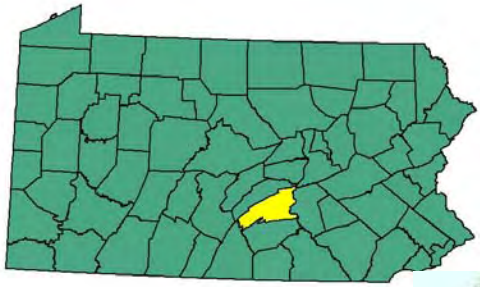
A NATURAL AREAS INVENTORY OF PERRY COUNTY, PENNSYLVANIA

Update – 2005



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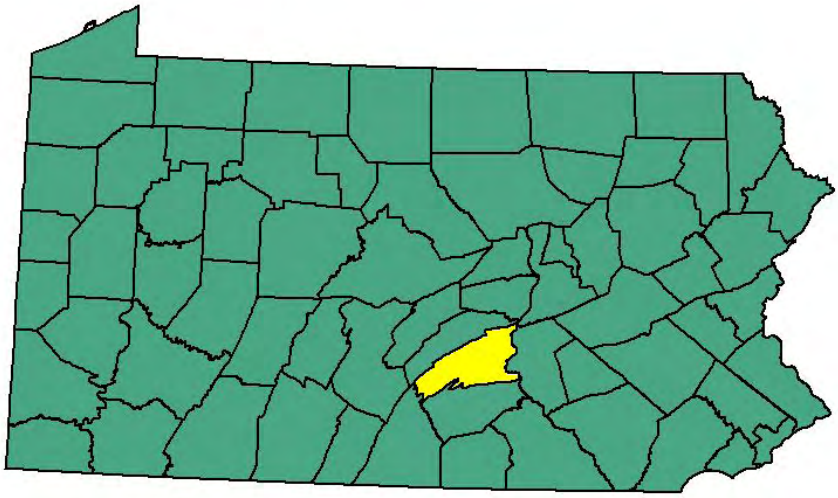

Prepared by:

The Pennsylvania Science Office
The Nature Conservancy
208 Airport Drive
Middletown, Pennsylvania 17057

Submitted to:

The Tri-County Regional Planning Commission
Dauphin County Veterans Memorial Office Building
112 Market Street, Seventh Floor
Harrisburg, PA 17101-2015
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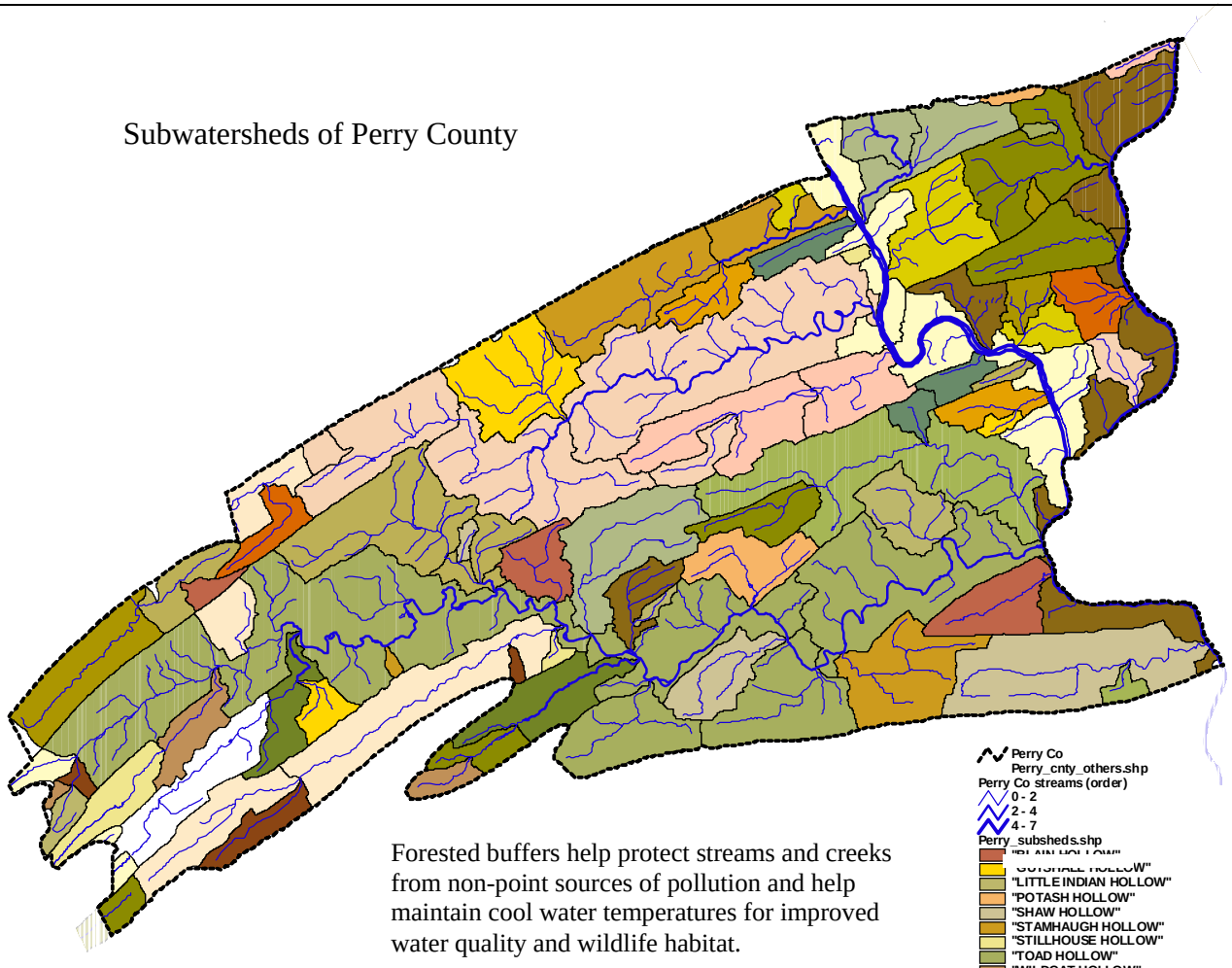
This project was financed in part by a grant from the Keystone Recreation, Park and Conservation Fund, under the administration of the PA Department of Conservation and Natural Resources, Bureau of Recreation and Conservation and a Community Development Block Grant, under the administration of the PA Department of Community and Economic Development, Office of Community Development and Housing.

Subwatersheds of Perry County

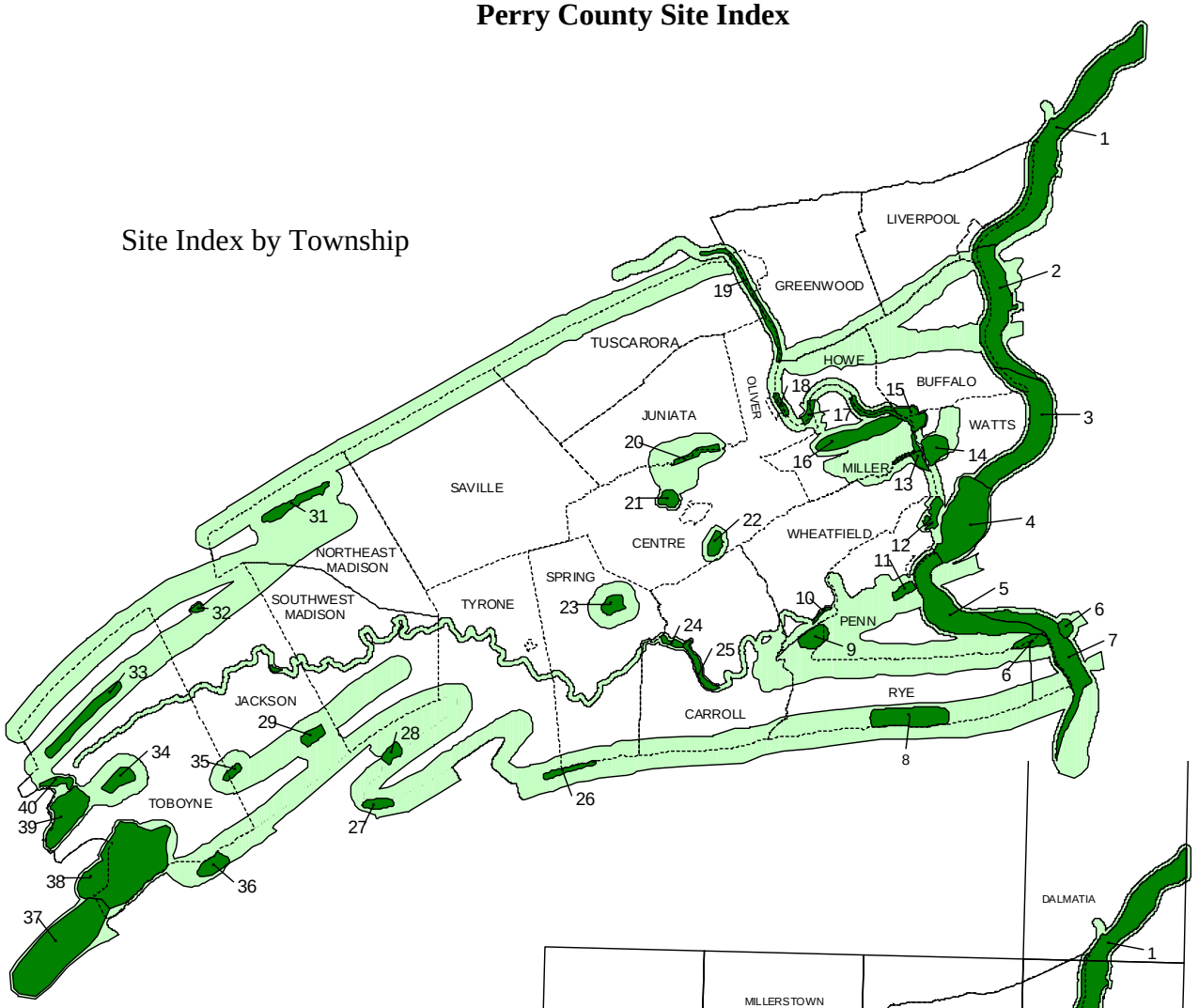


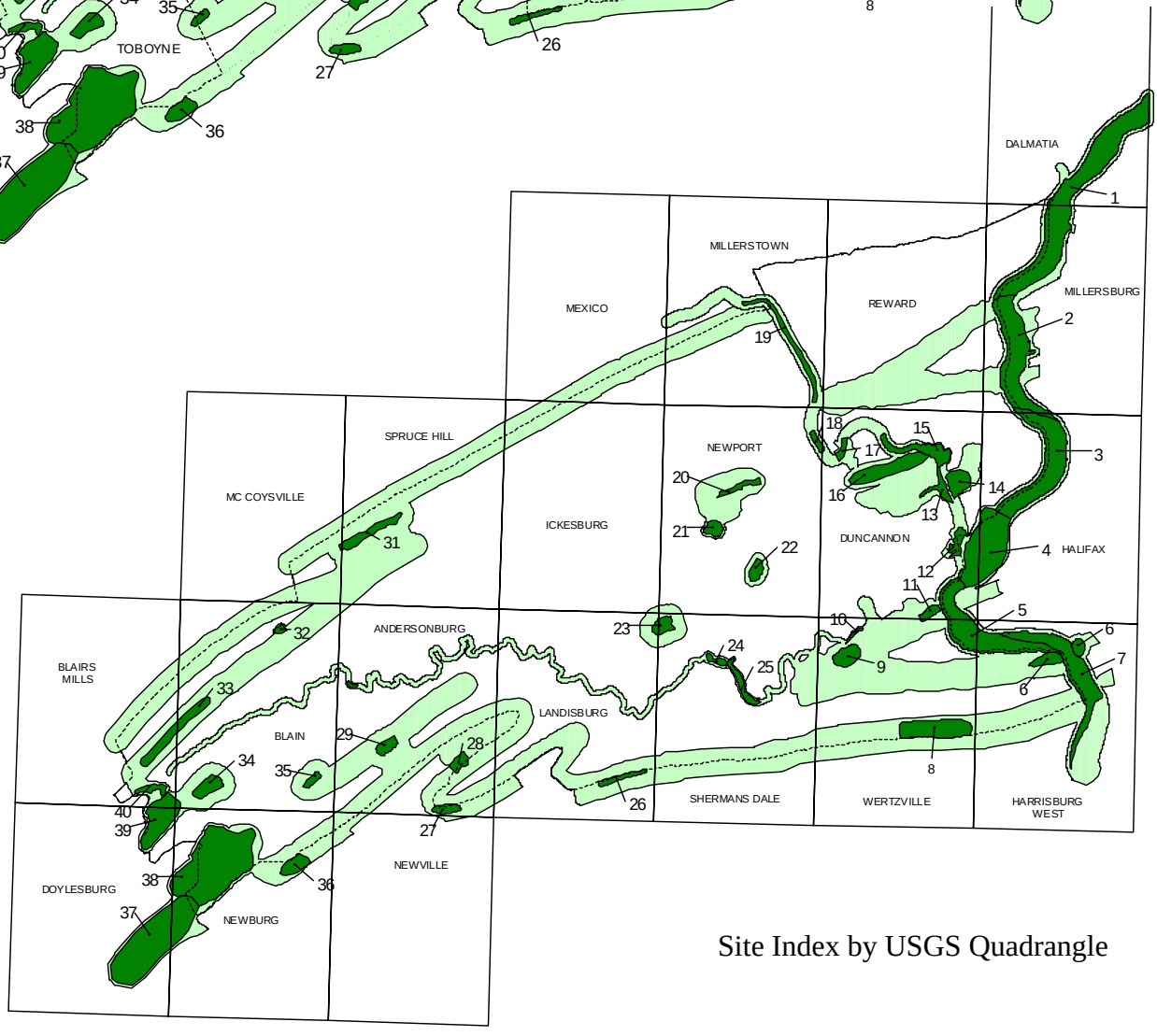
Forested buffers help protect streams and creeks from non-point sources of pollution and help maintain cool water temperatures for improved water quality and wildlife habitat.

Preservation and repair of forested stream corridors in even heavily urbanized areas can significantly increase protection for water quality and wildlife habitat within the region.

Perry County Site Index

Site Index by Township





Site Index by USGS Quadrangle

Index to Perry County Sites—Listed by Site Number

- Note that natural areas with species of special concern are in capital letters while locally significant sites are in lower case letters throughout the document.
- Sites numbered from West to East, North to South

Site #	Site Name	Changes Since 2000	Municipality	USGS Quadrangle(s)	Page(s)
1	SUSQUEHANNA RIVER AT STATE GAME LANDS #258	NEW	Liverpool Twp. & Dauphin Co.	Millersburg	52
2	SUSQUEHANNA RIVER AT MILLERSBURG	NEW	Buffalo Twp. & Dauphin Co.	Millersburg	36
3	SUSQUEHANNA RIVER AT HALIFAX	NEW	Buffalo & Watts Twp. & Dauphin Co.	Halifax	36, 84
4	STATE GAME LANDS #290		Watts Twp. & Dauphin Co.	Duncannon, Halifax	84
5	SUSQUEHANNA RIVER AT SPEECEVILLE	NEW	Penn Twp. & Dauphin Co.	Duncannon, Harrisburg West, Wertzville	62
6	SECOND MOUNTAIN CLIFFS		Penn, Rye Twps. & Dauphin Co	Harrisburg West	62, 66
7	SUSQUEHANNA RIVER AT FORT HUNTER/ROCKVILLE	UPDATED	Rye Twp., & Daupnin & Cumberland Cos.	Harrisburg West	66
8	LAMBS GAP/TROUT RUN HEADWATERS	UPDATED	Rye Twp.	Wertzville	66
9	Pine Ridge Swamp		Penn, Rye Twps.	Wertzville	62, 66
10	SHERMANS CREEK AT PINE RIDGE		Wheatfield Twp.	Wertzville	88
11	COVE MOUNTAIN SLOPES		Penn Twp.	Duncannon, Wertzville	62
12	AQUEDUCT BLUFFS/JUNIATA RIVER SCOUR		Penn, Watts Twps. & Dauphin Co.	Duncannon	62, 84
13	LOSH RUN VALLEY		Miller, Wheatfield Twps.	Duncannon	54, 88
14	WATTS MOUNTAIN		Watts Twp.	Duncannon	84
15	JUNIATA RIVER AT HALF FALLS/HALF FALLS MOUNTAIN	UPDATED	Buffalo, Howe, Miller, Watts Twps.	Duncannon	36, 46, 54, 84
16	WHITE RUN VALLEY		Miller Twp.	Duncannon	54
17	JUNIATA RIVER SCOUR AT TRIMMERS ROCK		Howe, Miller, Oliver Twps.	Duncannon	46, 54, 60
18	JUNIATA RIVER AT NEWPORT		Howe, Oliver Twps. & Newport Boro.	Newport	46, 60
19	JUNIATA RIVER - MILLERSTOWN TO OLD FERRY STATION		Greenwood, Oliver, Tuscarora Twps. & Millerstown Boro.	Millerstown	44, 60, 80
20	LITTLE BUFFALO CREEK MARSH	UPDATED	Centre, Juniata Twp.	Newport	42, 50
21	LIMESTONE RIDGE WOODS		Centre Twp.	Newport	42

Site #	Site Name	Changes Since 2000	Municipality	USGS Quadrangle(s)	Page(s)
22	BOX HUCKLEBERRY STATE FOREST NATURAL AREA		Centre Twp	Newport	42
23	MILLIGAN RIDGE PONDS	UPDATED	Spring Twp.	Landisburg, Shermans Dale	74
24	Gibsons Rock Woods		Carroll Twp.	Shermans Dale	40
25	SHERMANS CREEK - DROMGOLD TO SHERMANS DALE	UPDATED	Carroll Twp.	Shermans Dale, Wertzville	40
26	WAGGONERS GAP	NEW	Tyrone Twp. & Cumberland Co.	Landisburg	82
27	FLAT ROCK SITE	NEW	Tyrone Twp. & Cumberland Co.	Andersonburg	82
28	TUSCARORA TRAIL SITE	NEW	Tyrone Twp. & Cumberland Co.	Andersonburg	82
29	BOWERS MOUNTAIN SITE - EAST		Jackson Twp.	Andersonburg	48
30	Bull Run School Cliffs		Jackson Twp.	Andersonburg	48
31	PEPPERBUSH HILL PONDS / LIBERTY VALLEY POOLS	UPDATED	Northeast Madison Twp.	Spruce Hill	58
32	BIG KNOB	NEW	Jackson Twp.	Blain	48
33	CONOCOCHEAGUE MOUNTAIN SITE	NEW	Toboyne Twp.	Blairs Mills, Blain	76
34	FOWLER HOLLOW ROAD SITE		Toboyne Twp.	Blain	76
35	BOWERS MOUNTAIN SITE - WEST		Jackson, Toboyne Twp.	Blain	48, 76
36	THREE SQUARE HOLLOW EAST		Toboyne Twp. & Cumberland Co.	Newburg	76
37	GUNTER VALLEY AND RIDGES	NEW	Toboyne Twp. & Franklin, Cumberland Cos.	Newburg	76
38	SECOND NARROWS SLOPES	UPDATED	Toboyne Twp. & Franklin Co.	Newburg	76
39	THE HEMLOCKS		Toboyne Twp.	Blairs Mills, Newburg	76
40	BIG ROUND TOP WOODS	UPDATED	Toboyne Twp.	Blairs Mills	76

Index to Perry County Sites—Listed Alphabetically by Site Name

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Site #	Site Name	Changes Since 2000	Municipality	USGS Quadrangle(s)	Page (s)
12	AQUEDUCT BLUFFS/JUNIATA RIVER SCOUR		Penn, Watts Twps. & Dauphin Co.	Duncannon	62, 84
32	BIG KNOB	NEW	Jackson Twp.	Blain	48
40	BIG ROUND TOP WOODS	UPDATED	Toboyne Twp.	Blairs Mills	76
29	BOWERS MOUNTAIN SITE - EAST		Jackson Twp.	Andersonburg	48
35	BOWERS MOUNTAIN SITE - WEST		Jackson, Toboyne Twp.	Blain	48, 76
22	BOX HUCKLEBERRY STATE FOREST NATURAL AREA		Centre Twp	Newport	42
30	Bull Run School Cliffs		Jackson Twp.	Andersonburg	48
31	CONOCOCHEAGUE MOUNTAIN SITE	NEW	Toboyne Twp.	Blairs Mills, Blain	76
	COVE MOUNTAIN OUTCROP	see SECOND MOUNTAIN CLIFFS			
11	COVE MOUNTAIN SLOPES		Penn Twp.	Duncannon, Wertzville	62
27	FLAT ROCK SITE	NEW	Tyrone Twp. & Cumberland Co.	Andersonburg	82
34	FOWLER HOLLOW ROAD SITE		Toboyne Twp.	Blain	76
24	Gibsons Rock Woods		Carroll Twp.	Shermans Dale	40
37	GUNTER VALLEY AND RIDGES	NEW	Toboyne Twp. & Franklin, Cumberland Cos.	Newburg	76
	HALF FALLS MOUNTAIN	see JUNIATA RIVER AT HALF FALLS/HALF FALLS MOUNTAIN			
19	JUNIATA RIVER - MILLERSTOWN TO OLD FERRY STATION		Greenwood, Oliver, Tuscarora Twps. & Millerstown Boro.	Millerstown	44, 60, 80
	JUNIATA RIVER AT HALF FALLS	see JUNIATA RIVER AT HALF FALLS/HALF FALLS MOUNTAIN			
15	JUNIATA RIVER AT HALF FALLS/HALF FALLS MOUNTAIN	UPDATED	Buffalo, Howe, Miller, Watts Twps.	Duncannon	36, 46, 54, 84
	JUNIATA RIVER AT MILLERSTOWN	see JUNIATA RIVER - MILLERSTOWN TO OLD FERRY STATION			
18	JUNIATA RIVER AT NEWPORT		Howe, Oliver Twps. & Newport Boro.	Newport	46, 60
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Site #	Site Name	Changes Since 2000	Municipality	USGS Quadrangle(s)	Page (s)
	JUNIATA RIVER TO OLD FERRY STATION	see JUNIATA RIVER - MILLERSTOWN TO OLD FERRY STATION			
8	LAMBS GAP/TROUT RUN HEADWATERS	UPDATED	Rye Twp.	Wertzville	66
	LAUREL RUN ROAD SITE	see SECOND NARROWS SLOPES			
	LIBERTY VALLEY POOLS	see PEPPERBUSH HILL PONDS / LIBERTY VALLEY POOLS			
21	LIMESTONE RIDGE WOODS		Centre Twp.	Newport	42
20	LITTLE BUFFALO CREEK MARSH	UPDATED	Centre, Juniata Twps.	Newport	42, 50
13	LOSH RUN VALLEY		Miller, Wheatfield Twps.	Duncannon	54, 88
23	MILLIGAN RIDGE PONDS	UPDATED	Spring Twp.	Landisburg, Shermans Dale	74
	PEPPERBUSH HILL PONDS	see PEPPERBUSH HILL PONDS / LIBERTY VALLEY POOLS			
31	PEPPERBUSH HILL PONDS / LIBERTY VALLEY POOLS	UPDATED	Northeast Madison Twp.	Spruce Hill	58
9	Pine Ridge Swamp		Penn, Rye Twps.	Wertzville	62, 66
6	SECOND MOUNTAIN CLIFFS		Penn, Rye Twps.	Harrisburg West	62, 66
	SECOND NARROWS POND	see SECOND NARROWS SLOPES			
	SECOND NARROWS SITE	see SECOND NARROWS SLOPES			
38	SECOND NARROWS SLOPES	UPDATED	Toboyne Twp. & Franklin Co.	Newburg	76
	SHERMAN MOUNTAIN/GUNTER ROAD SITE	see SECOND NARROWS SLOPES			
10	SHERMANS CREEK AT PINE RIDGE		Wheatfield Twp.	Wertzville	88
25	SHERMANS CREEK - DROMGOLD TO SHERMANS DALE	UPDATED	Carroll Twp.	Shermans Dale, Wertzville	40
4	STATE GAME LANDS #290		Watts Twp. & Dauphin Co.	Duncannon, Halifax	84
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3	SUSQUEHANNA RIVER AT HALIFAX	NEW	Buffalo & Watts Twps. & Dauphin Co.	Halifax	36, 84
2	SUSQUEHANNA RIVER AT MILLERSBURG	NEW	Buffalo Twp. & Dauphin Co.	Millersburg	36
	SUSQUEHANNA RIVER AT MONTGOMERY FERRY	See SUSQUEHANNA RIVER AT MILLERSBURG			

Site #	Site Name	Changes Since 2000	Municipality	USGS Quadrangle(s)	Page (s)
5	SUSQUEHANNA RIVER AT SPEECEVILLE	NEW	Penn Twp. & Dauphin County	Duncannon, Harrisburg West, Wertzville	62
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39	THE HEMLOCKS		Toboyne Twp.	Blairs Mills, Newburg	76
36	THREE SQUARE HOLLOW EAST		Toboyne Twp. & Cumberland Co.	Newburg	76
	THREE SQUARE HOLLOW POOLS	see SECOND NARROWS SLOPES			
28	TUSCARORA TRAIL SITE	NEW	Tyrone Twp. & Cumberland Co.	Andersonburg	82
26	WAGGONERS GAP	NEW	Tyrone Twp. & Cumberland Co.	Landisburg	82
14	WATTS MOUNTAIN		Watts Twp.	Duncannon	84
16	WHITE RUN VALLEY		Miller Twp.	Duncannon	54

A NATURAL AREAS INVENTORY OF DAUPHIN COUNTY, PENNSYLVANIA
UPDATE 2005

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2005 UPDATE SUMMARY

The original Tri-County Natural Areas Inventory (NAI), which was completed in 2000, included descriptions, maps, and rankings of sites of ecological significance in the county. The emphasis of the report was upon locations of species listed as rare, threatened, or endangered Federally, or in Pennsylvania, and exemplary natural communities. This NAI update is a thorough revision to the original report. It includes new information based on fieldwork that was completed since the original NAI was written. Many of the new sites have resulted from inventories of neighboring counties. Additionally, several sites of geologic importance were included in order to be consistent with newer methodology adopted by the authors. The sites that were not visited since completion of the original NAI were not reevaluated. Even with additional fieldwork completed since the original Tri-County NAI report was written, the top sites listed as top priorities in the original report are still considered the most important sites for conservation in the counties. Based upon the results of new field visits, the update includes changes in the rankings of sites listed in the original report, as well as any new sites discovered since the original inventories. The rankings are based on the same criteria used in the original report.

There is also updated information about elements reported in the original document. In some cases the state rarity rank (S rank), global rank (G rank), state and federal legal status, and/or the quality for an element has changed. Appendix 1 contains descriptions of state and global rank codes, and Appendix 2 contains descriptions of population quality ranks.

The results presented in the update have been reorganized from the original Tri-County NAI. There are tables for each township in the counties rather then for each USGS quadrangle map. Additionally, the tables have been organized by natural area and the species occurring within each site rather than comprehensively for the quad. Each table provides global and state rarity ranks, state legal status, site quality, date last observed for each element, and the status of each element occurrence (i.e. delisted, new, rank change). Following the table is a brief narrative for each site, noting whether it is a NEW natural area or an UPDATED site description.

All original natural communities and species of concern are described in the tables and text. Species codes used in the original report have been replaced by the species name in most cases. Sensitive species are not identified in order to prevent unauthorized collection and possible extirpation of the species at the site. Where the original report did not name any element occurrences, the update names all plants and natural communities, as well as most animals.

Maps of each township accompany the text, showing the location of each site identified. The area outlined on a map represents the general location of a species as well as the watershed or subwatershed area where the elements are located. Additional information about how this report was designed and how it can be used is detailed in the Introduction and Natural Areas Inventory Methods in the body of the report.

(Title Page of First Edition)

A NATURAL AREAS INVENTORY OF CUMBERLAND, DAUPHIN, AND PERRY COUNTIES, PENNSYLVANIA 2000

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The **SUSQUEHANNA RIVER** connects all three counties, and is home to rare bird, mussel, and plant species, as well as floodplain forests and an abundance of more common species. Photo: PA Science Office of The Nature Conservancy.

Preface to the First Edition

The Cumberland, Dauphin, and Perry Counties Natural Areas Inventory is a document compiled and written by the Pennsylvania Science Office of The Nature Conservancy. It contains information on the locations of rare, threatened, and endangered species and of the highest quality natural areas in the three counties; it is not an inventory of all open space. It is intended as a conservation tool and should in no way be treated or used as a field guide. Accompanying each site description are general management recommendations that would help to ensure the protection and continued existence of these rare plants, animals and natural communities. The recommendations are based on the biological needs of these elements (species and communities). The recommendations are strictly those of The Nature Conservancy and do not necessarily reflect the policies of the state or the policies of the three counties or townships for which the report was prepared.

Managed areas such as federal, state, county and township lands, private preserves and conservation easements are also provided on the maps where that information was available to us. This information is useful in determining where gaps occur in the protection of land with rare species, natural communities and locally significant habitats. The mapped boundaries are approximate and our list of managed areas may be incomplete, as new sites are always being added.

Implementation of the recommendations is up to the discretion of the landowners. However, cooperative efforts to protect the highest quality natural features through the development of site-specific management plans are greatly encouraged. Landowners working on management of or site plans for specific areas described in this document are encouraged to contact the Pennsylvania Science Office of The Nature Conservancy for further information.

Although an attempt was made through advertising, public meetings, research, and informal communications to locate the sites most important to the conservation of biodiversity within the three counties, it is possible that something was missed. Anyone with information on sites that may have been overlooked should contact the Tri-County Regional Planning Commission (see address on following page). This Natural Areas Inventory will be updated within five years, and additional sites may be included at that time.

ACKNOWLEDGMENTS

This project was financed in part by a grant from the Keystone Recreation, Park and Conservation Fund, under the administration of the PA Department of Conservation and Natural Resources, Bureau of Recreation and Conservation and a Community Development Block Grant, under the administration of the PA Department of Community and Economic development, Office of Community Development and Housing. Additional funding came from Cumberland, Dauphin, and Perry Counties, and from contributions by Gregory H. Knight, Esq., and from anonymous donors.

The species information utilized in the inventory came from many sources as well as our own field surveys. We wish to acknowledge the work of all of those who have carried out botanical and zoological survey work over the years. Without their contributions, this survey would have been far less complete. Biologists from institutions and agencies such as the Academy of Natural Sciences in Philadelphia, the Morris Arboretum of the University of Pennsylvania, the Department of Conservation and Natural Resources (formerly DER), the Pennsylvania Game Commission, the Pennsylvania Fish and Boat Commission, Shippensburg University, and Dickinson College were among the contributors for plant and animal records. Rob Criswell conducted surveys for rare fish species and Larry Klotz conducted surveys for rare plant species under contract for this report. Gene Wingert and Randy Cassell of Cumberland Valley High School provided valuable information on vernal pond communities of South Mountain. The foresters of Tuscarora State Forest provided information and maps of areas of interest in Tuscarora State Forest and elsewhere in Perry County. Dan Brauning of the PA Game Commission DCNR provided information on sites for rare bird species. Steve Spangler provided information and assistance on surveys State Game Lands in Cumberland County. Many thanks go to those who reviewed the draft of this report. Finally, we especially wish to thank the many landowners who granted us permission to conduct inventories on their lands. The task of inventorying the natural heritage of Cumberland, Dauphin, and Perry Counties would have been far more difficult without this tremendous pool of information gathered by many people over many years.

Donald Cameron was the Coordinator of County Natural Areas Inventories at the start of this project. He planned the inventory, performed background research, and conducted much of the fieldwork. He deserves credit for his contributions to this Inventory.

Copies of this document may be obtained from:

The Tri-County Regional Planning Commission
Dauphin County Veterans Memorial Office Building
112 Market Street, Seventh Floor
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(717)-234-2639

TABLE OF CONTENTS

INTRODUCTION

The Tri-County Region of Cumberland, Dauphin, and Perry counties is located in south-central Pennsylvania, centered about the Susquehanna River. Together, the three counties area is approximately 1,625 square miles (Tri-County Regional Planning Commission). The region encompasses a mix of forest, agriculture, small towns, suburbs, and urban areas. From 1990 to 2000, the combined population of the three counties increased more than seven percent, to 509,074 people (U.S. Bureau of Census), a continuation of the trend illustrated in the 1980's. In 2004, the population of each county was estimated at 221,397 people in Cumberland County, 253,282 people living in Dauphin County, and 44,652 people living in Perry County. Dauphin County illustrated the lowest percentage of growth among the three counties from 2000 to 2004.

Development patterns in the three counties have been greatly influenced by the dominant features of the landscape itself. The Great Valley, incorporating central Cumberland and Lower Dauphin counties, contains the majority of the urban and intensely agricultural areas, while the more rugged topography of Perry and northern Dauphin counties has a more sparsely settled mixture of forests and small farms. Each of the three counties still contain a patchwork of natural and human-dominated habitats, including cropland, pasture, young and old forests, ponds, streams, and rivers. These areas are used for hunting, fishing, hiking, birdwatching, and other activities that make the region an attractive place to live. Birdwatching in Pennsylvania is becoming more and more popular. In 1991, bird watching generated $256.4 million in retail sales and supported 6,040 jobs within Pennsylvania (Southwick Assoc. 1995). The same pieces of the landscape that provide scenic and recreational opportunities also function as habitat for a great diversity of plants and animals, including some which are rare, threatened and endangered species. Cumberland, Dauphin, and Perry County each contain intact examples of natural communities and sites for species rare in the state or even globally rare.

Much of the recent population growth in the region has occurred through new developments and the expansion of small towns and suburbs into previously rural areas. Recent changes such as the expansion of Route 322 and the growth of suburbs in the Cumberland Valley have affected the entire region. As growth continues, the natural areas that comprise the Tri-County Region's native natural heritage can be easily lost without careful planning of growth and development. Protecting the integrity of these natural systems provides benefits to humans as well as providing for the survival of wildlife, rare and otherwise. The danger of losing rare species and habitats is more intense in a region experiencing growth as rapidly as the Tri-County area. Wise planning can maintain open space, including natural environments and the plants and animals associated with them. A balance between growth and the conservation of scenic and natural resources can be achieved by guiding development away from the most environmentally sensitive areas.

In order to achieve such a balance and ensure protection of critical natural areas, county and municipal governments, the public, and developers must know the location and importance of these sites. This knowledge can help prevent conflicts over land use as well as help to direct protection efforts and limited conservation dollars to the most vulnerable areas. The Pennsylvania Science Office of The Nature Conservancy, under contract to the Tri-County Planning Commission, has undertaken this project to provide a document and maps that will aid in the identification of these important areas.

The Natural Areas Inventory report presents these three counties' known outstanding natural features—floral, faunal and geologic. The Inventory provides maps of the best natural communities (habitats) and all the known locations of animal and plant species of special concern (endangered,

threatened, or rare) in Cumberland, Dauphin, and Perry Counties. A written description and a summary table of the sites, including quality, degree of rarity, and last-observed date, accompany each map. Potential threats and some suggestions for protection of the rare plants or animals at the site are included in many of the individual site descriptions. Selected geologic features of statewide significance are also noted. In addition, the inventory describes locations of areas that are significant on a county-wide scale but cannot be deemed exemplary natural communities because no species of concern were documented at these sites. These "locally significant" sites represent good examples of habitats that are relatively rare in the county, support an uncommon diversity of plant species, and/or provide valuable wildlife habitat on a local level. Locally significant sites are referenced in lowercase lettering throughout this report, whereas natural area sites are referenced in uppercase lettering.

Particular species names, common and scientific, are provided in coordination with the state agency with jurisdiction over those species. Plants are under the jurisdiction of the PA Department of Conservation and Natural Resources (DCNR). Mammals and birds are under the jurisdiction of the PA Game Commission (PGC). Fish, aquatic invertebrates, reptiles, and amphibians are under the jurisdiction of the PA Fish and Boat Commission (PFBC) and are considered vulnerable to unauthorized collection. They are therefore not identified in the text of this report, at the request of the PFBC, in order to provide some measure of protection for the species. Terrestrial invertebrates are currently not regulated by a jurisdictional agency in Pennsylvania, though the Natural Heritage Program keeps track of many taxa that are considered rare in the state. Scientific names of associated species referenced in the site descriptions are provided in an appendix (Appendix VIII) in order to simplify the site descriptions.

The information and maps presented in this report provide a useful guide for planning development and parks, for conserving natural areas, and for setting priorities for the preservation of the most vulnerable natural areas. An overall summary identifies the highest quality sites in each county. All of the sites in this report were evaluated for their importance in protecting biological diversity on a state and local level, but many also have scenic value, provide water quality protection, and are potential sites for low-impact passive recreation, nature observation and/or environmental education.

The Natural Areas Inventory will be provided to each municipality through the Tri-County Planning Commission. The inventory is one tool that will aid in the implementation of county and municipal comprehensive plans. The counties, municipalities, land trusts, and other organizations can use the Natural Areas Inventory to identify potential protection projects that may be eligible for funding through state or community grant programs. Landowners will also find this inventory useful in managing and planning for the use of their land; it gives them the opportunity to explore alternatives that will provide for their needs and still protect the species and habitats that occur on their land. In addition, land managers may wish to consult this report in an effort to avoid potential conflicts in areas with species of special concern and/or identify ways of enhancing or protecting this resource. Users of this document are encouraged to contact the Pennsylvania Science Office of The Nature Conservancy for additional information.

Questions regarding potential conflicts between proposed projects (developments, culverts, pipelines, etc.) and species of concern mentioned in this report should be directed to the Environmental Review Specialist at the PNHP Office in Harrisburg (717) 772-0258.

NATURAL HISTORY OVERVIEW OF THE COUNTIES

The climate, geology, topography, and soils have been important in the development of the plant communities (forests, wetlands, etc.) as well as other natural features (e.g., streams and geologic features) in the three counties. Both natural and human disturbances have played an important role in the development and alteration of those plant communities and have caused the extirpation of some species and the introduction of others. These combined factors provide the framework for locating and identifying exemplary natural communities and species of special concern within the region. A brief overview of the physiography, geology, soils, and vegetation of Cumberland, Dauphin, and Perry Counties provides the background for the natural areas inventory methodology and findings presented in this report.

Physiography and Geology

Physiographic Provinces are classified by the characteristic landscapes and distinctive geologic formations that comprise each province. Physiography relates in part to a region's topography and climate, two factors that significantly influence soil development, hydrology, and land use patterns of an area. Bedrock type also influences soil formation and hydrology. Therefore, both physiography and geology are important to the patterns of plant community distribution, which is in turn important to animal distribution (see Vegetation). Certain plant communities and species might be expected to occur within some provinces and not in others, due to differences in climate, soils, and moisture regime. Physiographic and geologic information has come from a variety of sources, including Geyer and Bolles (1979 and 1987), Berg et al. (1981), *The Atlas of Pennsylvania* (Cuff et al. 1989), the *Geologic Map of Pennsylvania* (Socolow 1980), *Glacial Deposits of Pennsylvania* (Socolow 1981), and *Physiographic Provinces of Pennsylvania* (Berg et al. 1989).

The Tri-County region is situated within parts of three Physiographic Provinces: the Ridge and Valley Province, the Blue Ridge Province, and the Piedmont Province (Berg *et al* 1989). Each of these provinces has characteristic rock formations and topography (Geyer and Bolles 1979). The Ridge and Valley Province, underlain by wrinkled layers of sedimentary rock, contains most of the land in the three counties. This Province is divided into two Sections: the Appalachian Mountain Section and the Great Valley Section. The northwest-to-southeast running ridges of northern Perry and northern Dauphin Counties are part of the Appalachian Mountain section. These sandstone ridges typically range from 800 to 1200 feet in elevation and are fairly uniform. The valleys between these ridges may be more different from each other, reflecting differences in the underlying bedrock. South of the Appalachian Mountain Section is the Great Valley Section. This section occurs in a broad band across most of Cumberland County and the central part of Dauphin County. The Great Valley Section has a flat to rolling topography underlain by limestone and shale.

The Blue Ridge Physiographic Province (South Mountain Section) is represented by the portion of South Mountain that is located in southwestern Cumberland County. This portion of South Mountain represents the northern most tip of the Blue Ridge Physiographic Province, which continues south into Maryland and Virginia. The topography consists of steep ridges and narrow valleys, and the underlying rocks are erosion-resistant granite, sandstones, quartzite, and diabase.

The Piedmont Physiographic Province, Gettysburg-Trenton Section, extends into the south end of Dauphin County and into a very small part of Cumberland County near the town of Lisburn.

This Section has steep-sided diabase ridges and rolling hills underlain by conglomerates, sandstones, and shales.

Soils

The distribution of soils in these three counties reflects both local topography and bedrock geology. The physiographic regions outlined above tend to have similar soils, which in turn influence land use patterns. The Great Valley Section is mostly in agriculture, while the Appalachian Mountain and South Mountain Sections contain many woodlands and reservoirs, with small farms in the valleys.

The following brief descriptions of soil characteristics are taken from USDA soil surveys of each county, cited below, and the reader is referred to those documents for more detailed information. Additional information on associated vegetation is provided based on image interpretation and field surveys conducted for this Natural Areas Inventory. Soil types are important in the inventory process, as some natural communities and rare plant species are closely associated with specific soil types or characteristics.

The soil associations of the three counties have been described in two soil surveys: one for Cumberland and Perry Counties (Zarichansky 1983), and one for Dauphin County (Kunkle *et al* 1972). These are described below, grouped by physiographic section. An association is a group of soils with a distinctive, proportional pattern of occurrence in the landscape (Carey and Yaworksi 1963). Eight soil associations have been described for Cumberland County, eight for Dauphin county, and seven for Perry County. Each soil association contains one or more major soils and minor soils. The soils of the three counties are described together, arranged by physiographic section. Additional information on associated vegetation types is provided based on field surveys conducted for this Natural Areas Inventory.

Appalachian Mountain Section--The ridges of this section have soils derived from resistant quartzite, sandstone, siltstone, and shale. The **Hazleton-Laidig-Buchanan** association in Perry Co. and the **Dekalb-Lehew** association in Dauphin Co. are deep soils of stony sandy loam, on level to very steep upper slopes and ridgetops. This land is almost all in woodland. The valleys of this section are more variable, depending on their parent material. The **Weikert-Calvin-Berks** association, which covers the most area in Perry Co., and the **Cavin-Leck Kill-Klinesville** association in Dauphin Co., are shallow to deep soils derived from shales and sandstone. They are found in coves and on lower hills and ridges. These soils are used for a mixture of cropland, pasture, and woodland.

The **Elliber-Kreamer** association in Perry Co. consists of deep, gently sloping to steep soils on low ridges and valleys, derived from cherty limestone. These soils are suited to use as cropland. The **Murrill-Laidig-Buchanan** association in Perry Co. and the **Laidig-Buchanan-Andover** association in Dauphin Co. are deep soils of lower mountain slopes, formed from colluvium. These soils have fragipans from accumulated clay, and are well-drained to poorly drained. They are used for agriculture where not too stony or poorly drained. The valleys of the *Appalachian Mountain Section* also contains small areas of soil associations found in the *Great Valley Section*, as described below.

Great Valley Section--The northern portion of this section is underlain by shale, siltstone, and sandstone, from which the **Berks-Weikert-Bedington** (Cumberland Co.) and **Berks-Bedington-**Weikert (Dauphin Co.) are derived. These soils, which extend in a band across both

counties, are used mainly for agriculture. Immediately to the south is the **Hagerstown-Duffield** association, derived from weathered limestone. These soils are mostly on level to sloping terrain, and are very fertile. Few natural areas remain. Sinkholes and limestone outcrops may occur in these areas.

South Mountain Section--Three soil associations are found in this Section, south of the Great Valley in southwestern Cumberland County. The **Highfield-Glenville** association, formed in weathered schist and rhyolite, occurs on the tops and upper slopes of mountains and ridges. These are deep soils used for croplands, orchards, and pasture where not too steep or stony. The **Hazleton-Clymer** association occurs on ridgetops and sideslopes of sandstone and quartzite. They are deep, well-drained soils, nearly entirely forested because of their slope and stoniness. Downslope of South Mountain to the north is the **Murrill-Laidig-Buchanan** association. This is the same association, formed in colluvium, discussed in the Appalachian Mountain Section.

Gettysburg-Newark Section--This section, occurring in southern Dauphin and a small portion of southern Cumberland Counties, contains three soil associations. The **Athol-Neshaminy** association contains deep soils on undulating terrain, formed from conglomerate, breccias, and diabase. These soils are suitable for crops and pasture. Stony Ridge, which runs north-south across the *Great Valley*, is an extension of this association. The **Lewisberry-Penn-Athol** association in Dauphin Co. contains deep and moderately deep soils on undulating terrain, formed from red sandstone and shale. Most of this area has been cleared for farm crops. The **Brecknock-Neshaminy Association** is associated with ridges formed from intrusive diabase dikes; Neshaminy soils are derived from diabase, and Brecknock soils from adjacent, metamorphosed sandstones and shales. Most of the Brecknock areas have been cleared for croplands, while most of the Neshaminy soils are still wooded.

Two soil associations related to river valleys are found in the Tri-Counties. The **Monongahela-Atkins-Middlebury** association is formed from alluvium along the Susquehanna River and major tributaries in Perry and Cumberland Counties, and the **Duncannon-Chavies-Tioga** association is made up of sandy or silty loams along Susquehanna River terraces and floodplains in Dauphin Co.

Vegetation

The vegetation of Cumberland, Dauphin, and Perry Counties reflects the environmental conditions (geology, topography, soils, climate) and disturbance history, both natural and anthropogenic that occur within the counties. The three counties are located in the original Oak-Chestnut Forest Region (Braun 1950). The American chestnut (*Castanea dentata*) was once a dominant feature of the Oak-Chestnut Forest, but was virtually eliminated with the introduction to North America of the chestnut blight fungus (*Endothia parasitica*) in 1904. Today the forest of this region is more aptly classified as Appalachian Oak Forest (Bailey 1980) or Mixed Oak Forest (Monk et al. 1990), dominated by white, red, scarlet, and black oaks (*Quercus alba*, *Q. rubra*, *Q.coccinea*, and *Q. velutina*), often mixed with tulip poplar (*Liriodendron tulipifera*), red maple *Acer rubrum*), and/or beech (*Fagus grandifolia*). This forest type occurs on the slopes and tops of all the mountain ridges within the counties as well as in some of the narrower valleys of central Dauphin and western Perry Counties, and throughout the more convoluted mountain ridges of South Mountain. At some of the higher elevation, cooler north-facing slopes in western Perry County, Tulip Tree (beech) maple forest may predominate, with tulip tree, red and sugar maple (*Acer*

saccharum), hickories, and sweet birch (*Betula lenta*) mixing with or replacing most of the oaks and heaths.

Several notable variations in the typical "Mixed Oak Forest" composition (Monk et al. 1990) occur with relationship to soil, soil moisture, and topography. Drier ridge tops with shallow nutrient poor soils are characterized by chestnut oak (*Quercus montana*) and black gum (*Nyssa sylvatica*) with red maple and other oaks as associates, and an understory of ericaceous shrubs including blueberries (*Vaccinium* spp.), huckleberries (*Gaylussacia* spp.), and mountain laurel (*Kalmia latifolia*). Some of these ridgetop woodlands also contain a significant component of pitch pine (*Pinus rigida*) and scrub oak (*Quercus ilicifolia*); these areas are known as Pitch pine-scrub oak barrens (Smith 1983). "Big Flat Barrens" is an example of this community type. Another distinct variant is the Mesic Central Forest community type, which occurs on slopes and in ravines adjacent to the Susquehanna River. Examples of this community type occur at Mahantango Mountain and along Shermans Creek at Cove Mountain. This broadly defined community type is characterized by some combination of the following species: sugar maple, red oak, basswood (*Tilia americana*), sweet birch, hemlock (*Tsuga canadensis*), tulip poplar, maple-leaved viburnum (*Viburnum acerifolium*), and witch hazel (*Hamamelis virginiana*), and has many additional woody and herbaceous associates. Yet another variant occurs along some of the small stream corridors and adjacent north-facing slopes of the region, and is dominated by hemlock with a minor component of yellow birch (*Betula alleghaniensis*) and an understory of ericads and witch hazel. Because of the dense shade and acidic litter, these hemlock-dominated forests typically have a depauperate herbaceous layer, often limited to several species of fern and sedges.

Only a small fraction of the forest cover of the Piedmont section remains, most having been cleared for agriculture and development, or repeatedly logged for lumber and fuel (Keever 1973). On the Piedmont Section tulip poplar often becomes the dominant tree after logging, seeding in on the openings and then growing more quickly than other trees. As the forest matures, however, shade-tolerant species (such as red oak) replace tulip poplar because it does not regenerate under a closed canopy (Tryon 1980). Currently forested lands of the piedmont such as State Game Lands 246 exist on areas such as rocky slopes and wetlands that are poorly suited to other uses. Some of the unforested Piedmont lands, particularly areas that were seldom or never plowed, support native vegetation similar to sites in Virginia as described by Braun (1950). These contain native grasses such as little blue stem (*Schizachyrium scoparium*), big blue stem (*Andropogon* spp.), and Indian grass (*Sorghastrum nutans*), and scattered small trees such as sassafras (*Sassafras albidum*) and/or red cedar (*Juniperus virginiana*).

The majority of the forests in the three counties have past histories of logging and are currently in some stage of regrowth. The largest stands of older regrowth observed during the inventory were located in Tuscarora State Forest in western Perry County. The oldest forest known in the three-county area is thought to be the virgin stand growing in Hemlocks Natural Area of Tuscarora S. F. Some areas historically cleared for agriculture have been succeeding back to forest. On drier soils in Perry County and northern Cumberland County, these successional forests are characterized by significant stands of Virginia pine (*Pinus virginiana*).

Wetlands

Wetlands include vegetation types important for the area, providing essential habitat for many plant and animal species. The type of wetland depends on soil type, disturbance, and length and duration of flooding. In Cumberland, Dauphin, and Perry Counties many of the wetlands are associated with streams or rivers and include floodplain forests, forested swamps, shrub swamps, and graminoid marshes. Two other wetlands types known from the region are seepage swamps and vernal pools.

Ephemeral or vernal pools are wetlands that fill with water on an intermittent basis due to annual precipitation, rising groundwater, or surface water runoff (Kenney and Burne, 2000). These pools become almost completely dry in most years, losing water through transpiration and evaporation. These pools, due to being ephemeral and virtually free of breeding fish, attract many species of breeding salamanders, turtles, frogs and toads. Some species, like the Spotted Salamander (*Ambystoma maculatum*), are obligate vernal pool species. This species and other *Ambystoma* species lay eggs only in vernal pools.

Floodplain forests occur along rivers and streams in low-lying areas. These locations are periodically inundated by floodwaters of spring runoff or runoff from intense storm events. In south-central Pennsylvania these forests are characterized by a canopy containing some combination of silver maple, sycamore, river birch, black willow, green ash, American elm, or box-elder. Shrubs and vines common to these forests include spicebush, ninebark, silky dogwood, Virginia creeper, and poison ivy. Floodplain forest communities, especially along the Susquehanna River, receive severe disturbances from floodwaters including erosion and scouring by water, ice, and debris and/or deposition of massive quantities of sediments and debris. Only species with adaptations or tolerance for these kinds of conditions can survive here.

Floodplains on smaller waterways receive less intense disturbances but are still periodically flooded which limits the kinds of vegetation that can occur on them. Pin oak, swamp white oak, silver maple, red maple, ash, sycamore, and black walnut are frequent on wetter bottomland soils associated with smaller creeks. Understory species include spicebush, violets, nettles, cut-leaved coneflower, golden alexanders and many other wildflowers. Several species of special concern are found in these habitats. In addition, floodplain forests also serve as a protective buffer against erosion and flood damage along many of the area's creeks.

Graminoid marshes are wetlands dominated by grasslike plants such as cattails, sedges, and grasses. These wetlands may be found in association with streams or in areas with ground water seepages. Graminoid marshes are uncommon in the Tri-county region, except as successional communities following beaver dams or other impoundments.

Seepage swamps are relatively small forested or shrub-dominated wetlands found on lower slopes where water emerges at the surface in a diffuse flow. They may be dominated by red maple with hemlock and yellow birch as associates, and an understory of rhododendron, swamp azalea, spicebush, and/or highbush blueberry. Common herbs in these seepage wetlands include skunk cabbage, violets, manna grass, sedges, and ferns, including cinnamon fern, royal fern, and sensitive fern, and sphagnum moss.

Because wetlands are relatively rare in south-central Pennsylvania, they are important refugia for plants as well as important habitat for nesting and migrating birds. Many other animals groups such as amphibians, reptiles, odonates, and lepidopterans also depend on specific wetland habitats for all or a portion of their life cycles.

Ephemeral/Fluctuating Natural Pools

Pennsylvania Natural Community Type

State Rank: S3 Global Rank: GNR

General Description

Ephemeral/flucting natural pools, more commonly referred to as vernal pools, are shallow natural depressions within the forest that seasonally fill with water during spring and fall rains, and dry during the summer months. Vernal pools rely on rainfall for their sole source of water input. These pools are void of fish species because of the cyclic pattern of alternating wet/dry periods. For this reason, vernal pools support a wide array of organisms that are specially adapted to the varying hydroperiod. The life histories of several insect species and amphibian species are tied to the fluctuating conditions of vernal pools for breeding and development of young. Many other species are known to use these pools as foraging grounds and for hibernation.

No other group of organisms has their life history tied to vernal pools more than the Ambystomatid salamanders. These species are considered vernal pool obligates, meaning their life histories are directly linked to the alternating wet/dry cycle of vernal pools. Pennsylvania's three species of Ambystomatid salamanders, commonly known as mole salamanders, spend the majority of their lives underground, sometimes up to several meters below the surface! Because of their secretive lifestyles, the mole salamanders are rarely seen by most people. In fact, the only reliable way to see these creatures is to be at a vernal pool, at night, while it's raining, during the breeding season!

a spring season view of a vernal pool

The Cycle of Vernal Pools

Beginning in late February through March, the first warm rains of the year cause the ice that has covered the vernal pools to melt, initiating the mole salamander breeding migrations. The first species to enter the pools is the Jefferson Salamander, *Ambystoma jeffersonianum*. The Jefferson salamander is gray with blue flecking on the sides. The extremely long toes of the Jefferson salamander distinguish it from all other species of salamander in Pennsylvania. Jeffersons arrive at the pools, often crawling over snow, and slip into the water through small gaps and openings in the ice. For the next several days, the male Jefferson salamanders will court the females. Eggs are then deposited in jelly-like masses, usually attached to vegetation or sticks and limbs that have fallen into the pool. After the eggs are laid, Jeffersons will migrate out of the pools and back onto land where they will spend the rest of the year in subterranean retreats.

The migration of the Jefferson salamander usually overlaps with the breeding migrations of the Spotted salamander, *Ambystoma maculatum*. This robust salamander can grow to be nearly 8 inches long! The spotted salamander is brown to black with brilliant yellow or orange spots on the head and back. These salamanders have been known to form aggregations, known as breeding balls, where dozens of males will cluster around one or two females. Once spotted salamanders have laid their eggs on submerged vegetation and twigs, like the Jeffersons, they will migrate back into the surrounding forest.

a gray treefrog calling at a vernal pool

Wood frogs (*Rana sylvatica*), spring peepers, (*Pseudacris crucifer*), and gray treefrogs (*Hyla versicolor*), extensively use vernal pools for breeding as well. The calls of these species can sometimes be used to locate vernal pools. The wood frog, which produces a call that sounds similar to squabbling ducks, are vernal pool obligates. Wood frogs are pinkish-brown, moderately sized frogs reaching lengths of about three to four inches and have dark brown masks under the eyes. The spring peeper is a small tree frog, which will rarely exceed an inch in length. Spring peepers are light brown with a brown "X" across their backs. The call is a high-pitched "peep!" and large deafening choruses are a sure sign that spring is on the way. The gray treefrog is greenish gray with bright yellow patches beneath the legs. Their call is a fluttering musical chirp. Vernal pools can also support many other frogs and toads, including the green frog (*Rana clamitans*), the bullfrog (*Rana catesbeiana*), the American toad (*Bufo americanus*), and the Eastern spadefoot toad (*Scaphiopus holbrookii*).

The vernal pools, now laden with amphibian eggs, are converged upon by a host of other species, which feed on the egg masses, larvae and tadpoles. The spotted turtle (*Clemmys guttata*) and red spotted newts (*Notophthalmus viridescens*) are frequent visitors of vernal pools. These species gorge themselves on the nutrient rich salamander and frog egg masses. Eastern garter snakes (*Thamnophis sirtalis*), and Eastern hognosed snakes (*Heterodon platyrhinos*) can be found hunting for salamanders and toads along the pool margins, and northern water snakes (*Nerodia sipedon*) will feed on the larvae and tadpoles within the pools.

As the spring rains end and summer begins, the water level in the pools drops considerably, often drying up completely. This decrease in water level coincides with the metamorphosis of the larval salamanders and tadpoles into adult salamanders, frogs and toads. These young salamanders and froglets begin their terrestrial lives, returning to the pools to breed once they attain sexual maturity.

vernal pool salamander egg masses and tadpoles

During the summer, drying vernal pool basins provide a unique habitat for an array of plants, some of which are specially adapted to the same cyclic wet/dry pattern upon which the amphibians rely. Vernal pools provide habitat for several rare plant species, including the federally listed Northeastern Bulrush, (*Scirpus ancistrochaetus*).

a marbled salamander migrating to a vernal pool

The onset of fall rains begins to refill the dried pool basins. It is during these rain episodes that the third species of mole salamander in Pennsylvania, the marbled salamander (*Ambystoma opacum*) breeds. The marbled salamander is a stout species, with a jet-black body patterned with unmistakable dazzling white bands. This species breeds in the shallows of the pools with the females laying their eggs under leaf litter and wood within the pool basin. As fall rains fill the pools and inundate the eggs, the marbled salamander eggs will hatch and the larvae spend the winter months beneath the ice, feeding on the aquatic vernal pool insects. For this reason, the marbled salamander larvae are much larger than the larvae of the Jefferson and spotted salamanders in the spring.

Status and Threats

Currently, Pennsylvania tracks Ephemeral/Fluctuating Natural Pools as important natural communities within the forest. Besides providing critical habitat for unique plants, per square inch, vernal pools provide the largest biomass production of vertebrates of any other community in the northeast!

Only within the last few decades have we begun to understand the importance of vernal pools to the ecology of Pennsylvania's forests. Temporary pools have historically been viewed as mosquito breeding pools, of little importance to forest ecology. As a result, a long history of vernal pool destruction exists. Many people have treated vernal pools with pesticides to control mosquitoes. Although mosquitoes will use vernal pools to breed, the animals specially adapted to vernal pools use the mosquito larvae as a food source. Most mosquito eggs laid in vernal pools don't survive to metamorphosis because the vernal pool species feed on the mosquito larvae. Unfortunately, pesticide application to vernal pools can be detrimental to the vernal pool obligates that rely on this unique natural community. Amphibians as a whole are highly sensitive to poisons and the application of chemicals can destroy the intricate food webs in vernal pool communities.

Despite the recent awareness of the importance of vernal pools to forest ecology, vernal pools are not protected from modification or destruction. Vernal pools provide critical habitat for a number of species of plants and animals that are specially adapted to the cyclic patterns exhibited by ephemeral/fluctuating natural pools. It is important to protect these ecological gems to conserve the rich biodiversity of the community.

PNHP
Pennsylvania Natural Heritage Program

References

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Disturbance

The nature, scale and frequency of disturbance are influential in the evolution and appearance of natural communities and associated rare species. Disturbance can be beneficial or destructive to the development and persistence of natural communities.

Some examples of natural disturbances are flooding, fire, and deer browsing. While often regarded as a detrimental impact, both fire and small-scale flooding can be beneficial to certain communities or rare species. Floodplain forests benefit from the periodic scouring and deposition of sediments as streams overtop their banks. At the same time, streamside wetland communities hold excess water, thus reducing the scale of flooding downstream. In contrast, deer have been blamed for a number of negative impacts on Pennsylvania flora and fauna (Rhoads et al. 1992): a reduction in the amount of understory, poor regeneration of some species, decreased songbird diversity, and direct loss of rare plants.

In many cases, human disturbance has been clearly destructive to natural habitats and species associated with them. Although necessary, farming, mining and development are disturbances that have completely eradicated some natural communities and habitats. For example, old-growth forests are all but non-existent although occasional old trees may be encountered; many wetland habitats have been filled or altered, resulting in the loss of some of the native plants and animals of these sites. Although some species, including several rare species, are aided by on-site disturbance (e.g. clearing or mowing), human disturbance is detrimental to most species. With wide-ranging human disturbance, some plant and animal species may be completely eradicated from an area because they cannot compete or survive under newly created conditions.

An increasing threat to these communities and natural habitats is the introduction and spread of exotic (i.e., non-native), invasive species across the landscape. These include, among others, the chestnut blight fungus that dramatically changed the composition of our forests; the grass carp that can disrupt native aquatic life; and a long list of plants that out-compete native species. Non-native plants such as Japanese honeysuckle (*Lonicera japonica*), tree-of-heaven (*Ailanthus altissima*), Oriental bittersweet (*Celastrus orbiculatus*), and garlic mustard (*Alliaria officinalis*) have become commonplace in disturbed woodlands, often to the point of excluding some of the native plants. In wetlands and along streams, purple loosestrife (*Lythrum salicaria*), Japanese knotweed (*Polygonum cuspidatum*), and mile-a-minute weed (*Polygonum perfoliatum*) are aggressive, weedy species that follow in the wake of disturbance and crowd out native species. The natural disturbances of flooding and scouring that occur along the Juniata and Susquehanna river corridors have helped to facilitate the invasion and colonization of many exotic species. There are few if any plant communities along the two major river corridors that do not have significant components of exotic species. The species with the greatest impact in these communities tend to be robust herbs such as purple loosestrife and Japanese knotweed, although vines such as Japanese hops are also serious problems. Aquatic habitats of the rivers, streams, and lakes are also vulnerable to invasion by exotics. Curly pondweed (*Potamogeton crispus*), a native of Europe, has become the dominant plant species in some of the regions waterways, and Asiatic clam (*Corbicula fluminea*) has become the most common mussel in some of the regions' streams.

Control of these problematic, non-native species is necessary for the long-term maintenance of high quality natural systems. Discouraging the use of these and other potentially weedy exotics in and around natural areas can help to prevent further encroachment. Some nurseries now carry a selection of tree, shrub and herbaceous species that are native to Pennsylvania, and these are recommended where plantings are necessary in, or adjacent to, natural areas. *The Vascular Flora of Pennsylvania* (1993) is a helpful reference for determining whether a plant species is native to the state or not.

Invasive Plant Species

Among the most aggressive introduced plant species in Pennsylvania include the following four top offenders of natural areas. These species are not kept in check by natural predators, and out-compete native species. Once established, they can be very difficult and time consuming to remove. Natural Areas should be monitored regularly for pioneer populations of these species. Small populations, once encountered, should be eradicated to help ensure the continued viability of natural areas. Photos: PA Department of Agriculture

Japanese Knotweed (*Polygonum cuspidatum*)

Tree of Heaven (*Ailanthus altissima*)

Purple loosestrife (*Lythrum salicaria*)

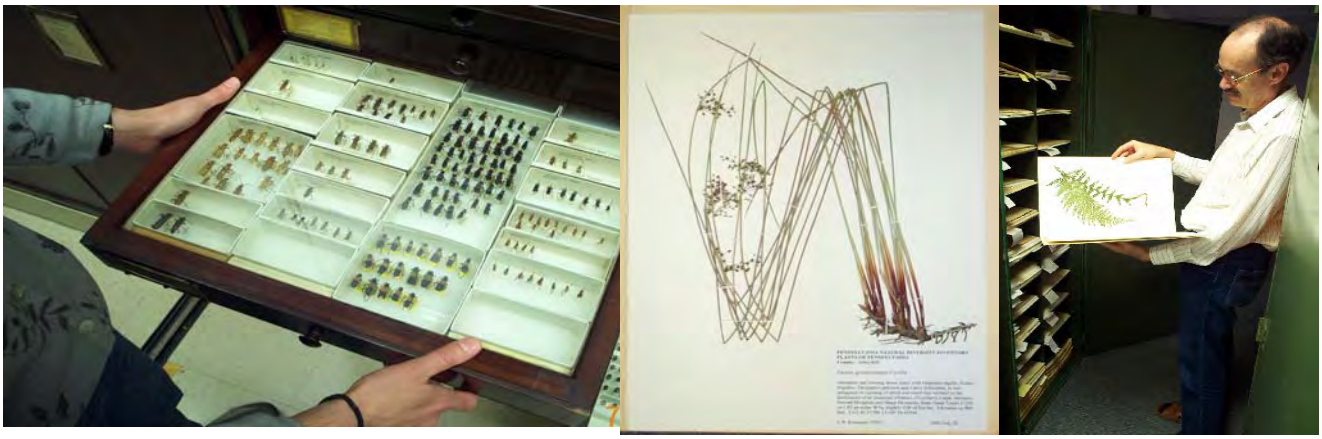
Multiflora rose (*Rosa multiflora*)

PENNSYLVANIA NATURAL HERITAGE PROGRAM DATA SYSTEM

In order to plan for the protection and stewardship of Cumberland, Dauphin, and Perry Counties' natural features, the Pennsylvania Science Office (PSO) of The Nature Conservancy (TNC) was contracted by the Tri-County Regional Planning Commission to provide an inventory of significant flora, fauna and natural communities in the three counties. Critical to this effort is the Pennsylvania Natural Heritage Program (PNHP) database. PNHP was established in 1982 as a joint venture of The Pennsylvania Science Office (PSO) of The Nature Conservancy, the Pennsylvania Department of Conservation of Natural Resources (DCNR), and the Western Pennsylvania Conservancy. In its 14 years of operation, the PNHP database has become Pennsylvania's chief storehouse of information on outstanding natural habitat types (called natural communities in PNHP terminology), sensitive plant and animal species (species of special concern), and heron rookeries. Several other noteworthy natural features are also mapped including DEP designated Exceptional Value streams (Shertzer 1992) and outstanding geologic features (based on recommendations from Geyer and Bolles 1979). Over 10,000 detailed occurrence records, largely the result of field surveys, are stored in computer files and denoted on topographic maps. Additional data are stored in extensive manual files set up for over 150 natural community types, over 800 plant and animal species, and about 650 managed areas, and are organized according to each of Pennsylvania's 881 7½' USGS topographic quadrangle maps.

Beginning in 1982, PSO has collected existing data on occurrences of elements of concern, drawing from publications, herbarium and museum specimens, and the knowledge of expert botanists, zoologists, ecologists, and naturalists. From this foundation, PSO has focused its efforts on, and conducted systematic inventories for, the best occurrences of the priority elements.

The PA Science Office has used this systematic inventory approach to identify the areas of highest natural integrity in Cumberland, Dauphin, and Perry Counties. These areas, comprised of natural communities with their characteristic species, represent an estimated 85-90 percent of the biological diversity of an area (The Nature Conservancy, 1988); the other 10-15 percent consists of sensitive plant and animal species, which occur both within and outside these natural communities. The full range of biological diversity in the three counties can be conserved by protecting both sites with the best occurrences of the counties' natural communities and good populations of their sensitive plants and animal species. The natural community and sensitive species data are the basis for judging the biological values of sites within the county.



The Pennsylvania Natural Diversity Inventory database has collected existing data on occurrences of species and communities (elements) of special concern, drawing from publications, herbarium and museum specimens, and the knowledge of expert botanists, zoologists, ecologists, and naturalists.

NATURAL AREAS INVENTORY METHODS

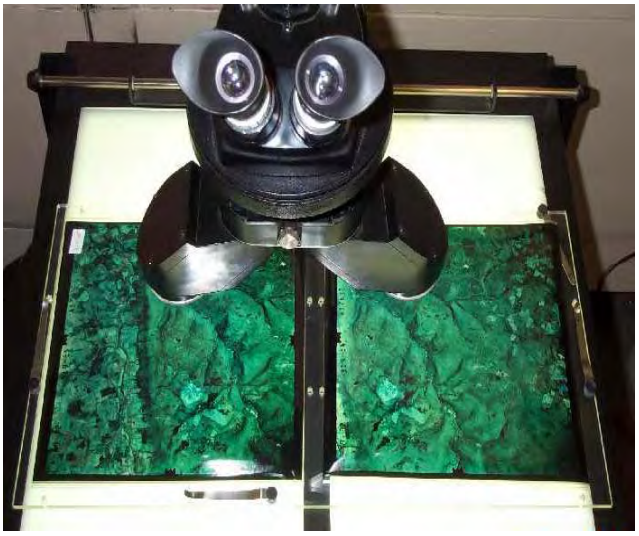
Methods used in the Tri-County Natural Areas Inventory followed PNHP procedures, and those developed in Illinois (White 1978) and Indiana (Anonymous 1985). The inventory proceeds in three stages: 1) information is gathered from the PNHP database files, local experts, and map and air photo interpretation; 2) ground survey and reconnaissance by aircraft is conducted; and 3) data are analyzed and mapped.

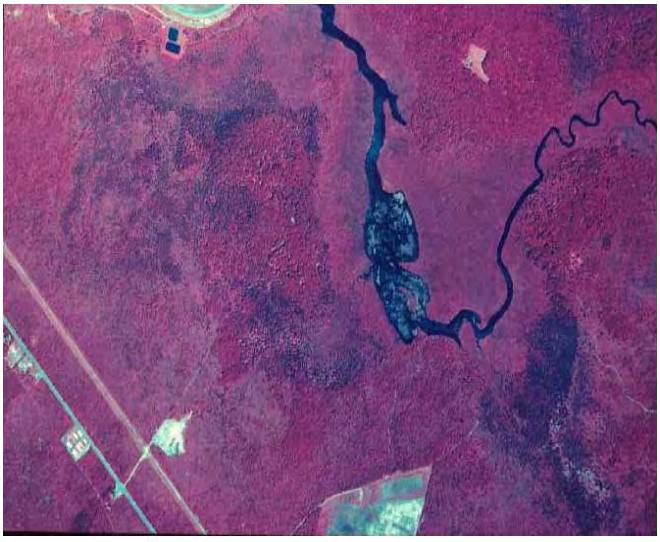
Information Gathering

A list of natural features found in each county was prepared from the PNHP database and supplemented with information volunteered by local individuals and organizations familiar with the three counties. In the spring of 1996 a public meeting was held and Recommended Natural Area Survey Forms (Appendix III) were distributed to facilitate public input. PSO staff solicited information about potential natural communities, plant species of special concern and important wildlife breeding areas from knowledgeable individuals and local conservation groups. A number of potential natural areas were identified.

Map and Air Photo Interpretation

PSO ecologists familiarized themselves with the air photo characteristics of high quality natural communities already documented (Appendix VI). Additional data from vegetation maps, soil-survey maps, field survey records and other sources were consulted to gain familiarity with the three counties' natural systems. This information, along with references on physiography, geology, and soils, was used to interpret photos and designate probable vegetation types and potential locations for exemplary communities and rare species. In many instances, vegetation was classified at an ecosystem level, and it was therefore critical that an ecologist or person with similar training interpret the maps and aerial photos.





Work progressed systematically within the area encompassed by each USGS topographic map. The natural area potential of all parcels of land was assessed using aerial photographs. Areas

continuing into adjacent counties were examined in their entirety. Topographic maps for use during field surveys were marked to indicate locations and types of potential natural areas based on characteristics observed on the photos. For example, an uneven canopy with tall canopy trees could indicate an older forest; a forest opening, combined with information from geology and soils maps, could indicate a seepage swamp community with potential for several rare plant species. Baseline information on sites appearing to have good quality communities or potential for rare species was compiled on Potential Natural Area Survey Forms (Appendix III) to help prioritize field work.

After an initial round of photo interpretation, field surveys were conducted to determine what was actually on the ground. Locations with minimally disturbed natural communities or with species of special concern were outlined on topographic quadrangle maps. The photo signatures (characteristic patterns, texture, tone of vegetation, and other features on the photos) of these sites were then used as a guide for continued photo interpretation and future field surveys. Photo signatures which led to poor quality sites enabled the elimination of further field work on other sites with similar signatures.

Field Work

Experienced PSO biologists and contractors conducted numerous field surveys throughout the three counties from winter 1997 to spring 1999. Biologists evaluated the degree of naturalness of habitats (including assessment of percent of native vs. non-native plant species, degree of human disturbance, age of trees, etc.) and searched for plant and animal species of special concern. Workers categorized the vegetation by natural community type for each potential natural area visited. An evaluation of quality was made for each natural community, care being taken to give reasons for the quality rank. Boundaries of the community types were redrawn, if needed, based on new field information. The Potential Natural Area Survey Form (Appendix III) was completed for each community with a quality-rank of "C" and above. Community information recorded included the dominant, common, and other species, as well as disturbances to the community. Field forms were completed for all occurrences of sensitive plant and animal species, and natural communities (see sample Plant Survey Form, Appendix V), the quality of each population or community was assessed, and locations were marked on USGS topographic quadrangle maps.

On May 5, and Dec. 16, 1997, and in April 1998, low altitude reconnaissance flights were taken over the counties to provide a more accurate overview of the current condition and extent of known natural areas and to assess the potential of any additional areas.

Small Mammal Surveys

Invertebrate Surveys

Data Analysis

To organize the natural features data and set conservation priorities, each natural community or species (element) is ranked using factors of rarity and threat on a state-wide (state element ranking) and range-wide (global element ranking) basis (see Appendix I). Each location of a species element (an element occurrence) is ranked according to naturalness, its potential for future survival or recovery, its extent or population size, and any threats to it. An explanation of the five element occurrence quality ranks is given in Appendix II. The element-ranking and element occurrence-ranking systems help PSO personnel to simultaneously gauge the singular importance of each occurrence of, for example, a pitch pine-scrub oak barren community, rough-leaved aster, or giant swallowtail in the three counties, as well as the state-wide or world-wide importance of these natural features. Obviously, sites with a greater number of highly-ranked elements merit more immediate attention than sites with a smaller number of lower ranked elements.

Field data for natural communities of C-rank or better, and for all plant and animal species of concern found were combined with existing data and summarized on PNHP Element Occurrence Records for mapping and computerization. Mapped locations of natural features, including approximate watershed or subwatershed boundaries, were then transcribed on to acetate map overlays for County use and distribution.

Information on the needs of the rare species in this report has come from a variety of sources, including field guides and research publications. For reptiles and amphibians, the major source is DeGraaf and Rudis (1981); for birds, Brauning (1992); for moths, Covell (1984); for butterflies, Opler and Krizek (1984) and Opler and Malikul (1992); Schweitzer (1981) provided much of the information on moth and butterfly species rarity in Pennsylvania. A list of species of special concern currently known in the three counties is provided in Appendix VII. The scientific (Latin) names of non-listed species referred to in the report are given the first time they are mentioned in the body of the report.

Landscape Analysis

Background: Fragmentation of the landscape by roads, utility lines, and other human disturbances can impact the surrounding landscape significantly. A road or utility line cut through a forested block cleaves the large block into two smaller blocks and significantly increases the amount of edge habitat within the forest. When a forest with a closed canopy is disturbed by road building activities, the newly disturbed soil and open canopy favor the establishment of invasive species of plants and animals. Many of these will out-compete and displace native species in this disturbed habitat. These smaller forest fragments will have significantly more edge habitat and less forest interior than the original forest block. Furthermore, fragmentation of large forest blocks decreases the ability of many species to migrate across manmade barriers such as roads. Migration corridors, once severed, isolate populations of species one from another, limit the gene flow between populations and create islands of suitable habitat surrounded by human activity. Much of the native biological diversity of an area can be preserved by avoiding further fragmentation of these large forested areas.

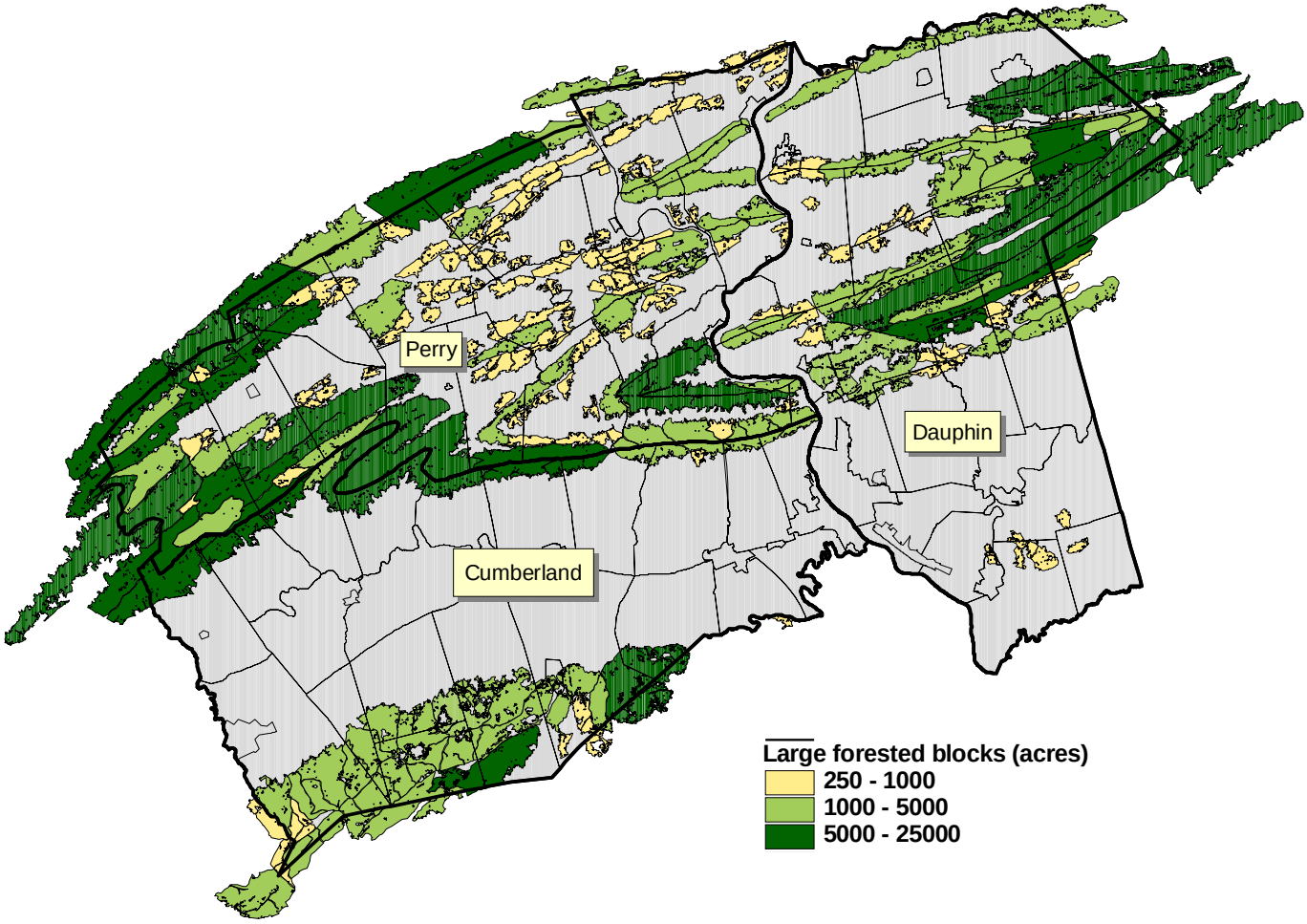
The larger forested blocks in the County (those of at least 250 acres in area) have been highlighted in an effort to draw attention to the significance of contiguous forested blocks within the County. Besides being habitat suitable for many native species, unfragmented forest blocks in close proximity to each other become natural corridors for species movement within and through the county. In many cases, by highlighting the larger forested blocks, the most natural landscape corridors become evident.

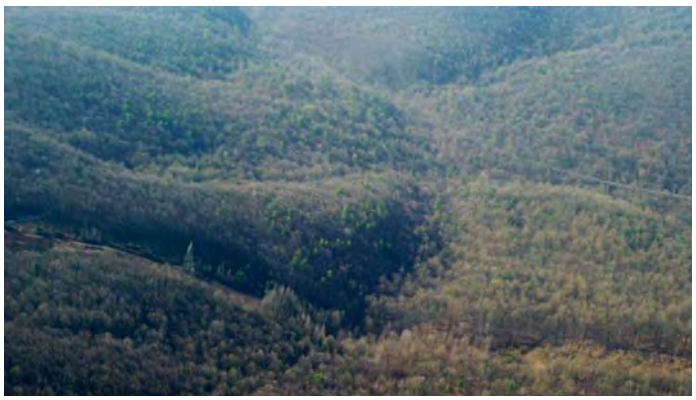
GIS Methodology: Creating NAI Forest Block Layers

The Pennsylvania portion of the National Land Cover Dataset (NLCD) was created as part of land cover mapping activities for Federal Region III that includes the states of Maryland, Delaware, Pennsylvania, Virginia, West Virginia, and the District of Columbia. The NLCD classification contains 21 different land cover categories with a spatial resolution of 30 meters. The NLCD was produced as a cooperative effort between the U.S. Geological Survey (USGS) and the U.S. Environmental Protection Agency (US EPA) to produce a consistent, land cover data layer for the conterminous U.S. using early 1990s Landsat thematic mapper (TM) data. The analysis and interpretation of the satellite imagery was conducted using very large, sometimes multi-state image mosaics (i.e. up to 18 Landsat scenes). Using a relatively small number of aerial photographs for 'ground truth', the thematic interpretations were necessarily conducted from a spatially-broad perspective. **This evaluation must be made remembering that the NLCD represents conditions in the early 1990s** (The Nature Conservancy 1999).

Deciduous, evergreen and mixed forest land cover types were grouped to provide a single "forested" cover type. This forest block layer was overlain by the Penn DOT road layer to identify forest blocks fragmented by roads. The Penn DOT right-of-way (ROW) distance was applied as a buffer to roads: Interstates have a 500-foot ROW, PA and US designated roads have a 150-foot ROW, local roads have a 100-foot ROW. Forest blocks with an area of greater than 250 acres were selected from the forest land cover type. This process highlights interior forest blocks greater than 250 acres in area as presented below.

Large Unfragmented Forest Blocks of Cumberland, Dauphin and Perry Counties





Large, relatively unfragmented forested areas cross the Tri-county area, providing valuable habitat for many species of plants and animals. The connected forest blocks also act as important migration corridors for dispersal throughout the region.

Fragmenting features, such as roads, powerlines and buildings, greatly diminish the long-term viability of these areas. A concerted effort should be made to guide such projects away from these remaining large forested areas.

CONSERVATION RECOMMENDATIONS

The following are general recommendations for protection of natural areas within a county. Approaches to protecting a natural area are wide-ranging and factors such as land ownership, time constraints, and tools/resources available should be considered when prioritizing protection of these sites. Prioritization works best within a planning situation, however, opportunities may arise that do not conform to a plan and the decision on how to manage or protect a natural heritage area may be made on a site-by-site basis. Keep in mind that personnel in our program or staff from state natural resource agencies are available to discuss more specific options as needed.

1. Consider conservation initiatives for natural areas on private land.

Conservation easements protect land while leaving it in private ownership. A conservation easement is a legal agreement between a landowner and a conservation or government agency that permanently limits a property's use in order to protect its conservation values. It can be tailored to the needs of both landowner and conservation organization. Tax incentives apply to conservation easements.

Leases, management agreements, and mutual covenants also allow the landowner to retain ownership and ensure permanent protection of land, though in a much more limited way. There are no tax deductions for these conservation methods. A lease to a land trust or government agency can protect land temporarily and ensure that its conservation values will be maintained. This can be a first step to help a landowner decide if they want to pursue more permanent protection methods. Management agreements require landowner and land trust to work together to develop a plan for managing resources such as plant or animal habitat, or protecting a watershed. Mutual covenants can be appropriate where land protection is important to several landowners but not of sufficient benefit to the general public to warrant a conservation easement.

Land acquisition can be at fair market value, as a last resort by conservation organization, or as a bargain sale in which a sale is negotiated for a purchase price below fair market value with tax benefits that reduce or eliminate the disparity. The NAI will help to pinpoint areas that may be excellent locations for new county or township parks. Sites that can serve more than one purpose such as wildlife habitat, flood and sediment control, water supply, recreation, and environmental education would be particularly ideal. Private lands adjacent to public should be examined for acquisition when a priority site is present on either property and there is a need of additional land to complete protection of the associated natural features.

Fee simple acquisition gives landowner maximum control over the use and management of the property and its resources. This conservation initiative is appropriate when the property's resources are highly sensitive and protection cannot be guaranteed using other conservation approaches.

Local zoning ordinances are one of the best-known regulatory tools available to municipalities. Examples of zoning ordinances a municipality can adopt include: overlay districts where the boundary is tied to a specific resource or interest such as riverfront protection and floodplains, and zoning to protect stream corridors and other drainage areas using buffer zones.

2. Prepare management plans that address species of special concern and natural communities.

Many of the already-protected natural areas are in need of additional management recommendations to ensure the continued existence of the associated natural elements. We hope that managers will incorporate specific recommendations into existing plans or prepare new plans. These may include: removal of exotic plant species; leaving the area alone to mature and recover from previous disturbance; creating natural areas within existing parks; limiting land-use practices such as mineral extraction, residential or industrial development, agriculture and certain forestry practices.

Existing parks and conservation lands provide important habitat for plants and animals at both the county level and on a regional scale. For example, these lands may serve as nesting or wintering areas for birds or as stopover areas during migration. Management plans for these areas should emphasize a reduction in activities that fragment habitat. Adjoining landowners should be educated about the importance of their land as it relates to species of special concern and their habitat needs and agreements should be worked out to minimize encroachments that may threaten native flora and fauna.

3. Protect bodies of water.

Protection of reservoirs, wetlands, rivers, and creeks is vital; especially those that protect biodiversity, supply drinking water, and are attractive recreational resources. Many sites that include rare species, unique natural communities or locally significant habitats are associated with water. Protection of high quality watersheds is the only way to ensure the viability of natural habitats and water quality. Land managers and township officials should scrutinize development proposals for their impact on entire watersheds not just the immediate project area. Cooperative efforts in land use planning among municipal, county, state, and federal agencies, developers, and residents can lessen the impact of development on watersheds.

4. Provide for buffers around natural areas.

Development plans should provide for natural buffers between disturbances and natural areas, be it a barrens community, wetland, water body, or forest. Disturbances may include construction of new roads and utility corridors, non-conservation timber harvesting, and disruption of large pieces of land. County and township officials can encourage landowners to maintain vegetated buffer zones within riparian zones. Vegetated buffers (preferably of PA-native plant species) help reduce erosion and sedimentation and shade/cool the water. This benefits aquatic animal life, provides habitat for other wildlife species, and creates a diversity of habitats along the creek or stream.

Watersheds or subwatersheds where natural communities and species of special concern occur (outlined on the Township maps in this report) should be viewed as areas of sensitivity, although all portions of the watershed may not be zones of potential impact. As an example, conserving natural areas around municipal water supply watersheds provides an additional protective buffer around the water supply, habitat for wildlife, and may also provide low-impact recreation opportunities.

5. Reduce fragmentation of surrounding landscape.

Residents and township officials should encourage development in sites that have already seen past disturbances. Care should be taken to ensure that protected natural areas do not become "islands" surrounded by development. In these situations, the site is effectively isolated and its value for wildlife is reduced. Careful planning can maintain natural environments and the

plants and animals associated with them. A balance between growth and the conservation of natural and scenic resources can be achieved by guiding development away from the most environmentally sensitive areas.

The reclamation of previously disturbed areas, or brownfields development, for commercial and industrial projects presents one way to encourage economic growth while allowing ecologically sensitive areas to remain undisturbed. Cluster development could be used to allow the same amount of development on much less land and leave much of the remaining land intact for wildlife and native plants. By compressing development into already disturbed areas with existing infrastructure (villages, roads, existing ROW's), large pieces of the landscape can be maintained intact. If possible, networks or corridors of woodlands or greenspace should be preserved linking sensitive natural areas to each other.

6. Encourage the formation of grassroots organizations.

County and municipal governments can do much of the work necessary to plan for the protection and management of natural areas identified in this report. However, grassroots organizations are needed to assist with obtaining funding, identifying landowners who wish to protect their land, providing information about easements, land acquisition, and management and stewardship of protected sites. Increasingly, local watershed organizations and land trusts are taking proactive steps to accomplish conservation at the local level. When activities threaten to impact ecological features, the responsible agency should be contacted. If no agency exists, private groups such as conservancies, land trusts and watershed associations should be sought for ecological consultation and specific protection recommendations.

7. Manage for invasive species.

Invasive species threaten native diversity by dominating habitat used by native species and disrupting the integrity of the ecosystems they occupy. Management for invasives depends upon the extent of establishment of the species. Small infestations may be easily controlled or eliminated but more well established populations might present difficult management challenges. Below is a list sources for invasive species information.

The ***Mid-Atlantic Exotic Plant Pest Council*** (MA-EPPC) is a non-profit organization (501c3) dedicated to addressing the problem of invasive exotic plants and their threat to the Mid-Atlantic region's economy, environment, and human health by: providing leadership; representing the mid-Atlantic region at national meetings and conferences; monitoring and disseminating research on impacts and controls; facilitating information development and exchange; and coordinating on-the-ground removal and training. A membership brochure is available as a pdf file at http://www.ma-eppc.org .

Several excellent web sites exist to provide information about invasive exotic species. The following sources provide individual species profiles for the most troublesome invaders, with information such as the species' country of origin, ecological impact, geographic distribution, as well as an evaluation of possible control techniques. The Nature Conservancy's Weeds on the Web at http://tncweeds.ucdavis.edu/. The Virginia Natural Heritage Program's invasive plant page at http://www.dcr.state.va.us/dnh/invinfo.htm. The Missouri Department of Conservation's Missouri Vegetation Management Manual at http://www.conservation.state.mo.us/nathis/exotic/vegman/. The following site is a national invasive species information clearinghouse listing numerous other resources on a variety of related topics: http://www.invasivespecies.gov/.

RESULTS

Each year biologists meet to discuss and rank the most important sites for the protection of biodiversity in Pennsylvania. This meeting consists of a review and ranking of all sites within the state, in terms of the rarity and quality of the species or habitats of concern, potential threats, and protection needs. The results of these meetings provide a baseline for evaluating the statewide significance of the sites recognized in the Natural Areas Inventory.

Priorities for Protection

The Natural Areas Inventory recognizes sites at two primary levels of significance for the protection of biological diversity: 1) sites of statewide importance and 2) sites of local significance.

Table 1 in this section lists all sites identified within the county with natural communities and species of concern by order of priority for protection. These sites are displayed in UPPER CASE LETTERS throughout the report. This table ranks sites from the most important and threatened to the least. Ranks are based on rarity, quality, and threats or management needs of the elements at the site. Sits in this category that are ranked 1 or 2 may contain some of the best natural areas in the state. Table 1 lists the site name, local jurisdiction(s), and pertinent information about the site's significance. A more detailed description of each site is included in the text for each Township in which it occurs.

Locally significant sites are indicated in Title Case Letters throughout the document, and are briefly discussed in the text accompanying each map. These are sites at which species of special concern or high-quality natural communities could not be documented during the survey period. These areas are not exemplary at the state level, but may be important at the county level. Examples would include relatively intact forested areas, large wetlands, and other areas significant for maintaining local biodiversity. Additionally, sites from the 2000 NAI report that supported species of plants or animals that have since been removed from the species of concern list due to a reevaluation of their state status are retained as locally significant sites in this update. These secondary sites are listed in Table 2 accompanied by qualitative ranks (high, medium, or low) according to size, level of disturbance, proximity to other open-space lands, and potential for sustaining a diversity of plant and animal life. These secondary site ranks must be viewed as very approximate.

Each of the primary sites identified in this report has associated with it mapped areas described as **Core Habitat** and **Supporting Landscape**. Core Habitat areas are intended to identify the essential habitat of the species of concern or natural community that can absorb very little activity or disturbance without substantial impact to the natural features. The Supporting Landscape identifies areas surrounding or adjacent to core habitat that are not considered the primary habitat of the specis of concern or natural community, but may serve as secondary habitat. These areas also provide support by maintaining vital ecological processes as well as isolation from potential environmental degradation. Supporting Landscape areas may be able to accommodate some types of activities without detriment to natural resources of concern.

Exceptional Natural Feature: The Susquehanna River

In considering the value of specific sites for the preservation of biological diversity it is important to note that these sites are dependent on the integrity of larger scale systems such as the Susquehanna River and its tributary watersheds. The Susquehanna River and its adjacent forested watersheds comprise one of the major corridors for the movement of biota in central Pennsylvania. This includes the habitat for resident species, habitat required for migrating birds on a biannual basis, habitat for resident and migratory aquatic animals, habitat needed for the long term survival of plant species, and more. Conserving the best sites as highlighted in this report must be considered as part of the effort to conserve the greater natural functional value of the river corridor. In reviewing the report it is evident that many of the best natural sites within the three counties are along the river and its major tributaries. Along with these sites are many areas that were beyond the scope of this project to fully investigate. Any intact natural area in or adjacent to the these waterways should be considered potential important habitat. The development of a comprehensive conservation plan for the portions of the three counties adjacent to the river and its major tributaries, conducted in conjunction with other counties in the lower Susquehanna River Basin, may be the best tool for conserving this important natural resource. Nearly all of the region is in the Susquehanna watershed, and soil and groundwater conservation and protection throughout the three counties will benefit biological diversity in the counties as well as downstream.

Susquehanna River near Harrisburg

Kittatinny Ridge at Blue Mountain

Exceptional Natural Feature: The Kittatinny Ridge

The southern border of Perry County follows the ridgeline of Blue Mountain, or North Mountain, part of the Kittatinny Ridge. This mountain range stretches southwesterly from southern New York and northwestern New Jersey, continuing through southeastern Pennsylvania and terminating near the Maryland border. The ridge is world-renowned as a transportation corridor for migrating raptors and songbirds as well as for the movement of other biota in the northeastern United States. The ridge functions as an interstate greenway, linking many of southeastern Pennsylvania's most biologically important areas with each other. Without this resulting connectivity, these biologically rich areas would become functional islands in a sea of farmland, suburban development and other lands modified by human activity, effectively severing modes of reproductive mingling and dispersal for many species of plants and animals.

The Kittatinny Ridge Project, led by Audubon Pennsylvania, is a collaborative effort of local, regional, and state organizations and agencies to focus public attention on the importance of the Ridge through Pennsylvania and to promote conservation activities to protect the Ridge from further habitat loss, fragmentation, and inappropriate land use.

Species of Concern: Timber Rattlesnake

The ridges and boulder fields of the Appalachian Mountains have historically provided extensive habitat for the PA-candidate G4, S3S4 timber rattlesnake (*Crotalus horridus*). The Pennsylvania Fish and Boat Commission (PFBC) has been gathering information regarding the status of the timber rattlesnake in the state, in particular the South Mountain region, for several years. In order to enhance the protection of the timber rattlesnake in Pennsylvania, the locations of known den and breeding sites are not identified in this report. However, important habitats for the timber rattlesnake occur the length of the mountains in northern Dauphin County. Some of these habitats are included in the sites identified in this report for other species or communities, but persistence of this species in the county and region will depend on maintaining connectivity of the rocky forested ridges that provide habitat for den and breeding sites.

Timber rattlesnakes primarily occur on south or southwest-facing slopes, on rocky slopes where they can find refuge in spaces between the boulders as well as thermoregulate in the sunny openings. Hibernacula, or dens, often are found under canopy cover but are usually located within several hundred meters of an open basking site. Persistence of these sites relies on forestry practices that maintain a diversity of open areas adjacent to forested foraging habitat. Additionally, these habitats should be buffered and protected from development to reduce human-snake encounters.

The following sections contain brief descriptions outlining the top priority sites for each county, and tables listing all sites in the county. Complete descriptions for all sites, arranged by township in alphabetical order, are presented in the Results.

Top Priority Natural Areas in Perry County

All of the natural areas in the county are important to maintaining biodiversity in the region and the state. However, the following six sites from Table 1 are the most critical at present for maintaining Perry County's biological diversity into the future. More detailed descriptions and mapped locations of all sites are included in the Results section that follows.

BOX HUCKLEBERRY STATE FOREST NATURAL AREA (Centre Township) This site is an approximately 10-acre oak-heath forest occupying a dry, northwest-facing slope. White pine, chestnut oak, Virginia pine, and black oak are the dominant overstory species, with white pine, black-gum, and various oaks in the understory. A **G3, S1 PA-threatened shrub species, box huckleberry (*Gaylussacia brachycera*)**, is a dominant species in the groundcover on about eight acres of the site. Associated groundcover includes tree seedlings, wintergreen black huckleberry, mountain laurel, blueberry, spotted wintergreen, wild sarsparilla, and rattlesnake-weed. This is the largest population of the species in the state, and it is thought to have persisted at the site for over 1200 years. The site was heavily logged approximately 50 years ago and is now protected as a State Forest Natural Area. The box-huckleberry is reproducing and no immediate threats are evident.

However, this species is relatively shade-intolerant, and the population should be monitored as the forest matures.

WATTS MOUNTAIN (Watts Township) This site is a series of parallel ridges on the eastern side of the Juniata River and U.S. Routes 22-322. The ridges have very steep, mostly wooded slopes and a well drained, shale or shale-sandstone substrate. Hemlock is present, and sometimes dominant, on the moister and cooler lower slopes, while mixed hardwoods and pines grow on the upper slopes. The overall quality of the site has been degraded by logging and encroaching agriculture, but particularly by highway construction during the expansion of Routes 22-322 in the 1960s. Despite these disturbances, various portions of the wooded north-facing upper slopes support a good-ranked population of **G3, S1 PA-endangered box huckleberry (*Gaylussacia brachycera*)**. The landowner supports conservation of the plant on this property, and no immediate threats are apparent. The site should be monitored to ensure that deer browse or increased shading do not adversely affect the species of concern.

SECOND NARROWS SLOPES (Toboyne Township and Franklin County)

Includes former sites: THREE SQUARE HOLLOW PONDS, SECOND NARROWS POND, LAUREL RUN ROAD, and SHERMAN MOUNTAIN-GUNTER ROAD. This site contains a fair to good quality **Ephemeral/Fluctuating Natural Pool Community** in State Game Lands 76. The ponds contain a fair to good quality population of **Northeastern Bulrush (*Scirpus ancistrochaetus*)**, **a PA-endangered G3, S3** plant species of concern. The Federally endangered status of this plant indicates that the species is in danger of extinction throughout all or a significant portion of its range. The northeastern bulrush is primarily found in temporary ponds and other pools with fluctuating water levels. These ponds also typically provide important breeding habitat for forest dwelling amphibians such as the wood frog, and the spotted salamander. Associated species include rattlesnake mannagrass, woolgrass, royal fern, and three-way sedge. The surrounding woods consisted of canopy trees such as red maple, black tupelo, black birch, black locust, and various oak species. Multiflora rose is present along the roadside but it and other exotics do not pose a direct threat to the population.

A small population of **Purple Bedstraw (*Galium latifolium*) a G5, S3** plant species of concern was documented on the dry loose-shale slopes of Price Knob in Tuscarora State Forest. Additionally, the rocky eastern portion of this site supports a population of **PA-threatened Allegheny woodrat (*Neotoma magister*)**.

Threats and Disturbances

Logging and other changes in the habitat adjacent to the ponds would decrease the quality of the habitat for the populations of Northeastern bulrush at this location. The increased use of All Terrain Vehicles (ATVs) in public forest property poses a potential threat to the site.

Conservation Recommendations

Logging should be avoided near the ponds in this area, and an undisturbed forested buffer should be maintained around each vernal pond. The site should be monitored for ATV traffic, and trails near the ponds blocked as they appear.

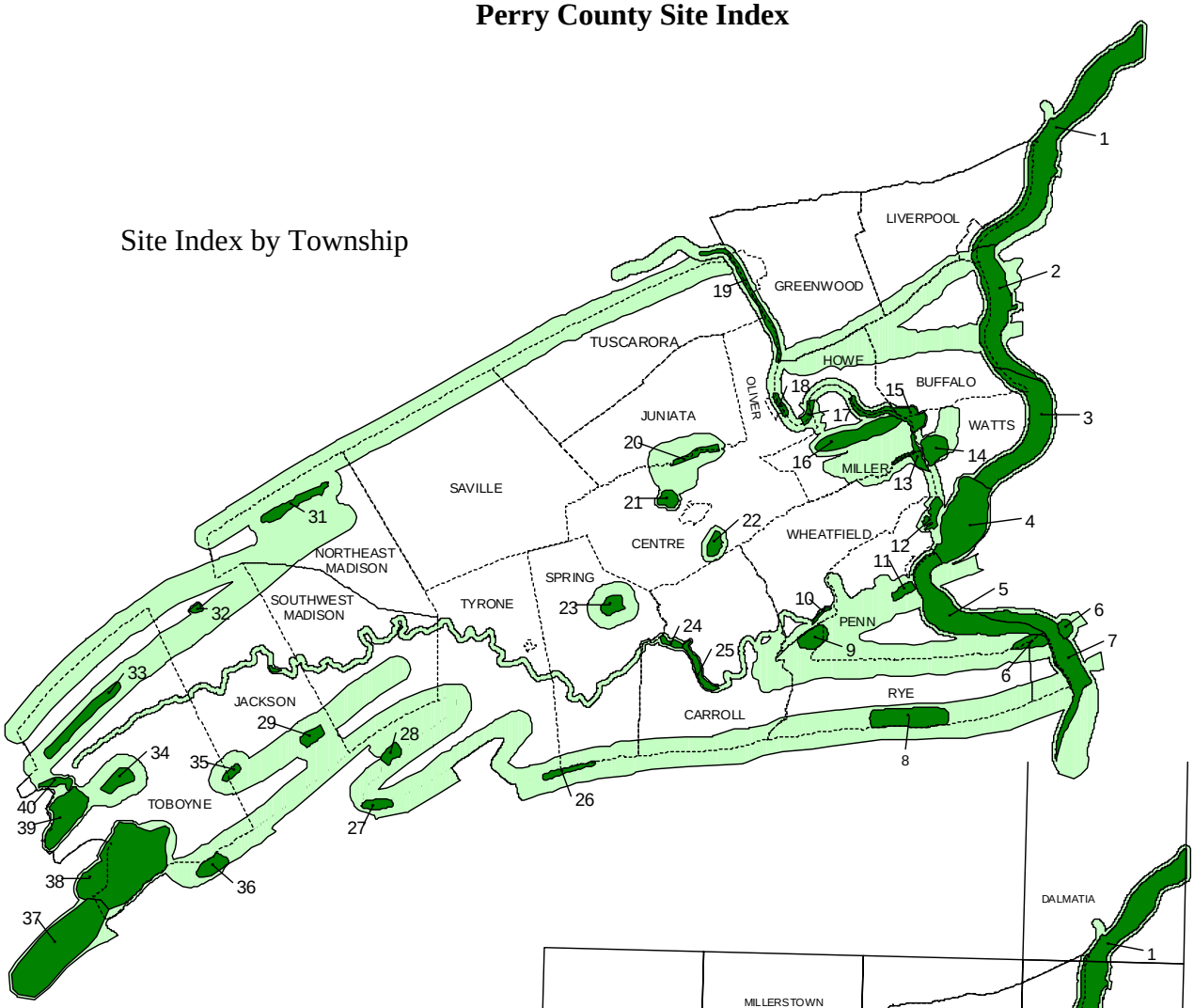
LAMBS GAP/TROUT RUN HEADWATERS—UPDATED—(Rye Township) This site supports a fair quality example of a **S2S3 Circumneutral Broadleaf Swamp Natural Community**. It is comprised of a series of broad seeps, which occur in the bottom of a valley between Little Mountain and Blue Mountain. The swamp is dominated by American beech, black birch, and tulip poplar with an understory of smooth alder and spicebush. The substrate of the seeps is relatively deep muck. Moss-covered hummocks support shrub copses, trees, and several species of fern. A wide diversity of herbs, sedges, and grasses grows within the swamp as well as along its margins. Skunk cabbage and jewelweed are dominant herbs. The site supports a good quality population of **G3, S1 PA-endangered glade spurge (*Euphorbia purpurea*).** During recent surveys, three animal species of concern were found. The relative isolation of the site, tucked between the mountains, makes it good habitat for a number of common birds, reptiles, and amphibians. A few species that have been observed here during our field surveys include wood and green frogs, dusky and red-backed salamanders, northern water snakes, and 26 species of birds. The swamp is undisturbed except for some nearby mountain bike trails. Adjacent slopes on the two mountains were both clear cut over ten years ago but the clear cutting does not appear to have impacted the hydrology of the site. Opportunistic exotic species that frequently colonize disturbed areas may invade the clear cuts and potentially threaten the quality of the site. Limiting disturbances in this watershed, particularly by re-routing the existing bike trails, will help to maintain the quality of this site and allow the globally rare species to persist here. This site is located in State Game Lands 170.

MILLIGAN RIDGE PONDS –UPDATED—(Spring Township) This site consists of a group of woodland ponds located in an upland area between Germany Ridge and Milligan Ridge. The surrounding uplands have a well-drained, acidic, sandy soil, with a forest of oak, hickory, pine, and heaths. The ponds themselves are flooded in the spring but dry by late summer. Around the margins of the pools are red maple, black-gum, sweet birch, greenbriar, winterberry, highbush blueberry, huckleberry, and button-bush, along with royal fern, cinnamon fern, and Sphagnum moss. The **G3, S3 PA-endangered Northeastern Bulrush (*Scirpus ancistrochaetus*)** is found in at least two of these ponds. It grows in the middle of the pools, on organic substrate, and is associated with wool-grass, mannagrass, soft rush, marsh-St.-Johns-wort, and various sedges. This good-quality population is large and reproducing. Any logging or development in the area should include buffers to protect the quality of these pools and the species of concern.

PEPPERBUSH HILL PONDS/LIBERTY VALLEY POOLS—UPDATED—(Northeast Madison Township) This site is a group of at least 12 vernal ponds on a low ridge at the base of Tuscarora Mountain. The ponds are on level or gently sloping terrain; surrounding area is well-drained, acidic, oak-hickory-pine-heath woods. The perimeters of the ponds have red maple, black-gum, pin oak, and sweet-birch trees, and thickets of greenbriar, dangleberry, maleberry, pepperbush, chokeberry, cinnamon fern, and royal fern. Some of the pond beds are unvegetated, while others have dense herbaceous and shrubby vegetation. Two of the ponds contain **Northeastern Bulrush (*Scirpus ancistrochaetus*)**, **a PA-endangered G3, S3** plant species of concern. The species of concern is associated with buttonbush, three-way sedge, St. Johns-wort, soft rush, woolly bulrush, and various sedge species. The species of concern was observed in fruit and appeared healthy. The surrounding woods have been selectively-logged, and a small amount of slash put in the ponds. Providing a buffer for the ponds in the event of future logging will help the species of concern to persist.

Perry County Site Index

Site Index by Township



Site Index by USGS Quadrangle

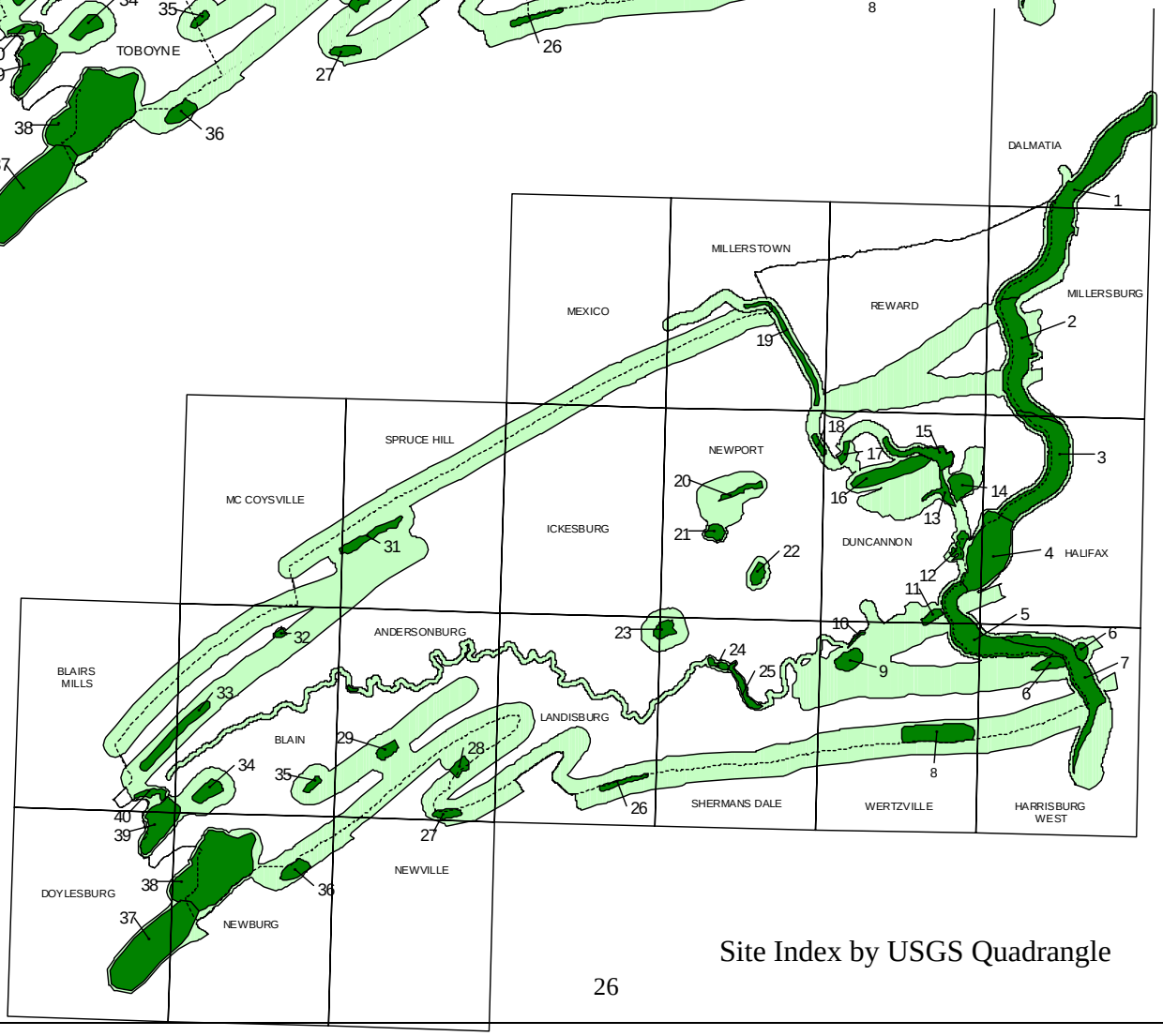


Table 1. The sites of statewide significance for the protection of biological diversity in Perry County in approximate order of priority from the most important (rank = 1) to the least (rank = 5). The presence of species of special concern and/or exemplary natural communities has been documented at these sites. More in-depth information on each site including detailed site descriptions and management recommendations where appropriate can be found in the text of the report following the maps for each municipality. Quality ranks, legal status, and last observation dates for species of special concern and natural communities are located in the table that precedes each map page.

Ranking of Statewide Significant Sites

County Rank[1]	Site Name (Site #)	Municipality	PA Heritage Ranks[2] and Site Importance	Page(s)
1	BOX HUCKLEBERRY STATE FOREST NATURAL AREA #22	Centre Twp.	This site an approximately 10-acre oak-heath forest occupying a dry, northwest-facing slope. A **G3, S1 PA-threatened shrub species, box huckleberry (*Gaylussacia brachycera*)**, is a dominant species in the groundcover on about eight acres of the site. This is the largest population of the species in PA, and it is thought to have persisted at the site for over 1200 years. The site was heavily logged approximately 50 years ago and is now protected as a State Forest Natural Area.	42
1	LAMBS GAP/TROUT RUN HEADWATERS #8 **UPDATED**	Rye Twp.	This site supports a fair quality example of a **S2S3 Circumneutral Broadleaf Swamp Natural Community**. The site supports a good quality population of **G3, S1 PA-endangered glade spurge (*Euphorbia purpurea*).** Three animal species of concern were also located during surveys in 2001 and 2002.	66
2	SECOND NARROWS SLOPES #38 **UPDATED**	Toboyne Twp. & Franklin Co.	This site contains a fair to good quality **Ephemeral/Fluctuating Natural Pool Community** in State Game Lands 76. The ponds contain a fair to good quality population of **Northeastern Bulrush (*Scirpus ancistrochaetus*)**, **a PA-endangered G3, S3** plant species of concern. A small population of **Purple Bedstraw (*Galium latifolium*) a G5, S3** plant species of concern was documented on the dry loose-shale slopes of Price Knob in Tuscarora State Forest. Additionally, the rocky eastern portion of this site supports a population of **PA-threatened Allegheny woodrat (*Neotoma magister*)**.	76

County Rank[1]	Site Name (Site #)	Municipality	PA Heritage Ranks[2] and Site Importance	Page(s)
2	WATTS MOUNTAIN #14	Watts Twp.	Watts Mountain is a series of parallel ridges on the eastern side of the Juniata River and U.S. Routes 22-322. Various portions of the wooded north-facing upper slopes support a good-ranked population of **G3, S1 PA-endangered box huckleberry (*Gaylussacia brachycera*)**.	84
3	AQUEDUCT BLUFFS/ JUNIATA RIVER SCOUR #12	Penn, Watts Twps. & Dauphin Co.	**The S2, PA-threatened jeweled shooting star (*Dodecatheon radicatum*)** occupies moist limestone cliffs on the west side of the Juniata. The **G4, S1 PA-endangered flat-stemmed spike rush (*Eleocharis compressa*)** occurs along a scoured area of riverbank, growing on sparsely populated bedrock ridges at the water's edge. Also occurring with the spike rush is the **G5, S4 lance fog fruit (*Phyla lanceolata*)**, which has been delisted since the 2000 report.	62, 84
3	BOWERS MOUNTAIN SITE – EAST #29	Jackson Twp.	This southeast-facing forested mountain slope supports the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**.	48
3	BOWERS MOUNTAIN SITE-WEST #35	Jackson, Toboyne Twps.	This southeast-facing forested mountain slope supports the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**.	48, 76
3	CONOCOCHEAGUE MOUNTAIN SITE #33 **NEW**	Toboyne Twp.	Active signs of **G3G4, S3 PA-threatened Allegheny woodrat (*Neotoma magister*)** were located at the crest of this mountain during surveys in 1996. The same species was again located on the Conococheague Mountian at a site to the southwest.	76
3	COVE MOUNTAIN SLOPES #11	Penn Twp.	This site is a fair-quality example of a rich **S2 Mesic Central Forest Natural Community**. The community occupies a rocky, north-facing lower slope of Cove Mountain bounded on the north by Shermans Creek.	62
3	FOWLER HOLLOW ROAD SITE #34	Toboyne Twp.	This forested slope on the north side of Fowler Hollow Run supports the **G3G4, S3 PA-threatened Allegheny woodrat (*Neotoma magister*)**.	76

County Rank[1]	Site Name (Site #)	Municipality	PA Heritage Ranks[2] and Site Importance	Page(s)
3	MILLIGAN RIDGE PONDS #23 **UPDATED**	Spring Twp.	This site consists of a group of woodland ponds located in an upland area between Germany Ridge and Milligan Ridge. The **PA-endangered G3, S3Northeastern Bulrush (*Scirpus ancistrochaetus*)** is found in at least two of these ponds. This good-quality population is large and reproducing.	74
3	PEPPERBUSH HILL PONDS / LIBERTY VALLEY POOLS #31 **UPDATED**	Northeast Madison Twp.	This site is a group of at least 12 vernal ponds on a low ridge at the base of Tuscarora Mountain. Two of the ponds contain **Northeastern Bulrush (*Scirpus ancistrochaetus*), a PA-endangered G3, S3** plant species of concern. The species of concern was observed in fruit and appeared healthy.	58
3	SUSQUEHANNA RIVER AT FORT HUNTER-ROCKVILLE #7 **NEW**	Marysville Boro. & Dauphin Co.	This site is located in the Susquehanna River and is characterized by a bedrock bottom covered with gravel and cobbles with boulders. It supports **three species of rare aquatic animals**.	66
3	SUSQUEHANNA RIVER AT SPEECEVILLE #5 **NEW**	Penn Twp. & Dauphin Co.	A pair of nesting Bald Eagles was documented among the river islands at this site.	62
3	WAGGONERS GAP #26 **NEW**	Tyrone Twp. & Cumberland Co.	This site is located on the crest of Blue Mountain in the vicinity of Waggoners Gap. This site supports two species of concern, the **G5, S3 Prickly-pear cactus (*Opuntia humifusa*) and the G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**.	82
3	WHITE RUN VALLEY #16	Miller Twp.	A good population of **G5, S3 puttyroot (*Aplectrum hyemale*)** is found growing in a rich oak and tulip-tree forest with a dense understory of spicebush. The site also supports the **Northeastern Bulrush (*Scirpus ancistrochaetus*), a PA-endangered G3, S3** plant species of concern occupying a series of small wetland pools in the White Run Valley.	54
4	FLAT ROCK SITE #27 - **NEW**	Tyrone Twp. & Cumberland Co.	This southeast facing forested mountain slope supports the presence of the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**.	82

County Rank[1]	Site Name (Site #)	Municipality	PA Heritage Ranks[2] and Site Importance	Page(s)
4	GUNTER VALLEY AND RIDGES #37 **NEW**	Toboyne Twp. & Franklin, Cumberland Cos.	This site is the watershed for a High Gradient Clearwater Creek natural community, designated as an Exceptional Value Stream by the PA Department of Environmental Protection. One individual of **Northern Myotis *(Myotis septentrionalis),*** a G4 S3B, S3N animal species of concern, was captured above a small stream (Trout Run) habitat feeding a large reservoir. Also at this site, an individual of **a G4, S3S4 animal species of concern** was found in 2002.	76
4	JUNIATA RIVER AT HALF FALLS/HALF FALLS MOUNTAIN #15 **UPDATED**	Buffalo, Howe, Miller, Watts Twps.	This site consists of a section of the Juniata River, with a ledge (Half Falls) at the upstream end and riffles and gravel bars downstream. Small populations of **two animal species of concern** were found in were found in an area of shallow quickwater habitat with a substrate of large cobbles and gravel.	36, 46, 54, 84
4	JUNIATA RIVER AT NEWPORT #18	Howe, Oliver Twps. & Newport Boro.	This site is a riffle on the Juniata River. It supports **three animal species of special concern**, all of which were observed alive at the site in 1994.	46, 60
4	JUNIATA RIVER SCOUR AT TRIMMERS ROCK #17	Howe, Miller, Oliver Twps.	A small population of **G4, S1 PA-endangered flat-stemmed spike rush (*Eleocharis compressa*)** was found growing on exposed bedrock ridges near the water's edge, below the spring high-water mark.	46, 54, 60
4	JUNIATA RIVER-MILLERSTOWN TO OLD FERRY STATION #19	Greenwood, Oliver, Tuscarora Twps. & Millerstown Boro.	A fair to good quality population of **a G3/G4 animal species** was found to occupy several separate areas of habitat in the Juniata River.	44, 60, 80
4	LIMESTONE RIDGE WOODS #21	Centre Twp.	A good quality population of **G4?, S1 PA-Endangered oblique milkvine (*Matelea obliqua*)** was observed at this site in an open ridgetop woods. This site was last observed in 1987, and additional surveys are recommended.	42

County Rank[1]	Site Name (Site #)	Municipality	PA Heritage Ranks[2] and Site Importance	Page(s)
4	LITTLE BUFFALO CREEK MARSH #20 **UPDATED**	Centre, Juniata Twps.	This site is an open wetland between Buffalo Ridge and Buffalo Creek. A powerline R.O.W. crosses the wetland. The lepidopteran **black dash (*Euphyes conspicuus*, G4, S3)** was discovered here in 1996. In 1989 a nest of **pied-billed grebe (*Podilymbus podiceps*)** was discovered along the lake shore. No recent observations of this species have been recorded.	42, 50
4	SECOND MOUNTIAN CLIFFS #6	Penn, Rye Twps., & Marysville Boro.	Formerly known as Cove Mountian Outcrop, this site is located on the summit of Cove Mountain near its southern terminus north of Marysville. The site has supported excellent quality populations of the Allegheny woodrat (*Neotoma magister*), as well as Black Vultures, which are no longer considered rare in the state. Neither species was observed in field surveys during the inventory.	62, 66
4	SUSQUEHANNA RIVER AT HALIFAX #3 - **NEW**	Watts & Buffalo Twps. & Dauphin Co.	This site is located in the Susquehanna River at a series of large islands, part of which is included in State Game Lands #254. Two animal species of special concern were found here in 1998.	36, 84
4	SUSQUEHANNA RIVER AT MILLERSBURG #2 - **NEW**	Buffalo Twp. & Dauphin Co.	Three animal species of concern were found here during field surveys in 1997.	36
4	SUSQUEHANNA RIVER AT STATE GAME LANDS #258 # 1 - **NEW**	Liverpool Twp. & Dauphin Co.	This site consists of an archipelago of islands in the Susquehanna River near the Dauphin-Northumberland Co. line. Four animal species of concern were documented at this site.	52
4	THREE SQUARE HOLLOW EAST #4 - **NEW**	Toboyne Twp. & Cumberland Co.	This site consists of the forested crest and steep upper slope of a southeast facing mountain ridge. It supports a fair quality population of the **PA-Threatened Allegheny woodrat (*Neotoma magister*)**.	76
4	THE HEMLOCKS #39	Toboyne Twp.	This site consists of an area of old growth in an isolated mountain valley. The old growth area is a **Northern Conifer Forest Natural Community**, occurring along Patterson Run in a steep, north-facing ravine.	76

County Rank[1]	Site Name (Site #)	Municipality	PA Heritage Ranks[2] and Site Importance	Page(s)
5	BIG KNOB #32 **NEW**	Jackson Twp.	This site is considered an **outstanding geologic feature** of Pennsylvania, consisting of an exposed peak of Tuscarora quartzite, from the Silurian period (405-430 million years ago), located near the Perry and Juniata County border on a folded ridge between Conococheague and Tuscarora mountains.	48
5	BIG ROUND TOP WOODS #40 **UPDATED**	Toboyne Twp.	A mature second-growth, high-elevation forest of mixed conifer and hardwood species occupies this site. A good population of **G5, S3 purple bedstraw (*Galium latifolium*)** was found in these woods in 2003.	76
5	LOSH RUN VALLEY #13	Miller, Wheatfield Twps.	This site is an early succesional rich woods adjacent to Losh Run. A fair population of **G5, S2 PA-threatened common hop-tree (*Ptelea trifoliata*)** occurs here.	54, 88
5	SHERMANS CREEK AT PINE RIDGE #10	Wheatfield Twp.	A small population of an aquatic animal species of concern was found at this site in 1998. Preserving water quality will protect the species of concern as well as the other wildlife which use the Creek.	62, 88
5	SHERMANS CREEK - DROMGOLD TO SHERMANS DALE #25 **UPDATED**	Carroll Twp.	A small population of **an aquatic animal species of concern** was found at several sites along this portion of the Creek in 1998. Another aquatic species of concern was found at the site in 1995; more recent surveys did not rediscover this species.	40
5	STATE GAME LANDS #290 #4	Watts Twp. & Dauphin Co.	This site is at the confluence of the Juniata and Susquehanna Rivers. A fair population of **G4, S1 PA-endangered False loosestrife seedbox (*Ludwigia polycarpa*)** was discovered in 2001 occupying the more open parts of an extremely densely vegetated herb thicket on an island dominated by purple loosestrife and weedy natives. Two aquatic animal species of concern were observed at the site in 1995. An animal species of concern has been breeding at this site since 1991.	84
5	TUSCARORA TRAIL SITE #28 **NEW**	Tyrone Twp. & Cumberland Co.	This site is a rocky forested ridgetop along the border of Cumberland and Perry Counties, dominated by oak. Evidence of the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)** was found here in 1990.	82

Table 2. Areas of local significance in Perry County based on size, diversity of wildlife and plant life, water quality protection, and recreation potential. (These sites do not include high quality natural communities and no species of special concern have been documented at the sites, although several of the areas have potential for rare species to occur.)

Ranking of Locally Significant Sites

County Rank[1]	Site Name (site#)	Municipality	Natural Feature and Importance	Page(s)
HIGH	Bull Run School Cliffs #30	Jackson Twp.	This site is an approximately 150 meter long corridor of north -facing cliffs and steep slopes along Shermans Creek. The flora is diverse and there is potential for rare plant species, although none were found in surveys from the Creek. There is also a very narrow corridor of rich floodplain forest on the other side of the Creek, next to the road, with a diverse spring ephemeral flora.	48
HIGH	Pine Ridge Swamp #9	Penn, Rye Twps.	This site is a forested swamp, which forms the headwaters of Trout Run, a small tributary of Shermans Creek. It is located in a narrow valley between Pine Ridge and Cove Mountain. The swamp is fed by numerous small springs and seeps around its margins. The site has potential as habitat for rare plant species.	62, 66
MED	Gibsons Rock Woods #24	Carroll Twp.	This site is an area of cliffs and woods where Shermans Creek has cut through the east end of Pisgah Ridge. The northerly aspect and the cliffs have allowed some species more typical of northern climes, such as Canada yew and mountain maple to colonize and persist at the site.	40

[1]Ranks are very approximate and are based primarily on the quality of the habitat. Sites with more intact natural communities (on a counties-wide scale) are given highest priority. Other sites represent areas with locally significant woodlands or wetlands or sites that support a particularly rich or unusual flora or fauna. Areas that are already protected as park land or open space may be assigned lower rank to reflect lower urgency for protection action. Sites of similar rank are listed alphabetically by site name.

Natural Areas of Perry County by Township

The Susquehanna River experiences seasonal fluctuation in water level creating ice and flood scoured islands and floodplains that provide valuable habitat for plants and animals adapted to these conditions.

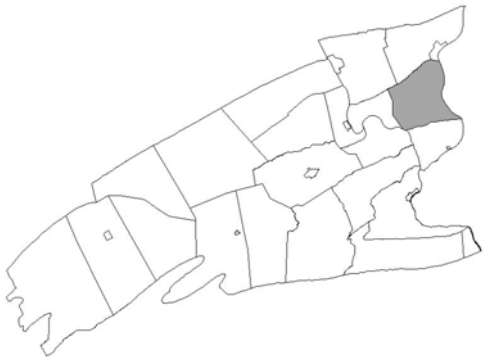
BUFFALO TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Juniata River at Half Falls/Half Falls Mountain (4)	Animal Species of Concern	G3G4	S3S4	N	08-07-98	CD
	Animal Species of Concern	G4	S4	N	08-07-98	E
Susquehanna River at Halifax (4)	Animal Species of Concern	G3G4	S3S4	N	08-28-98	CD
	Animal Species of Concern	G4	S4	N	08-28-98	E
Susquehanna River at Millersburg (4)	Animal Species of Concern	G3G4	S3S4	N	10-24-97	AB
	Animal Species of Concern	G4	S4	N	10-24-97	E
	Animal Species of Concern	G4	S3S4	N	10-24-97	E

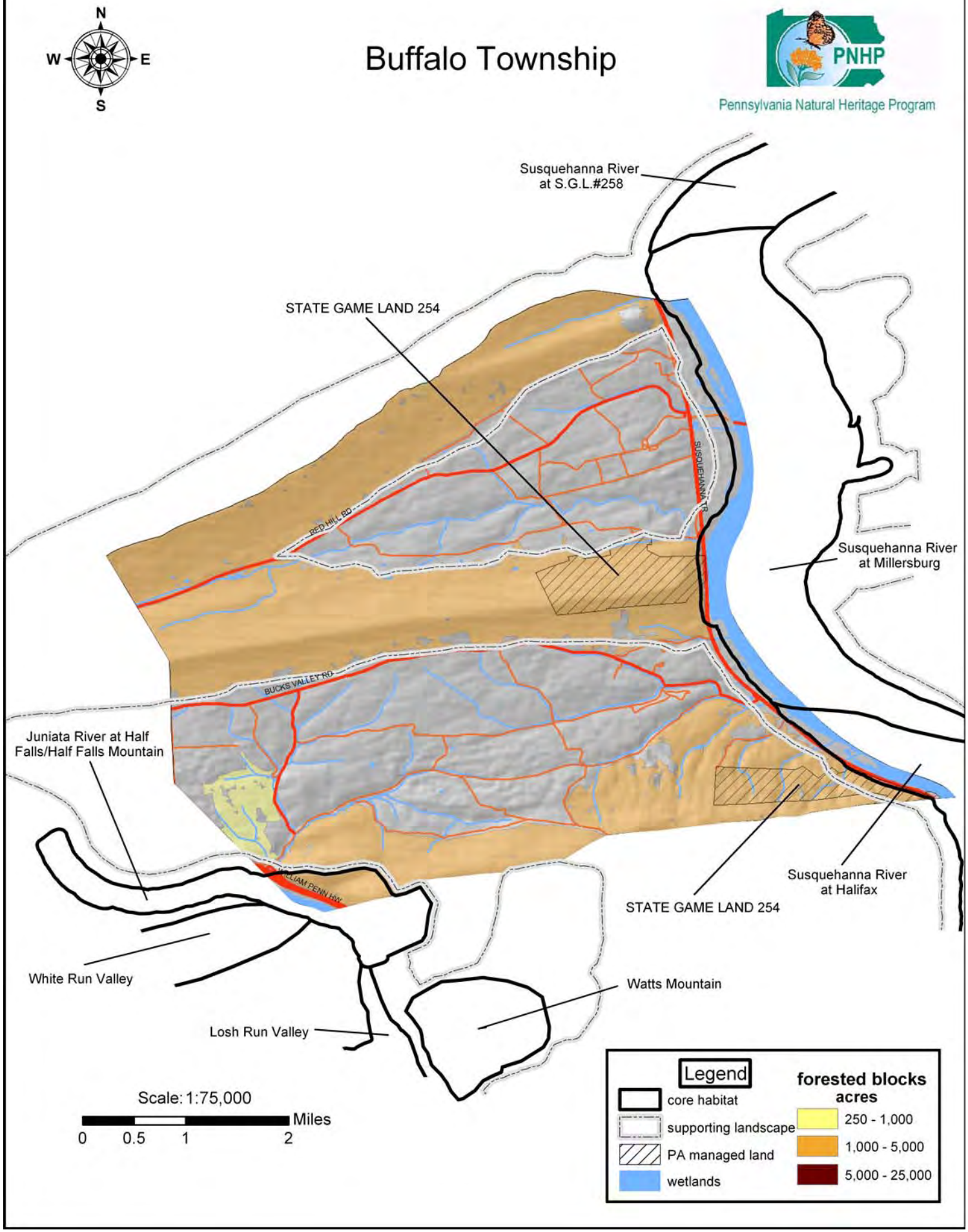
* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: State Game Lands 254



BUFFALO TOWNSHIP MAP


N
W
E
S
Buffalo Township
PNHP
Pennsylvania Natural Heritage Program
Susquehanna River at S.G.L.#258
STATE GAME LAND 254
RED HILL RD
SUSQUEHANNA TR
Susquehanna River at Millersburg
BUCKS VALLEY RD
Juniata River at Half Falls/Half Falls Mountain
WILLIAM PENN HWY
Susquehanna River at Halifax
STATE GAME LAND 254
White Run Valley
Watts Mountain
Losh Run Valley
Scale: 1:75,000
Miles
0
0.5
1
2
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000

BUFFALO TOWNSHIP

Buffalo Township drains to the Juniata River in the southwest and the Susquehanna River along its eastern border. Three forested ridgelines (Buffalo Mountain, Berry Mountain, and Half Falls Mountain) through this township are cut by the Susquehanna River between Perry and Dauphin Counties. These ridges are the source of several headwater streams. Additional large intact forest blocks are found along the Acker and Board Run drainages. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. Increasing riparian buffers along the Susquehanna and its tributaries will help reduce agricultural runoff and erosion and protect the watershed from degradation. Protection of these continuous forested ridges of the Appalachian Mountain Section is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the downstream watersheds.

JUNIATA RIVER AT HALF FALLS—UPDATED—(Buffalo, Howe, Miller, and Watts Townships)

This site consists of a section of the Juniata River, with a ledge (Half Falls) at the upstream end and riffles and gravel bars downstream. Small populations of two animal species of concern were found in an area of shallow quickwater habitat with a substrate of large cobbles and gravel. No aquatic plants were observed. More searching of this and adjacent portions of the Juniata is needed to determine the extent of the population of the species of concern. Protecting the flow levels and water quality of the Juniata is essential to the continued survival of these species.

The upland portion of this site includes Half Falls Mountain, formerly noted as a locally significant site. Route 22-322 cuts through the base of the slope, which is made up largely of talus at its lower end, giving way to a forested upper slope dominated by white pine, hemlock, chestnut and black oaks, and sweet birch. The sparse understory and shrub layers contain flowering dogwood, blueberry, redbud, and poison ivy. A northern fence lizard was observed using the lower talus slope. Sharp bedrock ridges and cliffs along the north and south edges of the slope support table-mountain pine, sassafras, and a variety of lichen species.

Threats and Disturbances

Charcoal in the soil indicates a history of fire at this site in the past. The site is currently undisturbed by human factors, although logging has taken place on the adjacent east-facing slope. Threats to the animal populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:

Maintaining the free-flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

SUSQUEHANNA RIVER AT HALIFAX (Buffalo & WattsTownships and Dauphin County)

This site is located in the Susquehanna River at a series of large islands, part of which is included in State Game Lands #254. Two animal species of special concern were found here in 1998. The river bottom has a bedrock bottom with areas of sand and gravel.

Threats and Disturbances:

Threats to these populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:
Maintaining the free flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

SUSQUEHANNA RIVER AT MILLERSBURG—NEW—(Buffalo Township and Dauphin County)

This site is a portion of the Susquehanna River just upstream of the confluence of the Susquehanna adjacent to Millersburg Borough. A forested island is present in the western half of the river. The river is shallow with low intensity riffles flowing over large cobbles and gravel. Algae and water-stargrass grow scattered on the river bottom. Three animal species of concern were found here during field surveys in 1997.

Threats and Disturbances:
Threats to these populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

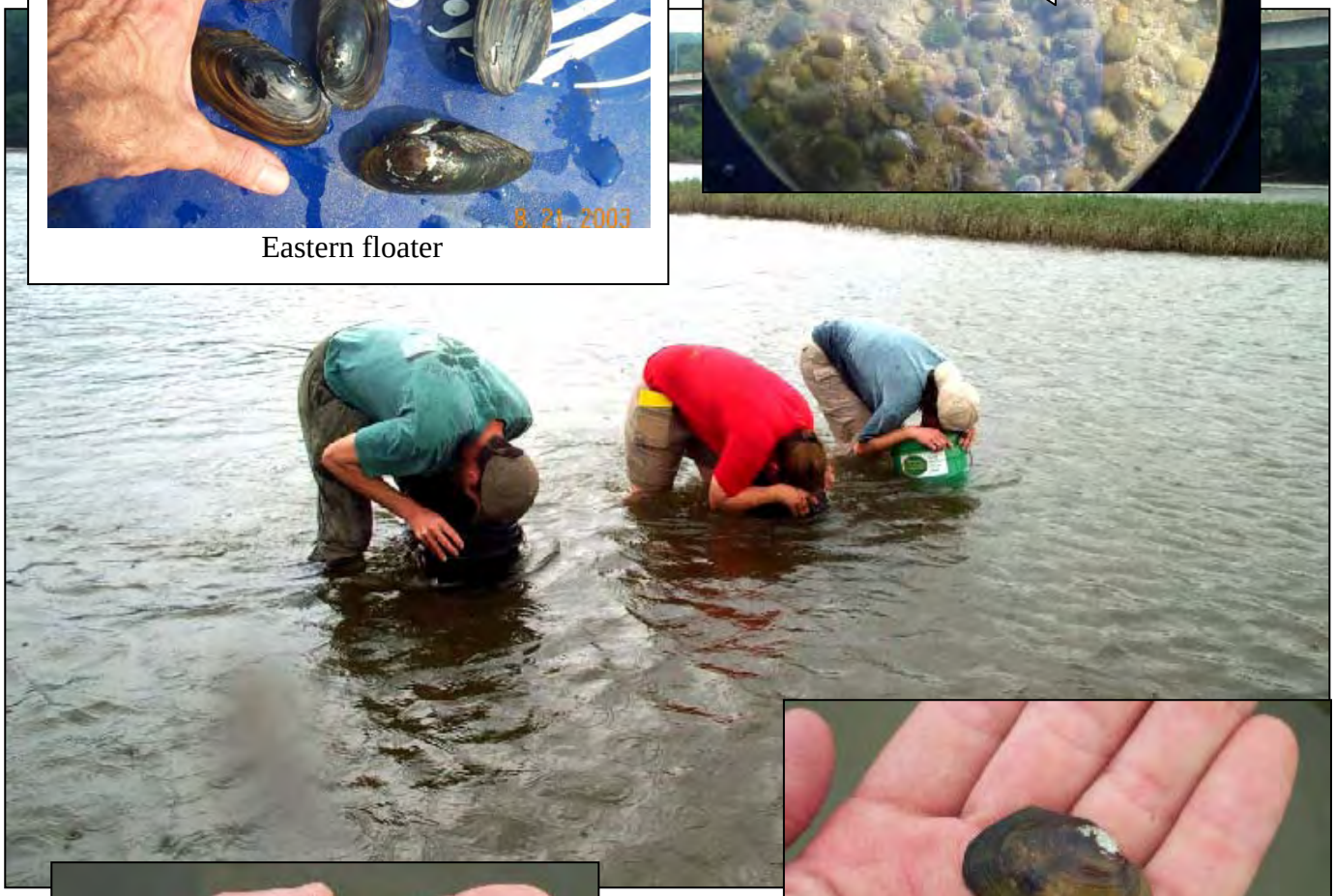
Conservation Recommendations:
Maintaining the free flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

Blue Mountain between Perry and Cumberland Counties is part of the Kittatinny Ridge, an internationally recognized raptor migration corridor that runs from southern New England through Pennsylvania to Maryland. It roughly coincides with the Appalachian Trail in Pennsylvania. The forested ridges and slopes also serve as a migration corridor and habitat for numerous species of animals and plants in the region. Photo: PA Science Office of The Nature Conservancy.

Freshwater Mussels in the Juniata and Susquehanna Rivers

Portions of the Susquehanna River in Cumberland, Dauphin and Perry Counties and the Juniata River in Perry County have very good populations of freshwater mussels. One method of surveying for mussels is to look through the bottom of a bucket that has been replaced with plexiglass. This allows for an unobstructed look at the river bottom. All that is typically seen of mussels is the hinge edge, which is barely protruding above the surface of the gravel substrate.

Eastern floater



Green Floater

Yellow lamp mussel

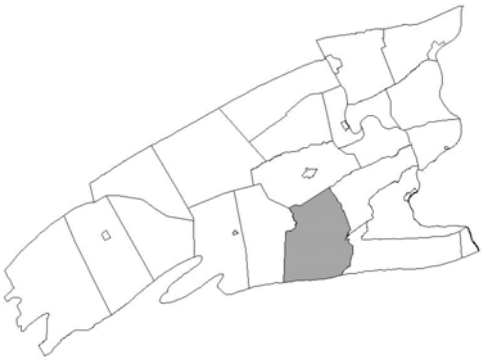
CARROLL TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Shermans Creek-Dromgold to Shermans Dale (5)	Animal Species of Concern	G5	S1	N	1993	E
	Animal Species of Concern	G4	S4	N	07-03-98	E

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

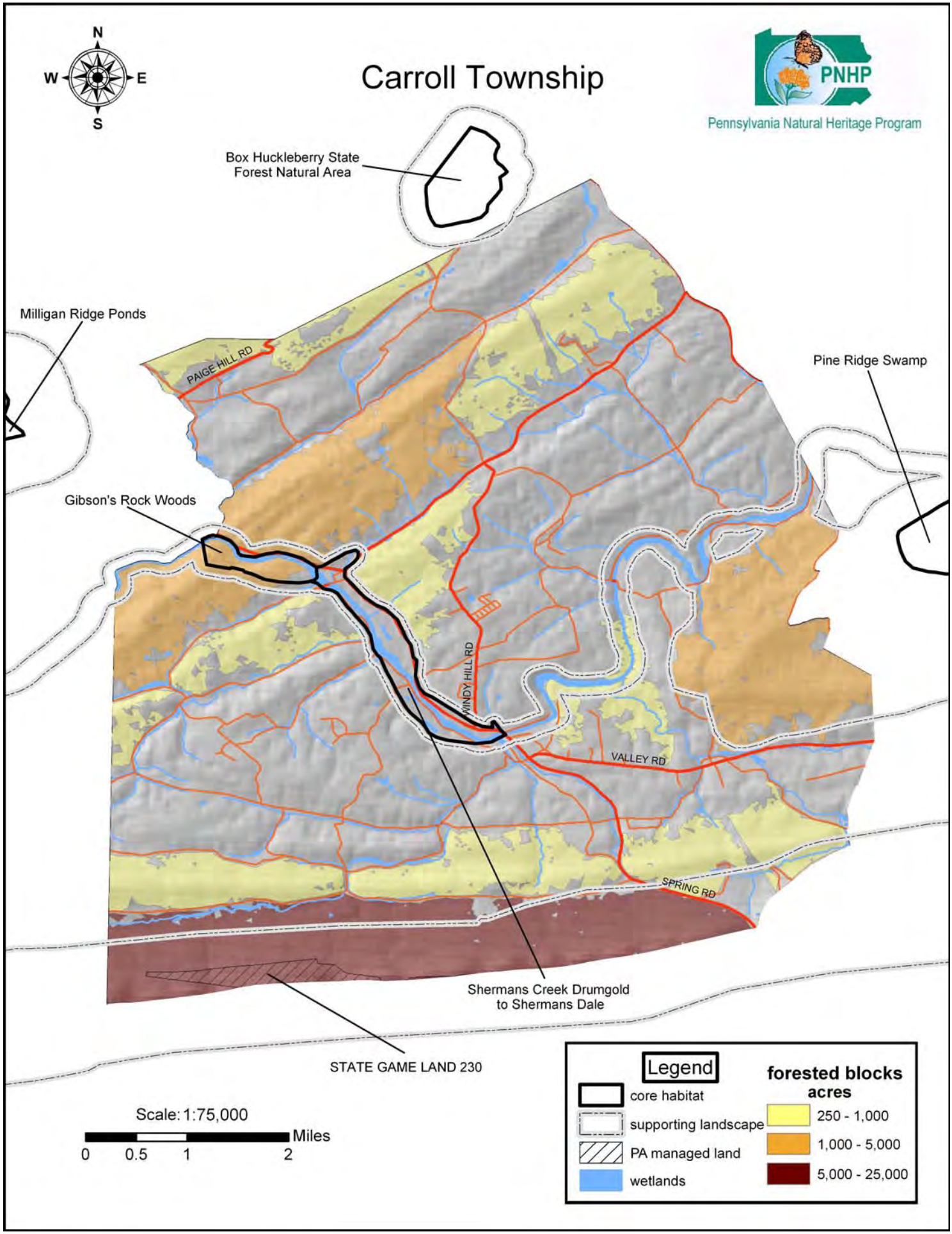
Locally Significant: Gibson's Rock Woods

Managed Lands: State Game Lands 230



Carroll Township is bisected by Shermans Creek traveling through a matrix of farm and forested lands. The southern border of the township contains a portion of the continuous Blue Mountain forested ridgeline. Protection of the continuous forested ridge along Blue Mountain is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. Several smaller ridges in the township also provide continuous forest blocks, including a long portion along Shermans Creek.

CARROLL TOWNSHIP MAP


N
W
E
S
Carroll Township
PNHP
Pennsylvania Natural Heritage Program
Box Huckleberry State Forest Natural Area
Milligan Ridge Ponds
PAIGE HILL RD
Pine Ridge Swamp
Gibson's Rock Woods
WINDY HILL RD
VALLEY RD
SPRING RD
Shermans Creek Drumgold to Shermans Dale
STATE GAME LAND 230
Scale: 1:75,000
Miles
0
0.5
1
2
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000

SHERMANS CREEK-DROMGOLD TO SHERMANS DALE—UPDATED—(Carroll Township)

This portion of Shermans Creek is a series of riffles and pools, with a substrate ranging from bedrock ridges to areas of sand and cobbles. Aquatic vegetation is common, including tape-grass, waterweed, and riverweed. A small population of an aquatic animal species of concern was found at several sites along this portion of the Creek in 1998. Another aquatic species of concern was found at the site in 1993; more recent surveys did not rediscover this species. Most of this portion of the Creek has a forested buffer along its banks.

Threats and Disturbances

Degradation of water quality for agricultural runoff or other sources are the main threats to the species of concern in the Creek. Threats to the rare plant include a proposed bridge relocation project and competition from invasive species.

Conservation Recommendations:

Maintaining the best quality water possible will help the animal species persist and even flourish at this site into the future.

Locally Significant Site:

Gibson's Rock Woods (Carroll Township)

This site is an area of cliffs and woods where Shermans Creek has cut through the east end of Pisgah Ridge. Fifty to one hundred-foot high cliffs rise above a forest dominated by hemlock, with beech, and sweet and yellow birches. The cliffs and Creek may have made logging this site impractical in the past--several of the beech and hemlock trees are unusually large for the county's forests. The northerly aspect and the cliffs have allowed some species more typical of northern climes, such as American yew and mountain maple to colonize and persist at the site.

Populations of American yew (*Taxus canadensis*) were found in Perry County. This species was recently removed form the PA species of concern list due to updated statewide population estimates.

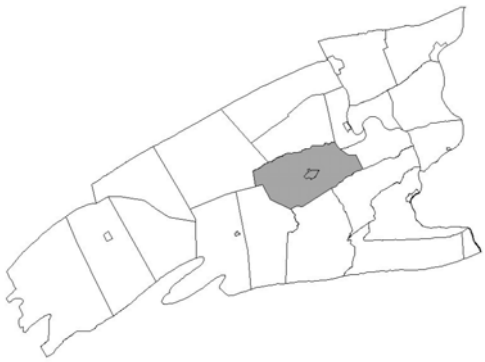
CENTRE TOWNSHIP, BLOOMFIELD BOROUGH

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Box Huckleberry State Forest Natural Area (1)	Plant: Box Huckleberry Gaylussacia brachycera	G3	S1	PT	06-27-97	A
Limestone Ridge Woods (4)	Plant: Oblique Milkvine Matelea obliqua	G4?	S1	PE	07-09-87	B
Little Buffalo Creek Marsh (4)	Animal: Black Dash Euphyes conspicuus	G4	S3	N	07-26-96	E
	Animal: Pied-billed Grebe Podilymbus podiceps	G5	S3BS4N	N	1989	E

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: State Game Lands 256
Little Buffalo State Park

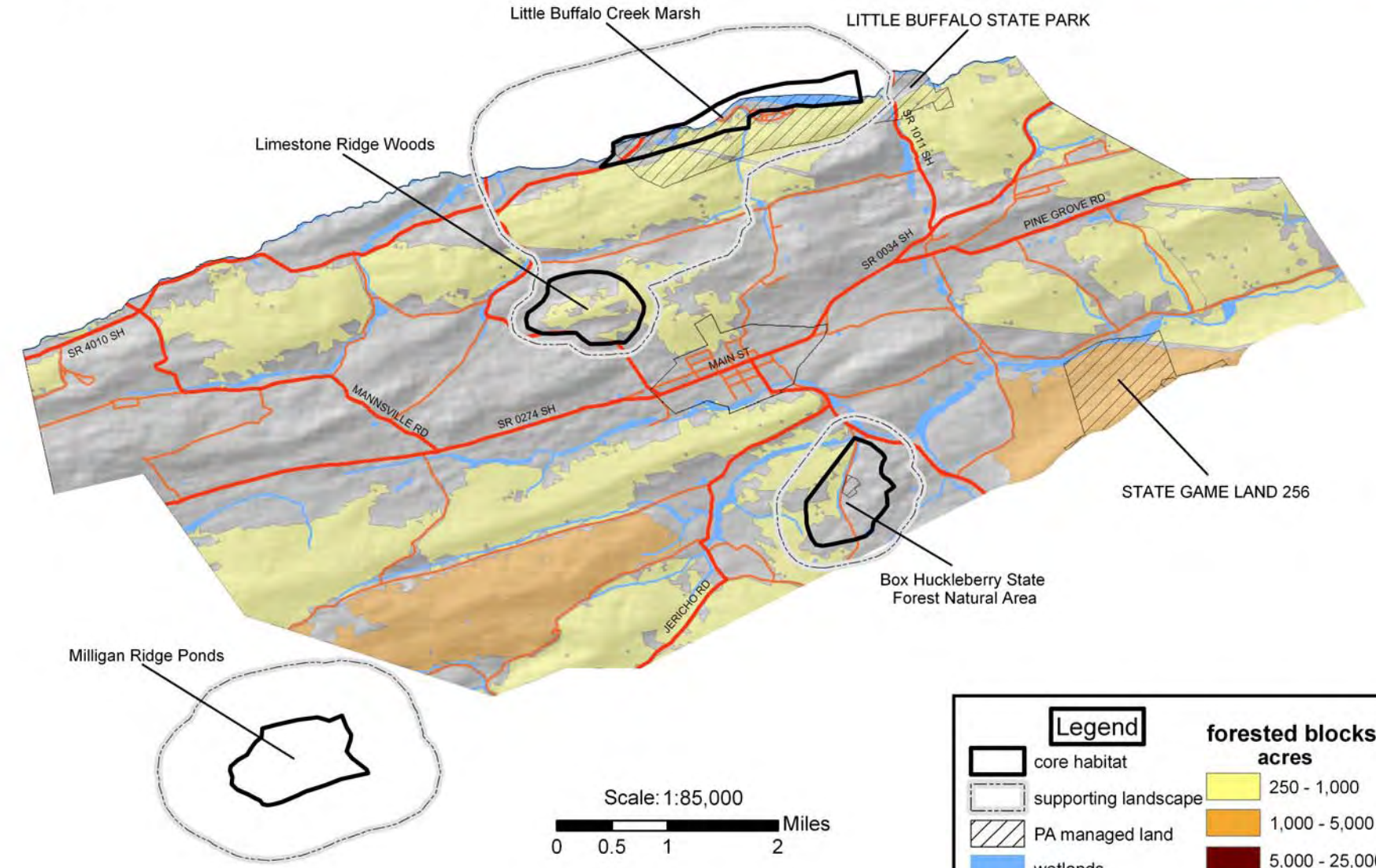


Centre Township drains to the Juniata River through Little Buffalo and Little Juniata Creeks, flowing through forested portions on either side of an agricultural valley. The large forested blocks in this township are relatively isolated from the forested ridgelines surrounding the rest of the county. Protection of these forest blocks and restoration of connectivity to other natural areas will enhance the value of this area as a wildlife corridor and to protecting the water quality of the watersheds. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin.

CENTRE TOWNSHIP MAP

Centre Township

Pennsylvania Natural Heritage Program



BOX HUCKLEBERRY STATE FOREST NATURAL AREA (Centre Township)

This site is an approximately 10-acre oak-heath forest occupying a dry, northwest-facing slope. White pine, chestnut oak, Virginia pine, and black oak are the dominant overstory species, with white pine, black-gum, and various oaks in the understory. A **G3, S1 PA-threatened shrub species, box huckleberry (*Gaylussacia brachycera*)**, is a dominant species in the groundcover on about eight acres of the site. Associated groundcover includes tree seedlings, wintergreen black huckleberry, mountain laurel, blueberry, spotted wintergreen, wild sarsparilla, and rattlesnake-weed. This is the largest population of the species in the state, and it is thought to have persisted at the site for over 1200 years. The site was heavily logged approximately 50 years ago and is now protected as a State Forest Natural Area.

Threats and Disturbances

The box-huckleberry is vegetatively reproducing and no immediate threats are evident. However, this species is relatively shade-intolerant, and the population should be monitored as the forest matures.

LIMESTONE RIDGE WOODS (Centre Township)

A good quality population of **G4?, S1 PA-Endangered oblique milkvine (*Matelea obliqua*)** was observed at this site in an open ridgetop woods. This site was last observed in 1987, and additional surveys are recommended.

Threats and Disturbances

Natural succession and competition from exotic species are potential threats to this population.

LITTLE BUFFALO CREEK MARSH—UPDATED—(Centre and Juniata Townships)

This site is an open wetland between Buffalo Ridge and Buffalo Creek. A powerline R.O.W. crosses the wetland. The vegetation is a diverse mixture of shrubs and herbs. Shrub species include spicebush, arrow-wood, chokeberry, buttonbush, winterberry, smooth alder, swamp raspberry, willow, swamp dogwood, and multiflora rose. Herbs include skunk cabbage, ragged-fringed orchid, arrow-leaved tearthumb, bur-reed, spotted jewelweed, woolly bulrush, soft rush, and numerous species of goldenrods, grasses, and sedges. The lepidopteran **black dash (*Euphyes conspicuus*, G4, S3)** was discovered here in 1996. Associated species were viceroy, pearl crescent, spicebush swallowtail, peck's skipper, and wild indigo duskywing. Additional survey work is needed to determine the quality of the population.

In 1989 a nest of **pied-billed grebe (*Podilymbus podiceps*)** was discovered along the lake shore. No recent observations of this species have been recorded. This site is within Little Buffalo State Park.

Threats and Disturbances

Spraying of the powerline R.O.W. could negatively affect the lepidoptera population at this site by killing nectar and larval food sources.

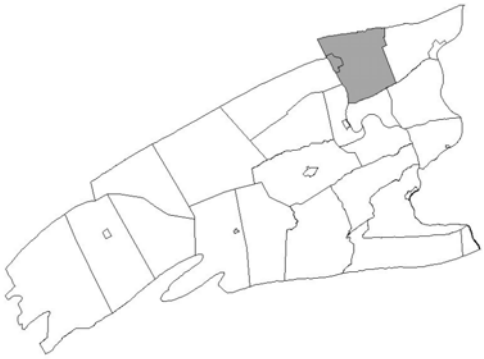
GREENWOOD TOWNSHIP, MILLERSTOWN BOROUGH

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Juniata River—Millerstown to Old Ferry Station (4)	Animal Species of Concern	G3G4	S3S4	N	10-07-98	BC

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: None



Greenwood Township is bordered on the west by the Juniata River. Tuscarora Mountain terminates in the northwest corner of the township, and Buffalo Mountain forms the southern boundary. These ridges contain most of the intact forest in an otherwise agricultural township. Several floodplain wetlands can be found along the forested riparian zone of Cocolamus Creek. Forested riparian corridors should be restored and maintained where they remain. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. In addition, reforestation of creek and stream banks can help link larger forested blocks together, contributing to their utility as a natural wildlife corridor.

JUNIATA RIVER - MILLERSTOWN TO OLD FERRY STATION (Greenwood, Oliver, and Tuscarora Townships and Millerstown Borough)

A fair to good quality population of a G3/G4 animal species was found to occupy several separate areas of habitat in the Juniata River. The species of concern was found in quickwater areas with a substrate of mixed gravel and exposed bedrock. Plant species present include algae beds in slackwater and some water-stargrass in the quickwater.

Threats and Disturbances

No immediate threats to this population are apparent.

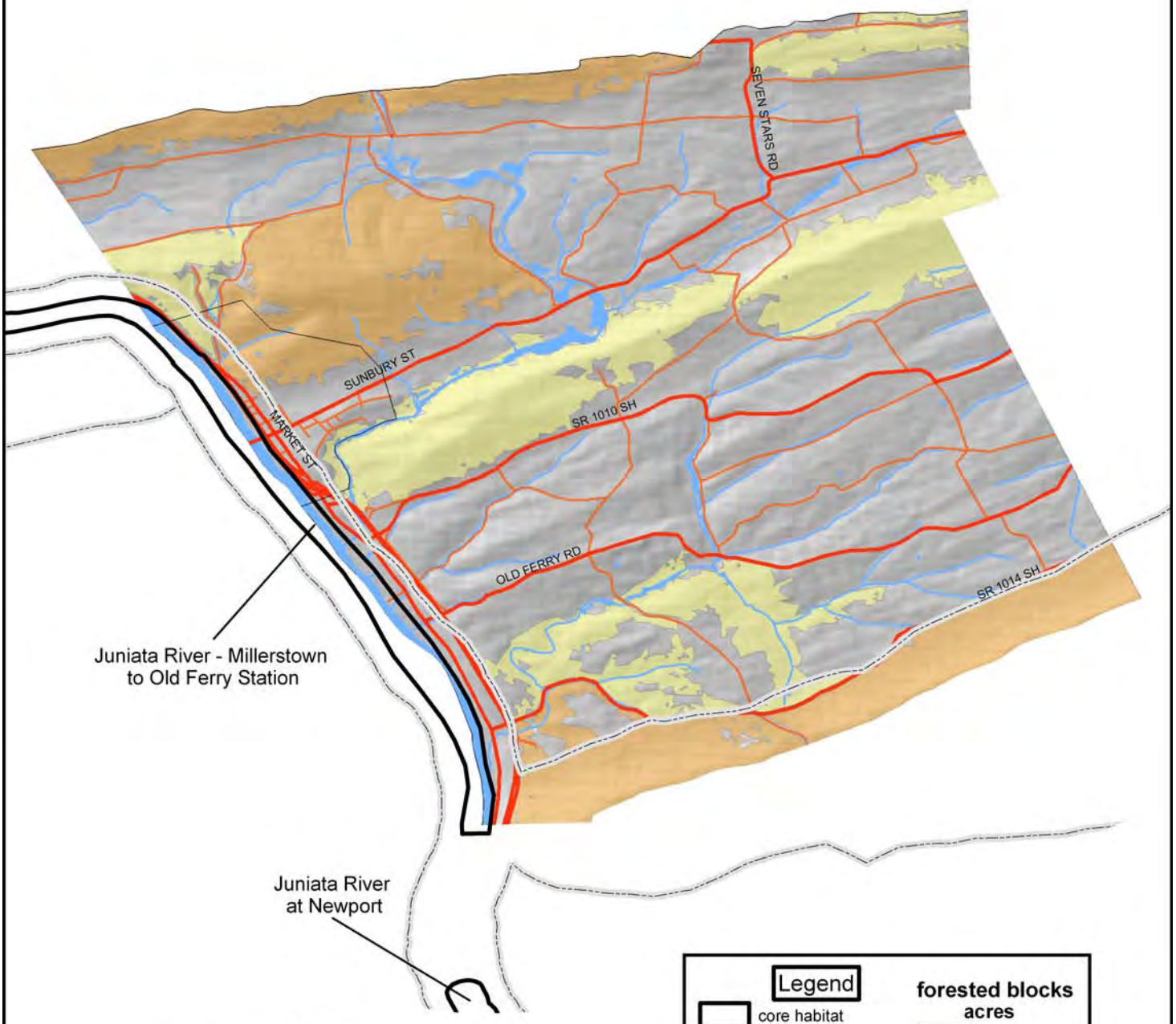
Conservation Recommendations

Maintaining the flow and water quality of the Juniata is essential to the species' survival.

GREENWOOD TOWNSHIP MAP

Greenwood Township

Pennsylvania Natural Heritage Program



Scale: 1:75,000

0 0.5 1 2 Miles

Legend

- core habitat
- supporting landscape
- PA managed land
- wetlands

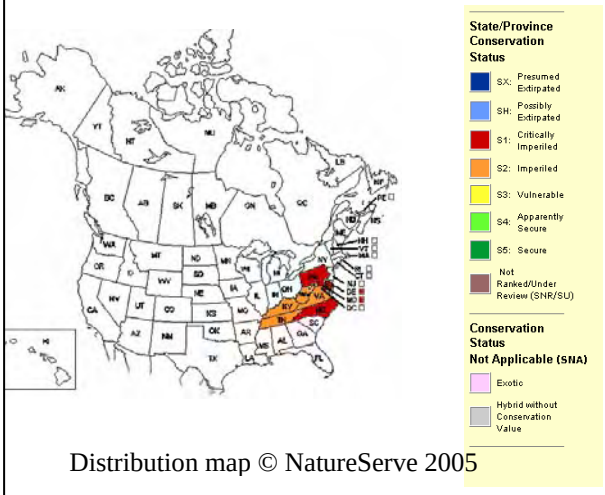
forested blocks acres

- 250 - 1,000
- 1,000 - 5,000
- 5,000 - 25,000

Box Huckleberry

The box huckleberry (*Gaylussacia brachycera*) is closely related to blueberries. They have waxy evergreen leaves and small bell-shaped flowers that develop into edible fruits. The flowers have not been documented to produce fertile seeds so reproduction of the plant is thought to be exclusively vegetative, producing underground rhizomes like a strawberry plant to generate an expansive single clone. The age of a single clump of box huckleberry, some of which are a mile in length, are calculated by assuming an average yearly growth rate of six inches a year. Researchers determined that the plant would have taken from several thousand, up to 12,000 years to produce vegetative populations of this size. Box huckleberry is only known to occur in eight states in the mid and southern Appalachians. It is considered imperiled or critically imperiled in all the states in which it occurs.

Photo: Charlie Eichelberger



Distribution map © NatureServe 2005

Photo: Charlie Eichelberger

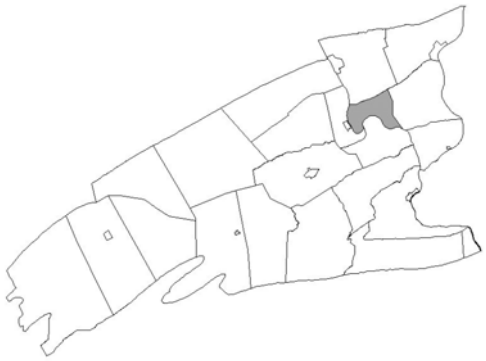
HOWE TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Juniata River at Half Falls/Half Falls Mountain (4)	Animal Species of Concern	G3G4	S3S4	N	08-07-98	CD
	Animal Species of Concern	G4	S4	N	08-07-98	E
Juniata River at Newport (4)	Animal Species of Concern	G3G4	S3S4	N	08-02-94	E
	Animal Species of Concern	G4	S4	N	08-02-94	E
	Animal Species of Concern	G4	S3S4	N	08-02-94	E
Juniata River Scour at Trimmers Rocks (4)	Plant: Flat-stemmed Spike-rush *Eleocharis compressa*	G4	S1	PE	07-14-98	CD

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

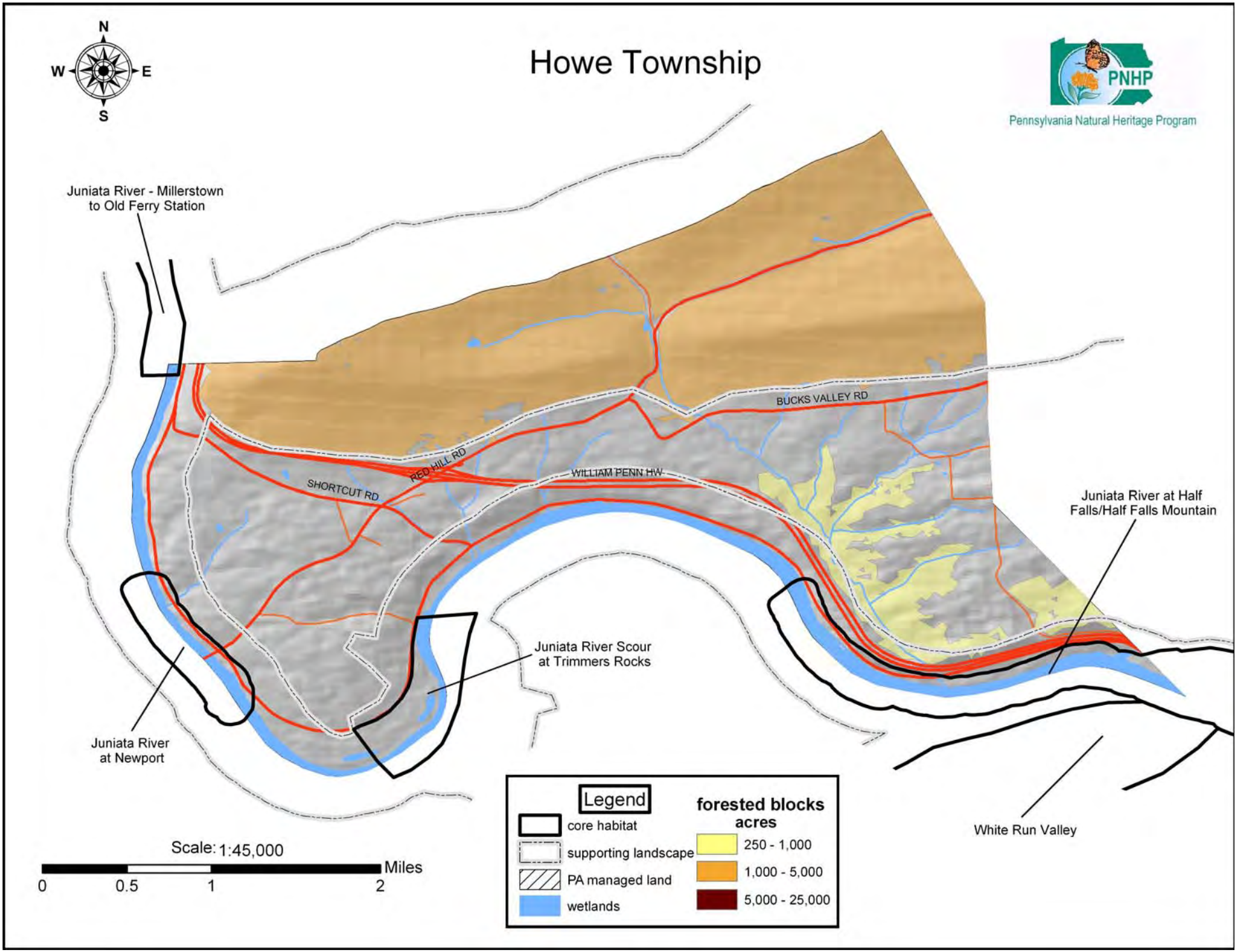
Locally Significant: None

Managed Lands: None



Howe Township's dominant natural feature is the Juniata River, flowing along the entire western and southern boundary. Additionally, the Berry/Buffalo Mountains begin in the northern part of the township. These ridges contain most of the intact forest in an otherwise agricultural township. A significant forest block remains along Howe Creek and should be maintained. Forested riparian corridors help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. In addition, reforestation of creek and stream banks can help link larger forested blocks together, contributing to their utility as a natural wildlife corridor.

HOWE TOWNSHIP MAP


Howe Township
N
W
E
S
PNHP
Pennsylvania Natural Heritage Program
Juniata River - Millerstown to Old Ferry Station
BUCKS VALLEY RD
RED HILL RD
WILLIAM PENN HW
SHORTCUT RD
Juniata River at Half Falls/Half Falls Mountain
Juniata River Scour at Trimmers Rocks
Juniata River at Newport
White Run Valley
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000
Scale: 1:45,000
Miles
0
0.5
1
2

JUNIATA RIVER AT HALF FALLS—UPDATED—(Buffalo, Howe, Miller, and Watts Townships)

This site consists of a section of the Juniata River, with a ledge (Half Falls) at the upstream end and riffles and gravel bars downstream. Small populations of two animal species of concern were found in an area of shallow quickwater habitat with a substrate of large cobbles and gravel. No aquatic plants were observed. More searching of this and adjacent portions of the Juniata is needed to determine the extent of the population of the species of concern. Protecting the flow levels and water quality of the Juniata is essential to the continued survival of these species.

The upland portion of this site includes Half Falls Mountain, formerly noted as a locally significant site. Route 22-322 cuts through the base of the slope, which is made up largely of talus at its lower end, giving way to a forested upper slope dominated by white pine, hemlock, chestnut and black oaks, and sweet birch. The sparse understory and shrub layers contain flowering dogwood, blueberry, redbud, and poison ivy. A fence lizard was observed using the lower talus slope. Sharp bedrock ridges and cliffs along the north and south edges of the slope support table-mountain pine, sassafras, and a variety of lichen species.

Threats and Disturbances

Charcoal in the soil indicates a history of fire at this site in the past. The site is currently undisturbed by human factors, although logging has taken place on the adjacent east-facing slope. Threats to the animal populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:

Maintaining the free-flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

JUNIATA RIVER AT NEWPORT (Howe and Oliver Townships and Newport Borough)

This site is a riffle on the Juniata River. It is characterized by a cobble substrate with some areas of clean swept gravel. It supports three animal species of special concern, all of which were observed alive at the site in 1994.

Threats and Disturbances:

Threats to these populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:

Maintaining the free flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

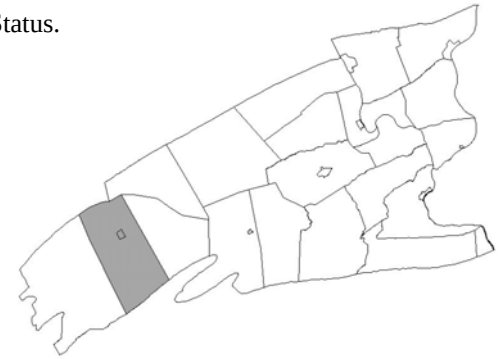
JUNIATA RIVER SCOUR AT TRIMMERS ROCKS (Howe, Miller, and Oliver Townships)

The Juniata River bends sharply northward at this site, and the shoreline is scoured by winter ice and flooding. Stunted floodplain forest dominated by silver maple, river birch, and sycamore gives way closer to the water to an herbaceous community of mixed grasses, water-willow, smartweed, and spike rushes. A small population of **G4, S1 PA-endangered flat-stemmed spike rush (*Eleocharis compressa*)** was found growing on exposed bedrock ridges near the water's edge, below the spring high-water mark. This species is dependent on regular disturbance from the river, and no threats or management requirements are evident.

JACKSON TOWNSHIP, BLAIN BOROUGH

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Big Knob (5)	Geologic Feature: Erosional Remnant	G?	S?	N		E
Bowers Mountain Site—East (3)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	05-02-91	E
Bowers Mountain Site—West (3)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	04-20-97	E

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.



Locally Significant: Bull Run School Cliffs

Managed Lands: Tuscarora State Forest

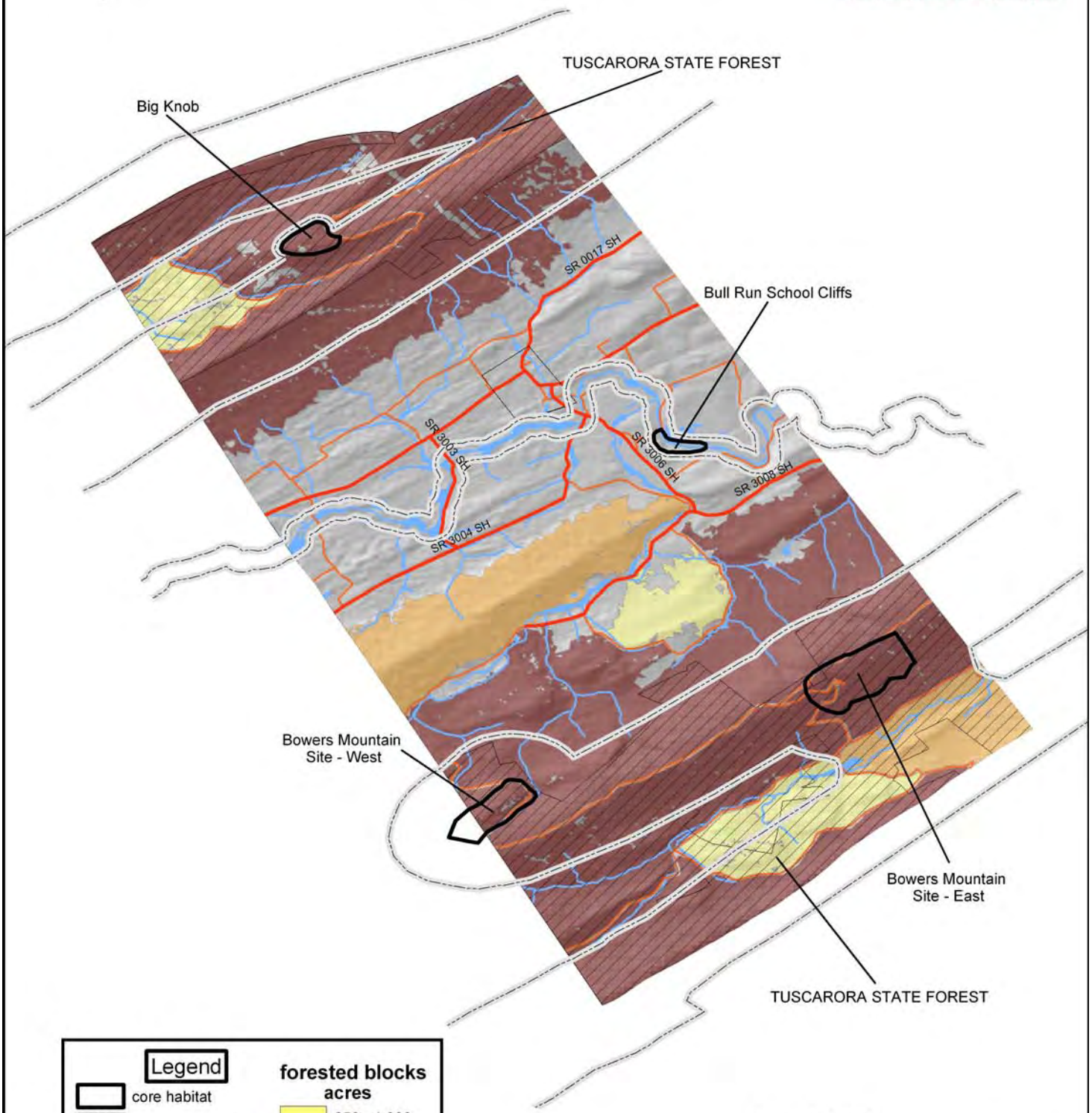
Other: High Quality Cold Water Fishery—Sherman Creek, South Branch Laurel Run, Laurel Run from South Branch to T339; Laurel Run Exceptional Value from source to confluence with South Branch

Jackson Township is bisected by Shermans Creek traveling through a matrix of farmland tucked in the valley between the Tuscarora Mountain ridge to the nroth and the Blue Mountain range in the southern portion. Protection of these continuous forested ridges is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. The floodplain of Shermans Creek contains many riparian wetlands that can be maintained by restoration of riparian buffers.

JACKSON TOWNSHIP MAP

Jackson Township

Pennsylvania Natural Heritage Program



BIG KNOB—NEW—(Jackson Township)

This site is considered an outstanding geologic feature of Pennsylvania, consisting of an exposed peak of Tuscarora quartzite, from the Silurian period (405-430 million years ago), located near the Perry and Juniata County border on a folded ridge between Conococheague and Tuscarora mountains. Currently there is a large transmission tower and associated grassy/weedy openings. The cleared area affords impressive views of the surrounding ridges and forests of Tuscarora State Forest. (Geyer and Bolles 1979)

BOWERS MOUNTAIN SITE - EAST (Jackson Township)

This southeast-facing forested mountain slope supports the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**. The canopy vegetation includes hemlock, black birch and mixed oaks. The subcanopy includes mountain laurel and striped maple. Evidence of this population was last observed in 1997.

BOWERS MOUNTAIN SITE - WEST (Jackson and Toboyne Township)

This southeast-facing forested mountain slope supports the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**. The canopy vegetation includes hemlock, black birch and mixed oaks. The subcanopy includes mountain laurel and striped maple. Evidence of this population was last observed in 1997. This site is located within Tuscarora State Forest.

Locally Significant Site:

Bull Run School Cliffs (Jackson Township)

This site is an approximately 150-meter long corridor of north-facing cliffs and steep slopes along Shermans Creek. The cliffs vary from 5 to 25 meters high, and are composed of a mixture of red shale and other bedrock. A mixture of mosses, ferns, wildflowers and vines cling to the cliffs, including maidenhair spleenwort, columbine, stonecrop, early saxifrage, jewelweed, seven-bark, poison ivy, and Virginia creeper. The flora is diverse and there is potential for rare plant species, although none were found in surveys from the Creek. In crevices and overhanging the cliffs, an open canopy of basswood, sugar maple and oaks is present. Across the Creek to the north, a very narrow strip of floodplain forest with a rich spring flora exists between the road and the Creek. Maintaining this strip will provide a buffer of shade and native vegetation for the cliffs, as well as reduce erosion along the Creek's banks.

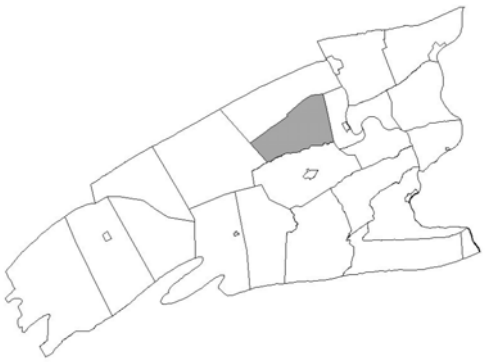
JUNIATA TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Little Buffalo Creek Marsh (4)	Animal: Black Dash *Euphyes conspicuus*	G4	S3	N	07-26-96	E
	Animal: Pied-billed Grebe *Podilymbus podiceps*	G5	S3BS4N	N	1989	E

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: Little Buffalo State Park

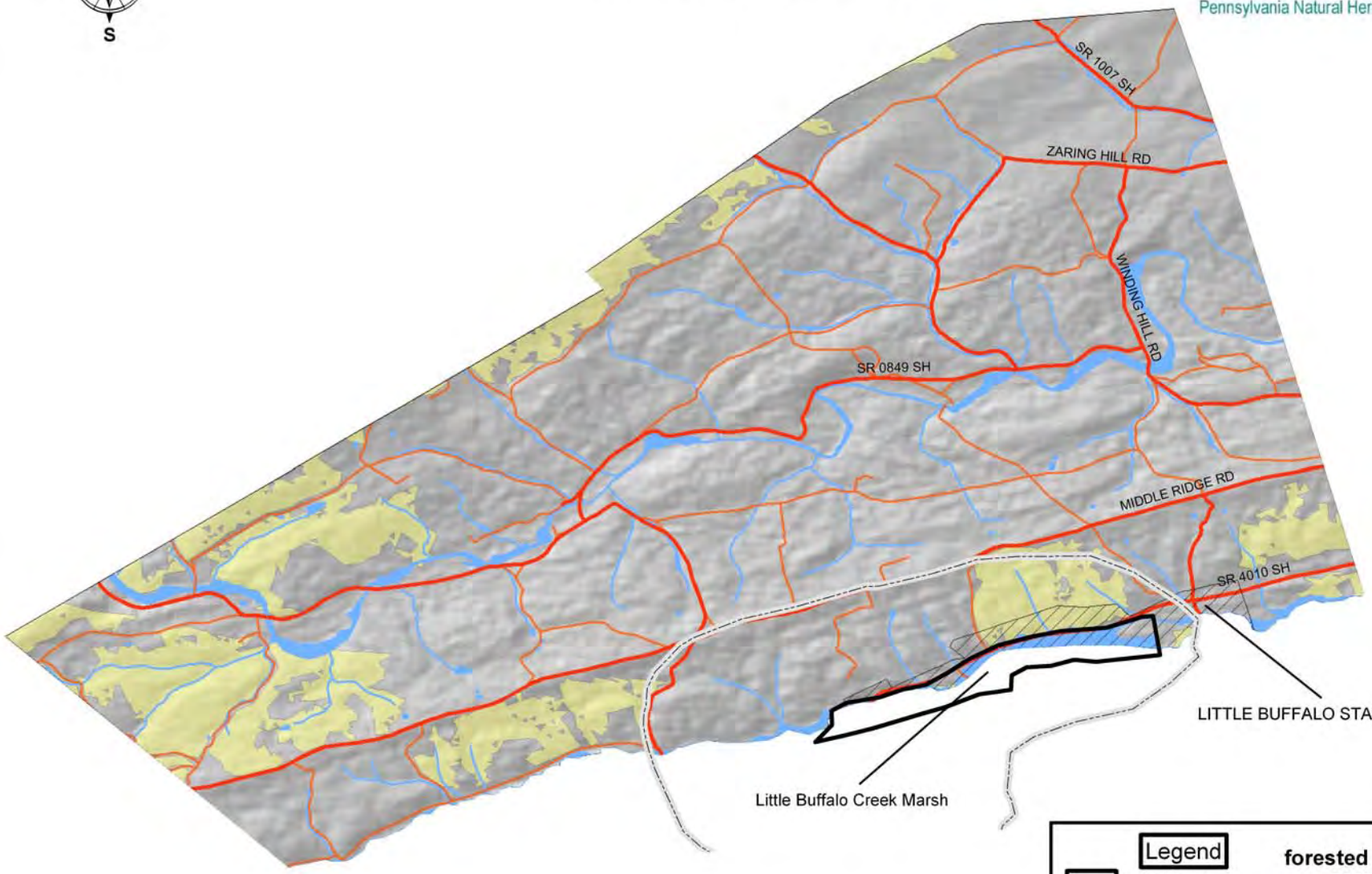


Juniata Township drains to the Juniata River through Little Buffalo and Buffalo Creeks, flowing through an agricultural valley. The large forested blocks in this township are relatively isolated from the forested ridgelines surrounding the rest of the county. Protection of these forest blocks and restoration of connectivity to other natural areas will enhance the value of this area as a wildlife corridor and to protecting the water quality of the watersheds. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin.

JUNIATA TOWNSHIP MAP

Juniata Township

Pennsylvania Natural Heritage Program



LITTLE BUFFALO CREEK MARSH—UPDATED—(Centre and Juniata Townships)

This site is an open wetland between Buffalo Ridge and Buffalo Creek. A powerline R.O.W. crosses the wetland. The vegetation is a diverse mixture of shrubs and herbs. Shrub species include spicebush, arrow-wood, chokeberry, buttonbush, winterberry, smooth alder, swamp raspberry, willow, swamp dogwood, and multiflora rose. Herbs include skunk cabbage, ragged-fringed orchid, arrow-leaved tearthumb, bur-reed, spotted jewelweed, woolly bulrush, soft rush, and numerous species of goldenrods, grasses, and sedges. The lepidopteran **black dash (*Euphyes conspicuus*, G4, S3)** was discovered here in 1996. Associated species were viceroy, pearl crescent, spicebush swallowtail, peck's skipper, and wild indigo duskywing. Additional survey work is needed to determine the quality of the population.

In 1989 a nest of **pied-billed grebe (*Podilymbus podiceps*)** was discovered along the lake shore. No recent observations of this species have been recorded. This site is within Little Buffalo State Park.

Threats and Disturbances

Spraying of the powerline R.O.W. could negatively affect the lepidoptera population at this site by killing nectar and larval food sources.

Jeweled shooting star (*Dodecatheon radicatum*) occurs along shaded rock outcrops in Perry County.
Photo: PA Science Office of The Nature Conservancy

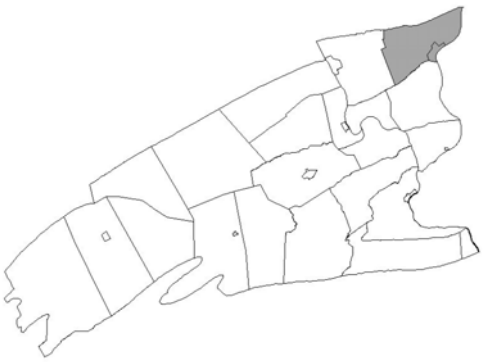
LIVERPOOL TOWNSHIP, LIVERPOOL BOROUGH

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Susquehanna River at State Game Lands #258 (4)	Animal Species of Concern:	G4	S2B	PE	2000	B
	Animal Species of Concern	G3	S2	N	07-28-98	B
	Animal Species of Concern	G4	S4	N	07-28-98	E
	Animal Species of Concern	G3G4	S3S4	N	07-28-98	E

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: State Game Lands 258

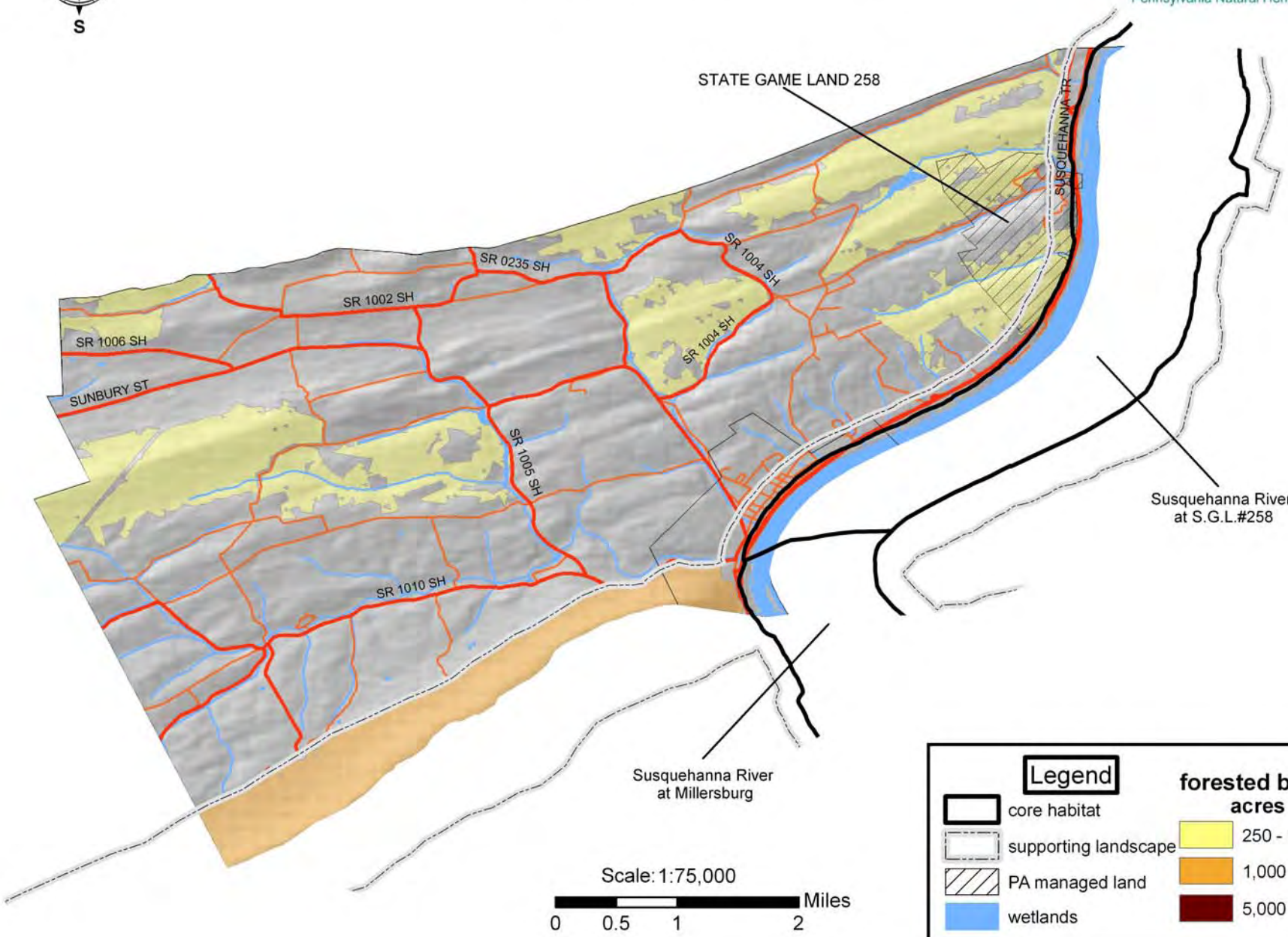


Liverpool Township drains directly to the Susquehanna River along its eastern border. The large forested blocks in this township are relatively isolated from the forested ridgelines surrounding the rest of the county. They are associated with the small tributary streams flowing through the township and form important riparian buffers. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. Increasing riparian buffers along the Susquehanna and its tributaries will help reduce agricultural runoff and erosion and protect the watershed from degradation. The Susquehanna River in this area is peppered with small islands that provide diversity in the river's topography and are important habitats for wildlife. Buffalo Mountain is a forested ridge along the southern township boundary that is part of a larger connected forest block. Protection of these continuous forested ridges of the Appalachian Mountain Section is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the downstream watersheds.

LIVERPOOL TOWNSHIP MAP

Liverpool Township

Pennsylvania Natural Heritage Program



SUSQUEHANNA RIVER AT STATE GAME LANDS #258—NEW—(Liverpool Township and Dauphin County)

This site consists of an archipelago of islands in the Susquehanna River near the Dauphin/Northumberland Co. line. The channels between the islands tend to have shallow, quick-flowing water over a substrate of gravel (cobbles and pebbles) and sand, with a few bedrock ridges. Three animal species of concern were found in this habitat. Crafts Island, the most southern of the large islands, is dominated by silver maple and spicebush. An animal species of concern was found on the southern half Craft's Island. This species is apparently breeding on the island.

Threats and Disturbances:

Camping or other recreational visits to this island during the breeding season could disturb this species of concern.

Conservation Recommendations:

All the animal species of concern at S.G.L. 258 are dependent on the maintaining the fish populations and water quality of the Susquehanna River.

Spotted salamanders breed in temporary woodland ponds.
Photo: PA Science Office of The Nature Conservancy

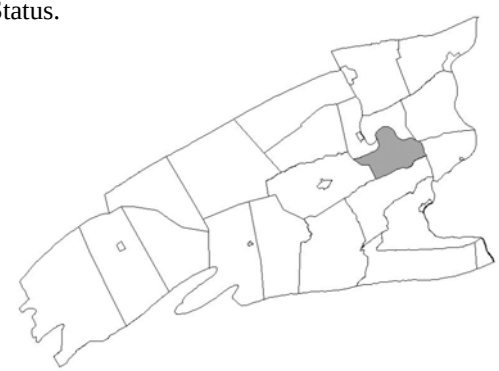
MILLER TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Juniata River at Half Falls/Half Falls Mountain (4)	Animal Species of Concern	G3G4	S3S4	N	08-07-98	CD
	Animal Species of Concern	G4	S4	N	08-07-98	E
Juniata River Scour at Trimmers Rocks (4)	Plant: Flat-stemmed Spike-rush *Eleocharis compressa*	G4	S1	PE	07-14-98	CD
Losh Run Valley (5)	Plant: Common Hop-tree *Ptelea trifoliata*	G5	S2	PT	06-27-97	C
White Run Valley (3)	Plant: Puttyroot *Aplectrum hyemale*	G5	S3	PR	04-29-97	B
	Plant Northeastern Bulrush *Scirpus ancistrochaetus*	G3	S3	PE	07-14-97	CD

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: State Game Lands 281

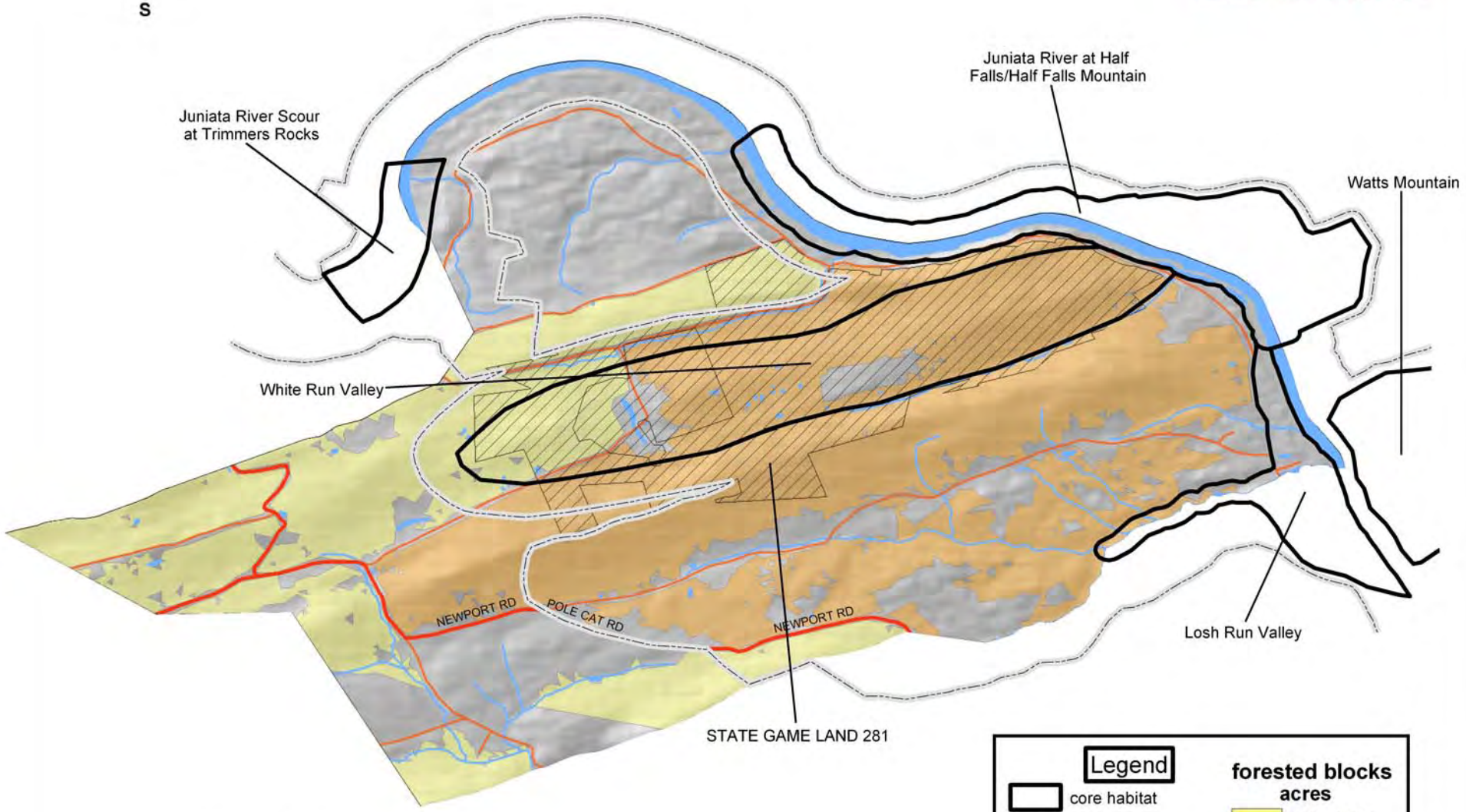


Miller Township's dominant natural feature is the Juniata River, flowing along the entire northeastern boundary. The township is mostly forested, with some agriculture dominating the lands along the river's edge. Restoration of a forested buffer along the river is encouraged where it is lacking. Forested buffers help filter surface water runoff, preventing many non-point sources of pollutino from entering waterways, protecting water quality in the township and the Susquehanna River basin. Maintenance of the existing large forested blocks and their connectivity will help link larger forested blocks together, contributing to their utility as a natural wildlife corridor.

MILLER TOWNSHIP MAP

Miller Township

Pennsylvania Natural Heritage Program



Scale: 1:55,000

0 0.5 1 2 Miles

Legend

- core habitat
- supporting landscape
- PA managed land
- wetlands

forested blocks acres

- 250 - 1,000
- 1,000 - 5,000
- 5,000 - 25,000

JUNIATA RIVER AT HALF FALLS—UPDATED—(Buffalo, Howe, Miller, and Watts Townships)

This site consists of a section of the Juniata River, with a ledge (Half Falls) at the upstream end and riffles and gravel bars downstream. Small populations of two animal species of concern were found in an area of shallow quickwater habitat with a substrate of large cobbles and gravel. No aquatic plants were observed. More searching of this and adjacent portions of the Juniata is needed to determine the extent of the population of the species of concern.

The upland portion of this site included Half Falls Mountain, formerly noted as a locally significant site. Route 22-322 cuts through the base of the slope, which is made up largely of talus at its lower end, giving way to a forested upper slope dominated by white pine, hemlock, chestnut and black oaks, and sweet birch. The sparse understory and shrub layers contain flowering dogwood, blueberry, redbud, and poison ivy. A fence lizard was observed using the lower talus slope. Sharp bedrock ridges and cliffs along the north and south edges of the slope support table-mountain pine, sassafras, and a variety of lichen species.

Threats and Disturbances

Charcoal in the soil indicates a history of fire at this site in the past. The site is currently undisturbed by human factors, although logging has taken place on the adjacent east-facing slope. The aquatic animals are vulnerable to degradation of water quality and sedimentation of their habitats.

Conservation Recommendations

Protecting the flow levels and water quality of the Juniata is essential to the continued survival of these species.

JUNIATA RIVER SCOUR AT TRIMMERS ROCKS (Howe, Miller, and Oliver Townships)

The Juniata River bends sharply northward at this site, and the shoreline is scoured by winter ice and flooding. Stunted floodplain forest dominated by silver maple, river birch, and sycamore gives way closer to the water to an herbaceous community of mixed grasses, water-willow, smarted, and spike rushes. A small population of **G4, S1 PA-endangered flat-stemmed spike rush (*Eleocharis compressa*)** was found growing on exposed bedrock ridges near the water's edge, below the spring high-water mark.

Threats and Disturbances

This species is dependent on regular disturbance from the river, and no threats or management requirements are evident.

LOSH RUN VALLEY (Miller and Wheatfield Townships)

This site is an early succesional rich woodland adjacent to Losh Run. A fair population of **G5, S2 PA-threatened common hop-tree (*Ptelea trifoliata*)** occurs here, associated with red oak, bitternut hickory, japanese honeysuckle, poison ivy, and black locust.

Threats and Disturbances

The site is disturbed by exotic species, particularly privet, and is bounded by roads and a railroad. The population, though small, has no immediate threats, and no management concerns are apparent.

WHITE RUN VALLEY (Miller Township)

White Run Valley contains two plant species of concern occupying different habitats. A good population of **G5, S3 puttyroot (*Aplectrum hyemale*)** is found growing in a rich oak and tulip-tree forest with a dense understory of spicebush. Associated species include wintergreen and liverleaf. This species was first discovered here in 1987 and the population appears to be doing well, though timber harvesting in the area is a potential threat.

The site also supports the **Northeastern bulrush (*Scirpus ancistrochaetus*)**, **a PA-endangered G3, S3** plant species of concern occupying a series of small wetland pools in the White Run Valley. A fair to poor-quality population of the species of concern occupies several of the pools, associated with sedges, bur-reed, manna grass, and smartweed. Although disturbed, these vernal pools may also be used by amphibians and invertebrates.

Threats and Disturbances

Some of the pools appear natural, while others may be the old test pits. Slash from area logging has been thrown into some of the pools. Browsing by deer is also a concern at this site.

Conservation Recommendations

Ceasing the dumping of slash in the pools and allowing the ponds to recover should benefit the species of concern at this site.

An S3 plant species of concern, Puttyroot (*Aplectrum hyemale*), occurs in few hardwood forests in the county. (Photo by Mark Laroque).

THE NORTHEASTERN BULRUSH (*Scirpus ancistrochaetus*) is a Federally-Endangered plant species that is specially adapted to the fluctuating water levels of temporary pools. Photo: Julie Lundgren

VERNAL PONDS fill with water during the winter and early spring, frequently becoming completely dry by mid summer. Because of the dry period, fish are absent from these habitats, making them very important breeding habitats for amphibians.
Photo: PA Science Office of The Nature Conservancy.

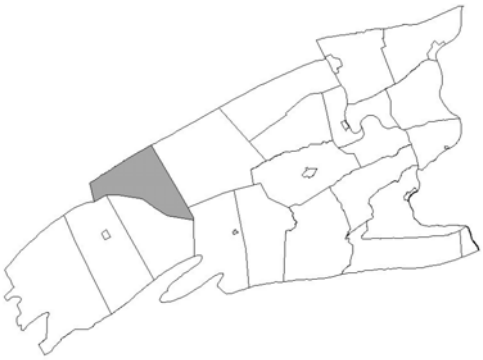
NORTHEAST MADISON TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Pepperbush Hill Ponds / Liberty Valley Pools (3)	Plant Northeastern Bulrush *Scirpus ancistrochaetus*	G3	S3	PE	07-29-94	BC

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: State Game Lands 88
Tuscarora State Forest

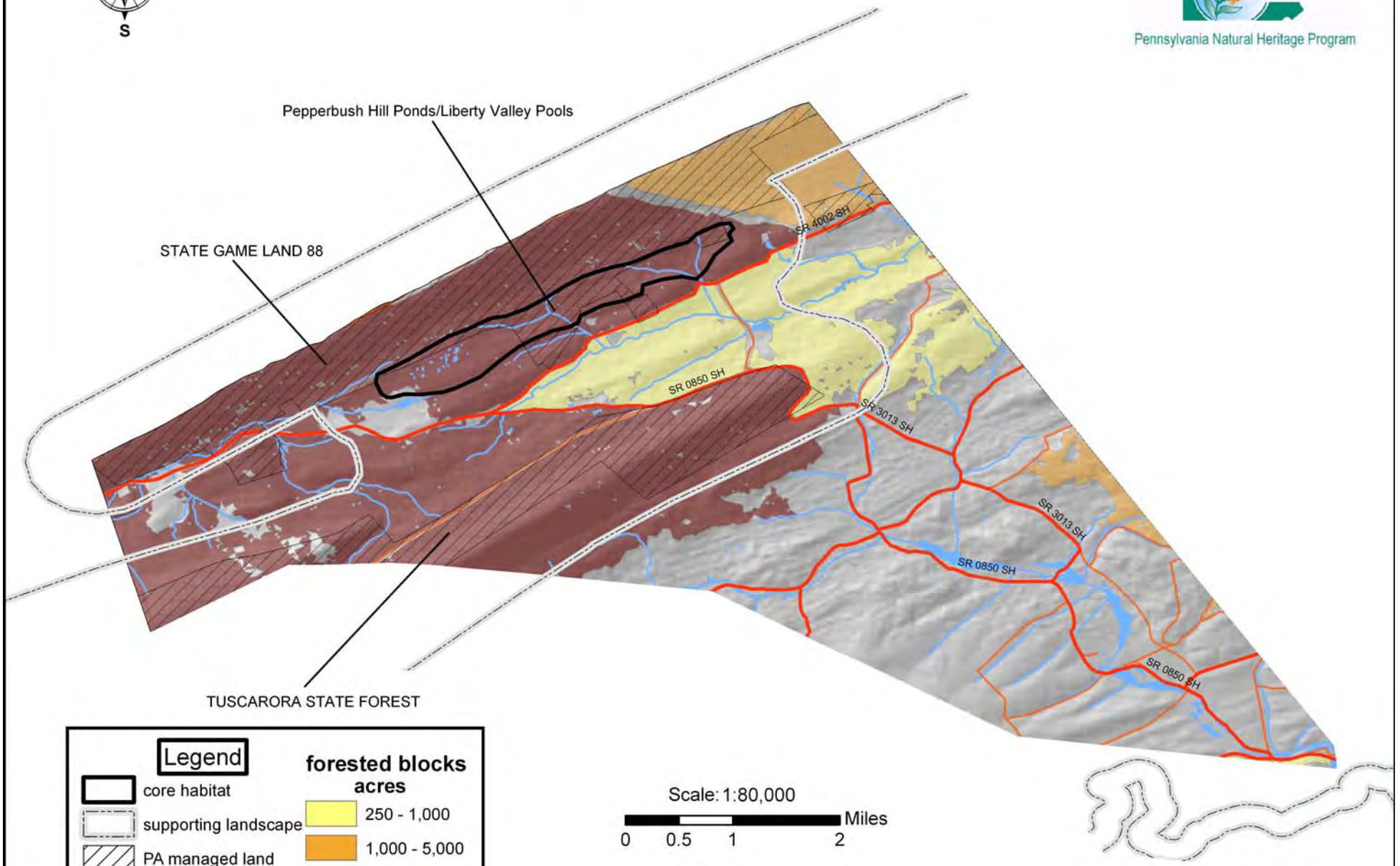


Northeast Madison Township is characterized by the forested ridges of Tuscarora Mountain draining into an agricultural valley of Bixler Run. Restoration of a forested buffer along the creeks in the valley is encouraged where it is lacking. Forested buffers help filter surface water runoff, preventing many non-point sources of pollutino from entering waterways, protecting water quality in the township and the Susquehanna River basin. In addition, reforestation of creek and stream banks can help link larger forested blocks together, contributing to their utility as a natural wildlife corridor. Protection of the continuous forested ridge along Tuscarora Mountain in the north is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Fragmented portions of this block are managed by the state; therefore efforts should be made to maintain the continuity of the forest blocks between the state lands.

NORTHEAST MADISON TOWNSHIP MAP

Northeast Madison Township

Pennsylvania Natural Heritage Program



PEPPERBUSH HILL PONDS/LIBERTY VALLEY POOLS—UPDATED—(Northeast Madison Township)

This site is a group of several vernal ponds on a low ridge at the base of Tuscarora Mountain. The ponds are on level or gently sloping terrain; surrounding area is well-drained, acidic, oak-hickory-pine-heath woods. The perimeters of the ponds have red maple, black-gum, pin oak, and sweet-birch trees, and thickets of greenbriar, dangleberry, maleberry, pepperbush, chokeberry, cinnamon fern, and royal fern. Some of the pond beds are unvegetated, while others have dense herbaceous and shrubby vegetation. The surrounding habitat is oak-heath forest, and has been clearcut near some of the pools. The pools provide potential habitat for amphibian communities. At least two of the ponds contain the **Northeastern bulrush (*Scirpus ancistrochaetus*)**, **a PA-endangered G3, S3** plant species of concern. The species of concern is associated with buttonbush, three-way sedge, St. Johns-wort, soft rush, woolly bulrush, and various sedge species. The species of concern was observed in fruit and appeared healthy.

Threats and Disturbances

The surrounding woods have been selectively-logged, and a small amount of slash put in the ponds. Other disturbance includes deer browse.

Conservation Recommendations

Providing a buffer for the ponds in the event of future logging will help the species of concern to persist.

Streamside Buffers

Forested buffers along waterways serve many purposes. They provide ground and surface water purification, provide shade for trout and other cold-water species, and help to control erosion. They are reservoirs of biological diversity and sanctuaries for common, sensitive and declining species. Enrollment in the Conservation Reserve Enhancement Program (CREP) can provide financial incentive to repair and protect streamside buffers.
Photo: PA Science Office of The Nature Conservancy

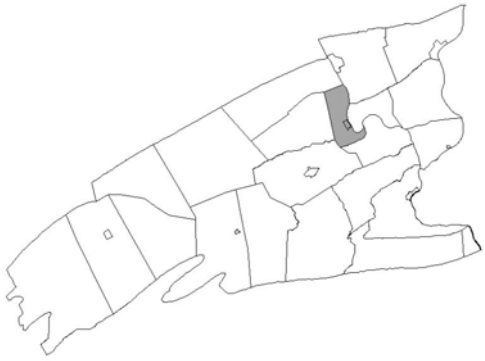
OLIVER TOWNSHIP, NEWPORT BOROUGH

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Juniata River—Millerstown to Old Ferry Station (4)	Animal Species of Concern	G3G4	S3S4	N	10-07-98	BC
Juniata River at Newport (4)	Animal Species of Concern	G3G4	S3S4	N	08-02-94	E
	Animal Species of Concern	G4	S4	N	08-02-94	E
	Animal Species of Concern	G4	S3S4	N	08-02-94	E
Juniata River Scour at Trimmers Rocks (4)	Plant: Flat-stemmed Spike-rush *Eleocharis compressa*	G4	S1	PE	07-14-98	CD

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

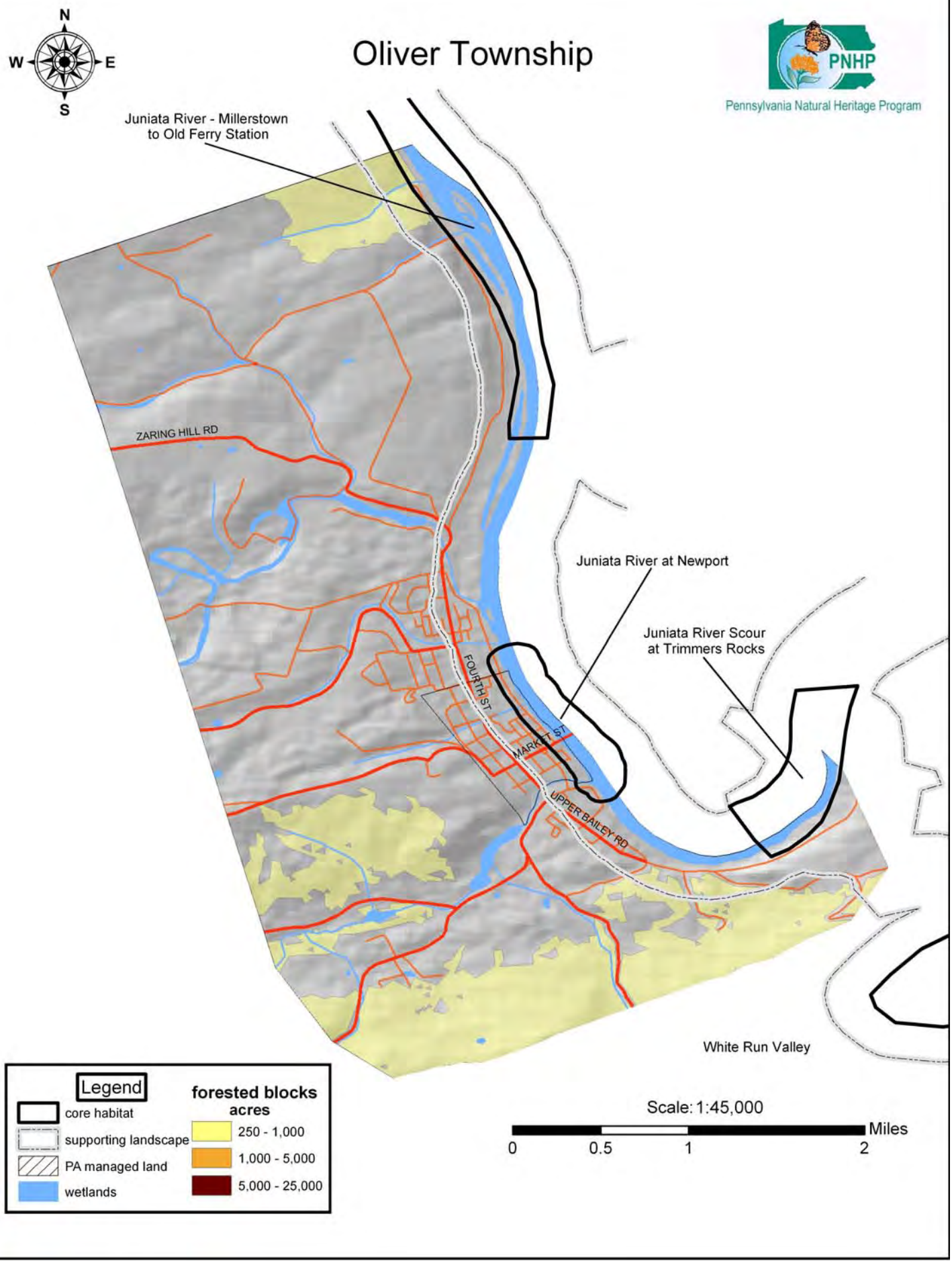
Managed Lands: None



Oliver Township's dominant natural feature is the Juniata River, flowing along the entire eastern boundary. Additionally, a forested portion of the Little Buffalo Creek watershed is found along the southern boundary. This ridge contains most of the intact forest in an otherwise agricultural township. Restoration of a forested buffer along the river is encouraged where it is lacking. Forested buffers help filter surface water runoff, preventing many non-point sources of pollutino from entering waterways, protecting water quality in the township and the Susquehanna River basin. Maintenance of the existing large forested blocks and their connectivity will help link larger forested blocks together, contributing to their utility as a natural wildlife corridor.

OLIVER TOWNSHIP MAP

Oliver Township



Pennsylvania Natural Heritage Program

JUNIATA RIVER - MILLERSTOWN TO OLD FERRY STATION (Greenwood, Oliver, and Tuscarora Townships and Millerstown Borough)

A fair to good quality population of a G3/G4 animal species was found to occupy several separate areas of habitat in the Juniata River. The species of concern was found in quickwater areas with a substrate of mixed gravel and exposed bedrock. Plant species present include algae beds in slackwater and some water-stargrass in the quickwater.

Threats and Disturbances

No immediate threats to this population are apparent.

Conservation Recommendations

Maintaining the flow and water quality of the Juniata is essential to the species' survival.

JUNIATA RIVER AT NEWPORT (Howe and Oliver Townships and Newport Borough)

This site is a riffle on the Juniata River. It is characterized by a cobble substrate with some areas of clean swept gravel. It supports three animal species of special concern, all of which were observed alive at the site in 1994.

Threats and Disturbances:

Threats to these populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:

Maintaining the free flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

JUNIATA RIVER SCOUR AT TRIMMERS ROCKS (Howe, Miller, and Oliver Townships)

The Juniata River bends sharply northward at this site, and the shoreline is scoured by winter ice and flooding. Stunted floodplain forest dominated by silver maple, river birch, and sycamore gives way closer to the water to an herbaceous community of mixed grasses, water-willow, smarted, and spike rushes. A small population of **G4, S1 PA-endangered flat-stemmed spike rush (*Eleocharis compressa*)** was found growing on exposed bedrock ridges near the water's edge, below the spring high-water mark. This species is dependent on regular disturbance from the river, and no threats or management requirements are evident.

PENN TOWNSHIP, DUNCANNON BOROUGH

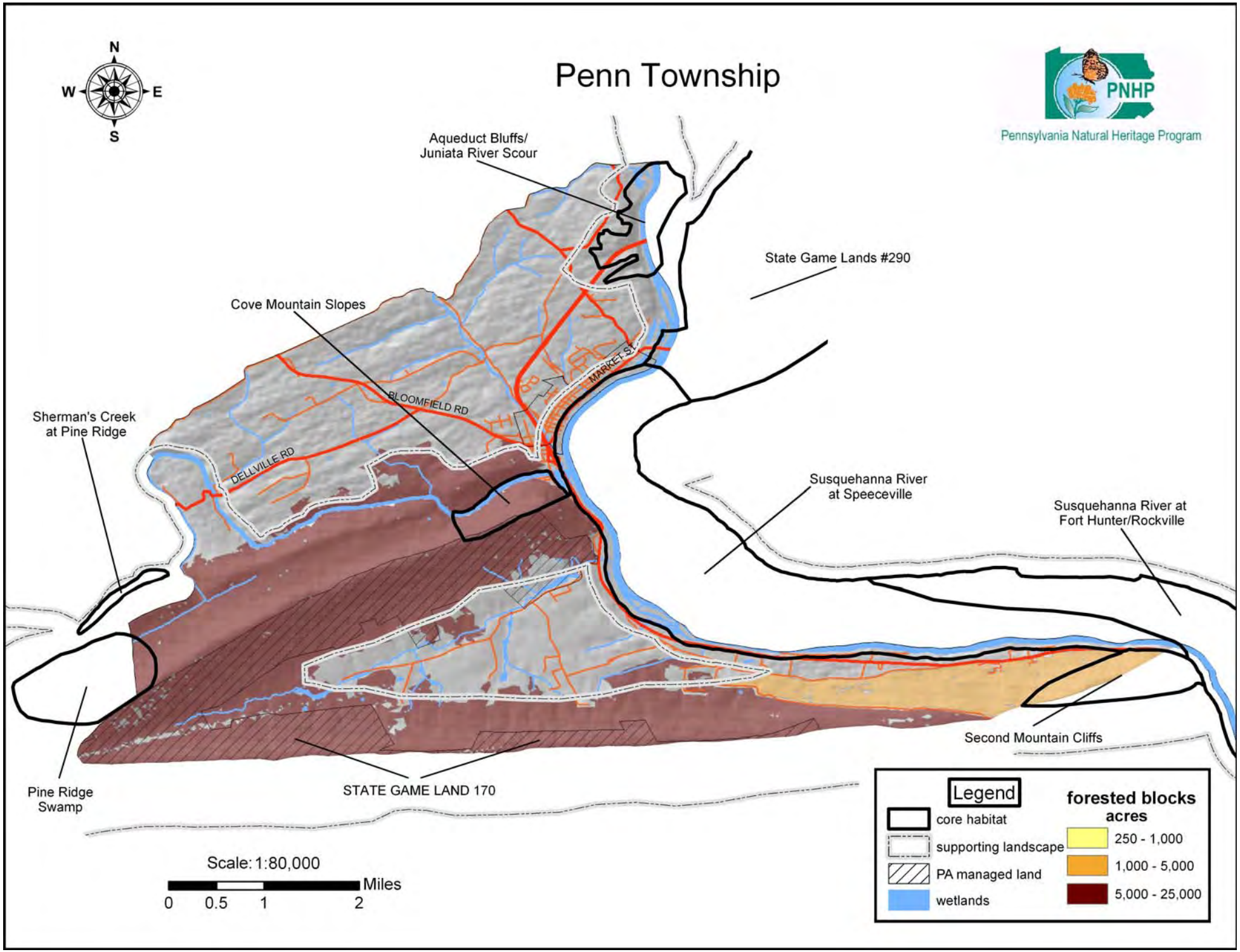
Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Aqueduct Bluffs-Juniata River Scour (3)	Plant: Jeweled Shooting-star *Dodecatheon radicatum*	G?	S2	PT	05-01-93	B
	Plant: Lance Fog-fruit *Phyla lanceolata*	G5	S4	DL	07-15-98	C
	Plant: Flat-stemmed Spike-rush *Eleocharis compressa*	G4	S1	PE	07-15-98	CD
Second Mountain Cliffs (4)	Animal Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	10-10-88	E
Cove Mountain Slopes (3)	Natural Community: Mesic Central Forest	G?	S2	N	06-02-98	C
Susquehanna River at Speeceville (3)	Animal Species of Concern	G4	S2	E	2004	E

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: Pine Ridge Swamp

Managed Lands: State Game Lands 120

PENN TOWNSHIP MAP


Penn Township
N
W
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S
PNHP
Pennsylvania Natural Heritage Program
Aqueduct Bluffs/
Juniata River Scour
State Game Lands #290
Cove Mountain Slopes
BLOOMFIELD RD
MARKET ST
DELLVILLE RD
Sherman's Creek
at Pine Ridge
Susquehanna River
at Speeceville
Susquehanna River at
Fort Hunter/Rockville
Second Mountain Cliffs
Pine Ridge
Swamp
STATE GAME LAND 170
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks
acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000
Scale: 1:80,000
Miles
0
0.5
1
2

Penn Township drains directly to the Susquehanna River along its eastern border, including the confluence of the Juniata River and Shermans Creek with the Susquehanna. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. Increasing riparian buffers along the Susquehanna and its tributaries will help reduce agricultural runoff and erosion and protect the watershed from degradation. The Susquehanna River in this area is peppered with small islands that provide diversity in the river's topography and are important habitats for wildlife. Forested ridges make up the southern portion of the township, including the Appalachian Scenic Trail, which crosses into Dauphin County at Duncannon. Protection of these continuous forested ridges of the Appalachian Mountain Section is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the downstream watersheds. Additionally, several spots along these wooded ridges contain scenic vistas and interesting geological structures. Many of locations have been written about in the *Outstanding Scenic Geological Features Of Pennsylvania* parts *1 & 2* (1979, 1987). These ridge top geologic features can be excellent vantage points for viewing hawk migrations.

AQUEDUCT BLUFFS/JUNIATA RIVER SCOUR—UPDATED—(Penn and Watts Townships and Dauphin County)

This site along the Juniata River has two listed species occupying distinct habitats. **The S2, PA-threatened jeweled shooting star (*Dodecatheon radicatum*)** occupies moist limestone cliffs on the west side of the Juniata, associated with maidenhair spleenwort, columbine, and poison ivy. The **G4, S1 PA-endangered flat-stemmed spike rush (*Eleocharis compressa*)** occurs along a scoured area of riverbank, growing on sparsely populated bedrock ridges at the water's edge. Also occurring with the spike rush is the **G5, S4 lance fog fruit (*Phyla lanceolata*)**, which has been delisted since the 2000 report.

Threats and Disturbances:

The habitat occupied by the shooting star is fairly inaccessible and there are no current threats to the population. The exotic species purple loosestrife is a potential threat to the river scour species, although annual scouring by ice and floods prevents succession from progressing at this site.

SECOND MOUNTAIN CLIFFS (Penn and Rye Township and Marysville Borough)

Formerly known as COVE MOUNTIAN OUTCROP, this site is located on the summit of Cove Mountain near its southern terminus north of Marysville. The site has supported excellent quality populations of the **Allegheny woodrat (*Neotoma magister*),** as well as Black Vultures, which are no longer considered rare in the state. Neither species was observed in field surveys during the inventory. Additional surveys for the rare species at the site are recommended.

Threats and Disturbances

The site has recently been disturbed by logging, although appropriate habitat remains. Widening of Route 11 to the east and construction of cellular phone towers are potential threats.

COVE MOUNTAIN SLOPES (Penn Township)

This site is a fair-quality example of a rich **S2 Mesic Central Forest Natural Community**. The community occupies a rocky, north-facing lower slope of Cove Mountain bounded on the north by Shermans Creek. A sharp bend and rapids in Shermans Creek forms the western boundary, and the Susquehanna River cuts a water gap through Cove Mountain at the eastern edge of the site. The slope

is rocky and steep, with Shermans Creek actively cutting into its base. The site is a fairly mature second growth woods, with sugar maple, basswood, and red oak the dominant species, and hemlock common along the Creek and on the steepest, rockiest portions. Sugar maple and spicebush are the most common species in the understory, with May-apple, wild ginger, sweet cicely, and baneberry among the ground cover. This community extends approximately halfway up the slope, before grading into a dry white pine (hemlock)-oak forest with openings of talus and black birch. Red-eyed vireos, winter wrens, worm-eating warblers, black-billed cuckoos, Acadian and great-crested flycatchers, ovenbirds, eastern wood-pewees, eastern titmice, and ruffed grouse are some of the bird species that can be observed here. There were no signs of recent logging at the site.

Threats and Disturbances

A gated dirt road runs near the base of the slope to a small reservoir west of the area surveyed. This road is used for mountain biking and hiking, and local municipalities apparently dump grass clippings, brush, and Christmas trees along the road. Exotics and weeds such as garlic mustard and pokeweed are common between this road and the creek. The dumping of brush along the dirt road widens the forest opening and is an avenue for exotics to invade.

Conservation Recommendations

Ending dumping, closing the road to motor vehicles, and allowing the forest to mature further would benefit the natural community. The Appalachian Trail runs along the top of the mountain above the site, with several scenic overlooks, and eventually cuts down through the east end of the Natural Community to Shermans Creek. Maintaining the slope in a natural state would also increase the scenic and conservation value of the Appalachian Trail Corridor.

SUSQUEHANNA RIVER AT SPEECEVILLE—NEW—(Penn Township and Dauphin County)

An animal species of concern was documented among the river islands at this site in 2004.

Threats and Disturbances:

Water quality and persistence of the river islands are the factors that most affect the health of this species' populations.

Locally Significant Site:

Pine Ridge Swamp (Penn and Rye Townships)

This area is a forested swamp that forms the headwaters of Trout Run, a small tributary of Shermans Creek. It is located in a narrow valley between Pine Ridge and Cove Mountain. The swamp is fed by many small seeps and springs from the base of the ridges along the perimeter. The swamp has a well-developed "pit and mound" topography, with hemlock, sweet birch, red maple and black ash growing on the mounds. The shrub layer has winterberry, and highbush blueberry. Sphagnum and other moss species and golden saxifrage are common in the wetter portions of the swamp. Cinnamon and royal ferns, various sedges, and skunk cabbage are also present in the groundcover. Upslope, southwest of the swamp are a series of small vernal pools; this area has been heavily logged, but the pools may be used by amphibian species and have potential for rare plant species if allowed to recover. Adjacent to the swamp is The Chimneys, the remains of an old foundry. The swamp itself is in fairly good condition and is potential habitat for rare plant species. Part of the site is owned by Duncannon Borough.

Above: The Allegheny woodrat (*Neotoma magister)*, which was once a common resident in Pennsylvania, is found in several locations in Perry County. The woodrat is a Pennsylvania-Threatened species.
Photo: Fred Habegger

Below: The Timber Rattlesnake (*Crotalus horridus*), a PA–Candidate species of concern, has been found on mountain ridges in Perry County. These misunderstood snakes are relatively mild-mannered, and will seek escape before defending themselves. This species is endangered in Pennsylvania primarily due to exploitation by snake hunters (Hulse 2001).
(Photo by the PA Science Office of The Nature Conservancy)

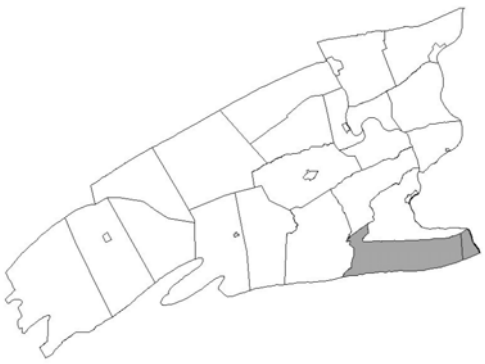
RYE TOWNSHIP, MARYSVILLE BOROUGH

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Second Mountain Cliffs (4)	Animal Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	10-10-88	E
Lambs Gap-Trout Run Headwaters (1)	Natural Community: Circumneutral Broadleaf Swamp	G?	S2S3	N	06-07-97	C
	Plant: Glade Spurge *Euphorbia purpurea*	G3	S1	PE	06-00-98	B
	Animal Species of Concern	G4	S1	N	06-26-02	AB
	Animal Species of Concern	G5	S1	N	08-26-01	E
	Animal Species of Concern	G4	S3	N	07-21-01	E
Susquehanna River at Fort Hunter/Rockville (3)	Animal Species of Concern	G3G4	S3S4	N	08-09-95	E
	Animal Species of Concern	G4	S3S4	N	08-09-95	E
	Animal Species of Concern	G5	S1	N	08-09-95	E
	Animal Species of Concern	G3G4	S1S2	N	05-19-01	E
	Animal Species of Concern	G3G4	S3S4	N	09-18-98	BC

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: Pine Ridge Swamp

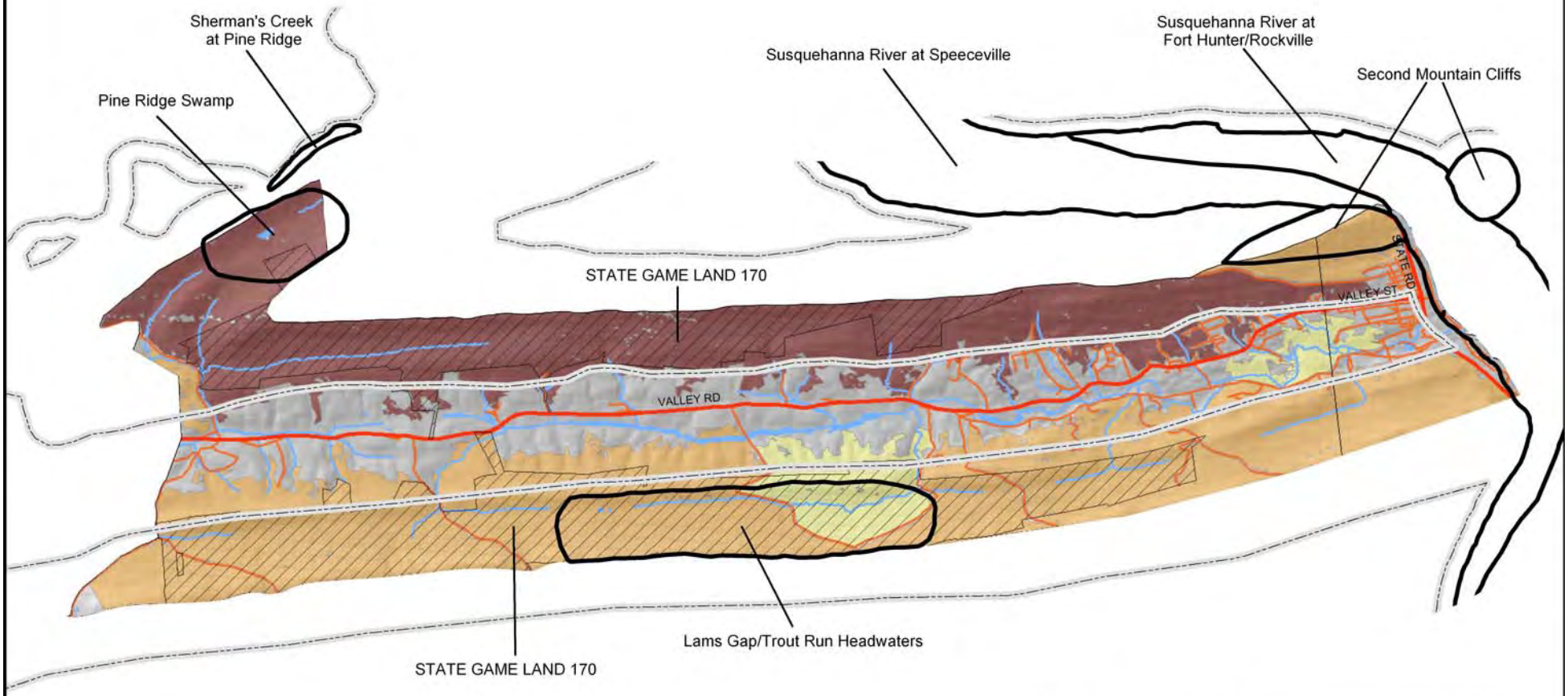
Managed Lands: State Game Lands 170



RYE TOWNSHIP MAP

Rye Township

Pennsylvania Natural Heritage Program



Scale: 1:100,000

0 1 2 4 Miles

Legend

- core habitat
- supporting landscape
- PA managed land
- wetlands

forested blocks acres

- 250 - 1,000
- 1,000 - 5,000
- 5,000 - 25,000

RYE TOWNSHIP

Rye Township drains directly to the Susquehanna River along its eastern border. Fishing Creek flows through agricultural lands between two forested ridges of the Appalachian Mountain Section. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. Increasing riparian buffers along Fishing Creek will help reduce agricultural runoff and erosion and protect the watershed from degradation. The Appalachian Scenic Trail winds across the forested ridges of the township. Protection of these continuous forested ridges of the Appalachian Mountain Section is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the downstream watersheds. Additionally, several spots along these wooded ridges contain scenic vistas and interesting geological structures. Many of locations have been written about in the *Outstanding Scenic Geological Features Of Pennsylvania* parts *1 & 2* (1979, 1987). These ridge top geologic features can be excellent vantage points for viewing hawk migrations.

SECOND MOUNTIAN CLIFFS (Penn and Rye Twp and Marysville Borough)

Formerly known as COVE MOUNTIAN OUTCROP, this site is located on the summit of Cove Mountain near its southern terminus north of Marysville. The site has supported excellent quality populations of the **Allegheny woodrat (*Neotoma magister*)**, as well as Black Vultures, which are no longer considered rare in the state. Neither species was observed in field surveys during the inventory. Additional surveys for the rare species at the site are recommended.

Threats and Disturbances

The site has recently been disturbed by logging, although appropriate habitat remains. Widening of Route 11 to the east and construction of cellular phone towers are potential threats.

LAMBS GAP/TROUT RUN HEADWATERS—UPDATED—(Rye Township)

This site supports a fair quality example of a **S2S3 Circumneutral Broadleaf Swamp Natural Community**. It is comprised of a series of broad seeps, which occur in the bottom of a valley between Little Mountain and Blue Mountain. The swamp is dominated by American beech, black birch, and tulip poplar with an understory of smooth alder and spicebush. The substrate of the seeps is relatively deep muck. Moss-covered hummocks support shrub copses, trees, and several species of fern. A wide diversity of herbs, sedges, and grasses grows within the swamp as well as along its margins. Skunk cabbage and jewelweed are dominant herbs. The site supports a good quality population of **G3, S1 PA-endangered glade spurge (*Euphorbia purpurea*).** The glade spurge is a plant of limited global distribution, known to occur in only seven states. During recent surveys, three animal species of concern were also documented at this site. The relative isolation of the site, tucked between the mountains, makes it good habitat for a number of common birds, reptiles, and amphibians. A few species that have been observed here during our field surveys include wood and green frogs, dusky and red-backed salamanders, northern water snakes, and 26 species of birds.

Threats and Disturbances

The swamp is undisturbed except for some nearby mountain bike trails. Adjacent slopes on the two mountains were both clear cut over ten years ago but the clear cutting does not appear to have impacted the hydrology of the site. Opportunistic exotic species that frequently colonize disturbed areas may invade the clear cuts and potentially threaten the quality of the site.

Conservation Recommendations

Limiting disturbances in this watershed, particularly by re-routing the existing bike trails, will help to maintain the quality of this site and allow the globally rare species to persist here. This site is located in State Game Lands 170.

Photo: R Harrison Wiegand

The glade spurge (*Euphorbia purpurea*) occurs along Trout Run in the vicinity of Lambs Gap.
The species has a very limited global distribution, only known to occur in seven mid-Atlantic states.
Draining and filing of wetland areas, extensive grazing, trampling, recreational vehicle activity, and hiking traffic are threats to this species (NatureServe 2006).
Increased deer populations may negatively impact this species unless the populations are protected from grazing. Preservation of the water quality within the seeps draining off the adjacent hillsides may be crucial to the continued success of this species at this site.

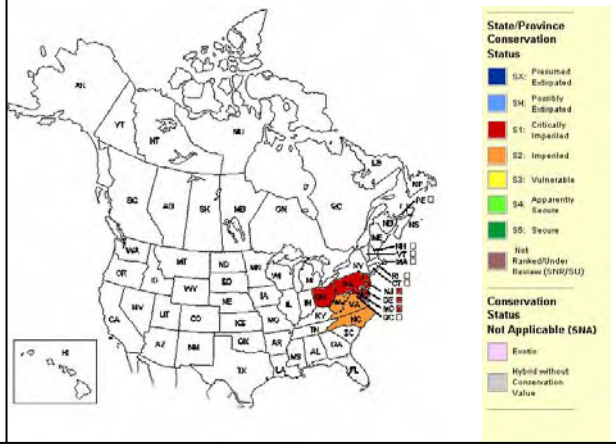


Photo: PA Science Office

SUSQUEHANNA RIVER AT FORT HUNTER/ROCKVILLE—NEW—(Rye Township, Marysville Borough and Cumberland & Dauphin County)

This site is located in the Susquehanna River and is characterized by a bedrock bottom covered with gravel and cobbles with boulders. It supports three species of rare aquatic animals. A fair to good quality population of a G3G4 animal species of concern was found at this site in 1998. The species of concern was found in coarse river gravel. During a survey in 2001 a population of a G3G4, S1S2 rare invertebrate was found in the Susquehanna River near Lions Park.

Threats and Disturbances:

Threats to these populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:

Maintaining the free flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

Locally Significant Site:

Pine Ridge Swamp (Penn and Rye Townships)

This area is a forested swamp that forms the headwaters of Trout Run, a small tributary of Shermans Creek. It is located in a narrow valley between Pine Ridge and Cove Mountain. The swamp is fed by many small seeps and springs from the base of the ridges along the perimeter. The swamp has a well-developed "pit and mound" topography, with hemlock, sweet birch, red maple and black ash growing on the mounds. The shrub layer has winterberry, and highbush blueberry. Sphagnum and other moss species and golden saxifrage are common in the wetter portions of the swamp. Cinnamon and royal ferns, various sedges, and skunk cabbage are also present in the groundcover. Upslope, southwest of the swamp are a series of small vernal pools; this area has been heavily logged, but the pools may be used by amphibian species and have potential for rare plant species if allowed to recover. Adjacent to the swamp is The Chimneys, the remains of an old foundry. The swamp itself is in fairly good condition and is potential habitat for rare plant species. Part of the site is owned by Duncannon Borough.

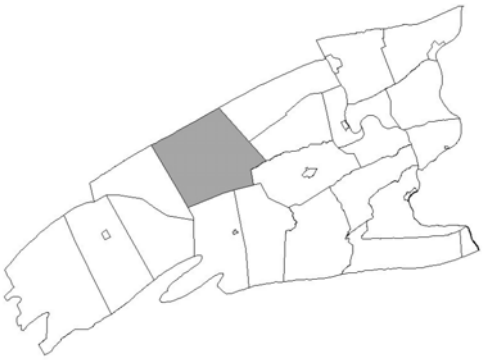
SAVILLE TOWNSHIP

Site Name	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
None						

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

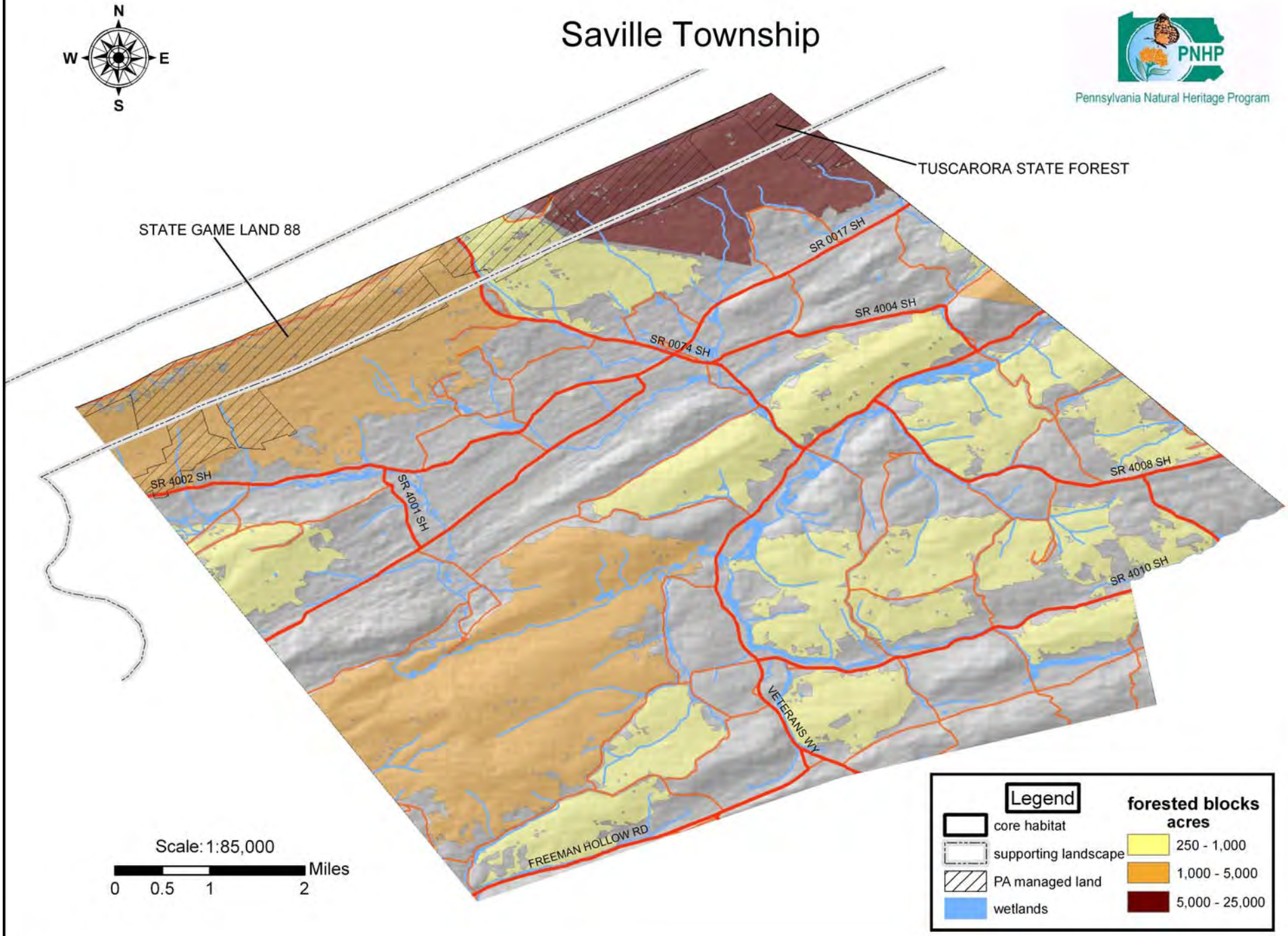
Managed Lands: Tuscarora State Forest
State Game Lands 88



Saville Township is characterized by a matrix of forested upland, the ridge of Tuscarora Mountain, and agriculture. Most of the wetlands in the township occur within the floodplain of Buffalo Run. Restoration of a forested buffer along the creeks in the valley is encouraged where it is lacking. Forested buffers help filter surface water runoff, preventing many non-point sources of pollutino from entering waterways, protecting water quality in the township and the Susquehanna River basin. In addition, reforestation of creek and stream banks can help link larger forested blocks together, contributing to their utility as a natural wildlife corridor. Protection of the continuous forested ridge along Tuscarora Mountain in the north is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Fragmented portions of this block are managed by the state; therefore efforts should be made to maintain the continuity of the forest blocks between the state lands.

SAVILLE TOWNSHIP MAP

Saville Township



Hemlock Wooly Adelgid

(Photos: PA Science Office of The Nature Conservancy)

The state tree of Pennsylvania, the Eastern Hemlock (*Tsuga canadensis*), has been under attack by an accidentally introduced insect species, the Hemlock Wooly Adelgid (*Adelges tsugae).* Many of these trees may succumb due to defoliation by these insect pests. The character of these hemlock-dominated habitats will likely change dramatically if continued defoliation occurs. The removal of the hemlock canopy would likely result in a marked decrease in these shade-adapted species and an increase in shade intolerant species, including many species considered invasive. The stable temperatures and hydrology of hemlock-dominated streams are the preferred habitat of native brook trout. Brook trout (*Salvelinus fontinalis*) were found to be two and a half times as likely to occur in hemlock streams than in hardwood streams, and were also found to be twice as abundant in hemlock streams (Snyder & Ross). It is difficult to predict the future consequences of the loss of mature stands of hemlock in these habitats.

Top: The wooly adelgid appears as a cottony mass on the undersides of hemlock branches.

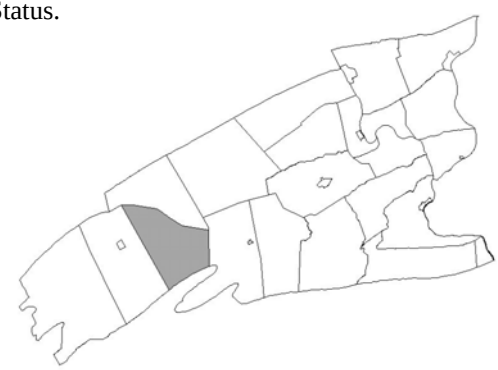
Center: The insect devours the evergreen needles of even the largest trees.

Bottom: Hemlock cannot withstand defoliation, and will die shortly after being stripped of its needles.

SOUTHWEST MADISON TOWNSHIP

Site Name	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
None						

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.



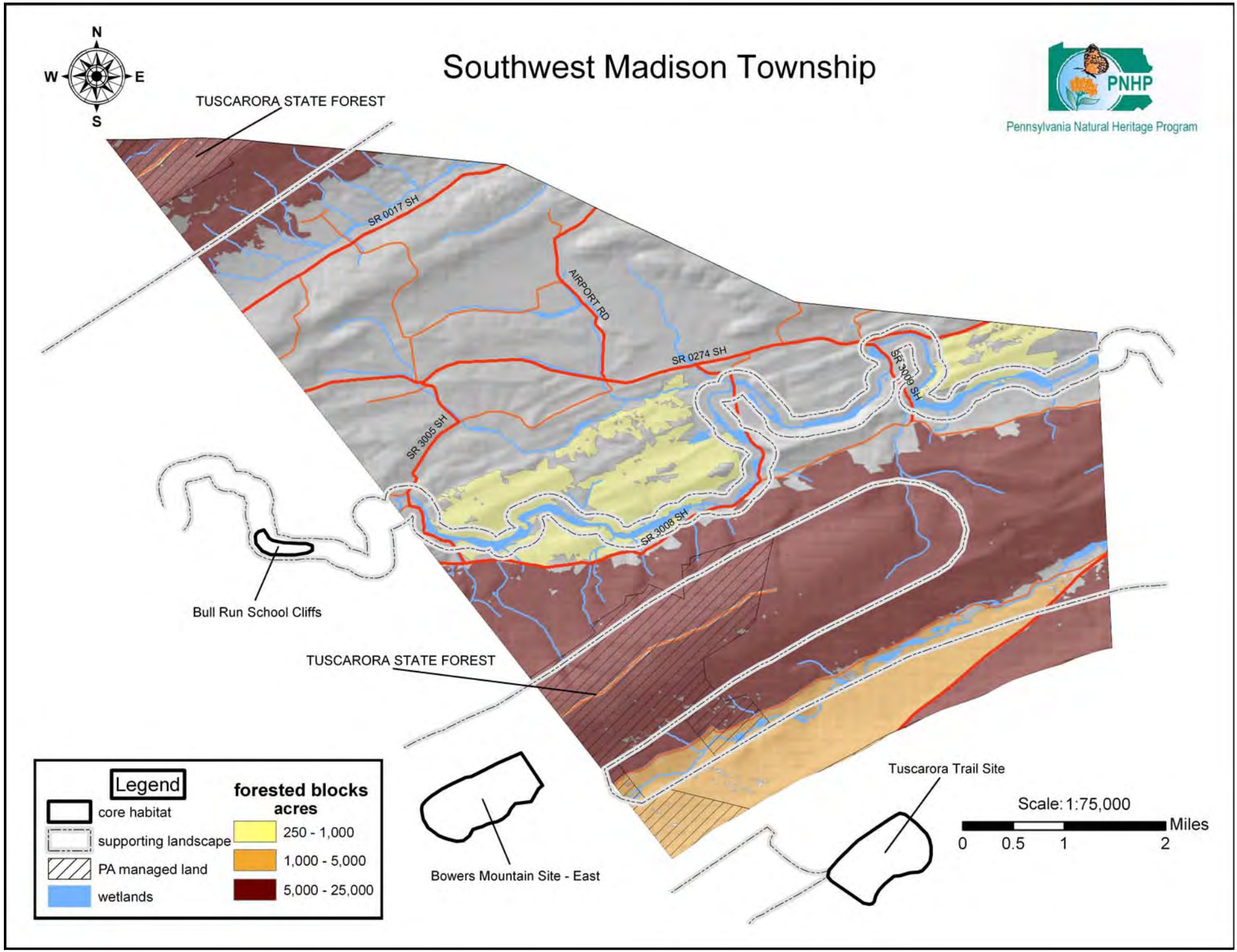
Locally Significant: None

Managed Lands: Tuscarora State Forest

Other: High Quality Cold Water Fishery—Sherman Creek to Cisna Run Village, Laurel Run to T339

Southwest Madison Township is bisected by Shermans Creek traveling through a matrix of farmland tucked in the valley between the Tuscarora Mountain ridge to the nroth and the Blue Mountain range in the southern portion. Protection of these continuous forested ridges is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. The floodplain of Shermans Creek contains many riparian wetlands among significant remaining forest blocks that can be maintained by restoration of riparian buffers.

SOUTHWEST MADISON TOWNSHIP MAP


Southwest Madison Township
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W
E
S
PNHP
Pennsylvania Natural Heritage Program
TUSCARORA STATE FOREST
SR 0017 SH
AIRPORT RD
SR 0274 SH
SR 3009 SH
SR 3005 SH
SR 3008 SH
Bull Run School Cliffs
TUSCARORA STATE FOREST
Tuscarora Trail Site
Bowers Mountain Site - East
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000
Scale: 1:75,000
Miles
0
0.5
1
2

Forested floodplains provide habitat for numerous species of breeding and migratory birds, invertebrates, mammals, reptiles and amphibians. These linear habitats provide natural travel corridors for animal species up and down stream. This is particularly important in areas where the only remaining intact closed canopy forest is on the active floodplain, due to farming or development of the adjacent uplands (Podniesinski & Wagner 2002).
Photo: PA Science Office of The Nature Conservancy

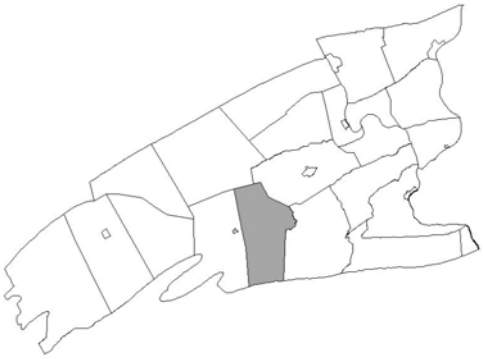
SPRING TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Milligan Ridge Ponds (3)	Plant: Northeastern Bulrush *Scirpus ancistrochaetus*	G3	S3	PE	07-19-94	B

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: Florence Jones Reinman Wildlife Sanctuary



Spring Township is bisected by Shermans Creek traveling through a matrix of farmland tucked in the valley below the Blue Mountain range in the southern portion. Protection of these continuous forested ridges is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Several large forested corridors are found in the township, in particular along the floodplain of Shermans Creek. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. The floodplain of Shermans Creek contains many riparian wetlands that can be maintained by maintenance and restoration of riparian buffers.

MILLIGAN RIDGE PONDS—UPDATED—(Spring Township)

This site consists of a group of woodland ponds located in an upland area between Germany Ridge and Milligan Ridge. The surrounding uplands have a well-drained, acidic, sandy soil, with a forest of oak, hickory, pine, and heaths. The ponds themselves are flooded in the spring but dry by late summer. Around the margins of the pools are red maple, black-gum, sweet birch, greenbriar, winterberry, highbush blueberry, huckleberry, and button-bush, along with royal fern, cinnamon fern, and Sphagnum moss. The G3, S3, PA-endangered **Northeastern bulrush (*Scirpus ancistrochaetus*)** is found in at least two of these ponds. It grows in the middle of the pools, on organic substrate, and is associated with wool-grass, mannagrass, soft rush, marsh-St.-Johns-wort, and various sedges. This good-quality population is large and reproducing.

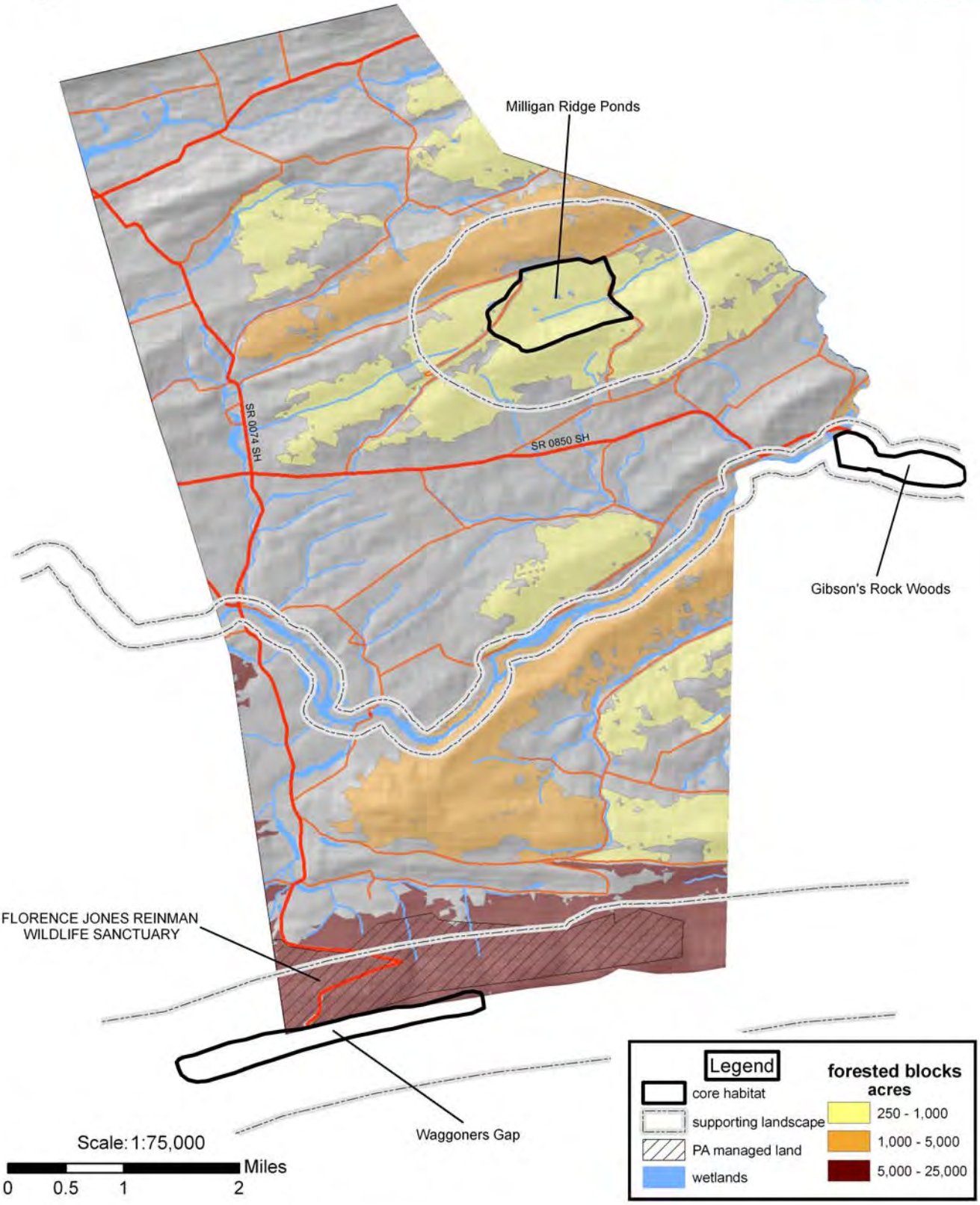
Conservation Recommendations

Any logging or development in the area should include buffers to protect the quality of these pools and the species of concern.

SPRING TOWNSHIP MAP

Spring Township

Pennsylvania Natural Heritage Program



From left to right and top to bottom: Songbirds such as 1) **Acadian Flycatcher** (*Empidonax virescens*), 2) **Black-throated Green Warbler** (*Dendroica virens*), 3) **Hooded Warbler** (*Wilsonia citrina*), 4) **Blue-headed Vireo** (*Vireo solitarius*), 5) **Scarlet Tanager** (*Piranga olivacea*), 6) **Wood Thrush** (*Hylocichla mustelina)*, and 7) **Louisiana Waterthrush** (*Seiurus motacilla*) all depend on large blocks of interior forest for successful breeding. Nest parasitism specialists such as Brown-headed Cowbirds and predators such as house cats, raccoons and Blue Jays are not as plentiful in the forest interior as on the forest edge. Several large contiguous forests in Cumberland County have large diverse forest songbird populations. Protecting large blocks of forest is important to the continued nesting of these neo-tropical migrant landbirds in Cumberland County and Pennsylvania. (Photos by Ron Austing).

TOBOYNE TOWNSHIP

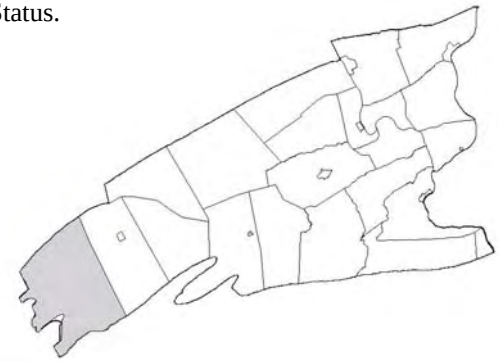
Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Big Round Top Woods (5)	Plant: Purple Bedstraw *Galium latifolium*	G5	S3	N	09-05-03	B
Bowers Mountain Site—West (3)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	04-20-97	E
Conococheague Mountain Site (3)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	10-31-96	E
Fowler Hollow Road Site (3)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	05-02-91	E
Gunter Valley and Ridges (4)	Natural Community: High Gradient Cleawater Creek	G?	S3	N		E
	Animal Species of Concern	G4	S3S4	PC	6/26/2002	E
	Animal: Northern Myotis *Myotis septentrionalis*	G4	S3B, S3N	N	6/27/2000	E
Second Narrows Slopes (2)	Natural Community: Ephemeral/Fluctuating Natural Pool Community	G?	S3	N	9/10/2002	BC
	Plant: Northeastern Bulrush *Scirpus ancistrochaetus*	G3	S3	PE	8/3/2003	BC
	Plant: Purple Bedstraw *Galium latifolium*	G5	S3	N	8/13/2003	D
	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	4-19-97	E
The Hemlocks (4)	Natural Community: Northern Conifer Forest	G5	S3S4	N	06-28-97	B
Three Square Hollow East (4)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	10-02-86	C

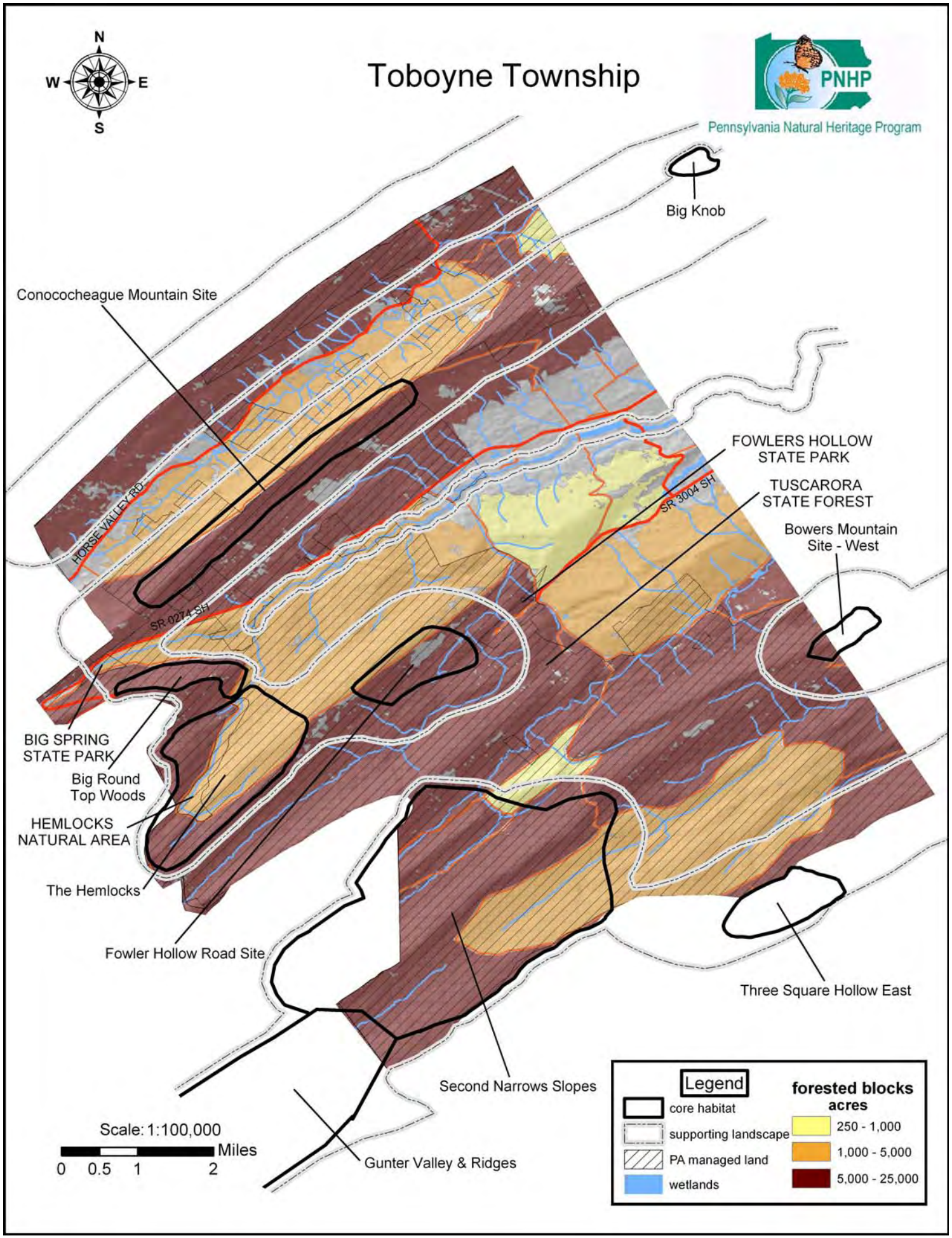
* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: Tuscarora State Forest

TOBOYNE TOWNSHIP MAP




N
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S
Toboyne Township
PNHP
Pennsylvania Natural Heritage Program
Big Knob
Conococheague Mountain Site
FOWLERS HOLLOW STATE PARK
TUSCARORA STATE FOREST
HORSE VALLEY RD
SR 0274-SH
SR 3004 SH
Bowers Mountain Site - West
BIG SPRING STATE PARK
Big Round Top Woods
HEMLOCKS NATURAL AREA
The Hemlocks
Fowler Hollow Road Site
Three Square Hollow East
Second Narrows Slopes
Gunter Valley & Ridges
Scale: 1:100,000
Miles
0 0.5 1 2
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks
acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000

Other: High Quality Cold Water Fishery—Sherman Creek, South Branch Laurel Run, Laurel Run from South Branch to T339; Laurel Run Exceptional Value from source to confluence with South Branch

Toboyne Township forms the heart of the Appalachian Mountain Section of Perry County, with continuously forested ridges and valleys connecting the Tuscarora Mountain in the north to the Blue Mountain in the south. The majority of the township is in the Tuscarora State Forest. Maintenance of the continuity of these forest blocks, especially that bordering the state forest, is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the many high quality headwater streams flowing into the valley below.

BIG ROUND TOP WOODS—UPDATED—(Toboyne Township)

A mature second-growth, high-elevation forest of mixed conifer and hardwood species occupies this site. Red oak, hemlock, sweet birch, chestnut oak, red maple, and black gum are prevalent in the canopy, with mountain laurel, mountain holly, and black huckleberry are among the shrub species present. There are very few groundcover species present -- Indian cucumber and evergreen wood fern are two. Some of the larger red oak and black gum trees are over 150 years old. The site is along an upper slope of Big Round Top, and is cut by several hiking trails and old logging roads. A good population of **G5, S3 purple bedstraw (*Galium latifolium*)** was found in these woods in 2003. Ravens, often a species of remote mountain forests, were observed at this site during our survey. Although it has been logged in the past, the forest shows little recent disturbance and good regeneration of young trees.

Conservation Recommendations

Excluding or limiting future logging operations to highly selective cutting will allow the persistence of this relatively mature forest.

BOWERS MOUNTAIN SITE - WEST (Jackson and Toboyne Township)

This southeast-facing forested mountain slope supports the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**. The canopy vegetation includes hemlock, black birch and mixed oaks. The subcanopy includes mountain laurel and striped maple. Evidence of this population was last observed in 1997. This site is located within Tuscarora State Forest.

CONOCOCHEAGUE MOUNTAIN SITE—NEW—(Toboyne Township)

Active signs of **G3G4, S3 PA-threatened Allegheny woodrat (*Neotoma magister*)** were located at the crest of this mountain during surveys in 1996. The same species was again located on the Conococheague Mountain at a site to the southwest. This species typically inhabits the deep crevices of rocky outcrops, boulder-strewn talus slopes and caves. Populations of this species throughout the state have experienced rapid decline in recent decades due to unknown causes. Additional surveys for this species at this site are recommended. These sites are found within the Tuscarora State Forest.

FOWLER HOLLOW ROAD SITE (Toboyne Township)

This forested slope on the north side of Fowler Hollow Run supports the **G3G4, S3 PA-threatened Allegheny woodrat (*Neotoma magister*)**. The canopy vegetation includes red maple, black birch, chestnut oak, red oak, and white oak. The understory includes striped maple, gooseberry, and ferns. Evidence of this population was last observed in 1991. This site is located within Tuscarora State Forest.

GUNTER VALLEY AND RIDGES—NEW—(Toboyne Township and Franklin and Cumberland Counties)

This site is the watershed for a **High Gradient Clearwater Creek** natural community, designated as an Exceptional Value Stream by the PA Department of Environmental Protection. The PA Bureau of Forestry recently purchased much of this land from the Shippensburg Water Authority. This large tract of land has potential for species of concern and deserves a more thorough biological survey. One individual of a **Northern Myotis (*Myotis septentrionalis*)**, **a G4 S3B, S3N** animal species of concern, was captured in a net above a small stream that leads to a large reservoir. Associated species include Little Brown Bat (*Myotis lucifugus*) and Big Brown Bat (*Eptesicus fuscus*). Dominant vegetation in this area includes Eastern Hemlock, Black Birch, American Beech, Black Gum, and Tuliptree, The herbaceous layer includes Stiltgrass, Hay-scented Fern, and Cinnamon Fern.

Also at this site, an individual of **a G4, S3S4 animal species of concern** was found.

Threats and Disturbances

If roosting by the Northern Myotis is nearby, one potential threat would be periodic logging along the mountains. No other disturbances or threats are noted.

Conservation Recommendations

Additional surveys of these bats are needed to better assess the population. Undisturbed forested buffers should be maintained along all waterways. For the other animal species of concern, logging should be avoided along rocky ridgetop outcrops except in the winter months to avoid impacting this species of concern.

THE HEMLOCKS (Toboyne Township)

This site consists of an area of old growth in an isolated mountain valley. The old growth area is a **Northern Conifer Forest Natural Community**, occurring along Patterson Run in a steep, north-facing ravine. The steep, rocky slopes are dominated by old growth hemlock trees, some over 150 feet tall. Near the head of the ravine the slopes are steepest and the canopy is almost entirely hemlock, with a few yellow birches in the understory and an herb layer dominated by intermediate wood-fern and mosses. Further downstream there are more hardwoods beneath the taller hemlocks, including red oak, cucumber-tree, tulip-tree, black-gum, red maple, and chestnut oak. The understory is densely shaded and sparse, with striped maple, witch-hazel, yellow birch, and hemlock. The herb layer contains downy rattlesnake-plantain, partridgeberry, jack-in-the-pulpit, squawroot, solomon's seal, Indian cucumber, Canada mayflower, and hay-scented fern. Bird species observed at The Hemlocks include Acadian Flycatcher, Scarlet Tanager, Red-eyed Vireo, Eastern Wood-Pewee, Hermit Thrush, Black-throated Blue Warbler, Black-throated Green Warbler, and Louisiana Waterthrush. This site is protected as a Natural Area within the Tuscarora State Forest and is used for hiking. No threats to the Natural Community are evident. This rare old-growth site deserves continued protection.

SECOND NARROWS SLOPES (Toboyne Township and Franklin County)

Includes former sites: THREE SQUARE HOLLOW PONDS, SECOND NARROWS POND, LAUREL RUN ROAD, and SHERMAN MOUNTAIN-GUNTER ROAD. This site contains a fair to good quality **Ephemeral/Fluctuating Natural Pool Community** in State Game Lands 76. The ponds contain a fair to good quality population of **Northeastern Bulrush (*Scirpus***

***ancistrochaetus*)**, **a PA-endangered G3, S3** plant species of concern. The Federally endangered status of this plant indicates that the species is in danger of extinction throughout all or a significant portion of its range. The northeastern bulrush is primarily found in temporary ponds and other pools with fluctuating water levels. These ponds also typically provide important breeding habitat for forest dwelling amphibians such as the wood frog, and the spotted salamander. Associated species include rattlesnake mannagrass, woolgrass, royal fern, and three-way sedge. The surrounding woods consisted of canopy trees such as red maple, black tupelo, black birch, black locust, and various oak species. Multiflora rose is present along the roadside but it and other exotics do not pose a direct threat to the population.

A small population of **Purple Bedstraw (*Galium latifolium*) a G5, S3** plant species of concern was documented on the dry loose-shale slopes of Price Knob in Tuscarora State Forest. Additionally, the rocky eastern portion of this site supports a population of **PA-threatened Allegheny woodrat (*Neotoma magister*)**.

Threats and Disturbances

Logging and other changes in the habitat adjacent to the ponds would decrease the quality of the habitat for the populations of Northeastern bulrush at this location. The increased use of All Terrain Vehicles (ATVs) in public forest property poses a potential threat to the site.

Conservation Recommendations

Logging should be avoided near the ponds in this area, and an undisturbed forested buffer should be maintained around each vernal pond. The site should be monitored for ATV traffic, and trails near the ponds blocked as they appear.

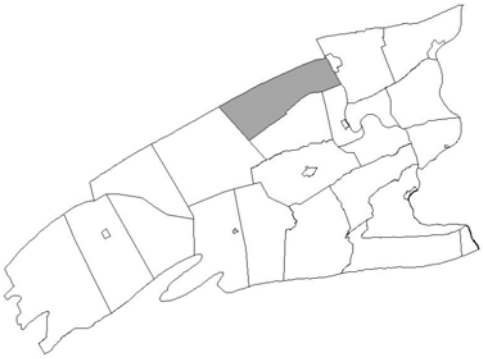
THREE SQUARE HOLLOW EAST—NEW—(Upper Mifflin Township)

This site consists of the forested crest and steep upper slope of a southeast facing mountain ridge. It is dominated by mixed oak species growing from a talus substrate. It supports a fair quality population of the **PA-Threatened Allegheny woodrat (*Neotoma magister*)**. A small portion of this site is located in Tuscarora State Forest.

TUSCARORA TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Juniata River—Millerstown to Old Ferry Station (4)	Animal Species of Concern	G3G4	S3S4	N	10-07-98	BC

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.



Locally Significant: None

Managed Lands: Tuscarora State Forest
State Game Lands 171

Saville Township is characterized by a matrix of forested upland, the ridge of Tuscarora Mountain, and agriculture. Most of the wetlands in the township occur within the floodplain of Raccoon Creek. Restoration of a forested buffer along the creeks in the valley is encouraged where it is lacking. Forested buffers help filter surface water runoff, preventing many non-point sources of pollutino from entering waterways, protecting water quality in the township and the Susquehanna River basin. In addition, reforestation of creek and stream banks can help link larger forested blocks together, contributing to their utility as a natural wildlife corridor. Protection of the continuous forested ridge along Tuscarora Mountain in the north is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Fragmented portions of this block are managed by the state; therefore efforts should be made to maintain the continuity of the forest blocks between the state lands.

JUNIATA RIVER - MILLERSTOWN TO OLD FERRY STATION (Greenwood, Oliver, and Tuscarora Townships and Millerstown Borough)

A fair to good quality population of a G3/G4 animal species was found to occupy several separate areas of habitat in the Juniata River. The species of concern was found in quickwater areas with a substrate of mixed gravel and exposed bedrock. Plant species present include algae beds in slackwater and some water-stargrass in the quickwater.

Threats and Disturbances

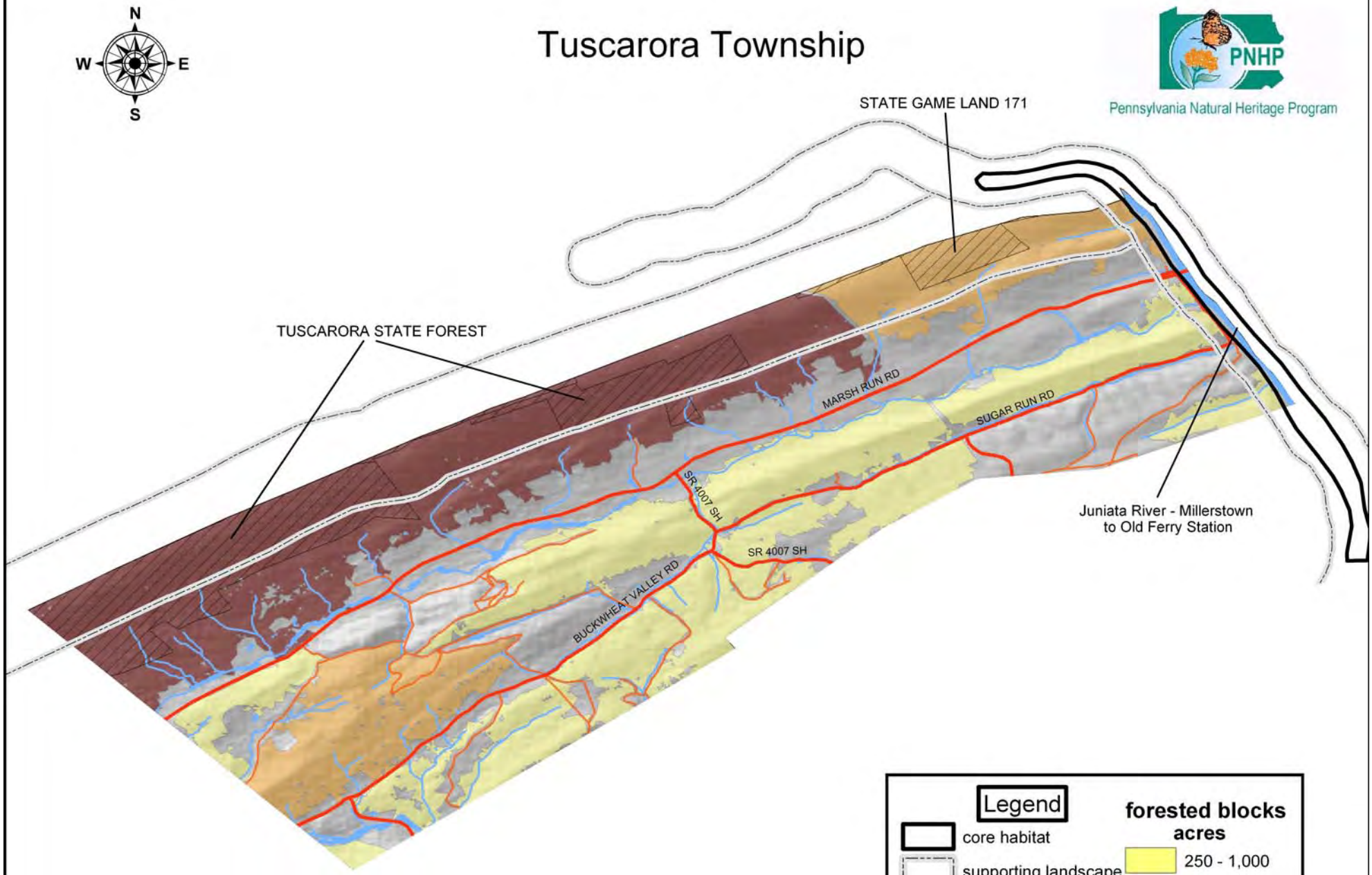
No immediate threats to this population are apparent.

Conservation Recommendations

Maintaining the flow and water quality of the Juniata is essential to the species' survival.

TUSCARORA TOWNSHIP MAP

Tuscarora Township



PNHP

Pennsylvania Natural Heritage Program

Rocky ridgetops and boulder fields like this one on Blue Mountain can be suitable habitat for Allegheny Woodrats as well as timber rattlesnakes.
Photo: PA Science Office of The Nature Conservancy.

TYRONE TOWNSHIP, LANDISBURG BOROUGH

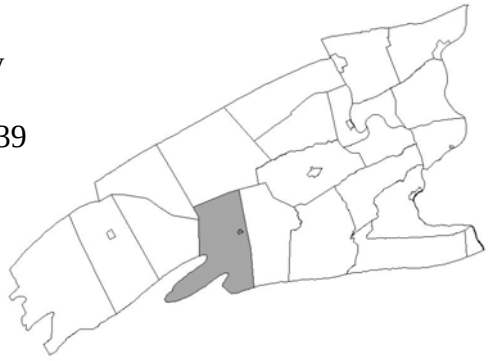
Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Flat Rock Site (4)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	07-19-96	E
Tuscarora Trail Site (5)	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	11-27-90	E
Waggoners Gap (3)	Plant: Prickly-pear Cactus *Opuntia humifusa*	G5	S3	PR	11-29-00	C
	Animal: Allegheny Woodrat *Neotoma magister*	G3G4	S3	PT	05-11-02	E

* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: Tuscarora State Forest
Florence Jones Reinman Wildlife Sanctuary

Other: High Quality Cold Water Fishery—Laurel Run to T339

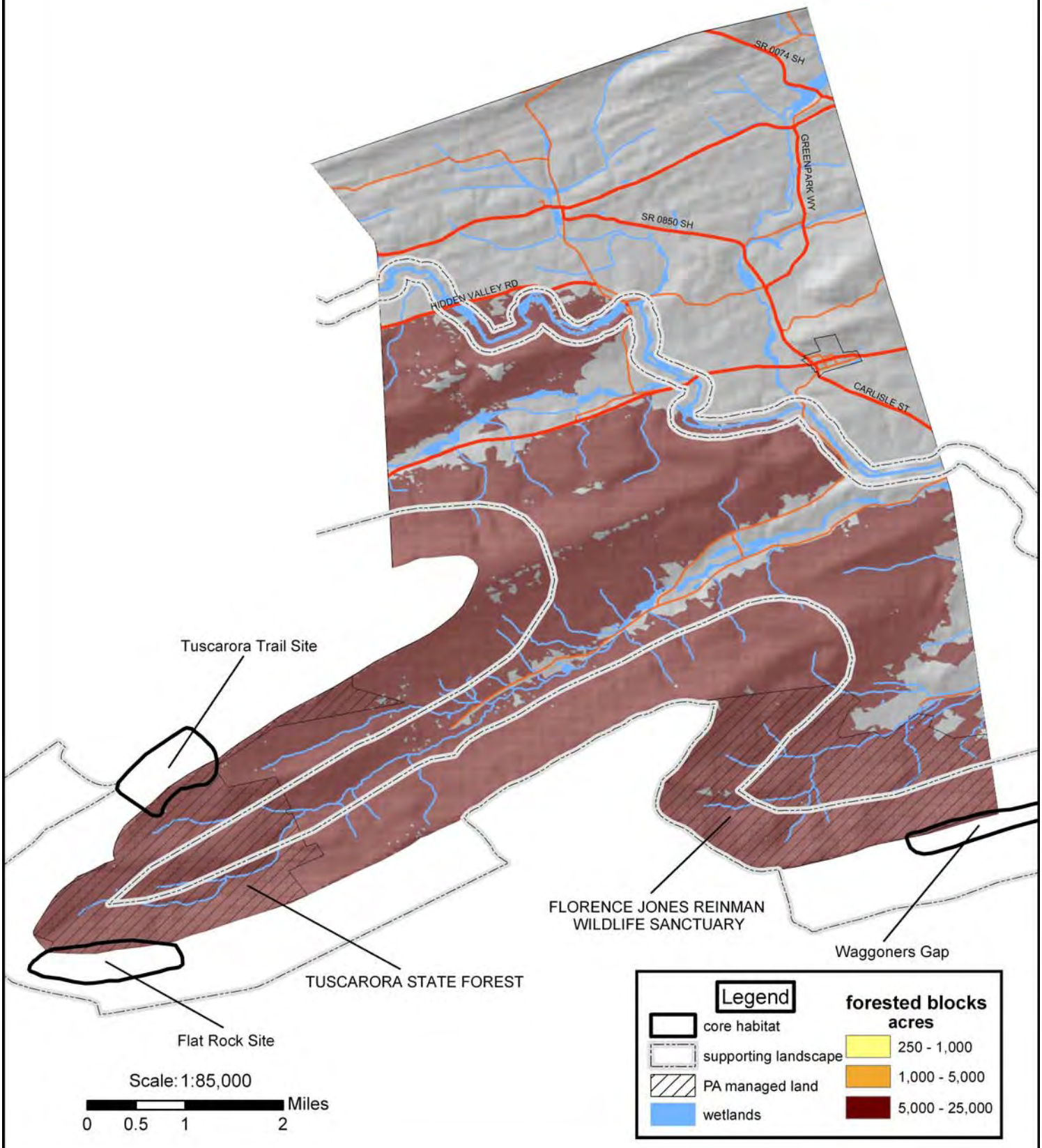


Southwest Madison Township is bisected by Shermans Creek traveling against the Blue Mountain range in the southern portion. Protection of these continuous forested ridges is critical to maintaining this area as a wildlife corridor and to protecting the water quality of the headwater streams flowing into the valley below. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. The floodplains of the many creeks in this township contain many riparian wetlands among significant remaining forest blocks that can be maintained by restoration of riparian buffers.

TYRONE TOWNSHIP MAP

Tyrone Township

Pennsylvania Natural Heritage Program



FLAT ROCK SITE—NEW—(Tyrone Township and Cumberland County)

This southeast-facing forested mountain slope supports a population of the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**. The canopy vegetation includes black oak and chestnut oak. The subcanopy includes witch hazel, mountain laurel, blackberry, and grape. Evidence of this population was last observed in 1996. This site is located within Tuscarora State Forest.

TUSCARORA TRAIL SITE—NEW—(Tyrone Township and Cumberland County)

This site is a rocky forested ridgetop along the border of Cumberland and Perry Counties, dominated by oak. Evidence of the **G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)** was found here in 1990; further surveys to determine the extent and condition of the population are recommended. This site is located within Tuscarora State Forest.

WAGGONERS GAP—NEW—(Tyrone Township and Cumberland County)

This site is located on the crest of Blue Mountain in the vicinity of Waggoners Gap. The area consists of three main habitat types including patches of exposed talus outcrops, patches of pine-oak-heath woodland, and more extensive xeric mixed oak forest. The talus outcrops occur on the ridgetop and on south-facing slopes and consist of large rock boulders, which form many small cave-like crevices and support no vegetation. These areas are fringed primarily with chestnut oak and black birch. The pine-oak-heath woodland occurs on a large expanse of exposed bedrock that flanks a section of the mountain ridge on the south side. This area is characterized by scattered pines and chestnut oaks with patches of mountain laurel and lowbush blueberry and a few scattered herbs. It can be seen on the upslope side of Route 74 when driving on the south side of the gap. This site supports two species of concern, the **G5, S3 Prickly-pear cactus (*Opuntia humifusa*) and the G3G4, S3 PA-Threatened Allegheny woodrat (*Neotoma magister*)**.

Threats and Disturbances

This site has been disturbed by the construction of Route 74 and radio transmission towers. Its close proximity to the road and the panoramic view makes it a desirable party spot and therefore vulnerable to degradation from trash and vandalism.

Prickly pear cactus occurs on a dry rocky outcrop in Perry County
Photo: PA Science Office of The Nature Conservancy

WATTS TOWNSHIP, NEW BUFFALO BOROUGH

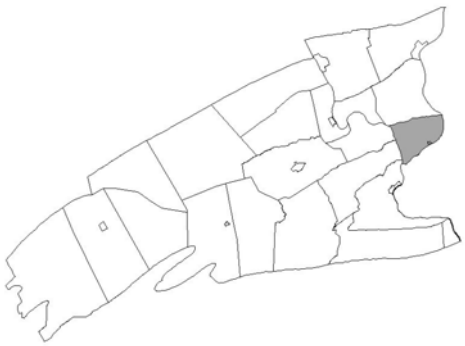
Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Aqueduct Bluffs/Juniata River Scour (3)	Plant: Jeweled Shooting-star *Dodecatheon radicatum*	G?	S2	PT	05-01-93	B
	Plant: Lance Fog-fruit *Phyla lanceolata*	G5	S4	DL	07-15-98	C
	Plant: Flat-stemmed Spike-rush *Eleocharis compressa*	G4	S1	PE	07-15-98	CD
Juniata River at Half Falls/Half Falls Mountain (4)	Animal Species of Concern	G3G4	S3S4	N	08-07-98	CD
	Animal Species of Concern	G4	S4	N	08-07-98	E
State Game Lands #290 (5)	Plant: False Loosestrife Seedbox *Ludwigia polycarpa*	G4	S1	PE	09-12-01	C
	Animal Species of Concern	G3G4	S3S4	N	9-13-95	E
	Animal Species of Concern	G4	S2B	PE	2000	B
Susquehanna River at Halifax (4)	Animal Species of Concern	G3G4	S3S4	N	08-28-98	CD
	Animal Species of Concern	G4	S4	N	08-28-98	E
Watts Mountain (2)	Plant: Box Huckleberry *Gaylussacia brachycera*	G3	S1	PE	03-18-98	B

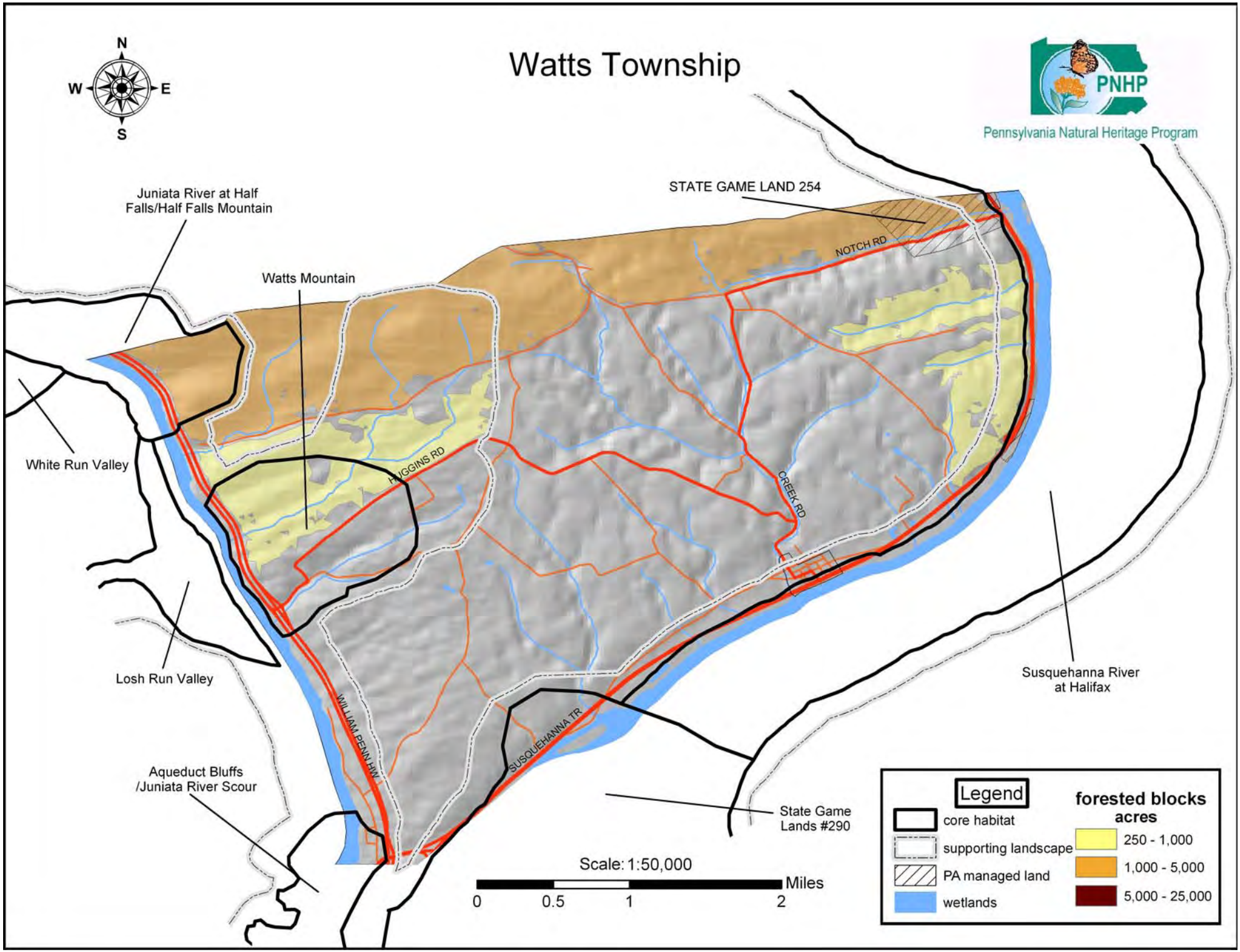
* Please refer to Appendix I for an explanation of PNHP Ranks and State Status.
**Please refer to Appendix II for an explanation of Quality Ranks.

Locally Significant: None

Managed Lands: State Game Lands 254

WATTS TOWNSHIP MAP




Watts Township
N
W
E
S
PNHP
Pennsylvania Natural Heritage Program
Juniata River at Half Falls/Half Falls Mountain
STATE GAME LAND 254
Watts Mountain
NOTCH RD
White Run Valley
HUGGINS RD
CREEK RD
Losh Run Valley
Susquehanna River at Halifax
WILLIAM PENN HWY
SUSQUEHANNA TR
Aqueduct Bluffs /Juniata River Scour
State Game Lands #290
Scale: 1:50,000
0
0.5
1
2
Miles
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000

WATTS TOWNSHIP

Watts Township drains to the Juniata River in the west and the Susquehanna River along its eastern border. Uplands in the northern portion of the township form the biggest forest blocks, yet some large blocks can be found along tributary streams to both rivers. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin. Increasing riparian buffers along the Susquehanna and its tributaries will help reduce agricultural runoff and erosion and protect the watershed from degradation.

AQUEDUCT BLUFFS/JUNIATA RIVER SCOUR—UPDATED—(Penn and Watts Townships and Dauphin County)

This site along the Juniata River has two listed species occupying distinct habitats. **The S2, PA-threatened jeweled shooting star (*Dodecatheon radicatum*)** occupies moist limestone cliffs on the west side of the Juniata, associated with maidenhair spleenwort, columbine, and poison ivy. The **G4, S1 PA-endangered flat-stemmed spike rush (*Eleocharis compressa*)** occurs along a scoured area of riverbank, growing on sparsely populated bedrock ridges at the water's edge. Also occurring with the spike rush is the **G5, S4 lance fog fruit (*Phyla lanceolata*)**, which has been delisted since the 2000 report.

Threats and Disturbances:

The habitat occupied by the shooting star is fairly inaccessible and there are no current threats to the population. The exotic species purple loosestrife is a potential threat to the river scour species, although annual scouring by ice and floods prevents succession from progressing at this site.

JUNIATA RIVER AT HALF FALLS—UPDATED—(Buffalo, Howe, Miller, and Watts Townships)

This site consists of a section of the Juniata River, with a ledge (Half Falls) at the upstream end and riffles and gravel bars downstream. Small populations of two animal species of concern were found in an area of shallow quickwater habitat with a substrate of large cobbles and gravel. No aquatic plants were observed. More searching of this and adjacent portions of the Juniata is needed to determine the extent of the population of the species of concern. Protecting the flow levels and water quality of the Juniata is essential to the continued survival of these species.

The upland portion of this site includes Half Falls Mountain, formerly noted as a locally significant site. Route 22-322 cuts through the base of the slope, which is made up largely of talus at its lower end, giving way to a forested upper slope dominated by white pine, hemlock, chestnut and black oaks, and sweet birch. The sparse understory and shrub layers contain flowering dogwood, blueberry, redbud, and poison ivy. A fence lizard was observed using the lower talus slope. Sharp bedrock ridges and cliffs along the north and south edges of the slope support table-mountain pine, sassafras, and a variety of lichen species.

Threats and Disturbances

Charcoal in the soil indicates a history of fire at this site in the past. The site is currently undisturbed by human factors, although logging has taken place on the adjacent east-facing slope. The aquatic animals are vulnerable to degradation of water quality and sedimentation of their habitats.

Conservation Recommendations:

Maintaining the free-flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

STATE GAME LANDS #290 (Watts Township and Dauphin County)

This site is at the confluence of the Juniata and Susquehanna Rivers. A fair population of **G4, S1 PA-endangered False loosestrife seedbox (*Ludwigia polycarpa*)** was discovered in 2001 occupying the more open parts of an extremely densely vegetated herb thicket on an island dominated by purple loosestrife and weedy natives. An unknown quality population of an aquatic animal species of concern was found in the west channel of the Susquehanna around Haldeman Island. The animal was found in still water 18 to 36 inches deep, with a substrate of large cobbles and bedrock, some silt-covered. Another aquatic animal species of concern was observed at the site in 1995. This site is an island in the Susquehanna River. A rare animal species has been breeding at this site since 1991. The island, part of State Game Lands #290, is a mixture of floodplain forest and agricultural fields, with a number of artificial ponds in the vicinity of the nest. The continued success of this species also depends on the health of fish populations in the Susquehanna.

Threats and Disturbances:

The primary threat to the false loosestrife seedbox is competition from purple loosestrife and other exotic plant species. The habitat itself is artificial and has been used in the past for waterfowl propagation. Threats to the animal populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:

Maintaining the free-flowing character of the river and the best quality water possible will help the animal species persist and even flourish at this site into the future.

SUSQUEHANNA RIVER AT HALIFAX (Buffalo & WattsTownships and Dauphin County)

This site is located in the Susquehanna River at a series of large islands, part of which is included in State Game Lands #254. Two animal species of special concern were found here in 1998. The river bottom has a bedrock bottom with areas of sand and gravel.

Threats and Disturbances:

Threats to these populations as well as to other common species that occupy this stretch of the river include thermal and chemical pollution, impoundment, and excessive sedimentation.

Conservation Recommendations:

Maintaining the free flowing character of the river and the best quality water possible will help these species persist and even flourish at this site into the future.

WATTS MOUNTAIN (Watts Township)

This site is a series of parallel ridges on the eastern side of the Juniata River and U.S. Routes 22-322. The ridges have very steep, mostly wooded slopes and a well drained, shale or shale-sandstone substrate. Hemlock is present, and sometimes dominant, on the moister and cooler lower slopes, while mixed hardwoods and pines grow on the upper slopes. The overall quality of the site has been degraded by logging and encroaching agriculture, but particularly by highway construction during the expansion of Routes 22-322 in the 1960s. Despite these disturbances, various portions of the wooded north-facing upper slopes support a good-ranked population of **G3, S1 PA-endangered box huckleberry (*Gaylussacia brachycera*)**.

Conservation Recommendations

The landowner supports conservation of the plant on this property, and no immediate threats are apparent. The site should be monitored to ensure that deer browse or increased shading do not adversely affect the species of concern.

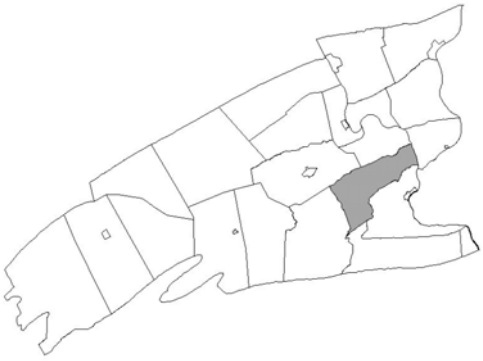
False loosestrife seedbox (*Ludwigia polycarpa*)
Photo: Tom Smith

Lance fog-fruit **(*Phyla lanceolata*)** has been removed from the species of concern list since the original Tri-county NAI report.
Photo: PA Science Office of The Nature Conservancy

WHEATFIELD TOWNSHIP

Site Name (County Rank)	Special Species / Community Type	PNHP Ranks* Global	PNHP Ranks* State	State Status	Last Seen (m-d-y)	Quality**
Losh Run Valley (4)	Plant: Common Hop-tree *Ptelea trifoliata*	G5	S2	PT	06-27-97	C
Shermans Creek At Pine Ridge (5)	Animal Species of Concern	G5	S1	N	07-15-98	C

* Please refer to Appendix I for an explanation of PNHP Ranks and Sta
**Please refer to Appendix II for an explanation of Quality Ranks.



Locally Significant: None

Managed Lands: State Game Lands 256

Wheatfield Township drains to the Susquehanna River through Sherman and Little Juniata Creeks, flowing through a matrix of forest and agriculture. The large forested blocks in this township are relatively isolated from the forested ridgelines surrounding the rest of the county. Protection of these forest blocks and restoration of connectivity to other natural areas will enhance the value of this area as a wildlife corridor and to protecting the water quality of the watersheds. Forested buffers help filter surface water runoff, preventing many non-point sources of pollution from entering waterways, protecting water quality in the township and the Susquehanna River basin.

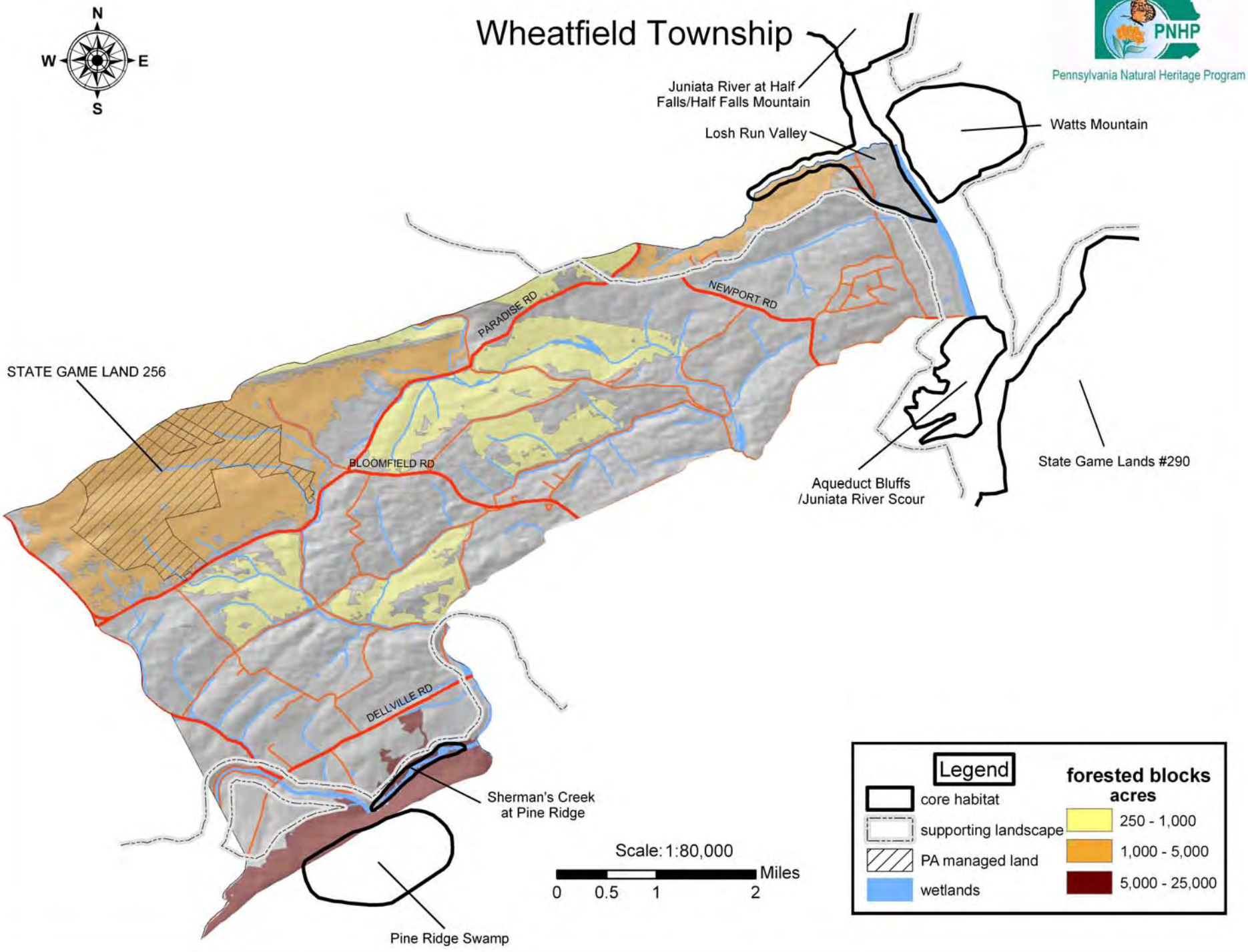
LOSH RUN VALLEY (Miller and Wheatfield Townships)

This site is an early succesional rich woodland adjacent to Losh Run. A fair population of **G5, S2 PA-threatened common hop-tree (*Ptelea trifoliata*)** occurs here, associated with red oak, bitternut hickory, japanese honeysuckle, poison ivy, and black locust.

Threats and Disturbances

The site is disturbed by exotic species, particularly privet, and is bounded by roads and a railroad. The population, though small, has no immediate threats, and no management concerns are apparent.

WHEATFIELD TOWNSHIP MAP


Wheatfield Township
N
W
E
S
PNHP
Pennsylvania Natural Heritage Program
Juniata River at Half Falls/Half Falls Mountain
Losh Run Valley
Watts Mountain
PARADISE RD
NEWPORT RD
STATE GAME LAND 256
BLOOMFIELD RD
Aqueduct Bluffs /Juniata River Scour
State Game Lands #290
DELLVILLE RD
Sherman's Creek at Pine Ridge
Pine Ridge Swamp
Scale: 1:80,000
0 0.5 1 2 Miles
Legend
core habitat
supporting landscape
PA managed land
wetlands
forested blocks acres
250 - 1,000
1,000 - 5,000
5,000 - 25,000

SHERMANS CREEK AT PINE RIDGE (Wheatfield Township)

A small population of an aquatic animal species of concern was found at this site in 1998. The substrate of the Creek here is a mixture of shale bedrock ridges and loose gravel. Associated animal species include Eastern Elliptio and the Asiatic Clam and a large population of crayfish. This portion of the Creek is surrounded by forest and is habitat to a variety of bird species, including kingfishers, green herons and great egrets. Preserving water quality will protect the species of concern as well as the other wildlife which use the Creek

Hop-tree (*Ptelea trifoliata*) is a PA-threatened plant species that resembles poison ivy, but is a small tree or tall shrub rather than a vine, and has clusters of wafer-like winged seeds rather than white berries. Photo: PA Science Office of The Nature Conservancy.

GLOSSARY

anthropogenic - human caused.

ATV - all-terrain-vehicle.

barrens - areas that are naturally infertile as a consequence of nutrient-poor soils; often form on resistant rock such as quartz, sandstone or highly weathered and leached glacial material.

canopy - the layer formed by the tallest vegetation.

circumneutral - pH between 5.5 and 7.

co-dominant - where several species together comprise the dominant layer (see "dominant" below).

community – an assemblage of plant or animal populations sharing a common environment and interacting with each other and the physical environment.

DCNR - Pennsylvania Department of Conservation and Natural Resources.

DEP - Pennsylvania Department of Environmental Protection.

diabase - a dark gray igneous rock. The chemical composition of diabase may support unusual plant communities.

dominant - the species (usually plant) exerting the greatest influence on a given community either by numerical dominance or influence on microclimate, soils and other species.

element - all-inclusive term for species of special concern and exemplary natural communities.

ericaceous - members of the heath family including blueberries, huckleberries, rhododendrons, and azaleas; these plants are adapted to living in acidic soils.

Exceptional Value Waters (EV) - DEP designation for a stream or watershed which constitutes an outstanding national, state, regional or local resource, such as waters of national, State or county parks or forests; or waters which are used as a source of unfiltered potable water supply, or waters of wildlife refuges or State Game Lands, and other waters of substantial recreational or ecological significance. For more detailed information about EV stream designations, the reader is referred to the Special Protection Waters Implementation Handbook (Shertzer 1992).

exotic - non-native; used to describe plant or animal species that were introduced by humans; examples include Japanese honeysuckle, purple loosestrife and grass carp; exotics present a problem because they may out-compete native species.

extant - currently in existence.

floodplain - low-lying land generally along streams or rivers that receives periodic flooding.

forb - non-grass herbaceous plant such as goldenrod.

graminoid - grass or grass-like plant such as a sedge or a rush.

ground cover - low shrubs, herbs and mosses that are found at or close to the ground surface.

hibernacula – a location where animals hibernate.

High-Quality Coldwater Fisheries (HQ-CWF) - DEP designation for a stream or watershed which has excellent quality waters and environmental or other features that require special water quality protection. For more detailed information about HQ-CWF stream designations, the reader is referred to the Special Protection Waters Implementation Handbook (Shertzer 1992).

hydrology - water system of an area including both surface water and ground water.

lepidoptera - moths and butterflies.

littoral - the area where water meets land, the shoreline.

mesic - moist, not saturated.

native – describes species that occurred in Pennsylvania or in the area in which they are found prior to European settlement; not introduced by human activities.

natural area - As used in this study, a site with either an exemplary natural community or species of special concern; not to be confused with the State Forest Natural Areas which are specific management units designated by DCNR Bureau of Forestry.

non-point - refers to diffuse sources of pollution such as storm water runoff contaminated with oil or pesticides.

POSCIP - Plant of Special Concern in Pennsylvania

Potential Natural Area - used by The Nature Conservancy to denote an area that may have desirable environmental characteristics to support rare species or exemplary natural communities, but which needs a field survey to confirm; a preliminary category given to sites prior to field survey (see METHODS section).

prescribed burning - burning under controlled conditions; needed to maintain communities such as limestone glades and pitch pine barrens.

riparian - streamside

rookery – the breeding ground of certain birds or animals, such as herons, penguins, and seals.

ROW - right-of-way, usually referring to powerlines or pipelines.

seeps - where water flows from the ground in a diffuse pattern and saturates the soil; lush herbaceous vegetation often grows in these wet areas.

soil association - a group of soils that are geographically associated in a characteristic repeating pattern and defined and delineated as a single unit.

soil series - groups of soils that have vertical profiles that are almost the same, that is, with horizons (layers) that are similar in composition, thickness, and arrangement.

succession - natural process of vegetation change through time; over time, the plant species of a site will change in composition and structure as light and soil conditions change (e.g., a field that is left alone may, over time, be taken over by shrubs, then small trees and eventually a woodland).

talus - slope formed of loose rock and gravel that accumulates at the base of mountains or cliffs.

TNC – The Nature Conservancy

understory - layer of shrubs and small trees between the herbaceous layer and the canopy.

upland – sites with well-drained dry to mesic soils.

wetland – are intermediate between aquatic and terrestrial habitats; characterized by a predominance of hydrophytes, where conditions are at least periodically wet enough, during the growing season, to produce anaerobic soil conditions and thereby influence plant growth.

vernal – occurring in the spring.

xeric - extremely dry or droughty.

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Appendix I: Natural Area Survey Form

Surveyor: Address & Phone:

Date of Observation_____Site Name:

Quadrangle Name_____ Exact Location of
Site (please be specific & include a map or sketch)

Owner:
Owners Attitude Toward Conservation:

Site Elevation:_____ Size of Site (acres):

Source of Lead:

Current Land Use:

Type of Area: __Old Growth Forest; __Marsh; __Shrub Swamp;
__Forested Swamp; __Bog; __Natural Pond.

Written Description: Try to convey a mental image of the site features (including vegetation, significant animals & plants, aquatic features, land forms, geologic substrata, scenic qualities, etc.):

Evidence of Disturbance:

Site Condition Compared to Your Last Visit:

Please attach any additional information, species list, etc.
Please send completed report forms to Pennsylvania Science Office
of The Nature Conservancy, 208 Airport Drive, Middletown, PA 17057
(717) 948-3962. Additional forms may be obtained from this
office. Thank you for your contribution.

Appendix II: Community Classification

CLASSIFICATION OF NATURAL COMMUNITIES IN PENNSYLVANIA (Fike 1999)

Community Name	State Rank
Terrestrial Forests	
CONIFEROUS TERRESTRIAL FORESTS:	
Hemlock (white pine) forest	S4
CONIFER – BROADLEAF TERRESTRIAL FORESTS	
Serpentine pitch pine - oak forest	S1
Serpentine Virginia pine - oak forest	S1
Pitch pine - mixed oak forest	S4
Virginia pine - mixed hardwood forest	S5
Dry white pine (hemlock) - oak forest	S4
Hemlock (white pine) - northern hardwood forest	S5
Hemlock (white pine) - red oak - mixed hardwood forest	S4
Hemlock - tuliptree - birch forest	S4
Rich hemlock - mesic hardwood forest	S2S3
BROADLEAF TERRESTRIAL FORESTS	
Dry oak - heath forest	S4S5
Dry oak - mixed hardwood forest	S3
Red oak - mixed hardwood forest	S5
Northern hardwood forest	S4
Black cherry - northern hardwood forest	S4
Tuliptree - beech -maple forest	S4
Sugar maple - basswood	S4
Mixed mesophytic forest	S1S2
Sweet gum - oak coastal plain forest	S1
Red maple (terrestrial) forest	S5
Black-gum Ridgetop forest	S3
Aspen/gray (paper) birch forest	S3 NOT TRACKED
Palustrine Forests	
CONIFEROUS PALUSTRINE FORESTS	
Black spruce - tamarack peatland forest	S3
Red spruce palustrine forest	S3
Hemlock palustrine forest	S3
CONIFER – BROADLEAF PALUSTRINE FORESTS	
Hemlock - mixed hardwood palustrine forest	S3S4
Red spruce - mixed hardwood palustrine forest	S3
BROADLEAF PALUSTRINE FORESTS	
Bottomland oak - hardwood palustrine forest	S2
Red maple - black-gum palustrine forest	S3S4
Red maple - black ash palustrine forest	S2S3
Red maple - magnolia Coastal Plain palustrine forest	S1
Great Lakes Region lakeplain palustrine forest	S1
Sycamore - (river birch) - box-elder floodplain forest	S3
Silver maple floodplain forest	S3

Red maple - elm - willow floodplain swamp	S2
Terrestrial Woodlands	
CONIFEROUS WOODLANDS	
Pitch pine - heath woodland	S2
Pitch pine - scrub oak woodland	S2S3
Red spruce rocky summit	S1
Pitch pine - rhodora - scrub oak woodland	S1
CONIFER – BROADLEAF TERRESTRIAL WOODLANDS	
Pitch pine - mixed hardwood woodland	S2S3
Virginia pine - mixed hardwood shale woodland	S2
Red-cedar - mixed hardwood rich shale woodland	S1S2
BROADLEAF – TERRESTRIAL WOODLANDS	
Dry oak - heath woodland	S3
Birch (black-gum) rocky slope woodland	S2
Yellow oak - redbud woodland	S2
Great Lakes Region scarp woodland	S1S2
Great Lakes Region bayberry - cottonwood community	S1
Palustrine Woodlands	
CONIFEROUS PALUSTRINE WOODLANDS	
Pitch pine - leatherleaf palustrine woodland	S1
Black spruce - tamarack palustrine woodland	S2
Red spruce palustrine woodland	S2S3
BROADLEAF PALUSTRINE WOODLANDS	
Red maple - highbush blueberry palustrine woodland	S4
Red maple - sedge palustrine woodland	S4
Red maple - mixed shrub palustrine woodland	S4
Terrestrial Shrublands	
CONIFEROUS TERRESTRIAL SHRUBLANDS	
Red-cedar - prickly pear shale shrubland	S2
Red-cedar - pine serpentine shrubland	S1
CONIFER – BROADLEAF TERRESTRIAL SHRUBLANDS	
Red-cedar - redbud shrubland	S2
BROADLEAF TERRESTRIAL SHRUBLANDS	
Low heath shrubland	S1
Low heath - mountain ash shrubland	S2
Scrub oak shrubland	S3
Rhodora - mixed heath - scrub oak shrubland	S1
Palustrine Shrublands	
BROADLEAF PALUSTRINE SHRUBLANDS	
Buttonbush wetland	S4
Alder - ninebark wetland	S3
Alder - sphagnum wetland	S4
Highbush blueberry - meadow-sweet wetland	S5
Highbush blueberry - sphagnum wetland	S5
Leatherleaf - sedge wetland	S3
Leatherleaf - bog rosemary peatland	S2
Leatherleaf - cranberry peatland	S2S3
Water-willow (Decodon verticillatus) shrub wetland	S3

River birch - sycamore floodplain scrub	S4
Black willow scrub/shrub wetland	S4
Poison sumac - red-cedar - bayberry fen	S1
Buckthorn - sedge (Carex interior) - golden ragwort fen	S1
Great Lakes Region scarp seep	S1
Great Lakes Region bayberry - mixed shrub palustrine shrubland	S1
Terrestrial Herbaceous Openings	
Little bluestem - Pennsylvania sedge opening	S2
Side-oats gramma calcareous grassland	S1
Calcareous opening/cliff	S2
Serpentine grassland	S1
Serpentine gravel forb community	S1
Great Lakes Region dry sandplain	S1
Great Lakes Region sparsely vegetated beach	S1
Herbaceous Wetlands	
PERSISTENT EMERGENT WETLANDS	
Bluejoint - reed canary grass marsh	S5
Cattail marsh	S5
Tussock sedge marsh	S3
Mixed forb marsh	S3
Herbaceous vernal pond	S3S4
Wet meadow	S5 NOT TRACKED
Bulrush marsh	S3
Great Lakes Region palustrine sandplain	S1
Prairie sedge - spotted joe-pye-weed marsh	S1S2
Open sedge (Carex stricta, C. prairea, C. lacustris) fen	S1
Golden saxifrage - sedge rich seep	S2
Skunk cabbage - golden saxifrage forest seep	S4S5
Serpentine seepage wetland	S1
Golden saxifrage - Pennsylvania bitter-cress spring run	S3S4
Sphagnum - beaked rush peatland	S3
Many fruited sedge - bladderwort peatland	S2
Water-willow (Justicia americana) - smartweed riverbed community	S4
Riverside ice scour community	S1S2
Big bluestem - Indian grass river grassland	S3
NON-PERSISTENT EMERGENT WETLANDS	
Pickerel-weed - arrow-arum - arrowhead wetland	S4
Spatterdock - water lily wetland	S4
Community Complexes	
ACIDIC GLACIAL PEATLAND COMPLEX	
GREAT LAKES REGION SCARP COMPLEX	
ERIE LAKESHORE BEACH - DUNE - SANDPLAIN COMPLEX	
MESIC TILL BARRENS COMPLEX	
SERPENTINE BARRENS COMPLEX	
RIDGETOP ACIDIC BARRENS COMPLEX	
RIVER BED - BANK - FLOODPLAIN COMPLEX	

* Not all natural communities have been assigned a global or state rank; disturbed or artificial communities are not assigned ranks.

Appendix III: Field Survey Form

PENNSYLVANIA NATURAL DIVERSITY INVENTORY EAST:
SPECIES OF SPECIAL CONCERN FIELD REPORT

SNAME: **EOCODE:**

SURVEYDATE:

SITENAME:

SOURCECODE

SURVEYSITE: **SURVEYOR:**

SPECIMEN REPOSITORY:

Locational Information QUADCODE DOTNUM
TEN,TEN COUNTYCODE TOWNSHIP

LAT:

LONG:

DIRECTIONS:

Global **PA EORANK:**
EORANK
COMMENTS:

DATA:

HABITAT
DESCRIPTION:

MISCELLANEOUS:

DATA SENSITIVITY: **OWNERCODE**

REASON FOR DATA **OWNER**
SENSITIVITY:

HABITAT SKETCH:

Appendix IV: PNHP Ranks, Federal and State Status

FEDERAL AND STATE STATUS AND THE PENNSYLVANIA NATURAL HERITAGE PROGRAM RANKS

FEDERAL STATUS

U.S. FISH AND WILDLIFE SERVICE CATEGORIES OF ENDANGERED AND THREATENED PLANTS AND ANIMALS

The following definitions are extracted from the September 27, 1985 U.S. Fish and Wildlife Service notice in the Federal Register:

LE - Listed Endangered - Taxa in danger of extinction throughout all or a significant portion of their ranges.

LT - Listed Threatened - Taxa that are likely to become endangered within the foreseeable future through all or a significant portion of their ranges.

PE - Proposed Endangered - Taxa proposed to be formally listed as endangered.

PT - Proposed Threatened - Taxa proposed to be formally listed as threatened.

C1 - Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.

C2 - Taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threats are not currently known or on file to support the immediate preparation of rules.

C3 - Taxa that are no longer being considered for listing as threatened or endangered species. Such taxa are further coded to indicate three categories, depending on the reason(s) for removal from consideration.

3A--Taxa for which the Service has persuasive evidence of extinction.

3B--Names that, on the basis of current taxonomic understanding, usually as represented in published revisions and monographs, do not represent taxa meeting the Act's definition of "species".

3C--Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

N - Taxa not currently listed by the U.S. Fish and Wildlife Service

STATE STATUS - NATIVE PLANT SPECIES

Legislative Authority: Title 25, Chapter 82, Conservation of Native Wild Plants, amended June 18, 1993, Pennsylvania Department of Environmental Resources.

PE - Pennsylvania Endangered - Plant species which are in danger of extinction throughout most or all 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 further decline in this Commonwealth, or if the species is greatly exploited by man.

PR - Pennsylvania Rare - Plant species which are uncommon within this Commonwealth. All species of native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification.

PX - Pennsylvania Extirpated - Plant species believed by the Department to be extinct within this Commonwealth. These plant species may or may not be in existence outside this Commonwealth. If plant species classified as Pennsylvania Extirpated are found to exist, the species automatically will be considered to be classified as Pennsylvania Endangered.

PV - Pennsylvania Vulnerable - Plant species which are in danger of population decline within Pennsylvania 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 - 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 - None - Plant species which are believed to be endangered, rare, or threatened, but which are being considered by the required regulatory review processes for future listing

STATE STATUS - ANIMALS

The following state statuses are used by the Pennsylvania Game Commission for (1990, Title 34, Chapter 133 pertaining to wild birds and mammals) and by the Pennsylvania Fish and Boat Commission (1991, Title 30, Chapter 75 pertaining to fish, amphibians, reptiles and aquatic organisms):

PE - Pennsylvania Endangered

Game Commission - 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.

Fish and Boat Commission - Endangered Species are all species and subspecies:

1) declared by 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) declared by the Executive Director (PaFC) to be threatened with extinction and appear on the Pennsylvania Endangered Species List published in the Pennsylvania Bulletin.

PT - Pennsylvania Threatened

Game Commission - Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the causal 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; or
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 93-205 (87-Stat. 884), as amended, that are not listed as "Pennsylvania Endangered".

Fish and Boat Commission - Threatened Species are all species and subspecies:

1) declared by 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 Executive Director (PaFC) 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.

APPENDIX IV (continued)

PNHP GLOBAL ELEMENT RANKS

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

GH = Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered (e.g., Bachman's Warbler).

GU = Possibly in peril range wide but status uncertain; need more information.

GX = Believed to be extinct throughout its range (e.g., Passenger Pigeon) with virtually no likelihood that it will be rediscovered.

PNHP STATE ELEMENT RANKS

S1 = Critically imperiled in state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.

S2 = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3 = Rare or uncommon in state (on the order of 21 to 100 occurrences).

S4 = Apparently secure in state, with many occurrences.

S5 = Demonstrably secure in state and essentially ineradicable under present conditions.

SA = Accidental in state, including species which only sporadically breed in the state.

SE = An exotic established in state; may be native elsewhere in North America (e.g., house finch).

SH = Of historical occurrence in the state with the expectation that it may be rediscovered.

SN = Regularly occurring, usually migratory and typically non-breeding species for which no significant or effective habitat conservation measures can be taken in the state.

SR = Reported from the state, but without persuasive documentation which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report.

SRF = Reported falsely (in error) from the state but this error persisting in the literature.

SU = Possibly in peril in state but status uncertain; need more information.

SX = Apparently extirpated from the state.

Note: A "T" appearing in either the G Rank or S Rank indicates that the intraspecific taxa is being ranked differently than the species. A "Q" in the rank indicates that there is taxonomic uncertainty about a taxa being ranked (i.e., taxa is being accepted as a full species or natural community in this list but may be treated as a variety or form by others). A "?" after a "G" or "S" indicates that the rank is uncertain at this time.

Appendix V: **Pennsylvania Element Occurrence Quality Ranks**

Quality Rank*	Explanation
A	Excellent occurrence: all A-rank occurrences of an element merit quick, strong protection. An A-rank community is nearly undisturbed by humans or has nearly recovered from early human disturbance; further distinguished by being an extensive, well-buffered occurrence. An A-rank population of a sensitive species is large in area and number of individuals, stable, if not growing, shows good reproduction, and exists in natural habitat.
B	Good occurrence: protection of the occurrence is important to the survival of the element in Pennsylvania, especially if very few or no A-rank occurrences exist. A B-rank community is still recovering from early disturbance or recent light disturbance, or is nearly undisturbed but is less than A-rank because of significantly smaller size, poorer buffer, etc. A B-rank population of a sensitive species is at least stable, in a minimally disturbed habitat, and of moderate size and number.
C	Fair occurrence: protection of the occurrence helps conserve the diversity of a region's or county's biota and is important to statewide conservation if no higher-ranked occurrences exist. A C-rank community is in an early stage of recovery from disturbance, or its structure and composition have been altered such that the original vegetation of the site will never rejuvenate, yet with management and time partial restoration of the community is possible. A C-rank population of a sensitive species is in a clearly disturbed habitat, small in size and/or number, and possibly declining.
D	small occurrence: protection of the occurrence may be worthwhile for historical reasons or only if no higher ranked occurrences exist. A D-rank community is severely disturbed, its structure and composition been greatly altered, and recovery to original conditions, despite management and time, essentially will not take place. A D-rank population of a sensitive species is very small with a high likelihood of dying out or being destroyed, and exists in a highly disturbed and vulnerable habitat.
E	Verified as extant, but has not been given a rank; additional information needed to evaluate quality.

*Intermediate ranks may also be assigned.

Appendix VII: Plants And Animals Of Special Concern In Perry County

PLANTS

SCIENTIFIC NAME	COMMON NAME
Aplectrum hyemale	puttyroot
Carex shortiana	a sedge
Dodecatheon radicatum	jeweled shooting star
Eleocharis compressa	flat-stemmed spike-rush
Euphorbia purpurea	glade spurge
Galium latifolium	purple bedstraw
Gaylussacia brachycera	box huckleberry
Ludwigia polycarpa	false loosestrife seedbox
Matelea obliqua	oblique milkvine
Optuntia humifusa	prickly-pear cactus
Phyla lanceolata	lance fog fruit
Ptelea trifoliata	common hop-tree
Ruellia strepens	limestone petunia
Scirpus ancistrochaetus	northeastern bulrush

ANIMALS

SCIENTIFIC NAME	COMMON NAME
Alasmidonta marginata	elktoe mussel
Alasmidonta undulata	triangle floater mussel
Crotalus horridus	timber rattlesnake
Euphyes conspicuus	black dash
Gomphus rogersi	Roger's clubtail dragonfly
Gomphus quadricolor	rapids clubtail dragonfly
Haliaeetus leucocephalus	Bald Eagle
Lampsilis cariosa	yellow lampmussel
Lasmigona subviridis	green floater mussel
Myotis septentrionalis	northern myotis
Neotoma magister	Allegheny woodrat
Podilymbus podiceps	Pied-billed Grebe
Pseudemys rubriventris	red-bellied turtle
Somatochlora linearis	lined bog skimmer dragonfly
Tachopteryx thoreyi	Thorey's grayback dragonfly

NATURAL COMMUNITIES

Circumneutral broadleaf swamp
Ephemeral/fluctuating natural pool
High gradient clearwater creek
Mesic central forest
Northern conifer forest

Appendix VIII: Associated Species of Plants and Animals Referenced in Site Descriptions for Perry County

Common Name	Scientific Name
Acadian Flycatcher	*Empidonax virescens*
American Beech	*Fagus grandifolia*
Arrow-Leaved Tearthumb	*Polygonum sagittatum*
Arrow-Wood	*Viburnum spp.*
Baneberry	*Actaea spp*
Basswood	*Tilia americana*
Belted Kingfisher	*Ceryle alcyon*
Big Brown Bat	*Eptesicus fuscus*
Bitternut Hickory	*Carya cordiformis*
Black Birch	*Betula lenta*
Black Gum	*Nyssa sylvatica*
Black Huckleberry	*Gaylussacia baccata*
Black Locust	*Robinia pseudoacacia*
Black Oak	*Quercus velutina*
Black-Billed Cuckoo	*Coccyzus erythropthalmus*
Black-Throated Blue Warbler	*Dendroica caerulescens*
Black-Throated Green Warbler	*Dendroica virens*
Bur-Reed	*Sparganium eurycarpum*
Buttonbush	*Cephalanthus occidentalis*
Canada Mayflower	*Maianthemum canadense*
Canada Yew	*Taxus canadensis*
Chestnut Oak	*Quercus montana*
Chokeberry	*Aronia melanocarpa*
Cinnamon Fern	*Osmunda cinnamomea*
Columbine	*Aquilegia canadensis*
Cucumber-Tree	*Magnolia acuminata*
Dangleberry	*Gaylussacia frondosa*
Downy Rattlesnake-Plantain	*Goodyera pubescens*
Early Saxifrage	*Saxifraga virginiensis*
Eastern Hemlock	*Tsuga canadensis*
Eastern Titmouse	*Parus bicolor*
Eastern Wood-Pewee	*Contopus virens*
Evergreen Wood Fern	*Dryopteris marginalis*
Fence Lizard	*Sceloporus undulatus*
Flowering Dogwood	*Cornus florida*
Garlic Mustard	*Alliaria petiolata*
Golden Saxifrage	*Chrysosplenium americanum*
Gooseberry	*Ribes spp.*
Great Egret	*Casmerodius albus*
Great-Crested Flycatcher	*Myiarchus crinitus*
Green Frog	*Rana clamitans*

Common Name	**Scientific Name**
Green Heron	*Butorides virescens*
Greenbriar	*Smilax rotundifolia*
Hay-Scented Fern	*Dennstaedtia punctilobula*
Hermit Thrush	*Catharus guttatus*
Highbush Blueberry	*Vaccinium corymbosum*
Huckleberry	*Gaylussacia baccata*
Indian Cucumber	*Medeola virginiana*
Intermediate Wood-Fern	*Dryopteris intermedia*
Jack-In-The-Pulpit	*Arisaema triphyllum*
Japanese Honeysuckle	*Lonicera japonica*
Jewelweed.	*Impatiens capensis*
Little Brown Bat	*Myotis lucifugus*
Liverleaf	*Hepatica americana*
Louisiana Waterthrush	*Seiurus motacilla*
Low Sweet Blueberry	*Vaccinium angustifolium*
Maidenhair Spleenwort	*Asplenium trichomanes*
Maleberry	*Lyonia ligustrina*
Manna Grass	*Glyceria septentrionalis*
Marsh-St.-Johns-Wort	*Triadenum virginicum*
May-Apple	*Podophyllum peltatum*
Mountain Holly	*Ilex montana*
Mountain Laurel	*Kalmia latifolia*
Mountain Maple	*Acer spicatum*
Multiflora Rose	*Rosa multiflora*
Northern Dusky Salamander	*Desmognathus fuscus*
Northern Water Snakes	*Nerodia sipedon*
Ovenbird	*Seirurus aurocapillus*
Partridgeberry	*Mitchella repens*
Pearl Crescent	*Phyciodes tharos*
Peck’s Skipper	*Polites peckius*
Pepperbush	*Clethra alnifolia*
Pin Oak	*Quercus palustris*
Poison Ivy	*Toxicodendron radicans*
Pokeweed	*Phytolacca americana*
Privet	*Ligustrum spp*
Purple Loosestrife	*Lythrum salicaria*
Ragged-Fringed Orchid	*Platanthera lacera*
Rattlesnake Mannagrass	*Glyceria canadensis*
Rattlesnake-Weed	*Hieracium venosum*
Red Maple	*Acer rubrum*
Red Oak	*Quercus rubra*
Red-Backed Salamanders	*Plethodon cinereus*
Redbud	*Cercis canadensis*
Red-Eyed Vireos	*Vireo olivaceus*

Common Name	**Scientific Name**
Rice Cutgrass	*Leersia oryzoides*
River Birch	*Betula nigra*
Riverbank Wild Rye	*Elymus riparius*
Riverweed	*Podostemum ceratophyllum*
Royal Fern	*Osmunda regalis*
Ruffed Grouse	*Bonasa umbellus*
Scarlet Tanager	*Piranga olivacea*
Seven-Bark	*Hydrangea arborescens*
Silver Maple	*Acer saccharinum*
Skunk Cabbage	*Symplocarpus foetidus*
Smartweed	*Polygonum amphibian*
Smooth Alder	*Alnus serrulata*
Soft Rush	*Juncus effusus*
Solomon's Seal	*Polygonatum biflorum*
Sphagnum	*Sphagnum spp.*
Spicebush	*Lindera benzoin*
Spicebush Swallowtail	*Papilio troilus*
Spike Rushes	*Eleocharis spp.*
Spotted Jewelweed	*Impatiens capensis*
Spotted Salamander	*Ambystoma maculatum*
Spotted Wintergreen	*Chimaphila maculata*
Squawroot	*Conopholis americana*
St. Johns-Wort	*Hypericum dissimulatum*
Stilt Grass	*Microstegium vimineum*
Stonecrop	*Sedum ternatum*
Striped Maple	*Acer pensylvanicum*
Sugar Maple	*Acer saccharum*
Swamp Dogwood	*Cornus racemosa*
Swamp Raspberry	*Rubus hispidus*
Sweet Cicely	*Osmorhiza claytonii*
Sycamore	*Platanus occidentalis*
Table-Mountain Pine	*Pinus pungens*
Tape-Grass	*Vallisneria americana*
Three-Way Sedge	*Dulichium arundinaceum*
Tulip Poplar	*Liriodendron tulipifera*
Viceroy	*Limenitis achippus*
Virginia Creeper	*Parthenocissus quinquefolia*
Virginia Pine	*Pinus virginiana*
Water-Stargrass	*Zosterella dubia*
Waterweed	*Elodea canadensis*
Water-Willow	*Justicia americana*
White Oak	*Quercus alba*
White Pine	*Pinus strobus*
Wild Ginger	*Asarum canadense*

Common Name	**Scientific Name**
Wild Indigo Duskywing	*Erynnis baptisiae*
Wild Sarsparilla	*Aralia nudicaulis*
Willow	*Salix spp.*
Wingstem	*Verbesina alternifolia*
Winter Wren	*Troglodytes troglodytes*
Winterberry	*Ilex verticillata*
Wintergreen	*Gaultheria procumbens*
Witch Hazel	*Hamamelis virginiana*
Wood Frog	*Rana sylvatica*
Woodreed	*Cinna arundinacea*
Wool-Grass / Woolly Bulrush	*Scirpus cyperinus*
Worm-Eating Warbler	*Helmitheros vermivorus*
Yellow Birch	*Betula alleghaniensis*