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**APPENDIX A. GLOSSARY**

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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.

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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.

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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 (NO <sub>x</sub> ) combines and reacts with volatile organic compounds in the presence of sunlight and warm temperatures.
Groundwater	Water beneath the earth's surface; found in pore spaces in rock material. Supplies wells and springs as a source of drinking water for many; also
High-Grading	Involves cutting of only the biggest, most profitable trees in a stand; considered a non-sustainable practice.
Hydric Soils	Soils that are adequately moist in the upper section to cultivate anaerobic conditions during the growing season.
Hydrologic Unit Code	A system for organizing watersheds of the United States that divides and subdivides the watershed into successively smaller hydrologic units and is then assigned an identifying number.
Hydrology	The study of movement of water on the earth; includes surface water and groundwater.
Indirect Deposition	Occurs when a pollutant enters a waterway by falling onto land and being washed into waterbodies as runoff.
Invasive species	Environmentally noxious weeds that grow aggressively, spread easily, and displaces other plants.
Karst	An area of limestone marked by irregularities such as sinkholes, fissures, caves, and underground streams, which are created by erosion.
Landscape Conservation Area	A larger area of land that contains minimal human disturbance and allows ecosystems to function on a landscape level.
Landslide	Ground movements that change the stability of slope from stable to unstable are landslides

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Lichens	A symbiosis between a fungal and algal life form that usually grows on trees or rocks.
Major Employers	Companies having a minimum of 200 employees.
Management Recommendations	Non-regulatory suggestions to improve the quality of life.
Methylmercury	A neurotoxin formed by the transformation of mercury by certain microorganisms; it is highly toxic and easily accumulates in fish, shellfish and animals that eat fish.
Natural Heritage Inventories	A method of assessing areas of important plants, animals, and ecological communities.
Natural Resources	A naturally-occurring material with economic value.
Nonpoint Source	Pollutants that have no readily visible source and often require detailed analysis and research to discern the source.
Ozone	A colorless, odorless, gas that forms in the atmosphere.
Ozone Layer	A colorless, odorless, gas located in the upper atmospheric layer that filters the sun's harmful ultraviolet rays.
Particular Matter	Tiny drops of liquid or small particles of dust, metal or other materials that float in the air.
Physiographic Provinces	A region with a particular type of landscape and geology.
Point Source	Pollutants that can be easily traced to their source.
Precipitation	Any form of water that falls from the sky, including, rain, snow, sleet, fog, and hail.
Preservation	The act or process of keeping something safe from harm or injury; the act of maintaining or reserving.
Prime Agricultural Soils	Soils that are extremely well suited for agricultural uses and meet certain physical, chemical, and slope characteristics.
Red beds	Stratosphere of reddish-colored sedimentary rocks, such as sandstone, siltstone, and shale.
Restoration	Returning to its original state or condition.

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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.

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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.

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**APPENDIX B. PLANNING COMMITTEES**

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**Lower Mahoning Creek Regional Watershed Conservation Plan Steering Committee**

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Dave Beale	Armstrong Conservation District
Tom Betts	Marion Center School District
Tom Clark	Ken Sink Trout Unlimited Evergren Conservancy
Jessica Coil	Armstrong County Tourist Bureau
Anne Daymut	Indiana Conservation District
Jeff Fliss	DEP - Watershed Manager
Art Hamley	PA Game Commission
Mike Holiday	Little Mahoning Watershed Association
Kristin Hulihan	Jefferson County Department of Development
Rich Muth	Pine Creek Sportsmen Club
Jeff Raykes	Indiana County Office of Planning and Development
Amber Siar	Jefferson Conservation District
Tracy Stack	DCNR - Southwest Regional Office

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**Lower Mahoning Creek Regional Watershed Conservation Plan Advisory Committees**

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***Project Area Characteristics***

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Bertha Ackerson	East Mahoning Township
Nathan Wells	Little Mahoning Creek Watershed Association

***Land Resources***

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Bertha Ackerson	East Mahoning Township
Fred Doverspike	East Mahoning Township
Gary Fleeger	Pennsylvania Geological Survey
Franklin Payne	Montgomery Township
Nathan Wells	Little Mahoning Creek Watershed Association

***Water Resources***

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Fred Doverspike	East Mahoning Township
Gary Fleeger	Pennsylvania Geological Survey
Franklin Payne	Montgomery Township
Nathan Wells	Little Mahoning Creek Watershed Association

***Biological Resources***

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Nathan Wells	Little Mahoning Creek Watershed Association
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***Cultural Resources***

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Fred Doverspike	East Mahoning Township
Nathan Wells	Little Mahoning Creek Watershed Association

**APPENDIX C. AGRICULTURAL SOILS**

Prime Agricultural Soils			Slope		
Map Symbol	Soil Name	Character (% slope)	Map Symbol	Soil Name	Slope Character (% slope)
<i>Armstrong County</i>			<i>Indiana County (continued)</i>		
AlB	Allegheny silt loam	3 to 8	GyB2	Guernsey silt loam, moderately eroded	3 to 8
EnA	Ernest silt loam	0 to 3	MoA2	Monongahela silt loam, moderately eroded	0 to 3
GcB	Gilpin channery silt loam	3 to 8	MoB2	Monongahela silt loam, moderately eroded	3 to 8
HaB	Hazleton channery loam	3 to 8	Ph	Philo silt loam	
MoA	Monongahela silt loam	0 to 2	Pm	Pope fine sandy loam	
MoB	Monongahela silt loam	2 to 6	Po	Pope silt loam	
Ph	Philo silt loam		RyB	Rayne silt loam	3 to 8
Pm	Pope fine sandy loam		UgB2	Upshur-Gilpin silty clay loams, moderately eroded	3 to 8
Po	Pope loam		WrA	Wharton silt loam	0 to 3
RaA	Rainsboro silt loam	0 to 3	WrB2	Wharton silt loam, moderately eroded	3 to 8
RnB	Rayne silt loam	3 to 8	<i>Jefferson County</i>		
Se	Steff loam		CkA	Cookport channery loam	0 to 3
Sf	Steff loam, high bottom		CkB	Cookport channery loam	3 to 8
UgB	Upshur-Gilpin silt loams	3 to 8	CkB2	Cookport channery loam, moderately eroded	3 to 8
WrB	Whartonsilt loam	3 to 8	CpA	Cookport loam	0 to 3
WtB	Wharton-Gilpin silt loams	3 to 8	CpB	Cookport loam	3 to 8
WvB	Wharton-Vandergrift complex	3 to 8	CpB2	Cookport loam, moderately eroded	3 to 8
<i>Indiana County</i>			EnA	Ernest silt loam	0 to 3
AhA	Allegheny silt loam	0 to 3	GcA	Gilpin channery silt loam	0 to 5
AhB2	Allegheny silt loam, moderately eroded	3 to 8	GcB	Gilpin channery silt loam	5 to 12
CkB2	Clarksburg silt loam, moderately eroded	3 to 8	GcB2	Gilpin channery silt loam, moderately eroded	5 to 12
ClA2	Clymer channery loam, moderately eroded	0 to 5	HaA	Clymer loam	0 to 5
CIB2	Clymer channery loam, moderately eroded	5 to 12	HaB	Clymer loam	5 to 12
CoA	Cookport loam	0 to 3	HaB2	Clymer loam, moderately eroded	5 to 12
CoB2	Cookport loam, moderately eroded	3 to 8	HIB	Hazleton channery loam	3 to 8
ErA2	Ernest silt loam, moderately eroded	0 to 3	HoA	Allegheny silt loam	0 to 5
GcA2	Gilpin channery silt loam, moderately eroded	0 to 5	MoA	Monongahela silt loam	0 to 3
GcB2	Gilpin channery silt loam, moderately eroded	5 to 12	MoB	Monongahela silt loam	3 to 8

Map Symbol	Soil Name	Slope Character (% slope)
<i>Jefferson County (continued)</i>		
Ph	Philo silt loam	
Pp	Pope fine sandy loam	
Ps	Pope silt loam	
RaB	Rayne silt loam	3 to 8
ScA	Chavies silt loam	0 to 5
ShB2	Shelocat silt loam, moderately eroded	3 to 8

Map Symbol	Soil Name	Slope Character (% slope)
<i>Indiana County (continued)</i>		
WnA	Wellston silt loam	0 to 5
WtA	Wharton silt loam	0 to 3
WtB	Wharton silt loam	3 to 8
WtB2	Wharton silt loam, moderately eroded	3 to 8
ZoA	Zoar silt loam	0 to 3

**Farmland of Statewide Importance**

Map Symbol	Soil Name	Slope Character (% slope)
<i>Armstrong County</i>		
AIC	Allegheny silt loam	8 to 15
At	Atkins silt loam	
CaB	Cavode silt loam	3 to 8
CaC	Cavode silt loam	8 to 15
EnB	Ernest silt loam	3 to 8
EnC	Ernest silt loam	8 to 15
GcC	Gilpin channery silt loam	8 to 15
GwB	Gilpin-Weikert complex	3 to 8
GwC	Gilpin-Weikert complex	8 to 15
HaC	Hazleton channery loam	8 to 15
Me	Melvin silt clay loam	
RaB	Rainsboro silt loam	3 to 8
RaC	Rainsboro silt loam	8 to 15
RnC	Rayne silt loam	8 to 15
UgC	Upshur-Gilpin ilt loams	8 to 15
WeB	Weikert shaly silt loam	3 to 8
WeC	Weikert shaly silt loam	8 to 15
WrC	Wharton silt loam	8 to 15
Wtc	Wharton-Gilpin silt loams	8 to 15
WvC	Wharton-Vandergrift complex	8 to 15

Map Symbol	Soil Name	Slope Character (% slope)
<i>Indiana County (continued)</i>		
CaB2	Cavode silt loam, moderately eroded	3 to 8
CaC2	Cavode silt loam, moderately eroded	8 to 15
CkC2	Clarksburg silt loam, moderately eroded	8 to 15
CoC2	Cookport loam, moderately eroded	8 to 15
DaA2	Dekalb channery sand loam, moderately eroded	0 to 5
DaB2	Dekalb channery sand loam, moderately eroded	5 to 12
DaC2	Dekalb channery sand loam, moderately eroded	12 to 20
ErB2	Ernest silt loam, moderately eroded	3 to 8
ErC2	Ernest silt loam, moderately eroded	8 to 15
GcC2	Gilpin channery silt loam, moderately eroded	12 to 20
GwA2	Gilpin-Weikert shaly silt loams, moderately eroded	0 to 5
GwB2	Gilpin-Weikert shaly silt loams, moderately eroded	5 to 12
GyC3	Guernsey silt loam, severely eroded	8 to 15

<i>Indiana County</i>		
AhC2	Allegheny silt loam, moderately eroded	8 to 15
At	Atkins silt loam	
CaA	Cavode silt loam	0 to 3

Map Symbol	Soil Name	Slope Character (% slope)
<i>Indiana County (continued)</i>		
Me	Melvin silty clay loam	
MoC2	Monongahela silt loam, moderately eroded	8 to 15
RyC	Rayne silt loam	8 to 15
TrA	Tygart silt loam	0 to 3
TrB2	Tygart silt loam, moderately eroded	3 to 8
UgC2	Upshur-Gilpin silty clay loams, moderately eroded	8 to 15
VaB2	Vandergrift silt loam, moderately eroded	3 to 8
VaC2	Vandergrift silt loam, moderately eroded	8 to 15
WmB2	Westmoreland silt loam, moderately eroded	5 to 12
WmC2	Westmoreland silt loam, moderately eroded	12 to 20
WrC2	Wharton silt loam, moderately eroded	8 to 15

<i>Jefferson County (continued)</i>		
Aw	Atkins silt loam	
CaA	Cavode silt loam	0 to 3
CaB	Cavode silt loam	3 to 8
CaB2	Cavode silt loam, moderately eroded	3 to 8
CaC	Cavode silt loam	8 to 15
CaC2	Cavode silt loam, moderately eroded	8 to 15
CkC	Cookport channery loam	8 to 15
DcA	Dekalb channery loam	0 to 5
DcB	Dekalb channery loam	5 to 12
DcB2	Dekalb channery loam, moderately eroded	5 to 12
DcC	Dekalb channery loam	12 to 20
DcC2	Dekalb channery loam, moderately eroded	12 to 20
DhA	Dekalb loam	0 to 5
DhB	Dekalb loam	5 to 12
DhB2	Dekalb loam, moderately eroded	5 to 12

Map Symbol	Soil Name	Slope Character (% slope)
<i>Jefferson County (continued)</i>		
DhC	Dekalb loam	12 to 20
DhC2	Dekalb loam, moderately eroded	12 to 20
EnB	Ernest silt loam	3 to 8
EnB2	Ernest silt loam, moderately eroded	3 to 8
EnC	Ernest silt loam	8 to 15
EnC2	Ernest silt loam, moderately eroded	8 to 15
EnC3	Ernest silt loam, severely eroded	8 to 15
GcC	Gilpin channery silt loam	12 to 20
GcC2	Gilpin channery silt loam, moderately eroded	12 to 20
GgB	Gilpin silt loam	5 to 12
GgB2	Gilpin silt loam, moderately eroded	5 to 12
GgC	Gilpin silt loam	12 to 20
GgC2	Gilpin silt loam, moderately eroded	12 to 20
HaC2	Clymer loam, moderately eroded	12 to 20
HIC	Hazleton channery loam	8 to 15
HoB	Allegheny silt loam	5 to 12
HoC2	Allegheny silt loam, moderately eroded	5 to 12
HrB	Hartleton channery silt loam	3 to 8
HrC	Hartleton channery silt loam	8 to 15
MvA	Weikert-Gilpin channery silt loams	0 to 5
RaC	Rayne silt loam	8 to 15
Ty	Tyler silt loam	
WnB2	Wellston silt loam, moderately eroded	5 to 12
WnC2	Wellston silt loam, moderately eroded	12 to 20
WsB2	Westmoreland silt loam, moderately eroded	5 to 12
WsC2	Westmoreland silt loam, moderately eroded	12 to 20
WtC2	Wharton silt loam, moderately eroded	8 to 15

**APPENDIX D. MINING PERMITS**

**Non Coal Mining Permits**

County	Municipality	Size	Mine Name	Company	Permit #
Armstrong	Cowanshannock	Small <2,000 tons	Smith Shale Pit	D. Eugene Smith	3942301
Armstrong	Wayne	Small <2,000 tons	Earl O. Houser Strip	Earl O. Houser	3972301
Armstrong	Rayburn	Large	Continental Clay Mine	Continental Clay Company	3920301
Armstrong	Rayburn	Small <2,000 tons	Rupp Mine	Merle Rupp	2842302
Armstrong	Wayne	Small <2,000 tons	Huff Farms	Thomas Huff	3962301
Indiana	North Mahoning	Large	Griffith Quarry	Eward C. Griffith Quarrying Incorporated	32900301
Jefferson	Perry	<10,000 tons	Grange Mine	Original Fuels Incorporated	33012806

(Source: DEP, 2009c)

**Active Bituminous Coal Mining Permits - January 2009**

County	Municipality	Type	Mine Name	Company	Permit #
Indiana	Banks	Prep Plant	Hillman Tip	P&N Coal Company Incorporated	32851601
Indiana	North Mahoning	Prep Plant	Sprankle Mills Tipple V	Sprankle Mills Tipple	32921601
Indiana	Green	Refuse Disposal	Roxcoal Rock Refuse D	Rox Coal Incorporated	32980701
Armstrong	Madison	Surface	George Mine	Amerikohl Mining Incorporated	3050105
Armstrong	Madison	Surface	Mannion Mine	Original Fuels Incorporated	3050103
Armstrong	Boggs	Surface	Mine 41	Thomas J. Smith Incorporated	3040102
Armstrong	Redbank	Surface	Smith 46 Mine	Thomas J. Smith Incorporated	3070103
Indiana	Grant	Surface	Stitt	ABM Mining Company Incorporate	32990104
Indiana	East Mahoning	Surface	McAdoo Mine	Fossil Fuel Incorporated	32030110
Indiana	Grant	Surface	Rice Mine	Kraynak Coal Company	32020105
Indiana	East Mahoning	Surface	Moore Mine	P&N Coal Company Incorporated	32030105
Indiana	Banks	Surface	Lamkie	P&N Coal Company Incorporated	32070104
Indiana	South Mahoning	Surface	Smith NO 28 Mine	Thomas J. Smith Incorporated	32020104
Indiana	South Mahoning	Surface	Smith NO 39 Mine	Thomas J. Smith Incorporated	32060102
Indiana	East Mahoning	Surface	Smith Mine	THL Coal Company	32060103

Active Bituminous Coal Mining Permits - January 2009 (continued)

County	Municipality	Type	Mine Name	Company	Permit #
Indiana	East Mahoning	Surface	Joseph Mine	THL Coal Company	32010102
Jefferson	Ringgold	Surface	Schreckengost Mine	Bedrock Mines Limited Partnership	33960108
Jefferson	Perry	Surface	Means 2 Mine	Cookport Coal Company Incorporated	33050103
Jefferson	Perry	Surface	Hamilton Mine	McKay Coal Company Incorporated	33990102
Jefferson	Perry	Surface	Hamilton 2 Mine	McKay Coal Company Incorporated	33010102
Jefferson	Perry	Surface	Williams Run Mine	Original Fuels Incorporated	33080105
Jefferson	Ringgold	Surface	Neal Mine	Reichard Contr Incorporated	33070103
Jefferson	Perry	Surface	Hamilton III mine	Strishock Coal Company	33990109
Armstrong	Rayburn	Underground	Stitt Mine	Rosebud Mining Company	3991302
Indiana	Green	Underground	Starford Mine	Parkwood Resources Incorporated	32061301
Indiana	Green	Underground	North Branch Mine	Rox Coal Incorporated	32981301
Indiana	South Mahoning	Underground	Rossmoyne No 1	TJS Mining Incorporated	32021301
Jefferson	Perry	Underground	Dora 8 Deep Mine	Amfire Mining Co, Limited Liability Corp	33971301
Armstrong	Redbank	GFCC	Daugherty Project	J&J Snyder Incorporated	03-05-02
Armstrong	Redbank	GFCC	Snyder 1 Project	J&J Snyder Incorporated	03-05-01
Armstrong	Redbank	GFCC	Daugherty 2 Project	J&J Snyder Incorporated	03-07-01

(Source: DEP, 2009b)

## APPENDIX E. ILLEGAL DUMPSITES

Site ID	Dumpsite	Municipality	Tons	Proximity to Waterway	Visibility from Road	Terrain	Recent Activity
<i>Armstrong County</i>							
5	East Caldwell Road	Boggs Township	4	Within 50 feet	Partially	Steep slope	Yes
6	North Bullock Road	Boggs Township	0.5	No waterway/wetland	Partially	Medium slope	No
7	Heffelfinger Road	Boggs Township	1	In waterway/wetland	Partially	Steep slope	No
8	Pine Creek Road	Boggs Township	5	More than 100 feet	Partially	Extremely steep	Yes
9	South Bullock Road	Boggs Township	12.5	In waterway/wetland	Partially	Steep slope	Yes
10	River Mill	Boggs Township	1.5	More than 100 feet	Partially	Steep slope	Yes
24	Logan Road	Cowanshannock Township	0.125	More than 100 feet	Yes	Gentle slope	No
80	SR 1003 site 1	Madison Township	1.5	More than 100 feet	Partially	Steep slope	No
82	Deanville Road	Madison Township	1	More than 100 feet	Partially	Medium slope	No
87	Patrick Road	Mahoning Township	1.5	More than 100 feet	Partially	Extremely steep	Yes
88	Deanville Road	Mahoning Township	9	More than 100 feet	Yes	Steep slope	Yes
91	Crickets Road	Mahoning Township	17.5	No waterway/wetland	Yes	Steep slope	Yes
93	Mill Seat Road	Mahoning Township	3	More than 100 feet	Partially	Steep slope	Yes
94	Farm Road	Mahoning Township	2	No waterway/wetland	Partially	Medium slope	No
122	Wilinson Road	Pine Township	3	In waterway/wetland	Yes	Steep slope	No
123	Stewartson Road	Pine Township	10	More than 100 feet	Yes	Steep slope	Yes
131	McCauley Falls Road	Rayburn Township	2	50 to 100 feet	Partially	Steep slope	Yes
132	Lower Hayes Run Road	Rayburn Township	2	In waterway/wetland	Partially	Extremely steep	No
139	Sames Road	Redbank Township	1.5	In waterway/wetland	No	Steep slope	Yes
140	Creek Road	Redbank Township	1	Within 50 feet	Yes	Steep slope	No
141	German Road	Redbank Township	1	No waterway/wetland	Partially	Medium slope	Yes
142	SR 1010	Redbank Township	1	More than 100 feet	No	Steep slope	No
143	Minich Hollow Road	Redbank Township	14	Within 50 feet	Yes	Medium slope	Yes
145	Upper Mudlic Road	Redbank Township	0.5	In waterway/wetland	Yes	Gentle slope	No
170	Ridge Raod	Redbank Township	0.125	More than 100 feet	Yes	Medium slope	No
171	Kelly Hollow Rioad	Wayne Township	12.5	50-100 feet	Partially	Steep slopes	Yes
172	Laurel Road	Wayne Township	1.5	More than 100 feet	Partially	Medium slope	No
173	Miller Hollow Road	Wayne Township	1.5	More than 100 feet	Yes	Gentle slope	Yes
174	Pebble Road	Wayne Township	0.25	More than 100 feet	Yes	Gentle slope	No

Site ID	Dumpsite	Municipality	Tons	Proximity to Waterway	Visibility from Road	Terrain	Recent Activity
<b>Indiana County</b>							
4	Big Two	Grant Township	2.5	Within 50 feet	No	Steep slope	Yes
5	Butterbaugh	Grant Township	2.5	No waterway	Yes	Flat	Unknown
91	Wolfe Road	West Mahoning Township	2.5	More than 100 feet	Yes	Steep slope	N
92	North Elkin	North Mahoning Township	5	Within 50-100 feet	Partially	Steep slope	N
93	Bosh Road	North Mahoning Township	4	Within 50-100 feet	Yes	Flat	Unknown
137	Fry Cemetery Road	Canoe Township	32.5	Within 50 feet	Partially	Very steep	Yes

49

<b>Jefferson County</b>							
76	Orchard Road	Ringgold Township	0.5	No waterway	No	Gentle slope	Yes
77	South Slate Road	Porter Township	0.13	No waterway	Yes	Flat	Yes
78	Windy Whiz Road	Porter Township	12.5	No waterway	Yes	Flat	Yes
79	Freedline	Porter Township	1	Within 50 feet	Yes	Gentle slope	Yes

14.13

Site ID	Dumpsite	Tires	Appliances	Electronics	TVs	Furniture	Mattresses	Car Batteries	Car Parts	Bag Trash	Household Waste	Recyclables	Household Hazardous Waste	Clean Fill	Construction/ Demolition Waste	Yard Waste
<b>Armstrong County</b>																
5	East Caldwell Road	5	0	0	1	2	0	0	No	Yes	No	No	No	No	Yes	No
6	North Bullock Road	5	0	1	0	1	1	0	Yes	Yes	Yes	No	No	No	Yes	No
7	Heffelfinger Road	0	1	0	0	1	0	0	Yes	No	Yes	No	No	No	No	No
8	Pine Creek Road	0	0	0	0	1	2	0	Yes	No	Yes	No	No	No	Yes	Yes
9	South Bullock Road	60	3	2	5	5	1	0	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
10	River Mill	5	0	1	6	2	0	0	Yes	Yes	Yes	No	No	No	Yes	No
24	Logan Road	0	1	0	0	0	0	0	No	No	No	No	No	No	Yes	No
80	SR 1003 site 1	4	0	0	0	1	0	0	No	Yes	Yes	No	No	Yes	Yes	Yes
82	Deanville Road	10	0	0	0	0	0	0	Yes	No	Yes	No	No	Yes	No	Yes
87	Patrick Road	4	3	0	0	0	0	0	No	Yes	Yes	No	No	Yes	Yes	No
88	Deanville Road	60	3	2	1	2	1	0	Yes	Yes	Yes	No	No	Yes	Yes	Yes
91	Crickets Road	60	18	2	5	5	2	0	Yes	Yes	Yes	No	No	Yes	Yes	Yes
93	Mill Seat Road	15	8	0	5	2	2	0	No	Yes	Yes	No	No	Yes	No	Yes
94	Farm Road	15	6	0	1	0	0	0	Yes	No	No	No	No	Yes	Yes	Yes
122	Wilinson Road	20	2	0	1	1	0	0	No	No	Yes	No	No	Yes	Yes	No
123	Stewartson Road	50	4	0	4	6	0	0	Yes	Yes	Yes	No	No	Yes	Yes	Yes
131	McCauley Falls Road	0	0	0	0	0	1	1	Yes	Yes	Yes	No	Yes	No	Yes	No
132	Lower Hayes Run Road	2	2	1	1	2	0	0	Yes	Yes	Yes	No	Yes	No	Yes	No
139	Sames Road	8	7	1	2	0	0	0	No	Yes	Yes	No	No	No	No	No
140	Creek Road	4	3	0	1	0	0	0	No	Yes	No	No	No	No	Yes	No
141	German Road	8	0	0	0	1	0	0	Yes	No	Yes	No	No	No	No	No
142	SR 1010	4	2	1	0	0	0	0	Yes	No	Yes	No	No	No	Yes	No
143	Minich Hollow Road	80	6	2	4	5	2	0	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
145	Upper Mudlic Road	3	0	0	0	0	0	0	No	Yes	Yes	No	No	No	No	No
170	Ridge Raod	4	0	0	0	0	0	0	No	No	No	No	No	No	No	No
171	Kelly Hollow Rioad	10	2	0	0	1	1	0	No	No	Yes	No	No	No	Yes	No
172	Laurel Road	0	0	0	0	0	0	0	No	No	No	No	No	No	Yes	No
173	Miller Hollow Road	6	0	0	0	0	0	0	No	Yes	No	No	No	No	No	No
174	Pebble Road	0	0	0	0	0	0	0	No	Yes	No	No	No	No	Yes	No

Site ID	Dumpsite	Tires	Appliances	Electronics	TVs	Furniture	Mattresses	Car Batteries	Car Parts	Bag Trash	Household Waste	Recyclables	Houshold Hazardous Waste	Clean Fill	Construction/ Demolition Waste	Yard Waste
<b>Indiana County</b>																
4	Big Two	50	3	0	2	2	0	0	Yes	No	No	Yes	No	No	No	No
5	Butterbaugh	60	5	2	0	10	3	0	Yes	Yes	Yes	Yes	No	No	No	No
91	Wolfe Road	0	10	0	0	3	0	0	No	No	No	Yes	No	No	Yes	No
92	North Elkin	5	20	0	0	0	0	0	No	No	Yes	Yes	No	No	No	No
93	Bosh Road	8	25	0	1	0	0	0	No	No	Yes	Yes	No	No	No	No
137	Fry Cemetery Road	200	100	0	0	150	0	0	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

**son County**

76	Orchard Road	0	0	0	0	0	0	0	No	Yes	Yes	No	No	No	No	No
77	South Slate Road	0	0	0	0	0	0	0	No	Yes	No	No	No	No	No	No
78	Windy Whiz Road	20	1	0	0	2	0	0	No	Yes	Yes	No	No	No	No	No
79	Freedline	5	0	0	0	0	0	0	No	Yes	Yes	No	No	No	Yes	No

(Source: PA CleanWays, 2009; PA CleanWays, 2007a; PA CleanWays, 2007b)

**APPENDIX F. INTEGRATED WATERBODY REPORT IMPAIRED WATERWAYS**

<b>TMDL Segment and Reason</b>	<b>Impairment</b>	<b>ID Date</b>	<b>TMDL Date</b>
<b>Eagle Run</b>			
Aquatic Life (11950) - 2.38 miles Removal of Vegetation	Siltation	2006	2019
<b>Eagle Run (Unt 47372)</b>			
Aquatic Life (11950) - 1.72 miles Removal of Vegetation	Siltation	2006	2019
<b>Glade Run (Unt 46201)</b>			
Aquatic Life (3456) - 1.08 miles Abandoned Mine Drainage	Metals	2004	2017
<b>Glade Run (Unt 46210)</b>			
Aquatic Life (3463) - 1.62 miles Abandoned Mine Drainage	Metals	2004	2017
<b>Glade Run (Unt 46211)</b>			
Aquatic Life (3463) - 1.07 miles Abandoned Mine Drainage	Metals	2004	2017
<b>Leisure Run</b>			
Aquatic Life (4306) - 0.89 miles On site Wastewater	Organic Enrichment/Low D.O.	2004	2017
<b>Little Mahoning Creek</b>			
Aquatic Life (10030) - 0.63 miles Abandoned Mine Drainage	Metals	1998	2011
	pH	2002	2015
Aquatic Life (10031) - 6.31 miles Abandoned Mine Drainage	Metals	2002	2015
	pH	2002	2015
<b>Little Mudlick Creek</b>			
Aquatic Life (12798) - 1.66 miles Abandoned Mine Drainage	Siltation	2006	2019
<b>Little Mudlick Creek (Unt 47316)</b>			
Aquatic Life (12798) - 0.42 miles Abandoned Mine Drainage	Siltation	2006	2019
Aquatic Life (12065) - 2.58 miles Abandoned Mine Drainage	Metals	2006	2019
	Siltation	2006	2019
Channelization		2006	2019

<b>TMDL Segment and Reason</b>	<b>Impairment</b>	<b>ID Date</b>	<b>TMDL Date</b>
<b>Mahoning Creek</b>			
Aquatic Life (12065) - 2.58 miles			
Thermal Modifications		2006	2019
Removal of Vegetation	Siltation	2006	2019
Thermal Modifications		2006	2019
Urban Runoff/Storm Sewers	Nutrients	2006	2019
	Siltation	2006	2019
Aquatic Life (12067) - 1.14 miles			
Channelization	Siltation	2006	2019
Thermal Modifications		2006	2019
Removal of Vegetation	Siltation	2006	2019
Thermal Modifications		2006	2019
Road Runoff	Siltation	2006	2019
Aquatic Life (12304) - 2.16 miles			
Abandoned Mine Drainage	Metals	2006	2019
	Siltation	2006	2019
<b>Mahoning Creek (Unt 47253)</b>			
Aquatic Life (12776) - 0.51 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Mahoning Creek (Unt 47254)</b>			
Aquatic Life (12777) - 2.24 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Mahoning Creek (Unt 47255)</b>			
Aquatic Life (12777) - 0.37 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Mahoning Creek (Unt 47436)</b>			
Aquatic Life (12805) - 2.15 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Mahoning Creek (Unt 47444)</b>			
Aquatic Life (11941) - 0.65 miles			
Abandoned Mine Drainage	Metals	2006	2019
<b>Mahoning Creek (Unt 47737)</b>			
Aquatic Life (11973) - 1.17 miles			
Abandoned Mine Drainage	Metals	2006	2019
Surface Mining		2006	2019
<b>Mahoning Creek (Unt 47738)</b>			
Aquatic Life (11976) - 0.85 miles			
Abandoned Mine Drainage	Metals	2006	2019

<b>TMDL Segment and Reason</b>	<b>Impairment</b>	<b>ID Date</b>	<b>TMDL Date</b>
<b>Mahoning Creek (Unt 47749)</b>			
Aquatic Life (11976) - 0.73 miles			
Abandoned Mine Drainage	Metals	2006	2019
<b>Mahoning Creek (Unt 47920)</b>			
Aquatic Life (12307) - 1.03 miles			
On site Wastewater	Nutrients	2006	2019
	Pathogens	2006	2019
<b>Mudlick Run</b>			
Aquatic Life (10031) - 0.64 miles			
Abandoned Mine Drainage	Metals	2002	2015
	pH	2002	2015
<b>North Branch Little Mahoning Creek</b>			
Aquatic Life (11977) - 2.18 miles			
Abandoned Mine Drainage	Siltation	2006	2019
Aquatic Life (11978) - 1.06 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>North Branch Little Mahoning Creek (Unt 47628)</b>			
Aquatic Life (11977) - 1.53 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>North Branch Little Mahoning Creek (Unt 47629)</b>			
Aquatic Life (11977) - 0.72 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>North Branch Little Mahoning Creek (Unt 47630)</b>			
Aquatic Life (11977) - 1.14 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>North Branch Little Mahoning Creek (Unt 47631)</b>			
Aquatic Life (11977) - 0.33 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Pine Run</b>			
Aquatic Life (12793) - 5.27 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Pine Run (Unt 46280)</b>			
Aquatic Life (4702) - 1.63 miles			
Abandoned Mine Drainage	Metals	2004	2017

<b>TMDL Segment and Reason</b>	<b>Impairment</b>	<b>ID Date</b>	<b>TMDL Date</b>
<b>Pine Run (Unt 47348)</b>			
Recreational (12803) - 0.41 miles Abandoned Mine Drainage	Siltation	2006	2019
<b>Pine Run (Unt 47349)</b>			
Aquatic Life (12801) - 1.49 miles Abandoned Mine Drainage	Siltation	2006	2019
<b>Pine Run (Unt 47373)</b>			
Aquatic Life (11950) - 0.73 miles Removal of Vegetation	Siltation	2006	2019
<b>Ross Run</b>			
Aquatic Life (12815) - 3.68 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47483)</b>			
Aquatic Life (12815) - 0.36 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47484)</b>			
Aquatic Life (12815) - 0.51 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47485)</b>			
Aquatic Life (12815) - 0.92 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47486)</b>			
Aquatic Life (12815) - 0.34 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47487)</b>			
Aquatic Life (12815) - 0.33 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47488)</b>			
Aquatic Life (12815) - 0.41 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47493)</b>			
Aquatic Life (12815) - 0.52 miles Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47494)</b>			
Aquatic Life (12815) - 0.5 miles Grazing Related Agriculture	Siltation	2006	2019

<b>TMDL Segment and Reason</b>	<b>Impairment</b>	<b>ID Date</b>	<b>TMDL Date</b>
<b>Ross Run (Unt 47495)</b>			
Aquatic Life (12815) - 0.96 miles			
Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47496)</b>			
Aquatic Life (12815) - 0.39 miles			
Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47497)</b>			
Aquatic Life (12815) - 0.67 miles			
Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47498)</b>			
Aquatic Life (12815) - 0.41 miles			
Grazing Related Agriculture	Siltation	2006	2019
<b>Ross Run (Unt 47499)</b>			
Aquatic Life (12815) - 0.31 miles			
Grazing Related Agriculture	Siltation	2006	2019
<b>South Branch South Fork Pine Creek (Unt 47210)</b>			
Aquatic Life (8357) - 2.04 miles			
Agriculture	Nutrients	1998	2011
	Siltation	1998	2011
<b>South Branch South Fork Pine Creek (Unt 47211)</b>			
Aquatic Life (8357) - 0.7 miles			
Agriculture	Nutrients	1998	2011
	Siltation	1998	2011
<b>South Branch South Fork Pine Creek (Unt 47212)</b>			
Aquatic Life (8357) - 0.37 miles			
Agriculture	Nutrients	1998	2011
	Siltation	1998	2011
<b>South Branch South Fork Pine Creek (Unt 47215)</b>			
Aquatic Life (8357) - 0.39 miles			
Agriculture	Nutrients	1998	2011
	Siltation	1998	2011
<b>South Branch South Fork Pine Creek (Unt 47216)</b>			
Aquatic Life (8357) - 0.45 miles			
Agriculture	Nutrients	1998	2011
	Siltation	1998	2011

<b>TMDL Segment and Reason</b>	<b>Impairment</b>	<b>ID Date</b>	<b>TMDL Date</b>
<b>South Fork Pine Creek (Unt 47161)</b>			
Aquatic Life (4438) - 0.58 miles			
Abandoned Mine Drainage	Metals	2004	2017
<b>South Fork Pine Creek (Unt 47165)</b>			
Aquatic Life (4440) - 0.57 miles			
Abandoned Mine Drainage	Metals	2004	2017
<b>Sugarcamp Run</b>			
Aquatic Life (4203) - 1.02 miles			
Abandoned Mine Drainage	Metals	2004	2017
	Siltation	2004	2017
Aquatic Life (4205) - 1.41 miles			
Abandoned Mine Drainage	Metals	2004	2017
	pH	2004	2017
Aquatic Life (11941) - 1.83 miles			
Abandoned Mine Drainage	Metals	2006	2019
Aquatic Life (12800) - 2.73 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Sugarcamp Run (Unt 47347)</b>			
Aquatic Life (12800) - 0.52 miles			
Abandoned Mine Drainage	Siltation	2006	2019
<b>Sugarcamp Run (Unt 47696)</b>			
Aquatic Life (11941) - 0.79 miles			
Abandoned Mine Drainage	Metals	2006	2019
<b>Sugarcamp Run (Unt 47697)</b>			
Aquatic Life (11941) - 1.03 miles			
Abandoned Mine Drainage	Metals	2006	2019

(Source: DEP, 2007a; DEP 2007b; DEP, 2008b)

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**APPENDIX G. LITTLE MAHONING CREEK WATERSHED VISUAL ASSESSMENT FORM**

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Evaluator's Names \_\_\_\_\_ Date: \_\_\_\_\_

Sub-Watershed \_\_\_\_\_ Stream Section Name \_\_\_\_\_

Common Stream Name \_\_\_\_\_ Reference Section Perfect Reach

Weather Conditions Today \_\_\_\_\_ Past 2-5 Days \_\_\_\_\_

Land use within drainage (%): Grazing Pasture \_\_\_\_\_ Forest \_\_\_\_\_ Residential \_\_\_\_\_ Industrial \_\_\_\_\_  
Row Crop \_\_\_\_\_ Field \_\_\_\_\_ Conservation Reserve \_\_\_\_\_ Other \_\_\_\_\_

Dominant substrate (%): Boulder \_\_\_\_\_ Cobble \_\_\_\_\_ Gravel \_\_\_\_\_ Silt \_\_\_\_\_ Mud \_\_\_\_\_

Active Channel Width \_\_\_\_\_ Invasive species Presence \_\_\_\_\_

PLEASE DESCRIBE THE AREA THAT THE WATER FLOWS THROUGH:  
What type of forest? What type of farm? What type of residential?

PLEASE WRITE DOWN ANY GPS POINTS TAKEN AND WHY

SHOULD WATER SAMPLES BE TAKEN HERE? NEAR HERE?

## Scoring Descriptions

### Channel Condition

Natural channel; no structures, dikes. No evidence of down-cutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks. Any dikes or levees are set back to provide access to an adequate flood plain.	Altered channel; <50% of the reach with riprap and/or channelization. Excess <b>aggradation</b> ; braided channel. Dikes or levees restrict flood plain width.	Channel is actively downcutting or widening. >50% of the reach with riprap or channelization. Dikes or levees prevent access to the flood plain.
10    9    8	7    6    5    4	3                    2	1

**Aggradation:** The process by which a stream's gradient steepens due to increased deposition of sediment.

**Keys:** look for things like down cutting, lateral cutting, altered or widened sections, dykes, levees or other obstructions.

### Riparian Zone

Natural Vegetation extends at least two active channel widths on each side.	Natural vegetation extends one active channel width on each side. Or If less than one width, covers entire flood plain.	Natural vegetation extends half of the active channel width on each side.	Natural vegetation extends a third of the active channel width on each side. Or Filtering function moderately compromised.	Natural vegetation less than a third of the active channel width on each side. Or Lack of regeneration. Or Filtering function severely compromised.
10    9	8    7    6	5    4	3    2	1

**Keys:** Related to ACTIVE channel width, an example would be a 5' wide stream. 10' = 2x active channel width.

### Pool Variability

Even mix of large shallow, large deep, small shallow, small deep pools present.	Majority of pools large deep; very few shallow.	Shallow pools much more prevalent than deep.	Majority of pools small shallow, or absent.
10    9    8	7    6    5	4    3    2	1

### Channel Sinuosity

The bends in the stream increase the stream length 3-4 times longer than if it was a straight line.	The bends in the stream increase the stream length 2 times longer than if it was a straight line.	The bends in the stream increase the stream length 1 times longer than if it was a straight line.	Evidence of Channel straightening, slight bends beginning to form	Channel straight; waterway has been channelized for a long distance.
10    9	8    7	6    5	4    3	2    1

### Bank Stability

Banks are stable; at elevation of active flood plain; 33% or more of eroding surface area of banks in outside bends is protected by roots that extend to the base-flow elevation.	Moderately stable; at elevation of active flood plain; less than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the base-flow elevation.	Moderately unstable; banks may be low, but typically are high (flooding occurs 1 year out of 5, or less frequently); outside bends are actively eroding (overhanging vegetation at top of bank, some mature trees falling into stream annually, some slope failures apparent).	Unstable; banks may be low, but typically are high; some straight reaches and inside edges of bends are actively eroding as well as outside bends (overhanging vegetation at top of bare bank, numerous mature trees falling into stream annually, numerous slope failures apparent).
10    9    8	7    6    5    4	3                    2	1

**Keys:** All outside bends in streams erode; even the most stable streams may have 50% of its banks bare and eroding. A stable bank would be characterized by healthy vegetative cover, and/or a gentle slope. Unstable banks, on the other hand, would have little or no vegetative cover or a steep or vertical slope.

**Water Appearance**

Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy; objects visible at depth 1.5 to 3 ft; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of time; objects visible to depth 0.5 to 1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film.  Or Moderate odor of ammonia or rotten eggs.	Very turbid or muddy appearance most of the time; objects visible to depth <0.5 ft; slow moving water may be bright-green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface.  Or Strong odor of chemicals, oil, sewage, other pollutants.
10      9      8	7      6      5      4	3                      2	1

**Keys:** Remember to look at the water, not the substrate. If you dipped a glass in the water, what would the water look like?

**Nutrient Enrichment**

Clear water along entire reach; diverse aquatic plant community little algal growth present.	Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrates.	Greenish water along entire reach; abundant algal growth, especially during warmer months.	Pea green, gray or brown water along entire reach; severe algal blooms create thick algal mats in stream.
10      9      8	7      6      5      4	3                      2	1

**Keys:** Looking for algae and other aquatic vegetation, some is good, but it should not be excessive.

**Fish Barriers**

No barriers.	Seasonal water withdrawals inhibit movement within the reach.	Drop structures, culverts, dams or diversions (<1ft drop) within the reach.	Drop structures, culverts, dams or diversions (>1ft drop) within 3 miles of reach.	Drop structures, culverts, dams or diversions (>1ft drop) within the reach.
10      9	8      7      6	5      4	3      2	1

**Keys:** You are looking for withdrawals, culverts, dams and diversions. Anything that is imposed or constructed by man that would impede fish passage.

**Instream Fish Cover**

>7 cover types available	6 to 7 cover types available	4 to 5 cover types available	2 to 3 cover types available	None to 1 cover type available
10      9	8      7      6	5      4	3      2	1

**Cover types:** Logs/large woody debris, deep pools, overhanging vegetation, boulders/cobble, riffles, undercut banks, thick root mats, dense macrophyte beds, isolated/backwater pools, other: \_\_\_\_\_

**Embeddedness**

Gravel or cobble particles are <20% embedded.	Gravel or cobble particles are 20 to 30% embedded.	Gravel or cobble particles are 30 to 40% embedded.	Gravel or cobble particles are >40% embedded.	Completely embedded.
10      9	8      7      6	5      4	3      2	1

**Keys:** Embeddedness is defined as the degree to which objects in the stream bottom are surrounded by fine sediment. Only evaluate this item in **riffles & runs**. Measure the depth to which objects are buried by sediment. Be sure that you are looking at the entire reach, not just one riffle. To help better define embeddedness, picture a rock. If the average sediment in the stream covers the bottom 20% of the rock than you would check 20%. If the rock is covered 1/3<sup>rd</sup> of the way by sediment then it is 30% embedded.

**Insect/invertebrate Habitat**

At least 5 types of habitat available. Habitat is at a stage to allow full insect colonization (woody debris and logs not freshly fallen).	3 to 4 types of habitat. Some potential habitat exists, such as overhanging trees, which will provide habitat, but have not yet entered the stream.	1 to 2 types of habitat. The substrate is often disturbed, covered, or removed by high stream velocities and scour or by sediment deposition.	None to 1 type of habitat.
10      9      8	7      6      5      4	3                      2	1

Cover types: Fine woody debris, submerged logs, leaf packs, undercut banks, cobble, boulders, coarse gravel, other: \_\_\_\_\_

**Canopy Cover**

**Keys:** This pertains to waterways where channel is 50' or less.

**Coldwater fishery**

>75% of water surface shaded and upstream 2 to 3 miles generally well shaded.	> 50% shaded in reach. Or >75% in reach, but upstream 2 to 3 miles poorly shaded.	20 to 50% shaded.	<20% of water surface in reach shaded.
10      9      8	7      6      5      4	3                      2	1

**Warmwater fishery**

25 to 90% of water surface shaded; mixture of conditions.	>90% shaded; full canopy; same shading condition throughout reach.	(Intentionally blank)	<25% water surface shaded in reach.
10      9      8	7      6      5      4		1

**Sewage (if applicable)**

(Intentionally blank)	Noticeable odor, excess plant growth and siltation.	Noticeable odor, excess plant growth. And Questionable pipe and black stream substrate.	Visible pipe with effluent, heavy odor.
	5                      4	3                      2	1

**Manure Presence (if applicable)**

(Intentionally blank)	Evidence of livestock access to riparian zone.	Occasional manure in stream or waste storage structure located on the flood plain.	Extensive amount of manure on banks or in stream. Or Untreated human waste discharge pipes present.
	5                      4	3                      2	1

**Assessment Score**

**Explanation of Score Given**

Channel condition	<input type="checkbox"/>	_____
Riparian zone	<input type="checkbox"/>	_____
Pool Variability	<input type="checkbox"/>	_____
Channel Sinuosity	<input type="checkbox"/>	_____
Bank stability	<input type="checkbox"/>	_____
Water appearance	<input type="checkbox"/>	_____
Nutrient enrichment	<input type="checkbox"/>	_____
Fish barriers	<input type="checkbox"/>	_____
In-stream fish cover	<input type="checkbox"/>	_____
Embeddedness	<input type="checkbox"/>	_____
Invertebrate habitat	<input type="checkbox"/>	_____
Canopy Cover	<input type="checkbox"/>	_____

<i>Score only if applicable</i>	
Sewage	<input type="checkbox"/>
Manure presence	<input type="checkbox"/>

**TOTAL SCORE:** \_\_\_\_\_  
 (Add all scores and divide by number of scores given)

< 6.0 = POOR  
 6.1 – 7.4 = FAIR  
 7.5 – 8.9 = GOOD  
 > 9.0 = EXCELLENT

## Water Quality

In-Stream Habitat	Erosional	% of Total	Local Non-Point Sources			
	Riffle					
	Run			no evidence		
	Depositional				potential	
	Pool				obvious	
	Edge			Local Watershed Erosion		
	Bar				None	
	Backwater				Light	
				Moderate		
				Heavy		

**APPENDIX H. SPECIES OF CONCERN**

*Plants*

Scientific Name	Common Name	Global	State	State	Proposed	Federal	Location by County		
		Rank	Rank	Status	State Status	Status	Armstrong	Indiana	Jefferson
Penstemon laevigatus	Beard-tongue	G5	S3	N	TU			x	
Baptisia australis	Blue False-indigo	G5	S2	N	PT		x	x	x
Astragalus canadensis	Canadian Milkvetch	G5	S2	N	TU			x	
Carex typhina	Cattail Sedge	G5	S2	PE	PT		x		
Trillium flexipes	Declined Trillium	G5	S2	TU	PT		x	x	
Poa languida	Drooping Bluegrass	G3G4Q	S2	TU	PT				x
Stenanthium gramineum	Featherbells	G4G5	S1S2	N	TU		x	x	x
Lonicera hirsuta	Hairy Honeysuckle	G4G5	S1	TU	PE				x
Erigenia bulbosa	Harbinger-of-spring	G5	S4	PT	PR		x		
Viburnum trilobum	Highbush-cranberry	G5T5	S3S4	TU	PR				x
Utricularia cornuta	Horned Bladderwort	G5	S2	N	PT		x		
Cardamine maxima	Large Toothwort	G5	S2	N	PT				x
Polymnia uvedalia	Leaf-cup	G4G5	S3	N	PR		x	x	
Asplenium pinnatifidum	Lobed Spleenwort	G4	S3	N	PR		x		
Salix petiolaris	Meadow Willow	G5	S4	TU	WATCH			x	x
Cimicifuga americana	Mountain Bugbane	G4	S3	PT	PR			x	
Stellaria borealis	Mountain Starwort	G5	S1S2	N	TU				x
Galium latifolium	Purple Bedstraw	G5	S3	N	TU		x		
Platanthera peramoena	Purple-fringeless Orchid	G5	S2	TU	PT		x	x	
Filipendula rubra	Queen-of-the-prairie	G4G5	S1S2	TU	TU		x	x	
Potamogeton richardsonii	Red-head Pondweed	G5	S3	PT	PR		x		
Helianthus microcephalus	Small Wood Sunflower	G5	S4	N	WATCH		x	x	x
Scirpus pedicellatus	Stalked Bulrush	G4	S1	PT	PT		x		
Pedicularis lanceolata	Swamp Lousewort	G5	S1S2	N	PE		x		
Lathyrus venosus	Veiny Pea	G5	S2	N	PE		x		
Symphotrichum praealtum	Veiny-lined Aster	G5	S3	N	TU		x		x
Veratrum virginicum	Virginia Bunchflower	G5	S1	N	PE		x		

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Plants (continued)

Scientific Name	Common Name	Global Rank	State			Proposed State Status	Federal Status	Location by County		
			State Rank	Rank	Status			Armstrong	Indiana	Jefferson
Rosa virginiana	Virginia Rose	G5	S1		TU	TU		x		
Strophostyles umbellata	Wild Bean	G5	S2		N	PE		x		
Phaseolus polystachios	Wild Kidney Bean	G5	S1S2		N	PE		x		

Vertebrates

Scientific Name	Common Name	Global Rank	State			Proposed State Status	Federal Status	Location by County		
			State Rank	Rank	Status			Armstrong	Indiana	Jefferson
Botaurus lentiginosus	American Bittern	G4	S1B		PE	PE				x
Haliaeetus leucocephalus	Bald Eagle	G5	S2B		PT	PT		x		x
Etheostoma camurum	Bluebreast Darter	G4	S2		PT	PT		x		
Percina copelandi	Channel Darter	G4	S2			PT		x		
Spiza americana	Dickcissel	G5	S2B		PE	PE				x
Heterodon platirhinos	Eastern Hognose Snake	G5	S3					x	x	
Myotis leibii	Eastern Small-footed Myotis	G3	S1B,S1N		PT	PT		x	x	
Hiodon alosoides	Goldeye	G5	S2?		PT	PT		x		
Ardea herodias	Great Blue Heron	G5	S3S4B,S4N					x	x	x
Cryptobranchus alleganiensis	Hellbender	G3G4	S3						x	x
Myotis sodalis	Indiana or Social Myotis	G2	SUB,S1N		PE	PE	LE	x		
Lampetra aepyptera	Least Brook Lamprey	G5	S3		PC	CR			x	
Asio otus	Long-eared Owl	G5	S2B,S2S3N			CU			x	
Percina macrocephala	Longhead Darter	G3	S2S3			PT		x		
Lepisosteus osseus	Longnose Gar	G5	S3			CR		x		
Hiodon tergisus	Mooneye	G5	S2S3		PT	PT		x	x	
Ichthyomyzon greeleyi	Mountain Brook Lamprey	G3G4	S2		PT	PT				x
Necturus maculosus	Mudpuppy	G5	S3S4					x	x	
Accipiter gentilis	Northern Goshawk	G5	S2S3B,S3N			CR				x
Myotis septentrionalis	Northern Myotis	G4	S3B,S3N			CR		x		
Ichthyomyzon bdellium	Ohio Lamprey	G3G4	S2S3		PC	CP				x
Podilymbus podiceps	Pied-billed Grebe	G5	S3B,S4N			CR		x		

Lower Mahoning Creek Regional Watershed Conservation Plan

*Vertebrates (continued)*

Scientific Name	Common Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status	Location by County		
							Armstrong	Indiana	Jefferson
Regina septemvittata	Queen Snake	G5	S3				x	x	
Carpiodes carpio	River Carpsucker	G5	S1		CU		x		
Moxostoma carinatum	River Redhorse	G4	S3S4		CU		x		
Thamnophis brachystoma	Shorthead Garter Snake	G4	S3						x
Liochlorophis vernalis	Smooth Green Snake	G5	S3S4					x	
Porzana carolina	Sora	G5	S3B		CR		x	x	
Erimystax dissimilis	Streamline Chub	G4	S3				x		
Crotalus horridus	Timber Rattlesnake	G4	S3S4	PC	CA			x	
Rallus limicola	Virginia Rail	G5	S3B				x	x	
Glyptemys insculpta	Wood Turtle	G4	S3S4				x	x	

*Invertebrates*

Scientific Name	Common Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status	Location by County		
							Armstrong	Indiana	Jefferson
Aeshna tuberculifera	Black-tipped Darner	G4	S2S3						x
Ellipsaria lineolata	Butterfly Mussel	G4	S1S2		CU		x		
Pleurobema clava	Clubshell	G2	S1S2	PE	PE	LE	x	x	
Elliptio crassidens	Elephant Ear	G5	SX		CU		x		
Alasmidonta marginata	Elktoe	G4	S4		N		x	x	
Cyrogenia stegaria	Fanshell	G1Q	SX		PX	LE	x		
Leptodea fragilis	Fragile Papershell	G5	S2		CR		x		
Gomphus viridifrons	Green-faced Clubtail	G3G4	S1				x		x
Gomphus descriptus	Harpoon Clubtail	G4	S1S2				x		x
Toxolasma parvus	Lilliput	G5	S1S2		PE		x		
Fusconaia subrotunda	Long-solid	G3	S1		PE		x	x	
Quadrula quadrula	Mapleleaf	G5	S1S2		PT		x		
Gomphus fraternus	Midland Clubtail	G5	S2S3						x
Quadrula metanevra	Monkeyface	G4	SX		PX		x		
Gomphus adelphus	Mustached Clubtail	G4	S3S4					x	x

*Invertebrates (continued)*

Scientific Name	Common Name	Global	State	State	Proposed	Federal	Location by County		
		Rank	Rank	Status	State Status	Status	Armstrong	Indiana	Jefferson
Lanthus parvulus	Northern Pygmy Clubtail	G4	S3S4					x	x
Epioblasma torulosa rangiana	Northern Riffleshell	G2T2	S2	PE	PE	LE	x		
Boyeria grafiana	Ocellated Darner	G5	S3					x	x
Pleurobema cordatum	Ohio Pigtoe	G4	S1		PE		x		
Utterbackia imbecillis	Paper Pondshell	G5	S3S4		CU		x	x	
Quadrula pustulosa	Pimpleback	G5	S1		PX		x		
Potamilus alatus	Pink Heelsplitter	G5	S2		CR		x		
Lampsilis abrupta	Pink Mucket	G2	SX		PX	LE	x		
Tritogonia verrucosa	Pistolgrip Mussel	G4G5	S1		PE		x		
Cyclonaias tuberculata	Purple Wartback	G5	SX		PX		x		
Pleurobema rubrum	Pyramid Pigtoe	G2G3	SX		PX		x		
Quadrula cylindrica	Rabbitsfoot	G3G4	S1	PE	PE		x		
Villosa iris	Rainbow Mussel	G5Q	S1		PE		x	x	
Gomphus quadricolor	Rapids Clubtail	G3G4	S1S2					x	x
Villosa fabalis	Rayed Bean Mussel	G2	S1S2		PE	C	x		
Leucorrhinia proxima	Red-waisted Whiteface	G5	S2						x
Pleurobema plenum	Rough Pigtoe	G1	SX		PX	LE	x		
Obovaria subrotunda	Round Hickorynut	G4	S1		PE		x	x	
Pleurobema sintoxia	Round Pigtoe	G4G5	S2		PE		x	x	
Gomphus rogersi	Sable Clubtail	G4	S1					x	x
Simpsonaias ambigua	Salamander Mussel	G3	S1?	PE	PT		x		
Plethobasus cyphus	Sheepnose Mussel	G3	S1	PE	PE	C	x		
Epioblasma triquetra	Snuffbox	G3	S1	PE	PE		x	x	
Amblema plicata	Three-ridge	G5	S2S3		PT		x		
Enallagma divagans	Turquoise Bluet	G5	S3				x		
Fusconaia flava	Wabash Pigtoe	G5	S2		PE		x	x	
Lampsilis fasciola	Wavy-rayed Lampmussel	G5	S4		N		x	x	
Pieris virginiensis	West Virginia White	G3G4	S2S3				x	x	
Stylurus scudderi	Zebra Clubtail	G4	S1				x		x

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***Geologic Features***

Scientific Name	Common Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status	Location by County		
							Armstrong	Indiana	Jefferson
Meandering channels	Meandering Channels	GNR	SNR				x		
Erosional remnant	Erosional Remnant	GNR	SNR						x

***Natural Communities***

Scientific Name	Common Name	Global Rank	State Rank	State Status	Proposed State Status	Federal Status	Location by County		
							Armstrong	Indiana	Jefferson
High-gradient clearwater creek	High-gradient Clearwater Creek	GNR	S3						x
Northern hardwood forest		GNR	S4				x		
Hemlock palustrine forest		GNR	S3					x	x
Big bluestem - indian grass river grassland		GNR	S3				x		

**Basic Global Rank Codes and Definitions**

<b>Rank Code</b>	<b>Description</b>	<b>Definition</b>
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.

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**Basic Global Rank Codes and Definitions**


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<b>Rank Code</b>	<b>Description</b>	<b>Definition</b>
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.

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**Global Rank Qualifiers**


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<b>Qualifier</b>	<b>Description</b>	<b>Definition</b>
?	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.

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**State Rank Codes and Definitions**


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<b>Rank Code</b>	<b>Description</b>	<b>Definition</b>
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.

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**State Rank Codes and Definitions (continued)**


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<b>Rank Code</b>	<b>Description</b>	<b>Definition</b>
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.
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.

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**State Rank Codes and Definitions (continued)**


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<b>Rank Code</b>	<b>Description</b>	<b>Definition</b>
SZ	Zero Occurrences	Not of practical conservation concern in the state because there are no definable occurrences, although the taxon is native and appears regularly in the state. This rank will generally be used for long distance migrants whose occurrences during their migrations have little or no conservation value for the migrant as they are typically too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped, and protected. Typically, the SZ rank applies to a non-breeding population in the subnation -- for example, birds on migration. An SZ rank may in a few instances also apply to a breeding population, for example certain Lepidoptera which regularly die out every year with no significant return migration. Although the SZ rank typically applies to migrants, it should not be used indiscriminately. Just because a species is on migration does not mean it receives an SZ rank. SZ only applies when the migrants occur in an irregular, transitory, and dispersed manner.
SP	Potential	Potential that Element occurs in the state but no extant or historic occurrences reported.
SR	Reported	Element reported in the state but without a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the program hasn't yet received first-hand information; others are old, obscure reports.
SRF	Reported Falsely	Element erroneously reported in the state (e.g., misidentified specimen) and the error has persisted in the literature
SSYN	Synonym	Element reported as occurring in the state, but state does not recognize the taxon; therefore the Element is not ranked by the state.
*		S rank has been assigned and is under review. Contact the individual state Natural Heritage program for assigned rank.
Not Provided		Species is known to occur in this state. Contact the individual state Natural Heritage program for assigned rank.

**State Rank Qualifiers**

<b>Qualifier</b>	<b>Description</b>	<b>Definition</b>
80	Breeding	Basic rank refers to the breeding population of the Element in the state.
N	Non-breeding	Basic rank refers to the non-breeding population of the Element in the state.
?	Inexact or Uncertain	Denotes inexact or uncertain numeric rank. For SE denotes uncertainty of exotic status. (The ? qualifies the character immediately preceding it in the SRANK.)
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

**Pennsylvania State Status - Invertebrates**

<b>Status</b>	<b>Description</b>	<b>Definition</b>
N		No current legal status but is under review for future listing.

**Pennsylvania Status Definitions - Plants**

<b>Status</b>	<b>Description</b>	<b>Definition</b>
PE	Pennsylvania Endangered	Plant species which are in danger of extinction throughout most of their natural range within this Commonwealth, if critical habitat is not maintained or if the species is greatly exploited by man. This classification shall also include any populations of plant species that have been classified as Pennsylvania Extirpated, but which subsequently are found to exist in this Commonwealth.
PT	Pennsylvania Threatened	Plant species which may become endangered throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained to prevent their future decline, or if the species is greatly exploited by man.
PR	Pennsylvania Rare	Plant species, which are uncommon within this Commonwealth. All species of the native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification.
	Disjunct	Significantly separated from their main area of distribution
	Endemic	Confined to a specialized habitat.

**Pennsylvania Status Definitions - Plants (continued)**

<b>Status</b>	<b>Description</b>	<b>Definition</b>
PR	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 taxonomic 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**

<b>Status</b>	<b>Description</b>	<b>Definition</b>
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 State Status - Wild Birds and Mammals (continued)**

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".
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.

**Pennsylvania State Status - Wild Birds and Mammals (continued)**

Status	Description	Definition
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.
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".

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**Pennsylvania Biological Survey Suggested Status Definitions (continued)**


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<b>Status</b>	<b>Description</b>	<b>Definition</b>
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 Endangered or Threatened.
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.

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**Federal Status Codes and Definitions**


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<b>Status</b>	<b>Description</b>	<b>Definition</b>
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.

**Federal Status Codes and Definitions (continued)**

<b>Status</b>	<b>Description</b>	<b>Definition</b>
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. WILDLIFE LISTING**

<b>Common Name</b>	<b>Scientific Name</b>
<b>Amphibitans</b>	
bullfrog	<i>Rana catesbeiana</i>
American toad	<i>Bufo americanus</i>
Appalachian seal salamander	<i>Desmognathus monticola monticola</i>
eastern gray treefrog	<i>Hyla versicolor</i>
eastern hellbender	<i>Cryptobranchus alleganiensis alleganiensis</i>
four-toed salamander	<i>Hemidactylum scutatum</i>
fowlers toad	<i>Bufo fowleri</i>
jefferson salamander	<i>Ambystoma jeffersonianum</i>
longtail salamander	<i>Eurycea longicauda</i>
marbled salamander	<i>Ambystoma opacum</i>
mountain chorus frog	<i>Pseudacris brachyphona</i>
mountain dusky salamander	<i>Desmognathus ochrophaeus</i>
mudpuppy	<i>Necturus maculosus</i>
northern two-lined salamander	<i>Eurycea bislineata</i>
northern dusky salamander	<i>Desmognathus fuscus</i>
northern green frog	<i>Rana clamitans</i>
northern leopard frog	<i>Rana pipiens</i>
northern red salamander	<i>Pseudotriton ruber ruber</i>
northern spring peeper	<i>Pseudacris crucifer</i>
northern spring salamander	<i>Gyrinophilus porphyriticus</i>
pickerel frog	<i>Rana palustris</i>
redback salamander	<i>Plethodon cinereus</i>
red-spotted newt	<i>Notophthalmus viridescens</i>
slimy salamander	<i>Plethodon glutinosus</i>
spotted salamander	<i>Ambystoma maculatum</i>
Wehrle's salamander	<i>Plethodon wehrlei</i>
wood frog	<i>Rana sylvatica</i>

**Birds**

American bittern	<i>Botaurus lentiginosus</i>
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Spinus tristis</i>
American robin	<i>Turdus migratorius</i>
American woodcock	<i>Scolopax minor</i>
bald eagle	<i>Haliaeetus leucocephalus</i>
Baltimore oriole	<i>Icterus galbula</i>
barn owl	<i>Tyto alba</i>
barred owl	<i>Strix varia</i>
black-capped chickadee	<i>Poecile atricapillus</i>
black-throated green warbler	<i>Dendroica virens</i>
blue jay	<i>Cyanocitta cristata</i>
blue-gray gnatcatcher	<i>Polioptila caerulea</i>

**Birds (continued)**

broad-winged hawk	<i>Buteo platypterus</i>
brown thrasher	<i>Toxostoma rufum</i>
brown-headed cowbird	<i>Molothrus ater</i>
Canada goose	<i>Branta canadensis</i>
Carolina chickadee	<i>Poecile carolinensis</i>
cedar waxwing	<i>Bombycillus cedrorum</i>
cerulean warbler	<i>Dendroica cerulea</i>
chestnut sided warbler	<i>Dendroica pensylvanica</i>
common grackle	<i>Quiscalus quiscula</i>
common yellow throat	<i>Geothlypis trichas</i>
Cooper's hawk	<i>Accipiter cooperil</i>
dark-eyed junco	<i>Junco hyemalis</i>
dickcissel	<i>Spiza americana</i>
downy wood pecker	<i>Picoides pubescens</i>
eastern bluebird	<i>Sialia sialis</i>
eastern screech owl	<i>Megascops asio</i>
eastern screech owl	<i>Otus asio</i>
great blue heron	<i>Ardea herodias</i>
great horned owl	<i>Bubo virginianus</i>
green heron	<i>Butorides virescens</i>
house finch	<i>Carpodacus mexicanus</i>
house wren	<i>Troglodytes aedon</i>
indigo bunting	<i>Passerina cyanea</i>
killdeer	<i>Charadrius vociferus</i>
long-eared owl	<i>Asio otus</i>
mallard duck	<i>Anas platyrhynchos</i>
mourning dove	<i>Zenaida macroura</i>
mourning warbler	<i>Oporonis philadelphia</i>
northern cardinal	<i>Cardinalis cardinalis</i>
northern flicker	<i>Colaptes auratus</i>
northern goshawk	<i>Accipiter gentillis</i>
northern mocking bird	<i>Mimus polyglottos</i>
northern saw-wheat owl	<i>Aegolius acadicus</i>
osprey	<i>Pandion haliaetus</i>
pied-billed grebe	<i>Podilymbus podiceps</i>
pileated wood pecker	<i>Dryocopus pileatus</i>
purple finsh	<i>Carpodacus purpureaus</i>
red-bellied wood pecker	<i>Melanerpes carolinus</i>
red-sholdered hawk	<i>Buteo lineatus</i>
red-tail hawk	<i>Buteo jamaicensis</i>
red-winged balck bird	<i>Agelaius phoeniceus</i>
ruby-throated hummingbird	<i>Archilochus colubris</i>
ruffed grouse	<i>Bonasa umbellus</i>
rusty blackbird	<i>Euphagus carolinus</i>
scarlet tanger	<i>Piranga olivacea</i>

**Birds (continued)**

song sparrow	<i>Melospiza melodia</i>
sora	<i>Porzana carolina</i>
Swainson's thrush	<i>Catharus ustulatus</i>
tree swallow	<i>Tachycineta bicolor</i>
tufted titmouse	<i>Baeolophus bicolor</i>
turkey vulture	<i>Cathartes aura</i>
Virginia rail	<i>Rallus limicola</i>
white breasted nut hatch	<i>Sitta carolinensis</i>
white throated sparrow	<i>Zonotrichia albicollis</i>
wild turkey	<i>Meleagris gallopavo</i>
Wilson's Snipe	<i>Gallinago delicata</i>
wood duck	<i>Aix sponsa</i>
yellow-bellied sapsucker	<i>Sphyrapicus varius</i>

**Fish**

**Lamprey: Family Petromyzontidae**

American brook lamprey	<i>Lampetra appendix</i>
mountain brook lamprey	<i>Ichthyomyzon greeleyi</i>
Ohio lamprey	<i>Ichthyomyzon bdellium</i>

**Rocklings: Family Lotidae**

burbot	<i>Lota lota</i>
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**Pikes: Family Esocidae**

muskellunge	<i>Esox masquinongy</i>
northern pike	<i>Esox lucius</i>
tiger muskellunge	<i>Esox lucius</i> cross <i>Esox masquinongy</i>

**Catfish: Family Ictaluridae**

channel catfish	<i>Ictalurus punctatus</i>
brown bullhead	<i>Ameiurus nebulosus</i>

**Minnows: Family Cyprinidae**

bigmouth shiner	<i>Notropis dorsalis</i>
southern redbelly dace	<i>Phoxinus erythrogaster</i>
bigeye chub	<i>Hybopsis amblops</i>
blacknose dace	<i>Rhinichthys atratulus</i>
bluntnose minnow	<i>Pimephales notatus</i>
central stoneroller	<i>Campostoma anomalum</i>
common shiner	<i>Luxilus cornutus</i>
creek chub	<i>Semotilus atromaculatus</i>
emerald shiner	<i>Notropis atherinoides</i>
redside dace	<i>Clinostomus elongatus</i>
sand Shiner	<i>Notropis stamineus</i>
fallfish	<i>Semotilus corporalis</i>

**Fish (continued)**

**Perches: Family Percidae**

channel darter	<i>Percina copelandi</i>
longhead darter	<i>Percina macrocephala</i>
yellow perch	<i>Perca flavescens</i>
walleye	<i>Sander vitreus</i>
banded darter	<i>Etheostoma zonale</i>
fantail darter	<i>Etheostoma flabellare</i>
johnny darter	<i>Etheostoma nigrum</i>
logperch	<i>Percina caprodes</i>
greenside darter	<i>Etheostoma blennioides</i>

**Trout: Family Salmonidae**

brook trout	<i>Salvelinus fontinalis</i>
brown trout	<i>Salmo trutta</i>
rainbow trout	<i>Oncorhynchus mykiss</i>
golden rainbow trout	<i>Oncorhynchus mykiss var.</i>

**Sunfish: Family Centrarchidae**

black crappie	<i>Pomoxis nigromaculatus</i>
bluegill	<i>Lepomis macrochirus</i>
largemouth bass	<i>Micropterus salmoides</i>
pumpkin seed	<i>Lepomis gibbosus</i>
rock bass	<i>Ambloplites rupestris</i>
small mouth bass	<i>Micropterus dolomieu</i>
white crappie	<i>Pomoxis annularis</i>

**Suckers: Family Catostomidae**

golden redbreast	<i>Moxostoma erythrurum</i>
northern hogsucker	<i>Hypentelium nigricans</i>
shortheaded redbreast	<i>Moxostoma macrolepidotum</i>
white sucker	<i>Catostomus commersoni</i>

**Sculpins: Family Cottidae**

mottled sculpin	<i>Cottus bairdii</i>
slimy sculpin	<i>Cottus cognatus</i>

**Freshwater Mussels**

butterfly mussel	<i>Ellipsaria lineolata</i>
clubshell	<i>Pleurobema clava</i>
creeper	<i>Strophitus undulatus</i>
elephant ear	<i>Elliptio crassidens</i>
elktoe mussel	<i>Alasmodonta marginata</i>
fanshell	<i>Cyprogenia stegaria</i>
fatmucket	<i>Lampsilis radiata luteola</i>
flutedshell mussel	<i>Lasmigona costata</i>

**Freshwater Musselsb (continued)**

fragile papershell	<i>Leptodea fragilis</i>
kidneyshell	<i>Ptychobranchnus fasciolaris</i>
lilliput	<i>Toxolasma parvus</i>
long-solid	<i>Fusconaia subrotunda</i>
mapleleaf	<i>Quadrula quadrula</i>
monkeyface	<i>Quadrula metanevra</i>
northern riffleshell	<i>Epioblasma torulosa rangiana</i>
Ohio pigtoe	<i>Pleurobema cordatum</i>
paper pondshell	<i>Utterbackia imbecillis</i>
pimpleback	<i>Quadrula pustulosa</i>
pink heelsplitter	<i>Potamilus alatus</i>
pink mucket	<i>Lampsilis abrupta</i>
pistolgrip mussel	<i>Tritogonia verrucosa</i>
plain pocketbook mussel	<i>Lampsilis cardium</i>
purple wartyback	<i>Cyclonaias tuberculata</i>
pyramid pigtoe	<i>Pleurobema rubrum</i>
rabbitsfoot	<i>Quadrula cylindrica</i>
rainbow mussel	<i>Villosa iris</i>
rayed bean mussel	<i>Villosa fabalis</i>
rough pigtoe	<i>Pleurobema plenum</i>
round hickorynut	<i>Obovaria subrotunda</i>
round pigtoe	<i>Pleurobema sintoxia</i>
salamander mussel	<i>Simpsonaias ambigua</i>
sheepnose mussel	<i>Plethobasus cyphyus</i>
snuffbox	<i>Epioblasma triquetra</i>
spike mussel	<i>Elliptio dilatata</i>
three-ridge	<i>Amblema plicata</i>
Wabash pigtoe	<i>Fusconaia flava</i>
wavy-rayed lampmussel	<i>Lampsilis fasciola</i>

**Mammals**

American beaver	<i>Castor canadensis</i>
American black bear	<i>Ursus americanus</i>
American mink	<i>Mustela vison</i>
Appalachian cottontail	<i>Sylvilagus obscurus</i>
big brown bat	<i>Eptesicus fuscus</i>
coyote	<i>Canis latrans</i>
deer mouse	<i>Peromyscus maniculatus</i>
eastern chipmunk	<i>Tamias striatus</i>
eastern cottontail	<i>Sylvilagus floridanus</i>
eastern fox squirrel	<i>Sciurus niger</i>
eastern gray squirrel	<i>Sciurus carolinensis</i>
eastern pipistrel	<i>Pipistrellus subflavus</i>
eastern small-footed bat	<i>Myotis leibii</i>
eastern woodrat	<i>Neotoma floridana</i>

**Mammals (continued)**

evening bat	<i>Nycticeius humeralis</i>
gray fox	<i>Urocyon cinereoargenteus</i>
hairy-tailed mole	<i>Parascalops breweri</i>
hoary bat	<i>Lasiurus cinereus</i>
Indiana bat	<i>Myotis sodalis</i>
least shrew	<i>Cryptotis parva</i>
least weasel	<i>Mustela nivalis</i>
little brown bat	<i>Myotis lucifugus</i>
long-tailed shrew	<i>Sorex dispar</i>
long-tailed weasel	<i>Mustela frenata</i>
masked shrew	<i>Sorex cinereus</i>
meadow jumping mouse	<i>Zapus hudsonius</i>
meadow vole	<i>Microtus pennsylvanicus</i>
North American porcupine	<i>Erethizon dorasatum</i>
northern flying squirrel	<i>Glaucomys sabrinus</i>
northern myotis	<i>Myotis septentrionalis</i>
northern raccoon	<i>Procyon lotor</i>
northern river otter	<i>Lontra canadensis</i>
northern short-tailed shrew	<i>Blarina brevicauda</i>
pine vole	<i>Microtus pinetorum</i>
red bat	<i>Lasiurus borealis</i>
red fox	<i>vulpes vulpes</i>
red squirrel	<i>Tamiasciurus hudsonicus</i>
silver-haired bat	<i>Lasionycteris noctivagans</i>
smoky shrew	<i>Sorex fumeus</i>
snowshoe hare	<i>Lepus americanus</i>
southern bog lemming	<i>Synaptomys cooperi</i>
southern flying squirrel	<i>Claucomys volans</i>
star-nosed mole	<i>Condylura cristata</i>
striped skunk	<i>Mephitis mephitis</i>
Virginia opossum	<i>Didelphis virginiana</i>
water shrew	<i>Sorex palustris</i>
white-footed mouse	<i>Perocyscus leucopus</i>
whitetail deer	<i>Odocoileus virginianus</i>
woodchuck	<i>Marmota monax</i>
woodland jumping mouse	<i>Napaeozapus insignis</i>

**Reptiles**

black rat snake	<i>Elaphe obsoleta</i>
common snapping turtle	<i>Chelydraserpentina</i>
eastern box turtle	<i>Terrapene carolina</i>
eastern garter snake	<i>Thamnophis sirtalis</i>
eastern hognose snake	<i>Heterodon platirhinus</i>
eastern milk snake	<i>Lampropeltis triangulum</i>
eastern spiny softshell	<i>Apalone spinifera spinifera</i>

**Reptiles (continued)**

five-linked skink	<i>Eumeces fasciatus</i>
Kirtland's snake	<i>Clonophis kirtlandii</i>
midland painted turtle	<i>Chrysemys picta marginata</i>
mountain earth snake	<i>Virginia pulchra</i>
northern black racer	<i>Coluber constrictor constrictor</i>
northern brown snake	<i>Storeria dekayi dekayi</i>
northern copperhead	<i>Agkistrodon contortrix mokasen</i>
northern fence lizard	<i>Sceloporus undulatus hyacinthinus</i>
northern redbelly snake	<i>Storeria occipitomaculata occipitomaculata</i>
northern ringneck snake	<i>Diadophis punctatus edwardsii</i>
northern water snake	<i>Nerodia sipedon</i>
queen snake	<i>Regina septemvittata</i>
shorthead garter snake	<i>Thamnophis brachystoma</i>
smooth earth snake	<i>Virginia valeriae</i>
smooth green snake	<i>Opheodrys vernalis</i>
timber rattlesnake	<i>Crotalus horridus</i>
wood turtle	<i>Clemmys insculpta</i>

**APPENDIX J. RECREATIONAL & HISTORICAL SITES**

<b>Parks</b>	<b>Size</b>	<b>Description</b>
Dayton Ballfield	7 acres	Old baseball field converted into a little league field behind old Dayton school.
Dayton Elementary School		Playground, softball field, basketball court
Dayton Fairgrounds	107 acres	Grand stand, picnic area, race track, stage, camping area, show arena, dairy, barns
Dayton Fire Hall Park	1.4 acres	Playground, basketball court, tennis court, pavilion, recycling center
Dayton Grove Park	.5 acres	Playground, pavilion, benches, memorial
Greenwall Park	8.5 acres	Softball field, playground, pavilions, volleyball court, horseshoes, restrooms, and informal canoe access
Hemlock Lake	205 acres	Picnic shelters, restrooms, 60 acre lake, two boat launches, and hiking trails
Mahoning Elementary School		Playground, basketball court, open field
Mahoning Lake		Playground, picnic pavilions, restroom, volleyball court, horseshoes, grills, walking trails, scenic overlook, lake, opportunities for fishing, boating, hiking, and camping
Milton Loop Recreation Area		Part of Mahoning Lake provides picnic facilities and boat launch
Timblin Park		Large pavilion, playground, & ballfield
Sportsmen's Access		Canoe, kayak, car-top boat launch, and informational kiosk. No trailers permitted
Old Smicksburg Park		Passive park
Templeton Boat Launch and Armstrong Trail trailhead		Pennsylvania Fish and Boat Commission Boat Launch and trailhead for Armstrong Trail
Templeton Community Park	4 acres	Baseball field, playground, picnic pavilion, grill, basketball court, tennis court, concession stand, bandstand

<b>Golf Courses</b>	<b>Size</b>	<b>Description</b>
White Oak Golf Course	2,743 yards	9-hole public course with a par of 34

<b>Campground</b>	<b>Description</b>
Milton Loop Campground	52 campsites, modern restrooms, sanitary disposal station located on
Little Mahoning Bible Camp	
Creekbend Campground	Showers, electric and water hook up, and dump station. Nearby hiking
Nautical Mile Campground and Marina at Templeton	Located along Armstrong Trail, the campground provides primitive opportunities as well as full-hook up. A shower house and boat launch
Laurel Lake Camp & Retreat Center	Church camp and retreat center with lodging, meeting rooms, swimming pool and bath house, canoeing, jet skiing, fishing,

<b>Trails</b>	<b>Size</b>	<b>Description</b>
Armstrong Trail		
Baker Trail		
Duck Hollow Trail		Located at Hemlock Lake
Fordham Trail-Rail trail in Perry Township		
Great Shamokin Path		
Jefferson County Multi-Use Trail		

<b>Historical Sites</b>	<b>Date Listed</b>	<b>Location</b>
John B. McCormick House	5/3/19747	Georgeville, Pa
Thomas Marshall House	4/22/1976	Dayton, Pa
Coldwell Cut Viaduct	6/22/1988	Mahoning Township
Bridge between Madison and Mahoning Township	6/22/1988	Deanville
Old Dayton High School - old orphanage historical value	not listed	Dayton, Pa
Gilgal Church	not listed	
Crawford 1 Schoolhouse	not listed	
John Schmick Museum	not listed	Smicksburg, Pa

<b>State Game Lands</b>	<b>Size</b>	<b>Location</b>
State Game Land 137 South Bethlehem	929 acres	South Bethlehem
State Game Lands 262 Hillsdale	443 acres	Hillsdale
State Game Lands 287 Templeton	1,167 acres	Templeton

<b>Trout Approved Waters</b>	<b>County</b>	<b>Description</b>
North Fork Pine Creek	Armstrong	
South Fork Pine Creek	Armstrong	
Scrubgrass Creek	Armstrong	
Little Mahoning Creek	Indiana	Intersection of T-836 and SR 1037 to McCormick Bridge
Mudlick Creek	Indiana	

<b>Year Round Trout Approved Waters</b>	<b>County</b>	<b>Description</b>
Mahoning Creek	Armstrong	Mahoning Creek Dam outflow downstream to confluence with Pine Run

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## APPENDIX K. INTERVIEW AND SURVEY QUESTIONS

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### Interview Questions

1. How has the area changed in the past 10 years in terms of...? Were these changes good, bad, indifferent?
2. How do the following meet the needs of the community? (Are the quantities sufficient, insufficient, or satisfactory? Are they in good condition or in need of repair/improvement?) Do you have any proposed solutions or management recommendations?
  - a. Transportation –area roads, public transportation, availability or ease of using alternative transportation (biking, walking trails, etc.) to get around the area
  - b. Infrastructure – water and sewer lines, communications (cell phone reception, Internet service, etc.)
  - c. Employment opportunities
  - d. Educational opportunities
  - e. Land-use ordinances & zoning
3. Do the recreational opportunities currently meet the needs of the community and visitors? (Are there too many, not enough, or a sufficient number? What condition are they in? Are they easy to access?) Do you suggest any improvements or additions to the recreational opportunities throughout the area?
  - a. Parks/Picnic Sites
  - b. Hiking/Biking Trails
  - c. Off- Road Vehicle Riding
  - d. Scenic Vistas/Photography
  - e. Wildlife/Bird Watching
  - f. Hunting/Fishing
  - g. Boating/Swimming
  - h. Historical Sites/Structures
  - i. Other
  - j. Winter Recreation
4. What are some of the positive features of the watershed/area? (Please consider both ecology and social/community features in your answer, from water quality to economics.) What is one of the strongest or most attractive features/characteristic of the watershed area?
5. What impacts (positive or negative) are currently affecting the land, water, and biological resources? What positive/negative impacts are affecting the community character of the region? What impacts are affecting the local economy?
6. Do you have any specific projects or type of projects you would like to see identified in the plan? (Examples: Stream access locations for fishing/paddling; Erosion control projects; Trail development or linkages; Dirt and gravel road improvements; Restoration of a particular site or area affected by abandoned mines or mine refuse; Illegal dumpsites to be cleaned-up; Invasive plant infestations to control; Important natural areas to protect.)
7. What must the watershed conservation plan include to be successful?
8. Do you have any other concerns that we have not discussed?

- 9. Do you know of any other people we should ask to interview?
- 10. Do you have any questions or comments before we conclude this interview?

## Survey Questions

### Municipal Surveys

- 1.) Does your municipality have a comprehensive plan? YES or NO  
If yes, what is the name of the plan(s) and when was it adopted?
- 2.) Does your municipality currently utilize zoning? YES or NO  
Does your municipality currently utilizing subdivision ordinances? YES or NO  
Does your municipality have floodplain ordinances? YES or NO
- 3.) Are there any municipal parks in your municipality? If yes, please list them?
- 4.) a. Does your municipality have any public water services in the project area? YES or NO  
Supplier \_\_\_\_\_  
b. Do you foresee the need to upgrade or establish a public water supply in your municipality in the project area within the next ten years? YES or NO
- 5.) a. Does your municipality have any public sewage systems in the project area? YES or NO  
Treatment System \_\_\_\_\_  
b. Do you foresee the need to upgrade or establish a public sewage system in your municipality in the project area within the next ten years? YES or NO
- 6.) Who provides emergency services, such as:  
Police \_\_\_\_\_  
Fire \_\_\_\_\_  
EMS \_\_\_\_\_
- 7.) Is there anything unique, or well known about your municipality that you would like to have highlighted in the plan?
- 8.) Comments

### Public Surveys

# Residents & Visitors

*Continued*

\* Please use the following scale for the next three questions, each number can be used more than once.

- 5 = Very Important
- 4 = Somewhat Important
- 3 = Neutral
- 2 = Not very Important
- 1 = Not Important

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

- \_\_\_\_\_ Attractive Natural Settings
- \_\_\_\_\_ Community Activities
- \_\_\_\_\_ Educational Opportunities
- \_\_\_\_\_ New Business/Jobs
- \_\_\_\_\_ Preserving History/Culture
- \_\_\_\_\_ Recreation Opportunities
- \_\_\_\_\_ Residential Development
- \_\_\_\_\_ Water Quality
- \_\_\_\_\_ Other \_\_\_\_\_

**4. Please indicate the importance of the following recreational activities in the region.**

- \_\_\_\_\_ ATV Riding
- \_\_\_\_\_ Biking
- \_\_\_\_\_ Bird/Wildlife Watching
- \_\_\_\_\_ Boating
- \_\_\_\_\_ Canoeing/Kayaking
- \_\_\_\_\_ Fishing
- \_\_\_\_\_ Hiking
- \_\_\_\_\_ Horseback Riding
- \_\_\_\_\_ Hunting
- \_\_\_\_\_ Organized Sports
- \_\_\_\_\_ Photography
- \_\_\_\_\_ Picnicking
- \_\_\_\_\_ Snowmobiles
- \_\_\_\_\_ Swimming
- \_\_\_\_\_ Visiting Public Parks
- \_\_\_\_\_ Visiting Public Vistas
- \_\_\_\_\_ Other \_\_\_\_\_

# Residents & Visitors

**5. Please indicate the importance of addressing the following issues in this plan.**

- \_\_\_\_\_ Preserving Agricultural Lands
- \_\_\_\_\_ ATV/Snowmobile Conflicts
- \_\_\_\_\_ Providing ATV/Snowmobile Recreation Facilities
- \_\_\_\_\_ Infrastructure (roads, water/sewage, etc.)
- \_\_\_\_\_ Economic Development
- \_\_\_\_\_ Environmental Education
- \_\_\_\_\_ Erosion & Sedimentation
- \_\_\_\_\_ Flooding
- \_\_\_\_\_ Improving Forestry Techniques
- \_\_\_\_\_ Historical & Cultural Heritage
- \_\_\_\_\_ Illegal Dumping & Litter
- \_\_\_\_\_ Invasive Species
- \_\_\_\_\_ Mine Drainage/Mine Lands
- \_\_\_\_\_ Storm Water Runoff
- \_\_\_\_\_ Tourism
- \_\_\_\_\_ Waste Sites/Hazardous Spills
- \_\_\_\_\_ Water Quality
- \_\_\_\_\_ Water Quantity
- \_\_\_\_\_ Wildlife/Fisheries Habitats
- \_\_\_\_\_ Other \_\_\_\_\_

**6. What are the top 3 services/amenities that are lacking within the region? (i.e. restaurants, public restrooms, gas stations, emergency services, etc.)**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**7. Other comments or concerns.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Thank you for completing this survey.*

**Return Instructions:**

You may cut off and keep the informative panel with our contact information. Next, please refold the pamphlet, tape (do not staple), and place it in the mail with proper postage.

## Lower Mahoning Creek Regional Watershed Conservation Plan



*Complete a Survey and  
You Could Win!*

*Prize package includes donated items from local project partners*

*The goal of the Lower Mahoning Creek Regional Watershed Conservation Plan is to actively engage the public to address issues related to natural resources, socio-economics, recreation and culture; to encourage proper stewardship of land, water, and community resources; and to improve the quality of life throughout the region.*

# Residents

Only individuals with **permanent residence** within the project area (see map on left)

**1. In what county and municipality do you reside?**

County \_\_\_\_\_  
Municipality \_\_\_\_\_

**2. Near what part of the Lower Mahoning region do you reside?**

- ◇ Mahoning Creek
- ◇ Little Mahoning Creek
- ◇ Pine Creek
- ◇ Don't Know
- ◇ Other \_\_\_\_\_

**3. How long have you lived in the area?**

- ◇ Less than 1 year
- ◇ 1-10 years
- ◇ 11-20 years
- ◇ 21-30 years
- ◇ 31-40 years
- ◇ 41-50 years
- ◇ 51-60 years
- ◇ 60+ years

**4. How far do you travel to work?**

- ◇ Less than 1 mile
- ◇ 1-15 miles
- ◇ 16-30 miles
- ◇ 31-45 miles
- ◇ 46-60 miles
- ◇ N/A
- ◇ Farther \_\_\_\_\_

*Please continue with "Residents & Visitors" at far right*



# Visitors

Please Mark One

**1. Do you own property in the Mahoning region?**

- ◇ Yes
- ◇ No

**2. How far did you travel to visit?**

- ◇ Less than 1 mile
- ◇ 1-30 miles
- ◇ 31-60 miles
- ◇ 61-90 miles
- ◇ 91-120 miles
- ◇ 121-150 miles
- ◇ 151-180 miles
- ◇ Farther \_\_\_\_\_

**3. How long did you stay on this trip?**

- ◇ Less than one day
- ◇ 1-2 days
- ◇ 3-4 days
- ◇ 5-6 days
- ◇ One week
- ◇ A week and a half
- ◇ Two weeks
- ◇ Longer \_\_\_\_\_

**4. Approximately how much money did you spend?**

- ◇ Less than 100 dollars
- ◇ 100-500 dollars
- ◇ 500-1,000 dollars
- ◇ 1,000-2,000 dollars
- ◇ 2,000-3,000 dollars
- ◇ 3,000-5,000 dollars
- ◇ 5,000+ dollars

**5. What were your two biggest expenses?**

- ◇ Travel/Gas
- ◇ Food/Lodging
- ◇ Recreation/Supplies
- ◇ Souvenirs
- ◇ Others \_\_\_\_\_

**6. What was your reason for visiting?**

- ◇ Business
- ◇ Family/Friends
- ◇ Passing through
- ◇ Recreation/Vacation
- ◇ Visiting
- ◇ Other \_\_\_\_\_

**7. How often do you visit?**

- ◇ First time
- ◇ Seasonal
- ◇ Yearly
- ◇ Occasionally (every 2-5 years)
- ◇ Every 5+ years

**8. Do you plan to return to this area?**

- ◇ Yes
- ◇ No

# Demographics

(Optional)

**1. What is your gender?**

- ◇ Male
- ◇ Female

**2. What is your age?**

- ◇ 17 & under
- ◇ 18-25
- ◇ 26-45
- ◇ 46-65
- ◇ 66 & up

## Residents & Visitors

**1. What do you think are the two most important land uses in the Mahoning region?**

- ◇ Agricultural
- ◇ Commercial
- ◇ Forested
- ◇ Other \_\_\_\_\_
- ◇ Industrial
- ◇ Recreation
- ◇ Residential

**2. Where did you obtain this survey?**

- ◇ Business/Restaurant
- ◇ Event \_\_\_\_\_
- ◇ State park/state forest
- ◇ Watershed group
- ◇ Website
- ◇ Other \_\_\_\_\_

*Please continue with "Residents & Visitors" on reverse*

\* If you would like to be entered to win a prize package from our project sponsors and receive project updates, please complete the information below. Entries must be received by **November 30, 2009**.

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 \_\_\_\_\_  
 E-mail \_\_\_\_\_  
 Home Phone \_\_\_\_\_  
 Work Phone \_\_\_\_\_

APPENDIX L. NATIVE PLANT GUIDE

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
balsam fir	<i>Abies balsamea</i>																X		
fraser fir	<i>Abies fraseri</i>																X		
box-elder	<i>Acer negundo</i>	X	X		X			X				X	X						
Norway maple	<i>Acer platanoides</i>																X		
red maple	<i>Acer rubrum</i>				X											X	X		
silver maple	<i>Acer saccharinum</i>		X	X		X	X		X			X							
sugar maple	<i>Acer saccharum</i>										X				X				
mountain maple	<i>Acer spicatum</i>			X	X	X		X	X		X		X						
maple	<i>Acer spp</i>											X					X		
common yarrow	<i>Achillea millefolium</i>				X														
monkshood	<i>Aconitum uncinatum</i>										X								
sweetflag	<i>Acorus americanus</i>	X			X											X			
doll's eyes, white bugbane, white baneberry	<i>Actaea pachypoda</i>		X		X	X						X							
black cohosh, black bugbane, black	<i>Actaea racemosa</i>											X	X			X			
red baneberry	<i>Actaea rubra</i>									X									
northern maidenhair fern, maidenhair fern	<i>Adiantum pedatum</i>				X														
bottlebrush buckeye	<i>Aesculus parviflora</i>				X														
red buckeye, buckeye	<i>Aesculus pavia</i>	X			X	X				X			X	X		X			
false foxglove	<i>Agalinis purpurea</i>											X	X						

Lower Mahoning Creek Regional Watershed Conservation Plan

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blue giant hyssop, anise hyssop	<i>Agastache foeniculum</i>	X			X							X		X					
yellow giant hyssop	<i>Agastache nepetoides</i>		X																
giant purple hyssop	<i>Agastache scrophulariifolia</i>	X			X			X					X	X	X	X			
white snakeroot	<i>Ageratina altissima</i>												X						
small agrimony	<i>Agrimonia parviflora</i>				X	X					X					X			
red top	<i>Agrostis alba</i>	X			X														
hollyhock	<i>Alcea rosea</i>																X		
northern water plantain	<i>Alisma triviale</i>												X						
nodding onion, wild onion/leek	<i>Allium cernuum</i>									X									X
ramps, wild leeks	<i>Allium tricoccum</i>												X						
speckled alder	<i>Alnus rugosa</i>									X							X		
smooth alder	<i>Alnus serrulata</i>								X			X					X		
azalea	<i>Alnus serrulata</i>																X		
ragweed	<i>Ambrosia</i>																X		
downy serviceberry	<i>Amelanchier arborea</i>	X			X									X		X			
serviceberry, shadblow serviceberry, shadbush	<i>Amelanchier canadensis</i>														X			X	
allegheny serviceberry	<i>Amelanchier laevis</i>				X	X					X					X			
serviceberries, shadbush	<i>Amelanchier</i> spp.															X	X		
lead plant	<i>Amorpha canescens</i>			X	X		X	X				X				X			
Arkansas blue star flower	<i>Amsonia hubrectii</i>												X						
blue star, common blue star, eastern blue	<i>Amsonia tabernaemontana</i>						X					X						X	

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big bluestem grass, turkeyfoot	<i>Andropogon gerardii</i>	X	X		X	X					X	X	X			X	X		
little bluestem grass	<i>Andropogon scoparius</i>	X			X	X		X				X	X	X	X	X			
broom sedge	<i>Andropogon virginicus</i>				X								X				X		
meadow anemone, Canada anemone	<i>Anemone canadensis</i>		X									X							
pasque flower	<i>Anemone patens</i>		X		X	X		X	X		X	X	X				X		
wood anemone	<i>Anemone quinquefolia</i>												X				X		
thimbleweed, tall anemone	<i>Anemone virginiana</i>		X		X														
pussytoes, woman's tobacco, plantain-leaved pussytoes	<i>Antennaria plantaginifolia</i>		X																
wild columbine, eastern columbine, Canadian columbine, indianhemp	<i>Aquilegia canadensis</i>										X						X	X	X
wild sarsaparilla	<i>Aralia nudicaulis</i>				X	X			X		X								
spikenard	<i>Aralia racemosa</i>					X									X	X	X		
bearberry	<i>Arctostaphylos uva-ursil</i>				X														
redtop grass	<i>Argostis gigantean</i>	X	X	X	X								X						
jack-in-the-pulpit	<i>Arisaema triphyllum</i>					X													
dutchmans pipevine	<i>Aristolochia macrophylla</i>														X			X	
red chokeberry	<i>Aronia arbutifolia</i>				X														
black chokeberry	<i>Aronia melanocarpa</i>											X							
goatsbeard, bride's feathers	<i>Aruncus dioicus</i>									X									
wild ginger	<i>Asarum canadense</i>		X									X							
poke milkweed, tall milkweed	<i>Asclepias exaltata</i>		X								X		X					X	

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swamp milkweed, pink milkweed, white swamp milkweed	<i>Asclepias incarnata</i>	X																X	
purple milkweed	<i>Asclepias purpurascens</i>	X			X	X		X										X	
common milkweed	<i>Asclepias syriaca</i>		X											X			X	X	
butterflyweed, butterfly flower	<i>Asclepias tuberosa</i>					X					X					X		X	
whorled milkweed, horsetail milkweed	<i>Asclepias verticillata</i>		X				X					X						X	
pawpaw	<i>Asimina triloba</i>	X			X							X	X	X		X		X	
ebony spleenwort	<i>Asplenium platyneuron</i>				X	X		X					X	X					
blue wood aster, wood aster	<i>Aster cordifolius</i>					X					X		X		X			X	
white wood aster	<i>Aster divaricatus</i>	X	X								X	X						X	
heath aster	<i>Aster ericoides</i>				X						X							X	
smooth aster	<i>Aster laevis</i>	X						X					X						
dark leaf calico aster	<i>Aster lateriflorus</i>		X								X							X	
stiff-leaf aster, flaxleaf whitetop aster	<i>Aster linariifolius</i>										X			X					
big leaf aster	<i>Aster macrophyllus</i>		X		X				X										
New England aster	<i>Aster novae-angliae</i>				X						X		X			X	X	X	
New York aster	<i>Aster novi-belgii</i>					X					X							X	
aromatic aster	<i>Aster oblongifolius</i>		X									X	X					X	
purple-stemmed aster	<i>Aster puniceus</i>	X			X													X	
silky aster	<i>Aster sericeus</i>				X														
aster	<i>Aster spp</i>								X		X							X	
flat-topped aster	<i>Aster umbellatus</i>		X					X				X	X		X	X		X	

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lady fern	<i>Athyrium filix-femina</i>				X	X					X								
white wild indigo	<i>Baptisia alba</i>		X				X					X							
blue false indigo, wild indigo, false blue indigo	<i>Baptisia australis</i>												X					X	
cream wild indigo	<i>Baptisia leucophaea</i>		X										X			X			
dwarf wild indigo	<i>Baptisia minor</i>		X									X							
flare false indigo	<i>Baptisia solar</i>		X			X												X	
yellow wild indigo	<i>Baptisia sphaerocarpa</i>				X														
prairieblues wild indigo	<i>Baptisia starlite</i>		X									X	X	X		X		X	
yellow birch	<i>Betula alleghaniensis</i>																X		
birch	<i>Betula lenta</i>																X	X	
river birch	<i>Betula nigra</i>																X	X	
gray birch	<i>Betula populifolia</i>	X	X									X			X		X		
cross Vine	<i>Bignonia capreolata</i>	X			X			X					X	X		X			
boltonia, false aster	<i>Boltonia asteroides</i>	X			X														
sideoats grama	<i>Bouteloua curtipendula</i>												X				X		
bluejoint reedgrass	<i>Calamagrostis canadensis</i>	X	X		X								X						
American beautyberry	<i>Callicarpa americana</i>																X		
purple poppy mallow, winecups	<i>Callirhoe involucrata</i>							X											
bottlebrush	<i>Callistemon</i> spp.				X						X								
marsh marigold, marsh yellow marigold, cowslip	<i>Caltha palustris</i>				X	X	X				X		X		X				

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sweetshrub, Carolina allspice	<i>Calycanthus floridus</i>		X		X											X			
tall bellflower	<i>Campanula americana</i>				X														
creeping bellflower	<i>Campanula rapunculoides</i>	X	X		X	X						X	X			X		X	
trumpet vine, trumpet-creepe	<i>Campsis radicans</i>				X												X		
cut-leaf toothwort	<i>Cardamine concatenata</i>											X							
creek sedge	<i>Carex amphibola</i>											X			X				
appalachian sedge	<i>Carex appalachica</i>	X	X		X	X		X	X			X	X		X	X			
fringed sedge	<i>Carex crinita</i>	X	X		X			X				X							
bristleleaf sedge	<i>Carex eburnea</i>														X				
blue wood sedge	<i>Carex glaucoidea</i>														X				
gray's sedge	<i>Carex grayi</i>					X					X								
Ohio sedge	<i>Carex muskingumensis</i>								X										
Pennsylvania sedge	<i>Carex pennsylvanica</i>				X	X					X								
plantainleaf sedge, seersucker sedge	<i>Carex plantaginea</i>				X														
silver sedge	<i>Carex platyphylla</i>					X					X								
broad-leaf sedge	<i>Carex siderosticha</i>	X			X								X	X					
sedges	<i>Carex spp.</i>				X												X		
owl-fruit sedge	<i>Carex stipata</i>				X											X			
upright sedge, tussock sedge	<i>Carex stricta</i>		X																
fox sedge	<i>Carex volpinoidea</i>		X		X					X			X				X		
American hornbeam, ironwood	<i>Carpinus caroliniana</i>		X		X		X					X	X		X				
hornbeam	<i>Carpinus spp.</i>				X													X	

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sweet pignut hickory	<i>Carya glabra</i>															X			
shagbark hickory	<i>Carya ovata</i>				X	X					X					X	X	X	
hickories	<i>Carya</i> spp.		X	X			X					X	X		X		X		
mockernut hickory	<i>Carya tomentosa</i>		X									X						X	
blue cohosh, papoose root	<i>Caulophyllum thalictroides</i>															X			
wild lilac or New Jersey tea	<i>Ceanothus americanus</i>				X													X	X
American bittersweet	<i>Celastrus scandens</i>		X	X	X	X			X		X	X	X				X	X	
hackberry, sugarberry	<i>Celtis occidentalis</i>	X			X				X		X		X				X	X	
buttonbush	<i>Cephalanthus occidentalis</i>		X		X	X		X	X		X		X	X		X	X		
eastern redbud	<i>Cercis canadensis</i>				X								X				X		
partridge pea	<i>Chamaecrista fasciculata</i>											X							
wild sensitive-plant	<i>Chamaecrista nictitans</i>				X			X						X					
atlantic white cedar	<i>Chamaecyparis thyoides</i>	X			X														
leatherleaf	<i>Chamaedaphne calyculata</i>	X																	
river oats, northern sea oats, indian woodoats	<i>Chasmanthium latifolium</i>		X										X				X		
white turtlehead	<i>Chelone glabra</i>																X		X
pink turtlehead	<i>Chelone lyonii</i>		X	X			X					X	X						
turtlehead	<i>Chelone</i> spp.	X			X	X		X	X		X		X		X				
fringetree	<i>Chionanthus virginicus</i>									X									
green-and-gold, gold star	<i>Chrysogonum virginianum</i>			X		X						X	X						
southern green and gold	<i>Chrysogonum virginianum var. australe</i>				X								X						

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Maryland golden aster, golden aster	<i>Chrysopsis mariana</i>		X								X	X	X						
hairy golden aster	<i>Chrysopsis villosa</i>											X							
chicory	<i>Cichorium intybus</i>		X		X	X				X			X	X		X			
mountain bugbane, American bugbane	<i>Cimicifuga americanus</i>	X	X					X	X					X					
fairy candles	<i>Cimicifuga racemosa</i>		X								X								
field thistle	<i>Cirsium discolor</i>		X									X	X			X			
spring beauty	<i>Claytonia virginica</i>	X	X				X						X		X			X	
virgin's bower, devil's darning needles, clematis	<i>Clematis virginiana</i>											X							
summersweet, sweet pepperbush	<i>Clethra alnifolia</i>	X			X														
bluebeard-lily, corn-lily	<i>Clintonia borealis</i>	X																	
blue-eyed mary	<i>Collinsia verna</i>		X		X	X			X		X	X	X			X		X	
sweet-fern	<i>Comptonia peregrina</i>		X									X	X			X			
blue mistflower	<i>Conoclinium coelestinum</i>											X							
sand coreopsis, lanceleaf tickseed	<i>Coreopsis lanceolata</i>										X							X	
passion tickseed	<i>Coreopsis limerock</i>												X					X	
prairie coreopsis	<i>Coreopsis palmata</i>		X		X	X			X		X	X	X			X			
tickseed	<i>Coreopsis pubescens</i>												X			X		X	
pink coreopsis, pink tickseed	<i>Coreopsis rosea</i>										X								
tickseed	<i>Coreopsis</i> spp.										X					X			
coreopsis, tall tickseed	<i>Coreopsis tripteris</i>		X				X		X			X	X		X				

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threadleaf coreopsis, threadleaf tickseed, whorled coreopsis	<i>Coreopsis verticillata</i>															X			
pagoda dogwood	<i>Cornus alternifolia</i>	X																	
silky dogwood	<i>Cornus amomum</i>	X			X								X				X		
flowering dogwood	<i>Cornus florida</i>												X				X		
swamp dogwood, stiff dogwood	<i>Cornus foemina</i>	X			X	X		X			X		X						
cornelian	<i>Cornus mas</i>																X		
gray dogwood, red panicled dogwood	<i>Cornus racemosa</i>		X									X	X			X	X		
red osier dogwood, redtwig dogwood	<i>Cornus sericea</i>	X	X				X				X	X	X	X		X	X		
dogwoods	<i>Cornus spp.</i>																X		
yellow harlequin	<i>Corydalis flavula</i>																X		
rock harlequin	<i>Corydalis sempervirens</i>																X		
American hazelnut, American filbert	<i>Corylus americana</i>																X		
cockspur hawthorn	<i>Crataegus crusgalli</i>																X		
Washington hawthorn	<i>Crataegus phaenopyrum</i>	X			X												X		
dotted hawthorn	<i>Crataegus punctata</i>			X	X						X	X	X						
hawthorn	<i>Crataegus spp.</i>												X				X		
crocus	<i>Crocus spp.</i>																X		
orchard grass	<i>Dactylis glomerata</i>																X		
white prairie clover	<i>Dalea candida</i>		X		X	X		X	X		X	X	X		X				
tall larkspur	<i>Delphinium exaltatum</i>																X		
dwarf larkspur	<i>Delphinium tricorne</i>								X		X								

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hayscented fern	<i>Dennstaedtia punctilobula</i>						X												
hairgrass	<i>Deshampias flexuosa</i>		X				X					X	X						
sweet william	<i>Dianthus barbatus</i>				X	X										X			
squirrel corn	<i>Dicentra canadensis</i>	X										X				X			
dutchmans breeches	<i>Dicentra cucullaria</i>	X			X					X						X			
wild bleeding heart, turkeycorn, fringed bleeding heart	<i>Dicentra eximia</i>	X			X					X						X			
bush honeysuckle	<i>Diervilla lonicera</i>				X	X							X	X	X				
persimmon	<i>Diospyros virginiana</i>				X	X										X	X	X	
leatherwood	<i>Dirca palustris</i>				X	X					X		X			X			
shooting-star, American cowslips	<i>Dodecatheon meadia</i>	X													X				
parasol whitetop aster	<i>Doellingeria umbellata</i>				X						X								
goldie's wood fern	<i>Dryopteris goldiana</i>											X							
leather wood fern, marginal wood fern, evergreen wood fern, eastern wood fern	<i>Dryopteris marginalis</i>	X			X								X					X	
shield fern	<i>Dryopteris</i> spp.				X								X			X			
pale coneflower	<i>Echinacea pallida</i>											X	X						
yellow coneflower	<i>Echinacea paradoxa</i>					X							X						
purple coneflower	<i>Echinacea purpurea</i>			X	X	X							X		X	X	X		
coneflower	<i>Echinacea</i> spp.	X															X	X	
wild millet	<i>Echinochloa crus-galli</i>															X			
Canada wildrye	<i>Elymus canadensis</i>				X								X						

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bottlebrush grass	<i>Elymus hystrix</i>	X			X	X		X					X	X					
riverbank wild rye grass	<i>Elymus riparius</i>		X									X			X				
wild rye	<i>Elymus virginicus</i>	X																	
fireweed	<i>Epilobium angustifolium</i>				X														
horsetail	<i>Equisetum species</i>	X			X					X			X			X			
blue love grass	<i>Eragrostis elliottii</i>	X			X							X	X						
purple love grass, showy love grass	<i>Eragrostis spectabilis</i>										X							X	
daisy fleabane	<i>Erigeron strigosus</i>		X		X	X					X								
rattlesnake master	<i>Eryngium yuccifolium</i>				X	X		X			X	X	X			X		X	
trout lily, dogtooth violet, yellow trout lily, adder's tongue	<i>Erythronium americanum</i>																	X	
strawberry-bush	<i>Euonymus americanus</i>					X			X		X		X	X				X	
joe-pye weed, trumpetweed	<i>Eupatoriadelphus fistulosus</i>		X															X	
mistflower, blue mistflower, hardy ageratum	<i>Eupatorium coelestinum</i>				X	X		X			X		X		X			X	
little joe-pye weed	<i>Eupatorium dubium</i>				X	X					X		X		X	X		X	
hyssop-leaved boneset, thoroughwort	<i>Eupatorium hyssopifolium</i>	X			X			X						X				X	
gateway	<i>Eupatorium maculatum</i>											X							
spotted joe-pye weed	<i>Eupatorium maculatum</i>		X									X	X		X				
boneset, thoroughwort	<i>Eupatorium perfoliatum</i>												X			X			
purple joe-pyeweed, joe pye flower, sweetcented joe-pyeweed	<i>Eupatorium purpureum</i>		X		X	X							X			X			
snakeroot	<i>Eupatorium rugosm</i>		X			X					X		X						

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joe-pye-weed	<i>Eupatorium</i> spp.		X				X					X					X	X	
flowering spurge	<i>Euphorbia corollata</i>	X			X	X			X				X	X	X				
white wood aster	<i>Eurybia divaricata</i>				X							X	X		X			X	
flat-top goldentop	<i>Euthamia graminifolia</i>	X					X					X	X			X			
American beech	<i>Fagus grandiflora</i>		X			X		X	X			X	X				X		
beech	<i>Fagus</i> spp.	X															X		
queen-of-the-prairie	<i>Filipendula rubra</i>	X	X									X	X	X					
dwarf fothergilla	<i>Fothergilla gardenii</i>				X								X			X			
wild strawberry	<i>Fragaria virginiana</i>					X					X								
white ash	<i>Fraxinus americana</i>				X												X		
black ash	<i>Fraxinus nigra</i>															X			
green ash	<i>Fraxinus pennsylvanica</i>		X		X											X			
ash	<i>Fraxinus</i> spp.	X			X		X						X						
wandflower, beetleweed	<i>Galax urceolata</i>		X			X										X		X	
wintergreen, eastern teaberry	<i>Gaultheria procumbens</i>				X	X		X			X	X	X			X			
windflower	<i>Gaura lindheimeri</i>		X					X				X	X						
huckleberry	<i>Gaylussacia baccata</i>												X			X			
boxhuckleberry	<i>Gaylussacia brachycera</i>	X			X	X						X							
evening trumpet flower, Carolina jessamine	<i>Gelsemium sempervirens</i>		X		X						X	X				X			

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bottle gentian, closed gentian, blind gentian	<i>Gentiana clausa</i>				X	X										X			
wild geranium, wild cranesbill, wood geranium	<i>Geranium maculatum</i>				X													X	
cranesbill geranium	<i>Geranium sanguineum</i>																X		
prairie smoke	<i>Geum triflorum</i>	X			X	X		X					X			X		X	
American ipecac	<i>Gillenia stipulata</i>		X	X								X	X			X			
honey locust	<i>Gleditsia triacanthos</i>			X	X	X					X		X		X			X	
fowl mannagrass	<i>Glyceria striata</i>																X		
downy rattlesnake plantain	<i>Goodyera pubescens</i>		X									X						X	
Carolina silverbell	<i>Halesia carolina</i>	X	X		X								X			X		X	
witchhazel, American witch hazel	<i>Hamamelis virginiana</i>				X											X		X	
english ivy	<i>Hedera helix</i>																X		
helen's flower; common sneezeweed, dog-tooth daisy	<i>Helenium autumnale</i>		X												X				
sneezeweed, purple-headed helen's flower	<i>Helenium flexuosum</i>		X		X	X					X		X			X		X	
swamp sunflower	<i>Helianthus angustifolius</i>	X			X	X							X		X	X		X	
thin-leaf sunflower	<i>Helianthus decapetalus</i>	X														X		X	
woodland sunflower	<i>Helianthus divaricatus</i>	X	X		X		X					X		X		X			
tall sunflower, giant sunflower	<i>Helianthus giganteus</i>		X									X	X						
small-headed sunflower	<i>Helianthus microcephalus</i>				X														
western sunflower	<i>Helianthus occidentalis</i>				X							X			X				
dwarf perennial sunflower	<i>Helianthus salicifolius</i>		X																

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sunflower	<i>Helianthus</i> spp.	X	X									X	X	X			X		
oxeye daisy, smooth oxeye, false sunflower	<i>Heliopsis helianthoides</i>	X			X								X			X		X	
swamp pink	<i>Helonias bullata</i>		X		X								X						
daylily	<i>Emerocallis</i>																X		
roundlobe hepatica, sharplobe hepatica	<i>Hepatica acutiloba</i>	X																	
alumroot, coral bells	<i>Heuchera americana</i>		X									X							
hairy alum root	<i>Heuchera villosa</i>	X																	
shuttleworth's ginger	<i>Hexastylis shuttlewortii</i>				X	X			X				X						
scarlet rose mallow	<i>Hibiscus coccenius</i>				X	X					X		X			X			
swamp rose mallow, marsh hibiscus	<i>Hibiscus moscheutos</i>			X					X		X	X	X			X			
rattlesnake weed	<i>Hieracium venosum</i>											X							
bluets	<i>Houstonia caerulea</i>				X						X								
wood hyacinth	<i>Hyacinthoides hispanica</i>																X		
wild hydrangea	<i>Hydrangea arborescens</i>				X											X			
oakleaf hydrangea	<i>Hydrangea quercifolia</i>		X																
goldenseal, yellow root	<i>Hydrastis canadensis</i>						X					X		X					
maple-leaved waterleaf, broad-leaved waterleaf	<i>Hydrophyllum canadense</i>										X		X						
Virginia waterleaf, eastern waterleaf	<i>Hydrophyllum virginianum</i>		X						X			X	X						
saint john's wort	<i>Hypericum calycinum</i>			X	X	X					X		X	X		X			
dense hypericum	<i>Hypericum densiflorum</i>		X			X							X			X			
shrubby saint john's wort	<i>Hypericum prolificum</i>		X	X		X					X		X			X			

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great saint john's wort	<i>Hypericum pyramidatum</i>		X				X	X				X	X						
yellow star-grass	<i>Hypoxis hirsuta</i>		X	X	X				X					X		X			
inkberry	<i>Ilex glabra</i>				X	X											X		
American holly	<i>Ilex opaca</i>				X	X		X	X		X		X	X			X		
winterberry	<i>Ilex verticillata</i>						X					X	X				X		
jewelweed	<i>Impatiens capensis</i>														X				
pale jewelweed, touch-me-not	<i>Impatiens pallida</i>																X		
impatiens	<i>Impatiens</i> spp.																X		
crested iris	<i>Iris cristata</i>		X		X						X	X					X		
white crested iris	<i>Iris cristata alba</i>	X			X								X						
slender blue flag	<i>Iris prismatica</i>	X			X								X	X			X		
iris	<i>Iris</i> spp.																X		
blue flag iris, northern blue flag	<i>Iris versicolor</i>										X								
Virginia sweetspire, tassel-white	<i>Itea virginiana</i>	X			X						X			X			X		
twinleaf	<i>Jeffersonia diphylla</i>				X	X			X	X	X						X		
butternut	<i>Juglans cinerea</i>																	X	
black walnut	<i>Juglans nigra</i>	X	X									X							
Canada rush	<i>Juncus canadensis</i>			X	X				X						X				
soft rush	<i>Juncus effusus</i>	X																	
eastern red cedar	<i>Juniperus virginiana</i>				X												X	X	
mountain laurel	<i>Kalmia latifolia</i>				X												X		
june grass	<i>Koeleria cristata</i>	X								X									

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false boneset	<i>Kuhnia eupatorioides</i>				X														
flatpea	<i>Lathyrus sylvestris</i>	X			X	X									X				
rice cutgrass	<i>Leersia oryzoides</i>					X							X			X	X		
round headed bush clover	<i>Lespedeza capitata</i>				X				X	X									
fetterbush	<i>Leucothoe racemosa</i>			X	X	X		X	X		X							X	
rough blazing star	<i>Liatris aspera</i>	X			X								X						
cylindrical blazing star	<i>Liatris cylindracea</i>				X	X					X		X			X			
meadow blazing star	<i>Liatris ligulistylis</i>		X	X								X	X					X	
appalachian blazing star	<i>Liatris microcephala</i>			X			X												
prarie blazing star	<i>Liatris pycnostachya</i>	X			X							X	X	X				X	
northern blazing star	<i>Liatris scariosa</i>														X				
dense blazing-star, gayfeather, spike gayfeather	<i>Liatris spicata</i>				X													X	X
blazing-star, gayfeather	<i>Liatris</i> spp.	X	X															X	
button blazing star, scaly blazing star, gayfeather	<i>Liatris squarrosa</i>											X							
wood lily	<i>Lilium philadelphicum</i>				X													X	
lily	<i>Lilium</i> spp.																X		
turk's cap lily	<i>Lilium superbum</i>				X	X					X		X			X			
Canada lily, wild yellow	<i>Lillium canadense</i>			X					X							X		X	
spicebush	<i>Lindera benzoin</i>														X				
sweetgum	<i>Liquidambar styraciflua</i>	X			X		X						X	X					
tuliptree	<i>Liriodendron tulipifera</i>															X			X

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cardinal flower, red cardinal flower	<i>Lobelia cardinalis</i>														X		X		X
beechwood blend	<i>Lobelia cardinalis x siphilitica</i>	X	X									X	X					X	X
indian tobacco	<i>Lobelia inflata</i>	X																	
great blue lobelia	<i>Lobelia siphilitica</i>							X											X
pale spiked lobelia	<i>Lobelia spicata</i>		X		X								X				X		
trumpet honeysuckle, coral honeysuckle	<i>Lonicera sempervirens</i>					X			X	X	X					X	X		X
birdsfoot trefoil	<i>Lotus corniculatus</i>																X		
seedbox	<i>Ludwigia alternifolia</i>	X			X	X		X			X		X			X			
wild lupine, indian beet, old maids bonnets, blue lupine, sundial lupine	<i>Lupinus perennis</i>	X		X		X									X				
hairy woodrush, woodrush	<i>Luzula acuminata</i>	X			X							X	X		X				
magnolia	<i>Magnolia spp.</i>		X													X			
sweetbay magnolia	<i>Magnolia virginiana</i>	X																	
Canada mayflower	<i>Maianthemum canadense</i>	X	X				X					X	X			X			
feathery false lily of valley	<i>Maianthemum racemosum</i>		X		X											X			
American crabapple	<i>Malus glaucescens</i>																X		
apple	<i>Malus spp.</i>																X		
barbara's buttons	<i>Marshallia grandiflora</i>				X								X			X		X	
ostrich fern	<i>Matteuccia struthiopteris</i>		X		X	X			X			X	X	X				X	
meehan's mint, creeping ground mint	<i>Meehania cordata</i>											X						X	
Virginia bluebells	<i>Mertensia virginica</i>				X													X	

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sharpwing monkeyflower, winged monkey	<i>Mimulus alatus</i>		X									X	X						
monkey flower, square-stemmed monkey flower	<i>Mimulus ringens</i>															X		X	
partridgeberry	<i>Mitchella repens</i>				X														
bishops cap, mitrewort	<i>Mitella diphylla</i>		X		X						X			X					
basil balm	<i>Monarda clinopodia</i>	X			X														X
bee balm, oswego tea, bergamot, scarlet bee balm	<i>Monarda didyma</i>	X										X						X	X
wild bergamot, lavender bergamot, bee balm	<i>Monarda fistulosa</i>		X	X	X	X				X	X		X	X		X			X
purple bergamot	<i>Monarda media</i>		X	X		X		X	X			X	X						X
spotted bee balm	<i>Monarda punctata</i>				X	X			X		X		X						
beebalm, monarda	<i>Monarda</i> spp.	X															X		X
red mulberry	<i>Morus rubra</i>				X			X									X		
pink muhly grass	<i>Muhlenbergia capillaris</i>					X							X						
bayberry, northern bayberry	<i>Myrica pennsylvanica</i>		X								X	X					X		
black gum, tupelo, sour gum	<i>Nyssa sylvatica</i>	X															X		
sharp-leaved aster, whorled aster	<i>Oclemena acuminatus</i>		X	X			X					X	X						
evening primrose, common evening	<i>Oenothera biennis</i>											X							
sundrops, fireworks	<i>Oenothera fruticosa</i>				X				X	X									
stiff goldenrod	<i>Oligoneuron rigidum</i>				X												X		
sensitive fern	<i>Onoclea sensibilis</i>															X			

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pricklypear, eastern pricklypear cactus, devil's tongue	<i>Opuntia humifusa</i>				X				X		X		X			X			
aniseroot	<i>Osmorhiza longistylis</i>	X			X	X	X					X	X	X					
cinnamon fern	<i>Osmunda cinnamomea</i>				X														
interrupted fern	<i>Osmunda claytoniana</i>				X	X			X		X				X				
royal fern	<i>Osmunda regalis</i>	X				X							X						
hop-hornbeam	<i>Ostrya virginiana</i>											X				X			
sourwood	<i>Oxydendrum arboreum</i>															X			
allegheeny pachysandra, allegheny spurge	<i>Pachysandra procumbens</i>				X														
goldenragwort	<i>Packera aurea</i>		X					X											
peony	<i>Paeonia</i> spp.																X		
American ginseng	<i>Panax quinquefolius</i>				X											X			
atlantic costal panic grass	<i>Panicum amarulum</i>															X			
panic grass	<i>Panicum</i> spp.																X		
switch grass, panic grass	<i>Panicum virgatum (amarum)</i>				X	X											X		
wild quinine	<i>Parthenium integrifolium</i>	X	X																
Virginia creeper	<i>Parthenocissus quinquefolia</i>		X								X		X				X		
wild passion vine	<i>Passiflora incarnata</i>				X	X							X		X			X	
passionflower	<i>Passiflora</i> spp.		X															X	
arrow arum	<i>Peltandra virginica</i>																X		
beardtongue, foxglove, white beardtongue, talus slope penstemon	<i>Penstemon digitalis</i>											X							X

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hairy beardtongue	<i>Penstemon hirsutus</i>				X													X	X
small's beardtongue	<i>Penstemon smallii</i>	X	X						X			X	X						
beardstongue	<i>Penstemon</i> spp.		X																X
ditch stonecrop	<i>Penthorum sedoides</i>				X														
Carolina phlox	<i>Phlox carolina</i>																X		
woodland phlox, wild sweet william, meadow phlox, blue wood phlox	<i>Phlox divaricata</i>	X	X						X			X	X						
meadow phlox	<i>Phlox maculata</i>											X							
summer phlox, garden phlox, perennial phlox	<i>Phlox paniculata</i>																X		X
downy phlox	<i>Phlox pilosa</i>	X			X	X					X				X	X			X
phlox	<i>Phlox</i> spp.																X		
creeping phlox, summer phlox	<i>Phlox stolonifera</i>																X		
moss phlox, mountain phlox, moss pink	<i>Phlox subulata</i>												X						
ninebark	<i>Physocarpus opulifolius</i>				X	X					X			X		X			
obedient plant, false dragonhead	<i>Physostegia virginiana</i>			X					X			X	X						
pokeweed	<i>Phytolacca dodecandra</i>																X		
shortleaf pine	<i>Pinus echinata</i>				X	X					X				X				
pond pine	<i>Pinus palustris</i>						X					X			X				
pitch pine	<i>Pinus rigida</i>	X			X			X					X		X	X	X		
pinus	<i>Pinus</i> spp.	X															X		
eastern white pine	<i>Pinus strobus</i>														X		X		
Virginia pine	<i>Pinus virginiana</i>							X											

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American sycamore	<i>Platanus occidentalis</i>		X								X	X							
Kentucky blue-grass	<i>Poa pratensis</i>																X		
roughstalk bluegrass	<i>Poa trivialis</i>										X								
mayapple, mandrake	<i>Podophyllum peltatum</i>		X					X				X	X				X		
greek valerian, jacob's ladder, greek valerian, spreading jacob's ladder	<i>Polemonium reptans</i>			X	X	X			X		X		X						
variegated native jacob's ladder	<i>Polemonium</i> spp.				X	X													
smooth solomon seal	<i>Polygonatum biflorum</i>				X														
solomon's seal, giant solomon's seal	<i>Polygonatum canaliculatum</i>		X		X				X		X		X						
downy solomon's seal	<i>Polygonatum pubescens</i>	X														X			
Pennsylvania smartweed	<i>Polygonum pennsylvanicum</i>																X		
christmas fern	<i>Polystichum acrostichoides</i>															X			
tassel fern	<i>Polystichum polyblephorum</i>															X			
pickerelweed	<i>Pontederia cordata</i>															X		X	
aspen	<i>Populus</i> spp.																X		
bowman's root, indian physic, American ipecac	<i>Porteranthus trifoliata</i>															X			
long-leaf pondweed	<i>Potamogeton nodosus</i>																X		
sago pondweed	<i>Potamogeton pectinatus</i>																X		
prairie cinquefoil	<i>Potentilla arguta</i>				X														
bush cinquefoil, shrubby cinquefoil	<i>Potentilla fruticosa</i>				X	X					X					X			
Norwegian cinquefoil	<i>Potentilla norvegica</i>	X			X								X	X		X			
three-toothed cinquefoil	<i>Potentilla tridentata</i>		X								X		X					X	

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common selfheal	<i>Prunella vulgaris</i>			X					X			X							
wild plum	<i>Prunus americana</i>	X										X							
pin cherry	<i>Prunus pensylvanica</i>		X											X					
black cherry, wild cherry	<i>Prunus serotina</i>				X					X	X					X	X		
cherries	<i>Prunus</i> spp.			X			X		X			X	X				X		
choke cherry	<i>Prunus virginiana</i>		X										X			X	X		
hoary mountain mint	<i>Pycnanthemum incanum</i>				X	X		X				X	X	X	X	X			
showy mountain mint, clustered mountain mint, mountain mint	<i>Pycnanthemum muticum</i>									X									
slenderleaf mountain mint	<i>Pycnanthemum tenuifolium</i>		X										X			X			
Virginia mountain mint	<i>Pycnanthemum virginianum</i>				X														
white oak	<i>Quercus alba</i>				X	X											X		
swamp oak, swamp white oak	<i>Quercus bicolor</i>	X			X		X						X		X		X		
scarlet oak	<i>Quercus coccinea</i>					X											X		
bur oak	<i>Quercus macrocarpa</i>	X																	
pin oak	<i>Quercus palustris</i>												X				X		
willow oak	<i>Quercus phellos</i>																X	X	
chestnut oak	<i>Quercus prinus</i>																X		
red oak	<i>Quercus rubra</i>				X	X		X	X		X		X			X	X		
oaks	<i>Quercus</i> spp.																X		
black oak	<i>Quercus velutina</i>																X		
prairie coneflower	<i>Ratibida pinnata</i>	X	X																
Maryland meadow beauty	<i>Rhexia mariana</i>				X										X				

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meadow beauty, handsome hairy	<i>Rhexia virginica</i>	X			X						X								
sweet azalea	<i>Rhododendron arborescens</i>					X					X								
rosebay rhododendron	<i>Rhododendron maximum</i>		X									X						X	
swamp azalea	<i>Rhododendron viscosum</i>	X			X								X	X		X			
rhododendron	<i>Rhododendron</i> spp.																X		
swamp azalea	<i>Rhododendron viscosum</i>	X			X								X	X		X			
rhododendron	<i>Rhododendron</i> spp.																X		
fragrant sumac	<i>Rhus aromatica</i>															X			
dwarf-winged sumac	<i>Rhus copalina</i>				X					X							X		
smooth sumac	<i>Rhus glabra</i>				X												X		
sumacs	<i>Rhus</i> spp.	X			X			X						X		X	X		
staghorn sumac	<i>Rhus typhina</i>		X									X					X		
pasture rose, Carolina rose	<i>Rosa Carolina</i>		X		X		X					X	X	X	X		X		
swamp rose	<i>Rosa palustris</i>					X							X				X	X	
rose	<i>Rosa</i> spp.																X		
Virginia rose	<i>Rosa virginiana</i>	X	X											X			X		
common blackberry	<i>Rubus allegheniensis</i>		X									X	X				X		
flowering raspberry	<i>Rubus odoratus</i>	X			X			X						X			X		
thimbleberry	<i>Rubus parviflorus</i>		X			X					X		X			X			
blackberry, raspberry	<i>Rubus</i> spp.																X		
eastern coneflower, organe coneflower	<i>Rudbeckia fulgida</i>		X																
black-eyed susan	<i>Rudbeckia hirta</i>		X	X					X		X	X	X			X			

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green-headed coneflower, cutleaf coneflower	<i>Rudbeckia lanciniata</i>											X							
great coneflower	<i>Rudbeckia maxima</i>														X				
sweet coneflower	<i>Rudbeckia subtomentosa</i>	X	X		X		X					X	X	X				X	
brown-eyed-susan, three lobed coneflower	<i>Rudbeckia triloba</i>		X										X			X			
Carolina wild petunia	<i>Ruellia caroliniensis</i>										X								
fringe-leaved petunia, hairy wild petunia, wild petunia	<i>Ruellia humilis</i>		X				X		X		X	X	X		X				
limestone petunia	<i>Ruellia strepens</i>	X			X														
pussy willow	<i>Salix discolor</i>		X				X					X	X	X					
sandbar willow	<i>Salix exigua</i>		X					X				X	X			X			
black willow	<i>Salix nigra</i>			X	X			X				X	X	X			X		
silky willow	<i>Salix sericea</i>									X	X				X		X		
willow	<i>Salix spp.</i>																X		
lyreleaf sage, purple knockout	<i>Salvia lyrata</i>				X												X		
elderberry, American elder, common elderberry	<i>Sambucus canadensis</i>	X	X		X		X	X				X	X	X	X	X	X		
red-berried elder	<i>Sambucus racemosa ssp. pubens</i>	X																X	
bloodroot	<i>Sanguinaria canadensis</i>		X																
swamp burnet	<i>Sanguisorba canadense</i>	X																	
sassafras	<i>Sassafras albidum</i>										X							X	
water dragon, swamp lily, lizards tail	<i>Saururus cernuus</i>	X			X							X							
swamp saxifrage	<i>Saxifraga pensylvanica</i>														X				
early saxifrage	<i>Saxifraga virginensis</i>				X	X		X	X		X				X				

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little bluestem	<i>Schizachyrium scoparium</i>					X			X		X		X				X	X	
hardstem bullrush	<i>Scirpus acutus</i>		X		X												X	X	
black bullrush, green bullrush	<i>Scirpus atrovirens</i>		X									X							
wool grass, wool rush	<i>Scirpus cyperinus</i>				X														
three-square bullrush	<i>Scirpus pungens</i>											X					X		
softstem bullrush	<i>Scirpus tabermontanii</i>									X	X						X		
hoary skullcap, hyssop skullcap, skullcap	<i>Scutellaria incana</i>								X			X							
hyssop skullcap	<i>Scutellaria integrifolia</i>															X			
Allegheney skullcap	<i>Scutellaria serrata</i>				X	X			X		X								
sedum	<i>Sedum</i> spp.																X		
wild stonecrop, woodland stonecrop, stonecrop	<i>Sedum ternatum</i>															X			
golden ragwort, golden groundseal, squaw-weed	<i>Senecio aureus</i>											X						X	
northern wild senna, wild senna, American	<i>Senna hebecarpa</i>	X	X									X	X		X				
Maryland senna	<i>Senna marilandica</i>	X																	
bristlegrass	<i>Setaria</i> spp.																X		
wild pink, pink campion	<i>Silene caroliniana</i>				X	X				X			X			X		X	
royal catchfly	<i>Silene regia</i>	X																X	
starry campion	<i>Silene stellata</i>		X	X	X						X	X	X						
fire pink	<i>Silene virginica</i>		X									X	X						
compass plant	<i>Silphium laciniatum</i>												X						
cup plant	<i>Silphium perfoliatum</i>	X	X		X								X						

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prairie dock	<i>Silphium terebinthinaceum</i>														X				
whorled rosenweed	<i>Silphium trifoliatum</i>				X											X		X	
blue-eyed grass, select blue-eyed grass	<i>Sisyrinchium angustifolium</i>	X										X							
false solomon's seal	<i>Smilacina racemosa</i>						X					X						X	
greenbriar	<i>Smilax</i> spp.																X		
silverrod, white goldenrod	<i>Solidago bicolor</i>				X												X		
bluestem goldenrod, wreath goldenrod	<i>Solidago caesia</i>				X											X	X		
zigzag goldenrod	<i>Solidago flexicaulis</i>		X		X											X	X	X	
flat top goldenrod	<i>Solidago graminifolia</i>	X	X	X	X							X	X		X	X			
early goldenrod	<i>Solidago juncea</i>												X						
gray goldenrod	<i>Solidago nemoralis</i>				X														
anisescented goldenrod	<i>Solidago odora</i>		X				X												
roughleaf goldenrod	<i>Solidago patula</i>				X													X	
riddell's goldenrod	<i>Solidago reddellii</i>												X						
stiff goldenrod	<i>Solidago rigida</i>					X							X					X	
wrinkleleaf goldenrod, rough-stemmed goldenrod	<i>Solidago rugosa</i>				X												X		
seaside goldenrod	<i>Solidago sempervirens</i>												X						
blue-stemmed, grey, or showy goldenrod	<i>Solidago speciosa</i>			X			X					X							
short-pappus goldenrod, autumn goldenrod	<i>Solidago sphacelata</i>		X									X	X						
goldenrod	<i>Solidago</i> spp.	X			X								X				X	X	
American mountain ash	<i>Sorbus americana</i>																X		
indian grass	<i>Sorghastrum nutans</i>															X	X		

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American bur-reed	<i>Sparganium americanum</i>			X								X	X			X			
giant bur-reed	<i>Sparganium eurycarpum</i>									X							X		
prairie cord grass	<i>Spartina pectinata</i>		X	X							X	X	X		X	X			
indian pink	<i>Spigelia marilandica</i>				X				X		X								
meadowsweet	<i>Spiraea alba</i>		X									X							
steplebush	<i>Spiraea tomentosa</i>	X																	X
nodding ladies tresses	<i>Spiranthes cernua</i>										X								
fragrant lady's tresses	<i>Spiranthes cernua var. odorata</i>	X			X									X	X				X
lady's tresses orchid	<i>Spiranthes odorata</i>	X	X		X	X	X			X		X	X	X	X	X			X
narrow-leaved meadowsweet	<i>Spirea alba</i>				X	X					X			X		X			X
broad-leaved meadowsweet	<i>Spirea latifolia</i>		X																
tall dropseed, rough dropseed, meadow dropseed	<i>Sporobolus compositus</i>				X									X					
prairie dropseed	<i>Sporobolus heterolepis</i>															X			X
American bladdernut	<i>Staphylea trifolia</i>															X			
porcupine grass	<i>Stipa spartea</i>				X											X			
stokes' aster	<i>Stokesia laevis</i>								X	X	X								
wood poppy, celandine poppy	<i>Stylophorum diphyllum</i>				X														
snowberry	<i>Symphoricarpos</i>	X			X							X		X					
coralberry	<i>Symphoricarpos orbiculatus</i>		X									X					X		
blue heart-leaved aster	<i>Symphotrichum cordifolium</i>				X											X			
crooked-stem aster	<i>Symphotrichum prenanthoides</i>				X											X		X	
purple-stemmed aster	<i>Symphotrichum puniceum</i>	X			X														

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short's aster	<i>Symphotrichum shortii</i>					X					X	X		X	X	X			
reclining aster	<i>Symphyotrichum ericoides</i>									X									
calico aster	<i>Symphyotrichum lateriflorum</i>														X				
white or frost aster	<i>Symphyotrichum porteri</i>											X	X						
skunk cabbage	<i>Symplocarpus foetidus</i>				X	X			X	X						X			
bald cypress	<i>Taxodium distichum</i>	X			X							X							
yew	<i>Taxus spp.</i>																X		
meadow rue	<i>Thalictrum aquilegifolium</i>																X		
early meadow rue	<i>Thalictrum dioicum</i>				X						X								
tall meadow rue	<i>Thalictrum pubescens</i>				X											X			
rue anemone	<i>Thalictrum thalictroides</i>										X								
New York fern	<i>Thelypteris noveboracensis</i>	X			X								X		X	X			
foamflower, creeping foamflower	<i>Tiarella cordifolia</i>					X													
American linden or basswood	<i>Tilia americana</i>					X											X		
Mexican sunflower	<i>Tithonia rotundifolia</i>																X		
poison ivy	<i>Toxicodendron radicans</i>																X		
Ohio spiderwort, spiderwort	<i>Tradescantia ohiensis</i>				X											X			
spiderwort, Virginia spiderwort, common spiderwort	<i>Tradescantia virginiana</i>				X														
tassel rue	<i>Trautvetteria caroliniensis</i>		X																
blue curls	<i>Trichostema dichotomum</i>	X	X		X		X			X			X	X					
purple-top	<i>Tridens flavus</i>		X		X											X			
red clover	<i>Trifolium pratense</i>																X		

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white dutch clover	<i>Trifolium repens</i>																X		
southern trillium	<i>Trillium cuneatum</i>	X										X							
purple trillium, red trillium, wake robin, stinking benjamin, squawroot	<i>Trillium erectum</i>				X							X	X			X		X	
declined trillium, white wake-robin, drooping trillium	<i>Trillium flexipes</i>															X			
showy trillium, large flowering trillium	<i>Trillium grandiflorum</i>	X	X		X		X						X	X					
yellow trillium, southern	<i>Trillium luteum</i>			X								X							
prairie trillium, bloody noses	<i>Trillium recurvatum</i>		X			X					X	X	X			X			
toadshade, toad trillium	<i>Trillium sessile</i>	X	X		X	X		X			X		X	X	X	X		X	
trillium	<i>Trillium spp.</i>				X				X	X							X		
spreading globeflower	<i>Trollius laxus</i>	X														X			
eastern hemlock	<i>Tsuga canadensis</i>				X											X	X		
hemlock	<i>Tsuga Carrière</i>																X		
tulip	<i>Tulipa spp.</i>																X		
showy merrybells, large-flowered bellwort, wild oats	<i>Uvularia grandiflora</i>		X																X
bellwort, merrybells	<i>Uvularia perfoliata</i>	X		X	X	X										X		X	
wild oats	<i>Uvularia sessilifolia</i>				X								X						
lowbush blueberry	<i>Vaccinium angustifolium</i>				X								X				X		
highbush blueberry	<i>Vaccinium corymbosum</i>				X								X			X	X		
blueberries	<i>Vaccinium spp.</i>												X				X		
deerberry	<i>Vaccinium staminium</i>				X	X					X					X	X		

Lower Mahoning Creek Regional Watershed Conservation Plan

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
regal lingonberry	<i>Vaccinium vitis-idaea</i>										X								
wild celery	<i>Vallisneria Americana</i>																X		
purple vervain	<i>Verbena canadensis</i>				X					X	X					X			
blue vervain, simpler's joy, swamp verbena, blue verbena	<i>Verbena hastata</i>			X									X		X				
hoary vervain	<i>Verbena stricta</i>															X			
tall ironweed	<i>Vernonia gigantea</i>				X						X					X			
tawny ironweed, upland ironweed	<i>Vernonia glauca</i>											X							
New York ironweed, broadleaf ironweed	<i>Vernonia noveboracensis</i>												X						
culver's root	<i>Veronicastrum virginicum</i>															X			
giant ironweed	<i>Verononia gigantea</i>														X	X			
mapleleaf viburnum	<i>Viburnum acerifolium</i>		X													X			
witherod, wild raisin	<i>Viburnum cassinoides</i>				X								X						
arrowood viburnum, southern arrowwood	<i>Viburnum dentatum</i>		X														X		
nannyberry viburnum	<i>Viburnum lentago</i>										X								
possumhaw, witherod viburnum	<i>Viburnum nudum</i>		X									X							
blackhaw viburnum, black haw	<i>Viburnum prunifolium</i>												X			X	X		
viburnums	<i>Viburnum spp.</i>		X		X											X	X		
cranberry bush, highbush cranberry	<i>Viburnum trilobum</i>			X	X							X					X		
white violet, Canada violet	<i>Viola canadensis</i>					X					X	X	X				X	X	
marsh blue violet	<i>Viola cucullaria</i>																	X	
halberdleaf yellow violet	<i>Viola hastata</i>																	X	
labrador violet	<i>Viola labradorica</i>																	X	

Lower Mahoning Creek Regional Watershed Conservation Plan

Common Name(s)	Scientific Name	Dry Area Plant	Shady Area Plant	Shady Rain Garden Plant	Sunny Area Plant	Sunny Rain Garden Plant	Plant well suited for Banks	Cut Flower Garden Plant	Plant for near Lakes, Ponds or Streams	Soil Stabilizing Plant	Wet Area Plant	Plant for Wooded Areas	Deer Resistant Plant	Drought Tolerant Plant	Bee Attractant Plant	Bird Attractant Plant	Wildlife Attractant Plant	Butterfly Attractant Plant	Hummingbird Attractant Plant
common blue birdfoot violet	<i>Viola pedata</i>																	X	
smooth yellow violet	<i>Viola pennsylvanica</i>																	X	
downy yellow violet	<i>Viola pubescens</i>																	X	
long-spurred violet	<i>Viola rostrata</i>																X	X	
wild blue violet	<i>Viola sororia</i>																	X	
pansy	<i>Viola</i> spp.																X		
creamy violet	<i>Viola striata</i>																X	X	
grape, wild grape	<i>Vitis</i> spp.																X		
barren strawberry	<i>Waldsteinia fragarioides</i>																	X	
Virginia chain fern	<i>Woodwardia virginica</i>																	X	
yellow root	<i>Xanthorhiza simplicissima</i>																	X	
golden alexanders, zizia	<i>Zizia aurea</i>																	X	

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## **APPENDIX M: ENHANCING FISH HABITAT**

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Habitat is defined as the place where an organism lives or is naturally found. Enhancing habitat in an aquatic ecosystem improves the overall health and quality of a given waterway. By doing so, it in turn benefits everyone who enjoys outdoor recreation whether it be fishing, boating, or just an outdoor enthusiast.

Aquatic habitat enhancement can be constructed in both streams and lakes and is designed to improve habitat for everything from fish to various reptiles. As well as having a wide range of organisms that habitat enhancement structures benefit there is also a diverse variety of artificial habitat purposes and designs that Pennsylvania Fish and Boat Commission (PFBC) has come up with to suit the needs of Pennsylvania's wildlife. In order to perform a Fish Habitat improvement project the proper permits must first be required from Pennsylvania's Department of Environmental Protection (PA DEP). Once the permits are acquired grants are applied for to provide funding.

The primary objective of artificial fish habitat is to use resources such as wood and rock rubble to increase the abundance of submerged native habitat using designs engineered to mimic Pennsylvania's naturally occurring resources. Artificial fish habitat also provides excellent fishing opportunities for anglers if they are aware of the locations of the structures.

PFBC offers Lake Habitat Improvement Maps for all the state and federal owned lakes where habitat improvement projects have been completed. These maps show the general shape of the lake and indicate where all man made structures are located along with how many are present and the depth of their location. If read correctly these maps provide a very efficient way for anglers to navigate the structures and ultimately find fish (PFBC<sup>2</sup>).

### **Habitat Enhancing Structures for Cover**

Man-made aquatic habitat structures are designed to serve several different purposes for aquatic life, each one being necessary for a successful aquatic environment. One purpose for artificial habitat is to provide smaller prey fish with cover from predators where preexisting cover is nonexistent. Most needs for this type of habitat structure is in the early man made lakes that can be found scattered across Pennsylvania. This is because in earlier years when many lakes were being formed it was thought that the lake bottom should be bare, therefore all debris was cleared from the area leaving little to no cover remaining for aquatic organisms. There are many variations for this form of habitat that use all types of materials ranging from wooden poles to large sandstone rocks. Examples of this type of habitat structure are the Porcupine Crib, Porcupine Crib Jr., Post Stump, Post Stump Plus, Post Cluster, Post Cluster Plus, Rock Star, Vertical Plank Structure, Spider Hump, Stake Tree, Felled Shoreline Tree, and Rock Rubble Humps.

#### **Porcupine Crib and Porcupine Crib Jr.**

Porcupine Crib and Porcupine Crib Jr. are two habitat structures that are very alike in their design. They are constructed using 4ft. 2x2 pieces of rough timber, 8x8x16 concrete blocks, nails, and a nylon banding strap with steel buckle. The 4 ft. pieces of wood are nailed to one another while slowly stepping inward in the shape of a pyramid with the concrete blocks placed at the bottom for weights and the nylon banding strap used for added strength. Once completed the cribs are placed at the bottom of the lake at a minimum depth of about 10 ft. and are normally placed in clusters. Once submerged the Porcupine Crib and Crib Jr. form what serves as a wooden cage like structure with openings between the boards allowing smaller bait fish to swim in and out ultimately providing them with cover. At the same time the Porcupine Crib provides places for predatory fish to hunt due to the large amounts of bait fish that are drawn to

them. Porcupine cribs serve as excellent areas for fishermen seeking various species of pan fish as well as the larger game fish species that are drawn in too feed on them (PFBC<sup>1</sup>).

### **Post Stump and Post Stump Plus**

The Post Stump and Post Stump Plus have a simple design which involves nothing more than two to three 4ft. sections of 6 inch wide aquatic posts and are normally placed at a depth of about 4ft. of water. The Post Stump is made by pounding two sections the aquatic posts into the lake bottom until they are submerged about two feet below the surface. The two pieces of post can be placed straight up and down or at an angle depending on preference. The Post Stump Plus is constructed the same way as the plain Post Stump but involves a laterally positioned post that is bolted to the vertical posts underneath the waters surface for added cover. This Habitat structure is designed to benefit an array of aquatic organisms. The submerged posts act as artificial submerged stumps providing cover for predatory and prey fish alike. Being that this type of habitat structure is placed in shallower waters it creates fishing sites for anglers that are accessing the lakes from shore banks (PFBC<sup>1</sup>).

### **Post Cluster and Post Cluster Plus**

The Post Cluster and Post Cluster Plus are very similar in design and purpose to the Post Stump and Post Stump Plus. This type of habitat is made with 8ft. long sections of 6 inch wide aquatic posts and normally involves the use of heavy equipment to build. The Post Cluster is placed in about 4ft. of water and is constructed by inserting the 8ft. sections of aquatic posts about two feet into the lakes bottom allowing the tops to protrude from the waters surface. The Post Cluster can include as many poles in each cluster as preferred and can be arranged in any shape that is desired. The Post Cluster Plus is constructed the same as The Post Cluster except it involves laterally positioned posts that are bolted to the vertical posts underneath the waters surface for added cover. Once completed the clusters of protruding posts replicate what acts as submerged woodland. This habitat structure is designed to benefit an array of aquatic organisms. As well as providing cover for fish of all sizes the exposed post above the surface of the water serve as excellent perch sites for fish hunting birds. Also the Post Clusters exposed portions tend to eventually attract aquatic plant growth such as lily pads which in turn attracts organisms like frogs and dragonflies that fish and other organisms can feed on. This type of habitat structure draws in all types of fish species thus providing favorable fishing for boating and shore fishermen alike. The post clusters also act as a barrier between the shore and open water by breaking up waves decreasing shore line erosion (PFBC<sup>1</sup>).

### **Rock Star**

The Rock Star is a man made habitat structure that involves the use of both rough cut timber and sandstone rocks. To construct this type of structure you need seven tons of sand stone, seven eight ft. 2×6 sections of rough cut timber, and nails. A rock star consists of a two ton pile of sandstone encircled by five surrounding one ton piles of sandstone that is connected by five sections of 2×6 rough timber in the general shape of a star. The connecting pieces of rough cut timber should be buried in the rock piles and elevated from the lakes bottom for aquatic organisms to use for cover. After the star shaped structure is completed the last two sections of eight ft. 2×6 are nailed into the others that are already placed connecting any two of the pieces of boards for additional cover. These structures can be placed at any depth and are designed to provide cover for all types of aquatic organisms. Rock Stars can also double as spawning sites for some species of fish (PFBC<sup>1</sup>).

### **Vertical Plank Structure**

The vertical Plank Structure is a wooden box designed to provide cover for large and small fish alike. The structure consists of 59 sections of rough cut timber that rang from 1×4×24 to 2×3×48, nine concrete blocks to allow it to sink to the bottom, and nails. Small conifer trees may also be placed in the box once built to add additional cover. This habitat structure is used much the same as the Porcupine crib.

Placement is normally at a minimum depth of 10ft. and more often than not they are placed in clusters. The main difference being the Vertical plank structure has openings that are much larger in size allowing larger fish and other aquatic organisms to enter them. If located the Vertical Plank structure is an excellent place for anglers to try their luck for not only does it provide cover for bait fish but larger sized fish as well (PFBC<sup>1</sup>).

### **Spider Hump and Rock Rubble Hump**

The Rock Rubble Hump is the simplest artificial habitat structure there is as far as its general design is concerned. It consists of a pile of sandstone rock that stands anywhere from one to three ft. high and can be placed at any depth that is preferred. The Spider Hump is a more complex modification of the Rock Rubble Hump that is constructed using sandstone rocks, spikes, and 8ft. aquatic posts. A square is built with 8ft. posts then fastened down with spikes. Then 16 more evenly spaced posts are laid in the square and fastened down with all of the bottoms meeting in the center of the box. Once the posts are all placed three tons of rock is dumped onto the center of the structure to form a rock pile with wooden posts protruding providing excellent cover for all types of aquatic organisms. These habitat enhancement structures also provide excellent areas for fish species that prefer spawning in rocky areas (PFBC<sup>1</sup>).

### **Stake Tree**

The Stake Tree is constructed using a five gallon plastic bucket, 2×2 wooden stakes (varying in length), and concrete. To create a Stake Tree simply arrange 6 to 8 wooden stakes in any random order in the bucket then pour in concrete to harden and hold them in place. When completed place it anywhere where it's deep enough for it to become totally submerged and once placed it will replicate a submerged tree with branches. The Stake Tree can be placed in level or slightly steeping areas and in normally situated in groups of 10 to 30 structures or 50 to 60 per acre in a circular arrangement. These structures are excellent for attracting pan fish such as crappie and bluegill and are sure to provide fishing hot spots (PFBC<sup>1</sup>).

### **Felled Shoreline Tree**

The Felled Shoreline Tree habitat enhancement uses trees surrounding a lake or other body of water, a chain saw, and a steel cable to create ideal aquatic habitat. A Felled Shoreline Tree is formed but cutting down a tree along the edge of a body of water and angling it so it falls into the water. Once cut down the tree is fastened to the stump that is remaining with the steel cable to keep it in place. Although this is already a naturally occurring process among aquatic ecosystems it speeds up the process and allows the person creating the habitat to place the downed trees in favorable locations. The Felled Shoreline Tree structure is to be placed where the tree will fall into water that has a steep droop off and has a minimum depth of 10ft. towards the where the top of the tree will fall. These structures provide habitat for fish of all species and sizes (PFBC<sup>1</sup>).

## **Habitat Enhancing Structures for Spawning and Nesting**

Another purpose that Habitat enhancement structures are designed to improve is spawning and nesting sites available to aquatic organisms. There are several types of structures that are designed to provide nesting areas for specific types of fish species in Pennsylvania. These types of structures include the Black Bass Nesting Structure, Fathead Minnow Spawning Cover, and Channel Catfish Spawning Box. These three types of habitat structures all are designed to enable specific species of fish to reproduce efficiently by building them the necessary habitat for each of their unique forms of breeding or nesting habits.

### **Black Bass Nesting Structure**

The Black Bass Nesting Structure is built from wood, nails, and concrete blocks and when completed forms a table looking structure. It's constructed by building a base out of 4ft. pieces of 2×2 rough cut timber to place the concrete blocks in just as you would a porcupine box. Once the Blocks are in place for weights to make the structure sink to the bottom five 8ft. pieces of 1×8 rough cut timber are laid across the top with equal lengths of over hang on each side and nailed in place. The structures are placed in depths of about 5ft. and will provide ideal nesting sites for black bass species including the much sought after large mouth bass. The overhanging edges on opposing sides of the structure are about 14 inches from the bottom allowing bass to nest and lay their eggs underneath the cover it provides (PFBC<sup>1</sup>).

### **Fathead Minnow Spawning Cover**

The Fathead Minnow Cover habitat structure is very simple to construct and consists of nothing more than a 2ft. long 1×8 with one end being pointed and the other flat. To build Fathead Minnow Spawning Cover you use a sledge to pound the piece of 1×8 into the bank of a lake or other body of water at a depth of 1 to 2ft. The structure is to be driven into the substrate 3 to 6in. at a slight upward angle. For ideal success the recommended density of this structure is six per acre. Like most other fish species Fathead Minnows spawn seasonally occurring during the month of June therefore the structures may be removed once the spawning time period has expired (PFBC<sup>1</sup>).

### **Channel Catfish Spawning Box**

The Channel Catfish Spawning Box has one of the more complex structural designs, among the materials need to build this structure are 8ft. 1×8 boards, 16×16 concrete blocks, nails, and lag screws with washers. Using the boards a rectangle is constructed that is 32in. long 16in. wide and 10in. high. The box has a entrance hole 6in in diameter and two ½ in. air release holes on the top of the box towards the entrance hole. Two 16×16 concrete blocks are fastened to the bottom of the structure for anchors using the lag screws. Once completed the Channel Catfish Spawning Box is placed in 3 to 5ft. of water. When placed the structure will provide the Channel Catfish with a place to spawn or simply use for cover (PFBC<sup>1</sup>).

## **Habitat Enhancing Structures for Basking**

These types of structures are designed primarily for reptile species and are essentially small floating dock like structures anchored down to provide organisms like turtles with an island refuge from the water. Basking structures benefit more than just the organisms that use them for retreat from the water. They also provide cover for fish just the same as a boat dock would. There is one main type of basking structure design in Pennsylvania and it's called the Turtle Basking Platform.

### **Turtle Basking Platform**

The Turtle Basking Platform involves quite a variety of materials to construct. Materials needed to build this structure are 2ft. and 4ft. 1×8 rough cut lumber, 4ft. 4×4 rough cut lumber, various screws and bolts, stainless steel rope wire and cable clamp, PVC pipe and caps, sealer, conduit hangers, and 8×8×16 cement blocks. A 4ft. × 4ft. dock like structure is constructed from the rough cut timber and two capped PVC pipes serving as floats. The steel cables are then attached to opposing sides of the structure and the cement blocks are attached to the steel cables acting as anchors. These structures are placed in about 5ft. of water and can be placed alone or in clusters (PFBC<sup>1</sup>).

## **Habitat Enhancing Structures for Erosion Control**

These types of structures are designed to eliminate shoreline erosion and act as wave deflectors. They also deplete the amount of sediment eroded into the water and create a buffer zone for nutrient

saturation. This is accomplished by laying seeded jute matting above the banks where the habitat enhancement is constructed. Jute Matting will reinforce the shoreline and add plant growth to absorb nutrients. Along with the water quality benefits this type of habitat enhancement offers it also provides more desirable cover for fish that prefer shallow waters along the shoreline. Therefore these structures benefit anglers that fish from shore as well as the aquatic organisms that live there. There are two types of erosion controlling or deflecting habitat enhancement designs in Pennsylvania, the Saw-Toothed Deflector and the Stone Framed Deflector.

### **Saw-Toothed Deflector and Stone Framed Deflector**

These two types of structures are not only very similar in design and appearance but involve the use of all the same materials. Both are constructed using large sandstone or limestone boulders to form an outline and smaller sandstone or limestone rocks to fill in the interior of the structures. Also pre-seeded jute matting is used in the construction of these structures along the shore where rock meets dirt for accelerated plant growth and bank stability. The Saw-Toothed Deflector uses the rocks to form an irregular pattern along the shore where erosion is occurring. The Stone Framed Deflector places rocks in a triangular pattern consisting of a 30 degree angle from shore that meets a 90 degree angle coming back towards shore. The long face of the triangle should be facing the direction in which the wind and waves are coming from. Stone Framed Deflectors extend further out into the lake than Saw-Toothed Deflector thus provide more availability in the relation to fish habitat. Along with the construction of these habitat structures riparian buffers are often put in place where stone deflectors are located (PFBC<sup>1</sup>).

## **Habitat Enhancement Structures for Streams**

All of Pennsylvania's Rivers and streams are ever changing as the years go on. These changes develop naturally and can occur over the course of several years or just a couple days if flooding is severe enough. Changes among rivers and streams are caused by the systems natural urge to find equilibrium or the most stable direction of flow. This natural urge can cause the river or stream to wind back and forth and ultimately ruin the systems livability for more demanding aquatic organisms like trout. This is because constant bends and breaks in a running waterway causes it to become shallow, slow moving, and can in turn limit livable space for aquatic organisms. For this reason the Pennsylvania Fish and Boat Commission along with other conservation groups have developed ways to improve the course of a moving system while respecting the desired course of the waterway at the same time. These improvements often involve the use of heavy equipment and are constructed from natural materials such as wood and rock. A common solution that man made habitat enhancement structures provide for a moving aquatic ecosystems is straightening of its natural flow. By straightening the systems flow the river or stream will eventually move faster and deepen over the span of several years in turn providing more livable space and desirable habitat. Many of the created habitat structures also serve a double purpose for aquatic organisms by offering cover for them to hide amongst (Lutz, 2007).

There are various aquatic enhancements and habitat structures that are installed in Pennsylvania's streams and river systems. Sometimes they just involve stream bank stabilization or placement of woody debris for fish cover, but there are several man made habitat structures that involve quite elaborate designs and a lot of work to construct. All habitat structures require proper permits to build and place just as the habitat structures constructed for lakes. The most common types of structures that are constructed within streams are deflectors and Vanes. Both are mainly constructed to divert channel flow. There are also channel blocking structures that are made to block off side channels that drain from the main flow. And lastly there structures designed to provide habitat cover for aquatic organisms. These consist of Water Jacks, Cribs, and random rock or log structures (Lutz, 2007).

## **Channel Deflecting Structures**

Deflectors are triangular structures of all different sizes that serve several purposes and can be constructed from all sorts of materials ranging from rocks to brush and even tree roots. One thing that a deflector does for a stream is adjust the main current back to the center of the waterway. While doing so the deflector narrows the channel of flow and collects substrate and debris along the bank below the structure which also deepens the waterway. Deflectors also provide some habitat cover for aquatic species such as fish. Another type of habitat structure designed for streams are Vanes. A Vane serves the same purpose as a Deflector and is constructed from basically the same materials. Types of Vane and Deflector structures include Saw-Toothed Deflectors, Stone Deflectors, Stone Deflector with Single Log, Log framed Deflector, Overhead Deflector, Log Faced Stone Deflector, Stacked Deflector, Brush Deflector, Root Wad Deflector, Single Log Vane, Single Log Vane with Root Wad, Multi-Log Vane, Rock Vane, Rock Vane with J Hook, Log Cross Vane, Rock Cross Vane.

### **Saw-Toothed Deflectors, Stone Deflectors, and Stone Deflector with Single Log**

Saw-Toothed Deflectors are made from stone and are the simplest of the deflectors to construct. This habitat structure is made by dumping rock in the formation of triangles along the stream bank with a 30 degree angle facing the upstream end to center the current. They are to extend 5ft. out into the stream and are placed in groups of anywhere from three to as many needed. Stone Deflectors are built the same as the Saw-Toothed but tend to be larger and are placed alone instead of in groups. The Stone Deflector with Single Log is modified slightly from the others having a log buried in the rock pile that protrudes out from the tip of the deflector angling upstream against the flow. This is just to provide additional cover for fish and other aquatic organisms (PFBC<sup>1</sup>).

### **Log framed Deflector, Overhead Deflector, Log Faced Stone Deflector, and Stacked Deflector**

The Log Framed Deflector is designed to serve the same purpose as the Stone Deflector and is constructed the same way just with a triangular frame built from logs. The main log is placed along the face against the flow at a 30 degree angle and the brace log is put along the back side. The two logs are buried in the bank on the shore side and are pinned down at the tip with rebar. The Overhead Deflector is the same design but uses planking to fill in the deflector before the rock place as filler. As for the Log Faced Stone Deflector it's nothing more than a Stone Deflector one or two logs placed on the 30 degree face of the structure that diverts the current. The face log or logs are fastened to sill logs that are buried under the stone inside the structure. All three of these habitat enhancement structures are designed for current diversion and can double as cover for fish and other organisms like macro invertebrates (PFBC<sup>1</sup>).

### **Brush Deflector and Root Wad Deflector**

The Brush Deflector is a type of deflector that has many benefits. It's constructed from wooded stakes and brushy debris. This type of deflector is built by pounding the stakes into the bottom of the stream leaving about 2x2ft. square spaces in between. The stakes should form a triangle pointing towards the middle of the stream and each stake should protrude about 6 inches from the streams surface. Once the stakes are in place the spaces between stakes are stuffed with bundles of brush until it's built up to above normal water level. This structure will eventually develop growth over of the brush pile and become land that can be walked on forming a permanent deflector. The Root Wad Deflector is simply a root wad or lower portion of a tree that is placed with the root mass in the water and the trunk buried within the streams bank. This habitat structure acts as a deflector for current but server more as a cover provider. Aquatic Organisms use the entangled mass of roots for cover from predators (PFBC<sup>1</sup>).

### **Single Log Vane, Single Log Vane with Root Wad, and Multi-Log Vane**

The Single Log Vane and Single Log Vane with Root Wad are current deflecting structures and are designed to center the streams flow, prevent stream bank erosion, and provide cover for aquatic organisms. These habitat structures are constructed from logs and rock. A Single Log Vane is built by burying a log in the stream bank then pouring stone over the end that is stuck in the bank to hold it in place. A larger stone is also placed behind the tip of the log in the stream for added strength. The log is to be pointed upstream against the flow at a 20 to 30 degree angle. Single Log Vane with Root Wad is the same structure with a root wad deflector added on the downstream side of the structure for added cover and current deflection. The Multi-Log Vane is another similar structure that is built the same as the single log vane but as the name states multiple logs are placed in the stream bank to protrude into the stream instead of a single log. This structure may be used when there are stronger currents or larger streams for added stability (PFBC<sup>1</sup>).

### **Rock Vane and Rock Vane with J Hook**

The Rock Vane and Rock Vane with J Hook are two other vane structures that are constructed from only rock. A Rock Vane is built by making a line of larger stone out into the stream at a 90 degree angle. Then the upstream side of the structure is filled in with smaller rock forming a triangle. The Rock Vane with J Hook is the same structure just with a hook made from stone coming off the tip of the vane that curves downstream. These structures tend to deflect the current and form deep slow pools for aquatic habitat (PFBC<sup>1</sup>).

### **Log Cross Vane and Rock Cross Vane**

The Log Cross Vane and Rock Cross Vane are designed to center flow and create a deepened pool with a fast moving current on the down stream end of the structure. These can form damming barriers in low water conditions but when water levels are normal to high the water is carried over the structure and cuts into the bottom forming deep holes that are desirable for anglers. These structures are nothing more than two vanes built on opposing sides of a stream with their tips meeting in the middle to be fastened down. Log Cross Vane being made up of two opposing Single Log Vanes and the Rock Cross Vane being made up of two opposing Rock Vanes (PFBC<sup>1</sup>).

## **Channel Blocking Structures**

Channel blocking structures are habitat structures that are constructed to divert the flow of a stream back to its main channel. Over time streams can develop side channels from flooding that can deplete the amount of water as well as strength of current from the main channel. This can cause poor habitat for fish and other organisms that desire cool fast flowing waters and at the same time can impact the health of the stream. Channel blocking structures use natural materials to block these side channels off and correct the flow. There are two types of channel blocking structures these being the Stone Channel Block and The Log Frame Channel Block.

### **Stone Channel Block and Log Frame Channel Block**

The Stone Channel Blocker is simply a wall build from piling rock to block off side channels. A pile of larger rock is dumped right where the side channel flows out then a layer of smaller rock and another layer of the larger rock. The rocks are piled slightly higher than the normal water level and should not be piled higher than the surrounding stream banks. The Log Framed Channel Blocker is built in the same way but involves log frame for added strength. The log frame consists of 2 logs placed across the side channel perpendicularly that are connected by several brace logs that are fastened down with rebar. Once the frame is in place large rocks are poured over the edges and along the structures down stream face in the side channel. Then smaller filler rocks are dumped on to fill in the frame and other remaining space.

These structures keep the main flow of the stream going in the proper direction improving the overall quality of the stream (PFBC<sup>1</sup>).

## **Cover Providing Structures**

There are several different variations of habitat structures that provide aquatic organisms with cover. The simplest forms of these structures are the Random Boulder Placement and the Half Log Structure. Both are quick and easy to construct and their soul purpose is to provide cover for organisms such as fish. Another type of habitat structure that is designed to provide cover is the cribbing structure. There are several different types of these structures including Bank Cover Cribbing, Bank Cover Cribbing with Root Wad, Mud Sill Cribbing, and Modified Mud Sill Cribbing all of which including the same basic design. These structures are designed to be placed along stream banks to allow fish and other organisms to swim under them for cover while also doubling as bank stabilizers.

### **Random Boulder Placement and Half Log Structure**

Random Boulder structures are just as they sound. The Structures consist of boulders that are large enough to withstand flooding conditions being placed in the middle third of the wetted width of a stream. The boulders should protrude from the water's surface and should not be placed in a way that they would deflect the current of the stream towards the bank causing erosion. These habitat structures are very basic and easy to construct. The Half Log Structure consists of rebar, two 6 to 8 inch spacer logs, and a 3 to 4 foot long half log to be placed as the top. To construct this habitat structure the spacers and top are put in place and then fastened into place by pounding rebar through the top piece and spacer right into the stream bottom using preexisting drilled holes. The structure is to be placed parallel to the flow of the stream with the top slightly protruding from the water's surface. Both of these habitat structures are excellent for providing fish cover as well as cover for other aquatic organisms (PFBC<sup>1</sup>).

### **Brookie Water Jack and Water Jack**

The Water Jack and Brookie Water Jack are similar structures that basically serve the same purpose. Both are designed to dam up and center stream flow eventually creating a deepened pool on the down stream side of the structure for organisms to live in. The Brookie Water Jack is smaller and a little simpler to construct because it is designed to be built in small fast moving streams that inhabit brook trout thus giving it the name. These structures are built from logs, rock, and a sheet of hemlock planking. A single log is placed across the stream and buried in the ground on both sides for strength. Then the sheet of planking is placed on the upstream face of the structure forcing the water to flow up and over. A notch is also to be cut in the middle of the sheet of planking so that water is still able to flow in low water conditions and when high will center the streams flow. On each side of the log along the bank rock deflectors are placed over the log to center the flow and add strength. The Basic Water Jack is a more elaborate habitat structure designed to be placed in larger streams yet is designed to serve the same purpose. It consists of the same materials the Brookie Water Jack does but it uses more logs. At the center two logs are placed along the stream perpendicular to the flow and another is placed up stream in the same way. Then the piece of wooden planking is placed over the logs at an upward steeping angle connection the gap to force the flow of water up and over the structure. Once this part is completed wing logs are placed along the sides forming structures similar to Log Framed Deflectors that keep the flow of the stream centered and the stream banks from eroding. The water jack structures provide deep pools of cold fast moving water for all sorts of aquatic organisms to thrive in. these structures also server as bank erosion controllers and channel deflecting structures. Overall they are very beneficial to a streams habitat and are very beneficial (PFBC<sup>1</sup>).

### **Bank Cover Cribbing and Bank Cover Cribbing with Root Wad**

Cribbing structures are made from logs rock and planking boards. A Bank Cover Crib is constructed along the bank of the stream and is designed to act as an undercut bank for fish to hide under. This habitat structure is build by taking planking boards and driving them into the stream bank in a row to form a platform that extends out over the stream about 2 feet. With the platform in place a logs are fastened to the top and bottom of the platforms edge that hangs over the stream. The portions of the logs that extend further then the platform are buried in the ground for added support. Once there is a sturdy overhanging platform structure completed rocks are dumped over the plank platform to build it up to level with the stream bank. The Bank Cover Cribbing with Root Wad is build the same way as the Bank Cover Cribbing but has root wads protruding from under the structure for added cover. The root wads are buried in the stream bank and extend out from underneath the providing excellent habitat for aquatic organisms to hide amongst (PFBC<sup>1</sup>).

### **Mud Sill Cribbing and Modified Mud Sill Cribbing**

The Mud Sill and Modified Mud Sill Cribbing are similar I design to Bank cover Cribbing structures. The Mud Sill Cribbing is built in 8ft. sections and is made from oak planking, logs, and rock. To construct this type of habitat structure you must first dig ditches in the stream bank for the logs to lie in. Once the logs have been laid a platform is built over the part of the structure that hangs over the stream using the oak planking. When the platform is completed rocks are dumped over the top of the structure at an angle leveling it off with the stream bank. The Modified Mud Sill Cribbing it constructed in the same fashion but instead of being designed so the current can freely flow underneath the structure the up stream and down stream ends of the structure are brought down all the way to the bottom of the stream just leaving an undercut that can be gotten under from the front. Also a log is placed protruding into the water on the downstream end of the structure to deflect the current back under the structure and create an undercut. These habitat structures are very efficient in creating cover for organisms like trout and other fish species serving as good fishing spots for anglers. The Mud Sill and Modified Mud Sill Cribbing structures also prevent stream bank erosion and provide bank stability (PFBC<sup>1</sup>).

### **References:**

Lutz, K.J. (2007). *Habitat improvement for trout streams*. Retrieved August 24, 2010 from Pennsylvania Fish and Boat Commission website: [http://fishandboat.com/water/streams/habitat\\_improve\\_trout.pdf](http://fishandboat.com/water/streams/habitat_improve_trout.pdf).

Pennsylvania Fish and Boat Commission<sup>1</sup>. (n.d.).Habitat improvement. Retrieved August 24, 2010 from Pennsylvania Fish and Boat Commission website: <http://fishandboat.com/habitat.htm>.

Pennsylvania Fish and Boat Commission<sup>2</sup>. (n.d.). PFBC cooperative fish habitat management programs for lakes. Retrieved August 24, 2010 from Pennsylvania Fish and Boat Commission website: [http://fishandboat.com/water/habitat/mgmt\\_plans/lake/intro\\_lake\\_hab.htm](http://fishandboat.com/water/habitat/mgmt_plans/lake/intro_lake_hab.htm).

**APPENDIX N. FUNDING SOURCES**

<b>Sponsoring Organization</b>	<b>Description / Restrictions</b>	<b>Contact</b>
<b>BMP</b>		
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.	<a href="http://www.pacd.org">www.pacd.org</a>
<b>Community</b>		
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.	<a href="http://www.pittsburghfoundation.org">www.pittsburghfoundation.org</a>
<b>Energy</b>		
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	<a href="http://www.dep.state.pa.us">www.dep.state.pa.us</a>
<b>Environmental</b>		
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.	<a href="http://www.beldon.org">www.beldon.org</a>
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	<a href="http://www.benjerry.com">www.benjerry.com</a>
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.	<a href="http://www.eddiebauer.com">www.eddiebauer.com</a>

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Sponsoring Organization	Description / Restrictions	Contact
<b>Environmental (continued)</b>		
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.	<a href="http://www.heinz.org">www.heinz.org</a>
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 <del>advance this understanding</del>	<a href="http://www.rayproffitt.org">www.rayproffitt.org</a>
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.	<a href="http://www.surdna.org">www.surdna.org</a>
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.	<a href="http://www.heinz.org">www.heinz.org</a>
<b>Environmental/Watershed</b>		
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.	<a href="http://www.pa.lwv.org/wren">www.pa.lwv.org/wren</a>
River Network Watershed Assistance Grants	Watershed projects and group start-ups.	<a href="http://www.rivernetwork.org">www.rivernetwork.org</a>
Foundation for Pennsylvania Watersheds	Provides funding to grassroots organizations and watershed associations for specific watershed remediation in Pennsylvania.	<a href="http://www.pennsylvaniawatersheds.org">www.pennsylvaniawatersheds.org</a>

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Sponsoring Organization	Description / Restrictions	Contact
<b>Environmental Education</b>		
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. <del>Requires twenty percent match and reimbursement program.</del>	www.dep.state.pa.us
Education Mini Projects Program	Small grants for Pennsylvania-based grassroots educational projects that <del>address non-point source watershed concepts.</del>	(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; <del>salaries are not an approved expenditure</del>	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

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Sponsoring Organization	Description / Restrictions	Contact
<b>Environmental Education (continued)</b>		
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 shrenehess@yourinter.net, Indiana PA, 724-465-2595. Must be 501(c)3	<a href="http://www.pa.lwv.org/wren">www.pa.lwv.org/wren</a>
WREN - Opportunity Grants	The activities funded must be educational and relate to drinking water source protection or watershed education.	<a href="http://www.pa.lwv.org/wren">www.pa.lwv.org/wren</a>
<b>Environmental Justice</b>		
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
<b>Environmental Planning</b>		
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

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Sponsoring Organization	Description / Restrictions	Contact
<b>Environmental Planning (continued)</b>		
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	<a href="http://www.dcnr.state.pa.us">www.dcnr.state.pa.us</a>
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
<b>Flood Protection</b>		
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
<b>General</b>		
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. <i>Emphasis is given to corporate operating locations.</i>	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

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Sponsoring Organization	Description / Restrictions	Contact
<b>General (continued)</b>		
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.	<a href="http://www.boeing.com/community">www.boeing.com/community</a>
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.	<a href="http://www.efaw.org">www.efaw.org</a>
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	<a href="http://fdncenter.org/grantmaker/prospecthill/">http://fdncenter.org/grantmaker/prospecthill/</a>

**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.	<a href="http://www.dep.state.pa.us">www.dep.state.pa.us</a>
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**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.	<a href="http://www.nwf.org">www.nwf.org</a>
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.	<a href="http://www.nwf.org/wildalive">www.nwf.org/wildalive</a>
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.	<a href="http://www.nwf.org">www.nwf.org</a>

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Sponsoring Organization	Description / Restrictions	Contact
<b>Internship</b>		
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
<b>Land Protection</b>		
DCNR Community Conservation Partnership Program	Conserve and enhance river resources by offering planning grants, technical assistance, implementation grants, development grants, and acquisition grants.	<a href="http://www.dcnr.state.pa.us">www.dcnr.state.pa.us</a>
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.	<a href="http://michaeldfergusonfoundation.com/">http://michaeldfergusonfoundation.com/</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

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Sponsoring Organization	Description / Restrictions	Contact
<b>Loan</b>		
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 <del>capital campaign work</del>	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

<b>Multiple</b>		
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, <del>scholarship funds, or other individual aid</del>	<a href="http://www.commoncounsel.org/pages/foundation.html">www.commoncounsel.org/pages/foundation.html</a>
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, <del>filmmaking, conferences, or field trips</del>	(412) 234-1634
Charlotte and Donald Teast Foundation	Sustainable communities, arts, humanities, civic and public affairs, education, <del>the environment, health, and social services.</del>	(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 <del>services, and program-related investments</del>	<a href="http://jefferson.village.virginia.edu/readings/ford.html">http://jefferson.village.virginia.edu/readings/ford.html</a>

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Sponsoring Organization	Description / Restrictions	Contact
<b>Multiple (continued)</b>		
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 <del>not eligible</del> . <del>No mitigation work</del>	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 <del>government agencies</del> . <del>No grants to individuals</del>	www.scaife.com
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.	www.thelawrencefoundation.org

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Sponsoring Organization	Description / Restrictions	Contact
<b>Multiple (continued)</b>		
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.	<a href="http://www.levinsonfoundation.org">www.levinsonfoundation.org</a>
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.	<a href="http://www.turnerfoundation.org">www.turnerfoundation.org</a>

**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	<a href="http://www.beneficiafoundation.org">www.beneficiafoundation.org</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-	<a href="http://www.canaanvi.org">www.canaanvi.org</a>
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.	<a href="http://www.lindberghfoundation.org">www.lindberghfoundation.org</a>
Dana Corporation	Will consider funding air quality, environment, general, and water resources projects. Emphasis is given to areas where the corporation operates.	<a href="http://www.dana.com">www.dana.com</a>
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.	<a href="http://www.homedepot.com">www.homedepot.com</a>
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	<a href="http://www.wajones.com">www.wajones.com</a>

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Sponsoring Organization	Description / Restrictions	Contact
<b>Natural Resources (continued)</b>		
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	<a href="http://www.amrivers.org/feature/restorationgrants.htm">www.amrivers.org/feature/restorationgrants.htm</a>
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

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Sponsoring Organization	Description / Restrictions	Contact
<b>Plantings</b>		
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 <del>from other sources equal to the amount requested</del>	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
<b>Remediation/Restoration</b>		
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 <del>damage caused by coal mining</del>	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, <del>it can be used to pay a contractor. Must use volunteer help</del>	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, <del>municipal authority or incorporated 501(c)3</del>	(814) 472-1800
Bring Back the Natives - National Fish and Wildlife Foundation	Supports on-the-ground habitat restoration projects that benefit native aquatic <del>species in their historic range.</del>	www.nfwf.org

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Sponsoring Organization	Description / Restrictions	Contact
<b>Remediation/Restoration (continued)</b>		
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. <del>Only one administered to each state.</del>	www.cfda.gov/static/p66460.htm
NOAA Fish Habitat Restoration Program	Financial assistance for community-based habitat restoration projects, to	www.habitat.noaa.gov
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

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Sponsoring Organization	Description / Restrictions	Contact
<b>Research</b>		
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.	<a href="http://conservationresearch.wordpress.com/">http://conservationresearch.wordpress.com/</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	<a href="http://www.reeusda.gov/1700/funding/ourfund.htm">http://www.reeusda.gov/1700/funding/ourfund.htm</a>
<b>Stormwater Management</b>		
DEP Stormwater Management Program	Watershed planning for stormwater control and implementation of programs at local levels.	(717) 772-4048
<b>Streambank Fencing</b>		
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.	<a href="http://www.asafishing.org">www.asafishing.org</a>
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.	<a href="http://www.fws.gov">www.fws.gov</a>

Lower Mahoning Creek Regional Watershed Conservation Plan

Sponsoring Organization	Description / Restrictions	Contact
<b>Streambank Fencing</b>		
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 (see Appendix P)
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 (see Appendix P)
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 (see Appendix P)
<b>Technical Assistance</b>		
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.rivernetnetwork.org
<b>Volunteers</b>		
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
<b>Wetlands</b>		
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.	<a href="http://www.fws.gov">www.fws.gov</a>
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 (see Appendix P)

**APPENDIX O. USEFUL WEBSITES**

Source	Data	Website
<b>Project Area Characteristics</b>		
Bureau of Labor Statistics	Unemployment Rate	<a href="http://www.bls.gov/home.htm">http://www.bls.gov/home.htm</a>
Free Demographics	Population and Economic Data	<a href="http://www.freedemographics.com">http://www.freedemographics.com</a>
Green Media Toolshed	Pollution in Your Community	<a href="http://www.scorecards.com">http://www.scorecards.com</a>
Natural Lands Trust	Conservation by Design	<a href="http://www.natlands.org">http://www.natlands.org</a>
Pa. Department of Community and Economic	Zoning and Comprehensive Planning	<a href="http://www.elibrary.state.pa.us">http://www.elibrary.state.pa.us</a>
Pa. Department of Education	School Report Cards	<a href="http://www.paprofiles.org">http://www.paprofiles.org</a>
Smart Growth Partnership	Smart Growth	<a href="http://www.smartgrowth.org">http://www.smartgrowth.org</a>
United States Census Bureau	Population and Economic Data	<a href="http://www.census.gov">http://www.census.gov</a>

**Land Resources**

Conservation Reserve Enhancement Program	Conservation Practices	<a href="http://www.creppa.org">http://www.creppa.org</a>
Natural Resources Conservation Service	Soil Characteristics	<a href="http://www.nrcs.usda.gov/technical/efotg">http://www.nrcs.usda.gov/technical/efotg</a>
Pa. Department of Environmental Protection	Permits, Violations	<a href="http://www.dep.state.pa.us/efacts/default.asp">http://www.dep.state.pa.us/efacts/default.asp</a>
Pa. Geological Survey	Environmental Geology	<a href="http://www.dcnr.state.pa.us/topogeo/pub/environmental.aspx">http://www.dcnr.state.pa.us/topogeo/pub/environmental.aspx</a>
Pa. Geological Survey	Geological Characteristics	<a href="http://www.dcnr.state.pa.us/topogeo/index.aspx">http://www.dcnr.state.pa.us/topogeo/index.aspx</a>
Pa. Geological Survey	Mineral Resources	<a href="http://www.dcnr.state.pa.us/topogeo/pub/mineral.aspx">http://www.dcnr.state.pa.us/topogeo/pub/mineral.aspx</a>
Pa. Geological Survey	Environmental Geology for Land Use Planning	<a href="http://www.dcnr.state.pa.us/topogeo/education/landuse/landuseplan.aspx">http://www.dcnr.state.pa.us/topogeo/education/landuse/landuseplan.aspx</a>
Pa. Spatial Data Access (PASDA)	Geographic Information System Data	<a href="http://www.pasda.psu.edu/">http://www.pasda.psu.edu/</a>
United States Environmental Protection Agency	Brownfields	<a href="http://www.epa.gov/brownfields">http://www.epa.gov/brownfields</a>
United States Environmental Protection Agency	Superfund	<a href="http://www.epa.gov/superfund">http://www.epa.gov/superfund</a>
United States Environmental Protection Agency -	Enforcement and Compliance History	<a href="http://www.epa-echo.gov/echo/">http://www.epa-echo.gov/echo/</a>
United States Environmental Protection Agency - Envirofacts	Federal Permits, Violations, Wastesites	<a href="http://www.epa.gov/enviro/">http://www.epa.gov/enviro/</a>

**Water Resources**

Center for Dirt & Gravel Road Studies		<a href="http://www.mri.psu.edu/centers/cdgrs/Index.html">http://www.mri.psu.edu/centers/cdgrs/Index.html</a>
Coldwater Heritage Partnership		<a href="http://www.coldwaterheritage.org/">http://www.coldwaterheritage.org/</a>
Environmental Protection Agency	Surf Your Watershed	<a href="http://cfpub.epa.gov/surf/huc.cfm?huc_code=05030105">http://cfpub.epa.gov/surf/huc.cfm?huc_code=05030105</a>
Federal Emergency Management Agency	National Flood Insurance Program	<a href="http://www.fema.gov/business/nfip/">http://www.fema.gov/business/nfip/</a>

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Source	Data	Website
<b>Water Resources (continued)</b>		
Keystone Chapter Soil and Water Conservation Society		<a href="http://www.keystoneswcs.com/index.html">http://www.keystoneswcs.com/index.html</a>
League of Women Voters	Groundwater Primer for Pa.ns	<a href="http://pa.lwv.org/wren/pubs/primer.html">http://pa.lwv.org/wren/pubs/primer.html</a>
Pa. American Water		<a href="http://www.amwater.com/awpr1/paaw/default.html">http://www.amwater.com/awpr1/paaw/default.html</a>
Pa. Department of Environmental Protection	Stormwater Management Program	<a href="http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1437&amp;Q=518682&amp;PM=1">http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1437&amp;Q=518682&amp;PM=1</a>
Pa. Department of Environmental Protection	Water Resources Plan	<a href="http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/WaterResources/docs/WaterResourcesExecutiveSummary.htm">http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/WaterResources/docs/WaterResourcesExecutiveSummary.htm</a>
Pa. Department of Environmental Protection	Watershed Management	<a href="http://www.depweb.state.pa.us/watershedmgmt/site/default.asp">http://www.depweb.state.pa.us/watershedmgmt/site/default.asp</a>
Pa. Department of Environmental Protection	State Water Planning Resource Center	<a href="http://www.dep.state.pa.us/dep/deputate/watermgt/wc/act220/default.ht">http://www.dep.state.pa.us/dep/deputate/watermgt/wc/act220/default.ht</a>
Pa. Fish and Boat Commission	Wild Trout Waters	<a href="http://www.fish.state.pa.us/classa98.htm">http://www.fish.state.pa.us/classa98.htm</a>
Pa. Geological Survey:	Water Resources Reports	<a href="http://www.dcnr.state.pa.us/topogeo/groundwater/gwlist.aspx">http://www.dcnr.state.pa.us/topogeo/groundwater/gwlist.aspx</a>
Pa. Geological Survey:	Geology of Groundwater in Pa.	<a href="http://www.dcnr.state.pa.us/topogeo/education/es3.pdf">http://www.dcnr.state.pa.us/topogeo/education/es3.pdf</a>
Pa. Geological Survey:	Hydrogeologic and well-construction characteristics of the rocks of Pa.	<a href="http://www.dcnr.state.pa.us/topogeo/pub/w69recent.aspx">http://www.dcnr.state.pa.us/topogeo/pub/w69recent.aspx</a>
Pa. Geological Survey:	Pa. Groundwater Information System	<a href="http://www.dcnr.state.pa.us/topogeo/groundwater/PaGWIS/PaGWISMenu.asp?c=t">http://www.dcnr.state.pa.us/topogeo/groundwater/PaGWIS/PaGWISMenu.asp?c=t</a>
Pa. Trout	Wilderness Trout Streams	<a href="http://www.patrou.org/wildernesstroutstreams.htm">http://www.patrou.org/wildernesstroutstreams.htm</a>
Stroud Water Research Center		<a href="http://www.stroudcenter.org/">http://www.stroudcenter.org/</a>
U.S. Geological Survey	Water Resources Links	<a href="http://water.usgs.gov/lookup/getwatershed?05030105">http://water.usgs.gov/lookup/getwatershed?05030105</a>
United States Environmental Protection Agency	Water Quality Trading	<a href="http://www.epa.gov/owow/watershed/trading.htm">http://www.epa.gov/owow/watershed/trading.htm</a>
University of Pittsburgh	Regional Water Management Task Force	<a href="http://www.iop.pitt.edu/water/index.htm">http://www.iop.pitt.edu/water/index.htm</a>

**Biological Resources**

*Biodiversity*

Ecological Society of America	Biodiversity	<a href="http://www.esa.org/">http://www.esa.org/</a>
NatureServe	Biodiversity	<a href="http://www.natureserve.org/">http://www.natureserve.org/</a>
Pa. Biodiversity Partnership	Biodiversity	<a href="http://www.pabiodiversity.org/index.html">http://www.pabiodiversity.org/index.html</a>
Pa. Biological Survey (PABS)	Biodiversity	<a href="http://alpha.dickinson.edu/prorg/pabs/index.htm">http://alpha.dickinson.edu/prorg/pabs/index.htm</a>
Pa. GAP Analysis Project	Biodiversity	<a href="http://www.orser.psu.edu/PAGAP/gappage.htm">http://www.orser.psu.edu/PAGAP/gappage.htm</a>

Source	Data	Website
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**Biological Resources (continued)**

***Invasive Species***

Aquatic Invasive Species of Pa.	Invasive Species	<a href="http://www.pserie.psu.edu/seagrant/ais/">http://www.pserie.psu.edu/seagrant/ais/</a>
Common Invasive Plant in Riparian Areas	Invasive Species	<a href="http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/streamrel/eaf/Docs/Invasive%20Plants.pdf">http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/streamrel/eaf/Docs/Invasive%20Plants.pdf</a>
Invasive Plants of Pa.	Invasive Species	<a href="http://www.dcnr.state.pa.us/forestry/wildplant/invasive.aspx">http://www.dcnr.state.pa.us/forestry/wildplant/invasive.aspx</a>
Invasive Plants of the Eastern United States	Plant Invaders of Mid-Atlantic Natural Areas	<a href="http://www.invasive.org/eastern/midatlantic/intro.html">http://www.invasive.org/eastern/midatlantic/intro.html</a>
Invasive Species	Invasive Species	<a href="http://www.invasive.org">www.invasive.org</a>
Invasive Species in Pa.	Invasive Species	<a href="http://www.biodiversitypartners.org/invasive/factsheets/PA.pdf">http://www.biodiversitypartners.org/invasive/factsheets/PA.pdf</a>
Mid-Atlantic Exotic Pest Plant Council		<a href="http://www.ma-eppc.org/">http://www.ma-eppc.org/</a>
U.S. Department of Agriculture:	National Agricultural Library – Pa. Invasive Species Resources	<a href="http://www.invasivespeciesinfo.gov/unitedstates/pa.shtml">http://www.invasivespeciesinfo.gov/unitedstates/pa.shtml</a>

***Native Plants and Landscaping***

American Chestnut Foundation	Pa. Chapter	<a href="http://www.patacf.org">www.patacf.org</a>
Arbor Day Foundation	Backyard Woods	<a href="http://www.arborday.org/backyardwoods/guide.cfm">http://www.arborday.org/backyardwoods/guide.cfm</a>
Arbor Day Foundation	Tree City U.S.A.	<a href="http://www.arborday.org/programs/treeCityUSA.cfm">http://www.arborday.org/programs/treeCityUSA.cfm</a>
Carnegie Library of Pittsburgh	Books on Native Plants	<a href="http://www.carnegielibrary.org/subject/gardening/nativeplants.html">http://www.carnegielibrary.org/subject/gardening/nativeplants.html</a>
Ernst Conservation Seeds	Native Plant Sales and Landscaping Information	<a href="http://www.ernstseed.com">www.ernstseed.com</a>
Pa. Department of Conservation and Natural Resources	Pa. Community Forests	<a href="http://www.dcnr.state.pa.us/forestry/pucfc/">http://www.dcnr.state.pa.us/forestry/pucfc/</a>
Pa. Flora Database		<a href="http://www.paflora.org/Web3/Speciesbywatershed_search_form.asp">http://www.paflora.org/Web3/Speciesbywatershed_search_form.asp</a>
Pa. Native Plant Society	Useful Links and Information Regarding Native Plants	<a href="http://www.pawildflower.org/04_links/links.htm">http://www.pawildflower.org/04_links/links.htm</a>
Sylvania Natives	Native Plant Sales	<a href="http://www.sylvanianatives.com">www.sylvanianatives.com</a>
U.S. Department of Energy	Energy Efficient Landscaping	<a href="http://www.eere.energy.gov/consumer/your_home/landscaping/index.cfm/mytopic=11910">http://www.eere.energy.gov/consumer/your_home/landscaping/index.cfm/mytopic=11910</a>
Western Pa. Audubon Society	List of plants native to Allegheny County and surrounding region	<a href="http://www.aswp.org/files/allegheny_county_Pa._native_plants_aswp.pdf">http://www.aswp.org/files/allegheny_county_Pa._native_plants_aswp.pdf</a>
Pa. Invertebrate Biodiversity Project		<a href="http://www.ento.psu.edu/home/frost/pinbiop/about.html">http://www.ento.psu.edu/home/frost/pinbiop/about.html</a>
Pa. Natural Heritage Program		<a href="http://www.naturalheritage.state.pa.us/">http://www.naturalheritage.state.pa.us/</a>

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Source	Data	Website
<b>Biological Resources (continued)</b>		
<i>Wildlife</i>		
U.S. Environmental Protection Agency	Ecoregions	<a href="http://www.epa.gov/wed/pages/ecoregions/reg3_eco.htm">http://www.epa.gov/wed/pages/ecoregions/reg3_eco.htm</a>
Animal Rescue League of Western Pa.	Wildlife Rehabilitation	<a href="http://www.pawildlifecenter.org/about-pwc.htm">http://www.pawildlifecenter.org/about-pwc.htm</a>
Audubon Society	Important Bird Areas	<a href="http://pa.audubon.org/iba/maps.html">http://pa.audubon.org/iba/maps.html</a>
Carnegie Museum of Natural History	2nd Pa. Breeding Bird Atlas	<a href="http://www.carnegiemnh.org/atlas/about_book.htm">http://www.carnegiemnh.org/atlas/about_book.htm</a>
Carnegie Museum of Natural History	Pa. Mammals	<a href="http://www.carnegiemnh.org/mammals/index.html">http://www.carnegiemnh.org/mammals/index.html</a>
Field Guides		<a href="http://www.enature.com/fieldguides/index.asp">http://www.enature.com/fieldguides/index.asp</a>
National Biological Information Infrastructure		<a href="http://www.nbio.gov/portal/server.pt">http://www.nbio.gov/portal/server.pt</a>
National Wildlife Federation		<a href="http://www.nwf.org/nationalwildlife/article.cfm?articleid=292&amp;issueid=">http://www.nwf.org/nationalwildlife/article.cfm?articleid=292&amp;issueid=</a>
North American Pollinator Protection Campaign		<a href="http://www.nappc.org/">http://www.nappc.org/</a>
Pa. Audubon		<a href="http://pa.audubon.org/">http://pa.audubon.org/</a>
Pa. Biological Survey	Important Mammal Areas	<a href="http://www.pawildlife.org/imap.htm">http://www.pawildlife.org/imap.htm</a>
Pa. Department of Conservation and Natural Resources	Endangered and Threatened Species of Pa.	<a href="http://www.dcnr.state.pa.us/wrcf/contents.aspx">http://www.dcnr.state.pa.us/wrcf/contents.aspx</a>
Pa. Fish and Boat Commission	Pa. Fishes	<a href="http://www.fish.state.pa.us/pafish/fishhtms/chapindx.htm">http://www.fish.state.pa.us/pafish/fishhtms/chapindx.htm</a>
Pa. Wildlife Federation		<a href="http://www.pawildlife.org/">http://www.pawildlife.org/</a>
Species Profiles		<a href="http://www.fcps.edu/StratfordLandingES/Ecology/mpages/organism_m">http://www.fcps.edu/StratfordLandingES/Ecology/mpages/organism_m</a>
The Wildlife Society		<a href="http://joomla.wildlife.org/?CFID=13824013&amp;CFTOKEN=85052420">http://joomla.wildlife.org/?CFID=13824013&amp;CFTOKEN=85052420</a>
Wildbird Recovery	Songbird Rehabilitation Center	<a href="http://www.stormpages.com/wildbird/index.html">http://www.stormpages.com/wildbird/index.html</a>
<b>Cultural Resources</b>		
National Parks Service	National Register of Historic Places	<a href="http://www.nps.gov/history/nr/research/nris.htm">http://www.nps.gov/history/nr/research/nris.htm</a>
PA Roots	Historical Information	<a href="http://www.pa-roots.com/">http://www.pa-roots.com/</a>
Pa. Department of Education	Environment and Ecology Standards	<a href="http://www.pde.state.pa.us/k12/lib/k12/envec.pdf">http://www.pde.state.pa.us/k12/lib/k12/envec.pdf</a>
Pa. Fish and Boat Commission	Fishing Regulations	<a href="http://www.fish.state.pa.us/regs_fish.htm">http://www.fish.state.pa.us/regs_fish.htm</a>

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## APPENDIX P. RESOURCE GUIDE

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### Conservation Groups

#### **American Chestnut Foundation**

Penn State University  
206 Forest Resources Lab  
University Park, PA 16802  
Website: [www.acf.org](http://www.acf.org)

#### **Armstrong County Herb and Garden Group**

623 Woodlawn Road  
Ford City, PA 16226  
Phone: 724-763-9773

#### **Armstrong County Hunting and Fishing Club**

592 Pony Farm Road  
Kittanning, PA 16201

#### **Armstrong County Sportsmen and Conservation League**

417 State Route 1031  
Templeton, PA 16259  
Phone: 724-545-7114  
<http://home.windstream.net/acscf>

#### **Armstrong Rails to Trails**

P.O. Box 777  
Kittanning, PA 16201  
Phone: 724-543-4478  
Fax: 724-543-1783  
<http://www.armstrongtrail.org/>

#### **Arrowhead Chapter Trout Unlimited**

153 Doyle Road  
Sarver, PA 16055  
Phone: 724-295-2718  
<http://www.arrowheadtu.com/>

#### **Audubon Society of Western PA**

614 Dorseyville Rd  
Pittsburgh, PA 15238  
Phone: 412-963-6100  
Fax: 412-963-6761  
Website: [www.aswp.org](http://www.aswp.org)

#### **Cowanshannock Creek Watershed Association**

P.O. Box 307  
Rural Valley, PA 16249  
<http://www.cowanshannock.org/>

#### **Evergreen Conservancy**

P.O. Box 0783  
Indiana, PA 15701  
Phone: 724-349-4333  
[www.evergreenconservancy.org](http://www.evergreenconservancy.org)

#### **Indiana County Bow and Gun Club**

P.O. Box 217  
Shelocta, PA 15774  
Phone: 724-726-1111

#### **Indiana County Parks and Trails**

1128 Blue Spruce Road  
Indiana, PA 15701  
Phone: 724-463-8636  
Fax: 724-463-8740  
[www.indianacountyparks.org](http://www.indianacountyparks.org)

#### **Ken Sink Trout Unlimited**

750 East Pike Road  
Indiana, PA 15701  
Phone: 724-459-3301  
[www.kensinktu.org](http://www.kensinktu.org)

#### **Kit-Han-Ne Chapter, National Wild Turkey Federation**

174 Williamson Road  
Templeton, PA 16259  
Phone: 724-548-7746

#### **Little Mahoning Creek Watershed Association**

P.O. Box 83  
Rochester Mills, PA 15771

#### **PA Parks and Forests Foundation**

105 North Front St., Suite 305  
Harrisburg, PA 17101  
Phone: 717-236-7644  
Website: [www.paparksandforests.org](http://www.paparksandforests.org)

#### **Pine Creek Sportsmen Club**

1169 State Route 1035  
Templeton, PA 16259  
Phone: 724-545-6384  
<http://home.windstream.net/acscf/pinecreekhtml.htm>

**Conservation Groups (continued)**

**Pine Run Watershed Association**  
RD 1 Box 81-A  
New Bethlehem, PA 16242

**Rachel Carson Trails Conservancy**  
P. O. Box 35  
Warrendale, PA 15086  
Phone: 412-475-8881  
<http://www.rachelcarsontrails.org>

**Upper Mahoning Creek Watershed Association**  
McGees Mill Road  
Box 1  
Troutville, PA 15866

**Western Pennsylvania Conservancy Watershed Conservation Program**  
40 West Main Street  
Ridgway, PA 15853  
Phone: 814-776-1114

**Historical Societies**

**Armstrong County Historical Museum and Genealogical Society**  
300 North McKean Street  
P.O. Box 735  
Kittanning, PA 16201  
Phone: 724-548-5707  
<http://armstrongcountyhistoricalsociety.org>

**Brady's Bend Historical Society**  
P. O. Box 451  
East Brady, PA 16028  
Phone: 725-526-5693  
<http://www.armstronghistory.org/bradysbend/index.php>

**Dayton Area Local History Society**  
Thomas Hindman Marshall House  
107 North State Street  
P.O. Box 447  
Dayton, PA 16222  
<http://www.daytonpa.org/>

**The Historical and Genealogical Society of Indiana County**

621 Wayne Avenue  
Indiana, PA 15701-3072  
Phone: 724-463-9600  
Fax: 724-463-9899  
<http://www.rootsweb.ancestry.com/~paicgs/>

**Smicksburg Area Heritage Association**  
Kittanning Street  
P.O. Box 89  
Smicksburg, PA 16256  
Phone: 814-257-8890

**Regional Planning Commissions**

**North Central Regional Planning and Development Commission (Jefferson County)**  
651 Montmorenci Road  
Ridgway, PA 15853  
Phone: 814-773-3162  
<http://web2.ncentral.com/ncentral/index.html>

**Southwest Pennsylvania Commission (Indiana and Armstrong counties)**  
425 Sixth Avenue  
Suite 2500  
Pittsburgh, PA 15219  
Phone: 412-391-5590  
Fax: 412-391-9160  
<http://www.spc9.org/index.shtml>

**State Agencies**

**PA Department of Agriculture – Headquarters**  
2301 North Cameron Street  
Harrisburg, PA 17110  
Phone: 717-787-4737  
[www.agriculture.state.pa.us](http://www.agriculture.state.pa.us)

**PA Department of Agriculture – Region 4 (Armstrong & Indiana counties)**  
6 McIntyre Road  
Gibsonia, PA 15044-9644  
Phone: 724-443-1585  
Fax: 724-443-8150  
[www.agriculture.state.pa.us](http://www.agriculture.state.pa.us)

**State Agencies (continued)**

**PA Department of Agriculture – Region 1  
(Jefferson County)**

13410 Dunham Road  
Meadville, PA 16335-8346  
Phone: 814-332-6890  
Fax: 814-333-1431  
www.agriculture.state.pa.us

**PA Department of Conservation and Natural  
Resources – Headquarters**

Rachel Carson State Office Building  
P.O. Box 8767  
400 Market Street  
Harrisburg, PA 17105-8767  
Phone: 717-787-2869  
www.dcnr.state.pa.us

**PA Department of Conservation and Natural  
Resources – Northwest Region (Jefferson  
County)**

230 Chestnut Street  
Meadville, PA 16335  
Phone: 814-332-6190  
www.dcnr.state.pa.us

**PA Department of Conservation and Natural  
Resources – Southwest Region (Armstrong &  
Indiana counties)**

1405 State Office Building  
300 Liberty Avenue  
Pittsburgh, PA 15222-1210  
Phone: 412-880-0486  
www.dcnr.state.pa.us

**PA Department of Environmental Protection  
– Headquarters**

Rachel Carson State Office Building  
400 Market Street  
Harrisburg, PA 17101  
Phone: 717-783-2300  
www.dep.state.pa.us

**PA Department of Environmental Protection  
– Southwest Region (Armstrong, Indiana, &  
Jefferson counties)**

400 Waterfront Drive  
Pittsburgh, PA 15222  
Phone: 412-442-4000  
www.dep.state.pa.us

**PA Department of Transportation  
Penn DOT – Headquarters**

Keystone Building  
400 North Street  
Harrisburg, PA 17120  
Phone: 717-787-2838  
www.dot.state.pa.us

**PA Department of Transportation – Region  
10-0 Office**

2550 Oakland Avenue  
Indiana, PA 15701  
Phone: 724-357-2800  
www.dot.state.pa.us

**PA Fish and Boat Commission –  
Headquarters**

1601 Elmerton Avenue  
P.O. Box 67000  
Harrisburg, PA 17106-7000  
Phone: 717-705-7800  
www.fish.state.pa.us

**PA Fish and Boat Commission – Northcentral  
Region (Jefferson County) P.O. Box 5306  
Pleasant Gap, PA 16823**

**Law Enforcement**  
Phone: 814-359-5250  
Fax: 814-359-5254

**PA Fish and Boat Commission – Northcentral  
Region (continued) Outreach & Education**

Phone: 814-359-5193  
Fax: 814-359-5153  
www.fish.state.pa.us

**PA Fish and Boat Commission – Southwest  
Region (Indiana & Armstrong counties)**

236 Lake Road  
Somerset, PA 15501  
**Law Enforcement**  
Phone: 814-445-8974  
Fax: 814-445-3497

**Outreach & Education**  
Phone: 814-443-9841  
Fax: 814-445-3497  
www.fish.state.pa.us

**State Agencies (continued)**

**PA Game Commission – Headquarters**

2001 Elmerton Avenue  
Harrisburg, PA 17110-9797  
Phone: 717-787-4250  
www.pgc.state.pa.us

**PA Game Commission – Northwest Region  
(Jefferson County)**

P.O. Box 31  
Franklin, PA 16323  
Phone: 814-432-3188  
www.pgc.state.pa.us

**PA Game Commission – Southwest Region  
(Armstrong & Indiana counties)**

4820 Route 711  
Bolivar, PA 15923  
Phone: 724-238-9523  
www.pgc.state.pa.us

**PA Geological Survey**

400 Waterfront Drive  
Pittsburgh, PA 15222  
Phone: 412-442-4235  
www.dcnr.state.pa.us/topogeo/index.aspx

**PA Governor – Main Office**

225 Main Capitol Building  
Harrisburg, Pennsylvania 17120  
Phone: 717-787-2500  
Fax: 717-772-8284

**PA Governor – Northwest Office (Jefferson  
County)**

100 State Street, Suite 202  
Erie, PA 16507  
Phone: 814-878-5719  
Fax: 814-455-3709  
www.governor.state.pa.us

**PA Governor – Southwest Office (Armstrong  
& Indiana counties)**

14th Floor, State Office Bldg.  
300 Liberty Avenue  
Pittsburgh, PA 15222  
Phone: 412-565-5700  
Fax: 412-565-2445  
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

**State Legislators**

(Legislators in office 2010; see General  
Assembly website: www.legis.state.pa.us for  
current information)

**House of Representatives – District 60**

**Hon. Jeffrey P. Pyle (2010)**

289 Route 85 Highway  
Home, PA 15747  
Phone: 724-397-2961  
Fax: 724-397-2964  
http://www.legis.state.pa.us

**House of Representatives – District 63**

**Hon. Donna Oberlander (2010)**

373 State Route 1042, Suite A  
Numine, PA 16244  
Phone: 724-783-6166  
Fax: 724-783-6177  
http://www.legis.state.pa.us

**House of Representatives – District 66**

**Hon. Samuel H. Smith**

109 Indiana Street, Suite 3  
Punxsutawney, PA 15767  
Phone: 814-938-4225  
Fax: 814-938-1950  
http://www.legis.state.pa.us

**State Senate – District 41**

**Hon. Donald C. White**

618 Philadelphia Street  
Indiana, PA 15701  
Phone: 724-357-0151  
http://www.legis.state.pa.us

**Federal Agencies**

**U.S. Army Corps of Engineers –  
Headquarters**

441 G. Street, NW  
Washington, DC 20314-1000  
Phone: 202-761-0011  
www.usace.army.mil

**Federal Agencies (continued)**

**U.S. Army Corps of Engineers – Pittsburgh District**

2200 William S. Moorhead Federal Building  
1000 Liberty Avenue  
Pittsburgh, PA 15222-4186  
Phone: 412-395-7500  
Fax: 412-644-2811  
<http://www.lrp.usace.army.mil/>

**U.S. Army Corps of Engineers – Mahoning Creek Lake**

145 Dam Site Road  
RR1, Box 229  
New Bethlehem, PA 16242  
Phone: 814-257-8811

**U.S. Department of Agriculture (USDA) – Headquarters**

1400 Independence Ave., S.W.  
Washington, DC 20250  
Phone: 202-720-2791  
[www.usda.gov](http://www.usda.gov)

**USDA Animal and Plant Health Inspection Service (APHIS) – Pennsylvania Wildlife Services**

P.O. Box 60827  
Harrisburg, PA 17106  
Phone: 717-236-9451  
Fax: 717-236-9454  
[www.aphis.usda.gov](http://www.aphis.usda.gov)

**USDA Farm Service Agency Pennsylvania State Farm Service Agency**

1 Credit Union Place  
Harrisburg, PA 17110  
Phone: 717-237-2117  
[www.fsa.usda.gov](http://www.fsa.usda.gov)

**USDA Farm Service Agency Armstrong County Farm Service Agency**

Armsdale Administrative Building  
124 Armsdale Road, Suite B2  
Kittanning, PA 16201  
Phone: 724-545-1022  
Fax: 724-545-9012  
[www.fsa.usda.gov](http://www.fsa.usda.gov)

**USDA Farm Service Agency Indiana County Farm Service Agency**

1432 Route 286 Highway East  
Indiana, PA 15701-1467  
Phone: 724-463-8547  
Fax: 724-463-1939  
[www.fsa.usda.gov](http://www.fsa.usda.gov)

**USDA Farm Service Agency Clearfield County Farm Service Agency (serving Jefferson County)**

478 Jeffers Street, Building 3  
Dubois, PA 15801-2438  
Phone: 814-375-1297  
Fax: 814-375-2435  
[www.fsa.usda.gov](http://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  
[www.pa.nrcs.usda.gov](http://www.pa.nrcs.usda.gov)

**USDA-NRCS Kittanning Field Office (Armstrong County)**

Armsdale Administrative Building  
124 Armsdale Road, Suite 3  
Kittanning, PA 16201  
Phone: 724-545-1022 ext. 3  
Fax: 724-545-9012  
[www.pa.nrcs.usda.gov](http://www.pa.nrcs.usda.gov)

**USDA-NRCS Indiana Field Office (Indiana County)**

1432 Route 286 Highway East  
Indiana, PA 15701-1467  
Phone: 724-463-8547 ext. 3  
Fax: 724-463-1939  
[www.pa.nrcs.usda.gov](http://www.pa.nrcs.usda.gov)

**USDA-NRCS DuBois Field Office (Jefferson County)**

478 Jeffers Street, Bldg. 3, Suite D  
DuBois, PA 15801-2438  
Phone: 814-375-2125 ext. 3  
Fax: 814-375-2435  
[www.pa.nrcs.usda.gov](http://www.pa.nrcs.usda.gov)

**Federal Agencies (continued)**

**USDA NRCS Resource Conservation and Development Council – Penn’s Corner (Armstrong & Indiana counties)**  
214 Donahoe Road, Suite C  
Greensburg, PA 15601  
Phone: 724-834-9063 ext. 116  
[www.parc.d.org](http://www.parc.d.org)

**USDA NRCS Resource Conservation and Development Council – Headwaters (Jefferson County)**  
478 Jeffers Street, Bldg. 3, Suite D  
DuBois, PA 15801  
Phone: 814-375-1372 ext. 4  
[www.headwaterspa.org](http://www.headwaterspa.org)

**USDA-NRCS State Soil Survey Office**  
USDA-NRCS  
Suite 340  
One Credit Union Place  
Harrisburg, PA 17110-2993  
Edgar A. White, Jr., State Soil Scientist  
Phone: 717-237-2207  
<http://soils.usda.gov/>

**USDA Rural Development**  
**Butler Area Office (Armstrong & Indiana counties)**  
625 Evans City Road, Suite 101  
Butler, PA 16001-8704  
Phone: 724-482-4800 ext. 4  
Fax: 724-482-9033  
[www.rurdev.usda.gov/pa](http://www.rurdev.usda.gov/pa)

**USDA Rural Development**  
**Crawford Area Office (Jefferson County)**  
14699 N. Main Street, Extension  
Meadville, PA 16335-9441  
Phone: 814-336-6155 ext. 4  
Fax: 814-337-0294  
[www.rurdev.usde.gov/pa](http://www.rurdev.usde.gov/pa)

**U.S. Department of Energy**  
**Pennsylvania Public Utility Commission**  
Commonwealth Keystone Building  
400 North Street  
P.O. Box 3265  
Harrisburg, PA 17105  
[www.puc.state.pa.us](http://www.puc.state.pa.us)

**U.S. Department of Energy**  
**National Energy Technology Laboratory**  
Pittsburgh Research Center  
626 Cochran Mill Road, P.O. Box 10940  
Pittsburgh, PA 15236  
Phone: 412-386-6569  
Fax: 412-386-5917  
[www.netl.doe.gov](http://www.netl.doe.gov)

**U.S. Environmental Protection Agency – Headquarters**  
Ariel Rios Building  
1200 Pennsylvania Avenue, N.W.  
Washington, DC 20460  
Phone: 202-272-0167  
[www.epa.gov](http://www.epa.gov)

**U.S. Environmental Protection Agency – Region 3 (DC, DE, MD, PA, VA, WV)**  
1650 Arch Street  
Philadelphia, PA 19103  
Phone: 215-814-5000  
Fax: 215-814-5103  
<http://www.epa.gov/region03/>

**U.S. 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  
[www.fws.gov](http://www.fws.gov)

**Armstrong County**

**Armstrong County Commissioners**  
450 Market Street  
Kittanning, PA 16201  
Phone: 724-548-3215  
<http://www.co.armstrong.pa.us/departments/elected-officials/commissioners>

**Armstrong County Conservation District**  
124 Armsdale Road  
Kittanning, PA 16201  
Phone: 724-548-3425  
<http://www.armstrongcd.org/>

**Armstrong County (continued)**

**Armstrong County Cooperative Extension**

124 Armsdale Road, Suite 112  
Armsdale Administration Bldg  
Kittanning, PA 16201  
Phone: 724-548-3447  
<http://armstrong.extension.psu.edu/>

**Armstrong County Planning and Development**

402 Market Street  
Kittanning, PA 16201  
Phone: 724-548-3223  
<http://www.co.armstrong.pa.us/>

**Boggs Township**

292 Mountain Trails Road  
Templeton, PA 16259  
Phone: 724-868-2546

**Cowanshannock Township**

P. O. Box 137  
Numine, PA 16244  
Phone: 724-783-6257

**Dayton Borough**

P. O. Box 396  
Dayton, PA 16222  
Phone: 814-257-9826

**Madison Township**

107 Lawsonham Road  
Templeton, PA 16259  
Phone: 724-868-2722

**Mahoning Township**

987 State Route 1025  
New Bethlehem, PA 16242  
Phone: 814-275-3059

**Pine Township**

P. O. Box 311  
Templeton, PA 16259  
Phone: 724-868-2922

**Rayburn Township**

142 McGregor Road  
Kittanning, PA 16201  
Phone: 724-548-7718

**Redbank Township**

409 Sugar Valley Road  
Mayport, PA 16240  
Phone: 814-365-5474

**Valley Township**

11521 State Route 85  
Kittanning, PA 16201  
Phone: 724-548-7046

**Wayne Township**

372 Boat Launch Road  
Dayton, PA 16222  
Phone: 814-257-8680

**Indiana County**

**Banks Township**

1870 Hemlock Lake Road  
Rossiter, PA 15772-6004  
Phone: 814-427-2112

**Canoe Township**

P. O. Box 355  
Rossiter, PA 15772  
Phone: 814-938-6383

**East Mahoning Township**

P. O. Box 164  
Marion Center, PA 15759  
Phone: 724-397-2260

**Grant Township**

100 East Run Road  
Marion Center, PA 15759  
Phone: 724-254-1530

**Green Township**

1492 Route 240 Highway  
Commodore, PA 15729  
Phone: 724-425-9355

**Indiana County Commissioners**

825 Philadelphia Street  
Indiana, PA 15701  
Phone: 724-465-3805  
[www.countyofindiana.org/commissioners](http://www.countyofindiana.org/commissioners)

**Indiana County (continued)**

**Indiana County Conservation District**

625 Kolter Drive, Suite 8  
Indiana, PA 15701-3571  
Phone: 724-471-4751  
Fax: 724-289-1506  
<http://iccdpa.org/>

**Indiana County Cooperative Extension**

827 Water Street  
Indiana, Pa 15701  
Phone: 724-465-3880  
<http://indiana.extension.psu.edu/>

**Indiana County Office of Planning and Development**

801 Water Street  
Indiana, PA 15701  
Phone: 724-465-3870  
<http://www.icopd.com/dev/index.php>

**Montgomery Township**

1220 Cush Creek Road  
Cherry Tree, PA 15724  
Phone: 814-743-6513

**North Mahoning Township**

673 Mottarn Road  
Rochester Mills, PA 15771  
Phone: 724-286-9681

**Smicksburg Borough**

P. O. Box 90  
Smicksburg, PA 16256  
Phone: 814-257-8890

**South Mahoning Township**

244 Rossmoyne Road  
Home, PA 15747  
Phone: 724-397-9090

**West Mahoning Township**

P. O. Box 88  
Smicksburg, PA 16256  
Phone: 814-375-1095

**Jefferson County**

**Jefferson County Commissioners**

155 Main Street, County Courthouse Annex  
Brookville, PA 15825  
Phone: 814-849-1653

**Jefferson County Conservation District**

1514 Route 28  
Brookville, PA 15825  
Phone: 814-849-7463  
[www.jeffersonconservation.com/index.html](http://www.jeffersonconservation.com/index.html)

**Jefferson County Cooperative Extension**

Parker P Blood Block  
180 Main Street  
Brookville, PA 15825  
Phone: 814-849-7361  
<http://jefferson.extension.psu.edu/>

**Jefferson County Department of Development**

155 Main Street, 2<sup>nd</sup> Floor  
Brookville, PA 15825  
Phone: 814-849-3047  
[www.jeffersoncountypa.com/default.htm](http://www.jeffersoncountypa.com/default.htm)

**Perry Township**

P. O. Box 50  
Hamilton, PA 15744  
Phone: 814-938-2480

**Porter Township**

774 Nye Branch Road  
Punxsutawney, PA 15767  
Phone: 814-938-3273

**Ringgold Township**

2253 Ringgold Timblin Road  
Ringgold, PA 15770  
Phone: 814-365-5109

**Timblin Borough**

Timblin Borough Box M  
Timblin, PA 15778  
Phone: 814-256-3838

## **Tourism Affiliates**

### **Armstrong County Historical Museum and Genealogical Society**

300 North McKean Street  
P.O. Box 735  
Kittanning, PA 16201  
Phone: 724-548-5707  
[www.armstrongcountyhistoricalsociety.org/](http://www.armstrongcountyhistoricalsociety.org/)

### **Armstrong County Tourist Bureau**

125 Market Street  
Kittanning, PA 16201  
Phone: 724-543-4003  
<http://www.armstrongcounty.com/>

### **Indiana County Tourist Bureau**

2334 Oakland Ave, Suite 7  
Indiana, PA 15701  
Phone: 724-463-7505  
Fax: 724-465-3819  
<http://www.visitindianacountypa.org/>

### **PA Great Outdoors Visitors Bureau (Jefferson County)**

175 Main Street  
Brookville, PA 15825  
Phone: 1-800-348-9393  
<http://www.visitpago.com/>

## **Schools**

### **Canoe-Grant Elementary School**

4590 Richmond Road  
Rochester Mills, PA 15771  
Phone: 724-286-9615  
<http://mcasd.net/elem/index.html>

### **Dayton Elementary**

175 East Grant Avenue  
Dayton, PA 16222  
Phone: 814-257-8151  
<http://www.asd.k12.pa.us>

### **Longview Elementary School**

19466 Rt 119 Hwy North  
Punxsutawney, PA 15767  
Phone: 814-938-5118  
<http://www.punxsy.k12.pa.us>

### **Mapleview Elementary School**

9329 Route 536  
Punxsutawney, PA 15767  
Phone: 814-938-5119  
<http://www.punxsy.k12.pa.us>

### **Marion Center High School**

22820 Route 403 Hwy North  
P.O. Box 209  
Marion Center, PA 15759  
Phone: 724-397-5551  
<http://mcasd.net/hs/index.html>

### **Marion Center Middle School**

22820 Route 403 Hwy North  
P.O. Box 199  
Marion Center, PA 15759  
Phone: 724-397-5551  
<http://mcasd.net/ms/index.html>

### **Punxsutawney High School**

500 North Findley St  
Punxsutawney, PA 15767  
Phone: 814-938-5151  
<http://www.punxsy.k12.pa.us>

### **Punxsutawney Middle School**

465 Beyer Ave  
Punxsutawney, PA 15757  
Phone: 814-938-5151  
<http://www.punxsy.k12.pa.us>

### **Rayne Elementary School**

2535 Route 119 Hwy North  
Home, PA 15747  
Phone: 724-463-8615  
<http://mcasd.net/elem/index.html>

### **Shannock Valley Elementary**

Box 325  
Rural Valley, PA 16249  
Phone: 724-783-6991  
<http://www.asd.k12.pa.us>

### **West Shamokin High School**

178 Wolf Drive  
Rural Valley, PA 16249  
Phone: 724-783-7040  
Fax: 724-783-6747  
<http://www.asd.k12.pa.us>

**Media/Outreach**

**Indiana Gazette**

899 Water Street

Indiana, PA 15701

Phone/switchboard: 724-465-5555

Toll free: 800-262-3077

<http://indianagazette.com/>

**Smicksburg/Dayton Advertising Co-op**

P.O. Box 86

Smicksburg, PA 16256

**APPENDIX Q. SUMMARY OF HYDRAULIC FRACTURE SOLUTIONS-MARCELLUS SHALE**

**TABLE 1**

SUMMARY OF HYDRAULIC FRACTURE SOLUTIONS - MARCELLUS SHALE									
Product Vendor	Application Sequence	Product Name	Hazardous Components (From MSDS)	Hazardous Ingredient Weight %	Pounds of hazardous ingredient / pound water	Gallons of Frac solution per stage	Concentration in Frac Solution (ppm)	EPA Risk Based Concentration - Residential Tapwater (ppm)	
BJS	1	HCl	Hydrochloric Acid	8%	0.015834	2000	83.68		
		CI-14	Propargyl Alcohol	5%	0.00004327	2000	0.23	0.073	
			Methanol	68%	0.000588472	2000	3.11	18	
		Ferrotrol 300L	Citric Acid	70%	0.0035	2000	18.50		
	2	XLW-32	Methanol	90%	0.001593	42000	176.79	18	
			Boric Oxide	20%	0.000354	42000	39.29		
		GW-3LDF	Petroleum Distillate Blend	60%	0.00321	42000	356.24		
			Polysaccharide	60%	0.00321	42000	356.24		
		GBW-20C	no hazardous ingredients	0%	0	42000	0.00		
		BF-7L	Potassium Carbonate	100%	0.0005725	42000	63.53		
GBW-15L	Sodium Chloride	14%	0.000154	42000	17.09				
	3	FRW-14	Hydrotreated light distillate	40%	0.000424	334000	374.20		
			Ethoxylated Alcohol	5%	0.000053	334000	46.77		
		Alpha 125	Glutaraldehyde	30%	0.0000798	334000	70.43		
Fractech	1	HCL	Hydrochloric Acid	8%	0.0168896	2000	89.26		
		40 HTL	Methanol	10%	0.0002	2000	1.06	18	
		NE100	Methanol	5%	0.0000485	2000	0.26	18	
		FE100L	no hazardous ingredients	0%	0	2000	0.00		
	2	HVG-04	no hazardous ingredients	0%	0	42000	0.00		
		B9	Potassium Hydroxide	20%	0.000206	42000	22.86		
		BXL-2	Potassium Hydroxide	10%	0.000117	42000	12.98		

SUMMARY OF HYDRAULIC FRACTURE SOLUTIONS - MARCELLUS SHALE								
Product Vendor	Application Sequence	Product Name	Hazardous Components (From MSDS)	Hazardous Ingredient Weight %	Pounds of hazardous ingredient / pound water	Gallons of Frac solution per stage	Concentration in Frac Solution (ppm)	EPA Risk Based Concentration - Residential Tapwater (ppm)
	3	ICI-3240	Dazomet	24%	0.0000696	334000	61.42	
			Sodium Hydroxide	4%	0.0000116	334000	10.24	
		ICI-150	Glutaraldehyde	50%	0.00014125	334000	124.66	
			Methanol	5%	0.000014125	334000	12.47	18
		FRW-50	Diesel (use discontinued)	20%	0.000194	334000	171.21	
		FRW-25	no hazardous ingredients (used in place of FRW-50)	0%	0	334000	0.00	
Universal	1	Iron Check	no hazardous ingredients	0%	0	2000	0.00	
		HCl	Hydrochloric Acid	8%	0.0168896	2000	89.26	
	2	Unilink 8.5	Ethylene Glycol	40%	0.00111	42000	123.19	73
			Boric Acid	7%	0.00019425	42000	21.56	
		GBL-8x	n/a	0%	0	42000	0.00	
		Unigel 19XL	no hazardous ingredients (guar gum)	0%	0	42000	0.00	
	3	FRP-21	no hazardous ingredients	0%	0	334000	0.00	
		Bioclear 200	2,2-Dibromo-3-Nitrilopropionamide	20%	0.0000625	334000	55.16	
			Polyethylene Glycol Mixture	60%	0.0001875	334000	165.48	
Halliburton	1	HAI-OS	Methanol	60%	0.001068	2000	5.64	18
			Propargyl Alcohol	10%	0.000178	2000	0.94	0.073
		FE-1A	Acetic Acid	60%	0.001235042	2000	6.53	
			Acetic Anhydride	100%	0.002184454	2000	11.54	
		HCl	Hydrochloric Acid	8%	0.0168896	2000	89.26	
	2	K-34	Sodium Bicarbonate	100%	0.001271735	42000	141.13	
		BC 140	Monoethanolamine	30%	0.000523988	42000	58.15	
			Ethylene Glycol	30%	0.000566485	42000	62.87	73
			Boric Acid	30%	0.000608982	42000	67.58	
		Delta Frac 140	no hazardous ingredients	0%	0	42000	0.00	

**SUMMARY OF HYDRAULIC FRACTURE SOLUTIONS - MARCELLUS SHALE**

Product Vendor	Application Sequence	Product Name	Hazardous Components (From MSDS)	Hazardous Ingredient Weight %	Pounds of hazardous ingredient / pound water	Gallons of Frac solution per stage	Concentration in Frac Solution (ppm)	EPA Risk Based Concentration - Residential Tapwater (ppm)
	3	FR-46	Ammonium Bisulfate	30%	0.000375	334000	330.95	
		Aldacide G	Glutaraldehyde	30%	0.0000798	334000	70.43	
Superior	1	AI-2	Glycol Ether (ethylene glycol monobutylether)	30%	0.000291	2000	1.54	18
			Propargyl Alcohol	30%	0.000291	2000	1.54	0.073
			Isopropyl Alcohol	30%	0.000291	2000	1.54	
			Proprietary Component	7%	0.0000679	2000	0.36	
		IC-100L	Cirtic Acid	100%	0.00154	2000	8.14	
		OB-Fe	Propylene Glycol	40%	0.000452	2000	2.39	730
			Ferrous Sulfate, Heptahydrate	30%	0.000339	2000	1.79	
		Super OW-3	Isopropyl Alcohol	40%	0.00018	2000	0.95	
			Methanol	13%	0.0000585	2000	0.31	18
		Super Pen 2000	Ethylhexanol	70%	0.000322	2000	1.70	
			Proprietary Component	30%	0.000138	2000	0.73	
		Super 100NE	Isopropyl Alcohol	30%	0.00015525	2000	0.82	
			Glycol Ethers	7%	0.00007245	2000	0.38	18
		HCl	Hydrochloric Acid	8%	0.0168896	2000	89.26	
	3	Bioclear 200	2,2-Dibromo-3-Nitrilopropionamide	20%	0.0000625	334000	55.16	
			Polyethylene Glycol Mixture	60%	0.0001875	334000	165.48	
		SAS-2	Hydrotreated Light Distillate	30%	0.000306	334000	270.06	
			Mineral Spirits	25%	0.000255	334000	225.05	
			Propylene Glycol	25%	0.000255	334000	225.05	730
			Ethoxylated Alcohols	4%	0.0000408	334000	36.01	

Source: <http://www.dep.state.pa.us/dep/deputate/minres/oilgas/FractListing.pdf>



## **Conservation Guidance for Landowners on Natural Gas Development** June 2010

Natural gas exploration and extraction activity have increased significantly across western Pennsylvania in recent years. Extraction of natural gas, much like any extractive activity, can have negative effects including serious environmental impacts. Western Pennsylvania Conservancy believes that conservation of the landscape and landowner management goals should be carefully considered prior to entering into a natural resource extraction lease agreement. Conservation features on the property that may need additional protection measures include but are not limited to the following: any water features such as streams, springs, seeps, and wetlands; steep slopes (generally those having a slope of 20% or greater); intact forests; wildlife habitat; native flora and fauna; natural vegetation and floodplain areas; recreational activities and scenic vistas.

It is important for the landowner to be aware of any potential negative impacts, as well as their rights as a landowner to control and guide any potential extractive use on their land. More specifically, in order to conserve the landscape, landowners should work with the land agent to carefully establish guidelines and develop an addendum to the lease agreement that permits recovery of this resource while at the same time promoting protection of ecologically-sensitive landscapes that include natural communities and species habitat.

### Site visit

Upon request for a lease, the landowner should meet with the interested party and conduct a site visit on the property to identify potential impacts to the ecological resources on the land. This evaluation should consider:

- Conservation of natural communities, wildlife habitat, species of special concern
- Impacts to recreational opportunities and scenic vistas
- Degree of landscape fragmentation
- Potential effects upon hydrology, water quality, air and noise pollution
- Ability to significantly improve or restore degraded natural resources

The developer should use available data to locate plant and animal species of special concern (including without limitation searches or surveys the developer otherwise may be required to conduct pursuant to applicable environmental laws, or any searches or surveys conducted by a governmental entity). The site visit should occur prior to the start

of seismic work. A seismic plan should be submitted to the landowner which includes a map showing all proposed seismic lines and test hole locations, as well as conservation values and features as identified in the site visit.

For Marcellus gas development, one well pad can now be used with directional drilling technology to extract natural gas from more than one square mile of shale that is located over a mile underground. Therefore, a landowner may decide to sign a lease but not allow any surface drilling or other infrastructure such as roads and pipelines on the property, but allow the gas to be extracted from another property nearby. This may result in lower payments from the developer, but it may better protect ecological resources on the property. The remainder of these conservation considerations focuses mostly on leases where drilling or other surface activities are permitted on the land owners' property.

If a significant gas source is found and a project moves forward, the developer should coordinate with the landowner as to the location of all proposed development including placement of a well or wells, access roads and pipelines and any other facility or equipment that will support the proposed operation. If the developer proceeds with extraction, the landowner should make sure the following details are addressed:

- Indicate parameters where no drilling is to occur;
- Identify maximum number of wells drilled per site;
- Require lease to include erosion and sediment control plan to be completed by developer and approved by the landowner prior to any earthmoving activity including well site clearing, well pad construction, pipeline construction and access road enhancement; and
- Require submission of a restoration and re-vegetation plan to be completed by developer and approved by landowner which identifies specific steps taken to minimize site disturbance, and addresses any alterations in the land associated with the extraction or transmission activities.

### Lease Agreement

All new leases should obtain a comprehensive insurance provision, indemnification and hold harmless clause to protect the landowner against degradation of ecological resources. Leases with an insurance provision should be enforced by the landowner (i.e. both proof of insurance and the landowner listed on the policy as an additional insured). The landowner should also require a performance bond to ensure the developer meets the terms of the agreement. All activities and operations must be in accordance with the laws of the Commonwealth of Pennsylvania. The developer must obtain and follow the appropriate permit application process, and secure a performance bond to ensure parameters for drilling are met.

Specific recommendations for items to include in the addendum to the lease agreement:

**Master Site Plan** – The developer should submit a master site plan to the landowner which would include the following:

- (a) a map or plat indicating the location of each and every well drilled or proposed for drilling;
- (b) a map or plat indicating the location of each existing potable and non-potable water well;
- (c) a map or plat indicating the location of each potable and non-potable water well drilled or to be drilled;
- (d) a route map indicating the location of each pipeline laid or to be laid;
- (e) a map or plat indicating the location of each existing road proposed for use;
- (f) a map or plat indicating the location of each bridge, drain pipe or culvert pipe to be constructed;
- (g) a plat, diagram and/or schematics indicating the location, design, construction of each slush pit to be constructed together with a corresponding maintenance plan for each such pit;
- (h) a map or plat indicating the location of stream, creek, brook, or wetland together with the location of each proposed drilling site and proposed clearing site near each such stream, creek, brook, or wetland; and
- (i) a map or plat that contains information regarding locations of plant and animal species of special concern, as well as locations of natural communities.

**Erosion and Sedimentation Control Plan** – This plan should include the following:

- (a) existing topographic features of the site;
- (b) contours, ditches and other excavations;
- (c) water bars or diversion channels for surface runoff to prevent siltation;
- (d) settling basins;
- (e) spreading of gravel or shale on intercepting dips;
- (f) installation of silt fences;
- (g) stabilization of cut slopes;
- (h) stabilization of highwalls; and
- (i) restoration and revegetation of the property as described in a restoration and re-vegetation plan.

**Wells** – To reduce fragmentation and invasive plant pathways, the developer should locate wells closer to previously disturbed or developed footprint (such as landings, roads, barrow pits, pipelines and wells). Such wells should be camouflaged or screened with native plants to reduce aesthetic impacts.

**Water** – *Water quality and quantity should be carefully considered and monitored prior to and following the extraction activity.* The developer should not contaminate or pollute springs, brooks, streams, wetlands, vernal pools or other waters on the property. Any water well usage should be restricted to drilling processes only. Water well usage should not be used for frac, stimulation or completion processes. The developer or its contractors and subcontractors should not construct earthen dams across

any stream to obtain a water supply for its operations. Developer should remove all water used in drilling and fracing processes from the property including water developed from the well. In addition, the developer must supply the landowner with a plan to address water source pollution in the event of a leak.

**Well Plugging** – At its own expense, developer should properly and effectively plug all wells on the leased premises before abandoning, in accordance with the regulations of the Department of Environmental Protection’s Bureau of Oil and Gas Management and all applicable laws of the Commonwealth. A copy of the Certificate of Well Plugging showing the plugging procedure used and submitted to the Bureau of Oil and Gas Management should be supplied to the landowner for each well plugged and abandoned. Parameters should be established to determine acceptable production rates. If production falls below the rate and is determined to be uneconomic (i.e., not in paying quantities) to maintain and operate, then developer should (a) plug and abandon the well and (b) restore the well site and access road to the satisfaction of landowner within a specified timeframe.

At the end of production, whether or not oil or gas is produced, the developer is required to cover all costs to plug the wells (according to Section 601.210 of the Oil and Gas Act) and restore all disturbed acres. All wells no longer in use should be plugged by the operator(s).

**Pipelines** – Where possible, pipelines should be laid within the boundaries of existing roads or rights of way, such as existing pipelines and transmission lines. Developer should submit a route map for each pipeline to the landowner for review and approval as to location prior to the laying of any line. Developer should keep the pipeline and right-of-way in good repair and appearance.

**Drilling** – It is best to limit the number of wells and number of disturbed acres. It is recommended that a buffer area (e.g. 300 feet) be included for all water sources (rivers, creeks, streams, wetlands, etc.) to prohibit drilling in certain areas. Clearing on steep slopes (those greater than 20%) should also be restricted.

**Pits** – Developer should prevent access of wildlife to pits or excavations dug for Developer's operations by erecting and maintaining fences. Developer should have thirty (30) days from date of completion of a well to reclaim the pit. Pits must be lined with an impervious liner, not merely clay. When drilling is complete, pit liner and its contents should be properly disposed offsite. Developer should ensure that each slush pit will consist of two (2) compartments; one to contain fluids materials from the drilling operations and the second to contain surface runoff from the drilling site. Appropriate buffers should be established for pits as well.

**Roads** – All road locations and grades must be identified in the Master Site Plan. The landowner should limit the size of all new roads (e.g., determine an appropriate road width to be 20 feet). The location of drilling operations should be close to existing roads to prevent further fragmentation of the property. Developer should construct access roads to drilling sites along existing pipeline rights-of-way, provided that a ten percent

(10%) grade can be maintained, as described in the Erosion and Sedimentation Control Plan. Road drainage structures should conform to the Environmental Sensitive Maintenance Principles of Penn State's Center for Dirt and Gravel Roads program.

**Erosion Sedimentation and Grading** – Topsoil disturbed during construction shall be stored on uphill side of disturbed area, saved and put back during reclamation. Developer should regrade and refill to contour any areas of land cleared for construction and infrastructure placement within ten (10) working days following disturbance and should reseed according to the restoration and revegetation plan. Temporary seedling should be required, in addition to permanent revegetation. Gravel or shale should be spread on intercepting dips that become subject to erosion. Further, the developer should, at its own expense, secure, plant and maintain native species (consisting of grasses and/or trees or shrub seedlings) on all well sites, retired access roads, pipeline rights-of-way and other cleared areas.

**Use of Department of Conservation and Natural Resources Gas Lease** – The landowner may need to enter into a lease agreement that has more stringent terms than the standard lease agreement provided by the developer. WPC recommends using DCNR's 2007 gas lease as a guiding document.

Nothing in this document constitutes legal advice. Western Pennsylvania Conservancy recommends that any landowner considering entering into a natural gas lease agreement should obtain the advice of an attorney and a consultant specializing in natural gas leasing. In addition, many resources are available online that can provide basic information and education.

Penn State College of Agricultural Sciences Cooperative Extension:  
<http://extension.psu.edu/naturalgas/publications>

DEP, Bureau of Oil and Gas Management, Marcellus Shale  
[http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new\\_forms/marcellus/marcellus.htm](http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/marcellus.htm)

DEP, fact sheet *Landowners and Oil and Gas Leases in Pennsylvania*  
<http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-44185/5500-FS-DEP2834.pdf>

DCNR, Marcellus Shale research in Pennsylvania  
<http://www.dcnr.state.pa.us/topogeo/oilandgas/marcellus.aspx>