundation	High
8.	Increase wildlife habitat by planting diverse native plant communities along riparian buffers.	Conservation Groups, Conservation Districts, DEP, Landowners, PFBC, USACE	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	High
9.	Develop partnerships and community involvement to implement riparian and streambank restoration projects.	Conservation Groups, Conservation Districts, DEP, Landowners, PFBC, USACE	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	High
10.	Identify areas of severe bank erosion and create a prioritized restoration plan to implement streambank stabilization, riparian restoration, and in-stream habitat improvement projects.	Conservation Groups, Conservation Districts, DEP, DCNR, Sportsmen's Clubs	DEP, EPA, Private Sources, Foundations, Cost-Share Programs	Medium

Goal 3-H: Protect wetlands.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Modify municipal ordinances to protect wetland areas of biological importance.	Conservation Groups, Municipalities, DEP, PNHP, Planning Commissions	DEP, DCED, Private Sources	High
2.	Protect wetland habitats and surrounding buffers for birds and wildlife by limiting development, storm runoff, and other disturbances.	Conservation Groups, DCNR, PGC, DEP, Planning Commissions	DEP, DCNR, Private Sources, Foundations	High
3.	Encourage state acquisition of important wetlands for protection.	Conservation Groups, DCNR, PGC, DEP, Planning Commissions	DEP, DCNR, Private Sources, Foundations	High
4.	Enhance and promote programs that restore wetlands from agricultural and streamside areas of limited value.	Conservation Groups, DEP, PDA, NRCS, Planning Commissions	DEP, Private Sources, Foundations	Medium

Goal 3-I: Further investigate wetlands and their functions.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Update wetland maps, and develop a digital coverage's database.	Conservation Groups, DCNR, PGC, DEP, Planning Commissions	DEP, Private Sources, Foundations	Medium
2.	Protect hydrology supporting wetlands.	Conservation Groups, DCNR, PGC, DEP, Planning Commissions	DEP, Private Sources, Foundations	Medium
3.	Inventory and assess the functionality of watershed wetlands, and develop restoration strategies based upon the assessment.	Conservation Groups, DCNR, PGC, DEP, Planning Commissions	DEP, DCNR, Private Sources, Foundations	Medium
4.	Study the historical wetland records, and explore the potential for recovery of lost/degraded wetland areas.	Conservation Groups, DEP, EPA	DEP, EPA, Private Sources, Foundations	Medium
5.	Encourage interstate collaboration on standardizing methods used to delineate and identify wetlands.	Conservation Groups, DEP, EPA, USACE, Legislators	EPA, USACE, DEP, Legislature	Medium
6.	Address federal redefinitions that exclude a large percentage of wetlands from protection and especially exclude them from U.S. Corps of Engineers responsibilities.	Conservation Groups, DEP, EPA, USACE	DEP, EPA, Private Sources, Foundations	Low
7.	Study the impacts that economic development has had on historical wetland loss.	Conservation Groups, DCNR, PGC, DEP, Planning Commissions	DEP, DCNR, DCED, Private Sources, Foundations	Low

Goal 3-J: Reduce the amount of erosion and sedimentation entering waterways.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote stronger use of best management practices to control erosion and sedimentation in farming, forestry, development, and mining industries; conduct more site inspections.	Conservation Groups, Conservation Districts, DEP, DCNR	DEP, EPA, Private Sources, Foundations	High
2.	Conduct a watershed study to determine sources of sedimentation and develop strategies to reduce impacts through best management practices.	Conservation Groups, DEP, Conservation Districts	DEP, EPA, Private Sources, Foundations	Medium
3.	Establish a permit process that requires all earth moving industries to abide by the same erosion and sedimentation control standards.	Conservation Groups, DEP, Conservation Districts	DEP, EPA, Private Sources, Foundations	Medium
4.	Establish steep slope or grading ordinances for earth moving industries.	Conservation Groups, DEP, Conservation Districts, Municipalities	DEP, EPA, Private Sources, Foundations	Medium
5.	Incorporate environmentally sensitive construction and maintenance techniques on dirt and gravel roads.	Conservation Groups, DEP, Conservation Districts, Municipalities	DEP, EPA, Private Sources, Foundations	Medium

Goal 3-K: Monitor water quantity to ensure demand does not exceed water supply.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Conserve groundwater through the installation of riparian buffers, porous pavement, and other best management practices.	Conservation Groups, Conservation Districts, Landowners	DEP, Cost-share Programs, Private Sources, Foundations	High
2.	Establish U.S. Geological Survey stream gauges to monitor the flow of tributaries in the Connoquenessing watershed.	USGS, Conservation Districts, Conservation Groups, DEP, USACE, PaGS	USGS, EPA, Private Sources, Foundations	Medium
3.	Encourage Pennsylvania Department of Environmental Protection to conduct Source Water Assessment Project survey for the Connoquenessing Creek watershed.	Conservation Groups, Conservation Districts, DEP, LWV, RWA, PaGS	DEP	Medium
4.	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 Groups, Conservation Districts, DEP, PaGS	DEP, EPA, Private Sources, Foundations	Medium

Goal 3-K: Monitor water quantity to ensure demand does not exceed water supply (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
5.	Update USGS stream gauging station database to include current groundwater flow, depths and quality information.	USGS, Conservation Groups, Conservation Districts, PFBC, DEP, PaGS	USGS, DEP, EPA, Private Sources, Foundations	Medium
6.	Encourage municipalities to develop Source Water Protection Plans for all public water supplies.	Municipalities, Water Suppliers, DEP, LWV, RWA, Conservation Groups, Conservation Districts	DEP, LWV, Private Sources, Foundations	Medium
7.	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.	USGS, Conservation Groups, Conservation Districts, PFBC, DEP, PaGS	USGS, DEP, EPA, Private Sources, Foundations	Medium
8.	Conduct source water or well-head protection plans in order to identify and protect drinking water sources.	Conservation Groups, Conservation Districts, Municipalities, LWV, RWA, PaGS	WREN, Private Sources, Foundations	Medium
9.	Encourage area residents and well drillers to monitor groundwater levels in critical areas that can be used as baseline data to determine loss of groundwater.	Conservation Groups, Conservation Districts, Citizens, Schools, Well Drillers, PaGS	DEP, EPA, Private Sources, Foundations	Medium
10.	Develop a locally based program for disseminating information about protecting private well supplies to homeowners.	Conservation Groups, Conservation Districts, DEP, LWV, RWA, PaGS	DEP, WREN, Private Sources, Foundations	Medium
11.	Inventory public and private wells including information regarding well construction, pump tests, and geologic information and incorporate the data into Pennsylvania Geological Survey's PaGWIS database.	Conservation Groups, Conservation Districts, DEP, LWV, RWA, PaGS	DEP, WREN, Private Sources, Foundations	Low

Goal 3-L: Investigate the need and effectiveness of establishing a water quality trading program within the Connoquenessing Creek watershed.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Explore and develop institutional framework for water quality trading.	Conservation Districts, Conservation Groups, DEP, EPA	DEP, EPA, Private Sources, Foundations	Low
2.	Support and strengthen the water quality trading program to improve overall water quality and industrial discharges.	Conservation Districts, Conservation Groups, DEP, EPA	DEP, EPA, Private Sources, Foundations	Low

Goal 3-M: Develop a monitoring plan for the watershed or completed project areas, integrating quality assurance/quality control standards into the plan.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Involve schools and community groups in water quality monitoring programs.	Conservation Groups, Conservation Districts, Community Groups, Schools	DEP, EPA, Private Sources, Foundations	High
2.	Compile a database of all background monitoring data.	Conservation Groups, Conservation Districts, Community Groups, Schools, PaGS	DEP, EPA, Private Sources, Foundations	High
3.	Continue efforts to collect water quality information on a seasonal basis and compare past and present monitoring results to check for changes in conditions.	Conservation Groups, Conservation Districts, Community Groups, Schools, PaGS	DEP, EPA, Private Sources, Foundations	High
4.	Analyze water samples for bacteria to identify problem areas.	Conservation Groups, Conservation Districts, Community Groups, Schools, PaGS	DEP, EPA, Private Sources, Foundations	High
5.	Conduct seasonal chemical, biological, and visual assessments for at least one year to provide background data for prioritization of future projects.	Conservation Groups, Conservation Districts, Community Groups, Schools, PaGS	DEP, EPA, Private Sources, Foundations	Medium
6.	Monitor the biochemical oxygen demand above and below sewage effluents.	Conservation Groups, Conservation Districts, Community Groups, Schools	DEP, EPA, Private Sources, Foundations	Low

Goal 3-N: Establish and implement water conservation practices to reduce water consumption.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Launch a watershed-wide water conservation program to educate the public about the value of reducing water consumption and utilizing water conservation products and techniques.	Conservation Groups, Conservation Districts, DEP	DEP, WREN, Private Sources, Foundations	High
2.	Establish an ongoing program for regional schools to promote water conservation.	Conservation Groups, Conservation Districts, Schools	DEP, Private Sources, Foundations	High
3.	Work with landowners and developers to incorporate environmentally friendly water conservation practices in their homes and business.	Conservation Groups, Developers, DEP, Landowners	Private Sources	Medium

Goal 3-N: Establish and implement water conservation practices to reduce water consumption (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
4.	Promote and establish a program for retrofitting homes and businesses for water conservation practices through tax breaks, rebates, and other incentives.	Conservation Groups, Developers, DEP, Legislators, Landowners	DEP, Private Sources	Medium
5.	Establish guidelines that require installation of low-flow devices for all new construction.	Conservation Groups, Developers, DEP, Legislators	DEP, Private Sources	Low

Goal 3-O: Conduct an assessment of natural and man-made impoundments, and implement recommendations to enhance their ecosystems.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Assess, control, monitor, and mitigate exotic species that directly affect lake uses.	Conservation Groups, Conservation Districts, DEP, PALMS	DEP, DCNR, EPA, Private Sources, Foundations	Medium
2.	Assess and inventory lakes and ponds in the watershed for size, use, water quality, and aquatic life.	Conservation Groups, Conservation Districts, DEP, PALMS	DEP, DCNR, EPA, Private Sources, Foundations	Medium
3.	Inventory dams for their uses, and evaluate maintenance versus removal, while considering public safety, recreation, and present use.	Conservation Groups, Conservation Districts, DEP, USACE, American Rivers	DEP, EPA, Private Sources, Foundations	Medium
4.	The Hereford Manor Lake Conservancy & Watershed Group, Inc. should continue to solicit the support from local and county governments to develop a partnership with the Pennsylvania Fish and Boat Commission to lease and provide for the day to day management and operation of the Hereford Manor Lake property.	Hereford Manor Lake Conservancy and Watershed Group, Inc., other local Conservation Groups, PFBC, County and local Governments	PFBC, PA Redevelopment Assistance Capital Program (RCAP), Private Sources, Foundations	Medium
5.	Improve recreation and conservation efforts at Hereford Manor Lakes as recommended within the *Hereford Manor Lakes Feasibility Study and Master Plan* with physical and programmatic improvements to the site.	Hereford Manor Lake Conservancy and Watershed Group, Inc., other local Conservation Groups, PFBC, County and local Governments	PFBC, Private Sources, Foundations, WREN, DCNR	Medium

Goal 3-P: Reduce impacts caused by point and non-point source impairments.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Identify sources of bacteria pollution in Brush and Breakneck creeks to reduce to acceptable levels by working with landowners and sewage authorities to reduce sewage contamination.	Conservation Groups, Conservation Districts, DEP	DEP, DCED, Private Sources, Foundations	High

Goal 3-P: Reduce impacts caused by point and non-point source impairments (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
2.	Work with local and state agencies to enforce regulations protecting water quality, particularly for High Quality and Exceptional Value designated streams.	Conservation Groups, Conservation Districts, DEP, PFBC	Private Sources, Foundations	Medium
3.	Encourage the transfer of permit violation fees to a local organization for water quality improvements within the watershed.	Conservation Districts, Conservation Groups, DEP	Private Sources	Medium
4.	Develop strong partnerships with Pennsylvania Department of Environmental Protection to establish and implement Total Maximum Daily Loads for high priority tributaries.	Conservation Districts, Conservation Groups, DEP	DEP	Medium
5.	Determine the impacts of salt and ash used for snow/ice removal on water quality and investigate alternatives.	Conservation Groups, Municipalities, Universities, PennDOT	DEP, EPA, PennDOT, Private Sources, Foundations	Medium
6.	Encourage municipalities and PennDOT to utilize dry sweeping and other alternatives as opposed to washing residual salt, cinder, and debris from roadways into storm drains and waterways.	Conservation Groups, Municipalities, PennDOT	DEP, EPA, PennDOT, Private Sources, Foundations	Low
7.	Utilize and support updates to the Pennsylvania Non-Point Source Management Plan	Conservation Groups, DEP, NRCS, PDA	DEP, Private Sources, Foundations	Low

Goal 3-Q: Investigate methods to reduce impacts of acid precipitation.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop a monitoring network to identify areas streams that are impaired by acid precipitation and its effects on aquatic life.	Conservation Groups, Conservation Districts, Citizens, DEP	DEP, EPA, Private Sources, Foundations	Low
2.	Conduct a demonstration project to determine the effect land liming of agricultural, forest, and strip-mined lands has on water quality through neutralization of acidic waters.	Conservation Groups, Conservation Districts, DEP	DEP, EPA, Private Sources, Foundations	Low
3.	Develop a land and/or water acid neutralization demonstration project to determine if such treatment could neutralize water pH.	Conservation Groups, Conservation Districts, DEP	DEP, EPA, Private Sources, Foundations	Low

Goal 3-R: Identify, study, and treat abandoned mine drainage discharges.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Conduct an assessment of abandoned mine drainage contamination and develop a prioritized remediation and implementation plan.	Conservation Districts, Conservation Groups, DEP, OSM, PaGS	DEP, OSM, EPA, Private Sources, Foundations	Medium
2.	Implement strategies identified in a prioritized remediation plan.	Conservation Districts, Conservation Groups, DEP, Landowners	DEP, OSM, EPA, Private Sources, Foundations	Medium
3.	Upgrade treatment systems based on continued monitoring.	Conservation Districts, Conservation Groups, DEP, OSM	DEP, OSM, EPA, Private Sources, Foundations	Medium
4.	Identify areas where surface water is lost to underground mines, which is a contributing factor the production of abandoned mine drainage and develop remediation strategies.	Conservation Districts, Conservation Groups, DEP, PaGS	DEP, OSM, EPA, Private Sources, Foundations	Medium
5.	Identify all discharges with suitable deposits of iron oxide for recovery.	Conservation Districts, Conservation Groups, DEP, PaGS	DEP, OSM, EPA, Private Sources, Foundations	Medium

Goal 3-S: Monitor the use and effectiveness of dams.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop a plan for the replacement of the Upper and Lower Hereford Manor Lake dams, which fulfill regionally significant demands for fishing, recreation, and conservation related activities; and bring the structures into compliance with the Federal Dam Safety Act to maintain public safety.	Conservation Groups, DEP, PFBC, DCNR, Conservation District, Planning Department	DEP, PFBC, EPA, DCNR, Private Sources, Foundations	Medium
2.	Evaluate the cost-effectiveness of maintaining or removing unused dams.	Conservation Groups, DEP, PFBC, USACE, Conservation Districts	DEP, PFBC, EPA, USACE, Private Sources, Foundations	Low

Biological Resources

Goal 4-A: Develop, adopt, and implement management plans to protect forest and wildlife resources.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop detailed management plans for landowners of biologically diverse areas, including inventories of natural features and invasive species monitoring plans.	Conservation Groups, Landowners, PGC, DCNR, PNHP	DCNR, PGC, Private Sources	Medium

Goal 4-A: Develop, adopt, and implement management plans to protect forest and wildlife resources (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
2.	Conduct studies in conjunction with the Pennsylvania Natural Heritage Program to monitor biodiversity, including surveys for historical species of concern for which the status is unknown.	Conservation Groups, Sportsmen Groups, DCNR, PGC, PNHP	DCNR, Private Sources, Foundations	Medium
3.	Encourage planning departments to adopt and utilize management plans that protect forest landscapes.	DCNR, Landowners, Conservation Groups, Planning Departments	DCNR, Private Sources, Foundations	Medium
4.	Encourage landowners to contact a Pennsylvania Game Commission biologist to develop a wildlife management plan for their property.	Conservation Groups, Landowners, PGC, DCNR	PGC, Private Sources	Medium
5.	Encourage the development and use of forest stewardship or forest management plans and participation in the Pennsylvania Forest Stewardship Program and/or the Tree Farm Program.	DCNR, Landowners, Conservation Groups, Planning Departments	DCNR, Private Sources, Foundations	Medium
6.	Develop forest and wildlife management plans.	Conservation Groups, Landowners, PGC, DCNR	DCNR, PGC, Private Sources	Medium

Goal 4-B: Implement best management practices to protect forest resources.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote tree plantings, sustainable harvesting, and other best management practices.	Conservation Groups, Landowners, DCNR, Civic Groups	DCNR, Private Sources, Foundations	High
2.	Decrease forest fragmentation by maintaining contiguous forest tracts and/or travel corridors between existing non-contiguous forest tracts.	Conservation Groups, Sportsmen Groups, Landowners, DCNR	DCNR, PGC, Private Sources, Foundations	Medium
3.	Discourage the use of high-grading practices, such as diameter-limit harvest and selective cutting, and encourage timber harvesters to use sustainable best management practices based upon forest type and size under the direction of a professional forester.	Conservation Groups, Landowners, DCNR	DCNR, Private Sources, Foundations	Medium
4.	Encourage cooperation between conservation districts and state agencies to enforce regulations on the logging industry to minimize erosion and sedimentation.	Conservation Groups, Conservation Districts, Landowners, DCNR, DEP	DCNR, Private Sources, Foundations	Medium

Goal 4-B: Implement best management practices to protect forest resources (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
5.	Work with Woodland Owner Associations to educate the public, restore degraded areas, and develop demonstration areas.	Conservation Groups, Landowners, DCNR	DCNR, Private Sources, Foundations	Medium

Goal 4-C: Identify Important Bird and Mammal Areas.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Identify specific recommendations to improve habitat related to Important Bird Areas and Important Mammal Areas.	Conservation Groups, Landowners, PGC, DCNR, PNHP	DCNR, PGC, Audubon Society, Private Sources, Foundations	Medium
2.	Partner with local Audubon chapters and birding clubs to identify, characterize, and recommend Important Bird Areas.	Conservation Groups, Landowners, DCNR, PNHP	DCNR, Audubon Society, Private Sources, Foundations	Medium
3.	Identify and recommend Important Mammal Areas.	Conservation Groups, Landowners, PGC, PNHP	DCNR, PGC, Private Sources, Foundations	Medium

Goal 4-D: Identify and protect biologically diverse areas.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Restrict activities, such as grazing and off-road vehicles, and control invasive species within biological diversity areas.	Conservation Groups, Landowners, DCNR, PGC, PNHP	DCNR, Private Sources, Foundations	Medium
2.	Develop a land steward program for Biological Diversity Areas through which volunteers would be responsible for regular monitoring of these areas and educating landowners.	Conservation Groups, Landowners, DCNR, PGC, PNHP	DCNR, Private Sources, Foundations	Medium
3.	Develop incentive programs to encourage and reward landowners to develop management plans, decrease development, and use other conservation practices in and around riparian corridors and biologically diverse areas.	Conservation Groups, Sportsmen Groups, Landowners, DCNR, PGC, DEP, PNHP	DCNR, DEP, PGC, Cost-share Programs, Private Sources, Foundations	Medium
4.	Work with utility companies to limit herbicide use and to utilize alternative management techniques in right-of-ways.	Conservation Groups, Utility Company, Landowners, PNHP	DCNR, Private Sources, Foundations	Medium
5.	Develop new biotic study areas throughout the watershed and encourage local schools to utilize this resource, thereby fulfilling state curriculum requirements and broadening educational understanding of ecological resources.	Conservation Groups, Landowners, DCNR, PGC, Universities, School Districts, PNHP	DCNR, Universities, Private Sources, Foundations	Medium

Goal 4-D: Identify and protect biologically diverse areas (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Implement strategies to improve habitat within Biological Diversity Areas.	Conservation Groups, DCNR, Landowners, PNHP	DCNR, Private Sources, Foundations	Medium
7.	Establish and utilize biodiversity indices, such as Aquatic Community Classification, for selected stream segments to document the current status of biodiversity and to track changes over time as management recommendations are implemented.	Conservation Groups, Sportsmen Groups, DCNR, DEP, PFBC, USFWS, PNHP	DEP, DCNR, PFBC, PGC, USFWS, Private Sources, Foundations	Medium
8.	Protect biological diversity areas through collaborative partnerships among the present owner, citizens, local organizations, and Pennsylvania Department of Transportation.	Conservation Groups, Landowners, DCNR, PGC, PennDOT, PNHP	DCNR, Private Sources, Foundations	Low
9.	Refine information on Biological Diversity Areas contained in County Natural Heritage Inventories.	Conservation Groups, DCNR, Counties, PNHP, PGC, PFBC, PNHP	DCNR, Private Sources, Foundations	Low

Goal 4-E: Enhance aquatic habitats.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Incorporate aquatic habitat improvements into streambank stabilization and water quality remediation projects.	Conservation Groups, DEP, PFBC, Landowners	DEP, PFBC, Private Sources, Foundations	High
2.	Improve aquatic habitat for fish, mussels, and other organisms by implementing best management practices and other restoration activities.	Conservation Groups, DEP, PFBC, Landowners	DEP, PFBC, Private Sources, Foundations	High
3.	Increase habitat and passage for fish, mussels, and other aquatic organisms by removing dams on small tributaries and maintaining stable flow regimes downstream.	Conservation Groups, DEP, PFBC, ACOE, Landowners	DEP, PFBC, American Rivers, Private Sources, Foundations	Medium
4.	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	PFBC, DEP, Private Sources, Foundations	Medium

Goal 4-F: Protect rare, threatened, and endangered species and their habitats.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Protect or improve habitats that support threatened and endangered species and species of concern through acquisition, easements, and/or landowner education.	PNHP, PFBC, DCNR, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium

Goal 4-F: Protect rare, threatened, and endangered species and their habitats (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
2.	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.	PNHP, PFBC, DCNR, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium
3.	Appoint a liaison to work with a member of the PA Biological Survey to submit recent identification of rare, threatened, and endangered species within the watershed and to report the condition of these species' habitats.	PNHP, PFBC, DCNR, PABS, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium

Goal 4-G: Identify and protect important habitats for plant and animal species.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Identify high quality wetlands located in the watershed.	Conservation Groups, DCNR, DEP, PFBC	DCNR, DEP, Private Sources, Foundations	High
2.	Preserve native habitats by using smart land use planning strategies as defined in the Project Area Characteristics chapter.	PNHP, PFBC, DCNR, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium
3.	Identify and protect additional environmentally sensitive areas and areas of high biodiversity.	PNHP, PFBC, DCNR, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium
4.	Maintain grassland species habitats on public lands through controlled burns and limited mowing activity.	PNHP, PFBC, DCNR, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium
5.	Monitor activities in critical habitat areas.	Conservation Groups, Landowners, DCNR	DCNR, PGC, Private Sources, Foundations	Medium
6.	Establish more private backyard conservation areas to serve as wildlife habitat and travel corridors by providing activities and programs for landowners.	PNHP, PFBC, DCNR, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium
7.	Encourage no mow strategies for some fields in public lands to return a more natural state to provide habitat for wildlife.	PNHP, PFBC, DCNR, PGC, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Medium
8.	Encourage landowners of fallow fields to delay mowing until after breeding season for birds.	PNHP, PFBC, DCNR, PGC, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Low
9.	Encourage farmers to delay the first hay harvest until July or later providing young wildlife the opportunity to mature, if economic situation permits.	PNHP, PFBC, DCNR, PGC, Conservation Groups, Landowners	DCNR, PFBC, Private Sources, Foundations	Low

Goal 4-H: Monitor and control invasive species.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Conduct a watershed-wide invasive species plant survey to develop a list of areas where invasive species pose the greatest threats to biodiversity.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	Medium
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, Landowners	DCNR, Private Sources, Foundations	Medium
3.	Monitor riparian buffers for invasive species, and implement control practices.	Conservation Groups, Conservation Districts, DCNR, Landowners	DCNR, Private Sources, Foundations	Medium
4.	Develop a demonstration project to control invasive species, and restore natural communities while providing educational opportunities.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	Medium
5.	Develop a partnership and build on lessons learned from Natural Biodiversity and National Park Service invasive species control projects.	Conservation Groups, Conservation Districts, DCNR, National Park Service, Natural Biodiversity	DCNR, Private Sources, Foundations	Medium
6.	Work with landowners to develop detailed management recommendations, including an inventory of natural features and communities at the site.	Conservation Groups, Conservation Districts, DCNR, Landowners	DCNR, Private Sources, Foundations	Low
7.	Compile a publicly assessable Internet database of exotic and invasive species that allows moderated submissions from the public.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	Low

Goal 4-I: Implement strategies to conserve rare and unique plant and animal communities.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Protect limestone mine near Ellwood City, where the Indiana bat dwells during winter months.	Conservation Groups, Landowners, DCNR, PNHP	DCNR, EPA, Private Sources, Foundations	Medium

Goal 4-J: Promote the use of native plants.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote native plantings as part of surface mine reclamation plans.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	High
2.	Encourage the use of native plants in landscaping, wildlife habitat plantings, and educational activities.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	High

Goal 4-J: Promote the use of native plants (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
3.	Promote native tree plantings in remediation projects, such as streambank fencing or streambank stabilization.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	High
4.	Establish a reserve seed bank of native species that can be used in remediation efforts.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	Low
5.	Conduct an assessment and develop a management plan for native species.	Conservation Groups, Conservation Districts, DCNR	DCNR, Private Sources, Foundations	Low
6.	Support local plant and tree nurseries that grow native plants.	Conservation Groups, Nurseries, Citizens	Private Sources, Foundations	Low

Goal 4-K: Implement wildlife management practices to protect biodiversity.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote and support deer-management strategies, such as special hunting tags and deer exclosures in natural areas.	Conservation Groups, Sportsmen Groups, DCNR, PGC	PGC, Private Sources, Foundations	High
2.	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	PGC, Private Sources, Foundations	High
3.	Foster continued involvement in hunting activities among all age groups, and educate hunters on the importance of population control.	Conservation Groups, Sportsmen Groups, DCNR, PGC	PGC, Private Sources, Foundations	Medium
4.	Work with sportsmen's groups and landowners to increase public and private lands available for hunting.	Conservation Groups, Sportsmen Groups, Landowners, DCNR, PGC	PGC, Private Sources, Foundations	Medium
5.	Encourage hunters to participate in the Deer Management Assistance Program to keep deer herds at ecologically healthy levels.	Conservation Groups, Sportsmen Groups, DCNR, PGC	PGC, Private Sources, Foundations	Medium
6.	Develop areas for wildlife viewing and education to raise awareness about biodiversity.	Conservation Groups, Sportsmen Groups, Landowners, DCNR, PGC	PGC, Private Sources, Foundations	Medium
7.	Conduct an inventory of reptile and amphibian species and compare to historic data to determine if there have been significant changes to the population.	Conservation Groups, Universities, PFBC, PNHP	DCNR, PFBC, Private Sources, Foundations	Medium

Goal 4-K: Implement wildlife management practices to protect biodiversity (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
8.	Encourage private landowners to register their land in Deer Management Assistance Program to keep deer herds at ecologically healthy levels.	Conservation Groups, Sportsmen Groups, DCNR, PGC	PGC, Private Sources, Foundations	Medium

Cultural Resources

Goal 5-A: Increase awareness of recreational resources through marketing and outreach.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Promote tourism utilizing natural, cultural, and recreational resources.	Tourist Bureaus, Historical Societies, Municipalities, Businesses, Conservation Groups	Tourist Bureaus, Private Sources, Foundations	High
2.	Utilize local tourism promotion agencies to highlight recreational opportunities.	Tourist Bureaus, Municipalities, Businesses, Conservation Groups	Tourist Bureaus, Private Sources, Foundations	High
3.	Utilize local recreational facilities to host community festivals and events.	Tourist Bureaus, Historical Societies, Municipalities, Conservation Groups	Tourist Bureaus, Private Sources, Foundations	Medium
4.	Establish a visitor or welcome center and accompanying website where visitors can obtain information about recreational opportunities.	Tourist Bureaus, Historical Societies, Municipalities, Businesses, Conservation Groups	Tourist Bureaus, Private Sources, Foundations	Medium
5.	Establish a campaign to market recreational and historical resources to community residents.	Tourist Bureaus, Historical Societies, Municipalities, Businesses, Conservation Groups	Tourist Bureaus, Private Sources, Foundations	Medium
6.	Conduct an economic impact study of recreational activities to determine the impact that recreation has on the local economy.	Tourist Bureaus, Municipalities, Businesses, Conservation Groups	Tourist Bureaus, Private Sources, Foundations	Low

Goal 5-B: Enhance recreational opportunities for sportsmen and outdoor enthusiasts.

Hunting

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage agricultural landowners to participate in the Cooperative Farmland Program opening additional land to public hunting.	Landowners, PGC, Sportsmen Groups, Conservation Groups	PGC, Private Sources, Foundations	Medium

Goal 5-B: Enhance recreational opportunities for sportsmen and outdoor enthusiasts (continued).

Hunting (continued)

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
2.	Encourage woodlot landowners to participate in the Cooperative Forestry Program opening additional land to public hunting.	Landowners, PGC, DCNR, Sportsmen Groups, Conservation Groups	PGC, DCNR, Private Sources, Foundations	Medium
3.	Identify new, and protect existing areas open to hunting.	Landowners, PGC, Sportsmen Groups, Conservation Groups	PGC, Private Sources, Foundations	Medium
4.	Encourage landowners to allow hunting on their properties.	Landowners, PGC, Sportsmen Groups, Conservation Groups	PGC, Private Sources, Foundations	Low
5.	Support landowner liability protection.	Landowners, PGC, Sportsmen Groups, Conservation Groups, Insurance Companies	Private Sources, Foundations	Low

Fishing and Boating

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish a water trail, including maps and signage, and plan for additional access points for canoeing and kayaking, especially along lower section of Connoquenessing Creek.	PEC, Conservation Groups, PFBC, DCNR, Tourist Bureaus, Citizens, Businesses, Municipalities	PFBC, DCNR, Private Sources, Foundations	High
2.	Improve water quality in order to aid the recovery of the local fishery as a local resource for recreation and tourism.	Sportsmen Groups, Conservation Groups, PFBC, DEP	DEP, PFBC, Private Sources, Foundations	High
3.	Protect and improve area waterways to maintain or expand fisheries and fishing opportunities.	Sportsmen Groups, Conservation Groups, PFBC, DEP	DEP, PFBC, Private Sources, Foundations	High
4.	Work with private landowners to provide access to waterways for anglers and small non-powered watercraft.	Landowners, PFBC, Conservation Groups, DCNR	PFBC, DCNR, Private Sources, Foundations	Medium
5.	Remove inactive dams and establish portages around active dams to improve canoeing, and kayaking opportunities.	Conservation Groups, PFBC, American Rivers	PFBC, DEP, Private Sources, Foundations	Medium
6.	Implement boat cleaning programs to prevent invasive species movement.	PFBC, Conservation Groups, Sportsmen Groups, DEP, DCNR	PFBC, DEP, Private Sources, Foundations	Medium
7.	Explore the fisheries potential of the Connoquenessing Creek downstream of the Saxonburg Area Authority sewage treatment facility.	DEP, PFBC, Conservation Groups, Saxonburg Area Authority	PFBC, Private Sources, Foundations	Medium

Goal 5-B: Enhance recreational opportunities for sportsmen and outdoor enthusiasts (continued).

Fishing and Boating (continued)

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
8.	Explore ways to increase streamflow by utilizing groundwater during summer months on our local trout streams to create year-round fisheries.	DEP, PFBC, Conservation Groups	DEP, PFBC, Private Sources, Foundations	Low
9.	Create a youth fishing only area on one of the local waterways, even if it is only for several weeks of the year.	PFBC, Sportsmen Groups, Conservation Groups	PFBC, Private Sources, Foundations	Low

Camping

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Enhance camping experience through facility and program updates, encouraging more visitors to experience the natural environment.	Conservation Groups, Businesses, DCNR	PFBC, DCNR, Private Sources, Foundations	Medium
2.	Acquire and develop areas along the stream for primitive camping.	Conservation Groups, Businesses, DCNR	PFBC, DCNR, Private Sources, Foundations	Low

Goal 5-C: Establish recreational programs for youth.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish community or school programs to teach children about outdoor recreational opportunities, such as hiking, camping, fishing, hunting, kayaking, etc.	School Districts, Communities, Civic Groups, PFBC, PGC, DCNR	Private Sources, Foundations	Low
2.	Establish community or school programs to teach children how to swim.	School Districts, Communities	Private Sources, Foundations	Low
3.	Organize community sport leagues, such as baseball, basketball, and football.	School Districts, Communities, Park and Recreation Authorities	Private Sources, Foundations	Low

Goal 5-D: Improve recreational facilities and ensure availability and access.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish additional or enhance existing public access points to streams and trails, including amenities, such as parking and restroom facilities.	Conservation Groups, PFBC, DCNR, Civic Groups, Municipalities	DCNR, PFBC, Private Sources, Foundations	High
2.	Utilize Connoquenessing Creek for recreational opportunities.	Conservation Groups, Businesses	DCNR, Private Sources, Foundations	High
3.	Revive Butler City Park by restoring the bridge entering the park, connecting it to the Athletic Oval, and provide lighting, signage, and trash receptacles.	Butler, PennDOT, Civic Groups, Conservation Groups, Citizens	DCNR, Private Sources, Foundations	High

Goal 5-D: Improve recreational facilities and ensure availability and access (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
4.	Establish year-round recreational opportunities.	Municipalities, Community Groups, Landowners, Businesses	DCNR, Private Sources, Foundations	High
5.	Provide and enhance amenities, such as bathrooms and parking lots, at recreational facilities, including trailheads and municipal parks.	Municipalities, PFBC, Community Groups	DCNR, PFBC, Private Sources, Foundations	Medium
6.	Improve access and awareness of scenic vistas.	Conservation Groups, Landowners	DCNR, Private Sources, Foundations	Medium
7.	Redevelop recreational facilities for multiple uses providing a variety of activities and amenities.	Municipalities, Park and Recreation Authorities, Citizens	DCNR, Private Sources, Foundations	Medium
8.	Update equipment and safety features at existing community parks.	Municipalities, Park and Recreation Authorities, Citizens	DCNR, Private Sources, Foundations	Medium

Goal 5-E: Establish additional recreational facilities.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop low-impact recreational facilities for camping, hiking, biking, wildlife viewing, bird watching, picnicking, fishing and hunting.	Community Groups, Conservation Groups, DCNR	DCNR, Private Sources, Foundations	High
2.	Protect open spaces near developments to provide communities access to natural areas and secure potential parklands before development pressures and/or high prices prevent their acquisition.	Municipalities, DCNR, Conservation Groups	DCNR, Private Sources, Foundations	Medium
3.	Establish community parks in municipalities and counties lacking sufficient recreational facilities.	Municipalities, Park and Recreation, DCNR, Citizens	DCNR, Private Sources, Foundations	Medium
4.	Encourage and educate visitors to utilize recreational resources available to the public and respect private property owner rights.	Conservation Groups, Municipalities, Landowners	DCNR, Private Sources, Foundations	Medium
5.	Formally establish Hereford Manor Lake as a park site.	Municipalities, Citizens, Hereford Manor Lake Conservancy, PFBC, Conservation Groups	PFBC, DCNR, Private Sources, Foundations	Low
6.	Establish and maintain swimming areas with proper safety guidelines including lifeguards being on duty.	Municipalities, Civic Groups, Citizens	DCNR, Municipalities, Private Sources, Foundations	Low

Goal 5-F: Establish, expand, and improve area trails.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Construct additional footpaths at the Rock Point natural areas especially along Connoquenessing Creek and the Beaver River.	Conservation Groups, DCNR, Rock Point Boat Club	DCNR, Private Sources, Foundations	High
2.	Establish trails near streams providing scenic beauty and access to area waterways.	Trail Groups, Citizens, Conservation Groups	DCNR, Private Sources, Foundations	High
3.	Establish self-guided walking, biking, or automobile tours featuring the history and culture of the region.	Conservation Groups, Historical Societies, Trail Groups	Private Sources, Foundations	High
4.	Construct foot and bike paths in southern Butler County.	Conservation Groups, Landowners, Trail Groups, Municipalities	DCNR, Private Sources, Foundations	High
5.	Develop trails in urban areas for easier short-distance transportation.	Municipalities, Trail Groups, Citizens	DCNR, Private Sources, Foundations	High
6.	Develop or designate certain areas of trails for specific uses, such as off road vehicle riding, snowmobiling, hiking, biking, and horseback riding.	Conservation Groups, Municipalities, Trail Groups, 4-H, Recreational Vehicle Riding Clubs	DCNR, Private Sources, Foundations	High
7.	Prohibit motorized vehicles on walking and bike trails.	Citizens, Trail Groups, Municipalities	Private Sources, Foundations	High
8.	Establish a trail from Pullman Park to rail trail along Connoquenessing Creek providing lighting and other safety amenities.	Trail Groups, Citizens, Municipalities, Conservation Groups	DCNR, Private Sources, Foundations	High
9.	Utilize trails in educational pursuits.	Conservation Groups, Trail Groups, School Districts	DCNR, Private Sources, Foundations	Medium
10.	Establish well-defined trailheads on new and existing trails.	Trail Groups, Conservation Groups	DCNR, Private Sources, Foundations	Medium
11.	Explore the feasibility of developing new trails and/or enhancing existing trails.	Citizens, Trail Groups, Conservation Groups, Municipalities	DCNR, Private Sources, Foundations	Medium
12.	Increase safety for trails along roadways by erecting highway signage, alerting motorists of the trails, and offering trail safety seminars for trail users.	Trail Groups, Municipalities, PennDOT	DCNR, PennDOT, Private Sources, Foundations	Medium
13.	Increase maintenance of trail corridors to provide a safer recreational opportunity.	Trail Groups, Civic Groups, Conservation Groups	DCNR, Private Sources, Foundations	Medium

Goal 5-F: Establish, expand, and improve area trails (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
14.	Maintain trail paths, whether water or land, keeping free of debris and hazards.	Trail Groups, Civic Groups, Conservation Groups	Private Sources, Foundations	Medium

Goal 5-G: Convert abandoned rail lines into trails and tours.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Conduct a feasibility study investigating the preservation of railroad corridors for uses, such as rails-to-trails, that preserve these corridors and offer recreational opportunities.	Conservation Groups, Historical Societies, Municipalities, Civic Groups, Landowners, Trail Groups	DCNR, Private Sources, Foundations	Medium
2.	Establish a rail tour highlighting scenery and history of the railroad.	Historical Societies, Conservation Groups, Railroad Companies	DCNR, Private Sources, Foundations	Medium

Goal 5-H: Link recreational facilities to each other.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish a network of multi-use trails by connecting existing and new recreational trails.	Municipalities, Counties, Conservation Groups, Park and Recreation Authorities	DCNR, DCED, Private Sources, Foundations	Medium
2.	Explore possibility of connecting railroad corridors and trails from surrounding areas to existing trails.	Municipalities, Counties, Conservation Groups, Park and Recreation Authorities	DCNR, Private Sources, Foundations	Medium
3.	Establish greenway corridors and trails in the watershed to connect activity hubs and greenway for public use.	Conservation Groups, Conservation Districts, Planning Commissions	DCNR, Private Sources, Foundations	Medium
4.	Develop highway bike/hike trails connecting communities by enhanced existing roadways.	Municipalities, Counties, Conservation Groups, Park and Recreation Authorities, PennDOT	DCNR, PennDOT, Private Sources, Foundations	Medium

Goal 5-I: Encourage environmentally sound practices when operating recreational vehicles, and enforce existing laws to minimize intrusions on private lands.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Prohibit the use of recreational vehicles in at risk areas, such as steep slopes, streambanks, stream crossings, biological diversity areas, and habitat for rare, threatened, or endangered species.	DCNR, Conservation Groups, Municipalities, Counties, Police Departments, PGC	DCNR, PGC, Private Sources, Foundations	High
2.	Increase enforcement of illegal off-road vehicle use on private and public lands.	Municipalities, Counties, Police Departments	Police Departments, Municipalities	High

Goal 5-I: Encourage environmentally sound practices when operating recreational vehicles, and enforce existing laws to minimize intrusions on private lands (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
3.	Establish environmentally sound public trails or parks for off-road vehicles.	DCNR, Conservation Groups, Municipalities, Counties, Recreational Vehicle Riding Clubs	DCNR, DEP, Private Sources, Foundations	Medium
4.	Monitor the use of recreational vehicles to minimize their impacts on the environment.	Conservation Groups, Conservation Districts, DEP, Municipalities	DCNR, DEP, Private Sources, Foundations	Medium
5.	Conduct feasibility studies for the development of recreational areas and trails for off-road vehicles.	Recreational Vehicle Riding Clubs, DCNR, Municipalities, Counties, Conservation Groups	DCNR, Private Sources, Foundations	Medium
6.	Work with dealerships to offer incentives for customers attending riding etiquette and safety programs.	Businesses, Recreational Vehicle Riding Clubs, Conservation Groups, DCNR	DCNR, Businesses, Private Sources, Foundations	Low

Goal 5-J: Establish recreational facilities and programs for senior citizens and youth.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Establish a place where teens can legally gather safely during evenings, weekends, and summers.	Community Groups, Municipalities, Churches	Private Sources, Foundations	Low
2.	Establish recreational centers and community service opportunities throughout the watershed for the area's senior citizens.	Community Groups, Municipalities, Churches	Private Sources, Foundations	Low

Goal 5-K: Expand awareness, appreciation, and support for the arts.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Offer affordable, local, cultural activities, such as plays, concerts, etc.	Schools, Universities, Tourist Bureaus, Cultural Councils	Private Sources, Foundations	Low
2.	Expand space available for displays, storage, and instruction in the visual and performing arts.	Businesses, Schools, Universities	Private Sources, Foundations	Low
3.	Increase awareness for the visual and performing arts, especially as it relates to nature art.	Businesses, Schools, Universities, Cultural Council, Local Artists	Private Sources, Foundations	Low
4.	Use an existing cultural council or establish a taskforce to expand, finance, coordinate, and promote art activities.	Tourist Bureaus, Cultural Council, Theaters, Universities, Local Artists	Private Sources, Foundations	Low

Goal 5-K: Expand awareness, appreciation, and support for the arts (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
5.	Establish or expand an arts appreciation section in public and private school curricula.	Schools, Cultural Councils, Local Artists	Private Sources, Foundations	Low
6.	Broaden quantity and quality of the volunteer pool supporting the arts.	Citizens, Schools, Universities	Private Sources, Foundations	Low

Goal 5-L: Highlight and preserve local history within the region.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Protect historical sites from vandalism.	Municipalities, Citizens, Historical Societies	Private Sources, Foundations	High
2.	Preserve historical sites and landmarks.	Municipalities, Citizens, Historical Societies, PHMC	Private Sources, Foundations	High
3.	Establish tours highlighting historical sites and structures to increase awareness of local history.	Municipalities, Citizens, Historical Societies	Private Sources, Foundations	High
4.	Install interpretive signage at historical locations.	Municipalities, Citizens, Historical Societies, PHMC	Private Sources, Foundations	Medium
5.	Inventory historical sites.	Municipalities, Citizens, Historical Societies	Private Sources, Foundations	Medium
6.	Partner with local historical societies to learn about local historical sites, such as Rock Point and Harmony.	Citizens, Schools, Historical Societies, Municipalities	Private Sources, Foundations	Medium
7.	Establish a network within the historical community for projects and funding.	Municipalities, Counties, Citizens, Historical Societies	Private Sources, Foundations	Low
8.	Work with Pennsylvania Historical and Museum Commission, individuals, and agencies to determine if local historical sites and structures can be added to the National Register.	Municipalities, Citizens, Historical Societies, PHMC	Private Sources, Foundations	Low
9.	Establish a historical education center and museum.	Municipalities, Citizens, Historical Societies	Private Sources, Foundations	Low
10.	Highlight cultural diversity of industrial towns.	Municipalities, Citizens, Historical Societies, PHMC	Private Sources, Foundations	Low

Goal 5-L: Highlight and preserve local history within the region (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
11.	Develop a farming heritage museum.	Municipalities, Citizens, Historical Societies, Farmers	Private Sources, Foundations	Low

Goal 5-M: Promote appreciation for the local history.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Incorporate local history into classes taught at local school districts.	Schools, Historical Societies, Citizens	Private Sources, Foundations	High
2.	Increase awareness of the watershed's historical Native American culture.	Historical Societies, Ancestors, Schools	Private Sources, Foundations	Medium
3.	Host community events or festivals commemorating local historical events, places, and cultures.	Historical Societies, Communities, Civic Groups	Private Sources, Foundations	Medium
4.	Increase availability of historical sites and museums making it easier and more convenient for visitors to attend.	Historic Museums and Sites, Historical Societies	Private Sources, Foundations	Low
5.	Establish an organization to preserve historic sites, structures, and relics.	Municipalities, Citizens	Private Sources, Foundations	Low

Goal 5-N: Promote community involvement in conservation and educational initiatives.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Involve students and citizens in watershed activities.	Conservation Groups, Conservation Districts, School Districts	DEP, DCNR, Private Sources, Foundations	High
2.	Establish a communication network for school districts within the Connoquenessing Creek watershed to share information collected.	School Districts, Conservation Groups	DEP, Private Sources, Foundations	High
3.	Partner with businesses and industries to support local watershed work.	Conservation Groups, Businesses	Private Sources	High
4.	Create a watershed-wide recognition rewarding those advancing environmental education.	Conservation Groups	Private Sources, Foundations	Medium
5.	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.	Conservation Groups	Private Sources, Foundations	Medium
6.	Establish "Friends" groups to maintain public parks and trails, and to diffuse conflicts between adjacent property owners, and park or trail users.	Concerned Citizens, Conservation Groups, DCNR, Counties and Municipalities	Private Sources, Foundations	Medium

Goal 5-N: Promote community involvement in conservation and educational initiatives (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
7.	Establish volunteer corps to assist efforts of community planners, conservation organizations, and civic groups.	Conservation Groups, Civic Groups	DEP, Private Sources, Foundation	Medium
8.	Offer incentives to recruit and retain volunteers.	Conservation Groups, DEP, Civic Groups	Private Sources, Foundations	Medium
9.	Recruit maintenance and patrol crews to clean-up litter and maintain order at public sites and trails.	Conservation Groups, Concerned Citizens, DCNR	Private Sources, Foundations	Low
10.	Revitalize the Brush Creek Watershed Association.	Brush Creek Watershed Association, Citizens, Conservation Districts	DEP, Private Sources, Foundations	Low
11.	Establish a "Name-the-Tributary" program to enhance local awareness and name currently un-named tributaries.	Conservation Groups, Schools, Citizens, DEP	Private Sources, Foundations	Low

Education and Funding

Goal 6-A: Educate stakeholders how land use planning can be effective.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage and provide education sessions for municipal officials on integrated land-use planning, habitat conservation, and protecting and enhancing biodiversity.	Municipalities, DCED, PSATS, PSAB, Conservation Groups	DCED, PSATS, PSAB, Private Sources, Foundations	High
2.	Host workshops to educate and encourage municipal officials to create, review, update and enforce ordinances that support watershed-wide planning; provide sample ordinances to municipalities.	Municipalities, DCED, PSATS, PSAB	DCED, PSATS, PSAB, Private Sources, Foundations	High
3.	Provide educational programs for municipal and county officials about land-use planning and other tools that incorporate conservation goals into making communities more attractive and protecting biodiversity.	Conservation Groups, Conservation Districts, Municipal and County Officials	DEP, Private Sources, Foundations	Medium
4.	Educate residents and developers about environmentally friendly development practices, such as Smart Growth or Conservation by Design.	Municipalities, DEP, DCNR, Developers, Citizens, Conservation Groups	DEP, Private Sources, Foundations	Medium
5.	Conduct workshops, seminars, and demonstrations for decision-makers, from developers to government leaders, emphasizing best management practices.	Municipalities, DEP, DCNR, Developers, Conservation Groups	DEP, DCNR, Private Sources, Foundations	Medium

Goal 6-A: Educate stakeholders how land use planning can be effective (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Provide public education and awareness programs about the economic benefits and importance of watershed protection.	Citizens, Conservation Groups, Conservation Districts	DEP, DCNR, Private Sources, Foundations	Medium
7.	Increase municipal awareness of the values of preserving, protecting, and restoring the natural resources within the watershed, and promote inter-municipal cooperation.	Municipalities, Conservation Groups, Conservation Districts	DCED, DCNR, DEP, Private Sources, Foundations	Medium
8.	Provide required workshops and/or training sessions on sustainable maintenance practices.	Municipalities, DCED, PSATS, PSAB, Conservation Groups	DCED, PSATS, PSAB, Private Sources, Foundations	Medium
9.	Educate taxpayers about the connection between taxes and available services and how their tax dollars are spent.	Citizens, Elected Officials, Municipalities, DCED, PSATS, PSAB	DCED, PSATS, PSAB, Private Sources, Foundations	Low

Goal 6-B: Educate stakeholders about impacts associated with poor air quality.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate residents about the impacts that acid precipitation and mercury have on the environment impacting air quality.	Conservation Groups, EPA, DEP	DEP, EPA, Private Sources, Foundations	Low

Goal 6-C: Increase awareness about practices to assist agricultural and forest landowners in managing their lands effectively.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	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, DCNR, Foresters	DCNR, Private Sources, Foundations	Medium
2.	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	DEP, Private Sources, Foundations	Medium
3.	Educate loggers, landowners, and municipal officials about forestry best management practices, sustainable forestry management, and sustainable forestry certification.	Conservation Groups, Landowners, DCNR, USFS, Foresters	DCNR, Private Sources, Foundations	Medium

Goal 6-D: Increase awareness about impacts from litter, illegal dumps, and abandoned vehicles.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage proper disposal of household hazardous waste, by providing recycling workshops and other educational outreach programs.	Conservation Groups, PA CleanWays, DEP, DCNR, Municipalities	DEP, Private Sources, Foundations	Medium
2.	Educate citizens about the impacts illegal dumping has on water quality and the environment, aesthetics, health and human safety, and the economy.	Conservation Groups, PA CleanWays, DEP, DCNR, Municipalities	DEP, Private Sources, Foundations	Medium
3.	Educate the public to utilize practices such as "Leave no trace."	Conservation Groups, PA CleanWays, DCNR, Citizens	DCNR, Private Sources, Foundations	Medium
4.	Renew public interest in litter control education.	Conservation Groups, Civic Groups, Citizens, DEP, DCNR, PA CleanWays, Municipalities, School Districts	DEP, Private Sources, Foundations	Medium
5.	Develop public service announcements about proper waste disposal.	Conservation Groups, PA CleanWays, DEP, DCNR, Municipalities, Media	DEP, Private Sources, Foundations	Medium
6.	Educate citizens about traditional and innovative ways to reduce, reuse, and recycle.	Conservation Groups, PA CleanWays, DCNR, Citizens	DCNR, Private Sources, Foundations	Medium
7.	Educate residents about safety, human health, and the environmental impacts caused by unlicensed or abandoned vehicles, and encourage proper disposal.	Conservation Groups, Municipalities, PA CleanWays	Private Sources, Foundations	Low

Goal 6-E: Increase awareness about the benefits of riparian corridors.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate all watershed stakeholders about the importance of riparian corridors, and encourage establishment of riparian buffers.	DEP, NRCS, PFBC, PGC, USDA, EPA, Conservation Groups	EPA, DCNR, NRCS, PFBC, PGC, USDA, Private Sources, Foundations	High
2.	Promote the preservation and enhancement of vegetated streamside buffers through education about their benefits for wildlife, water quality, and flood prevention.	DEP, NRCS, PFBC, PGC, USDA, EPA, Conservation Groups	EPA, DCNR, NRCS, PFBC, PGC, USDA, Private Sources, Foundations	High
3.	Educate landowners about the value of riparian buffers.	DEP, NRCS, PFBC, PGC, USDA, EPA, Conservation Groups	EPA, DCNR, NRCS, PFBC, PGC, USDA, Private Sources, Foundations	High

Goal 6-E: Increase awareness about the benefits of riparian corridors (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
4.	Conduct outreach, education, and implementation programs on cost share and easements for streamside corridor conservation.	DEP, NRCS, PFBC, PGC, USDA, EPA, Conservation Groups	EPA, DCNR, NRCS, PFBC, PGC, USDA, Private Sources, Foundations	Medium

Goal 6-F: Educate stakeholders about the value and importance of wetlands.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop or expand outreach programs on the function and value of wetlands using high quality wetlands for hands-on demonstration workshops.	Conservation Groups, DEP, EPA	DEP, EPA, Private Sources, Foundations	Medium
2.	Educate municipal, county, state, and federal officials about planning and implementation of wetland mitigation and the establishment of replacement wetlands.	Conservation Groups, Municipalities, DEP, EPA	DEP, EPA, Private Sources, Foundations	Medium
3.	Partner with local conservation districts to educate stakeholders about ways to reduce erosion and sedimentation impacts through wetland development.	Conservation Groups, Conservation Districts, DEP, NRCS, Citizens	DEP, EPA, NRCS, Private Sources, Foundations	Medium
4.	Develop an education program addressing flood issues, flood prevention, flood recovery, and floodplain protection.	Conservation Groups, PEMA, Municipalities	DEP, EPA, PEMA, FEMA, Private Sources, Foundations	Medium

Goal 6-G: Increase awareness about water quality issues affecting communities.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Encourage school districts to work with conservation groups and agencies to educate students about watersheds.	Conservation Groups, Conservation Districts, School Districts	Private Sources, Foundations	High
2.	Promote environmental education campaigns, such as "Everybody lives downstream" and storm drain stenciling.	Conservation Groups, Conservation Districts, DEP	Private Sources, Foundations	Medium
3.	Utilize media, such as newspapers, radio stations, and television stations, to outreach to residence for increased participation and educational messages.	Conservation Groups, Conservation Districts, Media	DEP, Private Sources, Foundations	Medium
4.	Expand Connoquenessing Watershed Alliance and Wild Waterways Conservancy's environmental education role.	Conservation Groups, Conservation Districts, School Districts	Private Sources, Foundations	Medium
5.	Educate municipal and county officials about planning for stormwater best management practice implementation.	DEP, Counties, Municipalities, Conservation Groups	DEP, Private Sources, Foundations	Medium

Goal 6-G: Increase awareness about water quality issues affecting communities (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
6.	Educate homeowners about alternative sewage treatment systems, proper testing and maintenance of existing on-lot sewage systems.	Municipalities, SEO, Conservation Groups, DEP, DCED, Municipal Authorities	DEP, DCED, Private Sources, Foundations	Medium
7.	Offer landowner education workshops to provide information about the proper installation and maintenance of on-lot septic systems.	Citizens, Municipalities, DEP, Conservation Groups, SEOs	DEP, EPA, Private Sources, Foundations	Medium
8.	Conduct outreach campaigns to educate watershed residents about the land uses in their communities.	Conservation Groups, Conservation Districts, Cooperative Extensions	DEP, Private Sources, Foundations	Low

Goal 6-H: Establish ongoing environmental education programs.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Develop and implement educational workshops and/or outreach programs about point source pollution, how to report point source violations, and how to research permit information.	Conservation Groups, Sportsmen's Groups, Citizens, DEP, EPA	EPA, DEP, Private Sources, Foundations	Medium
2.	Develop and implement education programs for schools about abandoned mine drainage and other sources of non-point source pollution.	Conservation Groups, WPCAMR, DEP, Conservation Districts	DEP, EPA, Private Sources, Foundations	Medium
3.	Develop and implement locally based environmental/social educational programs that focus on Connoquenessing Creek.	Conservation Groups, Conservation Districts, Cooperative Extensions	DEP, Private Sources, Foundations	Medium
4.	Increase awareness of watershed-related issues through the distribution of materials and educational programs.	Conservation Groups, Conservation Districts, Cooperative Extensions	DEP, Private Sources, Foundations	Medium
5.	Hold stream monitoring workshops or trainings for adult and student volunteers.	Conservation Groups, Stakeholders, DEP	DEP, Private Sources, Foundations	Medium
6.	Create an outdoor education center in the watershed, potentially at the Athletic Field site in downtown Butler	Conservation Groups, Conservation Districts, School Districts	DCNR, Private Sources, Foundations	Low

Goal 6-I: Increase awareness about water quality, quantity, and conservation practices.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate homeowners about the effects of the overuse of fertilizers, pesticides, and herbicides on groundwater.	Conservation Groups, Conservation Districts, Landowners	DEP, Private Sources, Foundations	Medium

Goal 6-I: Increase awareness about water quality, quantity, and conservation practices (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
2.	Educate community residents and water suppliers about potential threats to the public water supply.	Conservation Groups, Conservation Districts, Citizens, Water Suppliers	DEP, Private Sources, Foundations	Medium
3.	Promote groundwater quality awareness when conducting education and outreach programs, and provide educational information about potential threats to water supply.	Conservation Groups, Municipalities, Water Suppliers, Conservation Districts	DEP, DCED, EPA, Private Sources, Foundations	Medium
4.	Develop or implement educational outreach programs for private well owners, specifically concerning sole source aquifer protection programs and protecting ground water supplies.	Conservation Groups, Conservation Districts, DEP, RWA, Landowners	DEP, Private Sources, Foundations	Medium
5.	Educate citizens on the importance of water quantity and the benefits of water conservation.	Conservation Districts, Conservation Groups	DEP, Private Sources, Foundations	Medium
6.	Educate homeowners about the significance of water-use designations and ways to minimize non-point source pollution.	Conservation Groups, Conservation Districts, Citizens	DEP, Private Sources, Foundations	Low

Goal 6-J: Educate stakeholders about the importance of wildlife and natural resources.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate the public 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.	Municipalities, Counties, PNHP, Conservation Groups	DCNR, Private Sources, Foundations	Medium
2.	Sponsor outreach programs to educate landowners about wildlife management practices.	Sportsmen Groups, PGC	PGC, Private Sources, Foundations	Medium

Goal 6-K: Increase awareness of the importance of biodiversity and protecting wildlife habitats.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Provide educational field trips to elected officials emphasizing natural resources and the value of those resources to the region.	Conservation Groups, PGC, DCNR, USFWS, Elected Officials, PNHP	DCNR, Private Sources, Foundations	Medium
2.	Educate citizens about biological diversity and the vital importance of conserving habitats and protecting species.	Conservation Groups, PGC, DCNR, USFWS, PNHP	DCNR, Private Sources, Foundations	Medium

Goal 6-L: Educate recreation users about proper and safe practices.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Educate hunters, anglers, and other outdoor recreators on the importance of land etiquette.	Conservation Groups, Sportsmen Groups, PFBC, PGC	PFBC, PGC, Private Sources, Foundations	Medium
2.	Educate sportsmen about areas open to public usage providing detailed maps delineating public-use areas.	Conservation Groups, Sportsmen Groups, PFBC, PGC	PFBC, PGC, Private Sources, Foundations	Medium
3.	Educate off-road vehicle operators to recreate in an environmentally sound manner.	Conservation Groups, DCNR, Recreational Vehicle Riding Clubs	DCNR, Private Sources, Foundations	Medium

Goal 6-M: Increase funding to address issues important to the Connoquenessing Creek watershed communities.

Project Area

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Increase lobbying and funding support for watershed projects and the environment in federal and state budgets.	Conservation Groups, DEP, DCNR, Legislators	DEP, DCNR, Conservation Groups, Legislature, Private Sources	Medium
2.	Increasing funding available to support the administrative needs of watershed organizations.	Conservation Groups, DEP, DCNR	Privates Sources, Foundations	Medium
3.	Increase funding available to provide sustainable maintenance practices on area roadways, including the dirt and gravel roads program.	Municipalities, PennDOT, Penn State, Conservation Groups	DEP, PennDOT, Private Sources	Low
4.	Increase funding for libraries so that services can be expanded, and establish bookmobile routes to rural areas.	Municipalities, Citizens	Private Sources, Foundations	Low
5.	Identify additional funding to install dry hydrants.	Municipalities, DEP, EPA, Fire Departments	DCED, DEP, EPA, Private Sources, Foundations	Low

Land Resources

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Secure funding for purchasing easements to specifically protect wetlands and riparian areas.	Conservation Groups, DEP, DCNR, EPA	DEP, Private Sources, Foundations	Medium
2.	Increase financial and technical assistance to small-scale agriculture operations to increase economic viability and environmental responsibility.	Conservation Groups, NRCS, USDA, PDA	DEP, NRCS, USDA, PDA, EPA, Private Sources, Foundations	Medium

Goal 6-M: Increase funding to address issues important to the Connoquenessing Creek watershed communities (continued).

Land Resources (continued)

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
3.	Encourage legislators to provide funding for the Environmental Quality Incentives Program, Conservation Reserve Enhancement Program, Conservation Resource Program, and other incentive-based conservation programs.	Conservation Groups, NRCS, USDA, PDA	DEP, NRCS, USDA, PDA, EPA, Private Sources, Foundations	Medium
4.	Increase funding to establish conservation easements and to secure their continual existence as a conservation tool.	Conservation Groups, DEP, DCNR	DEP, Private Sources, Foundations	Medium
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 curbside recycling programs.	Conservation Groups, PA CleanWays, Municipalities, Civic Groups	DEP, Private Sources, Foundations	Medium
6.	Identify additional local, state, and federal funding for the implementation of agricultural best management practices.	Conservation Groups, NRCS, USDA, PDA	DEP, NRCS, USDA, PDA, EPA, Private Sources, Foundations	Medium
7.	Increase funding to assist groups in hosting cleanup events, educating residents about illegal dumping, and expanding recycling programs.	Conservation Groups, PA CleanWays, Municipalities, Civic Groups	DEP, Private Sources, Foundations	Medium

Water Resources

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Identify additional funding for stream restoration projects.	Conservation Groups, DEP, EPA, NRCS, USDA, PGC, PFBC	DEP, EPA, Cost-share Programs, Private Sources, Foundations	Medium
2.	Increase local and state funding to continue watershed monitoring efforts currently being conducted.	Conservation Groups, DEP, EPA, PFBC	DEP, EPA, Private Sources, Foundations	Medium
3.	Increase local, state, and federal funding for adequate stormwater management facilities.	Counties, DEP, EPA, Conservation Groups	DEP, EPA, Private Sources, Foundations	Medium
4.	Establish and/or continue cost-share programs and grants to assist homeowners in septic repair, maintenance, and replacement.	DCED, DEP, Municipalities, Sewage Authorities	DCED, DEP, EPA, Private Sources, Foundations	Medium
5.	Lobby for increased state and federal funding for the implementation of adequate sewage treatment and septic facilities.	Sewage Authorities, DEP, EPA, DCED, Landowners, Municipalities, Conservation Groups	DCED, DEP, EPA, Private Sources, Foundations	Medium

Goal 6-M: Increase funding to address issues important to the Connoquenessing Creek watershed communities (continued).

Biological Resources

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Increase funding to implement invasive species control strategies.	USFS, DCNR, Conservation Groups	USFS, DCNR, Private Sources, Foundations	Medium
2.	Develop incentives to encourage the forest industry to utilize best management practices.	USFS, DCNR, Landowners, Conservation Groups	USFS, DCNR, Private Sources, Foundations	Low

Cultural Resources

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Secure local, state, federal, and private funding to provide environmental education programs for elected officials, watershed residents, businesses, and school-aged children.	Conservation Groups, School Districts, Citizens	DEP, EPA, Private Sources, Foundations	Medium
2.	Identify additional unrestricted funding for Connoquenessing Watershed Alliance development and projects.	Conservation Groups, Conservation Districts	Private Sources, Foundations	Low
3.	Determine needs and find ways to support local environmental educators.	Conservation Groups, Conservation Districts, Schools	DEP, EPA, Private Sources, Foundations	Low
4.	Advocate increased funding of public school environmental education.	Conservation Groups, Schools	DEP, EPA, Private Sources, Foundations	Low
5.	Increase funding for preservation and expansion of railroad tours in the watershed.	Historical Societies, Businesses	Private Sources, Foundations	Low

Goal 6-N: Increase funding to create, maintain and enhance existing recreational facilities and opportunities.

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
1.	Increase local, state, federal, and private funding for establishing and maintaining open space	Municipalities, Counties, Park and Recreation Authorities	DCNR, Private Sources, Foundations	Medium
2.	Increase local, state, federal, and private funding for establishing and maintaining waterway access points	Municipalities, Counties, Park and Recreation Authorities	DCNR, Private Sources, Foundations	Medium
3.	Increase local, state, federal, and private funding for establishing and maintaining trails and trail heads	Municipalities, Counties, Park and Recreation Authorities	DCNR, Private Sources, Foundations	Medium
4.	Identify and secure funding to promote ecotourism.	Tourist Bureaus, Municipalities, Businesses, Conservation Groups	Tourist Bureaus, Private Sources, Foundations	Low

Goal 6-N: Increase funding to create, maintain and enhance existing recreational facilities and opportunities (continued).

	Method to achieve goal	*Potential Partners*	*Potential Funding*	*Priority*
5.	Increase local, state, federal, and private funding for establishing and maintaining multi-use recreation.	Municipalities, Counties, Park and Recreation Authorities	DCNR, Private Sources, Foundations	Low
6.	Increase funding to support community sports programs.	Municipalities, Counties, Park and Recreation Authorities, School Districts	DCNR, Private Sources, Foundations	Low

Chapter 8. References

Action PA. (2005). Pennsylvania: #1 in all the wrong things. Retrieved June 5, 2006 from Action PA website: http://www.actionpa.org/pa/.

Air Quality Partnership. (n.d.). Welcome to the air quality partnership. Retrieved July 3, 2007 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/aq_apps/aqpartners/default.asp.

Allegany County Maryland Planning Department. (2002). *Allegany County comprehensive plan*. Retrieved September 23, 2004 from Allegany County Maryland Planning Department website: http://www/gov.allconet.org/plan/cpi.htm.

Alliance for the Chesapeake Bay. (2004). Riparian buffer preservation. Retrieved November 24, 2006 from Alliance for the Chesapeake Bay website: http://www.acb-online.org/pubs/projects/deliverables-145-2-2004.pdf.

Alliance for the Chesapeake Bay & Pennsylvania Department of Environmental Protection. (1998). *Pennsylvania stream releaf forest buffer tool kit*. Retrieved November 24, 2006 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/StreamReleaf/Forestbufftool/default.htm.

American Farmland Trust. (1998). *Agricultural conservation easements fact sheet*. Retrieved June 6, 2006 from American Farmland Trust website: http://www.farmlandinfo.org/tas/tafs-ace.html.

Angermeier, P.L., & Schlosser, I.J. (1995). *Conserving aquatic biodiversity: Beyond species and populations*. American Fisheries Society Symposium 17: 402-414.

Aquatic Invasive Species of Pennsylvania. (n.d.). Asiatic clam *(Corbicula fluminea)*. Retrieved June 23, 2008 from Aquatic Invasive Species of Pennsylvania website: http://www.pserie.psu.edu/seagrant/ais/watershed/clam.htm.

Arbor Day Foundation. (2007). Tree city USA. Retrieved December 6, 2007 from Arbor Day Foundation website: http://www.arborday.org/programs/TreeCityGrowthAwd.cfm.

Audubon Pennsylvania. (n.d.). Important bird area maps. Retrieved November 3, 2006 from Audubon Pennsylvania website: http://pa.audubon.org/iba/maps.html.

Beaver County Planning Commission, Beaver County Planning Department, & Gannett Fleming Inc. (1999). *Horizons planning for the 21st century a comprehensive plan for Beaver County*.

Berg, T.M., Geyer, A.R., and Edmunds, W.E. (1980). *Geologic map of Pennsylvania*. Pennsylvania Geological Survey, 4th ser., Map 1.

BF Environmental Consultants. (2004). Septic systems (Pennsylvania perspective). Retrieved May 17, 2006 from BF Environmental Consultants website: http://www.bfenvironmental.com/.

Bureau of Labor Statistics. (2007). Local area unemployment statistics. Retrieved December 3, 2007 from U.S. Department of Labor website: http://www.bls.gov/home.htm.

Burkett, K. (n.d.). *The early Native Americans*. Retrieved June 2, 2006 from Redbank Valley Archaeology website: http://www.orgsites.com/pa/redbankarch/_pppg1.php3.

Butler County Historical Society[1]. (n.d.). Bantam car/jeep. Retrieved June 6, 2007 from Butler County Historical Society website: http://www.butlercountyhistoricalsociety-pa.org/.

Butler County Historical Society[2]. (n.d.). General historical information on Butler County. Retrieved December 18, 2006 from Butler County Historical Society website: http://www.butlercountyhistoricalsociety-pa.org/history.html.

Butler Eagle. (2006). *Butler County fact finder 2006*. Retrieved November 28, 2006 from Butler Eagle website: http://ads.butlereagle.com/2005_Fact_Book/html/schools.html.

Butler Freeport Trail. (n.d.). Butler Freeport community trail. Retrieved December 15, 2006 from Butler Freeport Trail website: www.butlerfreeporttrail.org.

Connoquenessing Watershed Alliance. (2006). *Monitoring bacteria in the streams of the Connoquenessing watershed*. Retrieved July 2, 2007 from Connoquenessing Watershed Alliance website: http://www.connoqwatershed.org/Monitoring%20Bacteria%20in%20the%20Streams%20May%202006.pdf.

Cranberry Township Historical Society. (1989a). *Why Cranberry Township had no post office.* Retrieved February 16, 2007 from Cranberry Township website: http://www.twp.cranberry.pa.us/information/history/htext12.html.

Cranberry Township Historical Society. (1989b). *Why Cranberry Township is called Cranberry Township*. Retrieved February 16, 2007 from Cranberry Township website: http://www.twp.cranberry.pa.us/information/history/htext3.html.

Delano, H., & Wilshusen, J. (2001). *Landslides in Pennsylvania.* Harrisburg: Pennsylvania Geological Survey.

Driscoll, C. T., et. al. (2001). *Acid rain revisited: Advances in scientific understanding since the passage of the 1970 and 1990 Clean Air Act Amendment.* Hubbard Brook Research Foundation: Science Links Publication Vol. 1, No. 1.

Elder, D., Killam, G., & Koberstein, P. (1999). *The clean water act: an owner's manual*. Portland, Oregon: River Network.

Environmental Literacy Council. (2006). Coal mining. Retrieved May 15, 2006 from Environmental Literacy Council website: http:/enviroliteracy.org/article.

EPA Environmental News. (2000). *EPA orders AK Steel to reduce nitrate discharges, provide safe drinking water for Zelienople*. Retrieved April 23, 2007 from Environmental Protection Agency website: http://www.epa.gov/region03/r3press/pr00-01.htm.

Farmland preservation. (n.d.). Retrieved January 29, 2002 from Bureau of Farmland Preservation website: http://sites.state.pa.us/PA_Exec/Agriculture/bureaus/farmland_protection/index.htm.

Farmland protection policy act annual report FY 2000. (2001). Retrieved November 14, 2005 from U.S. Department of Agriculture Natural Resources Conservation Service website: http://www.nrcs.usda.gov/programs/fppa/pdf_files/FPPA-FY00Report.pdf.

Federal Emergency Management Agency. (2002). *National flood insurance program: Program description.* Retrieved November 28, 2006 from Federal Emergency Management Agency website: http://www.fema.gov/library/viewRecord.do?id-1480.

Federal Interagency Stream Restoration Working Group. (1998). *Stream corridor restoration: Principles, processes, and practices*. Retrieved November 30, 2006 from U.S. Department of Agriculture Natural Resources Conservation Service website: http://www.nrcs.usda.gov/technical/stream_restoration/newtofc.htm.

Fleeger, G. M. (1999). *The geology of Pennsylvania's groundwater* (3rd ed.): Pennsylvania Geological Survey, 4th ser., Educational Series 3, 34 p.

Free Demographics. (2005). Geography analysis. Retrieved April 5, 2006 from SRC Free Demographics website: http://www.freedemographics.com.

Fripp, J., Ziemkiewicz, P. F., PhD., & Charkavorki, H. (2000). Acid mine drainage treatment. Retrieved December 6, 2005 from Ecosystem Management Restoration Research Program website: http://el.erdc.usace.army.mil/emrrp/.

Gerwig, A. (2002). *Forum will discuss creek conditions*. Retrieved May 23, 2007 from Pittsburgh Tribune Review website: http://www.pittsburghlive.com/x/pittsburghtrib/s_76818.html.

Hakenkamp, C. C., Ribblett, S. G., & Palmer, M. A. (2001). *The impact of an introduced bivalve (Corbicula fluminea) on the benthos of a sandy stream*. Freshwater Biology 46:491-501.

Helms. (1998). *Non-wood forest products 13 resource assessment of non-wood forest products.* Retrieved December 12, 2007 from FAO Corporate Document Repository website: http://www.fao.org/docrep/004/Y1457e/Y1457e00.HTM.

Hereford Manor Lakes Conservancy and Watershed Group, Inc. (n.d.). What is the Hereford Manor Lake Conservancy and Watershed Group? Retrieved January 8, 2007 from Hereford Manor Lake Conservancy and Watershed Group website: http://www.herefordmanorlake.org/p2.htm.

Higgins, J., Lammert, M., Bryer, M., DePhilip, M., & Grossman, D. (1998). *Freshwater conservation in the Great Lakes basin: Development and application of an aquatic community classification framework*. The Nature Conservancy. Arlington, Virginia. 273 pp.

Historic Harmony. (2001). History. Retrieved October 30, 2006 from The Harmony Museum website: http://www.harmonymuseum.org/history.htm.

History of Butler County Pennsylvania. (1883a). *Advent of the White Man as a Settler* (D. Mohney, Trans.). Chicago, IL: Waterman, Watkins, and Company. Retrieved April 4, 2006 from Butler County Pennsylvania USGenWeb website: http://www.rootsweb.com/~pabutler/1883/.

History of Butler County Pennsylvania. (1883b). *Internal improvements* (S. Chestnutt, Trans.). Chicago, IL: Waterman, Watkins, and Company. Retrieved April 4, 2006 from Butler County Pennsylvania USGenWeb website: http://www.rootsweb.com/~pabutler/1883/.

History of Butler County Pennsylvania. (1883c). *Lancaster Township* (J. Mackey, Trans.). Chicago, IL: Waterman, Watkins, and Company. Retrieved April 4, 2006 from Butler County Pennsylvania USGenWeb website: http://www.rootsweb.com/~pabutler/1883/.

History of Butler County Pennsylvania. (1895a). S*chools and schools law* (C. Baughmen, Trans.). R.C. Brown Company Publishers. Retrieved February 16, 2007 from Butler County Pennsylvania USGenWeb website: http://www.rootsweb.com/~pabutler/1895/95x13.htm.

History of Butler County Pennsylvania. (1895b). *The Butler oil field* (D. Mohney, Trans.). R.C. Brown Company Publishers. Retrieved February 15, 2007 from Butler County Pennsylvania USGenWeb website: http://www.rootsweb.com/~pabutler/1895/95x19.htm.

Hollis, G. E. (1975). The effects of urbanization on floods of different recurrence intervals. Water Resources Research, 11, 431-435.

Hopey, D. (2001). *AK Steel reaches pollution accord*. Retrieved May 23, 2007 from Pittsburgh Post Gazette website: http://www.postgazette.com/healthscience/20010303aksteel2.asp.

Important Mammal Areas Project. (n.d.). Current Important Mammal Areas map. Retrieved December 18, 2007 from Important Mammal Areas Project website: http://www.pawildlife.org/imap.htm.

Jacobson, M., & Seyler, C. (2004). *Economic contribution of forestry to Pennsylvania*. Retrieved June 12, 2006 from Penn State Natural Resources Extension website: http://rnrext.cas.psu.edu/counties/ExtMap.htm.

King, R. O. (2005). Federal flood insurance: the repetitive loss program. Retrieved April 17, 2007 from website: http://www.fas.org/sgp/crs/misc/RL32972.pdf.

Kling, G., & Wuebbles, D. (2003). Impacts on Pennsylvania communities and ecosystems. Findings from *Confronting climate change in the Great Lakes region*.

Klapproth, J. C., & Johnson, J. (2000). *Understanding the science between riparian forest buffers: Effects on water quality.* (Publication 420-151). Virginia Cooperative Extension.

Knobeloch, L., et al. (2000). *Blue babies and nitrate-contaminated well water*. Environmental Health Perspective 108(7):675-678.

Kochanov, W. E. (1999). Sinkholes in Pennsylvania. Pennsylvania Geological Survey, 4th Series, Education Series 11.

Koehn, S. (2005). *Incentives for non industrial private forest landowners*. Retrieved August 1, 2006 from Maryland Department of Natural Resources website: http://www.dnr.state.md.us/forests/041505message.asp.

Lang, G. T. (2002). *Connoquenessing Creek watershed mussel survey, 2002*. Connoquenessing Watershed Alliance, Connoquenessing, PA.

Lutherlyn, (2006). Retreats/rental facilities. Retrieved December 18, 2006 from Lutherlyn website: http://www.lutherlyn.com/.

Mason County. (2006). 7.08.0110 Definitions. Retrieved November 29, 2006 from Mason County website: http://www.co.mason.wa.us/code/commissioners/_DATA/TITLE07/Chapter_7_08_DEFINITIONS/7_08_010Definitions_html.

McNab, H., & Aver, P. (1994). *Ecological subregions of the U.S.* Retrieved April 7, 2006 from U.S. Department of Agriculture, U.S. Forest Service Website: http://www.fs.fed.us/land/pubs/ecoregions.

Mitsch, W., & Gosselink, G. (2000). *Wetlands*. 3rd Edition: John Wiley & Sons.

National Environmental Education Advisory Council. (1996). *Report assessing environmental education in the U.S. and the implementation of the national environmental education act of 1990*. Retrieved January 24, 2005 from U.S. Environmental Protection Agency website: http://epa.gov/enviroed/neeac.html.

National Park Service. (2001). *Listing a property in the national register of historic places*. Retrieved August 22, 2002 from National Park Service website: http://www.cr.nps.gov/pr/listings.htm.

National Park Service. (2006). National register information systems. Retrieved October 31, 2006 from National Park Service website: http://www.nr.nps.gov.

National Park Service. (n.d.). National Historic Landmarks Program. Retrieved October 30, 2006 from National Park Service website: http://www.cr.nps.gov/nhl/.

Natural Lands Trust. (2001). *Growing greener conservation by design*. Media, PA.

Nedeau, E., Smith, A.K., & Stone., J. (2005). *Freshwater Mussels of the Pacific Northwest*. U.S. Fish and Wildlife Service, Vancouver, WA. 44pp. Available at: www.fws.gov/pacific/columbiariver/musselwg.htm.

Newbury, R., Belz, D., & Grubb, R. (1981). *Soil survey of Allegheny County, Pennsylvania*. Washington D.C.: U.S. Government Printing Office.

PA CleanWays. (2005). *Allegheny County illegal dump survey.* Retrieved July 3, 2007 from PA CleanWays website: http://www.pacleanways.org.

PA CleanWays. (2006). PA CleanWays chapters and affiliates. Retrieved August 1, 2006 from PA CleanWays website: http://www.pacleanways.org/chapters.html.

PA CleanWays. (2007). *Butler County 2007 illegal dump survey final report*. Greensburg, PA: PA CleanWays.

Palone, R., & Todd, A. (Eds.). (1997). *Chesapeake Bay riparian handbook: A guide for establishing and maintaining riparian forest buffers*. Retrieved November 30, 2006 from website: http://www.chesapeakebay.net/pubs/subcommittee/nsc/forest/riphbk.pdf.

Panorama Recreation. (2004). Recreation benefits. Retrieved March 20, 2006 from Panorama Recreation Center website: http://www.crd.bc.ca/panorama/benefits.htm.

Parmalee, P.W., & Bogan, A.E. (1998). *The freshwater mussels of Tennessee*. The University of Tennessee, Knoxville, TN. 328 pp.

Pennsylvania Bureau of Forestry. (n.d.). Pennsylvania Bureau of Forestry. Retrieved August 2, 2006 from Pennsylvania Bureau of Forestry website: http://www.dcnr.state.pa.us/forestry/ei.aspx.

Pennsylvania Code. (1997). Pennsylvania code title 25 environmental protection-Chapter 93.9s designated water uses. Retrieved October 26, 2005 from Pennsylvania Code website: http://www.pacode.com/secure/data/025/chapter93/chap93toc.html.

Pennsylvania Community Forests. (2007). Pennsylvania community forests. Retrieved November 6, 2007 from Pennsylvania Community Forests website: http://www.dcnr.state.pa.us/ forestry/pucfc/index.html.

Pennsylvania Conservation Reserve Enhancement Program. (2006). What is CREP? Retrieved December 12, 2007 from Pennsylvania Conservation Reserve Enhancement Program website: http://www.creppa.org/whatis.htm.

Pennsylvania Department of Agriculture. (2006). Agricultural security areas. Retrieved January 10, 2006 from the Pennsylvania Department of Agriculture website: http://www.agriculture.state.pa.us/agriculture/cwp/view.asp?a=3&q=129076.

Pennsylvania Department of Agriculture. (2007a). Bureau of Farmland Preservation. Retrieved December 12, 2007 from Pennsylvania Department of Agriculture website: http://www.agriculture.state.pa.us/agriculture/cwp/view.asp?q=128859.

Pennsylvania Department of Agriculture. (2007b). Pennsylvania noxious weed control list. Retrieved from Pennsylvania Department of Agriculture website: http://www.agriculture.state.pa.us/ agriculture/cwp/ view.asp?q=127683.

Pennsylvania Department of Conservation and Natural Resources. (2002). *Summary of Pennsylvania's all-terrain vehicle law*. Retrieved January 29, 2008 from Pennsylvania Department of Conservation and Natural Resources website: http://www.dcnr.state.pa.us/forestry/atv/ ATVBrochure.pdf.

Pennsylvania Department of Conservation and Natural Resources. (2004a). *Pennsylvania's Recreation Plan 2004–2008.* Retrieved June 27, 2007 from Pennsylvania Department of Conservation and Natural Resources website: http://www.dcnr.state.pa.us/ brc/RecGuide_ExecSummary.pdf.

Pennsylvania Department of Conservation and Natural Resources. (2004b). *The state of the forest: A snapshot of Pennsylvania's updated forest inventory*. Retrieved January 29, 2008 from Pennsylvania Department of Conservation and Natural Resources website: http://www.dcnr.state.pa.us/forestry/documents/PA_DCNR_FIA.pdf.

Pennsylvania Department of Conservation and Natural Resources. (2006). *2006 Pennsylvania annual pest condition report.* Retrieved February 27, 2007 from DCNR website: http://www.dcnr.state.pa.us/forestry/leaflets/fpmnews-dec06.pdf.

Pennsylvania Department of Conservation and Natural Resources. (2007a). Emerald ash borer. Retrieved from DCNR website: http://www.dcnr.state.pa.us/forestry/ fpm_invasives_EAB.aspx.

Pennsylvania Department of Conservation and Natural Resources. (2007b). S*tate forest resource management plan*. Retrieved December 12, 2007 from Pennsylvania Department of Conservation and Natural Resources website: http://www.dcnr.state.pa.us/forestry/sfrmp/index.htm.

Pennsylvania Department of Conservation and Natural Resources. (n.d.) *Forest health fact sheet: Hemlock woolly adelgid.* Retrieved November 20, 2007 from Pennsylvania Department of Conservation and Natural Resources website: http://www.dcnr.state.pa.us/forestry/leaflets/wooley.htm.

Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry. (2007). Rural and community forestry. Retrieved November 6, 2007 from Bureau of Forestry website: http://www.dcnr.state.pa.us/forestry/rural/index.aspx.

Pennsylvania Department of Education. (2002). *Academic standards for environment and ecology*. Retrieved February 21, 2006 from Pennsylvania Department of Education website: http://www.pde.state.pa.us/k12/envec.pdf.

Pennsylvania Department of Education. (2007). *College/University profiles*. Retrieved December 3, 2007 from Pennsylvania Department of Education website: http://www.pdehighered.state.pa.us/higher/lib/higher/07JulyHIGEDCollUnivPror2.pdf.

Pennsylvania Department of Education. (n.d.). School report cards. Retrieved June 28, 2006 from Pennsylvania Department of Education website: http://www.paprofiles.org/.

Pennsylvania Department of Environmental Protection. (1997). *Pennsylvania stream ReLeaf: A plan for conserving and restoring buffers along Pennsylvania streams*. Retrieved November 20, 2006 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/StreamReLeaf/ForestBuffTool/ReLeaf_Plan.pdf.

Pennsylvania Department of Environmental Protection. (2003). *Air pollution in Pennsylvania*. Retrieved March 28, 2005 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/dpe/deputate/airwaste/aq/factsheets/factsheets.htm.

Pennsylvania Department of Environmental Protection. (2004a). EFACTS. Retrieved October 14, 2004 from Pennsylvania Department of Environmental Protection website: http://www/dep.state.pa.us.

Pennsylvania Department of Environmental Protection. (2004b). *Pennsylvania reaches new record with dramatic increase in oil, gas well permits.* Retrieved July 30, 2006 from Pennsylvania Department of Environmental Protection website: http://www.depweb.state.pa.us/news/cwp/view.asp?A=3&Q=485880.

Pennsylvania Department of Environmental Protection. (2005). *Healing the land and water: Pennsylvania's abandoned mine reclamation program.* Retrieved November 15, 2005 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/dep/deputate/minres/reclaimpa/healinglandwater.html.

Pennsylvania Department of Environmental Protection. (2006a). *2006 Pennsylvania Integrated Water Quality Monitoring and Assessment Report*. Harrisburg, PA. Available at: http://www.depweb.state.pa.us/watersupply/cwp/view.asp?a=1261&q=480056.

Pennsylvania Department of Environmental Protection. (2006b). *DEP fact sheet: General permits for work in waterways, floodways and wetlands.* Retrieved June 17, 2008 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us. Keyword: Wetlands, wetlands report.

Pennsylvania Department of Environmental Protection. (2006 c). *Brownfields action team.* Retrieved July 30, 2006 from Pennsylvania Department of Environmental Protection website: http://www.depweb.state.pa.us/landrecwaste/cwp/view.asp?a=1243&q=462059.

Pennsylvania Department of Environmental Protection. (2006 d). Pennsylvania's Recycling Page. Retrieved July 30, 2006 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/dep/deputate/airwaste/wm/RECYCLE/Recycle.htm.

Pennsylvania Department of Environmental Protection. (2007). *DEP fact sheet: Pennsylvania Wetland Replacement Project.* Retrieved June 17, 2008 from the Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us. Keyword: Wetlands, wetlands report.

Pennsylvania Department of Environmental Protection[1]. (n.d.). An overview of the act 537 sewage facilities program. Retrieved August 3, 2004 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us. Keyword: Act 537.

Pennsylvania Department of Environmental Protection[2]. (n.d.). *Executive summary: Water Resources Planning Act*. Retrieved March 31, 2006 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/dep/deputate/watermgt/wc/act220.

Pennsylvania Department of Environmental Protection[3]. (n.d.). *Pennsylvania state water plan: Planning today for generations yet to come*. Retrieved January 6, 2006 from Pennsylvania Department of Environmental Protection website: http://www.3riverswetweather.org/f_resources/ PA_water_resources_planning.pdf.

Pennsylvania Department of Environmental Protection[4]. (n.d.). The NPDES permit. Retrieved August 3, 2004 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.us (keyword: NPDES permit).

Pennsylvania Department of Environmental Protection[5.] (n.d.). *The principle pollutants.* Retrieved March 28, 2005 from Pennsylvania Department of Environmental Protection website: http://www.dep.state.pa.us/dep/deputate/airwaster/aq/aqm/pollutants.htm.

Pennsylvania Envirothon. (2007). Forest succession and wildlife. Retrieved December 10, 2007 from Pennsylvania Envirothon website: http://www.envirothonpa.org/documents/ ForestSuccession.pdf.

Pennsylvania Fish and Boat Commission. (2005). Pennsylvania Fish and Boat Commission chronology and history. Retrieved November 9, 2006 from Pennsylvania Fish and Boat Commission website: http://sites.state.pa.us/PA_Exec/Fish_Boat/chrono.htm.

Pennsylvania Fish and Boat Commission. (2006a). *2005 Annual report*. Retrieved December 14, 2006 from Pennsylvania Fish and Boat Commission website: http://sites.state.pa.us/PA_Exec/Fish_Boat/promo/annualreport/2005.pdf.

Pennsylvania Fish and Boat Commission. (2006b). *Pennsylvania summary of fishing regulations and laws*. Retrieved November 9, 2006 from Pennsylvania Fish and Boat Commission website: http://sites.state.pa.us/PA_Exec/Fish_Boat/fishpub/summary/troutwaters.html.

Pennsylvania Fish and Boat Commission. (n.d.). *Keep Pennsylvania fishing: investing in our future.* Retrieved November 9, 2006 from Pennsylvania Fish and Boat Commission website: http://sites.state.pa.us/PA_Exec/Fish_Boat/promo/initiatives/jrlicense/00junior.htm.

Pennsylvania Game Commission. (2004). *Pennsylvania Game Commission strategic plan for 2003-2008*. Retrieved December 28, 2005 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=481&q=160674.

Pennsylvania Game Commission. (2005a). *Farmland habitats*. Retrieved June 5, 2006 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=496&q=166106.

Pennsylvania Game Commission. (2005b). Pennsylvania's comprehensive wildlife conservation strategy, part IIA: threats to wetland habitats. Retrieved December 27, 2005 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp.

Pennsylvania Game Commission[1]. (n.d.). 2006–2007 DMAP instructions. Retrieved March 8, 2007 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=465&q=151434.

Pennsylvania Game Commission[2]. (n.d.). Endangered species: Short-eared owl. Retrieved November 13, 2007 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=486&q=152645.

Pennsylvania Game Commission[3]. (n.d.). State Game Lands. Retrieved December 18, 2007 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp/browse.asp?a=480&bc=0&c=69913.

Pennsylvania Game Commission[4]. (n.d.). Threatened species: Bald eagle. Retrieved November 13, 2007 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=458&q=152498.

Pennsylvania Game Commission[5]. (n.d.). Threatened species: Osprey. Retrieved November 13, 2007 from Pennsylvania Game Commission website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=486&q=152561.

Pennsylvania Historic Architecture and Archaeology. (n.d.). *National Historic Landmarks and National Register of Historic Places in Pennsylvania.* Retrieved October 31, 2006 from Pennsylvania Historic Architecture and Archaeology website: http://www.arch.state.pa.us.

Pennsylvania Historical Museum Commission. (2007). National register listed, eligible, and national historic landmark properties. Retrieved May 10, 2007 from Pennsylvania Historical Museum Commission website: http://www.phmc.state.pa.us/bhp/nr/NRListedEligible.pdf.

Pennsylvania Municipalities Planning Code (sixteenth edition). (2002). Harrisburg, PA: Department of Community and Economic Development.

Pennsylvania Nutrient Management Program. (n.d.). Pennsylvania nutrient management program. Retrieved November 30, 2005 from Pennsylvania Nutrient Management Program website: http://panutrientmgmt.cas.psu.edu/cert_application_info.htm.

Pennsylvania Sea Grant. (2003). *Zebra mussels*. Retrieved May 4, 2005 from Purdue Research Foundation website: http://nsgl.gso.uri.edu/penn/penng03008.pdf.

Pennsylvania State Archives. (n.d.). Pennsylvania counties. Retrieved January 18, 2007 from Pennsylvania Historic Museum Commission website: http://www.phmc.state.pa.us/bah/dam/counties/county.asp?secid=31.

Private school review. (n.d.). Retrieved November 28, 2006 from Private School Review website: http://www.privateschoolreview.com/town_schools/stateid/PA/townid/6067.

Purdue Research Foundation. (2004). Pest tracker. Retrieved May 4, 2005 from Purdue Research Foundation website: http://ceris/purdue.edu/napis.index.html.

Radford University. (2005). *Physiographic provinces of Virginia*. Retrieved April 7, 2006 from Department of Geographic website: http://www.radford.edu/~swoodwar/CLASSES/GEOG202/physprov/physprov.html.

Rails-to-Trails Conservancy. (2006). Benefits of rail-trails. Retrieved December 18, 2006 from Rails to Trails Conservancy website: http://www.railtrails.org/whatwedo/railtrailinfo/benefits.html.

Robson, M. (n.d.). Encyclopedia of Public Health: Groundwater. Retrieved April 29, 2008 from Answers.com website: http://www.answers.com/topic/groundwater?cat=technology.

Rodewald, A. D. (2006). Managing wildlife habitat on public open space. Retrieved December 7, 2006 from The Ohio State University website: http://ohioline.osu.edu/b915/introduction.html.

Schueler, T. (2003). Impacts of impervious cover on aquatic systems. Ellicott City, MD: Center for Watershed Protection.

Sevon, W. D., & Barnes, J. (2002). *The Geological Story of Pennsylvania*. Harrisburg: Pennsylvania Geological Survey.

Shultz, C. (1999). *The Geology of Pennsylvania*. Harrisburg, PA: Pennsylvania Geological Survey.

Smart Growth Network. (2005). About smart growth. Retrieved October 27, 2005 from Smart Growth Online website: http://www.smartgrowth.org/about/default.asp.

Smart Growth Network. (1996). Smart growth principles. Retrieved June 8, 2006 from Smart Growth Partnership of Westmoreland County website: http://www.smartgrowthpa.org/principles.asp.

Smith, R. V. (1982). *Soil Survey of Beaver and Lawrence Counties, Pennsylvania*. Washington D.C.: U.S. Government Printing Office.

Smith, R. V. (1989). *Soil survey of Butler County, Pennsylvania*. Washington D.C.: U.S. Government Printing Office.

Society for Pennsylvania Archaeology, Inc. (2004). Discover and preserve Pennsylvania's archaeological heritage. Retrieved February 5, 2007 from Society of Pennsylvania Archaeology website: http://www.pennsylvaniaarchaeology.com/.

Spichiger, S. (2004). *Insect damage.* Pennsylvania Department of Conservation and Natural Resources Forest Pest Management News, 22, 3-4.

Strayer, D. L., & Jirka, K. J. (1997). *The Pearly Mussels of New York State*. The New York State Education Department, Albany, NY. 113 pp and plates.

Swearingen, J., Reshetiloff, K., Slattery, B., & Zwicker, S. (2002). *Plant invaders of Mid-Atlantic natural areas.* National Park Service and U.S. Fish & Wildlife Service, Washington, D.C. 82 pp.

The Weather Channel. (2006). Average temperatures. Retrieved April 6, 2006 from The Weather Channel website: http://www.weatherchannel.com.

Turner, A., Morrow, T., Harris, S., Dalby, P., Dressler, J., & Seiler, S. (n.d.). Acid mine drainage: studies in remediation. Retrieved July 26, 2006 from Center for Rural Pennsylvania website: http://www.ruralpa.org/acid_mine_remediation.pdf.

U.S. Agency for Toxic Substances and Diseases Registry. (2001). *Case studies in environmental medicine: Nitrate/Nitrite toxicity*.

U.S. Army Corps of Engineers. (2002). *Recognizing wetlands: An informational pamphlet*. Retrieved May 5, 2002 from U.S. Army Corps of Engineers website: http://www.usacoe.army.mil/inet/functions/CW/cecwo/reg/rw-bro.htm.

U.S. Census Bureau. (1990). Total population by census block groups. Retrieved September 1, 2004 from American Fact Finder website: http://americanfactfinder.uscensus.gov.

U.S. Census Bureau. (2000). Total population by census block groups. Retrieved September 1, 2004 from American Fact Finder website: http://americanfactfinder.uscensus.gov.

U.S. Census Bureau. (2006). Cranberry Township Population Finder. Retrieved July 5, 2006 from Population Finder website: http://factfinder.census.gov/.

U.S. Census Bureau. (n.d.). Demographic profiles. Retrieved September 1, 2004 from U.S. Census Bureau website: http://censtats.census.gov/cgi-bin/pct/pctProfile.pl.

U.S. Department of Agriculture. (2003). Natural resources conservation service. Retrieved July 6, 2006 from Natural Resources Inventory 2003 Annual NRI: http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landuse-mrb.html.

U.S. Department of Agriculture. (2006). National agricultural statistics service. Retrieved July 5, 2006 from Butler County Farm Numbers Web site: http://www.nass.usda.gov:8080/QuickStats/PullData_US_CNTY.jsp.

U.S. Department of Agriculture Farm Service Agency. (n.d.). Conservation reserve enhancement program. Retrieved November 30, 2006 from U.S. Department of Agriculture Farm Service Agency website: http://www.fsa.usda.gov/FSA/webapp?area= home&subject=copr&topic=cep.

U.S. Department of Agriculture Natural Resources Conservation Service. (2007). Warm-season grasses in Pennsylvania. Retrieved December 11, 2007 from U.S.Department Agriculture Natural Resources Conservation Service website: http://www.pa.nrcs.usda.gov/FTPPublications/warmseasongrasses04.pdf.

U.S. Department of Energy. (2007). *A consumer's guide to energy efficiency and renewable energy*. Retrieved December 5, 2007 from U.S. Department of Energy website: http://www.eere.energy.gov/consumer/your_home/landscaping/index.cfm/mytopic=11940.

U.S. Environmental Protection Agency. (2001). Functions and Values of Wetlands. Retrieved June 28, 2007 from the U.S. Environmental Protection Agency website: http://www.epa.gov/owow/wetlands/pdf/fun_val.pdf.

U.S. Environmental Protection Agency. (2002). *RCRA orientation manual executive summary*. Retrieved November 15, 2005 from U.S. Environmental Protection Agency website: http://www/epa.gov/epaoswer/general/orientat/.

U.S. Environmental Protection Agency. (2003). *Atmospheric deposition and water quality.* Retrieved March 29, 2005 from U.S. Environmental Protection Agency website: http://www.epa.gov/OWOW/oceans/airdep/air1.html.

U.S. Environmental Protection Agency. (2004). *CERCLA overview*. Retrieved March 29, 2004 from U.S. Environmental Protection Agency website: http://www.epa.gov/superfund/action/law/cercla.htm.

U.S. Environmental Protection Agency. (2005). *Mercury*. Retrieved October 4, 2005 from U.S. Environmental Protection Agency website: http://www/epa.gov/mercury/about.htm.

U.S. Environmental Protection Agency. (2006a). Brownfields. Retrieved July 8, 2006 from U.S. Environmental Protection Agency website: http://www.epa.gov/brownfields/.

U.S. Environmental Protection Agency. (2006b). *Consumer fact sheet on: Nitrates/Nitrites*. Retrieved August 15, 2007 from U.S. Environmental Protection Agency website: http://www.epa.gov/safewater/dwh/c-ioc/nitrates.html.

U.S. Environmental Protection Agency. (2006c). Superfund. Retrieved July 8, 2006 from U.S. Environmental Protection Agency website: http://www.epa.gov/superfund/.

U.S. Environmental Protection Agency. (2007). *Nitrates and nitrites: Toxicity and exposure assessment for children's health (TEACH) chemical summary.* Retrieved August 15, 2007 from U.S. Environmental Protection Agency website: http://www.epa.gov/teach/chem_summ/Nitrates_summary.pdf.

U.S. Postal Service. (n.d.). History of the U.S. postal service. Retrieved October 31, 2005 from U.S. Postal Service website: http://www.usps.com/history/history/his1.htm#contents.

University of California Museum of Paleontology. (n.d.). *The carboniferous*. Retrieved November 27, 2006 from University of California Museum of Paleontology website: http://www.ucmp.berkeley.edu/carboniferous/carboniferous.html.

USA Counties. (n.d.). Population—total and selected characteristics. Retrieved April 18, 2007 from U.S. Census Bureau website: http://censtats.census.gov/.

Vermont Conservation Education Fund. (2002). Subdivision regulations. Retrieved June 29, 2006 from People Can Plan website: http://peoplecanplan.org/pages/t3sr.html.

Washington State Department of Natural Resources. (2003). *State of Washington natural heritage plan.* Retrieved January 2, 2007 from Seattle Audubon website: http://birdweb.org/birdweb/ ecoregion_definition.aspx.

Washington's trail through Butler County. (n.d.). Retrieved October 31, 2006 from Butler County website: http://www.co.butler.pa.us.

Welsch, D. (n.d.). Riparian forest buffers: Function and design for protection and enhancement of water resources. Retrieved November 30, 2006 from U.S. Department of Agriculture Forest Service website: http://www.na.fs.fed.us/spfo/pubs/n_resource /buffer/ cover.htm.

Wikipedia Free Encyclopedia. (2007). Ohio River. Retrieved August 13, 2007 from the Wikipedia website: http://en.wikipedia.org/wiki/Ohio_River.

Wikipedia Free Encyclopedia. (2008). Landslide. Retrieved April 25, 2008 from the Wikipedia website: http://en.widipedia.org/wiki/Landslides.

Wills, R. (2007). *Back to the beginning*. Retrieved February 1, 2007 from Pittsburgh Tribune-Review website: http://www.pittsburghlive.com/x/pittsburghtrib/news/today/s_487122.html.

World Wildlife Federation. (2005). Ecoregions. Retrieved October 26, 2005 from the World Wildlife Federation website: http://www.worldwildlife.org/science/ecoregions.cfm.

APPENDIX A. GLOSSARY

Acidity	The capacity of water for neutralizing a basic solution.
Agricultural Preservation Areas	Lands enrolled in a statewide program that has been established to promote the conservation and preservation of agricultural lands and the agricultural community.
Air Pollutant	Any substance in the air that causes damage to life, ecosystems, or property.
Airsheds	Geographic areas responsible for emitting 75 percent of the air pollution reaching a body of water.
All Terrain Vehicle	A small, open motor vehicle having one seat and three or more wheels fitted with large tires. It is designed chiefly for recreational use over roadless, rugged terrain.
Atmospheric Deposition	The process of airborne pollutants falling to the ground.
Basicity	The extent to which a substance is a base, which is defined as having a pH over seven.
Bedrock	The solid rock that underlies the soil and other unconsolidated material, or that is exposed at the surface.
Best Management Practices	Refer to the most environmentally appropriate techniques for agriculture, forestry, mining, development, urban storm water management, and other practices that are potential threats to natural resources.
Biological Diversity	The number and variety of organisms found within a specific geographic region, or a particular habitat; the variability among living organisms on the earth, including the variability within and between species and within and between ecosystems.
Biological Diversity Area	An area of land recognized as supporting populations of state, nationally, or globally significant species or natural communities, high-quality examples of natural communities or ecosystems, or natural exceptional native diversity.
Canal	A man-made waterway that is usually used to connect existing bodies of water.
Carbon Monoxide	A colorless, odorless, poisonous gas that results from the incomplete burning of carbon fuels.

Comprehensive Plans	A general policy guide for the physical development of a municipality, taking into account many factors including locations, character, and timing of future development.
Concentrated Animal Feeding Operation	A farm where large quantities of livestock or poultry are housed inside buildings or a confined area and all units of production, including feed, wastes and dead animals are concentrated in one area.
Conservation	The maintenance of environmental quality and resources; resources include physical, biological, or cultural. Ecosystem management within given social and economic constraints; producing goods and services for humans without depleting natural ecosystem diversity, and acknowledging the natural character of biological systems.
Conservation Lands	Public or private lands with management plans that include the protection of natural areas as a primary objective.
Dedicated Area	An area of land recognized because of an owner's specific intention to protect it, which could result in the improving to become either a biological diversity area in the future or an even better high-quality area within an already designated biological diversity area.
Degradation	A degeneration to a poorer quality, condition or state.
Direct Deposition	Occurs when pollutants enter a waterway by falling directly into it.
Drainage Pattern	The arrangement of streams in a landscape in response to local topography and subsurface geology.
Easement	A deed restriction that landowners may voluntarily place of their property to protect its future uses.
Eco-region	A geographical unit based on associations of those biotic and environmental factors that directly affect or indirectly express energy, moisture, and nutrients regulating the structure and function of ecosystems.
Ecosystems	An area and its living and non-living components.
Environmental Education	A learning process that increases knowledge and awareness of the environment and associated challenges, develops skills and expertise to address these challenges, and fosters attitudes, motivation, and commitment to make informed decisions and take responsible actions.
Erosion	The processes by which solids are displaced from the earth's surface; includes weathering, dissolution, abrasion, corrosion, and transportation.

Factory Farms	Larger, corporate-based farms that emphasize high volume and profit.
Family Farms	Smaller farms that have been in operation for several generations.
Floodplain	The level land among the course of a river or stream formed by the deposition of sediment during periodic floods.
Forest Management	The art and science of treating a forest to promote a desired outcome.
Geology	Geology is the science that deals with the study of the earth and its history, and is the name of the natural features of our plant.
Ground-level Ozone	A harmful secondary pollutant formed in the atmosphere when nitrogen oxide (NOx) combines and reacts with volatile organic compounds in the presence of sunlight and warm temperatures.
Groundwater	Water beneath the earth's surface; found in pore spaces in rock material. Supplies wells and springs as a source of drinking water for many; also
High-Grading	Involves cutting of only the biggest, most profitable trees in a stand; considered a non-sustainable practice.
Hydric Soils	Soils that are adequately moist in the upper section to cultivate anaerobic conditions during the growing season.
Hydrolic Unit Code	A system for organizing watersheds of the United States that divides and subdivides the watershed into successively smaller hydrologic units and is then assigned an identifying number.
Hydrology	The study of movement of water on the earth; includes surface water and groundwater.
Indirect Deposition	Occurs when a pollutant enters a waterway by falling onto land and being washed into waterbodies as runoff.
Invasive species	Environmentally noxious weeds that grow aggressively, spread easily, and displaces other plants.
Karst	An area of limestone marked by irregularities such as sinkholes, fissures, caves, and underground streams, which are created by erosion.
Landscape Conservation Area	A larger area of land that contains minimal human disturbance and allows ecosystems to function on a landscape level.
Landslide	Ground movements that change the stability of slope from stable to unstable are landslides

Lichens	A symbiosis between a fungal and algal life form that usually grows on trees or rocks.
Major Employers	Companies having a minimum of 200 employees.
Management Recommendations	Non-regulatory suggestions to improve the quality of life.
Methylmercury	A neurotoxin formed by the transformation of mercury by certain microorganisms; it is highly toxic and easily accumulates in fish, shellfish and animals that eat fish.
Natural Heritage Inventories	A method of assessing areas of important plants, animals, and ecological communities.
Natural Resources	A naturally-occurring material with economic value.
Nonpoint Source	Pollutants that have no readily visible source and often require detailed analysis and research to discern the source.
Ozone	A colorless, odorless, gas that forms in the atmosphere.
Ozone Layer	A colorless, odorless, gas located in the upper atmospheric layer that filters the sun's harmful ultraviolet rays.
Particular Matter	Tiny drops of liquid or small particles of dust, metal or other materials that float in the air.
Physiographic Provinces	A region with a particular type of landscape and geology.
Point Source	Pollutants that can be easily traced to their source.
Precipitation	Any form of water that falls from the sky, including, rain, snow, sleet, fog, and hail.
Preservation	The act or process of keeping something safe from harm or injury; the act of maintaining or reserving.
Prime Agricultural Soils	Soils that are extremely well suited for agricultural uses and meet certain physical, chemical, and slope characteristics.
Red beds	Strat of reddish-colored sedimenatry rocks, such as sandstone, siltstone, and shale.
Restoration	Returning to its original state or condition.

Riparian Areas	Areas of protective vegetation next to a body of water that serves as a barrier against polluted runoff and provides habitat corridors for wildlife.
Runoff	Rainfall or snowmelt not absorbed by soil that flows over the surface of the ground to a receiving waterway.
Secondary Pollutant	A new air pollutant formed when primary pollutants react in the atmosphere.
Sedimentary Rock	Rocks formed by the deposition of sediment.
Sedimentation	The deposit of particles moved by erosion.
Silviculture	The art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands.
Smart Growth Practices	A current movement that focuses on redevelopment of established urban areas and other ways to reduce sprawl pressures on undeveloped countrysides.
Soil Associations	A classification of soil types that comprise two to three major soil types and a few minor soil types.
Stormwater	Water that runs off the land into surface waters during and immediately following periods of precipitation.
Stormwater Management Plan	Planning for surface runoff into streams and river systems during rain and/or snowmelt events.
Streambed	The channel base of a stream or river or creek; it serves as an interchange between groundwater and surface water.
Subsidence	The downward movement of surface material involving little or no horizontal movement.
Sustainable	The ability to provide for the needs of the world's current population without damaging the ability of future generations to provide for themselves. When a process is sustainable, it can be carried out over and over without negative environmental effects or impossibly high costs to anyone involved.
Symbiosis	An alliance between two or more species that benefits each member.
Synthetic Processes	Human-controlled processes, such as burning fossil fuels.
Temperate Continental Climate	A climate without extremes of temperatures or precipitation.

Topography	Describes landscape features of an area.
Total Maximum Daily Load (TMDL)	A limit for pollutant load placed on a waterway by Department of Environmental Protection. TMDLs are determined for a waterway based on how much pollutant it is determined that the waterway can assimilate and still meet its designated use criteria. TMDLs will be used to regulate the percentage of total pollutant load that each source in a watershed can contribute.
Unemployment Rate	The percentage of people of the total labor force that are actively seeking a job but cannot find employment.
Value Added	The additional value added to a product at a stage of production.
Water Gap	An opening or notch which occurs when a section of a ridge has a weaker geological structure and a stream essentially cuts through a ridge to end up
Water Quality Trading	A program which allows facilities with higher pollution control costs to purchase the right to pollute from facilities that have reduced their pollution output below their required limits.
Watershed	The area of land that drains to a particular point along a stream. Each stream has its own watershed. Topography is the key element affecting this area of land. The boundary of a watershed is defined by the highest elevations surrounding the stream. A drop of water falling outside of the boundary will drain to another watershed.
Wetland	An area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
Wildlife Management Areas	Areas dedicated to wildlife management activities and low-intensity, wildlife-related recreation, including hunting and wildlife observation.
Zoning	A legal mechanism by which government bodies, for the sake of protecting public health, safety, morals and general welfare, can limit a landowner's right to use privately owned land by dividing land into districts and creating land-use regulations.

APPENDIX B. PLANNING COMMITTEES

Connoquenessing Creek Watershed Conservation Plan Steering Committee

Dave Andrews	Butler Jr. High School Commoquenessing Watershed Allliance
Dave Barensfeld	Business Owner WPC Board Member
Megan Gahring	Lawrence County Conservation District Wildwaterways Conservancy
Heath Gamache	Lutherlyn
Ryan Harr	Butler County Conservation District
Dave Kemp	Connquenessing Watershed Alliance
Dave Lamperski	Butler County Environmental Advisory Committee Connoquenessing Watershed Alliance Forward Township Supervisor
Matt Montag	AK Steel Corporation Butler Works
John Ruch	Historic Harmony Inc.
Marty Warchol	Beaver County Conservation District

Connoquenessing Creek Watershed Conservation Plan Advisory Committees

Project Area Characteristics

Donelle Andrus	Butler County Planning Department
Margie Davies	Connoquenessing Watershed Alliance
Amy McKinney	Lawrence County Planning Department

Land Resources

Bob Barr	Rock Point Boat Club
Margie Davies	Connoquenessing Watershed Alliance
Sheryl Kelly	Butler County Department of Recycling and Waste Management
Fred Lochner	Wild Waterways Conservancy
Dennis McCandless	Concerned Citizen
Amy McKinney	Lawrence County Planning Department
Gary Pinkerton	Butler County Parks and Recreation Department
Jerry Zona	PA Cleanways - Lawrence/Butler Counties

Water Resources

John Ball	Hereford Mannor Lakes Conservancy
Bob Barr	Rock Point Boat Club
Margie Davies	Connoquenessing Watershed Alliance
Ely Heferle	Pennsylvania Department of Environmental Protection
Fred Lochner	Wild Waterways Conservancy
Dennis McCandless	Concerned Citizen
Natalie Price	Connoquenessing Watershed Alliance
	Butler County Community College
Denise Sheets	Community Development Corporation of Butler County

Biological Resources

Margie Davies	Connoquenessing Watershed Alliance
Sheree Dougherty	Wild Waterways Conservancy
Fred Lochner	Wild Waterways Conservancy
Natalie Price	Connoquenessing Watershed Alliance
	Butler County Community College

Cultural Resources

Everett Bleakney	Concerned Citizen
Jack Cohen	Butler County Tourism and Convention Bureau
Margie Davies	Connoquenessing Watershed Alliance
Hannah Hardy	Pennsylvania Environmental Council
Joanne McBride	Lawrence County Tourist Promotion Agency
Dennis McCandless	Concerned Citizen
Amy McKinney	Lawrence County Planning Department
Gary Pinkerton	Butler County Parks and Recreation Department
Carl Robertson	Providence Plantation
Jerry Zona	PA Cleanways - Lawrence/Butler Counties

APPENDIX C. MAJOR EMPLOYERS

Employer	Location	Employees
AK Steel Incorporated	Butler	4,000
Butler Memorial Hospital	Butler	1,200
Three Rivers Aluminum Co. Incorporated	Cranberry Township	900
Butler Area School District	Butler	850
Lutheran Affiliated Services	Cranberry Township	800
Penn United Technology, Incorporated	Saxonburg	675
Spang and Co. Incorporated	Butler	600
Manheims Pennsylvania Auction	Cranberry Township	595
Wal-Mart Supercenter	Cranberry Township	550
Mine Safety Appliance Company	Cranberry Township	500
Veka Incorporated	Fombell	466
II-VI Incorporated	Saxonburg	450
Lifesteps, Incorporated	Butler	425
Ellwood City Health Organization	Ellwood City	425
P, P, H, and K Incorporated	Butler	400
St. John Speciality Care Center	Mars	365
Nationwide Mutual Insurance Company	Butler	350
Passavant Retirement Health Center	Zelienople	308
Healthamerica Pa Incorporated	Cranberry Township	300
Mine Safety Appliance Company	Cranberry Township	300
Mine Safety Appliance Company	Evans City	300
Sysco Food Svs Pittsburgh Limited Liability Company	Harmony	300
Mars Area School District	Mars	280
County of Butler	Butler	256
Spang and Company Incorporated	East Butler	250
Sherwood Oaks	Cranberry Township	245
McClumonds Supply and Transit Company	Portersville	231
VNA Services	Butler	225
Pennfirst Financial Services	Ellwood City	220
Ellwood City Area School District	Ellwood City	214
Modern Transportation Service	Portersville	213
Wal-Mart Stores	Butler	212
Marmon Keystone Corporation	Butler	203
Ado Staffing Incorporated	Butler	200
Butler Community College	Butler	200
Butler Supermarkets, Incorporated	Butler	200
Jsp. International	Butler	200
Giant Eagle	Cranberry Township	200
Kohl's Department Store	Cranberry Township	200
Champ Penn Incorporated	East Butler	200
Spang and Company Incorporated	East Butler	200
Nalco Company	Ellwood City	200
Nalco Company	Fombell	200
University of Pittsburgh Medical Center	Mars	200

APPENDIX D. AGRICULTURAL SOILS

Prime Agricultural Soils

Allegheny County

Map Symbol	Soil Name	Slope Character (% slope)
CmB	Clymer silt loam	3 to 8
CuB	Culleoka silt loam	3 to 8
GpB	Gilpin-Upshur complex	3 to 8
HaB	Hazelton channery loam	3 to 8
Ph	Philo silt loam	
RaA	Rainsboro silt loam	0 to 3
RyB	Rayne silt loam	2 to 8
UaB	Upshur silty clay loam	3 to 8
WhB	Wharton silt loam	2 to 8

Beaver County

Map Symbol	Soil Name	Slope Character (% slope)
AgB	Allegheny loam	3 to 8
CmB	Clymer loam	3 to 8
CuB	Culleoka silt loam	3 to 8
GnB	Gilpin silt loam	3 to 8
GpB	Gilpin-Upshur complex	3 to 8
HaB	Hazelton channery loam	3 to 8
MoA	Monongahela silt loam	0 to 3
Ph	Philo silt loam	
Po	Pope silt loam	
TsB	Tilsit silt loam	3 to 8
WhA	Wharton silt loam	0 to 3
WhB	Wharton silt loam	3 to 8

Butler County

Map Symbol	Soil Name	Slope Character (% slope)
BeA	Braceville loam	0 to 3
BeB	Braceville loam	3 to 8
BuB	Buchanan loam	3 to 8
CmB	Clymer loam	3 to 8
CoA	Cookport loam	0 to 3
CoB	Cookport loam	3 to 8
GIB	Gilpin silt loam	3 to 8
HaB	Hazelton channery loam	3 to 8

Butler County (continued)

Map Symbol	Soil Name	Slope Character (% slope)
Ph	Philo silt loam	
Po	Pope silt loam	
RdB	Riverhead Sandy loan	3 to 8
TaA	Tilsit silt loam	0 to 3
WaA	Wharton silt loam	0 to 3
WaB	Wharton silt loam	3 to 8
WhA	Wheeling silt loam	0 to 3
WhB	Wheeling silt loam	3 to 8

Lawrence County

Map Symbol	Soil Name	Slope Character (% slope)
AgB	Allegheny silt loam	3 to 8
BcB	Braceville loam	3 to 8
CdB	Canfield silt loam	3 to 8
ChB	Chili silt loam	3 to 8
CmB	Clymer loam	3 to 8
CoB	Conotton gravelly loam	3 to 8
CuB	Culleoka silt loam	3 to 8
GnB	Gilpin silt loam	3 to 8
HaB	Hazelton channery loam	3 to 8
Lb	Lobdell silt loam	
LoB	Loudonville gravelly silt loam	3 to 8
MoA	Monongahela silt loam	0 to 3
Ph	Philo silt loam	
Po	Pope silt loam	
RaA	Ravenna silt loam	0 to 3
RaB	Ravenna silt loam	3 to 8
TsB	Tilsit silt loam	3 to 8
WhB	Wharton silt loam	3 to 8
WoB	Wooster gravelly silt loam	3 to 8

Farmland of Statewide Importance

Map Symbol	Soil Name	Slope Character (% slope)
Allegheny County		
CaB	Cavode silt loam	2 to 8
CaC	Cavode silt loam	8 to 15
CeB	Caneadea silt loam	3 to 8
CmC	Clymer silt loam	8 to 15
ErB	Ernest silt loam	2 to 8
ErC	Ernest silt loam	8 to 15
EvC	Ernest-Vandergrift silt loams	8 to 15
GIC	Gilpin silt loam	8 to 15
GpC	Gilpin-Upshur complex	8 to 15
GvB	Guernsey-Vandergrift silt loams	3 to 8
GvC	Guernsey-Vandergrift silt loams	8 to 15
GwC	Gilpin-Wharton silt loams	8 to 15
HaC	Hazelton loam	8 to 15
RaB	Rainsboro silt loam	3 to 8
RaC	Rainsboro silt loam	8 to 15
RyC	Rayne silt loam	8 to 15
TaB	Tilsit silt loam	3 to 8
UaC	Upshur silty clay loam	8 to 15
VcB	Vandergrift-Cavode silt loams	3 to 8
VcC	Vandergrift-Cavode silt loams	8 to 15
WhC	Wharton silt loam	8 to 15
Beaver County		
AgC	Allegheny silt loam	8 to 15
At	Atkins silt loam	
CeA	Cavode silt loam	8 to 15
CeB	Cavode silt loam	3 to 8
CeC	Cavode silt loam	8 to 15
ChC	Chili silt loam	8 to 15
CmC	Clymer loam	8 to 15
CoC	Conotton gravelly loam	8 to 15

Map Symbol	Soil Name	Slope Character (% slope)
Beaver County (continued)		
CuC	Culleoka silt loam	8 to 15
ErB	Ernest silt loam	3 to 8
ErC	Ernest silt loam	8 to 15
GnC	Gilpin silt loam	8 to 15
GpC	Gilpin-Upshur complex	8 to 15
GsB	Gilpin-Weikert complex	3 to 8
GtB	Guernsey silt loam	3 to 8
GtC	Guernsey silt loam	8 to 15
GvB	Guernsey-Vandergrift complex	3 to 8
GvC	Guernsey-Vandergrift complex	8 to 15
HaC	Hazelton channery loam	8 to 15
MoB	Monongahela silt loam	3 to 8
MoC	Monongahela silt loam	8 to 15
TsC	Tilsit silt loam	8 to 15
TyA	Tyler silt loam	0 to 3
TyB	Tyler silt loam	3 to 8
WhC	Wharton silt loam	8 to 15
Butler County		
At	Atkins silt loam	
BuC	Buchanan loam	8 to 15
CeA	Caneadea silt loam	0 to 3
CeB	Caneadea silt loam	3 to 8
CeC	Caneadea silt loam	8 to 15
CIA	Cavode silt loam	0 to 3
CIB	Cavode silt loam	3 to 8
CIC	Cavode silt loam	8 to 15
CmC	Clymer silt loam	8 to 15
CoC	Cookport loam	8 to 15
ErB	Ernest silt loam	3 to 8
ErC	Ernest silt loam	8 to 15
FeB	Fredpm loam	3 to 8
GnC	Gilpin-Upshur complex	8 to 15

Farmland of Statewide Importance

Map Symbol	Soil Name	Slope Character (% slope)
Butler County (continued)		
GoB	Gilpin-Weikert channery silt loams	3 to 8
GpC	Gilpin-Wharton silt loams	8 to 15
GrC	Gresham silt loam	8 to 15
HaC	Hazelton channery loam	8 to 15
MoB	Monongahela silt loam	3 to 8
MoC	Monongahela silt loam	8 to 15
RdC	Riverhead sandy loam	8 to 15
TaB	Tilsit silt loam	3 to 8
VcB	Vandergrift-Cavode silt loam	3 to 8
VcC	Vandergrift-Cavode silt loam	8 to 15
WaC	Wharton silt loam	8 to 15
Lawrence County		
At	Atkins silt loam	
CdC	Canfield silt loam	8 to 15
CeB	Cavode silt loam	3 to 8
CeC	Cavode silt loam	8 to 15
ChC	Chili silt loam	8 to 15
CmC	Clymer loam	8 to 15
CoC	Conotton gravelly loam	8 to 15
CuC	Culleoka silt loam	8 to 15
ErB	Ernest silt loam	3 to 8
ErC	Ernest silt loam	8 to 15
FnA	Frenchtown silt loam	0 to 3
FnB	Frenchtown silt loam	3 to 8
GnC	Gilpin silt loam	8 to 15
GsB	Gilpin-Weikert complex	3 to 8
GtB	Guernsey silt loam	3 to 8
GtC	Guernsey silt loam	8 to 15
GvC	Guernsey-Vandergrift complex	8 to 15
HaC	Hazelton channery loam	8 to 15
Ho	Holly silt loam	
LoC	Loudonville gravelly silt loam	8 to 15
MoB	Monongahela silt loam	3 to 8
MoC	Monongahela silt loam	8 to 15
RaC	Ravenna silt loam	8 to 15
ReB	Rexford silt loam	3 to 8
Sn	Sloan silt loam	
TsC	Tilsit silt loam	8 to 15
TyA	Tyler silt loam	0 to 3
TyB	Tyler silt loam	3 to 8
WhC	Wharton silt loam	8 to 15
WoC	Wooster gravelly silt loam	8 to 15

APPENDIX E. MINING PERMITS

Mine Name	Operation	Permit #	Issued Date		Status	Location
Adams 1 Mine	Surface Mine	3074SM25	6/28/1977	Inactive	Reclamation Complete	Summit Township
Aiken Mine	Surface Mine	37850108	2/21/1986	Inactive	Reclamation Complete	Perry Township
Amerikohl 19 Mine	Surface Mine	10860113	10/29/1997	Inactive	Reclamation Complete	Summit Township
Amerikohl 20 Mine	Surface Mine	10870107	11/25/1988	Inactive	Reclamation Complete	Summit Township
Amerikohl 26 Mine	Surface Mine	10890110	1/24/1990	Inactive	Reclamation Complete	Clearfield Township
Berbigler Mine	Surface Mine	10860104	3/16/1987	Inactive	Reclamation Complete	Clearfield Township
Bittner Mine	Surface Mine	10920108	8/6/1998	Inactive	Reclamation Complete	Concord Township
Blum 2 Mine	Surface Mine	37850110	7/1/1986	Inactive	Reclamation Complete	Wayne Township
Boarts Mine	Surface Mine	3077SM10	5/24/1977	Inactive	Reclamation Complete	Summit Township
Bonnie Brook Mine	Surface Mine	10860121	8/11/2000	Inactive	Reclamation Complete	Summit Township
Bonzo Mine	Surface Mine	10950104	8/2/2001	Inactive	Reclamation Complete	Jackson Township
Book 4 Mine	Surface Mine	10840113	6/17/1985	Inactive	Reclamation Complete	Worth Township
Book Mine	Surface Mine	3075SM8	10/27/1980	Inactive	Reclamation Complete	Worth Township
Boofer Mine	Surface Mine	10060302	9/22/2006	Active	Large Surface Mine Permit	Clay Township
Boots Mine	Surface Mine	37030101	2/26/2007	Active	Surface Mining Permit	Wayne Township
Brm 1 Mine	Surface Mine	10880103	8/1/1998	Inactive	Reclamation Complete	Summit Township
Brown Mine	Surface Mine	10850105	9/29/1997	Inactive	Reclamation Complete	Concord Township
Brucker Mine	Surface Mine	10820123	1/9/1998	Inactive	Reclamation Complete	Concord Township
Burr Mine	Surface Mine	10800115	6/30/1980	Inactive	Reclamation Complete	Jackson Township
Burr Mine	Surface Mine	10930103	8/12/2003	Inactive	Reclamation Complete	Jackson Township
Cadam 1 Mine	Surface Mine	1080102	11/2/1981	Inactive	Reclamation Complete	Summit Township
Campbell Mine	Surface Mine	10010112	8/1/2007	Active	Reclamation Complete	Concord Township
Carbon Ctr Mine	Surface Mine	10800113	4/16/1984	Inactive	Reclamation Complete	Summit Township
Cartwright Mine	Surface Mine	10900111	4/17/1998	Inactive	Reclamation Complete	Concord Township
Castellano Mine	Surface Mine	10820128	11/28/1983	Inactive	Reclamation Complete	Lancaster Township
Castellano Mine	Surface Mine	3075SM7	na	Abandoned	Bond Forfeited	na
Caye Mine	Surface Mine	37830106	3/7/1984	Inactive	Reclamation Complete	Perry Township
Ceasar Mine	Surface Mine	1079108	8/31/1979	Active	Reclamation Complete	Lancaster Township
Chicora 1 Mine	Underground	10851301	3/2/1998	Active	Reclamation Complete	Donegal Township
Chicora 2 Mine	Underground Mine	10891301	na	Abandoned	Bond Forfeited	na
Clearose 3 Mine	Surface Mine	3076SM33	2/17/1977	Inactive	Reclamation Complete	Summit Township
Clymer Mine	Surface Mine	10840108	12/23/1985	Inactive	Reclamation Complete	Oakland Township
Cooper Mine	Surface Mine	37930303	1/3/2005	Active	IM Completion Report	Slippery Rock Township

Mine Name	Operation	Permit #	Issued Date	Status		Location
Cox Chupka Mine	Surface Mine	10840116	3/9/2007	Active	Active	Oakland Township
Creese Site	Surface Mine	4920101	10/5/1998	Active	Reclamation Complete	Franklin Township
Cross 2 Mine	Surface Mine	37810104	10/26/1981	Active	Surface Mining Permit	Slippery Rock Township
Dallos Mine	Surface Mine	10020104	4/4/2007	Active	CM Annual Bond Calculation	Clay Township
Dambauch Site II Agric Utilization Site	Surface Mine	10020103	na	na	Proposed But Never Materialized	na
Darkowski Mine	Surface Mine	10940101	6/2/2003	Active	CM Annual Bond Calculation	Clay Township
Darmac 12 Mine	Surface Mine	10840122	11/12/1985	Inactive	Reclamation Complete	Summit Township
Darmac 12A Mine	Surface Mine	10850113	10/29/1986	Inactive	Reclamation Complete	Summit Township
Darmac 24 Mine	Surface Mine	10890109	na	Abandoned	Bond Forfeited	NA
Daugherty Mine	Surface Mine	37840106	11/4/2002	Inactive	Reclamation Complete	Perry Township
Davis Mine	Surface Mine	37010102	10/17/2006	Active	Surface Mining Permit	Wayne Township
Drennen Mine	Surface Mine	3078BC19	2/23/1979	Inactive	Reclamation Complete	Center Township
Duncan 2 Mine	Surface Mine	3077SM2	6/10/1977	Inactive	Reclamation Complete	Lancaster Township
Duff Mine	Surface Mine	37820109	7/5/1984	Active	Surface Mining Permit	Shenango Township
Elliott Mine	Surface Mine	10860107	4/6/1987	Inactive	Reclamation Complete	Oakland Township
EP Burr Mine	Surface Mine	1079116	2/24/1982	Inactive	Reclamation Complete	Jackson Township
Fawn 91 CRD Mine	Refuse Disposal	10743701	9/13/2005	Active	Refuse disposal permit	Clinton Township
Fawn 91 Mine	Underground	10841302	12/20/2004	Active	Underground mining permit	Clinton Township
Ferraro Mine	Surface Mine	10060103	pending	Active	Surface mining permit	Clay Township
Fisher Mine	Surface Mine	37980304	1/27/2004	Active	Reclamation Complete	Slippery Rock Township
Fleeger Love Mine	Surface Mine	3076SM30	10/15/1976	Inactive	Reclamation Complete	Concord Township
Flinner Mine	Surface Mine	10800120	4/7/1981	Inactive	Reclamation Complete	Lancaster Township
Fouch Mine	Surface Mine	10813020	6/24/1985	Inactive	Reclamation Complete	Oakland Township
Geibel Mine	Surface Mine	10060807	2/12/2007	Active	Small Surface Mine Permit	Clearfield Township
Guerra Mine	Surface Mine	37850102	na	Inactive	Reclamation Complete	na
Guiher Mine	Surface Mine	10900112	9/23/1997	Inactive	Reclamation Complete	Connoquenessing Township
Hall Mine	Surface Mine	10060101	pending	Active	Surface Mining Permit	Clay Township
Harlan Mine	Surface Mine	37880304	2/13/2006	Active	Reclamation Complete	Slippery Rock Township
Hays Mine	Surface Mine	10970102	10/17/2002	Active	Stage 2 Approved	Oakland Township
Hazen Wash Plt	Mineral Preparation Plant	4841601	6/24/1999	Active	Reclamation Complete	Franklin Township
Hemphill Mine	Surface Mine	10990104	8/15/2006	Active	CM Annual Bond Calculation	Clay Township
Herman Mine	Underground Mine	10971301	10/31/2001	Inactive	Reclamation Complete	Clearfield Township
Hohn Mine	Surface Mine	10930107	9/9/1999	Inactive	Reclamation Complete	Oakland Township
Hooker Tipple	Surface Mine	PA0102032	8/30/1984	Inactive	Reclamation Complete	Concord Township

Mine Name	Operation	Permit #	Issued Date	Status		Location
Humphrey Mine	Surface Mine	1079110	8/20/1979	Inactive	Reclamation Complete	Muddy Creek Township
Hunkele Mine	Surface Mine	10910101	1/12/1998	Inactive	Reclamation Complete	Summit Township
Hutchison Mine	Surface Mine	10890105	12/6/1998	Inactive	Reclamation Complete	Oakland Township
Isacco Mine	Surface Mine	10910107	8/4/2004	Inactive	Reclamation Complete	Center Township
Jeffery Washer Tipple	Mineral Preparation Plant	10831601	6/17/1986	Active	Reclamation Complete	Jackson Township
Kerry 24 Mine	Surface Mine	3077SM28	12/29/1977	Inactive	Reclamation Complete	Lancaster Township
Kerry 30 Mine	Surface Mine	10803005	2/13/1984	Inactive	Reclamation Complete	Connoquenessing Township
Kerry 30 Mine	Surface Mine	10800108	2/13/1984	Inactive	Reclamation Complete	Connoquenessing Township
Kerry 32 Mine	Surface Mine	10800111	10/17/1980	Inactive	Reclamation Complete	Muddy Creek Township
Knauf Mine	Surface Mine	3077SM29	9/23/1977	Inactive	Reclamation Complete	Jackson Township
Knaug 2 Mine	Surface Mine	3070BSM2	8/31/1979	Inactive	Reclamation Complete	Forward Township
Kohlepp Mine	Surface Mine	10840121	9/13/1985	Inactive	Reclamation Complete	Concord Township
Lamperski Mine	Surface Mine	10830115	1/8/1985	Inactive	Reclamation Complete	Forward Township
Lardintown Mine	Surface Mine	10980110	3/13/2006	na	Surface Mining Permit	Clinton Township
Liperote Mine	Surface Mine	10930102	8/4/2000	Inactive	Reclamation Complete	Summit Township
Mack Mine	Surface Mine	10930106	4/4/1998	Inactive	Reclamation Complete	Clay Township
Malinski Mine	Surface Mine	3077SM32	2/2/1978	Inactive	Reclamation Complete	Summit Township
Malis Mine	Surface Mine	10850110	8/31/1998	Inactive	Reclamation Complete	Oakland Township
Mamula Mine	Surface Mine	10920111	3/31/1994	Inactive	Reclamation Complete	Center Township
Maple Lane Farms 29 Mine	Surface Mine	10803003	9/13/1985	Inactive	Reclamation Complete	Connoquenessing Borough
McCarrier Mine	Surface Mine	10040104	5/30/2007	Active	CM Bond Liability Revision	Concord Township
McCrea Mine	Surface Mine	10010811	1/14/2007	Active	Small Surface Mine Permit	Clearfield Township
McMillen Mine	Surface Mine	37020307	12/24/2002	na	Large Surface Mine Permit	Wayne Township
Medusa Wampum Mine	Surface Mine	3779103	1/13/2006	Active	IM Bonding Inc	Shenango Township
Montgomery Mine	Surface Mine	1079109	8/26/1979	Inactive	Reclamation Complete	Muddy Creek Township
Moore Mine	Surface Mine	10010101	11/1/2006	Active	Reclamation Complete	Muddy Creek Township
Myers Mine	Surface Mine	37010301	5/29/2007	Active	Large Surface Mine Permit	Slippery Rock Township
Oak Ridge Villa Mine	na	37050903	pending	Active	Incidental Extraction	Wayne Township
Pennington Mine	Surface Mine	10970103	2/3/2004	Inactive	Reclamation Complete	Oakland Township
Portersville Mine	Surface Mine	10810106	12/15/1981	Inactive	Reclamation Complete	Muddy Creek Township
Portersville Tipple	Surface Mine	PA0125792	8/10/1984	Inactive	Reclamation Complete	Muddy Creek Township
Rader Mine	Surface Mine	37840107	6/5/1985	Inactive	Reclamation Complete	Perry Township
Raducz Mine	Surface Mine	10040301	7/31/2007	Active	Large Surface Mine Permit	Penn Township
Reino Mine	Surface Mine	37850115	3/10/1986	Inactive	Reclamation Complete	Wayne Township
Rhodes Mine	Surface Mine	3173SM10	4/16/1999	Active	Reclamation Complete	Slippery Rock Township

Mine Name	Operation	Permit #	Issued Date	Status		Location
Richland Sportsmens Mine	Surface Mine	10930104	10/31/2000	Inactive	Reclamation Complete	Center Township
Rodis Dayen Mine	Surface Mine	10920112	11/28/2006	na	Surface mining permit	Concord Township
Roudybush Mine	Surface Mine	10860108	3/16/1987	Inactive	Reclamation Complete	Summit Township
Sam Whitmir Mine	Surface Mine	1079119	3/12/1981	Inactive	Reclamation Complete	Oakland Township
Seneca Ldfl	Surface Mine	10000103	na	Active	Active	Jackson Township
Shaffer Mine	Surface Mine	10040102	2/2/2007	Active	Reclamation Complete	Concord Township
Smith Mine	Surface Mine	10980109	6/28/2006	Active	Stage 2 Approved	Muddy Creek Township
Southdown Wampum Mine	Surface Mine	37990302	pending	na	IM Blast Plan Approval	Shenango Township
State Ind 22 Mine	Surface Mine	10970105	12/22/2004	Active	CM Annual Bond Calculation	Concord Township
Stewart Mine	Surface Mine	3076SM32	9/22/1980	Inactive	Reclamation Complete	Concord Township
Trusel Mine	Surface Mine	37020302	8/29/2005	na	Large Surface Mine Permit	Slippery Rock Township
Vandevort Mine	Surface Mine	37820110	9/15/1983	Inactive	Reclamation Complete	Perry Township
Vidic Mine	Surface Mine	3077SM26	1/23/1978	Inactive	Reclamation Complete	Concord Township
Vogel Mine	Surface Mine	10810121	6/9/1982	Inactive	Reclamation Complete	Oakland Township
Waite Mine	Surface Mine	10920106	8/12/2003	Inactive	Reclamation Complete	Clay Township
Walker Mine	Surface Mine	3077SM30	10/7/1977	Inactive	Reclamation Complete	Oakland Township
Watkins Mine	Surface Mine	10810113	10/16/1981	Inactive	Reclamation Complete	Cranberry Township
Wayne Township Mine	Surface Mine	37870301	7/8/2003	Active	Large Surface Mine Permit	Wayne Township
Wayne Twp 2 Mine	Surface Mine	37000302	10/16/2006	Active	Reclamation Complete	Wayne Township
Weingartner Mine	Surface Mine	37050101	9/19/2007	Active	Proposed Awaiting Auth Decision	Wayne Township
Welsh Mine	Surface Mine	37050101	pending	Inactive	Reclamation Complete	Wayne Township
Welsh Mine	Surface Mine	37020105	3/20/2007	Active	Active	Wayne Township
West Pgh Mine	Surface Mine	37950303	5/15/2007	Active	Large Surface Mine Permit	Shenango Township
West Pittsburgh Mine	Surface Mine	37060104	pending	na	Surface Mining Permit	Shenango Township
Wilson Mine	Surface Mine	37930302	12/23/2004	Active	Reclamation Complete	Slippery Rock Township
Whitmire Mine	Surface Mine	3077SM15	3/1/1979	Inactive	Reclamation Complete	Oakland Township
Williams Mine	Surface Mine	10900106	na	Abandoned	Bond Forfeited	na
Windhorst Mine	Surface Mine	37920105	3/10/1999	Inactive	Reclamation Complete	Perry Township
Wise Mine	Surface Mine	10810102	10/23/1981	Inactive	Reclamation Complete	Muddy Creek Township
Wittman Mine	Surface Mine	10950102	8/24/2001	Inactive	Reclamation Complete	Lancaster Township
Wright Mine	Surface Mine	10950103	6/13/2006	Active	CM Annual Bond Calculation	Concord Township
Wright Strip	Surface Mine	4920102	7/12/1999	Active	Reclamation Complete	New Sewickley Township
Wthers Mine	Surface Mine	37970302	2/13/2007	na	Large Surface Mine Permit	Slippery Rock Township
Yalentu Mine	Surface Mine	3077SM11	4/8/1977	Inactive	Reclamation Complete	Oakland Township
Yvorra Mine	Surface Mine	37810110	2/4/1982	Inactive	Reclamation Complete	Perry Township

APPENDIX F. RESOURCE CONSERVATION AND RECOVERY ACT

Site	Permit	Type	City	State
Allegheny County				
Applied Concepts Incorporated.	PAR000005090	SQG	Warrendale	PA
Applied Concepts Incorporated.	PAR000035204	Not in a universe	Warrendale	PA
Atlanta Northern & Wire	PAD987284486	SQG	Warrendale	PA
Chemlawn Corp.	PAD092801992	Not in a universe	Warrendale	PA
Contract Applications Warrendale Plant	PAD982364192	Not in a universe	Warrendale	PA
Cranberry Manufacturing.	PAD124837881	CESQG	Warrendale	PA
Dowty Corp.	PAD051750990	SQG	Warrendale	PA
Doyle Equipment Company.	PAD107330789	SQG	Warrendale	PA
Emeryville Trucking Company.	PAD048193981	SQG	Warrendale	PA
Exxon Gas #27173	PAD987330834	CESQG	Warrendale	PA
Gatan Incorporated	PAR000006858	CESQG	Warrendale	PA
Hauhinco Trading	PAD982577223	SQG	Warrendale	PA
Herion Incorporated.	PAD088902564	CESQG	Warrendale	PA
John B Lombardos Complete Collision Incorporated	PA0000971622	CESQG	Warrendale	PA
Killam Associates DLA Division	PAD987356185	CESQG	Warrendale	PA
LECO Corp.	PAD074989393	Not in a universe	Warrendale	PA
Magee	PAR000020495	SQG	Warrendale	PA
Microbac Labs Incorporated.Pittsburgh Div.	PAD987322237	SQG	Warrendale	PA
Mitchell's Amoco	PAD987377686	SQG	Warrendale	PA
Owl Cleaners	PAR000035394	SQG	Warrendale	PA
Pittsburgh Tribune Review Newsworks	PAR000032417	SQG	Warrendale	PA
PPG Industries Incorporated.	PAR000020081	SQG	Warrendale	PA
Precision Auto Works	PAR000022343	CESQG	Warrendale	PA
Precision Auto Works	PAD982661845	SQG		PA
Retail Control Systems Incorporated.	PAD074979873	CESQG	Warrendale	PA
Shaner Autobody	PA0000909788	CESQG	Warrendale	PA
Sunoco Warrendale Plaza 0374 6526	PAD987400017	CESQG	Warrendale	PA
Team Rahal of Warrendale	PAR000526731	SQG	Wexford	PA
Thornhill Printing Incorporated.	PAD987269883	SQG	Warrendale	PA
Tosco 2634218 76 Gas Station	PAR000011148	SQG	Warrendale	PA
US Filter Incorporated. Warrendale PA	PAD981739188	SQG	Warrendale	PA
US Postal Service Warrendale Maint. Facility	PA6180090072	CESQG	Warrendale	PA
Warrendale Fac.	PAD072164858	LQQ	Warrendale	PA

Site	Permit	Type	City	State
Beaver County				
Rhodes Transit Freedom Depot	PAD987336518	SQG	Freedom	PA
Butler County				
A 1 Cleaners	PAD981733017	SQG	Butler	PA
Advanced Polymer Technology	PAD175522911	SQG Reporter	Harmony	PA
Air Turbine Propeller	PAR000510339	SQG	Zelienople	PA
Aircode Industries. Gases Manufacturing	PAD004375598	SQG	Butler	PA
AK Steel - Butler Works	PAD000736934	LQG Reporter	Butler	PA
Allegheny Axle	PAD987292950	CESQG	Butler	PA
Allegheny Metalworking	PAD987391356	SQG	Cranberry Township	PA
Allegheny Power Butler Service Center	PAD987381845	CESQG	Butler	PA
Allegheny Printed Plastics	PAR000009357	CESQG	Cranberry Township	PA
Amer Glass Research	PAD004375531	CESQG	Butler	PA
American Planting Company	PAD990752099	Not in a universe	Zelienople	PA
Ames Department Store	PAD987324100	CESQG	Butler	PA
Anderson Mavor USA Limited	PAD074995853	Not in a universe	Evans City	PA
Applied Test	PAD987346681	SQG	Butler	PA
Ashland Branded Marketing, Incorporated. 996	PAP000004501	Not in a universe	Harmony	PA
AT&T Butler	PAD980555635	SQG	Butler	PA
B & T Auto Repair	PAD086209632	SQG	Butler	PA
Baglier Buick GMC	PAD054826540	SQG	Butler	PA
Baldauf Auto Body	PAD982580144	SQG	Lyndora	PA
Barnes PCP Incorporated	PAD074971565	Not in a universe	East Butler	PA
Barnsteel Abrasives	PAD987337003	SQG	Butler	PA
Bartolis Cleaner Service	PAD013912738	SQG	Butler	PA
BASF Evans City Plant	PAR000509117	LQG	Evans City	PA
Basilon Cleaners	PAD123801201	SQG	Butler	PA
Basilon Dry Cleaners	PAD014361067	SQG	Mars	PA
Beahm and Son Limited	PA0000104943	CESQG	Evans City	PA
Beckwith Machinery Company	PA0000935262	SQG	Cranberry Township	PA
Bell Telephone Company of Pennsylvania	PAD000779876	Not in a universe	Zelienople	PA
Berry Metal Manufacturing	PAD004319992	Not in a universe	Harmony	PA
Bessemer & Lake Erie Railroad Company	PAD981105562	CESQG	Butler	PA
BFS Butler	PAD981934284	SQG	Butler	PA
Biedenbach Auto Body	PA0000899732	CESQG	Butler	PA
Billco Manufacturing	PAD004372371	SQG	Zelienople	PA

Site	Permit	Type	City	State
Butler County (continued)				
Billco Manufacturing Incorporated Plt 2	PAR000036004	SQG	Zelienople	PA
Bio Pace Technology	PAD982680431	SQG	Butler	PA
Bitter Auto Body	PA0000451997	CESQG	Butler	PA
Black Cat Industries	PAR000034272	CESQG	Cranberry Township	PA
Bobcat of Pittsburgh	PA0000601708	SQG	Cranberry	PA
BOC Gases	PAD981946239	SQG	Butler	PA
Booth, J.B. & Company Incorporated	PAR000019315	CESQG	Zelienople	PA
Borlands Auto Repair	PAR000043653	SQG	Mars	PA
BP Facility # 79557	PAR000511196	SQG	Cranberry Township	PA
BP Lubricants USA	PAD982700783	CESQG	Zelienople	PA
BP Oil 07049	PAD981934342	SQG	Butler	PA
BP Oil 07253	PAD981934441	SQG	Zelienople	PA
BP Oil 07365	PAD981934466	SQG	Butler	PA
BP Oil 79557	PAD981933492	SQG	Cranberry Township	PA
Brush Creek Treat Plant Sludge Farm	PAD000797803	Not in a universe	Zelienople	PA
Brush Creek Treatment Plant	PAD000779926	Not in a universe	Zelienople	PA
Buffalo and Pgh RR Butler	PAD982676280	SQG	Butler	PA
Burgh Charles F M	PAD990752446	Not in a universe	Harmony	PA
Burkerts, Jim Paint Shop	PAD982567745	SQG	Harmony	PA
Burt Hill Architects	PAD987356706	CESQG	Butler	PA
Butler American Sales	PAD013913272	SQG	Butler	PA
Butler Area Sewer Authority	PAD068718923	Not in a universe	Butler	PA
Butler Auto Auction	PAD987323961	SQG	Evans City	PA
Butler County Vocational Technology School	PAD124822685	SQG Reporter	Butler	PA
Butler Cnty Comm College	PAD030085690	SQG	Butler	PA
Butler Color Press	PAD037245370		Butler	PA
Butler Forge and Metal Works	PAD987341773	CESQG	East Butler	PA
Butler Mem Hospital	PAD068718253	SQG	Butler	PA
Butler U.S. Army Reserves Center	PA9210021565	CESQG	Butler	PA
Butler VA Med Center	PA9360007281	SQG	Butler	PA
Butler Winding Company	PAR000039867	Not in a universe	Butler	PA
C & M Chemicals Incorporated	PAD096339411	Unspecified	Portersville	PA
Cammisas Auto Body	PAD987329240	CESQG	Butler	PA
Cannon USA Cranberry Twp	PAD982567141	CESQG	Cranberry Township	PA
Cannon USA Incorporated	PAD987380672	SQG	Zelienople	PA
Capitol Cleaners	PAD013913413	SQG	Butler	PA
Cartwright and Lollo	PAD005001219	Transporter	Callery	PA
Castle Rubber Manufacturing	PAD059079533	SQG	East Butler	PA
CCC Truck Parts Company	PAR000020875	SQG	Zelienople	PA

Site	Permit	Type	City	State
Butler County (continued)				
Checkers 1 Hour Cleaners	PAD982661142	SQG	Mars	PA
Chuck Smith Ford	PAD987381639	CESQG	Zelienople	PA
Churchill Truck Lines	PAD987357753	CESQG	Mars	PA
City Auto Repair	PAD982575912	CESQG	Butler	PA
Classic Automotive Incorporated	PAR000508689	CESQG	Mars	PA
Classic Cleaner Cranberry Service	PAD982575516	SQG	Cranberry Township	PA
Cloverleaf Group Incorporated The DBA IDL Merchan	PAR000527085	LQG	East Butler	PA
Cochran Dave Auto Body	PAR000026716	CESQG	Butler	PA
Cochran Dave Auto Body	PAD016017220	Not in a universe	Butler	PA
Cochran Motors	PAD982661993	SQG	Butler	PA
Concast Metal Prod	PAD000765651	Reporter LQG	Mars	PA
Costco Wholesale 328	PAR000503169	SQG	Cranberry Township	PA
Cranberry Lincoln Mercury	PAD982576191	CESQG	Evans City	PA
Cranberry Lincoln-Mercury Inc	PAD982567000	SQG	Evans City	PA
Cue	PAD987389087	SQG	Cranberry Township	PA
Cygnus Manufacturing Company	PAR000508382	CESQG	Saxonburg	PA
Cygnus Manufacturing Company	PAR000509059	CESQG	Saxonburg	PA
Datt, John Auto Body	PAD982580003	SQG	Valencia	PA
DNM Autos Truck Service	PA0000847970	CESQG	Valencia	PA
Dubrook Incorporated	PAR000024091	SQG	Butler	PA
E S M Incorporated	PAD980918239	Not in a universe	Mars	PA
E S M Incorporated	PAD004378261	Not in a universe	Valencia	PA
E S M Incorporated	PAD004378832	Not in a universe	Mars	PA
Eagle Printery	PAR000524348	CESQG	Butler	PA
Eagle Printing Prod Center	PAR000510040	SQG	Butler	PA
Empire Speciality	PAD987332459	CESQG	Mars	PA
EPH Material Handling	PA0000076133	Not in a universe	Mars	PA
Ervin Industries	PAD074997677	Reporter SQG	Butler	PA
ESM Group Incorporated Myoma Plant	PAR000506907	CESQG	Mars	PA
Etzels Auto Body	PAD987394418	CESQG	Butler	PA
FB Leopold Manufacturing Zelienople	PAD982568925	SQG	Zelienople	PA
FBC Chem Manufacturing	PAD053160297	SQG	Mars	PA
Federal Express Corporation BFDA	PAD987365251	CESQG	Mars	PA
Fed Ex	PAD987326691	SQG	Zelienople	PA
Fender Benders Collision	PAR000002691	CESQG	Valencia	PA
Ferroslag	PAD000800474	Not in a universe	Butler	PA

Site	Permit	Type	City	State
Butler County (continued)				
Filmtronics	PAR000034181	Reporter LQG	Butler	PA
Fireforce	PA0000452029	CESQG	Mars	PA
Fireforce Incorporated	PA0000969477	Not in a universe	Butler	PA
Fishers Cleaners & Tuxedos/Butler	PAD981738701	Not in a universe	Butler	PA
Fishers Cleaners & Tuxedos	PAR000030981	CESQG	Butler	PA
GA Industries	PA0000088336	CESQG	Mars	PA
Geithers, Pete Auto Service	PAD013915046	SQG	Butler	PA
Giant Eagle No 640	PAR000042135	CESQG	Butler	PA
Greenwood Fire Station	PAD987395449	CESQG	Butler	PA
Guttendorf Press, The	PAD065614968	SQG	Zelienople	PA
Halstead Industriess Incorporated	PAD004335519	Not in a universe	Zelienople	PA
Harland, John H Co-Plant Number 44	PAD981945751	SQG	Mars	PA
Harmony Cleaners	PAD981105331	SQG	Harmony	PA
Harmony Industries Chrome Plating	PAD980828727	CESQG	Harmony	PA
Harmony Truck Repair	PAD987281375	SQG	Harmony	PA
Hauhinco	PAR000042507	CESQG	Evans City	PA
Heckett Plant #01	PAD981733405	SQG	Butler	PA
Herman Corporation	PAD981739980	SQG	Zelienople	PA
Herman Corporation	PAD004322608	Not in a universe	Zelienople	PA
Herr Voss Mars Division	PAD987285830	SQG	Mars	PA
Herr Voss Manufacturing	PAD052196375	SQG	Callery	PA
High Meadows Sewage Treatment Plant	PAD000797910	Not in a universe	Renfrew	PA
Highway Equipment Company	PAD981734106	SQG	Zelienople	PA
HJ Schhneider Construction	PAD987283272	SQG	Evans City	PA
Hoffman Auto Parts	PAD987285939	SQG	Butler	PA
Honeywell Alta Group Zelienople Building	PAR000501585	SQG	Zelienople	PA
Horizon Environmental Solutions Corporation	PAR000526814	Not in a universe	Cranberry Twp.	PA
Horizon Environmental Services Incorporated	PAR000507178	CESQG	Cranberry Twp.	PA
House of Kraus Incorporated, The	PAD004395539	Not in a universe	Butler	PA
Hunters Truck Center	PAD123746430	SQG	Butler	PA
Hunters Truck Sales	PAD981731706	CESQG	Butler	PA
Hutchinson Dry Cleaners	PAD981733439	SQG	Butler	PA
Hy Manufacturing Metals Manufacturing	PAD987328408	CESQG	Mars	PA
IA Const Zelienople Batch Plant	PAD981044480	Used Oil	Evans City	PA
Industrial Machine Incorporated	PAD043745553	Not in a universe	Zelienople	PA

Site	Permit	Type	City	State
Butler County (continued)				
International Machine	PAD981733157	SQG	Butler	PA
ISM Fastening System	PAD004327466	Reporter LQG	Butler	PA
J K Hydraulics Incorporated	PAR000030866	SQG	Butler	PA
J K Hydraulics Incorporated	PAR000020842	SQG	Butler	PA
Jack and Jill Dry Cleaners	PA0000368324	SQG	Mars	PA
James Austin Manufacturing	PAD004340923	CESQG	Mars	PA
JDL Leasing	PAD987379237	Not in a universe	Zelienople	PA
Jiffy Lube	PAD987357811	SQG	Butler	PA
Jims Auto Body	PAR000002709	CESQG	Butler	PA
Jims Auto Body	PAD987378981	CESQG	Zelienople	PA
Joesph J Brunner Incorporated Brunner Landfill	PAD007824766	Transporter	Zelienople	PA
Judson, Jim	PAD982572448	SQG	Butler	PA
Kasing Auto Sales Incorporated	PAD982570319	CESQG	Harmony	PA
Kelly Cadillac Chevrolet	PAD013915277	SQG	Butler	PA
Kenny Ross Chervolet	PAD987356896	SQG Transporter	Zelienople	PA
Kent Addams Auto	PAD987392180	CESQG	Harmony	PA
Keystone Alum Manufacturing	PAD080635311	Not in a universe	Mars	PA
Kozminski Auto Body	PAD987285954	SQG	Mars	PA
Kwik Fill S10	PAD987337375	SQG	Zelienople	PA
Kwik Fill S13	PAD987283090	SQG	Butler	PA
Kwik Fill S14	PAD987283058	SQG	Evans City	PA
Kwik Fill S61	PAD987337490	SQG	Prospect	PA
Kwik Fill S68	PAD987337474	SQG	Evans City	PA
Laidlaw Transit Prospect	PAR000017210	CESQG	Prospect	PA
Lancy International Incorporated	PAD101613719	SQG	Zelienople	PA
Langer Jeep Renault	PAD014977987	SQG	Evans City	PA
Larrys Auto	PA0000451930	Not in a universe	Mars	PA
Lasalle Dry Cleaner Service	PAD981734981	CESQG	Cranberry Twp.	PA
LB Smith	PAD981935406	SQG	Evans City	PA
Leasway	PAD981732258	SQG	East Butler	PA
Lectromat Manufacturing	PAD068719616	SQG	Mars	PA
Lennons Auto Body	PAR000001354	CESQG	Valencia	PA
Leopold F B Company	PAD123786097	SQG	Zelienople	PA
Leopold F B Company	PAD981936933	SQG	Harmony	PA
Lowes Home Ctrs No 0165	PAR000032870	SQG	Butler	PA
Main Steel Polishing	PAR000035378	SQG	Harmony	PA
Marmon Keystone	PAD063745756	SQG	East Butler	PA
Mars Mineral Corporation	PAT440012235	Not in a universe	Saxonburg	PA
Mashuda	PAD074993320	SQG	Evans City	PA
McDonald Mtr Incorporated	PAD013915863	SQG	Butler	PA
Meco Belts	PAR000020602	SQG	Zelienople	PA

Site	Permit	Type	City	State
Butler County (continued)				
Metalized Ceramics for Electronics Incorporated	PAR000040006	Not in a universe	East Butler	PA
Metro Dry Cleaner	PAD987284478	SQG	Cranberry Twp.	PA
Metscan Incorporated C/O Thomas Kane	PAD982679912	Not in a universe	Evans City	PA
MHF Incorporated	PAR000000281	Transporter	Zelienople	PA
MHF Logistical Solutions	PAR000505123	LQG Transporter Used Oil	Cranberry Twp.	PA
MHF Logistical Solutions Incorporated	PAR000036889	Transporter	Zelienople	PA
Midway Auto Body	PAD987351525 PAD987391828	CESQG CESQG	Valencia	PA
Mikan Pontiac	PAD047209986	SQG	Butler	PA
Mike Milech	PAD013916135	Not in a universe	Butler	PA
Mike's Collision	PAD987387776	CESQG	Zelienople	PA
Mike's Collision Repair	PAD162619712	Not in a universe	Harmony	PA
Miller Screen & Design	PAD043741511	SQG	Mars	PA
Milliken Automotive Service	PAD045282258	SQG	Butler	PA
Mine Safety Appliances	PAD981036551	Reporter LQG	Cranberry Twp.	PA
Mine Safety Appliances-Evans City Plant	PAD004322913	Reporter LQG TSD	Evans City	PA
Minuteman Press	PAR000024463	CESQG	Butler	PA
Modern Transportation Services	PAD981938038	Transporter	Zelienople	PA
Monro Muffler Brake 81	PAD982576977	SQG	Butler	PA
Montgomery Ward & Company	PAD987373164	Not in a universe	Butler	PA
Motor Express Incorporated	PAD044314474	Not in a universe	Zelienople	PA
Multiserv Plus Plant 16	PAD981113087	SQG	Butler	PA
Muscle Prod Butler	PAR000507301	CESQG	Butler	PA
Muska Auto	PA0000031336	CESQG	Mars	PA
Myers Trucking	PAD052190766	Transporter	Harmony	PA
Napco Valencia Plant	PAD004319802	Reporter LQG	Valencia	PA
Nationwide Insurance	PAD987342482	CESQG	Butler	PA
Neighborhood Cleaners, The	PAR000036533	CESQG	Cranberry Twp.	PA
Nick's Body Shop	PAD982579740	SQG	Lyndora	PA
Norsub Incorporated	PAD098434574	Transporter	Evans City	PA
North Star Pontiac	PAR000526889	SQG	Zelienople	PA
Oesterlings Sandblasting	PAR000021253	SQG	Butler	PA
Oesterlings Sandblasting & Painting	PAD982674798	SQG	Butler	PA
Overland Transport Systems	PAR000011890	Not in a universe	Zelienople	PA

Site	Permit	Type	City	State
Butler County (continued)				
PA Bureau of Narcotics Invest-Zelienople	PAD982695470	SQG	Zelienople	PA
PA DOT Butler Cnty Maintenance Building	PAD981731839	SQG	Butler	PA
PA Nat Guard Maintenance Shop	PA5211890038	SQG	Butler	PA
Paul's Chrome Plating Evans City	PAR000037275	LQG	Evans City	PA
Paul's Chrome Plating Mars	PAD094212081	Reporter Not in a universe	Mars	PA
Pelushi, Joseph A Scrap	PAD982578544	SQG Transporter	Unionville	PA
Pelushi, Joseph A Scrap	PAD013916671	Not in a universe	Butler	PA
Penn Champ	PAD058569740	Reporter Not in a universe	East Butler	PA
Penn Cleaners	PAD013912381	SQG	Butler	PA
Penn Power Cranberry Service Center	PAR000522805	CESQG	Zelienople	PA
Penn Vacusonics	PAR000034967	CESQG	Butler	PA
Penna Flame Industries Incorporated	PAR000019281	Not in a universe	Zelienople	PA
PENNDOT SR 0079 at Exit 26 N.	PAD987270980	Not in a universe	Zelienople	PA
Pennsylvania Recovery Corp	PAD058106626	Not in a universe	Mars	PA
Pennzoil Company	PAD063745020	Not in a universe	Butler	PA
Perry Forge Butler Plant	PAD004346219	Not in a universe	Zelienople	PA
Pierrel, Joe Auto	PAD118304716	SQG	Butler	PA
Pindroh Brothers Incorporated	PAD097122675	SQG	Evans City	PA
Precision Automotive	PAD982701328	SQG	Butler	PA
Preston Auto Group	PAD116020157	SQG	Butler	PA
Print King	PAR000526947	CESQG	Cranberry Twp.	PA
Pro One Auto	PAR000010413	CESQG	Butler	PA
Pullman Standard Building	PAD004317343	Not in a universe	Butler	PA
Pulva Manufacturing	PAD987285186	SQG	Valencia	PA
R & K Auto Sales	PAR000008250	CESQG	Zelienople	PA
R & K Specialties	PAR000038364	CESQG	Valencia	PA
Ralph's Auto Body	PAD166563080	SQG	Butler	PA
Refiners Transportation & Term	PAD084599448	CESQG	East Butler	PA
Resolite Division of Stabilit Amer	PAD004496816	Reporter Not in a universe	Zelienople	PA
Ritter Engineering	PAD987267457	SQG	Zelienople	PA
Robert Neff Incorporated	PAD987346442	SQG	Mars	PA
Robinson Industrial	PAD987332996	CESQG	Zelienople	PA
Rod's Auto Body	PAD987282738	CESQG	Renfrew	PA
Rome Metals Incorporated	PAD987372067	SQG	Zelienople	PA
Rood Trucking	PA0000780056	CESQG	Evans City	PA

Site	Permit	Type	City	State
Butler County (continued)				
S & W Wire	PAD987379476	CESQG	Zelienople	PA
Sam's Club 4859	PAR000512079	CESQG	Butler	PA
Sapienzas Service	PA0000786574	CESQG	Harmony	PA
Schaffner Printing	PAD004399036	CESQG	Butler	PA
Sears	PA0000045427	CESQG	Butler	PA
Servistar	PAD987285541	Not in a universe	East Butler	PA
Sheetz 217	PAR000507889	SQG	Butler	PA
Sheetz 250	PAR000524751	SQG	Butler	PA
Sheetz 335	PAR000525253	SQG	Butler	PA
Sheetz 133	PAR000526244	SQG	Mars	PA
Sherwin Williams Company, The	PAD982578858	CESQG	Butler	PA
Sherwin Williams Company, The	PAD987328309	SQG	Butler	PA
Sherwin Williams Company, The	PAD074958869	Not in a universe	Butler	PA
Simpson Buick Chevrolet	PAD015164049	SQG	Zelienople	PA
Sir Speedy Printers Manufacturing	PAR000010355	CESQG	Butler	PA
Sohio Oil Company (Site #57284)	PAD981934409	SQG	Butler	PA
Sorg Engineering Company Incorporated	PAD070460415	Not in a universe	Butler	PA
Spang Industriess Incorporated Magnetics Division	PAD004340949	Not in a universe	East Butler	PA
Spang Magnetics Division	PAD004334694	Not in a universe	East Butler	PA
	PAD980715742	Reporter		
		LQG		
Speedway Superamer	PAR000038018	SQG	Butler	PA
Steinheiser Propane	PAD123801094	SQG	Butler	PA
Stengles Auto Body	PAD987283959	SQG	Zelienople	PA
Stirling Village L & G	PAR000008268	CESQG	Butler	PA
Strutz Fabricators Incorporated	PAD990703472	Not in a universe	Mars	PA
Student Transportation of Amer	PA0000082594	CESQG	Prospect	PA
Sunoco 0323 6783	PAR000502815	CESQG	Seven Springs	PA
Sunoco 0363 4995	PAD987340437	CESQG	Butler	PA
Sunoco 0364 0968	PAD982676793	CESQG	Butler	PA
Sunoco 0364 1008	PAD982676736	SQG	Mars	PA
Sunoco Service Station	PAD000774430	Not in a universe	Butler	PA
Sunoco Service Station	PAD000774406	Not in a universe	Butler	PA
Sunoco Service Station	PAD000754127	Not in a universe	Mars	PA
Sunoco Service Station	PAD000774414	Not in a universe	Butler	PA
Sunoco Service Station	PAD000774422	Not in a universe	Butler	PA
Sunoco Service Station	PAD000754259	CESQG	Mars	PA
Sunoco Service Station	PAD000775510	Not in a universe	Zelienople	PA
Superamer 5208	PA0000140376	CESQG	Butler	PA
Tee Pee Cleaners	PAD982675118	SQG	Mars	PA
The Home Depot #4135	PAR000043703	CESQG	Cranberry Twp.	PA

Site	Permit	Type	City	State
Butler County (continued)				
The Home Depot #4139	PAR000043679	CESQG	Butler	PA
The Warrendale Plating Company Incorporated	PAD004386629	Unspecified	Mars	PA
Tool-o-Matic Incorporated	PAD004357414	Not in a universe	Zelienople	PA
Tosco 2634215 76 Gas Station	PAR000011072	SQG	Cranberry Twp.	PA
Traco Aluminum Window Manufacturing	PAD004396610	Reporter LQG	Cranberry Twp.	PA
Transaxle	PAR000004044	SQG	Zelienople	PA
Triangle Gasoline	PAD987364825	SQG	Butler	PA
Trinity Industries	PAD981043318	Not in a universe	Butler	PA
Tru Green Corporation	PAD981732985	SQG	Mars	PA
Turnpike Toyota	PAD987346491	SQG Reporter	Mars	PA
TW Phillips Gas & Oil	PAD987359023	SQG	Butler	PA
Tyco Healthcare Retail Group	PAD068722834	SQG	Harmony	PA
U S X Corp. Homesteak Works	PAD000731364	Not in a universe	Saxonburg	PA
Ultra Pure Technologies	PAD987279056	SQG	Mars	PA
Universal Manufacturing	PAD004341079	SQG	Zelienople	PA
Universal Motor Sales of Butler	PAD059080622	SQG	Butler	PA
UPS Butler Distribution Center	PAD987358728	CESQG	Butler	PA
US Waste Hauler Company	PAD008936866	Transporter	Zelienople	PA
Vesuvius USA	PAD004329124	Not in a universe	Zelienople	PA
Viking Spirit Trailers Manufacturing	PAR000010405	CESQG	Renfrew	PA
Vogel Disposal Service Incorporated	PAD005820691	TSD	Zelienople	PA
Wack Engineering	PAD987390127	SQG	Harmony	PA
Wagner Printing Manufacturing	PA0000199711	CESQG	Butler	PA
Wal Mart Supercenter 1885	PAR000506790	CESQG	Butler	PA
Wal Mart Supercenter 1885	PAR000502195	CESQG	Butler	PA
Wal Mart Stores Incorporated	PAR000038455 PAR000502104	CESQG CESQG	Cranberry Twp.	PA
Warrenty Parts	PAD101583128	SQG	Valencia	PA
Waterbec Auto Body	PA0000131714	CESQG	Butler	PA
Weaverling Printing	PAR000030973	CESQG	Cranberry Twp.	PA
Weaverling Printing Company	PAR000017558	CESQG	Cranberry Twp.	PA
Wise Business Forms Incorporated	PAR000032128	CESQG	Butler	PA
Wise Business Forms Incorporated	PAD051131779	Not in a universe	Butler	PA
Wise Machine Company	PA0000008490	SQG	Butler	PA
Woodings Industries	PAD045294147	Not in a universe	Mars	PA
Woodward Industries	PAD004378139	CESQG	Mars	PA
Wroblewski Gulf	PAR000509042	SQG	Zelienople	PA
Yoder Pontiac & Oldsmobile	PA0000018754	SQG	Zelienople	PA

Site	Permit	Type	City	State
Butler County (continued)				
Zimmerman's Service	PAD981739451	SQG	Valencia	PA
Lawrence County				
AEP Ellwood City	PAD987400504	CESQG	Ellwood City	PA
Amer Steel	PAD004341095	Not in a universe	Ellwood City	PA
Columbia Gas Ellwood City Comp Station	PAD987397825	SQG	Ellwood City	PA
Columbia Gas of PA Ellwood City	PA0001016880	SQG	Ellwood City	PA
	PAR000505263	SQG		
Commercial Machine Works/ALCO Standard	PAD010448108	SQG	Ellwood City	PA
Ellwood City Borough Wastewater Treatment Plant	PAD074959305	Not in a universe	Ellwood City	PA
Ellwood City Forge	PAD982680555	CESQG	Ellwood City	PA
Ellwood City Heat Treating Company. InCompanyrporated.	PAD119118875	Not in a universe	Ellwood City	PA
Ellwood City Hospital	PAD068743772	SQG	Ellwood City	PA
Ellwood City Iron & Wire	PAD987271434	LQG	Ellwood City	PA
Ellwood Laundry Service	PAD014065916	SQG	Ellwood City	PA
ETSS Incorporated.	PAR000023309	Not in a universe	Ellwood City	PA
H & H Gen Tire	PAR000008243	CESQG	Ellwood City	PA
Hall Industries Incorporated.	PAD147306328	SQG	Ellwood City	PA
INMETCO Manufacturing	PAD087561015	Reporter	Ellwood City	PA
		LQG		
		TSD		
Kwik Fill S0028 280	PAD987337334	SQG	Ellwood City	PA
Laidlaw Transit Incorporated.	PAR000042960	CESQG	Ellwood City	PA
Legend Buick Pontiac	PAD987384351	CESQG	Ellwood City	PA
MSL Industries Incorporated.-Garrett Division	PAD001747500	LQG	Ellwood City	PA
McElwain Chevrolet Oldsmobile	PAD982571473	SQG	Ellwood City	PA
Mill Tex Industries	PA0000144105	SQG	Ellwood City	PA
Myers Chemical Transport	PAD041255175	SQG	Ellwood City	PA
		Transporter		
Nino's One Hour Martinizing	PAD014066872	SQG	Ellwood City	PA
ONDEO NALCO South Plant	PAD000651992	Reporter	Ellwood City	PA
		LQG		
		Used Oil		
P & L Machine Company	PAD990827354	Not in a universe	Ellwood City	PA
Paul's Auto Body	PA0000561936	CESQG	Ellwood City	PA
Pecoraro-Freeman Buick-Pontiac Incorporated.	PAD153749676	SQG	Ellwood City	PA
Ralph Viccari S 1 Hour Cleaners	PAD987367984	SQG	Ellwood City	PA
Richard A Barnes DMD	PAR000030015	CESQG	Ellwood City	PA

Site	Permit	Type	City	State
Lawrence County (continued)				
Sherwin-Williams Co.	PAD000739482	Not in a universe	Ellwood City	PA
Sli Lighting	PAD987279619	Reporter Not in a universe	Ellwood City	PA
Solomon's Dry Cleaning	PAD014067342	SQG	Ellwood City	PA
STM	PAD987401015	SQG	Ellwood City	PA
Sunoco Service Station	PAD000759050	Not in a universe	Ellwood City	PA
Sunoco Service Station-Ellwood City	PAD000759027	Not in a universe	Ellwood City	PA
Sunoco Service Station-Ellwood City	PAD000759035	Not in a universe	Ellwood City	PA
Sunoco Service Station-Ellwood City	PAD000759043	Not in a universe	Ellwood City	PA
Tic Toc Food Mart 108	PAD987327764	SQG	Ellwood City	PA
Townsend Textron Manufacturing.	PAD004340394	TSD	Ellwood City	PA
Universal Machine & Valve Corp.	PAD056882814	Not in a universe	Ellwood City	PA
US Liquids	PAD987270154	Transporter	Ellwood City	PA
Walt Ziegler Auto Body Shop	PA0000791491	CESQG	Ellwood City	PA
Whiting Dry Cleaner & Laundry Service.	PAD072175060	CESQG	Ellwood City	PA

APPENDIX G. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS

Site/Facility Name	Permit #	Permit Type	Issue Date	Expire Date	City	Municipality
Allegheny County						
Luthultz, Robert	PAG046304	State Issued	1/15/2005	2/4/2009	Wexford	Marshall Township
Timbercreek Farms Homeowners Association	PA0205249	State Issued	12/6/2005	12/31/2010	Warrendale	Marshall Township
US Postal Service	PAR806152	State Issued	8/31/2005	8/31/2010	Warrendale	Marshall Township
Beaver County						
New Sewickley Township	PA0098914	State Issued	1/12/2006	1/31/2011	Rochester	New Sewickley Township
Penna Flame Industry	PA0004685	State Issued	4/6/2006	4/30/2011	Zelienople	Franklin Township
Safran, Greg	PAG046180	State Issued	4/12/2004	2/4/2009	Fombell	Franklin Township
Schweiger, Rani	PAG046185	State Issued	7/19/2004	2/4/2009	Fombell	Franklin Township
Smithwand Mobile Home Park Sewage Treatment Plant	PA0098060	State Issued	11/12/2003	11/12/2008	Fombell	Franklin Township
Sunoco Incorporated	PA0028011	State Issued	8/25/2003	8/25/2008	Rochester	New Sewickley Township
Wright, Dale & Elaine	PA0218456	State Issued	8/31/2005	8/31/2010	New Brighton	New Sewickley Township
Wright, Dean	PAG046322	State Issued	5/22/2006	2/4/2009	Harmony	Franklin Township
Camp Kon O Kwee Spencer	PA0217824	State Issued	3/11/2003	3/11/2008	Fombell	Marion Township
Butler County						
Three Rivers Ice Cream Service	PA0239186	State Issued	7/31/2003	7/30/2008	Evans City	Forward Township
A Cubed Corporation	PA0002216	State Issued	6/9/2004	6/8/2009	Mars	Adams Township
Abbey Woods Homeowners Association	PA0221325	State Issued	9/23/2004	9/22/2009	Zelienople	Jackson Township
Air Products & Chemicals, Incorporated	PAR238301	State Issued	12/17/2002	12/16/2007	Lyndora	Butler Township

Site/Facility Name	Permit #	Permit Type	Issue Date	Expire Date	City	Municipality
Butler County (continued)						
Albanowski, Albert	PAG048574	State Issued	6/29/2004	2/4/2009	Evans City	Jackson Township
Barnhart, Ralph	PAG048900	State Issued	7/18/2003	7/17/2008	Butler	Summit Township
Baxter Mobile Home Park	PA0102580	State Issued	5/17/2006	5/16/2011	Butler	Center Township
Bergbigler, James	PAG049211	State Issued	11/21/2005	2/4/2009	Butler	Oakland Township
Berry Metal Manufacturing	PAR208303	State Issued	1/28/2003	1/27/2008	Harmony	Jackson Township
Blank, Michael	PAG048882	State Issued	4/7/2003	4/6/2008	Evans City	Adams Township
Boyda, Theodore	PAG048386	State Issued	6/13/2006	2/4/2009	Renfrew	Penn Township
Brush Creek Water Pollution Control Facility	PA0024571	State Issued	11/15/2004	11/14/2009	Cranberry Township	Cranberry Township
Buffalo & Pittsburgh Railroad	PAR808331	State Issued	4/7/2003	4/6/2008	Butler	Butler Township
Butler County Airport Authority	PAR808353	State Issued	3/4/2005	3/3/2010	Butler	Penn Township
Butler County Country Club	PA0220931	State Issued	11/2/2004	11/1/2009	Butler	Penn Township
Chestnut Grove Homeowners Association	PA0238619	State Issued	6/23/2006	6/22/2011	Butler	
Clifford, Brenda & Gregory	PAG048703	State Issued	8/15/2005	2/4/2009	Valencia	Adams Township
Connoquenessing Borough Sewage Treatment Plant	PA0223051	State Issued	7/22/2005	7/21/2010	Connoquenessing	Connoquenessing Borough
Cromwell Estates Mobile Home Park	PA0239666	State Issued	6/6/2006	6/11/2011	Saxonburg	Jefferson Township
Cumberledge, C Thomas Sr.	PA0222810	State Issued	12/26/2003	12/25/2008	Connoquenessing	Lancaster Township
Ervin Industries	PAR218308	State Issued	8/29/2003	8/28/2008	Butler	Summit Township
Evans City Borough Wastewater Treatment Plant	PA0028941	State Issued	6/20/2003	6/19/2008	Evans City	Jackson Township
Evans City Borough Wastewater Treatment Plant	PA0102130	State Issued	1/7/2005	1/6/2010	Evans City	Jackson Township
Gavin, Jeffery	PAG048907	State Issued	8/7/2003	8/6/2008	Butler	Penn Township
Glenn Hawbaker Incorporated	PAR708322	State Issued	4/26/2006	4/25/2011	Butler	Penn Township
Green, Kevin & Rita	PA0239208	State Issued	7/18/2003	7/17/2008	Fennelton	Summit Township
Green Acres MHP	PA0102482	State Issued	4/24/2006	4/23/2011	Butler	Penn Township
High Meadows Sewer Service	PA0091197	State Issued	6/2/2003	6/1/2008	Butler	Penn Township

Site/Facility Name	Permit #	Permit Type	Issue Date	Expire Date	City	Municipality
Butler County (continued)						
Hulbert, Gregory	PAG048585	State Issued	1/12/2004	1/11/2009	Harmony	Jackson Township
Jaksec, Florence	PA0239747	State Issued	3/7/2006	3/6/2011	Butler	Penn Township
John Wagner & Sons Auto Recycling	PAR608331	State Issued	7/7/2005	7/6/2010	Harmony	Lancaster Township
Joseph Brunner Incorporated	PAR506116	State Issued	12/21/2005	12/21/2010	Zelienople	New Sewickley Township
Kennedy, William	PAG048638	State Issued	9/17/2004	2/4/2009	Evans City	Adams Township
Keystone Senior Care	PA0092304	State Issued	9/8/2003	9/7/2007	Butler	Penn Township
Kibbie, John	PAG049017	State Issued	11/8/2004	2/4/2009	Butler	Summit Township
Lighthouse Foundation Group Home	PA0221635	State Issued	3/27/2003	3/26/2008	Butler	Middlesex Township
Lutherlyn Camp & Retreat Center	PA0104299	State Issued	9/30/2005	9/29/2010	Prospect	Connoquenessing Township
Mason, David & Lori	PA0239461	State Issued	6/3/2004	6/2/2009	Saxonburg	Clinton Township
Meadow Ridge Sewage Treatment Plant	PA0239518	State Issued	8/20/2004	8/19/2009	Evans City	Forward Township
Michael's Restaurant & Motel	PA0239411	State Issued	3/24/2004	3/23/2009	Butler	Franklin Township
Middlesex Township Wastewate Treatment Plant	PA0238937	State Issued	4/3/2003	4/3/2008	Butler	Middlesex Township
Nalepa, Nancy & Ronald	PAG048939	State Issued	1/22/2004	1/21/2009	Evans City	Forward Township
Oak Springs Mobile Home Park Incorporated	PA0102547	State Issued	11/9/2004	11/8/2009	Cranberry Township	Cranberry Township
One Land Corporation/Fitness Center	PA0102598	State Issued	3/21/2005	3/20/2010	Valencia	Middlesex Township
Orchard, Karen	PAG049212	State Issued	10/31/2005	2/4/2009	Mars	Adams Township
Pennsylvania American Water-Butler	PA0210161	State Issued	11/18/2005	11/17/2010	Butler	Oakland Township
Penn Christian Academy	PA0093301	State Issued	8/1/2005	7/31/2010	Butler	Penn Township
Petrick, Robert	PAG048597	State Issued	3/4/2004	2/4/2009	Butler	Penn Township
Pine Valley Estates Mobile Home Park	PA0041564	State Issued	10/2/2003	10/1/2008	Harmony	Jackson Township
Pittsburgh District Church	PA0031879	State Issued	10/14/2005	10/13/2010	Butler	Franklin Township
Port O-Call Mobile Home Park	PA0090590	State Issued	2/2/2004	2/1/2009	Butler	Penn Township
Purvis Brothers Incorporated	PAR808378	State Issued	2/17/2004	2/16/2009	Mars	Adams Township
Puskar, Kathleen	PAG048897	State Issued	8/7/2003	8/6/2008	Renfrew	Forward Township

Site/Facility Name	Permit #	Permit Type	Issue Date	Expire Date	City	Municipality
Butler County (continued)						
Reffner, Collins	PA0239763	State Issued	1/31/2006	1/31/2011	Butler	Summit Township
Rock Lake North Association	PA0104132	State Issued	4/21/2003	4/20/2011	Zelienople	Jackson Township
Rolling Valley Estates	PA0102822	State Issued	12/27/2004	12/26/2009	Butler	Connoquenessing Township
Sandy Hill Estates	PA0102717	State Issued	8/10/2004	8/9/2009	Valencia	Middlesex Township
Sarver, Thomas	PAG049182	State Issued	6/30/2005	2/4/2009	Butler	Cranberry Township
Saxonburg Area Authority	PA0029122	State Issued	12/15/2004	12/14/2009	Renfrew	Jefferson Township
Scherer, Jean & Joseph	PAG048846	State Issued	2/3/2003	2/2/2008	Renfrew	Forward Township
Seibel, Fred	PAG048996	State Issued	8/12/2004	2/4/2009	Saxonburg	Middlesex Township
Severino, Dan & Pauline	PAG049236	State Issued	5/4/2006	2/4/2009	Evans City	Forward Township
Shannon Mills Estate	PA0239569	State Issued	10/14/2005	10/13/2010	Renfrew	Butler Township
Shemela, Ronald	PAG048922	State Issued	9/17/2003	9/16/2008	Mars	Adams Township
Smith, Grant	PAG049154	State Issued	3/21/2005	2/4/2009	Harmony	Jackson Township
Starr Subdivision	PA0239623	State Issued	12/5/2005	12/4/2009	Valencia	Middlesex Township
Staskiewicz, Thomas & Alma	PAG048530	State Issued	7/28/2003	7/27/2008	Mars	Adams Township
Suburban Animal Clinic	PA0221287	State Issued	1/30/2004	1/29/2009	Butler	Penn Township
Summit School Incorporated	PA0031305	State Issued	5/24/2006	5/23/2011	Herman	Summit Township
Traficante, Michael	PAG048514	State Issued	2/12/2003	2/11/2008	Butler	Penn Township
UPS Incorporated	PAR808348	State Issued	3/23/2005	3/22/2010	Butler	Summit Township
USF Holland Incorporated/Mars Pennsylvania Facility	PAR808357	State Issued	1/31/2006	1/30/2011	Mars	Adams Township
Victnor Farms Single Residence Sewage Treatment Plant	PA0239101	State Issued	6/11/2003	6/10/2008	Evans City	Forward Township
Villa Vista Estates	PA0102610	State Issued	7/5/2005	7/4/2010	Butler	Middlesex Township
Weider, Andrea Single Resident Sewage Treatment Plant	PAG048878	State Issued	3/13/2003	3/12/2008	Evans City	Forward Township
Western Butler County Authority	PA0021504	State Issued	6/19/2003	6/18/2008	Zelienople	Jackson Township

Site/Facility Name	Permit #	Permit Type	Issue Date	Expire Date	City	Municipality
Butler County (continued)						
Wilson Ridge-Walnut Square and Hidden Acres	PA0239615	State Issued	9/13/2005	9/12/2010	Evans City	Forward Township
Wolfe, John	PAG048967	State Issued	5/12/2004	2/4/2009	Cranberry Township	Cranberry Township
Woodland Meadows Mobile Home Park	PA0101826	State Issued	11/30/2004	11/29/2009	Renfrew	Connoquenessing Township
Woods, Abbey	PA221325	State Issued	9/23/2004	9/22/2009	Zelienople	Jackson Township
Zacherl, James	PAG048339	State Issued	9/2/2004	2/4/2009	Renfrew	Penn Township
Ziegler, Bruce	PAG049157	State Issued	3/16/2005	2/4/2009	Butler	Summit Township
Lawrence County						
Baker, Bruce	PAG049250	State Issued	5/10/2006	2/4/2009	Harmony	Perry Township
Ellport Borough Sewer Authority	PA0038814	State Issued	3/8/2005	3/7/2010	Ellwood City	Wayne Township
Ellwood City Borough Wastewater Treatment Plant	PA0026832	State Issued	7/27/2005	7/26/2010	Ellwood City	Wayne Township
Nalco Company-Ellwood Plant	PA0003824	State Issued	8/25/2004	8/31/2009	Ellwood City	Wayne Township
Salvation Army-Camp Allegheny	PA0209996	State Issued	7/12/2006	7/11/2011	Ellwood City	Wayne Township
Santilo, Charles & Deborah	PAG048509	State Issued	9/26/2003	9/25/2008	Ellwood City	Wayne Township
Schry Water Conditioning	PA0003573	State Issued	10/18/2004	10/17/2009	Ellport	Wayne Township
West Wind Village Mobile Home Park	PA0238872	State Issued	6/19/2003	6/18/2008	Ellwood City	Wayne Township

Appendix H: Species of Concern

Common Name	Scientific Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status
Birds						
American Bittern	*Botaurus lentiginosus*	G4	S1B	PE	PE	
American Coot	*Fulica americana*	G5	S3B,S3N		CR	
Appalachian Bewick's Wren	*Thryomanes bewickii altus*	G5T2Q	SH		PX	
Bald Eagle	*Haliaeetus leucocephalus*	G5	S2B	PT	PT	PS:LT,PDL
Common Moorhen	*Gallinula chloropus*	G5	S3B		CA	PS
Dickcissel	*Spiza americana*	G5	S2B	PE	PE	
Great Blue Heron	*Ardea herodias*	G5	S3S4B, S4N			
King Rail	*Rallus elegans*	G4	S1B	PE	PE	
Least Bittern	*Ixobrychus exilis*	G5	S1B	PE	PE	
Marsh Wren	*Cistothorus palustris*	G5	S2S3B		CR	
Osprey	*Pandion haliaetus*	G5	S2B	PT	PT	
Pied-billed Grebe	*Podilymbus podiceps*	G5	S3B,S4N		CR	
Sedge Wren	*Cistothorus platensis*	G5	S1B	PE	PE	
Short-eared Owl	*Asio flammeus*	G5	S1B,S3N	PE	PE	
Sora	*Porzana carolina*	G5	S3B		CR	
Upland Sandpiper	*Bartramia longicauda*	G5	S1S2B	PT	PT	
Virginia Rail	*Rallus limicola*	G5	S3B			
Fish						
Southern Redbelly Dace	*Phoxinus erythrogaster*	G5	S1	PT	PT	
Invertebrates						
Appalachian Jewelwing	*Calopteryx angustipennis*	G4	S1S2			
Blue-tipped Dancer	*Argia tibialis*	G5	S1			
Gray Petaltail	*Tachopteryx thoreyi*	G4	S3			
Halloween Pennant	*Celithemis eponina*	G5	S2S3			
Regal Fritillary	*Speyeria idalia*	G3	S1			
Sable Clubtail	*Gomphus rogersi*	G4	S1			
Smoky Rubyspot	*Hetaerina titia*	G5	S2			
Mammals						
Northern Myotis	*Myotis septentrionalis*	G4	S3B,S3N		CR	

Common Name	Scientific Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status
Mussels						
Clubshell	*Pleurobema clava*	G2	S1S2	PE	PE	LE, XN
Creek Heelsplitter	*Lasmigona compressa*	G5	S2S3		CR	
Long-solid	*Fusconaia subrotunda*	G3	S1		PE	
Purple Wartyback	*Cyclonaias tuberculata*	G5	SX		PX	
Rainbow Mussel	*Villosa iris*	G5	S1		PE	
Snuffbox	*Epioblasma triquetra*	G3	S1		PE	
Plants						
American Columbo	*Swertia caroliniensis*	G5	S1	PE	PE	
American Globeflower	*Trollius laxus*	G4T3	S1	PE	PE	
Appalachian Gametophyte Fern	*Vittaria appalachiana*	G4	S2	PT	PT	
Autumn Willow	*Salix serissima*	G4	S2	PT	PT	
Balsam Poplar	*Populus balsamifera*	G5	S1	PE	PE	
Beard-tongue	*Penstemon laevigatus*	G5	S3	N	TU	
Broad-leaved Water-plantain	*Alisma triviale*	G5	S1	PE	PE	
Broad-leaved Willow	*Salix myricoides*	G4	S2	N	TU	
Broad-winged Sedge	*Carex alata*	G5	S2	PT	PT	
Brome Grass	*Bromus kalmii*	G5	S3	N	TU	
Brook Lobelia	*Lobelia kalmii*	G5	S1	PE	PE	
Brown Sedge	*Carex buxbaumii*	G5	S3	TU	PR	
Carolina Grass-of-parnassus	*Parnassia glauca*	G5	S2	PE	PE	
Carolina Leaf-flower	*Phyllanthus caroliniensis*	G5	S1	PE	PE	
Carolina Willow	*Salix caroliniana*	G5	S1	N	PE	
Common Shooting-star	*Dodecatheon meadia*	G5	S1	PE	PE	
Cyperus-like Sedge	*Carex pseudocyperus*	G5	S1	PE	PE	
Dodder	*Cuscuta campestris*	G5T5	S2	N	TU	
Downy Willow-herb	*Epilobium strictum*	G5?	S3	PE	PR	
Drooping Bluegrass	*Poa languida*	G3G4Q	S2	TU	PT	
Duckweed sp.	*Lemna turionifera*	G5	SU	TU	TU	
Featherbells	*Stenanthium gramineum*	G4G5	S1S2	N	TU	
Glaucous Rattlesnake-root	*Prenanthes racemosa*	G5	SNR	PX	PX	

Common Name	Scientific Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status
Plants (continued)						
Great Indian-plantain	*Cacalia muehlenbergii*	G4	S1	N	PE	
Greenflowered Wintergreen	*Pyrola chlorantha*	G5	S1	N	TU	
Harbinger-of-spring	*Erigenia bulbosa*	G5	S2	PT	PT	
Hard-stemmed Bulrush	*Schoenoplectus acutus*	G5	S2	PE	PE	
Heartleaf Meehania	*Meehania cordata*	G5	S1	TU	PE	
Highbush-cranberry	*Viburnum trilobum*	G5T5	S3S4	TU	PR	
Hooded Ladies'-tresses	*Spiranthes romanzoffiana*	G5	S1	PE	PE	
Laurentian Bladder-fern	*Cystopteris laurentiana*	G3	S1	TU	PE	
Lobed Spleenwort	*Asplenium pinnatifidum*	G4	S3	N	PR	
Meadow Willow	*Salix petiolaris*	G5	S4	TU	DL	
Mead's Sedge	*Carex meadii*	G4G5	S1	TU	PE	
Mistflower	*Eupatorium coelestinum*	G5	S3	N	TU	
New England Grape	*Vitis novae-angliae*	G4G5Q	S1	PE	PE	
Pineland Pimpernel	*Samolus parviflorus*	G5T5	S2	TU	PE	
Prairie Sedge	*Carex prairea*	G5?	S2	PT	PT	
Purple Rocket	*Iodanthus pinnatifidus*	G5	S1	PE	PE	
Pursh's Golden-rod	*Solidago purshii*	G4G5	SH	TU	TU	
Puttyroot	*Aplectrum hyemale*	G5	S3	PR	PR	
Queen-of-the-prairie	*Filipendula rubra*	G4G5	S1S2	TU	TU	
Roundleaf Serviceberry	*Amelanchier sanguinea*	G5	S1	TU	PE	
Scarlet Indian-paintbrush	*Castilleja coccinea*	G5	S2	TU	PT	
Sedge sp.	*Carex tetanica*	G4G5	S2	PT	PT	
Shining Ladies'-tresses	*Spiranthes lucida*	G5	S3	N	TU	
Short-awn Foxtail	*Alopecurus aequalis*	G5	S3	N	TU	PS
Showy Goldenrod	*Solidago speciosa var. speciosa*	G5T5?	SNR	N	PT	
Showy Lady's-slipper	*Cypripedium reginae*	G4	S2	PT	PT	

Common Name	Scientific Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status
Plants (continued)						
Slender Spike-rush	*Eleocharis elliptica*	G5	S2	PE	PE	
Slender Spike-rush	*Eleocharis tenuis var. verrucosa*	G5T3T5	S1	PE	PE	
Small Wood Sunflower	*Helianthus microcephalus*	G5	S3	N	TU	
Small Yellow Lady's-slipper	*Cypripedium calceolus var. parviflorum*	G5	S1	PE	PE	
Snow Trillium	*Trillium nivale*	G4	S3	PR	PR	
Soft-leaved Sedge	*Carex disperma*	G5	S3	PR	PR	
Sterile Sedge	*Carex sterilis*	G4	S1	PT	PE	
Stiff Cowbane	*Oxypolis rigidior*	G5	S2	TU	PT	
Swamp Lousewort	*Pedicularis lanceolata*	G5	S1S2	N	PE	
Tall Larkspur	*Delphinium exaltatum*	G3	S1	PE	PE	
Tall Tick-trefoil	*Desmodium glabellum*	G5	SU	TU	TU	
Thin-leaved Cotton-grass	*Eriophorum viridicarinatum*	G5	S2	PT	PT	
Twig Rush	*Cladium mariscoides*	G5	S2	PE	PE	
Virginia Bunchflower	*Melanthium virginicum*	G5	SU	N	TU	
White Trout-lily	*Erythronium albidum*	G5	S3	N	TU	
Wild Kidney Bean	*Phaseolus polystachios*	G5	S1S2	N	TU	
Yellow Gentian	*Gentiana alba*	G4	SH	TU	PX	
Reptiles						
Bog Turtle	*Glyptemys muhlenbergii*	G3	S1S2	PE	PE	LT, SAT
Eastern Massasauga	*Sistrurus catenatus catenatus*	G3G4T3T4Q	S1S2	PE	PE	C
Kirtland's Snake	*Clonophis kirtlandii*	G2	SH	PE	PE	

Basic Global Rank Codes and Definitions

Rank Code	Description	Definition
GX	Presumed Extinct	Believed to be extinct throughout its range. Not located despite intensive searches of historic sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
GH	Possibly Extinct	Known from only historical occurrences. Still some hope of rediscovery.
G1	Critically Imperiled	Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000) or stream miles (<10).
G2	Imperiled	Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or stream miles (10 to 50).
G3	Vulnerable	Vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
G4	Apparently Secure	Uncommon but not rare, and usually widespread. Possibly cause for long-term concern. Typically more than 100 occurrences and more than 10,000 individuals.
G5	Secure	Common, typically widespread and abundant. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
G#G#	Range Rank	A numeric range rank (e.g., G2G3) is used to indicate uncertainty about the exact status of a taxon.
T	Infraspecific Taxon (trinomial)	The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species= basic rank (e.g.., a G1T2 subrank should not occur). A population (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T rank; in such cases a Q is used after the T rank to denote the taxon's questionable taxonomic status.

Global Rank Qualifiers

Qualifier	Description	Definition
?	Inexact Numeric Rank	Denotes inexact numeric rank.
Q	Questionable Taxonomy	Taxonomic status is questionable; numeric rank may change with taxonomy.
C	Captive or Cultivated Only	Taxon at present is extant only in captivity or cultivation, or as a reintroduced population not yet established.

State Rank Codes and Definitions

Rank Code	Description	Definition
SX	Extirpated	Element is believed to be extirpated from the "state" (or province or other subnational unit).
SH	Historical	Element occurred historically in the state (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would become SH without such a 20-year delay if the only known occurrences in a state were destroyed or if it had been extensively and unsuccessfully looked for. Upon verification of an extant occurrence, SH-ranked elements would typically receive an S1 rank. The SH rank should be reserved for elements for which some effort has been made to relocate occurrences, rather than simply ranking all Elements not known from verified extant occurrences with this rank.
S1	Critically Imperiled	Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically 5 or fewer occurrences or very few remaining individuals or acres.
S2	Imperiled	Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. Typically 6 to 20 occurrences or few remaining individuals or acres.
S3	Vulnerable	Vulnerable in the state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences.
S4	Apparently Secure	Uncommon but not rare, and usually widespread in the state. Usually more than 100 occurrences.
S5	Secure	Demonstrably widespread, abundant, and secure in the state, and essentially ineradicable under present conditions.
S?	Unranked	State rank is not yet assessed.

State Rank Codes and Definitions (continued)

Rank Code	Description	Definition
SU	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible, the most likely rank is assigned and a question mark added (e.g.., S2?) to express uncertainty, or a range rank (e.g.., S2S3) is used to delineate the limits (range) of uncertainty.
S#S#	Range Rank	A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status of the Element. Ranges cannot skip more than one rank (e.g.., SU should be used rather than S1S4).
HYB	Hybrid	Element represents an interspecific hybrid.
SE	Exotic	An exotic established in the state; may be native in nearby regions (e.g.., house finch or catalpa in eastern U.S.).
SE#	Exotic Numeric	An exotic established in the state that has been assigned a numeric rank to indicate its status, as with S1 through S5.
SA	Accidental	Accidental or casual in the state (i.e., infrequent and outside usual range). Includes species (usually birds or butterflies) recorded once or only a few times. A few of these species may have bred on the one or two occasions they were recorded. Examples include European strays or western birds on the East Coast and vice-versa.
SZ	Zero Occurrences	Not of practical conservation concern in the state because there are no definable occurrences, although the taxon is native and appears regularly in the state. This rank will generally be used for long distance migrants whose occurrences during their migrations have little or no conservation value for the migrant as they are typically too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped, and protected. Typically, the SZ rank applies to a non-breeding population in the subnation -- for example, birds on migration. An SZ rank may in a few instances also apply to a breeding population, for example certain Lepidoptera which regularly die out every year with no significant return migration. Although the SZ rank typically applies to migrants, it should not be used indiscriminately. Just because a species is on migration does not mean it receives an SZ rank. SZ only applies when the migrants occur in an irregular, transitory, and dispersed manner.
SP	Potential	Potential that Element occurs in the state but no extant or historic occurrences reported.

State Rank Codes and Definitions (continued)

Rank Code	Description	Definition
SR	Reported	Element reported in the state but without a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the program hasn't yet received first-hand information; others are old, obscure reports.
SRF	Reported Falsely	Element erroneously reported in the state (e.g., misidentified specimen) and the error has persisted in the literature
SSYN	Synonym	Element reported as occurring in the state, but state does not recognize the taxon; therefore the Element is not ranked by the state.
*		S rank has been assigned and is under review. Contact the individual state Natural Heritage program for assigned rank.
Not Provided		Species is known to occur in this state. Contact the individual state Natural Heritage program for assigned rank.

State Rank Qualifiers

Qualifier	Description	Definition
B	Breeding	Basic rank refers to the breeding population of the Element in the state.
N	Non-breeding	Basic rank refers to the non-breeding population of the Element in the state.
?	Inexact or Uncertain	Denotes inexact or uncertain numeric rank. For SE denotes uncertainty of exotic status. (The ? qualifies the character immediately preceding it in the SRANK.)
C	Captive or Cultivated	Element is presently extant in the state only in captivity or cultivation, or as a reintroduced population not yet established.
NOTE - A breeding status subrank is only used for species that have distinct breeding and/or non-breeding populations in the state. A breeding-status SRANK can be coupled with its complementary non-breeding-status SRANK. The two are separated by a comma, with the higher-priority rank listed first in		

Pennsylvania State Status - Invertebrates

Status	Description	Definition
N		No current legal status but is under review for future listing.

Pennsylvania Status Definitions - Plants

Status	Description	Definition
PE	Pennsylvania Endangered	Plant species which are in danger of extinction throughout most of their natural range within this Commonwealth, if critical habitat is not maintained or if the species is greatly exploited by man. This classification shall also include any populations of plant species that have been classified as Pennsylvania
PT	Pennsylvania Threatened	Plant species which may become endangered throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained to prevent their future decline, or if the species is greatly exploited by man.
PR	Pennsylvania Rare	Plant species, which are uncommon within this Commonwealth. All species of the native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification.
	Disjunct	Significantly separated from their main area of distribution
	Endemic	Confined to a specialized habitat.
	Limit of Range	At or near the periphery of their natural distribution
	Restricted	Found in specialized habitats or habitats infrequent in Pennsylvania.
PX	Pennsylvania Extirpated	Plant species believed by the Department to be extinct within this Commonwealth. These plants may or may not be in existence outside the Commonwealth.
PV	Pennsylvania Vulnerable	Plant species which are in danger of population decline within Commonwealth because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.
TU	Tentatively Undetermined	A classification of plant species which are believed to be in danger of population decline, but which cannot presently be included within another classification due to taxanomic uncertainties, limited evidence within historical records, or insufficient data.
N		No current legal status exists, but is under review for future listing.

Pennsylvania State Status - Wild Birds and Mammals

Status	Description	Definition
PE	Pennsylvania Endangered	Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania if the deleterious factors affecting them continue to operate. These are: 1) species whose numbers have already been reduced to a critically low level or whose habitat has been so drastically reduced or degraded that immediate action is required to prevent their extirpation from the Commonwealth; or 2) species whose extreme rarity or peripherality places them in potential danger of precipitous declines or sudden extirpation throughout their range in Pennsylvania; or 3) species that have been classified as "Pennsylvania Extirpated", but which are subsequently found to exist in Pennsylvania as long as the above conditions 1 or 2 are met; or 4) species determined to be "Endangered" pursuant to the Endangered Species Act of 1973, Public Law 93 205 (87 Stat. 884), as amended.
PT	Pennsylvania Threatened	Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the organism are abated. These are: 1) species whose populations within the Commonwealth are decreasing or have been heavily depleted by adverse factors and while not actually endangered, are still in critical condition; 2) species whose populations may be relatively abundant in the Commonwealth but are under severe threat from serious adverse factors that have been identified and documented; or 3) species whose populations are rare or peripheral and in possible danger of severe decline throughout their range in Pennsylvania; or 4) species determined to be "Threatened" pursuant to the Endangered Species Act of 1973, Public Law 93205 (87 Stat. 884), as amended, that are not listed as "Pennsylvania Endangered".
N		No current legal status but is under review for future listing.

Pennsylvania State Status - Fish, Amphibians, Reptiles, and Aquatic Organisms

Status	Description	Definition
PE	Pennsylvania Endangered	All species declared by: 1) the Secretary of the United States Department of the Interior to be threatened with extinction and appear on the Endangered Species List or the Native Endangered Species List published in the Federal Register; or 2) have been declared by the Pennsylvania Fish Commission, Executive Director to be threatened with extinction and appear on the Pennsylvania Endangered Species List published by the Pennsylvania Bulletin.
PT	Pennsylvania Threatened	All species declared by: 1) the Secretary of the United States Department of the Interior to be in such small numbers throughout their range that they may become endangered if their environment worsens, and appear on a Threatened Species List published in the Federal Register; or 2) have been declared by the Pennsylvania Fish Commission Executive Director to be in such small numbers throughout their range that they may become endangered if their environment worsens and appear on the Pennsylvania Threatened Species List published in the Pennsylvania Bulletin.
PC		Animals that could become endangered or threatened in the future. All of these are uncommon, have restricted distribution or are at risk because of certain aspects of their biology.
N		No current legal status, but is under review for future listing.

Pennsylvania Biological Survey Suggested Status Definitions

Status	Description	Definition
PE	Pennsylvania Endangered	Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania if the deleterious factors affecting them continue to operate. These are: 1) species whose numbers have already been reduced to a critically low level or whose habitat has been so drastically reduced or degraded that immediate action is required to prevent their extirpation from the Commonwealth; or 2) species whose extreme rarity or peripherality places them in potential danger of precipitous declines or sudden extirpation throughout their range in Pennsylvania; or 3) species that have been classified as "Pennsylvania Extirpated", but which are subsequently found to exist in Pennsylvania as long as the above conditions 1 or 2 are met; or 4) species determined to be "Endangered" pursuant to the Endangered Species Act of 1973, Public Law 93 205 (87 Stat. 884), as amended.

Pennsylvania Biological Survey Suggested Status Definitions

Status	Description	Definition
PT	Pennsylvania Threatened	Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the organism are abated. These are: 1) species whose populations within the Commonwealth are decreasing or have been heavily depleted by adverse factors and while not actually endangered, are still in critical condition; 2) species whose populations may be relatively abundant in the Commonwealth but are under severe threat from serious adverse factors that have been identified and documented; or 3) species whose populations are rare or peripheral and in possible danger of severe decline throughout their range in Pennsylvania; or 4) species determined to be "Threatened" pursuant to the Endangered Species Act of 1973, Public Law 93205 (87 Stat. 884), as amended, that are not listed as "Pennsylvania Endangered".
PR	Pennsylvania Rare	Plant species which are uncommon within this Commonwealth. All species of the native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification.
	Disjunct	Significantly separated from their main area of distribution
	Endemic	Confined to a specialized habitat.
	Limit of Range	At or near the periphery of their natural distribution
CP	Candidate Proposed	Species comprising taxa for which the Pennsylvania Biological Survey (PBS) currently has substantial information on hand to support the biological appropriateness of proposing to list as
CA	Candidate at Risk	Species that although relatively abundant now are particularly vulnerable to certain types of exploitation or environmental modification.
CR	Candidate Rare	Species which exist only in one of a few restricted geographic areas or habitats within Pennsylvania, or they occur in low numbers over a relatively broad area of the Commonwealth.
CU	Condition Undetermined	Species for which there is insufficient data available to provide an adequate basis for their assignment to other classes or categories.
PX	Pennsylvania Extirpated	Species that have disappeared from Pennsylvania since 1600 but still exist elsewhere.
DL	Delisted	Species which were once listed but are now cited for delisting.
N		No current legal status, but is under study for future listing.

Federal Status Codes and Definitions

LE	Listed Endangered	A species which is in danger of extinction throughout all or a significant portion of its range.
LT	Listed Threatened	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
LELT	Listed Endangered in part of range; listed Threatened in the remaining part.	
PE	Proposed Endangered	Taxa proposed to be listed as endangered.
PT	Proposed Threatened	Taxa proposed to be listed as threatened
PEPT		Proposed Endangered in part of range; proposed Threatened in the remaining part.
C	Candidate for listing.	
E(S/A)		Treat as Endangered because of similarity of appearance.
T(S/A)		Treat as Threatened because of similarity of appearance.
XE	Essential Experimental population	
XN	Nonessential Experimental population	
"xy" (mixed status)		Status varies for different populations or parts of range.
"x" NL		Status varies for different populations or parts of range with at least one part not listed.

APPENDIX I. RECREATION FACILITIES

Recreation Site	Municipality	Size	Amenities
Recreational Parks			
Adams Township Park	Adams Township		
Butler Athletic Field	Butler, City of		Athletic Field
Butler Memorial Park	Butler, City of	84.6 acres	Playgrounds, multi-purpose field, obstacle course, tennis courts, picnic shelters, horseshoe court, swimming pool, volleyball court, skateboarding and restrooms
Diamond Park	Butler, City of	.5 acres	Historical monuments, benches, and fountain
Father Marinaro Park	Butler, City of	7 acres	Multi-purpose field, playground, and sandbox
Institute Hill Playground	Butler, City of	.7 acres	Basketball court, volleyball court, and a playground
Island Playground	Butler, City of	2.2 acres	Picnic pavilion, playground, and volleyball court
Pullman Park	Butler, City of	7.3 acres	Baseball stadium and grandstand
Ritts Park	Butler, City of	7 acres	Tennis courts, basketball court, playground
Rotary Park	Butler, City of	2 acres	Picnic tables and playground
South Hills Playground	Butler, City of	.3 acres	Basketball courts, sandbox, and a playground
SS Play Area	Butler, City of		Playground
Whippo Avenue Playground	Butler, City of	1.3 acres	Swings, sandbox, and multi-purpose field
Almeda Park	Butler Township	417 acres	Multi-purpose field, picnic shelters, horseshoe and boccie courts, sand volleyball courts, swimming pool and bath house, playground, restrooms, and a fitness trail
Butler Community College	Butler Township		Athletic Field
Butler Township Athletic fields	Butler Township		Athletic fields
Daniel Lohner Park	Butler Township	.3 acres	Asphalt pad and picnic shelter
Highfield Park	Butler Township		
Meridian Athletic Fields 1 and 2	Butler Township		Athletic fields

Recreation Site	Municipality	Size	Amenities
Recreational Parks (continued)			
Saw Mill Run/Butler Township Park	Butler Township	90 acres	Deck hockey court, multi-purpose fields, lodge, 9-hole golf course, downhill ski trails, sledding area, picnic pavilion, hiking trail, restrooms, and a cross country ski trail.
Woodbury Estates Park Lot	Butler Township	1.7 acres	Undeveloped
Callery Field	Callery Borough		Athletic fields
Butler County Soccer Association	Center Township		Athletic fields
Lion Park	Center Township	3.7 acres	No facilities
Timberly Heights Athletic Fields	Center Township		Athletic fields
Connoquenessing Park	Connoquenessing Borough	16.3 acres	Fishing, tennis, basketball, horseshoes, picnic areas, Athletic fields, lake, and restrooms
Butler Farm Show	Connoquenessing Township		
Connoquenessing Elementary Play Area	Connoquenessing Township		Playground
Roe Field	Connoquenessing Township		Athletic fields
White Church Athletic Fields	Connoquenessing Township		Athletic fields
Whitestown Athletic fields	Connoquenessing Township		Athletic fields
Cranberry Athletic Fields	Cranberry Township		Athletic fields
Cranberry Play Areas	Cranberry Township		Playground
Cranberry School Athletic fields	Cranberry Township		Athletic fields
Cranberry Community Park	Cranberry Township	68 acres	picnic shelters, tennis courts, volleyball courts, athletic fields, playground, basketball court, nature
Cranberry Skate Park	Cranberry Township		Skate park
Graham Park (under dev.)	Cranberry Township		Under development
North Boundary Park	Cranberry Township		Picnic areas, baseball field, soccer fields, playground, sledding hill, water park, and walking path
Rolling Road Field	Cranberry Township	2 acres	Soccer/Hockey fields

Recreation Site	Municipality	Size	Amenities
Recreational Parks (continued)			
Brandon Park	East Butler Borough	.3 acres	Basketball court and playground
East Butler, City of Park	East Butler Borough	16.8 acres	Pavilion, playground, and horseshoe courts
Fifth Street Park	East Butler Borough	.2 acres	Playground and basketball court
Circle Playground	Ellwood City Borough		Playground
Ellport Community Park	Ellwood City Borough		Picnic areas, playground, fields, Connoquenessing Creek
Ewing Park	Ellwood City Borough		Picnic areas, playground, swimming pool, fields, hiking trails, running track, basketball court, and bocce
G. William Blank Jr. Park/ Franklin Township Park	Ellwood City Borough	6 acres	Pavilion and playground
Merritt Book Park	Ellwood City Borough		Playground
RC Steiffel Park	Ellwood City Borough	44 acres	Tennis, hockey, athletic fields
Rosannah Street Playground	Ellwood City Borough	.8 acres	
Edco Park	Evans City Borough	3.3 acres	Swimming pool, pavilion, volleyball courts
Evans City Athletic fields 1 and 2	Evans City Borough		Athletic fields
Evans City Athletic fields 3	Evans City Borough		Athletic fields
Evans City Elementary Athletic Fields	Evans City Borough		Athletic fields
Forward Township Ballfields	Forward Township		Athletic fields, Canoe access
Franklin Township Elementary Play Area	Franklin Township		Playground
Old Schoolhoue Playground	Harmony Borough	.25 acres	Swings, basketball court, and picnic table
Swampoodle Park	Harmony Borough		Basketball and picnic facilities
Wood Street Park	Harmony Borough		Passive park with stream access
Seneca Valley Athletic Fields	Jackson Township		Athletic fields
Jefferson Township Athletic fields	Jefferson Township		Athletic fields
Knoch Athletic Fields	Jefferson Township		Athletic fields
Laura J. Doerr Memorial Park	Jefferson Township		Swimming pool, pavilion, volleyball courts

Recreation Site	Municipality	Size	Amenities
Recreational Parks (continued)			
Bauder Park	Lancaster Township	1.5 acres	Athletic fields and picnic shelter
Garfield Playground	Mars Borough	1.8 acres	Multi-purpose field, playground, and basketball court
Mars Borough Athletic Field	Mars Borough	5.6 acres	Athletic fields and concession stand
Mars Borough Ice Skating Rink	Mars Borough	.7 acres	Ice skating rink, sand volleyball, and pavilion
Mars Borough Park	Mars Borough		
Athletic fields	Marshall Township		Athletic fields
Warrendale Park	Marshall Township		
Knob Hill Community Park	Marshall Township		
Middlesex Township Park	Middlesex Township	12 acres	Mixed use field, tennis court, pavilion, and playground
Moraine State Park (portions of)	Muddy Creek Township		
Green Valley Township Park	New Sewickley Township	89.2 acres	Athletic fields, restrooms, and concession stand
Brush Creek Park	North Sewickley Township	645	Picnic areas, tennis courts, horse trails, basketball courts, athletic fields, walking and jogging trails, playgrounds, lake, meadow, and a covered bridge
Penn Township Athletic fields	Penn Township		Athletic fields
Penn Township High School Athletic Fields	Penn Township		Athletic fields
Penn Township Playground	Penn Township		Playground
Renfrew Park	Penn Township	1.5 acres	Picnic shelter and half-court basketball
Pine Community Park	Pine Township		Playground
Portersville Community Park	Portersville Borough	37.7 acres	Multi-purpose fields, playground, pavilion, horseshoe courts, and restrooms
Prospect Boys and Girls Club Park	Prospect Borough		Athletic fields, pavilions
Richland Park	Richland Township		Playground
Aderhold Park	Saxonburg Borough	1.1 acres	Small wooded lot
Green Acres Park	Saxonburg Borough	1.8 acres	Under development

Recreational Facility	Location		Description
Recreational Parks (continued)			
Roebling Park	Saxonburg Borough		Picnic pavilions, museum
Seven Fields Town Park	Seven Fields Borough	7 acres	Playground, basketball courts, swimming pool, baseball field, soccer fields, and picnic pavilion
Adams Ridge Park	Seven Fields Borough		Basketball court, playground, tennis court, pool, athletic fields, restrooms, clubhouse
North Ridge Park	Seven Fields Borough		
Herman Athletic fields	Summit Township		Athletic Fields
Summit Play Area	Summit Township		Playground
Valencia Community Park	Valencia Borough	7 acres	Playground, basketball court, picnic shelter, and baseball field
Ecoz Park	Zelienople Borough	148 acres	Pavilions and stream access
Zelienople Community Park	Zelienople Borough	40 acres	Swimming pool, athletic fields, tennis court, basketball court, picnic areas, playground, and walking trail
Zelienople Main Street Park	Zelienople Borough		Historical monuments

Recreational Facility	Location	Description
Golf Courses		
Aubrey's Dubbs Dred Golf Course	Butler Township	18-hole semi-private course
Butler Country Club	Penn Township	18-hole private course
Conley Resort Inn	Penn Township	18-hole public course
Connoquenessing Country Club	North Sewickley	18-hole private course
Cranberry Highlands	Cranberry Township	18-hole public course
Del Mar Golf Course	Wayne Township	18-hole semi-private course
Hartmann's Deep Valley Golf Course	Jackson Township	18-hole public course
Highland Golf Course	Summit Township	18-hole public course
Krendale Golf Course	Butler Township	Three nine-hole courses played as 18-hole course
Lake Arthur Country Club	Franklin Township	18-hole public course
Lake Vue North Golf Club	Penn Township	18-hole public course
Mars-Bethel Golf Course	Adams Township	Nine-hole public course

Recreational Facility	Location	Description
Golf Courses (continued)		
Mount Chestnut Driving Range and Golf Course	Franklin Township/Center Township	Nine-hole public course
Old Stonewall Golf Club	North Sewickley	18- hole course
Pine Needles Par 3	Butler Township	Nine-hole public course
Pittsburgh North Golf Course	Richland Township	27-hole public course
Rittswood Golf Course	Middlesex Township	18-hole public course
Serene Valley Golf Course	Summit Township	Nine-hole public course
Stoughton Acres Golf Course	Center Township	18-hole public course
Strawberry Ridge Golf Course and Driving Range	Lancaster Township	18-hole public course
Suncrest Golf Course	Penn Township	18-hole public course
Treesdale Golf and Country Club	Adams Township	9-hole private course
Venango Trails Golf Club	Marshall Township	18-hole private course
Historic Sites		
Bessenheim Furnance	Franklin Township *(Beaver Co.)*	Old furnance site located in Franklin Township, Beaver County
Woolslayer Bridge	North Sewickley	Covered bridge over Brush Creek at the Brush Creek Park
Butler Armory	Butler, City of	
Butler County Courthouse	Butler, City of	
Butler County National Bank	Butler, City of	
Butler Historic District	Butler, City of	
Elm Court	Butler, City of	
Senator Walter Lowrie House	Butler, City of	
Harmony Historic District	Harmony Borough, Jackson Township	
Passavant House	Zelienople Borough	
Harmony Museum	Harmony Borough	
Maridon Museum	Butler, City of	
Providence Plantation	Evans City	
Harmonie Society Cemetery	Harmony Borough	
Saxonburg Historic District	Saxonburg Borough	
John Roebling House	Saxonburg Borough	

Recreational Facility	Location		Description
Conservation Areas			
Hereford Manor Lakes	Franklin Township		
Deston Woods Conservation Area	Butler Township	15 acres	1/4 mile trail, picnic tables
Glade Run Management Area	Middlesex Township	146.4 acres	Glade Run Lake (55 acre), fishing pier, boat launch, restrooms
Proposed Harmony Boat Launch	Harmony		
Seven Fields Nature Park	Seven Fields		
Middlesex Township Nature Preserve	Middlesex Township	18 acres	Undeveloped Nature Preserve
Rock Point	Ellwood City		Boat Launch

APPENDIX J. PUBLIC COMMENTS

Public Meeting Comments

Walking Trails

Issue, concern, or comment	Action Taken
What is the status of the Connoquenessing Water Trail?	Wild Waterways Conservancy, in cooperation with Pennsylvania Environmental Council, is working of the water trail. Wild Waterways Conservancy received a 50,000 grant from Pittsburgh 250
An application for a trail extension to the Butler-Freeport trail is being submitted in the April 2008 round of Community Conservation Partnership Program	Trail extensions are identified as a priority in the Watershed Conservation Plan and that should be highlighted in the grant application

Canoe and Kayak Access

Insurance and liability issues	Recreational Use Land and Water Act – a Pennsylvania Act that limits liability for making private land open to public for recreational purposes (pending in legislature)
Establish access points every five miles, as opposed to every 10 miles for varying skill levels, family friendly, and emergency service access	Recommendation will be added to establish access points every five miles

Implementation Plan

Promote and educate about the plan and encourage the use of the plan	WPC will advocate implementing; and will be available for guidance and technical assistance. Some project implementation although no specific recommendations are currently selected by WPC for implementation. WPC encourages involvement on the local community level

General Comments

Why does the “watershed” define study area?	Issues cross political boundaries
Bridge gaps; connect projects and efforts	Completion of the watershed plan and recommendation identified will bridge gaps and connect projects
Funding limits capabilities	Placement of the watershed plan on Pennsylvania Rivers Registry increases some funding opportunities
Grant assistance	WPC can help with grant review, Foundation center in Pittsburgh can help with grant writing and partnership development
Does the scope of the project fall solely within DCNR?	Not solely but many of the topics are interconnected. Funding may be sought

	from other sources
Pennsylvania Association for Sustainable Agriculture	Added to resource directory and as a partner is several recommendations
Jefferson Township has no zoning but does have subdivision update in report and Figure 1-8.	Updated and corrected in report
Add Winter's Junk Yard, Penn Township to the list of scrap yards.	Updated and corrected in report.
Clinton Township has zoning and is currently updating	Updated and corrected in report
Buffalo and Clinton completed a comprehensive plan and a mini-comp recreation plan is on going.	Comment noted
Multi-municipal plan for Slippery Rock Township received a grant to enhance recreational component.	Updated and corrected in report
Adams Township has a comprehensive park and open space greenway plan. Master site plan for community park.	Comment noted
Butler Township, Butler City, Penn Township, East Butler Borough, and Summit Township are working on a multi-municipal comprehensive plan.	Updated and corrected in report

Flooding

FEMA study – has anything been completed, it was to be reviewed and released by 2007? Website lists project as ongoing.	As of April 23, the study was suspended waiting for additional fee
Lack of response and enforcements by agencies, municipalities, etc.	Added to recommendation 1-H
Managing development cooperatively	Added to recommendation 1-G
Factory in Harmony expanded to being located within 50 feet of creek and is currently for sale.	Comment noted
Creekside Manor Development – 47 acres of prime farmland	WPC can provide technical assistance and advice for any land acquisition through its land protection department. Any land purchase by WPC must meet criteria standards
Plan for the removal of Porter's Cove dam approximately $100,000 for permitting, removal, etc. Removal of the dam will change the water level. Some concerns about maintenance and responsibility.	Dam is scheduled for removal fall 2008
Hereford Manor Lakes Conservancy is conducting a feasibility study around two high hazard dams at the site to consider repairing or removing dams. Public meetings were held on Feb. 28, 2008.	Results of public meeting will be released in second public meeting tentatively scheduled for May
Dam in Alameda Park scheduled for removal Fall 2008. Project is currently out for bid.	Dam is in the removal process and will be completed by end of 2008
Near Jefferson Center, the stream is being filled in up to the stream are there any Pa. laws that limit how close to the stream an area can be filled in? (Frazier and Saxonburg roads.)	Yes, there are laws. Contact the Pennsylvania Fish and Boat Commission to report suspicious activities

Sewage and Stormwater

Sewage overflows at Crab Run lift station impacting Moraine State Park.	Any suspicion of a violation of a discharge permit contact your local Pennsylvania Fish and Boat Commission conservation officer

Butler County is currently preparing a county-wide stormwater management plan	Identified as recommendation in goal 3-E

Written Comments

Harmony Borough

Comment	Action Taken
Chapter 1 Table 1.2 Land-Use Ordinances - The table indicates that Harmony Borough does not have a Comprehensive Plan; this is incorrect. It also fails to indicate that Harmony Borough has a Subdivision Ordinance as well as a Floodplain Ordinance by the use of "NA".	Table and text were corrected
Chapter 5 page 7 - "Two sites are being considered within the borough of Harmony". This is incorrect. Harmony Borough has a lease agreement with the Pennsylvania Fish and Boat Commission to construct a canoe launch at its Jackson Street property. The use of Wood Street Park has been not considered since the agreement with the PFBC was reached a year and a half ago.	Potential access at Wood Street Park removed
Chapter 5- page 18 - "The Harmony National Historic Landmark District in Harmony and Jackson Township" The Harmony Historic District outlined in the Harmony Borough Codification is all in Harmony Borough. To the best of my knowledge, Jackson Township has never recognized a National Historic District. I believe that the entire district is in Harmony Borough.	After verification, the Harmonie Society cemetery, part of the National Historic Landmark District, is located in Jackson Township
Appendix I - Recreational Facilities - the "Harmony Playground" which is referenced numerous times is actually referred to as the "Old Schoolhouse Playground" in municipal literature. Also, Swampoodle Park has a basketball court and picnic facilities. Wood Street Park is a passive park, not a site of future access to the Connoquenessing. It is already an access to the creek.	Harmony playground name was corrected. Amenities at Swampoodle and Wood Street Parks have been corrected

Pennsylvania Department of Conservation and Natural Resources

Typo in the second chapter, page one, paragraph four, line one reads “The U.S. the Carboniferous”…	Removed “The U.S”
Typo in chapter two, page eight, paragraph two, line five reads “no state forest exists” for just the watershed or the whole state?	No state forest exist in the watershed, clarification will be added

Comment	Action Taken
Add to the appendix contact information for potential funding sources listed.	Information added
Are you aware of the public swell over the condition of the dams at Hereford Manor Lakes? The dams are inadequate and do not meet the new federal guidelines and would require over 14 million to mitigate the problems. Area residents do not want the dam breached, but this is a real possibility. It would be nice if the issue was addressed a bit more in-depth in chapter three page nine, chapter four pages 22-23, chapter eight page nine, and goal 3-5.	Additional information regarding this topic and the outcomes of public meetings was obtained from Hereford Manor Lake Conservancy and incorporated
Chapter four, page 15, what are the names of the Pennsylvania endangered plant species referred to?	For preservation of the species, endangered species and their specific locations are not identified
Goal 1-H: you may want to make this a higher priority because a community cannot do the goal above it without having a comprehensive plan done first.	Priority was changed

Pennsylvania Fish and Boat Commission

Comment	Action Taken
The plan contains little information concerning fishing and boating opportunities, or the history of the Pennsylvania Fish and Boat Commission stockings such as species and numbers.	Chapter 5 Cultural Resources identifies fishing and boating opportunities in the watershed, including trout approved waters, special regulation areas, existing and potential canoe/kayak access locations, and waterway designated uses. A reference was added to refer to the Fish and Boat Commission website for stocking information
Recommend planning of/for future several canoe/kayak access areas along the lower section of the creek. Pennsylvania Fish and Boat Commission has several avenues by which to offer assistance in this area, including design assistance and grant programs.	Pennsylvania Fish and Boat Commission is listed as a potential partner and potential funding source for many recommendations. Recommendations will be revisited to see if partnership or funding may be added
Wetland delineation-What is the established procedure for wetland delineation? Who conducts and established official delineations? Efforts to locate, report, and delineate wetland resources must be a priority. I have observed many instances where farming practices, construction, excavation, et al. impact wetlands where delineations may have prevented the disturbance.	Additional information regarding the permitting process and the Pennsylvania Wetland Replacement Project was added
Road maintenance practices-the removal of salts, cinders, and other related debris from bridges that span waterways has been accomplished by washing the material into storm drain systems. This practice causes a direct pollution into the waterway below. Maintenance of these bridges should be accomplished by dry sweeping, and avoiding flushing with	Road Maintenance section added under Sources of Impairment; a corresponding management recommendation was also added

water.	
Stormwater systems should be expressed as a "waterway" in the watershed system, and should not be viewed only from a management and regulatory agenda perspective. As state and local regulations require the implementation of stormwater management plans, the resulting plan implementation creates a man-made tributary system.	Comment noted, "man-made" analogy was used in Water Resources chapter
Fish species in slower moving sections of streams the predominant bass species is likely Smallmouth Bass, not Largemouth Bass as described.	The species was changed as suggested
Eastern Massasauga Rattlesnake actual adult length is between 20 to 30 inches. (the plan states lengths range from 3-4 feet) In addition to those locally identified names, consider adding "swamp rattler" as it is also known. It should be noted that sightings of this snake should be reported to Pennsylvania Fish and Boat Commission.	Correct length range was changed and locally identified common name of "swamp rattler" was added
Fishing in the third paragraph Thorn Dam in Oakland Township may actually be called Thorn Run Reservoir/Dam as well as its water supply (Thorn Run (creek)).	Corrected
In survey results question nine first bullet comment,-"Contact with Pennsylvania to see how several unneeded dams can be removed"-it appears there should be an agency name following the word Pennsylvania.	Pennsylvania Department on Environmental Protection and Pennsylvania Fish and Boat Commission was added

Pennsylvania Geological Survey

Comment	Action Taken
The Pennsylvania Geological Survey has numerous resources that are very relevant to such a plan. You have the list of our water resource reports in your list of websites. But some specific reports should be mentioned in the text at appropriate locations. a. ES 3-Geology of Groundwater in Pennsylvania (http://www.dcnr.state.pa.us/topoeo/education/es3.pdf) b. W 69-Hydrogeologic and well-construction characteristics of the rocks of Pennsylvania (http://www.dcnr.state.pa.us/topogeo/pub/w69recent.aspx) c. EG 2- Environmental Geology for Land Use Planning (http://www.dcnr.state.pa.us/topogeo/education/landuse/landuseplan.aspx) d. Pennsylvania Groundwater Information System-a database of water well records at http://www.dcnr.state.pa.us/topogeo/groundwater/PaGWIS/PaGWOSMenu.asp?c=t e. EG-1 Engineering Characteristics of the Rocks of Pennsylvania provides information on the engineering, hydrologic (superseded by W 69), and geologic characteristics of all of the rocks of Pennsylvania. f. PAMAP	Comment noted. Some referenced documents may be included in the text the remaining will be added to the appendix

(http://www.dcnr.state.pa.us/topogeo/pamap/index.aspx. g. W 35-Summary groundwater resources of Allegheny County, Pa. h. W-36-Summary groundwater resources of Butler County, Pa. i. W-39-Summary groundwater resources of Beaver County, Pa. j. M 89- Coal resources of Allegheny County Pa.—Part 1, Coal crop lines, mined-out areas, and structure contours-has applicability to mine subsidence and AMD discussions. k. M-90-Coal resources of Butler County, Pa.—Part 1, Coal crop lines, mined-out areas, and structure contours-has applicability to mine subsidence and AMD discussions.	
Chapter one, page three discussion of topography might be worthwhile to include physiographic section and ecoregion maps, with the watershed outlined.	Comment noted. Because only one watershed is located in one physiographic section the map was not included
Although it is implied by the discussion of both physiographic sections and ecoregions in the topography section, it would be useful to discuss that ecoregions, although also based on flora and fauna, almost exactly coincide with physiographic sections, because the geology is a major control of the flora and fauna.	Clarification added
PA Bureau of Forestry has developed a Pennsylvania ecoregions map. Your discussion of ecoregions should probably use the names and boundaries designated on that map.	Comment noted. Ecoregions used are those of the U.S. Forest Service
Discuss the data available from PA Geological Survey through PAMAP.	Comment noted
Chapter two discusses geology, but never addresses why knowing the geology is important. The soils are derived from the rocks. Different plants live on different geologic units. Groundwater, and therefore surface water, is controlled by the geology-both quantity and natural quality. Geology controls topography. Different units respond differently to development. Geology is the base of the ecological pyramid. That is why ecoregion boundaries largely coincide with physiographic section boundaries.	Clarification added
On page 2-1 and figure 2-1, the legend on the geologic map and the discussion of the geology have the stratigraphic units in the wrong order. Traditionally, units are discussed and listed in order that they occur, and not alphabetically. The Allegheny is located immediately above the Pottsville, and should be reflected as such on the map's legend. They also should be discussed in the proper order in the text.	Figure and text updated and corrected
Discuss what characteristics of the geologic units are that make them distinguishable from each other. You mention that they have distinct characteristics but you do not mention what they are.	Section expanded
Soil Associations-As part of the descriptions of the soil associations, include the parent material. For most, it will be	Statement added to the text referring interested readers to the Soil Surveys for

educational to see that soil characteristics are depended on the geologic source material from which they are derived.	specific soils identified in the soil associations
Page 2-11, under oil and gas exploration, the Drake well was drilled not dug.	Corrected
A map of the oil and gas fields and pools would be useful to see what parts of the watershed have or had production. Our subsurface geology section can provide you with the field data.	Figure added
You mention that the number of oil and gas permits increased 32.4 percent from 2004 to 2005, but that the watershed has seen a decline in permits. You might mention the current exploration trends (geologically and geographically) to show where they are relative to the watershed. Again, our subsurface geology section can help provide the information.	Figure 2-6 was added indicating where oil and gas wells are located
On page 2-12 under mining, note which formations are the coal-bearing formations. The PA Geological Survey has a series of county coal reports in the mineral resource series (M 89 [Allegheny County] and M 90 [Butler County]- http://www/dcnr.stat.pa.us/topogeo pub/mineral.aspx), which show coal crop lines, mined out areas, and geologic structure. These reports are also applicable to the discussion on page 2-14 about mine subsidence. Also, a coal availability study for the Saxonburg 71/2' quad (http://www.dcnr.state.pa.us/topogeo/ pub/openfile/of05_02.aspx) evaluates coal resources, and the environmental, cultural, and technological restriction to their mining.	Information about geologic formations added to the mining section
Two additional critical areas (starting on page 2-12) that should be discussed are groundwater recharge areas and areas for potential future natural resource extraction.	Added
On page 2-13, under landslide, in the explanation of a slump, 'weight rotation" does not make sense. I think that you are referring to the mass of material sliding and rotating on an arcuate failure surface.	Explanation changed and expanded
In Table 2-3, is Soose Auto Wrecking in the Connoquenessing watershed or the Slippery Rock watershed?	Site was verified and salvage yard name was changed and is located within the project area
Page 2-18, do the two active landfills within the watershed accept out-of-state waste?	Seneca – verified, yes currently only within their service area. Brunner –verified does not accept out of state waste
On page 2-19, under Abandoned Mines, you mention that the southeast corner of the watershed is completely free of coal mining. You should mention that it will likely remain so, because the Casselman and Glenshaw Formations do not generally contain economic coals. Past and future coal mining will largely be confined to the outcrop areas of the Allegheny Formation, which, with some exception, is the only one in the watershed with economic coals.	Section expanded
Do you know the acreage of the inactive and abandoned coal mines in the watershed?	Comment noted. Information on the acreage of inactive and abandoned mine lands could not be calculated

On page 3-2, Little Connoquenessing Creek is included in the Middle Connoquenessing watershed discussion, but in Table 3-1, it is included in the Lower Connoquenessing Creek.	Updated and corrected
On page 3-3, the heading "Important Components of Water Quality" should be "Important Components of Water Resources." These components are not just for water quality, but also water quantity.	Changed as suggested
Under "Important Components," a brief discussion of the hydrologic cycle, including the relative amounts of water in each part, would be appropriate. For Statewide, that can be gotten in our Educational Series 3 booklet on the Geology of Pennsylvania's Groundwater. There may be information more specific to the watershed in our Water Resource Reports 35, 36, and 39, which are groundwater summaries for Allegheny, Butler, and Beaver counties, respectively.	Hydrologic Cycle section was added
Under "Important Components," groundwater should be before surface water in the Water Resources section, because 1.) groundwater is the much larger resource (estimated 30 times as much groundwater as surface water) and 2). Groundwater is the single largest source of surface water, probably 60 to 70 percent of stream flow, not 50 percent as noted on page 3-5. Most surface water is basically where the water table intersects the land surface. The fact that groundwater and surface water are a single resource and should NOT be considered separately in any planning is a crucial principal that is not understood by many planners. <u>This principal should be reiterated at every opportunity</u>, as you will see in later comments.	The subheadings under "Important Components" were rearranged accordingly; The percentage of groundwater contribution to surface streams was changed to 60–70 percent; Comment on groundwater and surface water being identified as a single resource was clarified and incorporated throughout the plan in appropriate sections
In order to understand the groundwater system better, PA Geological Survey's water well database (PaGWIS) provides a large, spatially distributed source of water well data. Starting in June 2009, all records for new wells drilled in Pa will require coordinates determined by an approved method (preferably GPS), but most records currently in the system do NOT have accurate coordinates. We would like to work with local watershed groups in getting accurate locations for these wells. We do not have sufficient staff in the water well section (one part-time person) to locate all of these hundreds of thousands of wells statewide. It would be to everyone's benefit to have accurate locations.	Recommendation added
Page 3-15, the definitions of perennial, intermittent, and ephemeral should be on page 3-3 under "Streams and Rivers," where it is explained that a surface water body is simply a reflection of where the water table intersects the ground surface. This is another reason why the surface water section should be after the groundwater section. It helps to explain that groundwater and surface water are a single system, not two separate systems. While the benthic macroinvertebrate community is a good indicator for classifying streams as perennial, intermittent, or ephemeral in the absence of detailed water table fluctuation data, the actual definition is based on	Changed and clarified as suggested

the relative poison of the stream bottom with respect to the water table. The definition of perennial given here does not include the water table as part of the definition, although that is why they flow year-round.	
In Chapter 3, there is a whole section Water Quality, but nothing about water quantity. Generally groundwater flow is very important because quality problems cannot be evaluated if the flow paths are not known. Also, quantity is important because so many use it for various purposes, and overuse can affect streamflow (since streamflow is mostly derived from groundwater.)	
There are some problems in the groundwater section, starting on page 3-4. The section probably should be completely rewritten. We can help you do this. Specifically, a.) There is the statement "the quality of streams and lakes can directly impact the quality of groundwater, and vice versa." The vice versa is the more likely, because streams and lakes are in discharge areas, and usually do not infiltrate to the groundwater system. Their effect on groundwater is usually local. Also, the quality of groundwater is itself important, not just its effects on surface water. b.) The statement "water levels are most affected by precipitation patterns" is not true. Water levels are affected by precipitation, but are most affected by evapotranspiration. Water levels will usually drop in the summer regardless of the amount of rain, because most of the rain is transpired by plants. See example is ES 3. c.) "Through the space between grains may be small, cumulatively they are capable of generating large amounts of water." In unconsolidated sediments, that is true, but in lithified rocks, most of the space between the grains (pores) has been filled by the binding material that has lithified the rock. d.) "secondary opening occur from fractures in the geology of rocks." Remove the words "geology of." e.) "Any one fracture will likely generate more water than a primary opening, because secondary openings are usually less abundant and are not capable of yielding much water." This sentence makes no sense to me. Most groundwater flow in lithified rocks is through fractures.	Changes and clarifications made as suggested
The wetlands section, starting on page 3-9, in the first paragraph, it should be noted that the reason that a wetland is covered with water at least part of the year is because a wetland occurs where the water tables is at or very near the surface. The seasonal fluctuations of the water table result in the wetland being wet and dry in different parts of the year.	Explanation added
On page 3-9, in the second paragraph under wetlands, there are several references to wetlands helping to absorb water into the ground and recharge the groundwater. However, wetlands are generally discharge areas, and are not areas of significant water infiltration and groundwater recharge, especially when the water table is at or above the land surface.	Clarification made, and references to wetlands "absorbing" water were reworded

On page 3-11, under non-point source pollution, indicate that it is also through groundwater pollution discharge into streams, such as the AMD example given.	Changed as suggested
On page 3-12, under contour farming, indicate that it allows increased infiltration and groundwater recharge.	Clarified as suggested
On page 3-13, does strip cropping alone increase the infiltration of water? It would not be nearly as effective as it is when combined with contour farming, which is the real key.	Comment noted and incorporated into definition of strip cropping
In the discussion of sewage facilities under "Pennsylvania Sewage Facilities Act," starting on page 3-13, it should be noted that sewage treatment plants in areas using wells as a water source (public or private) result in a reduction in groundwater storage, because the water removed through wells is not returned to the groundwater system after use and treatment, but diverted to the surface water system. In contrast, as far as groundwater quantity, private sewage systems do not disrupt the natural hydrologic cycle, because water removed from the groundwater system is returned to the subsurface after use and treatment.	Further explanation incorporated into the discussion in the noted section
On page 3-14, in the second paragraph, note that the pollution of groundwater can eventually result in pollution of surface water because surface water is largely derived from groundwater. It may appear to be a minor change, but the importance of groundwater to surface water needs to be emphasized at every opportunity because it is a crucial, but little understood principle.	Comment noted and added
On page 3-16, in the water quality monitoring section, I assume that you are referring only to surface water monitoring. Again, because the majority of surface water is derived from groundwater discharge, you might recommend direct groundwater quality monitoring. Detection of pollution in groundwater can head off surface water pollution. Because groundwater contamination cleanup is much more difficult than surface water, finding it early through monitoring can save a lot of money and effort by detecting it early before it spreads and before it discharges to surface water.	Suggestion incorporated into text and as management recommendation; See management recommendations 3-K.4, 3-K.5, 3-K.7, and 3-K.9
On page 3-16, under abandoned mine drainage, I would suggest pointing out that AMD is pollution that simply occurs because of a change in the physical groundwater flow system, and does not require the introduction of any pollutant into the water system. I think that most people assume that pollution requires the introduction of some foreign material into the system, but that is not the case.	Clarification added as suggested
For land and water resources, Pennsylvania Geological Survey (PaGS) might be potential partners, but mostly a source of data and information to be used in many of these goals and methods. PaGS could be a potential partner in several of the methods listed for Goals 1-B, 1-C, 1-E, 3-K, 3-M, and 3-R.	Added to recommendations
For Goal 3-K, I would suggest adding that all private water wells should be inventoried. Many of the well records should	Added to recommendations

be available through the Pennsylvania Geological Survey's PaGWIS database. Accurate locations should be determined for all of the wells (and reported to the PaGS for updating PaGWIS). These well records include well construction, pump test, and geologic information, and can be used for a variety of purposes, including developing a baseline water level study, as described in method nine for Goal 3-K. It is a readily available source of groundwater and geologic data spatially distributed through the entire watershed.	
Delano and Wishusen (2001) is published by Pennsylvania Geological Survey, not the Pennsylvania Geological Society	Corrected
PaGWIS (Pennsylvania Groundwater Information System) (http://www.dcnr.statepa.us/topogeo/groundwater/PaGWIS/PaGWISMenu.asp?c=t) should be listed as a source for water well data under Water Resources chapter.	Added to Appendix
Pennsylvania Geological Survey web site (http://www.dcnr.state.pa.us /topogeo/index.aspx) should be listed as a source for Geological Characteristics data under Land Resources.	Added to Appendix
Our environmental geology series of publication (http://www.dcnr. state.pa.us/topogeo/pub/environmental.aspx) should be listed as a source for environmental geology reports under Land Resources.	Added to Appendix
Our mineral resource series of publication (http://www.dcnr. state.pa.us/topogeo/pub/mineral.aspx) should be listed as a source for mineral resource reports under Land Resources.	Added to Appendix
I would suggest that links to all of the websites listed in Appendix O, including those I am suggesting be added to it, should be made available on your Watershed Conservation plan website.	The entire report including appendices are available on website, including these sources. Direct links to each resource
The golf courses on Figure 5-1 are largely, if not all, mislabeled. At least the ones that I am familiar with are mislabeled. I'm not sure that gold courses exist at all of the locations in Figure 5-1. I think that some of the other recreational facilities are wrong also. For example, #122 is Harmony Historic District, but it is nowhere near Harmony on Figure 5-1. And some numbers on the map are not on the key (e.g. 132 in Butler). I think that Parks are largely located and labeled correctly, but golf course and historic sites have numerous (perhaps most) errors in both location and labeling. However, everything should be rechecked and corrected.	Key corrected

Bob Cichra

Comment	Action Taken
Chapter one Table 1-2: Connoquenessing Township has a Comprehensive Plan-It was adopted 11/7/07 Resolution #113. It was a joint plan with Connoquenessing Borough. I am not	Verified and corrected

aware if Connoquenessing Borough has adopted it yet.	
Chapter one Table 1-2: Connoquenessing Township has a Subdivision Ordinance: Code of Ordinances - Connoquenessing Township Adopted by Ordinance 59, September 9, 1997 - Chapter 22, Subdivision and Land Development.	Verified and corrected
Chapter one Table 1-2: In the Code of Ordinances, there is also a section on Flood Plains (Chapter 8) which describes the requirements for floodplain construction	Verified and corrected
Fig 1-13 - Connoquenessing Fire Department is not shown.	Added to figure
Fig 1-13 - Meridian Fire Department is not shown	Added to figure
Chapter six, page 15: I believe “Somewhat Important should be one not two in the description.	Corrected throughout the chapter

APPENDIX K. SURVEY AND INTERVIEW QUESTIONS

Public Survey

Connoquenessing Creek Watershed Conservation Plan

Thank you for taking the time to complete this very important survey. The Connoquenessing Creek Watershed Conservation Plan Steering Committee and Western Pennsylvania Conservancy are conducting this survey.

The purpose of this study is to help us understand what residents of the communities within the watershed think of current conditions and their future visions. Your ideas provide a basis for making recommendations and priorities for the watershed in the plan. Should you have any questions about the survey, or if you would like to find out more information or become involved in the planning process, please do not hesitate to contact Carla Ruddock or Kylie Daisley of the Western Pennsylvania Conservancy at 724-459-0953.

Thanks again for your time to complete this survey. We truly value your input.

Public Survey

1.) In what county and municipality do you reside?

County _____ Municipality _____

2.) In what watershed do you reside?

□ Lower Connoquenessing Creek (Mainstem) –Little Connoquenessing Creek to mouth and including Brush Creek
□ Middle Connoquenessing Creek (Mainstem) –Thorn Creek to Little Connoquenessing Creek and including Glade Run, Breakneck Creek, and little Connoquenessing Creek
□ Upper Connoquenessing Creek (Mainstem) –Headwaters to Thorn Creek including Bonnie Brook and Thorn Creek
□ Don't Know
□ Other _____

3.) What do you think are the two most common land uses in your area?

□ Residential
□ Commercial
□ Industrial
□ Forested
□ Agricultural
□ Recreation
□ Other_____

4.) Please indicate the importance of the following watershed values.

	Very Important	Somewhat Important	Neutral	Not likely Important	Not Important
Attractive Natural Settings	5	4	3	2	1
Preserving Historic Sites	5	4	3	2	1
Recreation Opportunities	5	4	3	2	1
Water Quality Improvement	5	4	3	2	1
New Business/Jobs	5	4	3	2	1
Community Activities	5	4	3	2	1
Residential Development	5	4	3	2	1
Educational Opportunities	5	4	3	2	1
Other _____	5	4	3	2	1

5.) Please indicate the importance of the following recreational activities in the watershed.

	Very Interested	Somewhat Interested	Neutral	Not-likely Interested	Not Interested
Boating	5	4	3	2	1
Hiking	5	4	3	2	1
Fishing	5	4	3	2	1
Canoeing/Kayaking	5	4	3	2	1
Horseback Riding	5	4	3	2	1
Swimming	5	4	3	2	1
Hunting	5	4	3	2	1
Bird Watching	5	4	3	2	1
Picnicking	5	4	3	2	1
Visiting Scenic Vistas	5	4	3	2	1
Organized Sports	5	4	3	2	1
Photography	5	4	3	2	1
Visiting Public Parks	5	4	3	2	1
ATV Riding	5	4	3	2	1
Biking	5	4	3	2	1
Golfing	5	4	3	2	1
Other _____	5	4	3	2	1

6.) List three things you like about the watershed.

1. _____
2. _____
3. _____

7.) List three things you don't like about the watershed.

1. _____
2. _____
3. _____

8.) List three suggestions to improve conditions in the watersheds.

1. _____
2. _____
3. _____

9.) Other comments or concerns.

_____
_____
_____

If you would like to be informed of public meetings regarding this project and project updates, please complete the information below.

Name _____ E-mail _____
Address _____ Home Phone _____
_____ Work Phone _____

Completed Surveys can be sent to
Connoquenessing Creek Watershed Conservation Plan, 246 South Walnut Street, Blairsville, PA 15717

Municipal Survey

Part One - Phone

1.) Does your municipality have a comprehensive plan? **YES or NO**
If yes, what is the name of the plan(s) and when was it adopted?

_____
_____

2.) Does your municipality currently utilize zoning and/or subdivision ordinances?
YES or NO If yes, what types of ordinances do you have?

_____
_____
_____

3.) Does your municipality have floodplain ordinances? **YES or NO**

4.) Are there any municipal parks in your municipality? If yes, please list them?

_____
_____
_____

5.) a. Does your municipality have any public water services in the Connoquenessing Creek watershed area? **YES or NO** If yes, please list the name and capacity of each facility.

_____
_____
_____

b. Do you foresee the need to upgrade or establish a public water supply in your municipality in the Connoquenessing Creek watershed area within the next ten years? **YES or NO**

6.) a. Does your municipality have any public sewage systems in the Connoquenessing Creek watershed area? **YES or NO** If yes, please list the name and capacity of each facility.

_____
_____
_____

b. Do you foresee the need to upgrade or establish a public sewage system in your municipality in the Connoquenessing Creek watershed area within the next ten years? **YES or NO**

7.) Is there anything unique, or well known about your municipality that you would like to have highlighted in the plan?

Part Two – Mailed

Connoquenessing Creek Watershed Conservation Plan

Thank you for taking the time to complete this very important survey. The Connoquenessing Creek Watershed Conservation Plan Steering Committee and Western Pennsylvania Conservancy are conducting the survey.

The purpose of this study is to help us understand what municipal officials of the communities within the Connoquenessing Creek watershed think of current conditions and how they would like to see the watershed resources and characteristics progress in the future. This will give the steering committee a basis for making recommendations for the watershed in the plan. Should you have any questions about the survey, or if you would like to find out more information or become involved in the planning process, please do not hesitate to contact Carla Ruddock of Western Pennsylvania Conservancy at 724-459-0953 ext. 107.

Thank you again for taking the time to complete this survey. We truly value your input.

Municipal Survey

1.) In what county and municipality do you represent?

County _____ Municipality _____

2.) In what watershed(s) is your municipality located?

□ Lower Connoquenessing Creek (Mainstem) –Little Connoquenessing Creek to mouth and including Brush Creek
□ Middle Connoquenessing Creek (Mainstem) –Thorn Creek to Little Connoquenessing Creek and including Glade Run, Breakneck Creek, and little Connoquenessing Creek
□ Upper Connoquenessing Creek (Mainstem) –Headwaters to Thorn Creek including Bonnie Brook and Thorn Creek
□ Don't Know
□ Other _____

3.) What do you think are the two most common land uses in your area?

□ Residential
□ Commercial/Industrial
□ Water/Wetlands
□ Forested
□ Agricultural
□ Recreational
Other_____

4.) Please indicate the importance of the following watershed values.

	Very Important	Somewhat Important	Neutral	Not likely Important	Not Important
Attractive Natural Settings	5	4	3	2	1
Preserving Historic Sites	5	4	3	2	1
Recreation Opportunities	5	4	3	2	1
Water Quality Improvement	5	4	3	2	1
New Business/Jobs	5	4	3	2	1
Community Activities	5	4	3	2	1
Residential Development	5	4	3	2	1
Educational Opportunities	5	4	3	2	1
Other _____	5	4	3	2	1

5.) Please indicate the importance of the following recreational activities in the watershed.

	Very Interested	Somewhat Interested	Neutral	Not-likely Interested	Not Interested
Boating	5	4	3	2	1
Hiking	5	4	3	2	1
Fishing	5	4	3	2	1
Canoeing/Kayaking	5	4	3	2	1
Horseback Riding	5	4	3	2	1
Swimming	5	4	3	2	1
Hunting	5	4	3	2	1
Bird Watching	5	4	3	2	1
Picnicking	5	4	3	2	1
Visiting Scenic Vistas	5	4	3	2	1
Organized Sports	5	4	3	2	1
Photography	5	4	3	2	1
Visiting Public Parks	5	4	3	2	1
ATV Riding	5	4	3	2	1
Biking	5	4	3	2	1
Other _____	5	4	3	2	1

6.) What are the three most critical needs or challenges in your county or municipality that affect the Connoquenessing Creek watershed?

4. _____
5. _____
6. _____

7.) What projects would you like to see implemented in the area that you represent that could be included in the Connoquenessing Creek Watershed Conservation Plan? Please list short-term and long-term projects and goals.

a.) Land Use/Land Resources (farmland preservation, development, planning, etc.)

_____
_____
_____
_____

b.) Water Resources (quality, quantity, etc.)

_____
_____
_____
_____

c.) Biological Resources (plant, animal, terrestrial, aquatic, areas of concern, etc.)

_____
_____
_____
_____

d.) Cultural Resources (historical, recreational, environmental education, etc.)

_____
_____
_____
_____
_____

e.) Other (roads/other transportation, economy/jobs, population & demographic trends)

_____
_____
_____
_____

Completed surveys can be sent to: Connoquenessing Creek Watershed Conservation Plan, 246 South Walnut Street, Blairsville, PA 15717, Attention: Carla Ruddock

Interview Questions

Connoquenessing Creek Watershed Conservation Plan Name: _____
Key Individual Interview

1. How has the watershed* changed in the past 10 years? Were these changes good, bad, indifferent? *Note: "watershed" includes landscape features, ecological communities, & human infrastructure.

   _____
   _____
   _____

2. How do the following currently meet the needs of the watershed community? (Are the quantities sufficient, insufficient, or satisfactory? Are they in good condition?) Please include your solution recommendations.

    a. Transportation –area roads, public transportation

    _____
    _____
    _____
    _____

    b. Infrastructure – water and sewer lines

    _____
    _____
    _____
    _____

    c. Employment Opportunities

    _____
    _____
    _____
    _____

    d. Educational Opportunities

    _____
    _____
    _____
    _____

    e. Land Use Ordinances

    _____
    _____
    _____
    _____

3. Do the recreational opportunities currently meet the needs of the watershed community? (Are there too many, not enough, or a sufficient number? What condition are they in? Are they easy to access? Please include your solution recommendations.)

    a. Parks/Picnic Sites

    _____
    _____
    _____
    _____

    b. Hiking/Biking Trails

    _____
    _____
    _____
    _____

c. Off- Road Vehicle Riding

_____
_____
_____
_____

d. Scenic Vistas/Photography

_____
_____
_____
_____

e. Wildlife/Bird Watching

_____
_____
_____
_____

f. Hunting/Fishing

_____
_____
_____
_____

g. Boating/Swimming

_____
_____
_____
_____

h. Historical Sites/Structures

_____
_____
_____
_____

i. Golf Courses and other

_____
_____
_____
_____

4. What are some of the positive features of the watershed? (Please consider both the ecological and social community in your answer, from water quality to economics.)

_____
_____
_____
_____
_____
_____

5. What are some of the negative impacts currently affecting the land, water, and biological resources?

   _____
   _____
   _____
   _____
   _____

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

   _____
   _____
   _____
   _____

7. What must the watershed conservation plan say to be successful?

   _____
   _____
   _____

8. What must the watershed conservation plan *not* say to be successful?

   _____
   _____
   _____

9. Do you know of any other people we should interview?

   Name _____ Phone _____
   Address _____

   Name _____ Phone _____
   Address _____

   Name _____ Phone _____
   Address _____

10. Do you have any other questions or comments before we conclude this interview?

APPENDIX L. FUNDING SOURCES

Sponsoring Organization	Description / Restrictions	Contact
BMP		
State Conservation Commission-Dirt and Gravel Roads Maintenance	Available to local municipalities and state agencies for projects dealing with the BMPs for erosion and sedimentation control problems and fugitive dust in watersheds; dirt and gravel road jurisdiction required.	www.pacd.org
Community		
Pittsburgh Foundation	Economic, community development and the environment. Activities that increase employment, build strong neighborhoods, and promote civic engagement by all segments of the population. Funds for quality of life.	www.pittsburghfoundation.org
Energy		
DEP - Alternative Fuels	The Alternative Fuels Incentive Grants program continues to fund a considerable number of projects that use alternative fueled energy sources to reduce air pollution and our dependence on foreign oil. Alternative fuels include compressed natural gas.	www.dep.state.pa.us
Environmental		
Beldon II Fund	Support environmental organizations working at the state-level. Some grants are made to regional and national organizations for efforts that support the work of state level groups.	www.beldon.org
Ben & Jerry's Foundation	Grant applications need to demonstrate that the project will lead to environmental change, address the root causes of environmental problems, and must help ameliorate an unjust or destructive situation by empowering constituents and facilitating leadership.	www.benjerry.com
Eddie Bauer	Fund projects in certain local areas that support environmental goals such as clean rivers and streams or beautifying parks and school grounds. Must be 501(c) 3 and proposal should be kept between 2-3 pages.	www.eddiebauer.com

Environmental (continued)

Sponsoring Organization	Description / Restrictions	Contact
Howard Heinz Endowment	This program promotes environmental quality and sustainable development by supporting efforts to eliminate waste, harness the power of the market, and create a restorative economy. Should Promote sustainable urban design. Concentrated in Western Pennsylvania.	www.heinz.org
Raymond Proffitt Foundation	The foundation's purpose is to protect and restore the quality of the natural and human environment by informing and educating the general public about the impact of human endeavors upon the natural environment. The RPF strives to advance this understanding.	www.rayproffitt.org
Surdna Foundation	The foundation's goal is to prevent damage to the environment and to promote more efficient, economically sound, environmentally beneficial, and equitable use of land and natural resources. Does not fund environmental education, sustainable agriculture, food production or toxic and hazardous waste.	www.surdna.org
Vira I Heinz Endowment	This program promotes environmental quality and sustainable development by supporting efforts to eliminate waste, harness the power of the market, and create a restorative economy. The program's goal is to promote sustainable urban design. Western Pennsylvania watersheds only.	www.heinz.org

Environmental/Watershed

EPA-Clean Water State Revolving Fund	May also contact: Beverly Reinhold (717) 783-6589. Infrastructure Investment Authority, Keystone Building 22 South Third Street, Harrisburg, PA 17101. email: breinhold@state.pa.us or Peter Slack, (717) 772-4054; DEP 400 Market Street, Harrisburg, PA 17105	(717) 772-4054
WREN - Conference/Training Scholarships	The activities funded must be educational and relate to drinking water source protection or watershed education. Applicant is required to provide a five percent match.	www.pa.lwv.org/wren
River Network Watershed Assistance Grants	Watershed projects and group start-ups.	www.rivernetwork.org
Foundation for Pennsylvania Watersheds	Provides funding to grassroots organizations and watershed associations for specific watershed remediation in Pennsylvania.	

Environmental Education

Sponsoring Organization	Description / Restrictions	Contact
Captain Planet	Supports hands-on environmental projects for children and youth to encourage innovative programs that empower children and youth around the world to work individually and collectively to solve environmental problems. Only for environmental education of children. Online only.	www.turner.com/cpf
DEP Environmental Education Grants	Open to schools, conservation districts, and non-profits. Open in summer, awarded in spring. Final application due dates vary. Application available online. Requires twenty percent match and reimbursement program.	www.dep.state.pa.us
Education Mini Projects Program	Small grants for Pennsylvania-based grassroots educational projects that address non-point source watershed concepts.	(717) 236-1006
Emerson Charitable Trust	Strong emphasis on cultural aspects and youth education, also science and education.	(314) 553-3722
EPA Environmental Education Grants Region III	Grants awarded to small non-profit groups for various projects in Region III.	(215) 566-5546
National Environmental Education and Training Foundation	To increase environmental awareness, environmental education, partnerships, etc. May also be reached at (202) 261-6464. Proposal deadlines: Jan. 1, March 1, July 15, and Sept. 1	(202) 833-2933
PACD - Mini Projects	The objectives of the Educational Mini-Project must promote the We All Live Downstream message by: stimulating an awareness of and interest in Pennsylvania's non-point source water pollution problems and solutions; salaries are not an approved expenditure.	www.pacd.org
Project Wild	Project Wild is an interdisciplinary supplementary environmental and conservation program for educators of children in grades K-12. Small grants only.	www.projectwild.org
The Dunn Foundation	Promote the issues of the negative effect that sprawl, visual pollution, and poorly planned development have on the visual environment of communities and the resulting loss of quality of life. Encourage dialogue within and between communities. Do not fund property acquisition, capital improvement projects, capital campaigns, endowments, individuals, religious groups, or political organizations.	www.dunnfoundation.org

Environmental Education (continued)

Sponsoring Organization	Description / Restrictions	Contact
The Pathways to Nature Conservation Fund - National Fish and Wildlife Foundation	A partnership between the more than 270 Wild Birds Unlimited, Inc. franchises and the National Fish and Wildlife Foundation. The Pathways to Nature Conservation Fund offers grants to enhance environmental education activities and bird and wildlife viewing opportunities at significant sites.	www.nfwf.org
Water Resources Education Network - LWV	Funding to develop education programs for water issues facing communities. Local contact is shrerenehess@yourinter.net, Indiana PA, 724-465-2595. Must be 501(c)3	www.pa.lwv.org/wren
WREN - Opportunity Grants	The activities funded must be educational and relate to drinking water source protection or watershed education.	www.pa.lwv.org/wren

Environmental Justice

EPA-Environmental Justice Small Grant Program	The program provides financial assistance to eligible affected local community-based organizations working on or planning to work on projects to address local environmental and/or public health concerns.	(202) 564-0152
Nathan Cummings Foundation	The foundation's purpose is to facilitate environmental justice and environmentally sustainable communities by supporting the accountability of corporations, governments, and other institutions for their environmental practices. Does not fund individuals, scholarships, or capital or endowment campaigns.	www.ncf.org
Norman Foundation	Support efforts that strengthen the ability of communities to determine their own economic, environmental, and social well-being, and that help people control those forces that affect their lives. Only fund in U.S. They do not fund individuals, universities, conferences, scholarships, research, films, media, arts projects, capital campaigns, fundraising drives, or direct social service programs.	www.normanfdn.org

Environmental Planning

Coldwater Heritage Partnership	Grants for prioritizing watersheds in need of protection, for assessment of coldwater ecosystems, and for the development of watershed conservation plans.	(717) 787-2316

Sponsoring Organization	Description / Restrictions	Contact
Environmental Planning (continued)		
DEP Nonpoint Source Control	Grants for planning and non-point source pollution control projects.	(717) 787-5259
DCNR - Community Conservation Partnership Program	Available to organizations that conserve and enhance river resources. Planning grants are available to identify significant natural and cultural resources, threats, concerns, and special opportunities, and the development of river	www.dcnr.state.pa.us
NRCS Watershed Surveys and Planning	Providing assistance for planning in water and coordinated water and related land resource programs in watersheds and river basins. Types of surveys and plans funded include watershed plans, river basin surveys and studies, flood hazard analyses, and floodplain studies.	www.nrcs.usda.gov
Flood Protection		
DEP Flood Protection Grant Program	Open to communities that need to perform non-routine maintenance or improvements to already existing flood protection projects. Also applies to the purchase of specialized equipment. Open to communities that have flood protection projects that are deemed operable.	(717) 787-7432
General		
Archer-Daniels-Midland Foundation	Proposals can be sent in letter form containing: 1) Description of the organization applying. 2) Description of the project/What funding would be used for. 3) A budget including how much is going to administrative costs. Emphasis is given to corporate operating locations.	www.admworld.com
Audrey Hillman Fisher Foundation, Inc.	Must refer to Application Procedures for more information. Preference given to southwestern Pennsylvania and central New Hampshire.	(412) 338-3466
Eureka Company	No specific interest, but, general focus is on social services, health, and the environment (wildlife, fisheries, habitat, and sustainable community development)	www.electrolux.se
Henry Hillman Foundation	Preference is given to organizations in the Pittsburgh/southwestern Pennsylvania area.	www.guidestar.org
Patagonia, Inc. Environmental Grants Program	Supports small grassroots organizations. Does not fund land acquisition.	www.patagonia.com

Sponsoring Organization	Description / Restrictions	Contact
General (continued)		
The Boeing Company	Provides contributions for capital campaigns, seed money (one-time grants) for new programs or projects that address community needs and priorities, and one-time grants to buy equipment, improve facilities, or enable special projects.	www.boeing.com/community
The Education Foundation for America	EFA's priorities include supporting the monitoring of the utility restructuring process as it impacts the environment, combating the growth of the "wise-use" movement, opposing large-scale live-stock confinement, and cutting federal "pollution." Letter limited to two pages.	www.efaw.org
The Prospect Hill Foundation	The foundation's environmental grant making concentrates on habitat and water protection in the northeastern region of the United States. Must have 501(c)3. The organization does not fund individuals, basic research, sectarian religious	http://fdncenter.org/grantmaker/prospecthill/
GIS		
DEP-GIS Software Grant	The grants consist of the latest commercial release of ArcView GIS software; several texts about utilizing GIS for environmental applications and land-use planning; CD-ROM containing spatial data about the commonwealth. Only issue 10 per quarter.	www.dep.state.pa.us
Habitat		
General Challenge Grant Program -National Fish and Wildlife Foundation	Requires non-federal match of 2:1. Address actions promoting fish and wildlife conservation and habitat; should involve conservation and community interest; leverage available funding and evaluate project outcomes.	www.nwf.org
Keep the Wild Alive (KWA) Species Recovery Fund	Fund on-the-ground projects that directly improve conditions for the endangered species highlighted in the KWA campaign. Current National Wildlife Federation employees are ineligible and applications must be submitted in English.	www.nwf.org/wildalive
Small Grants Program - National Fish and Wildlife Foundation	Address priority actions promoting fish and wildlife conservation and the habitats on which they depend; work proactively to involve other conservation and community interest; leverage available funding, and evaluate project outcomes. A 2:1 match of non-federal funds is required.	www.nwf.org

Sponsoring Organization	Description / Restrictions	Contact
Internship		
Office of Surface Mining Intern Program	Candidates must organize their work, work well with community groups and on their own, quickly internalize the requirements of acid mine drainage remediation and the national Clean Streams program, write well and enjoy public presentations. Academic credit. Can be undergraduate or graduate student. Positions available in AL, IL, IN, IA, KY, MD, MS, OH, OK, PA, TN, VA, WV. Must provide housing for interns.	(202) 208-2836
Land Protection		
DCNR Community Conservation Partnership Program	Conserve and enhance river resources by offering planning grants, technical assistance, implementation grants, development grants, and acquisition grants.	www.dcnr.state.pa.us
Lowes Charitable Foundation	Environmental initiatives that support the continued enhancement of the natural landscape, natural environment enhancers, and/or park improvement projects. Must apply online. Must be a 501(c)3.	www.lowes.com
Michael D. Ferguson Charitable Foundation	General environment, wildlife, fisheries, habitat, sustainable community, and development.	n/a
Nationals Parks Service - Land & Water Conservation Fund	Provide federal grants for land acquisition and conservation to federal and state agencies.	(303) 969-2500
The Wilderness Society	To preserve wilderness and wildlife, protect America's prime forest, parks, rivers, and shore lands, and foster an American land ethic. Alternate address Montana Regional Office, 105 West Main St., Suite E, Bozeman, MT 59715-4689	www.wilderness.org
Town Creek Foundation	Environmental issues of interest to the foundation include: 1) Preserving the ecological richness of our natural heritage, with a major focus on our federal public lands. 2) Promoting policies and practices to protect the land, estuaries, and coastal bays.	www.towncreekfdn.org

Sponsoring Organization	Description / Restrictions	Contact
Loan		
Environmental Loan Fund	The loan can be used for membership development, creating and implementing a workplace giving program, cause-related marketing, donor development, special events, direct mail campaigns, mission related business enterprises, or capital campaign work.	www.envsc.org
Pennsylvania Infrastructure Investment Authority Drinking Water Loans	Must show water quality impact, must have qualified loan candidate. Loans to stormwater projects and non-point source projects. Interest is 1-2.8 percent over 20 years.	(717) 787-813
Multiple		
Acorn Foundation	Interested in small and innovative community-based projects which preserve and restore habitats supporting biological diversity and wildlife, and advocate for environmental justice. Does not fund the following: direct services, capital expenditure, construction or renovation programs, programs undertaken by tax-supported institutions or government initiatives, emergency funding, scholarship funds, or other individual aid.	www.commoncounsel.org/pages/foundation.html
Allegheny Foundation	The Allegheny Foundation concentrates its giving in the western Pennsylvania area and confines its grant awards to programs for historic preservation, civic development, and education. No event sponsoring. Does not fund individuals.	www.scaife.com
Anne & George Clapp Charitable & Educational Trust	Fields of interest include education, social services, youth and child welfare, and aging. Limited support for cultural programs, historic preservation, and conservation. Southwestern Pennsylvania only; grants are not made to individuals. No grants are made for medical research, research projects, filmmaking, conferences, or field trips.	(412) 234-1634
Charlotte and Donald Teast Foundation	Sustainable communities, arts, humanities, civic and public affairs, education, the environment, health, and social services.	(214) 373-6039
Ford Foundation	Interested in general/operating support, continuing support, endowment funds, program development, conferences/seminars, professorships, publication, seed money, fellowships, internships, research, technical assistance, consulting services, and program-related investments.	http://jefferson.village.virginia.edu/readings/ford.html

Multiple (continued)

Sponsoring Organization	Description / Restrictions	Contact
Max and Victoria Dreyfus Foundation	Consider support for museums, schools, educational and skill training projects, programs for youth, seniors, and the handicapped. Must be located in the U.S.	(914) 682-2008
National Fish and Wildlife Fund -Five Star Restoration Challenge	Projects must involve diverse partnerships of, ideally, five organizations that contribute funding, land, technical assistance, workforce support, and/or other in-kind services. Projects involving only research, monitoring, or planning are not eligible. No mitigation work.	www.nfwf.org
National Parks Foundation	Education, training, preservation, and conservation. The grants that are available change often. See the website for current funding opportunities. Projects must connect with National Parks, be located on or next to National	www.nationalparks.org
Native Plant Conservation Initiative - National Fish and Wildlife Foundation	Through this initiative, grants of federal dollars will be provided to non-profit organizations and agencies at all levels of government to promote the conservation of native plants. There is a strong preference for "on-the-ground" projects that involve local communities and citizen volunteers in the restoration	www.nfwf.org
Public Welfare Foundation	The Public Welfare Foundation supports organizations that address human needs in disadvantaged communities, with strong emphasis on organizations that include service, advocacy and empowerment in their approach: service that remedies specific problems; advocacy that addresses those problems in a systemic way through changes in public policy; and strategies to empower	www.publicwelfare.org
Robert Shaw Charitable Foundation	Money to assist those organizations who work to enhance the educational, health and welfare, cultural, youth development, social welfare, and community development needs of the area. Only one grant per year will be	(724) 832-7578
Scaife Family Foundation	Grants awarded will support programs that strengthen families, address the health and welfare of women and children, or promote animal welfare. No event sponsorships, endowments, capital campaigns, renovations, or government agencies. No grants to individuals.	www.scaife.com
The French Foundation	Environment, and natural resources	n/a
The Lawrence Foundation	The mission of The Lawrence Foundation is to make a difference in the world by providing contributions and grants to organizations that are working to solve pressing educational, environmental, health, and other issues.	wwwthelawrencefoundation.org

Sponsoring Organization	Description / Restrictions	Contact
Multiple (continued)		
The Max and Anna Levinson Foundation	Interested in the environment, including preservation of ecosystems and biological diversity, but also environmental justice, alternative energy, alternative agriculture, and toxics. Must have 501(c)3 status. Rarely fund organizations with budgets in excess of $500,000.	www.levinsonfoundation.org
Turner Foundation	Supports activities to preserve the environment, conserve natural resources, protect wildlife, and develop and implement sound population policies. Interested in protecting rivers, lakes, wetlands, aquifers, oceans. Does not provide funding for buildings, land acquisition, endowments, start-up funds, films, books, magazines, or other specific media projects. Alternate Phone: 404-681-0172.	www.turnerfoundation.org
Natural Resources		
Beneficia Foundation	Only applications for projects focusing on conservation of the environment or the arts will be considered. Beneficia has no geographic preferences, but favors requests for project support over general support and does not look favorably	n/a
Canaan Valley Institute	Promotes the development and growth of local associations committed to improving or maintaining the natural resources of their watersheds in the Mid-	www.canaanvi.org
Charles A. and Anne Morrow Lindburgh Foundation	Grants awarded for the conservation of natural resources and water resource management. Grants are awarded to individuals for research and educational programs, not to organizations for institutional programs.	www.lindberghfoundation.org
Dana Corporation	Will consider funding air quality, environment, general, and water resources projects. Emphasis is given to areas where the corporation operates.	www.dana.com
Home Depot	Assistance is provided to non-profit organizations that direct effort toward protecting our natural systems. The grant program focuses on forestry and ecology, clean up, and recycling, green building design, and lead poisoning prevention.	www.homedepot.com
W. Alton Jones Foundation, Inc.	The goals of the foundation are to build a sustainable world by developing new ways for humanity to interact responsibly with the planet's ecological systems, and build a secure world by eliminating the possibility of nuclear war by	www.wajones.com

Sponsoring Organization	Description / Restrictions	Contact
Natural Resources (continued)		
Leo Model Foundation	Grants for habitat conservation, watershed conservation, and species preservation in the U.S.	(215) 546-8058
National Fish and Wildlife Fund Challenge Grants for Conservation	The foundation, in partnership with the NRCS and NACD (National Association of Conservation Districts) provides challenge grants. Primary goal of the program is to support model projects which positively engage private landowners.	www.nfwf.org
Rivers, Trails and Conservation Assistance Program	Grants to work with National Park Service to conserve land and river resources, and provides funding for various projects dealing with the conservation of these resources, including the development of trails and greenways.	(215) 597-1581
The River Restoration - NOAA	Submittal by email whenever possible. Encourage contact to discuss project prior to submitting application. Formal non-federal matches not required, but encouraged. Dam removal and fish passage. Available in northeast, Mid-Atlantic, and California.	www.amrivers.org/feature/restorationgrants.htm
The Watershed Protection and Flood Prevention Act	Plan development for natural resource concerns within a watershed area; cost sharing available to carry out plan.	(717) 782-4429
The William C. Kenney Watershed Protection Foundation	Protecting the remaining wild rivers of the west and ensuring the effectiveness of small environmental organizations.	www.kenneyfdn.org
Other		
Charles Stewart Mott Foundation	The environmental program is devoted to reform of international lending and trade policies. Projects must be part of a national demonstration when out of the Flint, Michigan area.	www.mott.org
North American Fund for Environmental Cooperation	Funds community based projects in Canada, Mexico and the U.S. to enhance regional co-operation, prevent environmental and trade disputes, and to	(514) 350-4357
PA DEP Brownfields Inventory	Grantees will be paid $1,000 for each site registered into the PA Site finder. Municipalities and economic development agencies may apply for the grant by submitting an application.	(717) 783-7816
Retired and Senior Volunteer Program (RSVP)	Provides a variety of opportunities for people aged 55+ to volunteer in the management of trails, rivers, and open space. Grants can be used for staff	www.nationalservice.org/senior/index.html

Plantings

Sponsoring Organization	Description / Restrictions	Contact
National 4-H Council	Grants are used to stimulate community tree planting and/or reforestation projects. Awarded to communities in support of on-going community planting/reforestation project or to stimulate new and creative youth-led projects. Organization must secure matching funds or in-kind contributions from other sources equal to the amount requested.	www.fourhcouncil.edu
National Gardening Association	One hundred grants to be awarded to start-up programs involving children, and 300 will be awarded to established programs. Covers tools, seeds, plant materials, products, and educational resources. Grant restricted to programs involving children. There is a $10.00 administrative fee.	www.kidsgardening.com
Plant Material Centers	American Indian Liaison Resource Conservation and Community Assistance Division of USDA/NRCS. PMC select and grow plants that grow naturally and provide them to those people who wish to grow native plants.	(202) 720-8576

Remediation/Restoration

Abandoned Mine Land Reclamation Program - Office of Surface Mining	Applications accepted anytime. Provides for the restoration of eligible lands and waters that have been mined, abandoned, or left inadequately restored. Two different grants are available. Protects land and corrects environmental damage caused by coal mining.	www.osmre.gov
AMD Watershed Assessment - Bureau of Mining and Reclamation	Must be a municipality, municipal authority or incorporated non-profit. AMD projects only.	(717) 787-7007
American Canoe Association CFS Grants	For grassroots organizations to improve waterways. Cleanups, riparian corridor, and water quality monitoring projects. Very flexible as long as it is improving waterways and fish habitat. Can not be used to pay staff. However, it can be used to pay a contractor. Must use volunteer help.	www.acnet.org
PA DEP - BAMR Abandoned Mine Reclamation Grants	Funds must be used for project development, design, construction, and directly related expenses. Site chosen must be located in a watershed or area with an approved rehabilitation plan . No administrative cost. Must be a municipality, municipal authority, or incorporated 501(c)3.	(814) 472-1800
Bring Back the Natives - National Fish and Wildlife Foundation	Supports on-the-ground habitat restoration projects that benefit native aquatic species in their historic range.	www.nfwf.org

Remediation/Restoration (continued)

Sponsoring Organization	Description / Restrictions	Contact
Community Foundation	Projects related to abandoned mine drainage remediation, alkaline discharges, streambank preservation, removal of spoil piles, and other issues related to water quality are of interest to the foundation's board of advisors.	(814) 669-4847
EPA - Nonpoint Source Implementation Grants	Funds are provided to the state to carry out non-point source projects and programs pursuant to Section 319 of the Clean Water Act as amended by the Water Quality Act of 1987. Grants are awarded to a single agency in each state, designated by the governor. 40 percent non-federally funded match required. Only one administered to each state.	www.cfda.gov/static/p66460.htm
NOAA Fish Habitat Restoration Program	Financial assistance for community-based habitat restoration projects, to	n/a
Office of Surface Mining Clean Stream Initiative	This grant is used to treat AMD. Design and administration is covered but the bulk of funding must go into construction. Must have funding partners. Applications available upon request. Review period takes 2.5-3 months, depending on eligibility. Must be a cooperative agreement.	(717) 782-2285
PA DEP -Stream Improvement Project Reimbursements	Provides assistance in an instance where a stream is posing a treat to structures, such as homes or businesses. Must pose threat to structure. Must be applied for by a conservation group or municipality.	(717) 783-7480
PA Fish and Boat Commission	Habitat improvement and technical assistance.	(814) 359-5158
Partnership with the U.S. Army Corps of Engineers	To foster cooperation on projects of mutual interest, such as fish and wildlife habitat restoration, non-structural flood control opportunities, wetland restoration, and endangered species protection.	www.nfwf.org
Pinellas County Environmental Foundation - National Fish and Wildlife Foundation	A partnership between Pinellas County and the National Fish and Wildlife Foundation. These two groups share the common goals of actively pursuing the protection, restoration and enhancement of fish and wildlife habitat, and developing creative and sustainable solutions to natural resource issues.	www.nfwf.org

Sponsoring Organization	Description / Restrictions	Contact
Research		
Conservation & Research Foundation at Connecticut College	The conservation and enlightened use of the earth's resources to encourage research to deepen the understanding of the intricate relationship between people and the environment. Will support higher education, individuals, museums, non-profits, and research. Unsolicited proposals are not accepted; however, letters of inquiry including a budget may be sent.	n/a
USDA - Nutrient Science for Improved Watershed Management	Funds for integrated research in extension management of nutrients on a watershed level. Nutrients of interest are nitrogen and phosphorous. Please note that a research foundation maintained by a college or university is not eligible. These grants are for research.	http://www.reeusda.gov/1700 /funding/ourfund.htm
Stormwater Management		
DEP Stormwater Management Program	Watershed planning for stormwater control and implementation of programs at local levels.	(717) 772-4048
Streambank Fencing		
Ducks Unlimited - PA Stewardship Program	Provides strong incentives to landowners to create wooded stream buffers, create wider than minimum buffers, and fence cattle out of the stream. Grant is available for fencing and tree planting.	(814) 386-3458
Fish America Foundation	Grants awarded for streambank stabilization materials, instream habitat improvements, contracted heavy equipment, and stream morphology work. Match not required, but is highly recommended.	www.asafishing.org
Partners for Fish and Wildlife Program	The Partners for Fish and Wildlife Program provides technical and financial assistance to private landowners for habitat restoration on their lands. A variety of habitats can be restored to benefit Federal trust species (for example, migratory birds and fish and threatened and endangered species.) Normally the cost share is 50 percent (the Service and the landowner each pay half of the project costs), but the percentage is flexible. Services or labor can qualify for cost-sharing.	(724) 938-4215
US Fish and Wildlife Service	Assists landowners in installation of high-tensile electric fence to exclude livestock from streams and wetlands. No buffer requirements.	www.fws.gov

Sponsoring Organization	Description / Restrictions	Contact
Streambank Fencing		
USDA Conservation Reserve Program	Statewide costshare program for creating stream buffers. A 40 percent practice incentive as well as a $10/acre incentive. Buffers of 35-180 feet per side of the stream. Land must have been pasture.	Regional USDA office
USDA - Environmental Quality Incentives Program	A statewide program based on environmental problems. It addresses all environmental problems on a farm. They fund BMPs.	Regional USDA office
USDA Project Grass	A co-operative effort of local farmers, conservation districts, with assistance from USDA, to improve agriculture productivity in southwestern Pennsylvania. For local contacts see information brochure on file. Contact: james.harrold@pasomerset.fsc.usda.gov	Regional USDA office
Technical Assistance		
Watershed Assistance Grants	Funding supports organizational development and capacity building for watershed partnerships with diverse membership. Match requested but not required. Non-profits, tribes, and local government only.	www.rivernetwork.org
Volunteers		
3M Foundation	3M sponsors a volunteer program called Community Action Retired Employee Service (CARES). Company favors projects that impact 3M communities. Alternate Phone: 612-737-3061	www.mmm.com
Wetlands		
U.S. Fish and Wildlife Service	For wetland Conservation projects. Must have 50 percent non-federal match in small-grant program with North American Wetlands Conservation Council.	www.fws.gov
Wetlands Reserve Program USDA Natural Resources Conservation Service	Restore and protect wetlands on private property; provide landowners with financial incentives to enhance wetlands in exchange for retiring marginal agricultural land.	Regional USDA office

APPENDIX M: AQUATIC COMMUNITY CLASSIFICATION

What information is used to describe the communities and their habitats?

Community Indicators

The animals that are most commonly associated with each community type are listed. While not every organism described in a given community will occur in each location where this community is found, organisms listed in this section give a general account of which organisms to expect in that community's habitat.

Species of Conservation Concern

Fish and mussels that are associated with a community and are tracked for their rarity are noted.

Habitat

Average values of the community characteristics across their entire range are presented. Size of the stream's watershed, gradient (slope) and elevation are a few habitat characteristics that may be important to the community type. Local conditions are also mentioned.

Land Use Composition - Trends in land-use patterns were calculated for each stream reach as percentages of the entire contributing watershed. Different amounts of urban, agricultural, or forested area in watersheds can directly influence stream habitat and resident organisms. For example, some organisms are only found in heavily forested (undisturbed) watersheds, while others can tolerate the altered habitat types that are found in heavily agricultural or urbanized settings.

State and Global Rank Descriptions

State/Global Rank	Rank Description
SX/GX	**Extirpated** – Element is believed to be extirpated/extinct from the state/ its entire global range
SH/GH	**Historical** – Only known from historical records
S1/G1	**Critically Imperiled** – Critically imperiled because of extreme rarity or because of vulnerability to extirpation
S2/G2	**Imperiled** – Imperiled because of extreme rarity or because of vulnerability to extirpation
S3/G3	**Vulnerable** – Vulnerable because rare and uncommon, or found only in a restricted range
S4/G4	**Apparently Secure** – Uncommon but not rare, and usually widespread
S5/G5	**Secure** – Demonstrably widespread, abundant, and secure

Community Quality Rating

Community types are generally ranked as low, medium, or high quality indicated by their associated habitat, water chemistry, and the sensitivity of the community's common organisms to pollution.

Community Rarity

Rarity in watersheds within Pennsylvania was determined by examining the number and distribution of community occurrences.

Threats

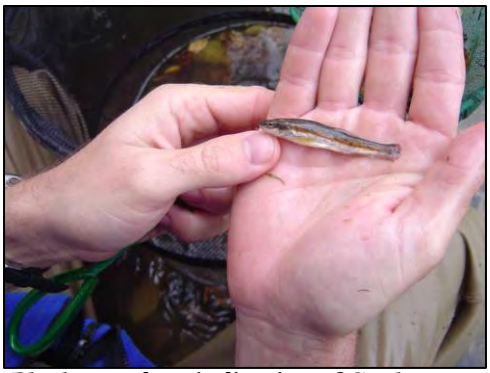
Potential pollution sources, where known, or other threats that may alter the natural state of the community are described.

Conservation Recommendations

Issues for natural resource managers and land planners to consider in the protection and management of watersheds and communities are described.

How does the Aquatic Community Classification relate to the DEP stream designations?

The purpose and meanings differ between the classes defined in Pennsylvania aquatic life use/special protection designations and aquatic fish assemblages from the Pennsylvania Aquatic Community Classification. The nomenclature of both classifications is similar. In both cases it is meant to relatively define the organisms and aquatic habitats along a gradient of water temperatures (and associated stream size). The DEP stream designations broadly encompass habitats occupied by several Aquatic Community Classification fish assemblages and are used in water quality regulation.



Blacknose dace indicative of Coolwater Stream Communities

Fish Communities

Coolwater Stream Community

Community Indicators: Blacknose dace, creek chub, stocked brown trout, white sucker, redside dace, longnose dace, fathead minnow, and pearl dace are common community members. Not all community members are present at community habitats.

Species of Conservation Concern: none

Habitat: This community type occurs in small to medium size streams, and in transitional temperature streams. Community habitats may occur in the headwaters of warm-water streams, in marginally or in seasonally warm streams, and in waters that have been degraded. Coolwater streams are generally faster than larger warm-water streams, and have intermediate temperature between warm and cold streams.

Fish in the Coolwater Stream Community are habitat generalists, and generally pollution tolerant. This community type may represent small, cool-water communities that occur in agricultural landscapes. This community also occurs in watersheds where urbanization and agriculture may be altering water quality.

In the Connoquenessing Creek watershed, the Coolwater Stream Community occurs in the headwaters of Connoquenessing Creek and in some tributaries, like Thorn Creek, Breakneck Creek, and Brush Creek. Because of its generalist nature, this community habitat may overlap with DEP designated Warm Water Fisheries (WWF) and Cold Water Fisheries (CWF) streams.

Community quality rating: Low-medium

Community rarity: No

Threats: The potential threats to the community habitat are a number of pollution types. Some tributaries to lower Connoquenessing Creek, like Brush Creek, are impaired for pollution from municipal point sources, degrading water with organic enrichment and low dissolved oxygen. In Thorn Creek and its tributaries, agricultural practices may be altering stream flow, adding nutrients, and modifying stream habitats. Mercury was cited as impairing fish consumption in Thorn Creek. Siltation from urban runoff and impoundment on Breakneck Creek (DEP, 2006a) likely degrades stream habitats. Near the community habitat in upper Connoquenessing Creek, urban runoff is causing excess siltation and one of the nearby tributaries has excess suspended solids from acid mine drainage.

Conservation recommendations: The habitat for the Coolwater Community represents an important transition between the smallest headwater streams and warm, larger streams. In its most natural state, this habitat is distinct among other habitat types and should be protected and restored.

Restoration of habitat and water quality is recommended especially addressing problems from sewer outfalls, agriculture, urban runoff and acid mine drainage. Management of storm water runoff and riparian vegetation restoration are critical to improvement of stream habitat conditions in agricultural and urban settings. Treating AMD is important for reducing stream acidity and toxic metal concentrations.

Warmwater Community

Community indicators: blunt-nose minnow, rock bass, pumpkinseed, bluegill, large-mouth bass, and golden shiner.

The pumpkinseed is one community indicator of a Warmwater Community

In other community locations, additional warm-water fish may be present, including: greenside darter, northern hogsucker, river chub, central stoneroller, rainbow darter, rosyface shiner, banded darter, smallmouth bass, common shiner, johnny darter, fantail darter, variegate darter, logperch, stonecat, silver shiner, blackside darter, striped shiner, golden redhorse, sand shiner, mimic shiner, spotfin shiner, yellow bullhead, silverjaw minnow, green sunfish, streamline chub, yellow perch, black redhorse, brown bullhead, tonguetied minnow, grass pickerel, trout perch, and Ohio lamprey. Brown trout and rainbow trout may sometimes be found with this community.

Species of Conservation Concern: None

Habitat: The Warmwater Community usually occurs in medium to large streams and rivers. Habitats are slower moving and warmer than small headwater streams. In its best condition, community habitat has little silt and turbidity, and is found in streams with gravelly substrate.

Examples of the community habitat are sections of Connoquenessing Creek and Breakneck Creek. The Community is also likely to occur in throughout the tributaries to Connoquenessing Creek that are also classified as Warm Water Fisheries by DEP.

Community quality rating: Medium

Community rarity: No

Threats: The mid- and upper-reaches of Connoquenessing Creek are impaired by excess salinity/TDS/chlorides and siltation from stormwater. Siltation from urban runoff and impoundment on Breakneck Creek (DEP, 2006a) degrade the stream habitat. Because of the large amount of agriculture in the watershed, runoff and habitat alteration from poorly managed agricultural areas is also a concern for this community.

Conservation recommendations: This community is a high conservation priority since high quality warmwater streams are uncommon. The fish in this community type are not especially rare individually, but this group represents habitats in need of protection.

Addressing threats of habitat alteration and water quality from impervious surfaces, agriculture, and other

sources is the major recommendation for protecting the Warmwater Community.

Large Stream and River Community

Community Indicators: Common carp, gizzard shad, emerald shiner, black crappie, and white crappie.

In other community locations, particularly large rivers, the following fish are also associated with the community: Channel catfish, sauger, freshwater drum, walleye, white bass, shorthead redhorse, spotted bass, silver redhorse, quillback carpsucker, flathead catfish, smallmouth buffalo, river redhorse, mooneye, muskellunge, longnose gar, brook silver-side, and northern pike.

Species of Conservation Concern: mooneye (S2/G5), smallmouth buffalo (S2/G5), longnose gar S2S3/G5), river redhorse (S3/G4), channel darter (S1S2/G4)

Habitat: Although the Large Stream and River Community occurs in the largest streams and rivers (hence, its name), it may be somewhat inappropriately named for the smaller warm water community habitats, like the Connoquenessing Creek. In addition to Connoquenessing Creek, the community occurs in Breakneck Creek. The diverse fish assemblage may also transition to the Warmwater Community throughout the watershed.

The preferred habitats of fish in the Large River Community generally exist in varied riverine habitats, including shallow shorelines, deep channels and slow or non-flowing impoundments behind dams. Impounded sections of the streams in the watershed may create habitat for this community type.

Community quality rating: Medium

Community rarity: Yes

Threats: Breakneck Creek and its tributaries are impaired for most of their lengths because of siltation from impoundment and from impervious surfaces. Runoff from urban/suburban sources, roads, and stormwater degraded water quality and habitat. The water quality on Connoquenessing Creek was found to have excess salinity/TDS/chlorides. Other sources of water quality degradation on Connoquenessing Creek are from impervious surface runoff and acid mine drainage (DEP, 2006a).

Conservation recommendations: Siltation and water quality issues within the watershed must be addressed to conserve fish habitat. Municipalities should work to reduce current stormwater issues and minimize additional runoff. Game and non-game fish populations and communities will benefit from better water quality and in-stream habitats.

Large, dead freshwater mussel shell found in Connoquenessing Creek near Camp Kon-O-Kwee

Freshwater Mussel Communities

General Threats and Conservation - Freshwater mussel populations are rapidly declining in North America. In the past 100 years, more than 10 percent of our continent's mussels have become extinct. For mussel species in the United States, nearly 25 percent have a status of federally endangered or threatened, and 75 percent are listed as endangered, threatened, or special concern by individual states (Nedeau et al., 2005).

Mussel communities are generally indicative of habitat types that are rare in Pennsylvania and becoming increasingly rarer. Mussel species are generally found in watersheds at least 75 km^2 (approximately 21.87 square miles) in size that have medium or large streams. Mussel richness (number of species) generally increases with increasing watershed size (Strayer & Jirka, 1997). The largest rivers in Pennsylvania, like the Ohio, Allegheny, Susquehanna and Delaware Rivers, generally have the most diverse mussel communities. Large streams and rivers of good quality without major habitat alterations are few.

Water quality threats to mussels include toxic and organic compounds released from industrial and municipal point sources. In recent decades, regulations of gross point source discharges have sufficiently improved water quality and allowed mussels to recolonize some streams and rivers. Non-point source pollution contributed from large areas, like farms and cities, can also threaten water quality for mussels. Agricultural practices can vary greatly, as can their influences on mussel communities. In many instances mussels are seemingly undisturbed by agricultural pollution, when compared to other aquatic organisms. However, excessive sedimentation and habitat alteration from agricultural practices can be detrimental to mussel communities. Runoff from urban and suburban developments appears to be more damaging to mussels, most likely due to combined effects of altered hydrology, warmer water temperatures and excess sediment and nutrient levels (Strayer & Jirka 1997).

Dams negatively influence mussel communities via hydrologic alteration, disrupted connectivity, habitat modification, and changes in thermal properties of the water. Dams also restrict the movement of fish hosts that transport the larval, parasitic mussel glochidia; this consequently restricts the dispersal ability and reproductive success of mussels. Alterations of the stream channel above and below the dam will potentially alter available habitat for mussel communities. Water quality and temperature are also largely altered in a reservoir. Impoundment management and drawdown plans are vital for maintaining healthy mussel communities.

The endangered northern riffleshell has declined due to habitat loss and poor water quality

Invasive mussel species like the zebra mussel and the Asian clam may be damaging to populations of native mollusks. Zebra mussels damage native mussels by attaching to individuals in large numbers, eventually killing them (Strayer & Jirka, 1997). Other non-native mussels may alter food resources and habitat (Hakenkamp et al., 2001), and may also deteriorate endemic mussel populations.

Mussel habitat requirements are not well known. Protecting habitats where mussels are currently occurring is a first step to ensuring a long-term mussel resource. Protection from major channel alteration by bridges, dams and dredging is important for maintaining habitat. Preventing excessive amounts of sediments, nutrients, and toxins in streams and rivers will maintain good water quality to support healthy mussel communities. Adopting zoning, stormwater detention ordinances, and natural resource protection ordinances will help protect mussel resources. Reducing the effects of urbanization through control of quantity and quality of stormwater will also help protect these habitats.

Many experts believe that effective aquatic conservation will result only from the protection of habitats within ecological and evolutionary contexts, which they equate with biological organization above the level of individual species (e.g. Angermeier & Schlosser, 1995). Targeting biological communities is a proactive approach to biodiversity conservation, because it protects whole assemblages of species before any single species declines into imperilment. In biological community protection, all species are protected: the common, the rare, and those not yet known (Higgins et al., 1998). Pennsylvania is fortunate to harbor many inland freshwater mussel taxa that are globally rare. By conserving the processes that support these species, we are better able to conserve the species. It is important to protect

each mussel community type and the habitats that contain rich mussel populations to effectively protect biodiversity.

Fatmucket Mussel Community

Community Indicators: fatmucket

Although the fatmucket may occur in the absence of other mussel species in the Connoquenessing Creek watershed, in other locations, mussel species like the giant floater, three-ridge, and Wabash pigtoe may be found with this community type.

Species of conservation concern: fatmucket (S4/G5), giant floater (S4/G5), Wabash pigtoe (S2/G5), three-ridge (S2S3/G5)

Preferring quieter and relatively slow waters in Pennsylvania, the Fatmucket Community inhabits various size streams, but usually occurs in medium size or larger streams. This community prefers with sand and gravel substrate, but reaches greatest abundance in standing water, in clay, silt, or mud substrate (Parmalee & Bogan, 1998). Fatmucket mussels usually prefer quiet or slow moving water with mud bottoms and avoid riffles (Parmalee & Bogan, 1998). This species is widespread and occurs in a variety of habitats (Strayer & Jirka, 1997).

The primary indicators are moderately strong indicators that this community is present, but are also found in other community types (especially the fatmucket mussel). A moderate number of rare and intolerant taxa are associated with this community. In the Connoquenessing Creek watershed, the community is found in Connoquenessing Creek, Little Connoquenessing Creek, Thorn Creek, and Glade Run. The Fatmucket Community is common throughout the Ohio River Basin.

Community quality rating: Undetermined

Community rarity: No

Threats: The causes of potential threats to the community area varied, but include acid mine drainage, urban/suburban runoff, and siltation and nutrient enrichment for agricultural sources. In the mid-reaches of Connoquenessing Creek, where the Fatmucket Community occurs, water quality impairment due to high salinity/total dissolved solids/chlorides and runoff from impervious surfaces likely damages the mussel community. The community habitat in Little Connoquenessing Creek and its tributaries is threatened by excess metals from acid mine drainage. In Thorn Creek and its tributaries, agricultural practices may be altering stream flow, adding nutrients, and modifying stream habitats. Mercury was cited as impairing fish consumption in Thorn Creek and may also be a hazard to mussels. Similar to Thorn Creek, headwaters of Glade Run are impaired by agriculture, leading to excess siltation and nutrients (DEP, 2006a).

Conservation recommendations: Conserving quiet medium- to large-size streams and the backwaters of rivers as community habitat is a priority for conservation. Aggressively combating the many sources of pollution and habitat degradation in the Connoquenessing Creek watershed is necessary to maintain the Fatmucket Community. Managing non-point sources in watersheds from agriculture and impervious sources will maintain quality habitats. In addition, preventing severe in-stream and riparian habitat and stream flow disturbance near community habitats will also ensure community survival over the long term**.** Acid mine drainage and associated pollution is particularly toxic to mussels; ameliorating water pollution from that source must be addressed for the health of mussel populations and communities.

Spike Mussel Community

Community Indicators: spike and black sandshell.

Several other mussels including the fatmucket, flutedshell, and pocketbook are also found in this community, but are common components of other communities, as well. In transitional habitat, like the lower Connoquenessing Creek, other species like, the giant floater are also found in the mussel community.

The spike pictured here is a species of concern as well as a community indicator of the Ohio/Great Lakes Mussels: Spike Mussel Community

Species of conservation concern: spike (S4/G5), black sandshell (S3S4/G5), fatmucket (S4/G5), flutedshell (S4/G5), pocketbook (S4/G5), and giant floater (S4/G5).

Community quality rating: High

Community rarity: No

Habitat: The habitat for the Spike Mussel Community is generally found in large streams and rivers system such as the habitats found in the Allegheny River and the Beaver River basin. In the Connoquenessing Creek watershed, the community was found in the lower reaches of Connoquenessing Creek below its confluence with Slippery Rock Creek.

The environment associated with this community includes waters that do not have a steep slope, but have varied substrates (stream bottom materials) and a mix of pool, riffle, and run habitat. The species in this community are typically found in medium to large rivers in sand and gravel substrate and are often associated with riffles. The spike mussel exists in a wide range of habitats of varied size and depth. It is one of the most abundant mussels in the Allegheny basin (Strayer & Jirka, 1997).

Water may have many dissolved ions in the watershed detected by relatively high conductivity and moderate alkalinity. Sandstone and shale geology is the dominant bedrock in the Connoquenessing Creek Watershed and is commonly associated with the spike community. The community can tolerate some disturbance in the watershed from agricultural sources, but prefers relatively good water quality and habitat.

Although the strongest indicators of this community are very common, a number of rare and pollution-intolerant taxa are often associated with this group.

Threats: Since this mussel community usually occurs in relatively high quality streams, the threats from poor water quality and habitat conditions in Connoquenessing Creek could be detrimental to this community. Much of the lower Connoquenessing Creek watershed is disturbed by a combination of agricultural and urban runoff and acid mine drainage. Sections of the Connoquenessing Creek adjacent to the Spike Community are classified as impaired by DEP for poor water quality, including high concentrations of metals, low pH, and salinity/total dissolved solids/chlorides. Tributaries to the lower Connoquenessing Creek are impaired by stormwater from urban runoff and by pollution from acid mine drainage (DEP, 2006a). Agriculture in the lower Slippery Rock Creek and throughout the Connoquenessing Creek watershed may also be contributing to poor water quality and habitat in the watershed.

Conservation Recommendations: This community is characterized by high mussel diversity, many rare species and very few species that can tolerate pollution; therefore it is a high conservation priority. This

community occurs in sections of watersheds that currently experience relatively little watershed disturbance.

Habitat disturbance and poor water quality may pose serious problems for the long term health of the community. Amelioration of water pollution from urban/suburban, agricultural, and mining sources should be a priority for conserving the Spike Community.

Flutedshell Mussel Community

Community Indicators: fluted shell, mucket, squawfoot, and plain pocketbook.

Also found with this community in the Connoquenessing Creek Watershed, are other mussel species, like: giant floater, fatmucket, spike mussel, and squawfoot.

Some additional species found with this community in other community habitats:
kidneyshell, elktoe, pocketbook, and wavy-rayed lampmussel.

Species of conservation concern: fluted shell (S4/G5), kidneyshell (S4/G4G5), mucket (S4/G5), giant floater (S4/G4), elktoe (S4/G4), squawfoot (S2S4/G5), plain pocketbook (S3S4/G5), wavy-rayed lampmussel (S4/G4), fatmucket (S4/G5), spike mussel (S4/G5),

Habitat: The Fluted Shell Community is characteristic of medium to large streams, like the Connoquenessing Creek, and medium size rivers. Habitats for this community are similar to the spike mussel community, but the stream size may be smaller. Sand and gravel beds are favorable to the fluted shell community.

A number of rare and pollution-intolerant mussel species are associated with this community type. Consequently, the Fluted Shell Community may be found in ecosystems that are still able to support species that cannot survive in other areas.

Community quality rating: High

Community rarity: No

Threats: Similar to the Spike Mussel Community environment, water quality and habitat issues in the lower Connoquenessing Creek watersheds are serious threats to the long-term health of the Fluted shell Community. Water pollution classified the Connoquenessing Creek as impaired, according to DEP for metals and pH from acid mine drainage, and high salinity/total dissolved solids/chlorides. Some tributaries to lower Connoquenessing Creek near the Fluted Shell Community occurrences, like Brush Creek, are impaired for pollution from municipal point sources, degrading water with organic enrichment and low dissolved oxygen. Stormwater and runoff from impervious surfaces also has degraded some tributaries to the Connoquenessing Creek (DEP, 2006a).

Conservation Recommendations: This community is characterized by high mussel diversity, many rare species and very few species that can tolerate severe pollution. It is a high conservation priority. Protection of current high quality mussel habitat is important for the long-term viability of the Fluted Shell Community in the Connoquenessing Creek. Minimizing altered channels and siltation resulting from some agricultural practices and urban runoff will benefit the community. Proactive measures to fix the water quality problems in the Connoquenessing Creek watershed are needed to sustain healthy mussel populations and communities.

APPENDIX N. RESOURCE GUIDE

Conservation Groups

Connoquenessing Watershed Alliance, Inc
PO Box 92
Connoquenessing, PA 16027
Website: www.connoqwatershed.org

Ducks Unlimited
Butler 020 - Butler County Chapter
325 Mercer Street
Butler, PA 16001
Phone: 724-287-5680

Ducks Unlimited
Cranberry 190 - North Hills Chapter
56 Rolling Road
Cranberry Twp., PA 16066
Phone: 724-776-7538

Ducks Unlimited
Pittsburgh 192 - West Wings Chapter
217 Pflugh Road
Butler, PA 16001
Phone: 724-865-2777

Hereford Manor Lake Conservancy and Watershed Association
PO Box 41
Fombell, PA 16123
Website: www.herefordmanorlake.org

National Wild Turkey Federation
Western Pennsylvania Regional
Carl Mowry
Phone: 724-283-5708
Website: www.panwtf.org

Pennsylvania Environmental Council (PEC)
Southwest Regional Office
22 Terminal Way
Pittsburgh, PA 15219
Phone: 412-481-9400
Fax: 412-481-9401
Website: www.pecpa.org/region/southwest

Stream Restoration Incorporated
3016 Unionville Road
Cranberry Township, PA 16066
Phone: 724-776-0161
Fax: 724-776-0166
Website: www.streamrestorationinc.org

Trout Unlimited: Arrowhead Chapter #214
153 Doyle Road
Sarver, PA 16055
Website: www.arrowheadtu.com

Trout Unlimited: Penns Woods West Chapter #042
P.O. Box 9772
Pittsburgh, PA 15229
Website: www.pwwtu.org

Western Pennsylvania Conservancy
Pittsburgh Office
800 Waterfront Drive
Pittsburgh, PA 15222
Phone: 412-288-2777
Fax: 412-231-1414
Website: www.waterlandlife.org

Western Pennsylvania Conservancy
Freshwater Conservation Program
246 South Walnut Street
Blairsville, PA 15717
Phone: 724-459-0953
Fax: 724-459-4721
Website: www.waterlandlife.org

Wild Waterways Conservancy, Inc.
101 East Spring Street, Suite 200
Zelienople, PA 16063
Phone: 724-452-1429
Fax: 724-452-1591
Website: www.wildwaterways.org

Historical Societies

Beaver County Model Railroad and Historical Society
416 Sixth Street
Monaca, PA 15061
Website: www.bcmrr.railfan.net/

Butler County Historical Society
Lowrie/Shaw House Museum
123 West Diamond Street
PO Box 414
Butler, PA 16003
Phone: 724-283-8116
Fax: 724-283-2505
Website: www.butlerhistory.com

Cranberry Township Historical Society
PO Box 1931
Cranberry Township, PA 16066
Phone: 724-776-3234

Ellwood City Historical Society
310 Fifth Street
Ellwood City, PA 16117
Phone: 724-752-2021

Evans City Area Historical Society
204 C Jackson Street
Evans City, PA 16033
Phone: 724-538-9846

Historic Harmony Inc.
218 Mercer Street
Harmony, PA 16037
Phone: 724-452-7341
Website: www.harmonymuseum.org

Lawrence County Historical Society
408 N. Jefferson Street
PO Box 1745
New Castle, PA 16103
Phone: 724-658-4022
Fax: 724-658-4022
Website: www.lawrencechs.com/index.html

Living History Center at Providence Plantation
300 Textor Hill Road
Evans City, PA
Phone: 724-538-8818
Website: www.frontier-history.org

Saxonburg Historical & Restoration Commission
PO Box 150
Saxonburg, PA 16056
Phone: 724-352-3024

Zelienople Historical Society
243 South Main Street
PO Box 45
Zelienople, PA 16063
Phone: 724-452-9457
Website: www.fyi.net/~zhs

State Agencies

Department of Conservation and Natural Resources (DCNR) Executive Office
Rachel Carson State Office Building, 7th Floor
400 Market Street, PO Box 8767
Harrisburg, PA 17105
Phone: 717-787-2869
Fax: 717-772-9106
Website: www.dcnr.state.pa.us

DCNR Southwest Region (Allegheny, Beaver, and Butler Counties)
1405 State Office Building
300 Liberty Avenue
Pittsburgh, PA 15222

DCNR Northwest Region (Lawrence County)
230 Chestnut Street
Meadville, PA 16335

Department of Environmental Protection (DEP) Headquarters
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17101
Phone: 717-783-2300
Website: www.dep.state.pa.us

State Agencies (continued)

DEP Southwest Regional Office
(Allegheny and Beaver County)
400 Waterfront Drive
Pittsburgh, PA 15222
Phone: 412-442-4000

DEP Beaver Falls District Office
(Allegheny and Beaver County)
206 Municipal Building
8th Avenue and 15th Street
Beaver Falls, PA 15010
Phone: 724-847-5270

DEP Northwest Regional Office
(Butler and Lawrence County)
230 Chestnut Street
Meadville, PA 16335
Phone: 814-332-6945
Fax: 814-332-6125

DEP New Castle District Office
(Butler and Lawrence County)
121 North Mill Street
New Castle, PA 16101
Phone: 724-656-3160
Fax: 724-656-3267

PA Fish and Boat Commission
Southwest Region
(Allegheny and Beaver County)
236 Lake Road
Somerset, PA 15501
Phone: 814-445-8974
Fax: 814-445-3497
Website: www.fish.state.pa.us

PA Fish and Boat Commission
Northwest Region
(Butler and Lawrence)
11528 State Highway 98
Meadville, PA 16335
Phone: 814-337-0444
Fax: 814-337-0579
Website: www.fish.state.pa.us

PA Game Commission
Southwest Region
(Allegheny and Beaver County)
4820 Route 711
Bolivar, PA 15923
Phone: 724-238-9523
Website: www.pgc.state.pa.us

PA Game Commission
Northwest Region
(Butler and Lawrence County)
PO Box 31
Franklin, PA 16323
Phone: 814-432-3188
Website: www.pgc.state.pa.us

PA Department of Agriculture
Regional Office
6 McIntyre Road
Gibsonia, PA 15044
Phone: 724-443-1585
Fax: 724-443-8150
Website: www.argiculture.state.pa.us

PA Department of Transportation
Penn DOT Central Office
Keystone Building
400 North Street
Harrisburg, PA 17120
Phone: 717-787-2838
Website: www.dot.state.pa.us

PA Department of Transportation
Region 10 Office
2550 Oakland Avenue
Indiana, PA 15701
Phone: 724-357-2800

PA Department of Transportation
Region 11 Office
45 Thoms Run Road
Bridgeville, PA 15017
Phone: 412-429-5000

State Agencies (continued)

PA Governor Edward G. Rendell
Southwest Office
(Counties served include Allegheny, Beaver, Butler, and Lawrence)
State Office Building, 14th Floor
300 Liberty Avenue
Pittsburgh, PA 15222
Phone: 412-565-5700
Fax: 412-565-2445
Website: www.governor.state.pa.us

PA State Conservation Commission
2301 North Cameron Street
Harrisburg, PA 17110
Phone: 717-787-8821
Fax: 717-705-3778
Website: www.pascc.state.pa.us

Federal Agencies

Environmental Protection Agency (EPA)
EPA Region 3 Regional Office
1650 Arch Street
Philadelphia, PA 19103
Phone: 1-800-438-2474
Website: www.epa.gov

Penn Soil Resource Conservation and Development Council (RC&D)
265 Holiday Inn Road, Suite 3
Clarion, PA 16214
Phone: 814-226-8160 ext.5
Fax: 814-226-4521
Website: www.pennsoilrcd.org

Penn's Corner RC&D
RR #12, Box 202C
Greensburg, PA 15601
Phone: 724-834-9063 ext. 116
Fax: 724-832-9063 ext.3
Website: www.parcd.org/penns_corner.htm

United States Army Corps of Engineers
Pittsburgh District
2200 William S. Moorhead Federal Building
1000 Liberty Avenue, Room 1817
Pittsburgh, PA 15222
Phone: 412-395-7500
Fax: 412-644-4093
Website: www.lrp.usace.army.mil

U.S. Department of Agriculture (USDA)
Animal and Plant Health Inspection Service (APHIS) – Pennsylvania Wildlife Services
PO Box 60827
Harrisburg, PA 17106
Phone: 717-236-9451
Fax: 717-236-9454
Website: www.aphis.usda.gov/wildlife_damage

USDA Farm Service Agency
Pennsylvania State Farm Service Agency
1 Credit Union PL
Harrisburg, PA 17110
Phone: 717-237-2117
Website: www.fsa.usda.gov

USDA Farm Service Agency
Butler County Farm Service Agency
625 Evans City Road
Butler, PA 16001
Phone: 724-482-4800 ext 2
Fax: 724-482-4826
Website: www.fsa.usda.gov

USDA Natural Resources Conservation Service (NRCS) Pennsylvania State Office
One Credit Union Place, Suite 340
Harrisburg, PA 17110
Phone: 717-237-2100
Fax: 717-237-2238
Website: www.pa.nrcs.usda.gov

USDA-NRCS Butler Field Office
(Allegheny, Beaver, and Butler Counties)
625 Evans City Road, Ste. 102
Butler, PA 16001
Phone: 724-482-4800 ext. 3
Fax: 724-482-4826

Federal Agencies (continued)

USDA-NRCS New Castle Field Office
(Lawrence County)
1503 Old Butler Road
New Castle, PA 16101
Phone: 724-652-5811
Fax: 724-657-8503

USDA Rural Development
Butler Area Office
(Allegheny, Beaver, and Butler Counties)
625 Evans City Road, Suite 101
Butler, PA 16001
Phone: 724-482-4800 ext 4
Fax: 724-482-9033
Website: www.rurdev.usda.gov/pa

USDA Rural Development
Crawford Area Office
(Lawrence County)
14699 N. Main Street, Extension
Meadville, PA 16335
Phone: 814-336-6155 ext 4
Fax 814-337-0294
Website: www.rurdev.usda.gov/pa

United States Department of Energy
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
PO Box 3265
Harrisburg, PA 17105
Website: www.puc.state.pa.us

United States Department of Energy
National Energy Technology Laboratory
Pittsburgh Research Center
626 Cochrans Mill Road, PO Box 10940
Pittsburgh, PA 15236
Phone: 412-386-6569
Fax: 412-386-5917
Website: www.netl.doe.gov

United States Fish and Wildlife Service
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, PA 16801
Phone: 814-234-4090
Fax: 814-234-0748
Website: www.fws.gov

Allegheny County

Allegheny County Executive
101 County Courthouse
436 Grant Street
Pittsburgh, PA 15219
Phone: 412-350-6500
Fax: 412-350-6512
Website: www.county.allegheny.pa.us

Allegheny County Department of Economic Development
425 Sixth Avenue, Suite 800
Pittsburgh, PA 15219
Website: www.alleghenyplaces.com

Allegheny County Conservation District
400 North Lexington St, Suite 102
Pittsburgh, PA 15208
Phone: 412-241-7645
Fax: 412-242-6165
Website: http://accd.pghfree.net

Allegheny County Cooperative Extension
400 North Lexington Street
Pittsburgh, PA 15208
Phone: 412-473-2540
Fax: 412-473-2768
Website: www.cas.psu.edu/directory/county.asp

Allegheny County Visit Pittsburgh
The Regional Enterprise Tower
425 Sixth Avenue
Pittsburgh, PA 15219
Phone: 800-366-0093
Fax: 412-644-5512
Website: www.visitpittsburgh.com

Allegheny County (continued)

Bradford Woods Borough
4908 Wexford Run Road, PO Box 163
Bradford Woods, PA 15015
Phone: 724-935-2990
Fax: 724-935-0293
Website: bradfordwoodspa.org

Marshall Township
525 Pleasant Hill Road
PO Box 2094
Warrendale, PA15086
Phone: 724-935-3090
Website: www.twp.marshall.pa.us

Pine Township
230 Pearce Mill Road
Wexford, PA 15090
Phone: 724-625-1591
Fax: 724-625-1560
Website: http://twp.pine.pa.us

Richland Township
4011 Dickey Road, Room 200
Gibsonia, PA 15044
Phone: 724-443-5921
Fax: 724-443-8860
Website: http://richland.pa.us

West Deer Township
109 East Union Road, PO Box 2
Russellton, PA 15076
Phone: 724-265-3680
Fax: 724-265-2228
Website: www.westdeertownship.com

Beaver County

Beaver County Commissioners
810 Third Street
Beaver, PA 15009
Phone: 724-728-5700
Website: www.co.beaver.pa.us

Beaver County Planning Commission
810 Third Street, Courthouse
Beaver, PA 15009
Phone: 724-728-5700
Fax: 724-775-3915
Website: www.co.beaver.pa.us/Planning/index.htm

Beaver County Conservation District
156 Cowpath Road
Aliquippa, PA 15001
Phone: 724-378-1701
Website: www.co.beaver.pa.us/conservation

Beaver County Cooperative Extension
2020 Beaver Avenue, Suite 200
Monaca, PA 15061
Phone: 724-774-3003
Fax: 724-774-0971
Website: www.cas.psu.edu/directory/county.asp

Beaver County Recreation and Tourism
Brady's Run Park
526 Brady's Run Road
Beaver Falls , PA 15010
Phone: 724-891-7030
Fax: 724-891-7085
Website: www.visitbeavercounty.com

Daugherty Township
2182 Mercer Road
New Brighton, PA 15066
Phone: 724-846-5337
Fax: 724-846-6481
Website: www.daughertytownship-pa.gov

Franklin Township
897 State Route 288
Fombell, PA 16123
Phone: 724-758-9702
Fax: 724-758-2414

Marion Township
485 Hartzell School Road
Fombell, PA 16123
Phone: 452-1986
Fax: 452-6619

Beaver County (continued)

New Sewickley Township
233 Miller Road
Rochester, PA 15074
Phone: 724-774-7822
Fax: 724-774-7825
Website: www.newsewickley.com/

North Sewickley Township
893 Mercer Road
Beaver Falls, PA 15010
Phone: 843-5826
Fax: 843-9108

Butler County

Butler County Commissioners
124 West Diamond Street
PO Box 1208
Butler, PA 16003
Phone: 724-285-4731
Website: www.co.butler.pa.us

Butler County Planning Commission
Fifth Floor, County Government Center
124 West Diamond Street
PO Box 1208
Butler, PA 16003
Phone: 724-284-5300
Website: www.co.butler.pa.us/butler

Butler County Conservation District
122 McCune Drive
Butler, PA 16001
Phone: 724-284-5270
Fax: 724-285-5515
Website: www.bccdonline.org

Butler County Cooperative Extension
101 Motor Pool Way
Butler, PA 16001
Phone: 724-287-4761
Fax: 724-287-5911
Website:
www.cas.psu.edu/directory/county.asp

Butler County Tourism & Convention Bureau
310 East Grandview Avenue
Zelienople, PA 16063
Phone: 866-856-8444
Second Phone: 724-234-4619
Fax: 724-234-4643
Website: www.visitbutlercounty.com

Adams Township
690 Valencia Road
Mars, PA 16046
Phone: 724-625-2221
Website: www.adamstwp.org

Butler Township
290 South Duffy Road
Butler, PA 16001
Phone: 724-283-3430
Fax: 724-282-2142
Website: www.butlertwp.org

Callery Borough
Drawer-G
199 Railroad Street
Callery, PA 16024
Phone: 724-538-3531

Center Township
419 Sunset Drive
Butler, PA 16001
Phone: 724-282-7805
Fax: 724-282-6550
Website: www.centertownship.net

Clay Township
1115 Euclid School Road
Butler, PA 16001
Phone: 724-637-2638
Fax: 724-637-3415

Clearfield Township
PO Box 5
Fenelton, PA 16034
Phone: 724-283-7701
Fax: 724-283-4111

Butler County (continued)

Clinton Township
711 Saxonburg Blvd
Saxonburg, PA 16056
Phone: 724-352-9000
Fax: 724-352-9011
Website: www.clintontownshippa.us

Concord Township
167 Manuel Road
West Sunbury, PA 16061
Phone: 724-894-2195

Connoquenessing Borough
228 Constitution Avenue, PO Box 471
Connoquenessing, PA 16027
Phone: 724-789-9097
Fax: 724-789-7900
Website: www.connoquenessingboro.com

Connoquenessing Township
102 Connoquenessing Drive
Renfrew, PA 16053
Phone: 724-789-7186
Fax: 724-789-7835

Cranberry Township
2525 Rochester Road, Suite 400
Cranberry Township, PA 16066
Phone: 724-776-4806
Fax: 724-776-5488
Website: www.twp.cranberry.pa.us

Donegal Township
PO Box 413
Chicora, PA 16025
Phone: 724-445-7303
Fax: 724-445-3090

East Butler Borough
1105 Randolph Road, PO Box 87
East Butler, PA 16029
Phone: 724-283-5402
Fax: 724-282-0287

Evans City Borough
220 Wahl Avenue
Evans City, PA 16033
Phone: 724-538-8320
Fax: 724-538-8444

Forward Township
207 Ash Stop Road
Evans City, PA 16033
Phone: 724-538-9251
Fax: 724-538-9251

Franklin Township
191 Election House Road
Prospect, PA 16052
Phone: 724-865-2412
Fax: 724-865-2469

Harmony Borough
217 Mercer Street, PO Box 945
Harmony, PA 16037
Phone: 724-452-6780
Fax: 724-452-6236
Website: www.harmony-pa.us

Jackson Township
140 Magill Road
Zelienople, PA 16063
Phone: 724-452-5581
Fax: 724-452-5584
Website: www.jacksontwpbutler.org

Jefferson Township
157 Great Belt Road
Butler, PA 16002
Phone: 724-352-2324
Fax: 724-352-8850

Lancaster Township
113 Kings Alley
Harmony, PA 16037
Phone: 724-452-7213
Fax: 724-453-0129

Mars Borough
598 Spring Road, PO Box 395
Mars, PA 16046
Phone: 724-625-1858
Fax: 724-625-4065

Butler County (continued)

Middlesex Township
133 Browns Hill Road
Valencia, PA 16059
Phone: 724-898-3571
Fax: 724-898-4607
Website: www.middlesextownship.org

Muddy Creek Township
114 Brians Court
Portersville, PA 16051
Phone: 724-368-3438
Fax: 724-368-3432

Oakland Township
565 Chicora Road
Butler, PA 16001
Phone: 724-287-8067
Fax: 724-287-3979

Penn Township
157 East Airport Road
Butler, PA 16002
Phone: 724-586-1165
Fax: 724-586-1172
Website: www.penntownship.org

Portersville Borough
1141 West Portersville Street, PO Box 148
Portersville, PA 16051
Phone: 724-368-9175
Fax: 724-368-9175

Prospect Borough
159 Monroe Street, PO Box 308
Prospect, PA 16052
Phone: 724-865-3010
Fax: 724-865-2320
Website: www.prospectborough.com

Saxonburg Borough
420 West Main Street, PO Box 275
Saxonburg, PA 16056
Phone: 724-352-1400
Fax: 724-352-8820
Website: www.saxonburgpa.com

Seven Fields Borough
2200 Garden Drive, Suite 100
Seven Fields, PA 16046
Phone: 724-776-3090
Fax: 724-776-3082
Website: www.sevenfields.org

Summit Township
502 Bonniebrook Road
Butler, PA 16002
Contact: Township Supervisors

Valencia Borough
61 Elmira Street
Valencia, PA 16059
Phone: 724-625-3430

Zelienople Borough
111 West New Castle Street
Zelienople, PA 16063
Phone: 724-452-6610
Fax: 724-452-6613
Website: www.zelieboro.org

Lawrence County

Lawrence County Commissioners
430 Court Street
New Castle, PA 16101
Phone: 724-658-2541
Website: www.co.lawrence.pa.us

Lawrence County Planning Office
430 Court Street
New Castle, PA 16101
Phone: 724-656-2144
Fax: 724-656-2151
Website: www.co.lawrence.pa.us/planning/index.html

Lawrence County Conservation District
Lawrence County Government Center
430 Court Street
New Castle, PA 16101
Phone: (724) 652-4512
Fax: (724) 652-9646
Website: www.lawrencecd.org

Lawrence County (continued)

Lawrence County Cooperative Extension
430 Court Street
Courthouse
New Castle, PA 16101
Phone: 724-654-8370
Fax: 724-656-2298
Website: www.cas.psu.edu/directory/county.asp

Lawrence County Tourist Promotion Agency
229 South Jefferson Street
New Castle, PA 16101
Phone: 888-284-7599
Fax: 724-654-2044
Website: www.visitlawrencecounty.com

Ellport Borough
313 Burns Avenue
Ellwood City, PA 16117
Phone: 724-752-1422
Fax: 724-752-9430

Ellwood City Borough
525 Lawrence Avenue
Ellwood City, PA 16117
Phone: 724-758-7777
Website: www.ecboro.com

Perry Township
284 Reno Road
Portersville, PA 16051
Phone: 724-368-8230

Shenango Township
1000 Willowbrook Road
New Castle, PA 16101
Phone: 724-658-4460

Slippery Rock Township
4334 US Route 422
New Castle, PA 16101
Phone: 724-924-2482

Wayne Township
1418 Wampum Road
Ellwood City, PA 16117
Phone: 724-752-1361
Website: http://ellwoodcity.org/wayne

APPENDIX O. USEFUL WEBSITES

Source	Data	Website
Project Area Characterisitics		
Bureau of Labor Statistics	Unemployment Rate	http://www.bls.gov/home.htm
Free Demographics	Population and Economic Data	http://www.freedemographics.com
Green Media Toolshed	Pollution in Your Community	http://www.scorecards.com
Natural Lands Trust	Conservation by Design	http://www.natlands.org
Pa. Department of Community and Economic Development	Zoning and Comprehensive Planning	http://www.elibrary.state.pa.us
Pa. Department of Education	School Report Cards	http://www.paprofiles.org
Smart Growth Partnership	Smart Growth	http://www.smartgrowth.org
United States Census Bureau	Population and Economic Data	http://www.census.gov
Land Resources		
Conservation Reserve Enhancement Program	Conservation Practices	http://www.creppa.org
Natural Resources Conservation Service	Soil Characteristics	http://www.nrcs.usda.gov/technical/efotg
Pa. Department of Environmental Protection	Permits, Violations	http://www.dep.state.pa.us/efacts/default.asp
Pa. Geological Survey	Environmental Geology	http://www.dcnr.state.pa.us/topogeo/pub/environmental.aspx
Pa. Geological Survey	Geological Characteristics	http://www.dcnr.state.pa.us/topogeo/index.aspx
Pa. Geological Survey	Mineral Resources	http://www.dcnr.state.pa.us/topogeo/pub/mineral.aspx
Pa. Geological Survey	Environmental Geology for Land Use Planning	http://www.dcnr.state.pa.us/topogeo/education/landuse/landuseplan.aspx
Pa. Spatial Data Access (PASDA)	Geographic Information System Data	http://www.pasda.psu.edu/
United States Environmental Protection Agency	Brownfields	http://www.epa.gov/brownfields
United States Environmental Protection Agency	Superfund	http://www.epa.gov/superfund
United States Environmental Protection Agency - ECHO	Enforcement and Compliance History	http://www.epa-echo.gov/echo/
United States Environmental Protection Agency - Envirofacts	Federal Permits, Violations, Wastesites	http://www.epa.gov/enviro/
Water Resources		
Center for Dirt & Gravel Road Studies		http://www.mri.psu.edu/centers/cdgrs/Index.html
Coldwater Heritage Partnership		http://www.coldwaterheritage.org/
Environmental Protection Agency	Surf Your Watershed	http://cfpub.epa.gov/surf/huc.cfm?huc_code=05030105
Federal Emergency Management Agency	National Flood Insurance Program	http://www.fema.gov/business/nfip/
Keystone Chapter Soil and Water Conservation Society		http://www.keystoneswcs.com/index.html

Source	Data	Website
Water Resources (continued)		
League of Women Voters	Groundwater Primer for Pa.ns	http://pa.lwv.org/wren/pubs/primer.html
Pa. American Water		http://www.amwater.com/awpr1/paaw/default.html
Pa. Department of Environmental Protection	Stormwater Management Program	http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1437&Q=518682&PM=1
Pa. Department of Environmental Protection	Water Resources Plan	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/WaterResources/docs/WaterResourcesExecutiveSummary.htm
Pa. Department of Environmental Protection	Watershed Management	http://www.depweb.state.pa.us/watershedmgmt/site/default.asp
Pa. Department of Environmental Protection	State Water Planning Resource Center	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/act220/default.htm
Pa. Fish and Boat Commission	Wild Trout Waters	http://www.fish.state.pa.us/classa98.htm
Pa. Geological Survey:	Water Resources Reports	http://www.dcnr.state.pa.us/topogeo/groundwater/gwlist.aspx
Pa. Geological Survey:	Geology of Groundwater in Pa.	http://www.dcnr.state.pa.us/topoeo/education/es3.pdf
Pa. Geological Survey:	Hydrogeologic and well-construction characteristics of the rocks of Pa.	http://www.dcnr.state.pa.us/topogeo/pub/w69recent.aspx
Pa. Geological Survey:	Pa. Groundwater Information System	http://www.dcnr.state.pa.us/topogeo/groundwater/PaGWIS/PaGWISMenu.asp?c=t
Pa. Trout	Wilderness Trout Streams	http://www.patrout.org/wildernesstroutstreams.htm
Stroud Water Research Center		http://www.stroudcenter.org/
U.S. Geological Survey	Water Resources Links	http://water.usgs.gov/lookup/getwatershed?05030105
United States Environmental Protection Agency	Water Quality Trading	http://www.epa.gov/owow/watershed/trading.htm
University of Pittsburgh	Regional Water Management Task Force	http://www.iop.pitt.edu/water/index.htm

Biological Resources

Biodiversity

Ecological Society of America	Biodiversity	http://www.esa.org/
NatureServe	Biodiversity	http://www.natureserve.org/
Pa. Biodiversity Partnership	Biodiversity	http://www.pabiodiversity.org/index.html
Pa. Biological Survey (PABS)	Biodiversity	http://alpha.dickinson.edu/prorg/pabs/index.htm
Pa. GAP Analysis Project	Biodiversity	http://www.orser.psu.edu/PAGAP/gappage.htm

Invasive Species

Aquatic Invasive Species of Pa.	Invasive Species	http://www.pserie.psu.edu/seagrant/ais/
Common Invasive Plant in Riparian Areas	Invasive Species	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/streamreleaf/Docs/Invasive%20Plants.pdf

Biological Resources (continued)

Invasive Species

Source	Data	Website
Invasive Plants of Pa.	Invasive Species	http://www.dcnr.state.pa.us/forestry/wildplant/invasive.aspx
Invasive Plants of the Eastern United States	Plant Invaders of Mid-Atlantic Natural Areas	http://www.invasive.org/eastern/midatlantic/intro.html
Invasive Species	Invasive Species	www.invasive.org
Invasive Species in Pa.	Invasive Species	http://www.biodiversitypartners.org/invasive/factsheets/PA.pdf
Mid-Atlantic Exotic Pest Plant Council		http://www.ma-eppc.org/
U.S. Department of Agriculture:	National Agricultural Library – Pa. Invasive Species Resources	http://www.invasivespeciesinfo.gov/unitedstates/pa.shtml

Native Plants and Landscaping

American Chestnut Foundation	Pa. Chapter	www.patacf.org
Arbor Day Foundation	Backyard Woods	http://www.arborday.org/backyardwoods/guide.cfm
Arbor Day Foundation	Tree City U.S.A.	http://www.arborday.org/programs/treeCityUSA.cfm
Carnegie Library of Pittsburgh	Books on Native Plants	http://www.carnegielibrary.org/subject/gardening/nativeplants.html
Ernst Conservation Seeds	Native Plant Sales and Landscaping Information	www.ernstseed.com
Pa. Department of Conservation and Natural Resources	Pa. Community Forests	http://www.dcnr.state.pa.us/forestry/pucfc/
Pa. Flora Database		http://www.paflora.org/Web3/Speciesbywatershed_search_form.asp
Pa. Native Plant Society	Useful Links and Information Regarding Native Plants	http://www.pawildflower.org/04_links/links.htm
Sylvania Natives	Native Plant Sales	www.sylvanianatives.com
U.S. Department of Energy	Energy Efficient Landscaping	http://www.eere.energy.gov/consumer/your_home/landscaping/index.cfm/mytopic=11910
Western Pa. Audubon Society	List of plants native to Allegheny County and surrounding region	http://www.aswp.org/files/allegheny_county_Pa._native_plants_aswp.pdf
Pa. Invertebrate Biodiversity Project		http://www.ento.psu.edu/home/frost/pinbiop/about.html
Pa. Natural Heritage Program		http://www.naturalheritage.state.pa.us/
U.S. Environmental Protection Agency	Ecoregions	http://www.epa.gov/wed/pages/ecoregions/reg3_eco.htm

Biological Resources (continued)

Wildlife

Source	Data	Website
Animal Rescue League of Western Pa.	Wildlife Rehabilitation	http://www.pawildlifecenter.org/about-pwc.htm
Audubon Society	Important Bird Areas	http://pa.audubon.org/iba/maps.html
Carnegie Museum of Natural History	2nd Pa. Breeding Bird Atlas	http://www.carnegiemnh.org/atlas/about_book.htm
Carnegie Museum of Natural History	Pa. Mammals	http://www.carnegiemnh.org/mammals/index.html
Field Guides		http://www.enature.com/fieldguides/index.asp
National Biological Information Infrastructure		http://www.nbii.gov/portal/server.pt
National Wildlife Federation		http://www.nwf.org/nationalwildlife/article.cfm?articleid=292&issueid=31
North American Pollinator Protection Campaign		http://www.nappc.org/
Pa. Audubon		http://pa.audubon.org/
Pa. Biological Survey	Important Mammal Areas	http://www.pawildlife.org/imap.htm
Pa. Department of Conservation and Natural Resources	Endangered and Threatened Species of Pa.	http://www.dcnr.state.pa.us/wrcf/contents.aspx
Pa. Fish and Boat Commission	Pa. Fishes	http://www.fish.state.pa.us/pafish/fishhtms/chapindx.htm
Pa. Wildlife Federation		http://www.pawildlife.org/
Species Profiles		http://www.fcps.edu/StratfordLandingES/Ecology/mpages/organism_menu.htm
The Wildlife Society		http://joomla.wildlife.org/?CFID=13824013&CFTOKEN=85052420
Wildbird Recovery	Songbird Rehabilitation Center	http://www.stormpages.com/wildbird/index.html

Cultural Resources

National Parks Service	National Register of Historic Places	http://www.nps.gov/history/nr/research/nris.htm
PA Roots	Historical Information	http://www.pa-roots.com/
Pa. Department of Education	Environment and Ecology Standards	http://www.pde.state.pa.us/k12/lib/k12/envec.pdf
Pa. Fish and Boat Commission	Fishing Regulations	http://www.fish.state.pa.us/regs_fish.htm