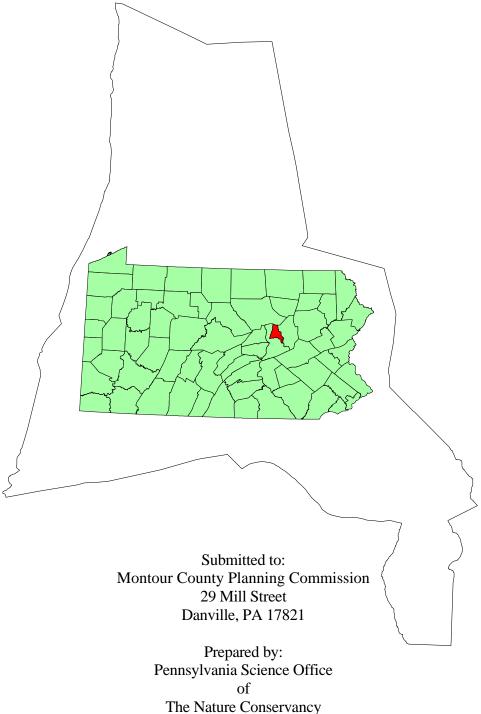
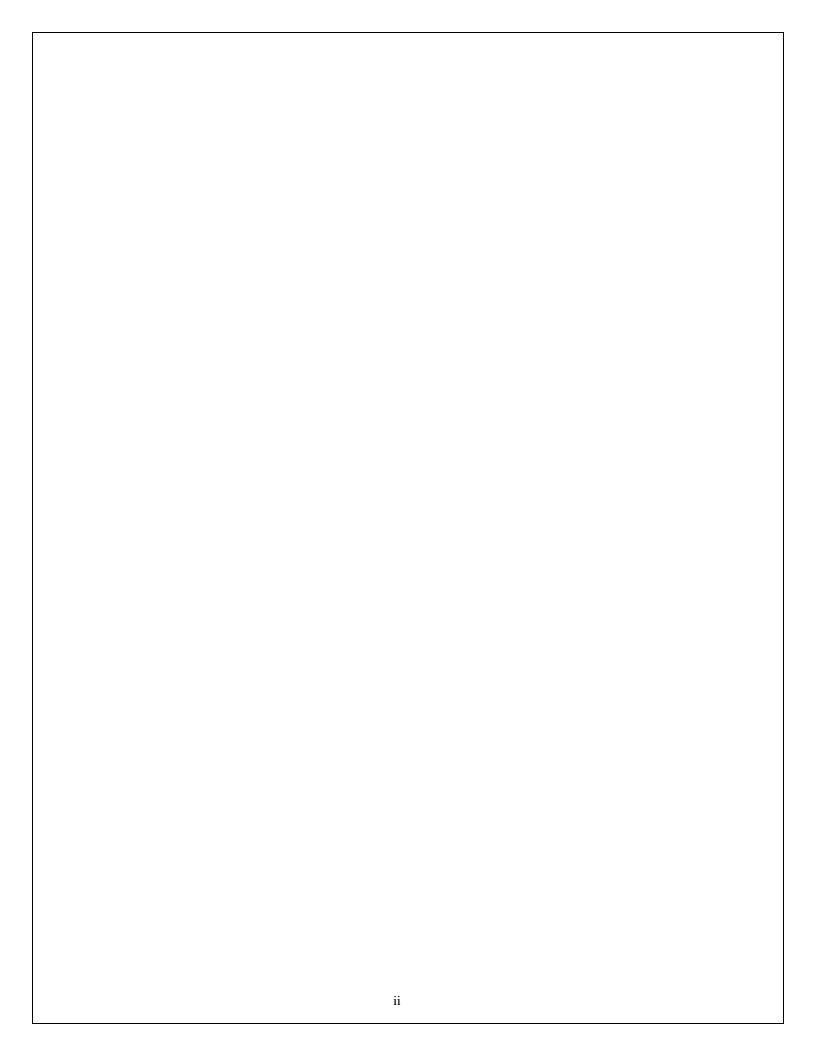
MONTOUR COUNTY NATURAL AREAS INVENTORY 2005



of
The Nature Conservancy
208 Airport Drive
Middletown, Pennsylvania 17057

This project was funded in part by state grants from the Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Recreation and Conservation, Wild Resources Conservation Program and Community Conservation Partnerships Program. Additional funding came from a State Wildlife Grant administered by the Pennsylvania Game Commission.

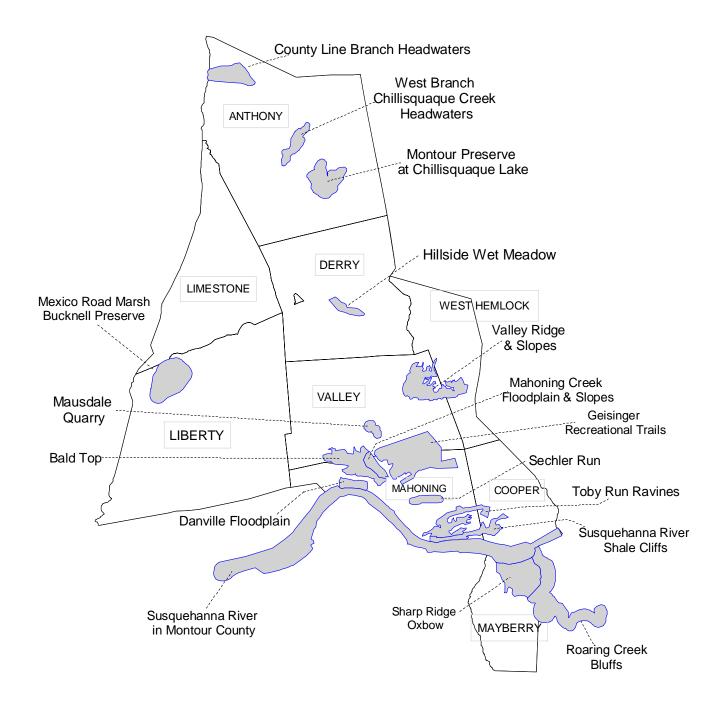




Sharp Ridge Oxbow, in Mayberry Township, is by far the largest intact wetland remaining in Montour County. The extensive herbaceous dominated wetland and the adjacent forested areas represent one of Montour County's best natural areas.

Photo: PA Science Office of the Nature Conservancy

Site Index by Township

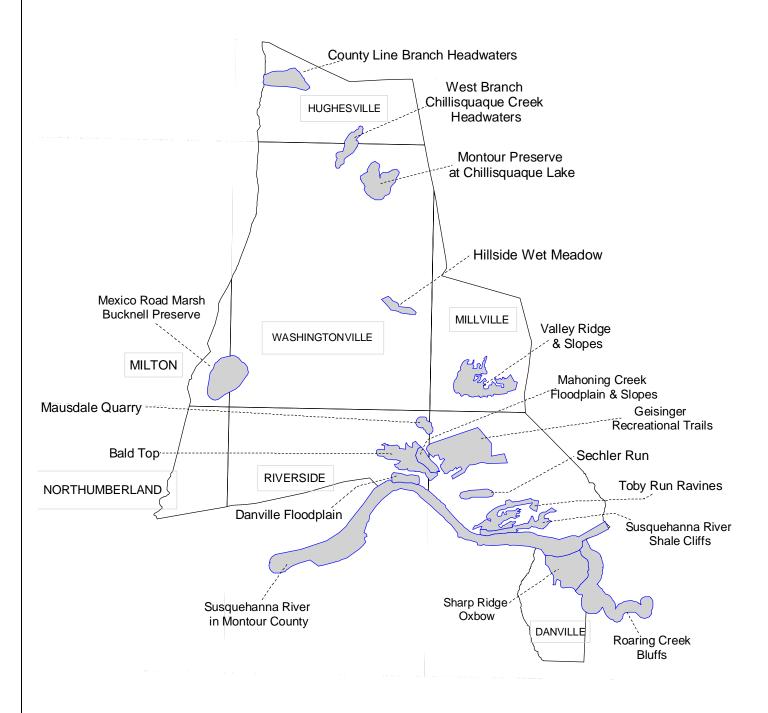


solution country i (actival i ii cas

Site Index Sites listed alphabetically

Site Name	Township(s)	Page # (s)
Bald Top/Montour Ridge	Mahoning	56
County Line Branch Headwaters	Anthony	30
Danville Floodplain	Mahoning	56
Geisinger Recreational Trails	Mahoning	56
Hillside Wet Meadow	Derry Township	44
Mahoning Creek Floodplain and Slopes	Mahoning	56
Mausdale Quarry	Valley	72
Mexico Road Marsh-Bucknell Preserve	Liberty	48
Montour Preserve at Lake Chillisquaque	Anthony	30
Roaring Creek Bluffs	Mayberry Township	66
Sechler Run	Danville Borough, Mahoning Township	26
Sharp Ridge Oxbow	Mayberry	66
Susquehanna River in Montour County	Mahoning, Cooper, Danville Borough, Mayberry, Columbia County, Northumberland County	36, 56, 66
Susquehanna River Shale Cliffs	Mahoning, Cooper Townships	36, 56
Toby Run Ravines	Mahoning Township, Cooper Township	36, 56
Valley Ridge and Slopes	Valley, West Hemlock	72, 80
West Branch Chillisquaque Creek Headwaters	Anthony	30

Site Index by Topographic Quadrangle



PREFACE

The Montour County 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 county; 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 county 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 county, it is likely that something was missed. Anyone with information on sites that may have been overlooked should contact the Montour County 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.

ACKNOWLEDGEMENTS

This project was funded in part by a state grant from the DCNR Wild Resource Conservation Fund.

The Department of Community & Economic Development, and the Pennsylvania State Game Commission-State Wildlife Grant also provided additional support. Thanks to everyone who provided financial and administrative support for the inventory. Without your help, this study would not have been possible.

The species information utilized in the inventory came from many sources as well as our own field surveys. We wish to acknowledge all of those who carried out botanical and zoological survey work over the years. Without their contributions, this survey would have been far less complete.

The report benefited from the help of local naturalists and conservationists who gave generously of their time. We especially thank Van Wagner, Tom Benfer, Robert Cameron, and others that graciously gave their own time and effort with their knowledge of the county. We would like to thank Betsy Hack at the Montour County Planning Commission and everyone at the Tax assessment Office for your help. Dr. Carol Loeffler was our pilot for low altitude aerial reconnaissance. Thanks to the many other private citizens who contacted our office with information on natural areas.

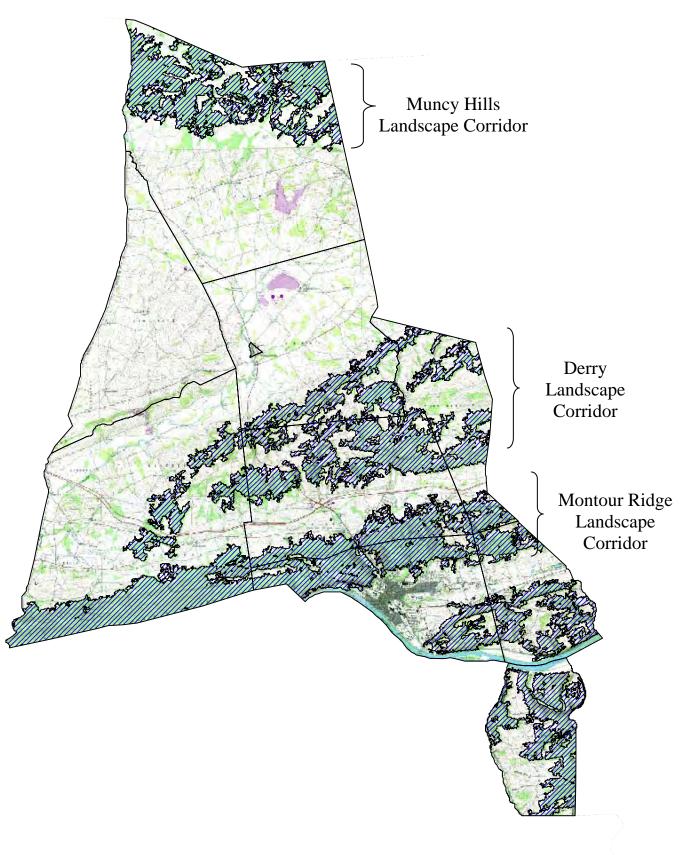
Many thanks to everyone who participated in the Technical Advisory Committee by reviewing the draft Natural Areas Inventory Report. Finally, we especially wish to thank the many landowners that granted us permission to conduct inventories on their lands. The task of inventorying the natural heritage of Montour County would have been far more difficult without this tremendous pool of information gathered by many people over many years.

Copies of this document may be obtained from: Montour County Planning Commission 29 Mill Street Danville, PA 17821

Table of Contents

Site Index by Township	iv
Site Index by Topographic Quadrangle	vi
Preface	vii
Acknowledgements	viii
Introduction	1
Natural History Overview Of The County	4
Physiography and Geology	4
Soils	5
Vegetation	6
Disturbance	8
Pennsylvania Natural Heritage Program Data System	9
Natural Areas Inventory Methods	10
Information Gathering	10
Map and Air Photo Interpretation	10
Field Work	11
Data Analysis	11
Forested corridors in Montour County	15
Results	18
Recommendations	19
Top Priority Natural Areas In Montour County	24
Anthony Township	30
Cooper Township	35
Cooper Township	36
Derry Township /Borough Of Washingtonville	44
Liberty Township	48
Limestone Township	52
Mahoning Township And Danville Borough	56
Mayberry Township	66
Valley Township	72
West Hemlock Township	80
Glossary	84
References and Literature Cited	87
Appendix I: Natural Area Survey Form	90
Appendix II: Classification Of Natural Communities In Pennsylvania (Fike 1999)	91
Appendix III: Field Survey Form	94
Appendix IV: Federal and State Status, TNC Global Ranks & PNHP State Ranks	95
Appendix V: Pennsylvania Element Occurrence Quality Ranks	100
Appendix VI: Special Plants And Animals Of Montour County	101
Appendix VII: Master plant/animal list of Montour County	102

Landscape Corridors of Montour County



INTRODUCTION

Montour County was formed from portions of Columbia County on May 3, 1850. Covering just 131 square miles, it is located along the banks of the Susquehanna River approximately 70 miles north of the state capital of Harrisburg. Neighboring counties include Lycoming County to the north, Northumberland County to the west and south, and Columbia County to the east. Danville was once the Columbia County seat until 1845, but when Bloomsburg usurped Columbia County, Danville wanted a new county. Newspaper activist Valentine Best went to the legislature and pushed the creation of the county, Montour County was created and Danville became the county seat (Pennsylvania Historical and Museum Commission, 2004). There are nine townships within Montour County; Anthony, Cooper, Derry, Liberty, Limestone, Mahoning, Mayberry, Valley, and West Hemlock.

Danville became a highway, canal, and then rail link on the North Branch route from Sunbury to Wilkes-Barre. Development and large-scale settlement in the county began to occur in the mid-1800's. The presence of iron in the hills surrounding Danville gave rise to iron ore works, which flourished from the 1830s through the end of the century. Danville's big mill, eventually owned by Bethlehem Steel, made iron and steel from 1838 to 1938. This ore was mined by underground and surface methods. Complementing this industry, iron mills began the manufacturing of T-rails (the first site in the country to do so), used across the country in constructing the nation's rail industry. With this economic development, the population of Danville increased from 1,100 in 1840 to 8,400 in 1870. Some economic hardships began to influence the population, however.

Despite hardships due to competition, national financial panic, and a major mill explosion, the rail production continued until the end of World War II. Other past industries included silk and shirt-making factories that were productive in the 1900's.

Today, still half the county is farmed (Pennsylvania Historical and Museum Commission, 2004). Montour County's emphasis on manufacturing continues to provide a large employment base in the county. The service industry also thrives in the county, with Geisinger Medical Center and related services providing a large employment base in the county.

Montour County was named for an Indian woman leader, Madame Montour, who was of French and Indian descent. In addition, the inventor of the typewriter, Christopher Sholes, was born in this county.

Montour County lies entirely within the Susquehanna River drainage. The north half drains to the west branch Susquehanna while the south half drains to the north branch Susquehanna. The river helped shape the history of Danville and its surrounding communities. The Susquehanna River forms part of the southern border of Montour County, where the Borough of Danville lies along the northern banks of the river. The Susquehanna River is the major natural feature of Montour County, and it played a large role in the settlement of Danville and Montour County; providing transportation to and from a trading post known as Montgomery's Landing, the present-day site of Danville. Many settlers from Europe were attracted to the beautiful lush valleys of the Susquehanna River, and hence, farming became an important economic base in the 1800's. The Susquehannock Indian Tribe farmed and fished the Susquehanna River Valley in the very early

days of the 1500's to the mid 1600's, before major European settlement of the area. The Susquehannocks were known as Conestoga in Pennsylvania, and settled in the Susquehanna River Valleys from Maryland to Southern New York. Farming continues to thrive in some locations, but the industry is just a small segment of past farming activities. Farming has shaped much of the landscape of Montour County, and few large unbroken forested tracts of land remain.

However, there are many recreational opportunities for Montour County residents to enjoy the outdoors. Montour Preserve and Lake Chillisquaque provides fishing, hiking, and environmental education opportunities. The Susquehanna River also provides ample recreational opportunities, including boating and fishing. In addition, several small parks dot the county with hiking, bird watching, and other recreational opportunities. 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 rare, threatened and endangered species.

Montour County's population has risen slightly from 17,735 in 1990 to 18,236 in 2000. Even with this small increase in population, increased development pressure on some of the sensitive natural areas of the county can still occur. In Pennsylvania, the Brookings report recently documented that Pennsylvania is using more land per capita than any other state in the union (Brookings Institute, 2001). With this rise in population, unsustainable farms are in danger of being converted to commercial and residential development. Farms represent many generations of cultural heritage and some farms contain a natural component or are adjacent to natural areas. The natural areas that comprise the natural heritage of Montour County can be easily lost without careful planning of growth and development; ironically the scenic and remote nature of these areas may make them prime targets for residential developments. Protecting the integrity of these natural systems provides benefits to humans as well as providing for survival of all flora and fauna, rare and otherwise. Planning for long-term sustainability can maintain open space, including natural environments and the plants and animals associated with them. Using a Natural Areas Inventory as a conservation tool can steer development away from environmentally sensitive areas, creating a needed balance between growth and the conservation of scenic and natural resources.

It is important that county and municipal government, the public, developers and planners know the location of such environmentally sensitive areas in order to maintain a balance and protection of these areas. Knowing where these areas are located can prevent land-use conflicts and drive conservation efforts to the most vulnerable areas. The Pennsylvania Science Office of The Nature Conservancy, with the support of the Montour County Planning Commission and the PA Department of Conservation and Natural Resources has undertaken this project to provide a document and maps that will aid in the identification of these important areas.

The Natural Areas Inventory (NAI) report presents the known outstanding natural features, flora, fauna and geology, in Montour County. The Inventory provides maps of the best natural communities (habitats) and the locations of animal and plant species of special concern (endangered, threatened, or rare) in Montour County. Due to budget and time constraints, some sites in the county have not been inventoried. The maps do not pinpoint the site of the species of concern but rather represent a zone of potential impact within the site's watershed. 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 countywide scale, but cannot be deemed exemplary natural communities because of past disturbances. 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.

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 preservation of the most vulnerable natural areas. An overall summary identifies the highest quality sites in the 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 Montour County Planning Commission. The Inventory is a conservation tool that will aid in the creation of municipal, county and comprehensive plans, and the emphasis on biological diversity should inform county and regional open space plans already underway. Montour County, its municipalities, land trusts, and other organizations can also use the Natural Areas Inventory to identify potential protection projects that may be eligible for funding through state or community grant programs such as Growing Greener. 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. For example, the Forest Stewardship program, coordinated by PA Department of Conservation and Natural Resources, Bureau of Forestry, assists landowners in creating management plans. These plans are developed based on landowner objectives (e.g., wildlife or timber management). Land managers may wish to consult this report and the Pennsylvania Natural Diversity Inventory (PNDI) 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 (717 948-3962) of The Nature Conservancy for additional information.

NATURAL HISTORY OVERVIEW OF THE COUNTY

The climate, topography, geology, and soils have been particularly important in development of ecosystems (forests, fields, wetlands) and physical features (streams, rivers, mountains) that occur in Montour County. Many disturbances, both natural and human, have been influential in forming and altering many of Montour County's ecosystems, causing 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 in the county. The following sections provide a brief overview of the physiography, geology, soils, surface water, and vegetation of Montour County.

Physiography and Geology

The characteristic landscapes and distinctive geological formations classify Physiographic Provinces. Physiography relates in part to a region's topography and climate. These two factors, along with bedrock type, significantly influence soil development, hydrology, and land use patterns of an area. Additionally, both physiography and geology are important to the patterns of plant community distribution, which in turn influences animal distribution. Because of the differences in climate, soils, and moisture regime, certain plant communities would be expected to occur within some provinces and not in others. Physiographic and geologic information was obtained from many sources including Ground Water in Northeastern Pennsylvania (Lohman 1957), The Geology of Pennsylvania (PA Geological Survey and Pittsburgh Geological Survey 1999), Soil Survey of Montour County, Pennsylvania (USDA 1985), and Physiographic Provinces of Pennsylvania (Sevan 2000).

Montour County lies entirely within the Ridge and Valley Physiographic province (Cuff et al., 1989). The Ridge and Valley province is a distinguished belt of long, narrow wooded ridges and broad agricultural valleys that sweep diagonally through central Pennsylvania. The ridges of this province are similar in structure and elevation, typically rising between 800-1200 feet above sea level, but occasionally to 2000 feet. Meanwhile, the valleys that dominate this region are variable depending on the type of rock that underlies them. Topographically, the county is divided into upland hills and valleys and ridges and is dissected by streams and a river (USDA, 1985). The Muncy Hills border the northern part of the county, and the Montour Ridge makes up the southern border adjacent to the Susquehanna River. The central part of the county is represented by low, rolling hills and valleys. Elevation ranges from 1,425 feet above sea level along Montour Ridge to 440 feet above sea level at the Susquehanna River. Sedimentary rocks cover about two-thirds of the county, including the Muncy Hills and the valley and lowland areas to the south. The Muncy Hills also consist of shales, sandstones, and graywackes: the low, rolling hills and valleys that are composed of less erosion-resistant shales and limestones. (USDA, 1985).

Montour County is completely within the Susquehanna River drainage basin in both the North and West Branch Watershed. Other main streams feeding the Susquehanna River in Montour County include Roaring, Chillisquaque and Mahoning Creeks.

Soils

A soil association is a group of soils with a distinctive, proportional pattern of occurrence in the landscape. This description of the soils of Montour County comes from *The Soil Survey of Montour County, Pennsylvania* (USDA, 1985). There have been six mapped soil associations for Montour and Sullivan Counties. They include: 1) Weikert-Berks-Hartleton Association, 2) Watson-Alvira-Weikert Association, 3) Hagerstown-Elliber-Edom Association, 4) Holly-Monongahela-Basher Association and 5) Klinesville-Calvin-Leck Kill Association, and 6) Buchanan-Laidig Association.

Soil Association	Description	Percentage of County	Land Use
Weikert-Berks- Hartleton Association	Gently sloping to steep, shallow to deep, well drained soils on upland ridges; formed in material weathered from shale and some sandstone	60	This soil association is mainly in cropland and pasture. Some areas, mostly the steeper parts, are wooded, and some others are used for building sites. Limitations are depth to bedrock, slope, erosion, and very low available water capacity.
Watson-Alvira- Weikert Association	Nearly level to steep, deep and shallow, somewhat poorly drained to well-drained soils in valleys and on hills and ridges; formed in material weathered from glacial till and shale	20	Most of this association is suited to and used for cropland. A seasonal high water table and the depth to bedrock are the main limitations.
Hagerstown- Elliber-Edom Association	Gently sloping to steep, deep, well-drained soils in valleys and on ridges; found in material weathered from limestone and calcareous shale	8	This association mainly is used for and suited to crops. Some areas on steep ridges are in woodland. Slope, erosion, and stone fragments in the soils are the main limitations.
Holly- Monongahela- Basher Association	Nearly level and gently sloping, deep, very poorly drained to moderately well-drained soils on floodplains and terraces; formed in alluvial material	7	This association is mainly in cropland, woodland, and pasture. Flooding and a high water table are the main limitations.
Klinesville-Calvin- Leck Kill Association.	Gently sloping to steep, shallow to deep, well drained soils on upland ridges; formed in material weathered from red shale	2	This association is mainly in cropland and pasture, but some of the steeper areas are wooded and some scattered areas are used for building sites. Much of the acreage is suitable for cultivation. The depth to bedrock, slope, erosion, and very low available water capacity are the main limitations.

Soil Association	Description	Percentage of County	Land Use
Buchanan-Laidig Association	Nearly level to steep, deep, moderately well drained and well drained soils on mountain side slopes and foot slopes; formed in colluvial material weathered from sandstone and shale	3	This association is mainly in woodland. Some small areas have been cleared for farming, but large stones on the surface interfere with cultivation. A firm underlying layer, slope, slow permeability, and large stones on the surface are the main limitations.

Vegetation

Upland Forest Communities

The American chestnut (Castanea dentata) once dominated many of the Eastern North American Hardwood Forests from Maine to Michigan to Alabama (Treadwell, 1996). However, around 1904, a Chestnut Blight (Cryphonectria parasitica) was introduced to North America from Asia. The blight spread from the Bronx Zoo northward and southward, and by 1960, there were basically no mature Chestnuts left standing (Treadwell, 1996). Today, some young sprouts and shoots still remain, but very few will ever reach maturity due to the blight. The loss of the chestnut from the forest canopies has left huge breaks all across the eastern United States. These holes have since filled with many of the Chestnut's associate species, including species of oak (Quercus sp.). These oak species comprise the Appalachian Oak Forest, which is the dominant vegetation type in the uplands of Montour County (Cuff et al., 1989). White oak (Quercus alba), northern red oak (Quercus rubra), and chestnut oak (Quercus montana) dominate the upland forest communities along with an array of other hardwood species. Hardwood associates such as scarlet oak (Quercus coccinea), black birch (Betula lenta), red maple (Acer rubrum), black gum (Nyssa sylvatica), hickory (Carya sp.), American beech (Fagus grandifolia) and tulip poplar (Liriodendron tulipifera) are the major associates within an Appalachian Oak Forest (The Pennsylvania Atlas, 1982). The understory of Appalachian Oak Forests typically consists of mountain laurel (Kalmia latifolia), low sweet blueberry (Vaccinium angustifolium), lowbush blueberry (Vaccinium pallidum), black huckleberry (Gaylussacia baccata), witch hazel (Hamamelis virginiana), and other species (Cuff et al., 1989). A good example of an Appalachian Oak Forest is found at Montour Ridge.

Wetlands

Even though wetlands account for only two percent of Pennsylvania's total area, they are home to a diverse array of rare plants and animals, and are an extremely productive part of the landscape as a whole (The Pennsylvania Atlas, 1982). Wetlands differ in size, structure and species diversity. Wetlands also differ according to their placement on the landscape – at stream headwaters, dips in valleys, or on slopes where ground water discharges and whether the water contained is flowing or stagnant. These different scenarios result in bogs and fens, marshes, swamps, floodplain forests, forested wetlands, wet meadows, and seeps. Wetlands differ also in vegetative species cover. Tree species such as red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), eastern hemlock (*Tsuga canadensis*), and ash species (*Fraxinus spp.*) usually dominate forested swamps. The understory consists of shrub species such as spicebush (*Lindera benzoin*), rhododendron and azaleas (*Rhododendron spp.*), winterberry holly (*Ilex verticillata*), alders (*Alnus species*), swamp rose (*Rosa palustris*), sedges (*Carex* species), and many others.

Graminoid marshes are wetlands dominated by grasslike plants such as cattails (*Typha latifolia*), sedges (*Carex* spp.), rushes (*Juncus* spp.), and grasses (*Glyceria* spp., *Poa* spp., *Panicum* spp., etc.). This type of wetland may be found in association with slow streams or in areas with ground water seepages. Graminoid marshes in the county are usually formed as successional communities following beaver dams or other impoundments. Examples of this type of wetland in Montour County occur at Sharp Ridge Oxbow and off Mexico Road along the Chillisquaque Creek. This is the most abundant wetland type in Montour County.

Seeps and wet meadows are small wetlands that are generally fed by ground water coming to the surface in a diffuse flow (The Pennsylvania Atlas, 1982). These vegetation in these areas consist of such species as skunk cabbage (*Symplocarpus foetidus*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), jewelweed (*Impatiens spp.*), sedges (*Carex spp.*), grasses and red maple (*Acer rubrum*). A good example of a seep in Montour County occurs along Bucknell Preserve near the Chillisquaque Creek. An example of a wet meadow is in the northern part of Montour County north of Washingtonville along Mud Creek.

Shrub Swamps are wetlands occurring on mineral soils with water near or above the surface most of the year (The Pennsylvania Atlas, 1982). Shrubs under 20 feet tall dominate the wetland. Frequent species of shrub swamps include buttonbush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), meadowsweet and steeplebush (*Spiraea latifolia* and *S. tomentosa*), Silky Dogwood (*Cornus amomum*), willows (*Salix spp.*), ninebark (*Physocarpus opulifolius*), sedges (*Carex spp.*), alder (*Alnus spp.*), and highbush blueberry (*Vaccinium corymbosum*). A small example of a shrub swamp in Montour County occurs along Sechler Run.

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 Bourne, 2000). These pools are dry for most of the year, 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. Plants typically associated with vernal ponds include woolgrass (*Scirpus cyperinus*), three-way sedge (*Dulichium arundinaceum*), pin oak (*Quercus palustris*), highbush blueberry (*Vaccinium corymbosum*), red maple (*Acer rubrum*), St. John's wort (*Hypericum*), and the federally endangered northeastern bulrush (*Scirpus ancistrochaetus*). There is potential for vernal ponds in Montour County, despite the fact that no examples were found during the 2004 field season.

Floodplains are flat tracts of land bordering a river, mainly in its lower reaches, consisting of alluvium deposited by the river. They are formed by the sweeping of the meander belts downstream, thus widening the valley, the sides of which may become some kilometers apart. In time of flood, when the river overflows its banks, sediment is deposited along the valley banks and plains. Floodplain vegetation tends to consist of large canopy trees, with a sparse understory plant layer. Many floodplains contain abundant exotic plant species. Plants typically associated with floodplain areas include silver maple (*Acer saccharinum*), American sycamore (*Platanus occidentalis*), musclewood (*Carpinus carolinensis*), river birch (*Betula nigra*), ash (*Fraxinus*)

spp.), red maple (Acer rubrum), spicebush (Lindera benzoin), hickory (Carya spp.), garlic mustard (Alliaria petiolata), Japanese knotweed (Polygonum cuspidatum), silky dogwood (Cornus amomum), jewelweed (Impatiens spp.), and eastern hop-hornbeam (Ostrya virginiana). Good examples of floodplain in Montour County occur along Mahoning Creek and along the Susquehanna River adjacent to Route 11.

Due to the rarity of undisturbed examples of wetlands in Montour County and Pennsylvania, all good examples of these habitats should be preserved whenever possible. Wetlands provide valuable habitat for breeding and migrating birds, mammals, reptiles, amphibians, dragonflies and damselflies, and many other insects. Wetlands also provide a refuge for many species of wetland dependent plants.

Disturbance

Disturbances, whether natural or man-made, have played a key role in shaping many of the natural communities and associated species. The frequency and scale of these disturbances have played a key role in the appearance of natural communities today.

Natural disturbances such as fires and flooding can actually benefit certain natural communities and species. Periodic fires are needed to maintain pitch pine (*Pinus rigida*) and scrub oak (*Quercus ilicifolia*) on barren areas in order to sprout new growth of these species and keep out other successional 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.

Another natural disturbance, over-browsing by deer, can have detrimental effects on natural communities and species (Rhoads and Klein, 1993). Excessive deer browse can decrease the understory of some forests, and halt regeneration of new growth of the canopy and understory. Deer browse has been known to have negative impacts on understory dependent forest songbirds, which have noticeably decreased with increased deer browse (PA Audubon, 2000). Deer browse can also have a direct effect on rare plants. Private landowners can be encouraged to control deer population by allowing hunting on their respective lands.

In many cases, human disturbances have directly affected natural communities and animal and plant species in certain areas. In Montour County, farming and suburbanization have created biological "islands" where small natural areas are surrounded by agriculture or development. This isolates gene pools of wildlife and/or plant species, inhibiting their gene flow between populations. In addition, logging and mining can affect forest age and natural community structure. For example, old-growth forests has virtually disappeared despite the fact that some scattered old trees remain. As farming remains an important industry in Montour County, some farm practices and abandoned farmland make conditions favorable for some grassland birds. Birds such as Short-eared Owl (*Asio flammeus*), Dickcissel (*Spiza americana*), Eastern Meadowlark (*Sturnella magna*), Bobolink (*Dolichonyx oryzivorus*), Upland Sandpiper (*Bartramia longicauda*), Henslow's Sparrow (*Ammodramus henslowii*), and Vesper Sparrow (*Pooechetes gramineus*) have benefited from human managed and created early successional areas.

Additionally, many wetlands have been filled resulting in loss of biodiversity at a given site. Human and natural disturbances create different habitats in different scenarios, but it's human disturbances that usually leave the most lasting effect on the environment. Many human disturbances are quite beneficial, especially to early successional species. However, what may be beneficial to a few species, is frequently detrimental to other species. Many rare species have become rare because they just can't cope with disturbance to their particular habitat, which is sometimes a specialized niche. Consequently, many species have declined due to human alteration of the landscape. Human disturbances are a permanent part of landscape, but decisions about the type, timing, and extent of future disturbances are important to the natural ecological diversity that remains.

Probably the most detrimental indirect effect that human disturbance has had on natural communities and associated species is the spread of non-native (i.e. exotic) invasive species in natural areas. Many of these invasive species, including the chestnut blight that changed the composition of eastern forests, have caused such widespread problems that they are now out-competing native species and decreasing overall quality of natural areas. Non-native plants such as Japanese barberry (*Berberis thumbergii*), multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), tree-of-heaven (*Ailanthus altissima*), Garlic mustard (*Alliaria officinalis*), and autumn olive (*Elaeagnus umbellata*) have become commonplace in disturbed woodlands and old fields, often to the point of excluding some of the native plants. In wetlands and along streams, common reed (*Phragmites australis*), European buckthorn (*Rhamnus frangula*), 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.

Some of these non-native invasive plants have become serious threats to ecosystems in Montour and in all counties in Pennsylvania. Control of these invasive plants is needed to help control further encroachment, especially in or adjacent to areas that have been categorized as high quality natural areas.. Some nurseries in Pennsylvania 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* (Rhoads and Klein 1993) is a helpful reference for determining whether a plant species is native to the state or not. Additional references include two PA Department of Conservation and Natural Resources publications: *Invasive Plants in Pennsylvania* and *Landscaping with Native Plants in Pennsylvania*.

Pennsylvania Natural Heritage Program Data System

In order to conduct an inventory of significant flora, fauna, and natural communities in the county, scientists from The Nature Conservancy's PA Science Office (PSO) first consulted the Pennsylvania Natural Heritage Program (PNHP) database. PNHP was established in 1982 as a joint venture of The Nature Conservancy (TNC) and the Western Pennsylvania Conservancy (WPC). In its 20 years of operation, the PNHP database has become Pennsylvania's chief storehouse of information on outstanding natural habitat types (natural communities), and sensitive plants and animals (species of special concern). 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 and 1987).

PNHP 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. From this foundation, PNDI has focused its efforts on, and conducts systematic inventories for, the best occurrences of the priority species and natural communities.

PNHP has recorded over 15,000-detailed occurrences of species and communities of special concern, largely the result of field surveys. These are stored in computer and manual files and denoted on topographic maps. Additional data are stored in extensive manual and digital files set up for over 200 natural community types, 1400 animals, and 3500 plants. These files are organized by each of Pennsylvania's 881 7-1/2 USGS topographic quadrangle maps using a geographic information system (GIS).

The PA Science Office has used this systematic inventory approach to identify the areas of highest natural integrity in Montour County. The natural community and sensitive species data are the basis for judging the biological values of sites within the county. Protecting the sites with the best occurrences of the County's natural communities and good populations of sensitive plant and animal species can help to insure that a full range of biological diversity in Montour County is preserved for the future.

NATURAL AREAS INVENTORY METHODS

Methods used in the Montour 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 is conducted by biologists in aircraft; 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 Montour County. In January of 2002 a public meeting was held and recommended Natural Area Survey Forms (Appendix I) were distributed to facilitate public input. TNC 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 by audience members and scheduled for field surveys.

Map and Air Photo Interpretation

PSO ecologists familiarized themselves with the air photo characteristics of high quality natural communities already documented (Appendix II). Additional data from vegetation maps, soil survey maps, field survey records and other sources were consulted to gain familiarity with Montour County's 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 interpreted 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 used 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 to help prioritize fieldwork.

After an initial round of photo interpretation, field surveys were conducted to evaluate the potential natural areas that were 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 with poor quality sites led to the elimination of further fieldwork on other sites with similar signatures.

Field Work

Experienced PSO biologists and contractors conducted numerous field surveys throughout Montour County during 2002 and 2003. 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 also categorized the vegetation of each potential natural area visited. An evaluation of quality was made for each potential natural community element, care being taken to give reasons for the quality rank. Boundaries of the community types were redrawn, if needed, based on new field information. 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 Field Survey Form, Appendix III), the quality of each population or community was assessed, and locations were marked on USGS topographic quadrangle maps.

In April of 2002, one low altitude reconnaissance flight was flown over the county 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.

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 IV). Each location of a species (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 V. The element ranking and element occurrence-ranking systems help PSO personnel to simultaneously gauge the singular importance of each occurrence of, for example, an Ephemeral/Fluctuating Pool Natural Community or yellow-fringed orchid occurrence in Montour County, 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 created and added electronically to PNHP's Geographical Information System (GIS) layer.

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 sources are Hulse et al. (2001) and 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 rare moth and butterfly species in Pennsylvania. A list of Plant and Animals of Special Concern in Montour County is provided in Appendix VI.

Conservation of natural lands in Montour County: Connecting natural linkages in the landscape

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 one kilometer in area ~ 320 acres) have been highlighted in an effort to draw attention to the significance of large forested blocks within the County. Besides being habitat suitable for many native species, large 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.

The science of Conservation Biology has shown that fragmented habitat is a recipe for extinction of species, as individuals cannot interconnect with each other to continue the species survival. It has been shown that protecting large cores of wildlife habitat is essential to protecting healthy ecosystems. However, protecting only large cores of wilderness is not enough; to facilitate the flow of

life across an entire landscape, these habitat cores must be linked by natural corridors that allow natural processes such as wildfires, predator-prey relationships, and spring floods to occur. These interconnected natural corridors also need to be buffered from ecologically damaging activities by areas of more compatible usage. The result should be a series of interconnected habitats that thrive ecologically and allow unimpeded movements of wildlife and increasing plant diversity. These connections will allow populations of a species to interbreed and improve overall genetic variability. These connections will be vital for species as shrinking habitats continue to degrade critical habitats (www.wildlandsproject.org).

These riparian forests, wetlands, and waterways offer diverse critical habitat for a wide diversity of plant species as well as for birds, reptiles, amphibians, dragonflies and damselflies, and other aquatic insects. Connecting ecological corridors such as large, forested tracts, and rivers and streams, are important in keeping small populations from becoming isolated. Furthermore, these corridors could become imperative for migration northward to higher elevations if the conditions in the region begin to warm climatically (www.wildlandsproject.com).

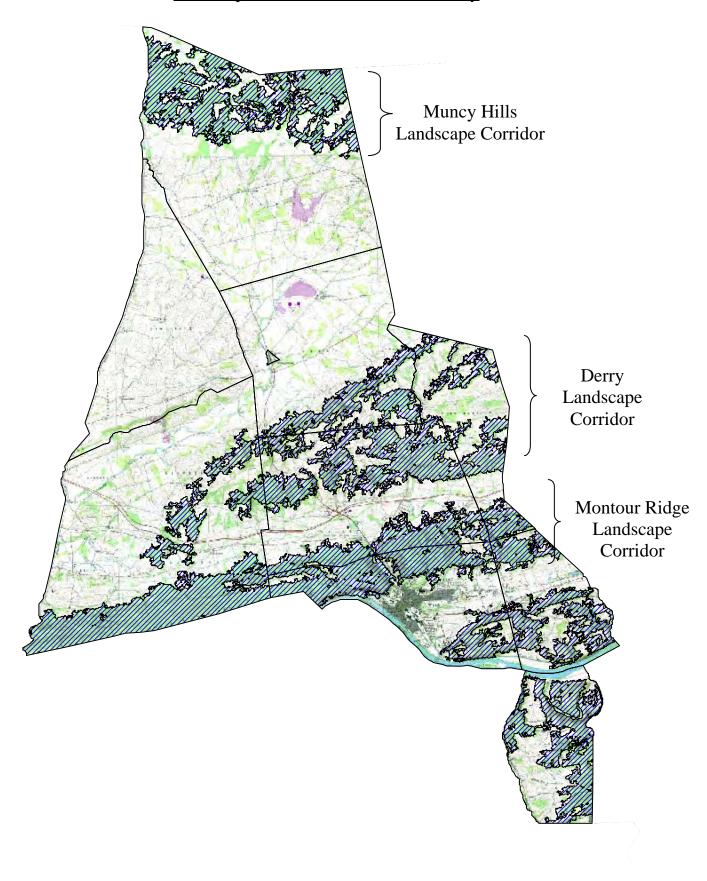
GIS Methodology: Creating NAI Forest Block Layers

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 one square kilometer were selected from the forest land cover type. This process highlights interior forest blocks greater than one square mile in area as presented below.

The final product of this landscape corridor analysis is three forested landscape corridors for Montour County referred to as Muncy Hills Landscape Corridor, Derry Landscape Corridor, and Montour Ridge Landscape Corridor.

Landscape Corridors of Montour County



Forested corridors in Montour County

1) Muncy Hills Landscape Corridor

The northern extent of Montour County contains a connection of natural areas that begin in the northwest part of the county across **Anthony Township**. This area represents one of the most forested parts of Montour County. However, this forested area is still fragmented throughout the corridor. This corridor spans the northern portion of the county where it is interrupted by several narrow roads. The stretch of forested area ends just north of the village of Exchange. This area is extensive in length, but the forested area is extremely narrow at times, and this could be buffered to further stabilize the natural corridor, decreasing predation, nest parasitism of landbirds from Brownheaded Cowbirds, and invasion of exotic invasive plant species. This corridor represents only forested linkages, and several non-forested linkages such as open farmland occur during this stretch. Species that are more adapted at traveling through non-forested corridors would travel well through such habitats.

This area in northern Montour County connects to large contiguous areas in Columbia County to the east and a few forested areas to the west in Northumberland County. There is some connectedness to the north into Lycoming County, but these forested blocks are cut off in Montour County. The connectedness to high quality natural areas in Columbia County such as Spruce Run and Iola Woods represent opportunities to coordinate efforts to connect these inter-county natural corridors by determining where fragmenting features interrupt the natural forested landscape. Spruce Run in Columbia County has exceptional habitat for birds, and Iola Woods contains rare plants. If the forested areas in northern Montour County are left undisturbed, opportunities exist to connect these areas to high quality habitats. This area is the most important forested corridor in Montour County and encompasses areas in Anthony Township. Since this area is rural in nature, large amounts of development do not yet exist. Instead, rural housing and small roads currently have a minimal impact on this forested corridor. In addition, agricultural lands may also serve as wildlife corridors, connecting forested areas and streams. Conservation programs such as the County Conservation District's Conservation Reserve Enhancement Program (CREP & CRP) can assist rural landowners with recommendations on how to improve their land for these purposes.

2) Derry Landscape Corridor

This natural corridor begins in Columbia County and continues west through West Hemlock Township. This corridor is much narrower and much more fragmented than Muncy Hills landscape corridor. However, the area is fairly uninterrupted as it heads west towards Derry Township and into Valley Township. The natural corridor is severely interrupted at Route 54, but enough forested areas occur on the west side of Route 54 for the natural corridor to continue. However, the natural corridor becomes very fragmented and is lost before the village of Oak Grove. A large block of forest south of Oak Grove is completely interrupted before Interstate 80. This corridor, which begins in Columbia County, is not as extensive in area or length as the Muncy Hills Corridor. Opportunities do exist to reconnect interrupted areas of this corridor by replanting trees where forested areas are fragmented and by installing wildlife corridors below major roads that connect forested corridor areas. In addition, agricultural lands may also serve as wildlife corridors, connecting forested areas and

streams. The County Conservation District can be very helpful in providing recommendations and potential funding to enhance wildlife corridors on agricultural and other rural lands.

3) Montour Ridge Landscape Corridor

This landscape corridor begins in Hemlock Township in Columbia County just west of Bloomsburg and continues with some interruption to West Hemlock and Cooper Townships in Montour County. This corridor almost disappears around the village of Kaseville in Valley Township. A few opportunities exist to construct wildlife corridors underneath rural roads to connect the existing corridor to the Geisinger Trails Natural Area (a locally significant site) in Mahoning Township. This site is a large forested area and continues the landscape corridor all the way west to Route 54 just north of the Borough of Danville. Route 54 is a major interruption to this forested/landscape corridor. However, on the west side of Route 54 is the start of a large contiguous forested area including the natural areas of Mahoning Creek Floodplain & Slopes and Bald Top. One challenge is somehow to link the forested areas east of Route 54 with the forested areas west of 54. Constructing wildlife corridors underneath Route 54 to a partly forested area would allow some wildlife to cross the barrier of Route 54 and nearby development. The forested corridor continues across the natural area of Bald Top and becomes less fragmented until it crosses Montour Ridge in Liberty Township. Montour Ridge is still fairly forested, but development along the ridge has severely fragmented this forest block. This easily broken portion of the forested corridor continues past areas of development and becomes much less fragmented on the western side of Montour Ridge, State Game Lands #115 and eventually, Northumberland County. Overall, this forested corridor is large and extensive, with definite wildlife connections through the landscape. The challenge will be finding ways to overcome the large barriers of Route 54 and nearby development in order to make wildlife friendly passageways.

Summary

Montour County has three main natural landscape corridors that provide habitat to numerous native species of plants and animals as well as allow for migration of a variety of wildlife through the county. These corridors facilitate the exchange of genetic materials across populations of many species of plants and animals. Intact interior forests can more easily resist the spread of exotic plant species, increase the population of native plants, provide critical migration corridors for small mammals, reptiles, amphibians and birds. These natural corridors help protect these animals from larger predators and human disturbances. Identifying the county's existing natural corridors and providing for their future protection and enhancement will go a long way towards securing the future native biological diversity of the region. Preliminary natural corridors were identified for this county using GIS, but more intensive work needs to be done to estimate accurately the total acreage of contiguous forested/wetland and undeveloped natural areas that could be connected with each other. The future biodiversity of Montour and neighboring counties may well depend upon some of these landscape corridors for linking animal and plant populations.





Lake Chillisquaque at Montour Preserve provides valuable recreational opportunities for people and critical habitat for many species of wildlife and plants. A survey of this area in 2004 found Toothcup (*Rotala ramosior*), an S3 plant species of concern in Pennsylvania. (Photo by The Nature Conservancy).

RESULTS

The natural areas for Montour County were evaluated by PSO staff (e.g., botanists, wildlife biologists, and ecologists) and ranked in order of importance for conservation of biodiversity at a statewide level. The size and quality, condition, landscape context, and rarity of the species or natural community were factors used to assign ranks for each site.

Table 2 presented in the Summary and Recommendations section prioritizes our conclusions on the most significant areas for the preservation of biological diversity in Montour County. The NAI recognizes sites at two primary levels of significance for the protection of biological diversity:

1) sites of **STATEWIDE IMPORTANCE**

2) sites of **Local Significance**

Sites displayed in **UPPER CASE LETTERS** throughout the report are those areas where state listed Rare, Threatened or Endangered Species or Natural Communities were documented. Sites in this category that are ranked 1 or 2 may contain some of the most important natural areas in the state. "Locally Significant" sites are indicated in **Title Case Letters** throughout the document. These are sites where no species of special concern or rare natural communities were documented during the survey period. These areas are not exemplary at the state level, but can be considered ecologically important at the county level. Examples would include relatively intact forested areas, large wetlands, and other areas significant for maintaining local biological diversity. Table 2 ranks the 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. Table 2 lists the site name, local jurisdiction, and pertinent information about the site. A more detailed description for each of the sites is included in the text of the report.

Surveys conducted during the scope of the Montour County Natural Areas Inventory documented 8 sites of statewide importance that contain rare species of plants, animals or natural communities. Eight different animal species of concern, four plant species of concern and one tracked natural community type were documented (Appendix VI). The report also highlights 10 sites considered significant at the county level (Locally Significant).

Maps showing the natural areas are included for each municipality. In order to protect the resource, the exact locations for species of special concern are not provided. Instead, a buffer for the site has been drawn; usually at the subwatershed level. It is not the intention of this report to exclude all proposed development from within the site buffers. Rather, any proposed development within these buffers should be carefully considered and the PNDI environmental review process should be followed.

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 natural area 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.

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 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 *Mid-Atlantic Exotic Plant Pest Council* (MA-EPPC) http://www.ma-eppc.org

.

The following site is a national invasive species information clearinghouse listing numerous other resources on a variety of related topics:

http://www.invasivespecies.gov/

On the municipality maps in this report, we have outlined the watersheds or subwatersheds where the natural communities and species of special concern occur. These areas should be viewed as zones of potential impact; protection of the entire area may not be necessary. Smaller buffer areas have been designated for locally significant sites. The core areas where the communities and species occur need to be given the most attention and fee title acquisition may be appropriate. Land uses that do not impact these important sites should be encouraged for the buffer zones.

We wish to emphasize that this Natural Areas Inventory is only a beginning. New sites with good natural communities and species of special concern wait to be discovered. Plant communities and plant and animal populations are dynamic, constantly changing with time and conditions. As this information is received and updated in the Pennsylvania Natural Diversity Inventory database, so too will the Natural Areas Inventories. If there are any questions about the impact of the proposed development or other activity should be directed to the Environmental Review Specialist at the PNHP Office in Harrisburg (717) 772-0258. Questions regarding protection methods and tools for planning should be directed to the Montour County Planning Commission at (570) 389-9146.



Adjacent to Route 11 west of Danville is a picturesque steep-sided ravine dominated by hemlocks and pines.

Exceptional Natural Feature

The Susquehanna River is the largest and most important natural feature within Montour County. The river provides ample recreational opportunities and habitat for a variety of biodiversity. The river stretches from the Columbia County border on the east to the Northumberland County border on the west. Within this area, an unknown quality population of a G4 S2B Pennsylvania-threatened animal species of concern occurs. In addition, two aquatic animal species of concern have also been documented from the Susquehanna River in Montour County.



Top Priority Natural Areas in Montour County

All of the natural areas in the county are important for maintaining biodiversity in the region and the state. However, the following sites from Table 2 are the most critical at present for maintaining Montour County's biological diversity into the future (see the SITE INDEX for approximate locations of these sites). More detailed descriptions and mapped locations of all sites are included in the Results section that follows.

BUCKNELL PRESERVE/MEXICO ROAD MARSH (Liberty Township)

This site, also known as "Tobias Marsh", contains two bird species of concern, an aquatic animal species of concern and a plant species of concern. During a survey of this marsh along Mexico Road, a territorial singing Marsh Wren (Cistothorus palustris), a G5, S2S3 animal species of concern, was seen during the safe dates of breeding for this species. In addition, calling Soras (Porzana carolina), a G5, S3B animal species of concern, were also heard during this survey during the safe breeding dates of this species. A third species, Virginia Rail (Rallus limicola), a G5 S3B animal species of concern, has been documented at this site in the past during surveys in 1980 and 1984, but was not located during this survey. It is probable that this species is still breeding here, but due to the extremely secretive nature of rails, the species was not found. In addition, a G5 S3S4 aquatic animal species of concern was found at this site. This species prefers slow aquatic environments with emergent vegetation. This site also contains a fair to good quality population of cat-tail sedge (Carex typhina), a G5 S2 Pennsylvania plant species of concern. This species was found in a deciduous bottomland forest along Chillisquaque Creek. This area also has several intermittent and permanent pools and channels, and slightly higher areas have more of a mesic forest.

MONTOUR PRESERVE AT LAKE CHILLISQUAQUE (Anthony Township)

A good-quality population of **Toothcup** (*Rotala ramosior*), a G5, S3 plant species of concern, was found along Lake Chillisquaque at Montour Preserve. The area around the lake was surveyed and this species was locally abundant around portions of the lakeshore. In addition, a **G5 S3S4 animal species of concern** was found at this site as well. This species is generally found in deeper lakes, quarries, and sand/gravel pits. Another **G5 S3S4 aquatic animal species of concern** was found at this site as well.

This site is a large recreational and hiking area in the northern part of Montour County. This area provides the people of Montour County with fishing, hiking, and educational opportunities. It is also an important area ecologically for many species of plants and animals and hosts a good variety of species that are native to the area.

SHARP RIDGE OXBOW (Mayberry Township)

This site contains a yet to be determined quality population of breeding **Sora** (*Porzana carolina*), a **G5**, **S3B** animal species of concern, and an yet to be determined quality population of a **G5**, **S3S4** animal species was found here as well. The Sora was found in a cattail dominated marsh. This species was flushed in an extensive survey within the marsh but was not seen. This species prefers shallow areas of robust or fine-leaved emergent vegetation, especially cattails, sedges, burreeds and bulrushes. Associated species with the Sora included Swamp Sparrow (*Melospiza georgiana*), Common Yellowthroat (*Geothlypis*

trichas), and Red-winged Blackbird (Agelaius phoeniceus), Wood Thrush (Hylocichla mustelina), Ovenbird (Seiurus aurocapillus), and Black-throated Green Warbler (Dendroica virens). This site also contains a yet to be determined population of a G5 S2S3 Pennsylvania aquatic animal species of concern. This species forages for food in the open marshy areas of this wetland.

SUSQUEHANNA RIVER IN MONTOUR COUNTY (Cooper, Mayberry, and Mahoning Townships & Danville Borough)

The **Susquehanna River** is one of Pennsylvania's greatest resources. The protection of this water source is critical to the survival of the many aquatic and terrestrial species that depend on this river system. Freshwater mussels have the highest current and future rate of extinction of any animal group in North America (Stein and Flack 1997). Some populations are found almost entirely within the Susquehanna River drainage. The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species. Protecting the quality of the Susquehanna River in Montour County is a top priority.

This site contains unknown quality populations of **three animal species** of concern that utilize the habitat associated with the Susquehanna River. Along this stretch of river, **one species of concern, a G4 S2B animal species**, uses islands as sites for breeding and at times will forage great distances up and down the river. This species has made a dramatic comeback in Pennsylvania and continues to increase in population. Two globally vulnerable aquatic animal species of concern were also documented in the Susquehanna River in Montour County.

There are numerous examples of disturbances along the Susquehanna River. The animal species of concern are especially affected by numerous non-point sources of pollution including sedimentation from cultivated and developed land along the river, runoff from roadways, pesticide runoff from agricultural fields, discharge of chemical pollutants, and thermal pollution. The main threat to these animals is reduction of water quality. The banks, floodplains, and islands of the river are, in areas, infested with the invasive introduced plant species, Japanese knotweed and purple loosestrife. Control of established populations of these species is very difficult, so eradication of pioneer populations is the best way to control the spread of these species of plants.

Water quality should be monitored and pollution sources should be identified where possible. Forested buffers should be maintained and created where absent along the length of the river with logging operations refraining from cutting within 100 feet of the river edge. River bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential, and roadway settings. In addition, the river floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Maintaining an intact, forested floodplain along the river can preserve much of the area's important biodiversity. The effectiveness of the forested riverbanks as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses, businesses and additional roadways along the river. Local planning should discourage construction of new structures and roadways along the river, adjacent slopes and floodplain.

Table 2. Summary of the sites for the protection of biological diversity in Montour County in approximate order of priority from the most important (rank = 1) to the least (rank = 5). 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.

County Rank	Site Name	Municipality	PA Heritage Ranks and Site Importance
1	SHARP RIDGE OXBOW	Mayberry, Franklin in Columbia County	This area is an extensive herbaceous wetland with scattered shrubs and interesting forested slopes. This area is the largest contiguous wetland in the county and has good landscape context. In addition, this site contains a yet to be determined quality population of <i>Sora</i> (<i>Porzana carolina</i>), a G5, S3B animal species of concern. This site also contains two G5 S3S4 animal species of concern that depend on the marshy emergent vegetation of the wetland.
1	MEXICO ROAD MARSH/BUCKNELL PRESERVE	Liberty	This area is a herbaceous wetland that grades into a mesic deciduous forest. This area contains populations of Sora (<i>Porzana carolina</i>), a G5, S3B animal species of concern, and Marsh Wren (<i>Cistothorus palustris</i>), a G5, S2S3B animal species of concern. This site also contains a good population of cat-tail sedge (<i>Carex typhina</i>), a G5, S2 plant species of concern, and a population of a G5 S3S4 aquatic animal species of concern . Bucknell Preserve is an important conservation area due to the diversity of plant species, and for the chance of harboring additional plant and animal species of concern.
1	SUSQUEHANNA RIVER IN MONTOUR COUNTY	Cooper, Mayberry, Mahoning Townships, Danville Borough, Columbia and Northumberland Counties	The Susquehanna River is the largest and most important natural feature within Montour County. The river provides ample recreational opportunities and habitat for a variety of native plants and animals. Along the river within Montour County's borders, a population of a G4 S2B PA-threatened animal species of concern occurs. In addition, two different globally vulnerable aquatic animal species of concern are also known to occur here. Maintaining an intact, forested floodplain along the river can preserve much of the area's important biodiversity. Local planning should discourage construction of new structures and roadways along the river, adjacent slopes and floodplain.
2	MONTOUR PRESERVE AT LAKE CHILLISQUAQUE	Anthony	This site is a large recreational and hiking area in the northern part of Montour County. This area provides the people of Montour County with fishing, hiking, and educational opportunities. Within this site is a good quality population of toothcup (<i>Rotala ramosior</i>), a G5, S3 PA-Rare plant species. This site also contains two different G5 S3S4 aquatic animal species of concern .
2	ROARING CREEK BLUFFS	Mayberry, Franklin Township in Columbia County	This area provides valuable habitat for jeweled shooting-star (<i>Dodecatheon radicatum</i>), a G?, S2, PA-Threatened plant species of concern. Several fair to good quality populations of this plant species exist at this site.

County Rank	Site Name	Municipality	PA Heritage Ranks and Site Importance
3	Mahoning Creek Floodplain and Slopes	Mahoning Township	This Locally Significant area consists of an extensive Silver Maple-River Birch-Silky Dogwood floodplain forest area, hemlock slopes, and a deciduous streamside forest. Mahoning Creek is a well-forested area with walking trails, a good diversity of spring wildflowers and good overall plant diversity, but with abundant exotic plant species. However, the area still has good plant diversity and potential for rare species. The slopes are mainly eastern hemlock, and many of these individual trees are affected with the hemlock woolly adelgid aphid (<i>Adelges tsugae</i>).
3	Bald Top/Montour Ridge	Valley, Mahoning	This Locally Significant site is a large forested block that contains hemlock slopes and ravines, and an extensive dry-oak heath forest. This area is locally significant due to the fact that it is one of the largest forested blocks in Montour County and because of the variety of habitats that occur here.
3	Geisinger Recreational Trails	Mahoning Township	This Locally Significant area is a large forested block north of the Borough of Danville that contains several different communities, including a ridgetop "Virginia pine-mixed hardwood forest", "red oak-mixed hardwood forest", and a streamside deciduous forest. The actual forest types in this area are not of conservation concern on a state-wide level, but the size and diversity of the site warrants locally significant status. This area also has good bird diversity, including some high quality habitat indicator species.
4	DANVILLE PARK FLOODPLAIN	Mahoning Township, Danville Borough	This area is owned by the borough of Danville and is adjacent to recreational fields and Route 11. A poor quality "Silver Maple Floodplain Forest" Natural Community, a Pennsylvania habitat of concern, occurs here. The area is almost purely silver maple and represents the best-known example of a floodplain forest in the county. The area is in poor ecological condition due to habitat fragmentation and exotic plant species but remains important for biodiversity within Montour County.
4	Sechler Run	Danville Borough	This Locally Significant site is located within the Borough of Danville and represents the best example of a natural habitat within the Borough. Despite the habitat fragmentation and exotic plant species that occur throughout the area, a good diversity of plant species and habitats exist here to make this site noteworthy.
4	County Line Branch Headwaters	Anthony Township	This Locally Significant area is a high quality forested stream valley and adjacent upland habitat with a good diversity of plant and animal species. This site is important as a large block of forested habitat. The forest also provides an important buffer at the headwaters of the County Line Branch of Chillisquaque Creek. A good variety of plants including spring wildflowers and animal life depend on this important component in the landscape of Montour County.

County Rank	Site Name	Municipality	PA Heritage Ranks and Site Importance
4	West Branch Chillisquaque Creek Headwaters	Anthony	This Locally Significant area is a very rich and diverse riparian forest community. This site contains a variety of community types including northern hardwoods and hemlock forests. This area also harbors a variety of spring wildflowers including a large population of wild leeks, which indicates the presence of rich soils. Though this site is relatively narrow and surrounded by agriculture, the area still remains an important component in the landscape. The forest serves as a buffer for the West Branch Chillisquaque Creek and provides important habitat for a variety of species.
4	Susquehanna River Shale Cliffs	Mahoning and Cooper Townships	Rocky, shale cliffs are the key feature for this Locally Significant site along with a fossil area near the base of the cliff. The main characteristics of this area are the sparsely wooded areas that have potential to contain some interesting shale cliff plant species. A good variety of plants occur here, as well as many exotic plant species.
5	MAUSDALE QUARRY	Valley	This site contains a fair quality population of backward sedge (<i>Carex retrorsa</i>), a G5, S1 PA-Endangered plant species. Despite the occurrence of a rare plant species, this site is in extremely poor ecological condition due to exotic plant species and forest fragmentation.
5	Hillside Wet Meadow	Derry Township	This Locally Significant area contains a good-sized herbaceous dominated wet meadow and surrounding wooded stream and fields. This area contains a high diversity of native plants, and represents good habitat for various species of wildlife.
5	Valley Ridge and Slopes	Valley and West Hemlock Townships	This Locally Significant area is characterized by hemlock slopes, a hemlock dominated streamside forest and a mixed pine-oak forested slope with some herbaceous openings. This area is interesting due to the large forested area, and the interesting herbaceous openings on the south facing slopes. Much of the hemlock area is disturbed due to the hemlock woolly adelgid aphid infestation, but some areas remain that warrant conservation value.
5	Toby Run Ravines	Mahoning , Cooper Townships	This Locally Significant site is primarily on the Danville State Hospital grounds, and includes the narrow ravine of Toby Run. This hemlock-dominated ravine has an interesting and diverse assemblage of primarily native vegetation. Additional surveys of this and adjacent areas for species of concern are recommended.



A secretive stalker of herbaceous-dominated wetlands, the **Sora** (*Porzana carolina*) is a rare rail that may be declining throughout its range. The secretive nature and difficult population measures make this species a species to watch closely throughout Pennsylvania. Two marshes in Montour County, Mexico Road Marsh, and Sharp Ridge Oxbow, could harbor good populations of this species. (Photo by Ron Austing)

ANTHONY TOWNSHIP

Site Name	Special Species / Community Type	PNHP Ranks* Global State		State Status	Last Seen	Quality**
	Tooth-cup (Rotala ramosior)	G5	S 3	PR	8/18/2004	Е
Montour Preserve at Lake Chillisquaque	Animal species of concern	G5	S3S4	N	7/29/2004	E
	Animal species of concern	G5	S3S4	N	7/28/2004	Е

Anthony Township is located in the northern part of the county and borders Lycoming County, Northumberland County, and Columbia County. This county contains an important landscape corridor that begins in Columbia County and extends into Northumberland County and Lycoming County. This township is one of the more forested areas in the county and is noteworthy for the Natural Areas Inventory. This township also contains a recreational natural area known as Montour Preserve at Lake Chillisquaque. This area is one of the most important areas for recreation in the county and contains a good diversity of plants and animals, including a few species of concern. Several nice contiguous forested areas were also surveyed during 2004. County Line Branch Headwaters and West Branch Chillisquaque Creek Headwaters were areas of good diversity of native plants and animals. Several other areas along the Muncy Hills Landscape Corridor are significant, due to the fact that each of them supports similar habitats to West Branch and County Line Branch. This township probably contains the most pristine forested land in the county, and steps should be taken to ensure that this extensive forested area remains forested. Finally, this area contains the most northern hardwood forest community type in the county. Extensive northern hardwood forest communities are rare in most of Montour County. This forest type typically consists of black cherry, sugar maple, birches, and American beech. Several creeks in this township would benefit from restoration of forested buffers to decrease nonpoint sources of pollution and improve water quality. Portions of West Branch Chillisquaque Creek, McKee Run, White Hall Creek, East Branch Chillisquaque Creek, and Middle Branch Chillisquaque Creek need additional forested buffers to ensure good water quality in the township.

<u>Locally Significant</u>: County Line Branch Headwaters, West Branch Chillisquaque Creek Headwaters

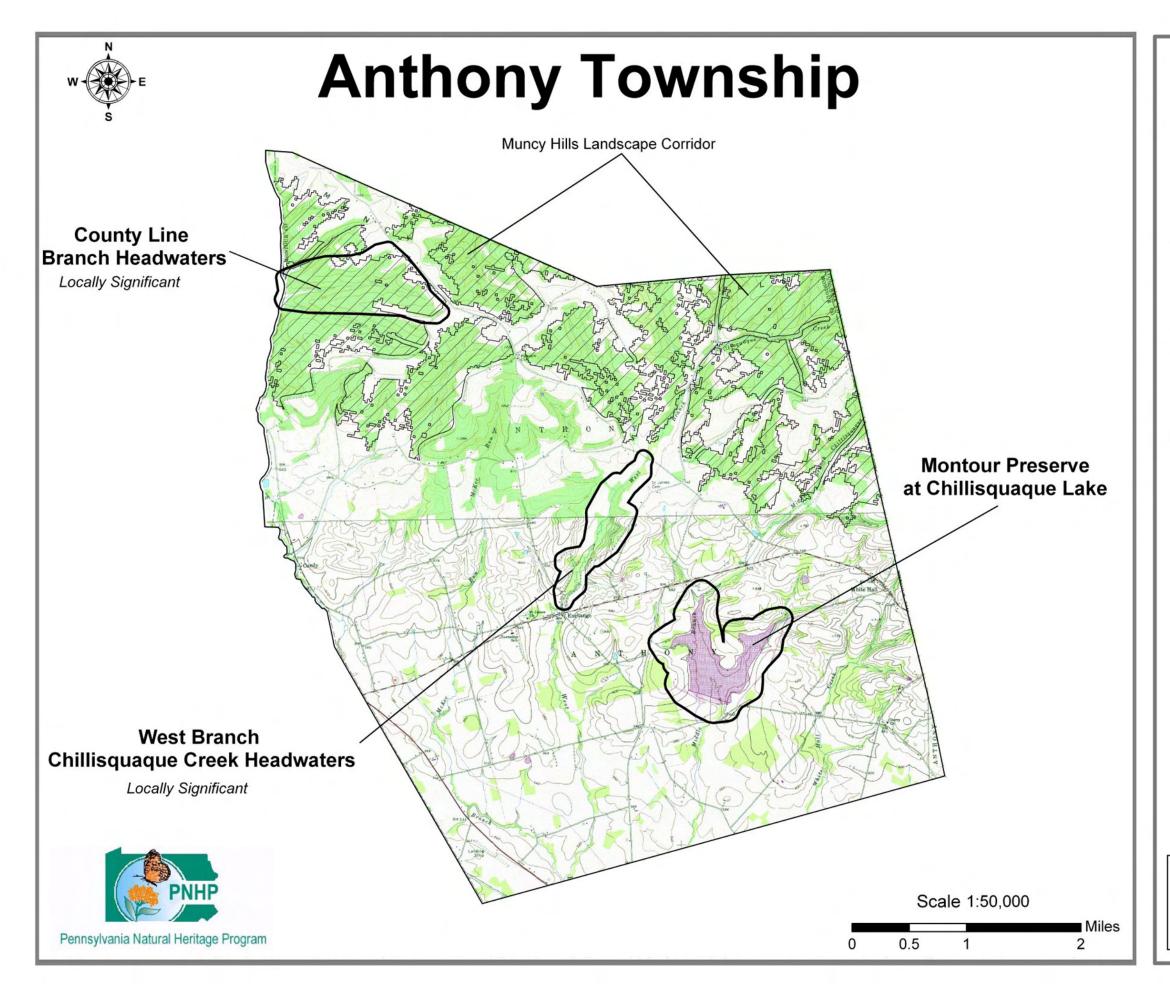
Managed Lands: None

Natural Corridor Linkages: Muncy Hills Landscape Corridor

Insert Anthony Township Map

^{*} Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



Anthony Township Montour County Natural Areas Inventory

Natural Areas:

Montour Preserve at Chillisquaque Lake

Locally Significant Sites:

County Line Branch Headwaters
West Branch
Chillisquaque Creek Headwaters

Landscape Corridors:

Muncy Hills Landscape Corridor



Legend

Natural Area or Locally Significant Site
Landscape Corridor

ANTHONY TOWNSHIP

County Line Branch Headwaters (Anthony Township)

This **Locally Significant** site is a high quality forested stream valley and adjacent upland habitat with a good diversity of plant and animal species. This site is important as a large block of forested habitat. The forest also provides an important buffer at the headwaters of the County Line Branch of Chillisquaque Creek. Biologists visited this site in the spring of 2004 finding a high diversity of spring wildflowers. A variety of plant and animal life depends on this important component in the landscape of Montour County.

Site dominant species list:

	Tre	es	
striped maple	Acer pensylvanicum	white ash	Fraxinus americana
red maple	Acer rubrum	blackgum	Nyssa sylvatica
sugar maple	Acer saccharum	black cherry	Prunus serotina
yellow birch	Betula allegheniensis	white oak	Quercus alba
black birch	Betula lenta	red oak	Quercus rubra
American beech	Fagus grandifolia	sassafras	Sassafras albidum
	Shri	ıbs	
witch hazel	Hamamelis virginiana	spicebush	Lindera benzoin
mountain laurel	Kalmia latifolia	blackberry	Rubus alleghaniensis
	Her	bs	
wild sarsaparilla	Aralia nudicaulis	large yellow wood sorrel	Oxalis grandis
jack-in-the-pulpit	Arisaema triphyllum	Virginia creeper	Parthenocissus quinquefolia
fleabane	Erigeron spp.	may-apple	Podophyllum peltatum
bedstraw	Galium spp.	solomon's seal	Polygonatum biflorum
wild geranium	Geranium maculatum	Christmas fern	Polystichum acrostichoides
hepatica	Hepatica spp.	cress	Rorippa spp.
jewelweed	Impatiens spp.	veined skullcap	Scutellaria nervosa
Canada mayflower	Maianthemum canadense	false solomon's seal	Smilacina racemosa
Indian cucumber	Medeola virginiana	rue anemone	Thalictrum thalictroides
partridgeberry	Mitchella repens	bellwort	Uvularia sessifolia
sensitive fern	Onoclea sensibilis	marsh blue violet	Viola cucullata
aniseroot	Osmorhiza longistylis		
	Anin		
northern two-lined salamander	Eurycea bislineata	Black-throated Green Warbler	Dendroica virens
northern spring salamander	Gyrinophilus porphyriticus porphyriticus	Tufted Titmouse	Baeolophus bicolor
redback salamander	Plethodon cinereus	Wood Thrush	Hylocichla mustelina
stoneflies	Plecoptera	Louisiana Waterthrush	Seiurus motacilla
fireflies	Lampyridae	Pileated Woodpecker	Dryocopus pileatus
Black-and-white Warbler	Mniotilta varia	Red-eyed Vireo	Vireo olivaceus
Eastern Phoebe	Sayornis phoebe	Scarlet Tanager	Piranga olivacea
Ovenbird	Seiurus aurocapillus		

Threats and Disturbances

The major threat to this area would be a change in ownership leading to development. Disturbances include nearby agriculture and timber harvesting as well as some non-native invasive species. Beech bark disease may also be a threat to the significant number of American beech growing here.

Conservation Recommendations

Many of the current landowners are interested in conservation and it may be worthwhile for local conservancies to pursue easements for the properties. Invasive species and diseases should be monitored and control methods should be applied where possible. Further field surveys are recommended.

MONTOUR PRESERVE AT LAKE CHILLISQUAQUE (Anthony Township)

A large population of **Toothcup** (*Rotala ramosior*), a G5, S3 plant species of concern, was found along Lake Chillisquaque at Montour Preserve. This species was locally abundant around portions of the lakeshore. **Two G5 S3S4 aquatic animal species were also found at this site.** One of the species prefers large lakes, quarries, and sand pits.

Site dominant species list:

Trees								
box-elder	Acer negundo		black tupelo	Nyssa sylvatica				
red maple	Acer rubrum		eastern hop-hornbeam	Ostrya virginiana				
sugar maple	Acer saccharum		pin oak	Quercus palustris				
musclewood	Carpinus caroliniana		red oak	Quercus rubra				
shagbark hickory	Carya ovata		American basswood	Tilia americana				
black ash	Fraxinus nigra		red elm	Ulmus rubra				
	Sh	ıru	bs					
speckled alder	Alnus rugosa		spicebush	Lindera benzoin				
alternate-leaved dogwood	Cornus alternifolia		morrow's honeysuckle	Lonicera morrowii				
silky dogwood	Cornus amomum		mountain holly	Nemopanthus mucronatus				
gray dogwood	Cornus racemosa	İ	multiflora rose	Rosa multiflora				
winterberry holly	Ilex verticillata		nannyberry	Viburnum lentago				
	Н	erl	bs					
swamp milkweed	Asclepias incarnata		St. john's wort	Hypericum spp.				
sedge	Carex gynandra	İ	orange jewelweed	Impatiens capensis				
sedge	Carex lurida		soft rush	Juncus effusus				
sedge	Carex lurida	İ	winged monkeyflower	Mimulus alatus				
sedge	Carex vulpinoidea	İ	sensitive fern	Onoclea sensibilis				
umbrella sedge	Cyperus spp.		wool-grass	Scirpus cyperinus				
willow-herb	Epilobium spp.	İ	purple-stemmed goldenrod	Solidago caesia				
boneset	Eupatorium perfoliatum	İ	blue vervain	Verbena hastata				
bedstraw	Galium spp.		ironweed	Vernonia noveboracensis				
	An	im						
widow skimmer	Libellula luctuosa	İ	Carolina Wren	Thryothorus ludovicianus				
eastern forktail	Ischnura verticalis	İ	Belted Kingfisher	Ceryle alcyon				
powdered dancer	Argia moesta	İ	Spotted Sandpiper	Actitis macularia				
bluet	Enallagma spp.	İ	Least Sandpiper	Calidris minutilla				
common whitetail	Libellula lydia		House Wren	Troglodytes aedon				
Northern Harrier	Circus cyaneus	1	Song Sparrow	Melospiza melodia				
Eastern Meadowlark	Sturnella magna	1	Great Egret	Ardea alba				
Eastern Towhee	Pipilo erythrophthalmus	1	Common Yellowthroat	Geothlypis trichas				
Field Sparrow	Spizella pusilla	1	twelve-spotted skimmer	Libellula pulchella				
Gray Catbird	Dumetella carolinensis	ı						

Threats and Disturbances

The main threats to this large population of toothcup include excessive flooding, and development along shores. Disturbances to this population include boats, water pollution, and tramping from people along shoreline.

Conservation Recommendations

Recommendations include that this population be monitored due to the posibility of some environmental changes to the lake. The lake is mostly undeveloped, but even though the site is a preserve, the area still has some potential for development of cabins along the shoreline.

Muncy Hills Landscape Corridor

The northern extent of Montour County contains a connection of natural areas cross Anthony Township. This area represents one of the most forested parts of Montour County. However, this forested area is still fragmented throughout the corridor. This corridor spans the northern portion of the county where it is interrupted by several narrow roads. The stretch of forested area ends just north of the village of Exchange. This area is extensive in length, but the forested area is extremely narrow at times, and this could be buffered to further stabilize the natural corridor, decreasing predation, nest parasitism of landbirds from Brown-headed Cowbirds, and invasion of exotic invasive plant species. This corridor represents only forested linkages, and several non-forested linkages such as open farmland occur during this stretch. Species that are more adapted at traveling through non-forested corridors would travel well through such habitats.

This area in northern Montour County connects to large contiguous areas in Columbia County to the east and a few forested areas to the west in Northumberland County. There is some connectedness to the north into Lycoming County, but these forested blocks are cut off in Montour County. The connectedness to high quality natural areas in Columbia County such as Spruce Run and Iola Woods represent opportunities to coordinate efforts to connect these inter-county natural corridors by determining where fragmenting features interrupt the natural forested landscape. Spruce Run in Columbia County has exceptional habitat for birds, and Iola Woods contains rare plants. If the forested areas in northern Montour County are left undisturbed, opportunities exist to connect these areas to high quality habitats. This area is the most important forested corridor in Montour County and encompasses areas in Anthony Township. Since this area is rural in nature, large amounts of development do not yet exist. Instead, rural housing and small roads currently have a minimal impact on this forested corridor. In addition, agricultural lands may also serve as wildlife corridors, connecting forested areas and streams. Conservation programs such as the County Conservation District's Conservation Reserve Enhancement Program (CREP & CRP) can assist rural landowners with recommendations on how to improve their land for these purposes.

West Branch Chillisquaque Creek Headwaters (Anthony Township)

This **locally significant** site is a very rich and diverse riparian forest community. This site contains a variety of community types including northern hardwoods and hemlock forests. Biologists visited this site in 2004 and found a variety of spring wildflowers including a large population of wild leeks, which indicates the presence of rich soils. Though this site is relatively narrow and surrounded by agriculture, the area still remains an important component in the landscape. The forest serves as a buffer for the West Branch Chillisquaque Creek and provides important habitat for a variety of species.

Dominant species list:

	7	re	es	
sugar maple	Acer saccharum		white pine	Pinus strobus
serviceberry	Amelanchier spp.		American sycamore	Platanus occidentalis
pignut hickory	Carya glabra		black cherry	Prunus serotina
American beech	Fagus grandifolia		basswood	Tilia americana
white ash	Fraxinus americana		eastern hemlock	Tsuga canadensis
tulip poplar	Liriodendron tulipifera	1	red elm	Ulmus rubra
	F	Ier	bs	
wild leeks	Allium tricoccum		dwarf ginseng	Panax trifolius
jack-in-the-pulpit	Arisaema triphyllum		Virginia creeper	Parthenocissus quinquefolia
rattlesnake fern	Botrychium virginianum		mayapple	Podophyllum peltatum
hay-scented fern	Dennstaedtia punctilobula		Christmas fern	Polystichum acrostichoides
marginal shield fern	Dryopteris marginalis]	buttercup	Ranunculus spp.
trout lily	Erythronium spp.		bloodroot	Sanguinaria canadensis
bedstraw	Galium spp.		false solomon's seal	Smilacina racemosa
jewelweed	Impatiens spp.		goldenrod	Solidago spp.
wood nettle	Laportea canadensis		skunk cabbage	Symplocarpus foetidus
sweet cicely	Osmorhiza claytonii		meadow rue	Thalictrum diocum
aniseroot	Osmorhiza longistylis		long-spurred violet	Viola rostrata
wood sorrel	Oxalis spp.		violet	Viola spp.
	Aı	nim	nals	
Ovenbird	Seiurus aurocapillus		Blue-headed Vireo	Vireo solitarius
Black-throated Green Warbler	Dendroica virens		Common Yellowthroat	Geothlypis trichas
Wood Thrush	Hylocichla mustelina			

Threats and Disturbances

The biggest threat to this area is development. Disturbances include ATV trails, trash dumping and presence of invasive, exotic species.

Conservation Recommendations

This area should be monitored for ATV use and some effort should be made to keep riders out of this site. There are many wet areas that could be easily destroyed by even light ATV use. Exotic species should also be monitored and control efforts pursued where possible.



Band-winged Meadowhawk (*Sympetrum semicinctum*), a Pennsylvania dragonfly species of concern, inhabits primarily shallow marshy areas, sometimes in bogs or fens, but usually with a slow current, springfed, and edged with sedges. It seems unable to compete well with other dragonflies and is susceptible to fish predation. This species was found in Montour County during the field season of 2004.

COOPER TOWNSHIP

	Special Species /	PNHP		State	Last	
Site Name	Community Type	Global	State	Status	Seen	Quality**
Susquehanna River in Montour County	Animal species of concern	G4	S2B	PE	8/11/04	Е
	Animal species of concern	G3G4	S3S4	N	9/28/95	Е
	Animal species of concern	G3	S2	N	9/28/95	Е

Cooper Township is located in the southeastern part of Montour County and includes Route 11 that connects Bloomsburg and Danville. It also includes the Susquehanna River to the south and Columbia County to the east. **The Susquehanna River** is by far the most important natural feature in this township, and steps to improve water quality along the river, including establishment of forested floodplain buffers, should be taken. This township also contains two locally significant areas that extend from Mahoning Township. **Toby Run Ravines** has diverse forested areas that extend eastward into Cooper Township. The main portion of **Susquehanna River Shale Cliffs** is in Mahoning Township, but a portion of this site is also in Cooper Township. **Montour Ridge Landscape Corridor** extends across the northern portion of the township and represents the most forested area of the township. This area is also somewhat fragmented by rural roads and some development, but is still extensive enough to provide important habitat for many species of plants and animals. Finally, the streams in this township would benefit from restoration of forested buffers to decrease non-point sources of pollution and improve water quality.

Locally Significant: Susquehanna River Shale Cliffs

Toby Run Ravines

Managed Lands: None

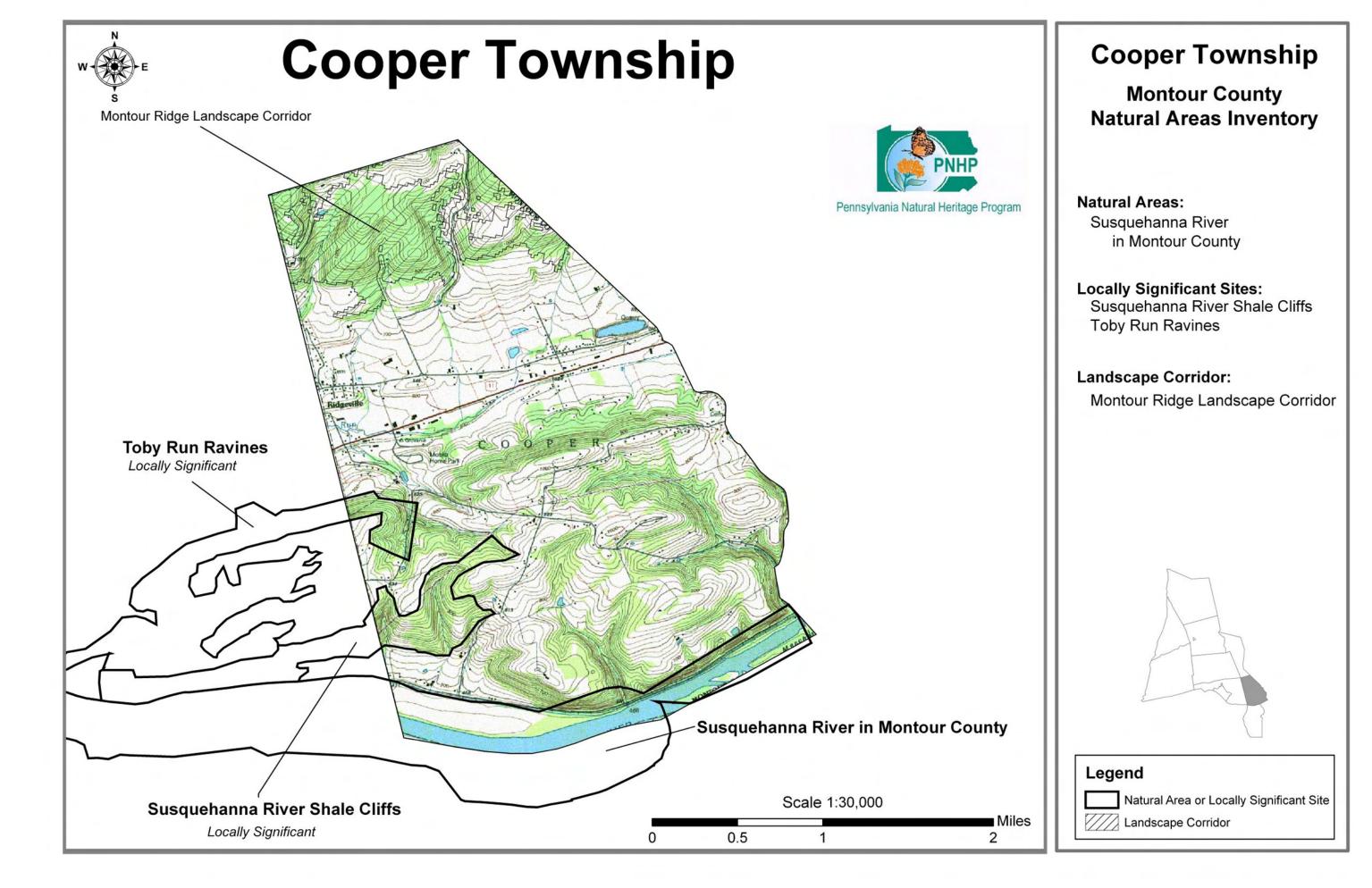
iagea Lanas. 140ne

<u>Landscape Corridors</u>: **Montour Ridge Landscape Corridor**

Insert Cooper Township Map

^{*} Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



COOPER TOWNSHIP

Montour Ridge Landscape Corridor

This landscape corridor begins in Hemlock Township in Columbia County just west of Bloomsburg and continues with some interruption to West Hemlock and Cooper Townships in Montour County. This corridor almost becomes completely broken up around the village of Kaseville in Valley Township. A few opportunities exist to construct wildlife corridors underneath rural roads to connect the existing corridor to the Geisinger Trails Natural Area (a locally significant site) in Mahoning Township. This site is a large forested area and allows the landscape corridor to be contiguous west to Route 54 just north of the Borough of Danville. Route 54 is a major interruption to this forested/landscape corridor. However, on the west side of Route 54 is the start of a large contiguous forested area including the natural areas of Mahoning Creek Floodplain and Slopes and Bald Top. One challenge is to link the forested areas east of Route 54 with the forested areas west of Route 54. Constructing wildlife corridors underneath Route 54 would allow some wildlife to cross beneath the roadway and also avoid nearby development. The forested corridor continues across the natural area of Bald Top and becomes less fragmented until it crosses Montour Ridge in Liberty Township. Montour Ridge is still fairly forested, but the area is under increasing pressure from development. This forested corridor continues past the development and becomes much less fragmented on the western side of Montour Ridge, connecting with State Game Lands #115 and eventually, Northumberland County. Overall, this forested corridor is large and extensive, with definite wildlife connections through the landscape. The challenge will be finding ways to overcome the large barriers of Route 54 and nearby development in order to make wildlife-friendly passageways.

SUSQUEHANNA RIVER IN MONTOUR COUNTY (Cooper, Mayberry, and Mahoning Townships, Danville Borough, and Columbia & Northumberland Counties).

The **Susquehanna River** is one of Pennsylvania's greatest resources. The protection of this water source is critical to the survival of the many aquatic and terrestrial species that depend on this river system. Freshwater mussels have the highest current and future rate of extinction of any animal group in North America (Stein and Flack 1997). Some populations are found almost entirely within the Susquehanna River drainage. The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species. Protecting the quality of the Susquehanna River in Montour County is a top priority.

This site contains unknown quality populations of **three animal species** of concern that utilize the habitat associated with the Susquehanna River. Along this stretch of river, **one species of concern, a G4 S2B animal species**, uses islands as sites for breeding and at times will forage great distances up and down the river. This species has made a dramatic comeback in Pennsylvania and continues to increase in population. **Two globally vulnerable aquatic animal species of concern** were also documented in the Susquehanna River in Montour County.

Threats and Disturbances

There are numerous examples of disturbances along the Susquehanna River. Two of these animal species of concern are especially affected by numerous non-point sources of pollution including sedimentation from cultivated and developed land along the river, runoff from

roadways, pesticide runoff from agricultural fields, discharge of chemical pollutants, and thermal pollution. The main threat to these animals is reduction of water quality. The banks, floodplains, and islands of the river are in areas infested with the invasive introduced plant species, Japanese knotweed and purple loosestrife. Control of established populations of these species is very difficult, so eradication of pioneer populations is the best way to control the spread of these species of plants. The **G4 S2B animal species of concern** in this area is extremely sensitive to human disturbance during the breeding season.

Conservation Recommendations

Any of the above types of disturbances should be minimized wherever possible. Also, monitoring of these populations of animal species of concern should continue into the future. Loss of individuals and reductions in population sizes should lead to an investigation into possible causes. Water quality should be monitored and pollution sources should be identified where possible. Forested buffers should be maintained and created where absent along the length of the river with logging operations refraining from cutting within 100 feet of the river edge. River bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential, and roadway settings. In addition, the river floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Maintaining an intact, forested floodplain along the river can preserve much of the area's important biodiversity. The effectiveness of the forested riverbanks as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses, businesses and additional roadways along the river. Local planning should discourage construction of new structures and roadways along the river, adjacent slopes and floodplain.

Susquehanna River Shale Cliffs (Mahoning Township, Cooper Township)

Rocky, shale cliffs are the key feature for this site along with a fossil area near the base of the cliff. The main characteristics of this area are the open Virginia pine woodlands that have potential to contain some interesting shale cliff plant species. A good variety of plants occur here and the cliffs are fairly extensive from west to east.

Threats and Disturbances

This site is adjacent to a road and exotic plant species are already a nuisance to the site. The continued spread of exotic plant species is a threat to the ecological integrity of the site. No other threats and disturbances were noted at this site.

Conservation Recommendations

This area is significant due to the potential for having interesting shale cliff plant species. However, as more invasive plant species colonize the site, the less chance one will find uncommon plants. It is recommended that an invasive plant management plan be written to protect the area from further ecological invasions. Future surveys for species of concern in this area are recommended.

Site dominant species list:

Trees							
Norway maple	Acer platanoides		American beech	Fagus grandifolia			
red maple	Acer rubrum		Virginia pine	Pinus virginiana			
sugar maple	Acer saccharum		black cherry	Prunus serotina			
serviceberry	Amelanchier spp.		chestnut oak	Quercus montana			
black birch	Betula lenta		red oak	Quercus rubra			
pignut hickory	Carya glabra		black oak	Quercus velutina			
mockernut hickory	Carya tomentosa		sassafras	Sassafras albidum			
hackberry	Celtis occidentalis		eastern hemlock	Tsuga canadensis			
flowering dogwood	Cornus florida						
		Shru	ıbs	·			
witch-hazel	Hamamelis virginiana						
	·	Her	bs	·			
garlic mustard	Alliaria petiolata		pennyroyal	Hedeoma pulegioides			
wild columbine	Aquilegia canadensis		alum-root	Heuchera americana			
maidenhair spleenwort	Asplenium trichomanes		Japanese honeysuckle	Lonicera japonica			
white wood-aster	Aster divaricatus		Indian pipe	Monotropa uniflora			
sedge	Carex swanii		Virginia creeper	Parthenocissus quinquefolia			
spotted wintergreen	Chimaphila maculata		Christmas fern	Polystichum acrostichoides			
horseweed	Conyza canadensis		early saxifrage	Saxifraga virginiensis			
common dittany	Cunila origanoides		blue-stem goldenrod	Solidago caesia			
bladder fern	Cystopteris tenuis		clasping aster	Symphyotrichum patens			
			poison-ivy	Toxicodendron radicans			

Toby Run Ravine (Mahoning Township, Cooper Township)

This locally significant site is primarily on the Danville State Hospital grounds, and includes the narrow ravine of Toby Run. This hemlock-dominated ravine has an interesting and diverse assemblage of primarily native vegetation. The thick hemlock-northern hardwood canopy creates a cool shaded habitat for a thick cover of ferns and typical woodland wildflower species. Large tree specimens such as hemlock, tulip poplar, sugar maple and beech frequent the slopes and bottomland of this gorge. Additional surveys of this and adjacent areas for species of concern are recommended.

Threats and Disturbances

The area has been degraded by the gradual but persistent invasion of introduced plants such as Norway maple, tree-of-heaven, autumn olive, multiflora rose and garlic mustard. A devastating introduced insect pest, the hemlock woolly adelgid, has infested the hemlocks of this forest. Left unchecked, this pest could destroy the hemlock component of the forest, which would likely dramatically alter the present habitat conditions, allowing increased sunlight, and with it, more introduced species to colonize this habitat.

Conservation Recommendations

The PA Bureau of Forestry has released a biological control for the hemlock woolly adelgid in several locations statewide. Its effectiveness at controlling this destructive insect pest in the state is, as yet, uncertain. Chemical controls for this pest are expensive and fairly impractical for large areas. There may be no viable solution to this infestation, and it may need to "run its

course". Control of the invasive plants can be similarly labor or cost intensive. Aggressive removal of pioneer populations early in their colonization can be the most effective way of reducing the impact of these species on natural habitats.

Site dominant species list:

Trees							
box-elder	Acer negundo		white ash	Fraxinus americana			
Norway maple	Acer platanoides		Kentucky coffee-tree	Gymnocladus dioica			
red maple	Acer rubrum		tulip poplar	Liriodendron tulipifera			
sugar maple	Acer saccharum		chestnut oak	Quercus montana			
tree-of-heaven	Ailanthus altissima		basswood	Tilia americana			
black birch	Betula lenta		eastern hemlock	Tsuga canadensis			
American beech	Fagus grandifolia		American elm	Ulmus americana			
	Sl	ırı	ibs				
alternate-leaved dogwood	Cornus alternifolia		wild hydrangea	Hydrangea arborescens			
red-willow	Cornus amomum		spicebush	Lindera benzoin			
autumn olive	Elaeagnus umbellata		multiflora rose	Rosa multiflora			
witch- hazel	Hamamelis virginiana		American elderberry	Sambucus canadensis			
	H	ler	erbs				
garlic mustard	Alliaria petiolata		dame's rocket	Hesperis matronalis			
jack-in-the-pulpit	Arisaema triphyllum		jewelweed	Impatiens sp.			
wild ginger	Asarum canadensis		Indian cucumber-root	Medeola virginiana			
northern lady fern	Athyrium felix-femina		partridge-berry	Mitchella repens			
false nettle	Boehmeria cylindrica		sensitive fern	Onoclea sensibilis			
turtlehead	Chelone glabra		may-apple	Podophyllum peltatum			
common wood fern	Dryopteris intermedia		bird-on-the-wing	Polygala paucifolia			
trout-lily	Erythronium americanum		Christmas fern	Polystichum acrostichoides			
wood geranium	Geranium maculatum		false solomon's-seal	Smilacina racemosa			
white-avens	Geum canadense		skunk-cabbage	Symplocarpus foetidus			

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 hemlockdominated 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 hemlockdominated 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.



Wetlands are not a common site in Montour County, and many species such as Swamp Sparrows (*Melospiza georgiana*), depend on open wetlands to breed. Swamp Sparrows were a common sight at Sharp Ridge Oxbow in Mayberry Township, which is one of the top conservation sites in the county

Cattail Sedge (Carex typhina)



A Pennsylvania Endangered plant species, the cattail sedge (*Carex typhina*) was found at Bucknell Preserve in Liberty Township. Further surveys should be conducted in the county to determine the extent of the G5, S2 plant species of concern.

Photo by permission of US Army Corps of Engineers Baltimore District http://raystown.nab.usace.army.mil/LandManagement/plants.htm

DERRY TOWNSHIP /BOROUGH OF WASHINGTONVILLE

Sta Name	Special Species /		Ranks*	State	Last		
Site Name	Community Type	Global	State	Status	Seen	Quality**	
NONE							

Derry Township is located in the central part of the county and contains the Borough of Washingtonville. The township is composed primarily of agricultural and residential areas with some small woodlots. No species of concern were identified in the township during this survey. However, several forested areas remain including part of a landscape corridor, **Derry Landscape Corridor**, in the southern portion of the township, which was identified from aerial photo interpretation. This area is also significant because it connects a long east-to-west natural corridor that extends from Columbia County through Montour County. Future field studies may be successful in identifying important ecological features in these habitats. Additional surveys of forested slopes, ravines and streams in this township are encouraged. Finally, portions of **Mud Creek** and **Chillisquaque Creek** would benefit from restoration of forested riparian buffers to decrease the impact of non-point sources of pollution and improve overall water quality.

Locally Significant: Hillside Wet Meadow

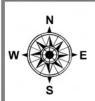
Managed Lands: None

<u>Landscape Corridors</u>: **Derry Landscape Corridor**

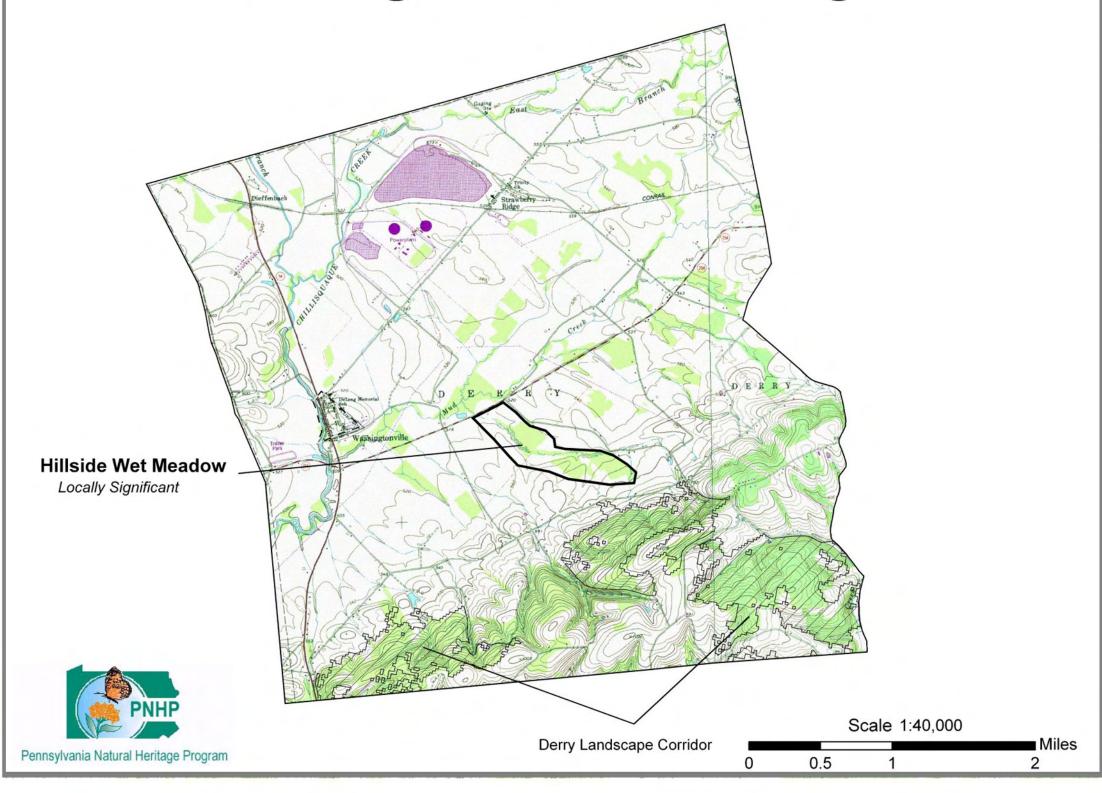
Insert Derry Township Map

^{*} Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



Derry Township Washingtonville Borough



Derry Township Washingtonville Boro

Montour County
Natural Areas Inventory

Locally Significant Sites:

Hillside Wet Meadow

Landscape Corridor:

Derry Landscape Corridor



Legend

Natural Area or Locally Significant Site

Landscape Corridor

L _ _ I Borough Boundary

DERRY TOWNSHIP

Derry Landscape Corridor

This natural corridor begins in Columbia County and continues west through West Hemlock Township. This corridor is much narrower and much more fragmented than Muncy Hills landscape corridor. However, the area is fairly uninterrupted as it heads west towards Derry Township and into Valley Township. The natural corridor is severely interrupted at Route 54, but enough forested areas occur on the west side of Route 54 for the natural corridor to continue. However, the natural corridor becomes very fragmented and is lost before the village of Oak Grove. A large block of forest south of Oak Grove is completely interrupted before Interstate 80. This corridor, which begins in Columbia County, is not as extensive in area or length as the Muncy Hills Corridor. Opportunities do exist to reconnect interrupted areas of this corridor by replanting trees where forested areas are fragmented and by installing wildlife corridors below major roads that connect forested corridor areas. In addition, agricultural lands may also serve as wildlife corridors, connecting forested areas and streams. The County Conservation District can be very helpful in providing recommendations and potential funding to enhance wildlife corridors on agricultural and other rural lands.

Hillside Wet Meadow (Derry Township)

This locally significant area contains a good-sized herbaceous dominated wet meadow, and surrounding wooded stream areas and fields. This area represents a good diversity of native plants, and quality habitat for various species of wildlife.

Threats and Disturbances

The main threats to this area are exotic plant species such as multiflora rose and autumn olive that may destroy the ecological integrity of the wet meadow and surrounding streamside woods.

Conservation Recommendations

This survey was conducted in early September so many plants that may be identifiable in June/July were missed. A more thorough survey should be conducted in June/July since this area has potential to contain some rare plants. Long-term exotic plant monitoring should be conducted to determine the spread of the invasive plants.

Shrubs							
silky dogwood	Cornus amomum		multiflora rose	Rosa multiflora			
gray dogwood	Cornus racemosa		poison sumac	Toxicodendron vernix			
cockspur hawthorn	Crataegus crus-galli		nannyberry	Viburnum lentago			
autumn olive	Elaeagnus umbellata						
		Не	erbs				
jack-in-the-pulpit	Arisaema triphyllum		grass-leaved rush	Juncus marginatus			
swamp milkweed	Asclepias incarnata		path rush	Juncus tenuis			
rattlesnake fern	Botrychium virginianum		great lobelia	Lobelia siphilitica			
sedge	Carex annectens		water-horehound	Lycopus americanus			
sedge	Carex gynandra		evening-primrose	Oenothera spp.			
turtlehead	Chelone glabra		sensitive grass	Onoclea sensibilis			
wild basil	Clinopodium vulgare		wool-grass	Scirpus cyperinus			
blue waxweed	Cuphea viscosissima		golden ragwort	Senecio aureus			
horsetail	Equisetum spp.		foxtail	Setaria spp.			
boneset	Eupatorium perfoliatum		Canada goldenrod	Solidago altissima			
white-snakeroot	Eupatorium rugosum		early goldenrod	Solidago juncea			
flat-topped goldenrod	Euthamia graminifolia		zig-zag aster	Symphyotrichum prenanthoides			
sunflower	Helianthus sp.		skunk cabbage	Symplocarpus foetidus			
orange-jewelweed	Impatiens capensis		New York ironweed	Vernonia noveboracensis			
soft rush	Juncus effusus						



A large and diverse calcareous forested area, Bucknell Preserve and the surrounding marshes are important natural areas for Montour County. This area contains four species of concern, good forest structure and an overall good diversity of plants and animals for this county (Photo: PA Science Office of The Nature Conservancy).



Scarlet Tanagers are treetop bird species that inhabit mature woodlands in Montour County. This species needs interior forested areas for breeding, and areas such as Bucknell Preserve provide good habitat. Pennsylvania as a state contains 17% of all global breeding Scarlet Tanagers, so the respo

LIBERTY TOWNSHIP

Site Name	Special Species / Community Type	PNHP Global	Ranks* State	State Status	Last Seen	Quality**
	Cattail Sedge (Carex typhina)	G5	S2	PE	8/10/2004	ВС
Mexico Road Marsh/Bucknell Preserve	Sora (Porzana carolina)	G5	S3B	CR	6/08/2004	E
Tieserve	Marsh Wren (Cistothorus palustris)	G5	S2S3B	CR	6/08/2004	Е
	Animal species of concern	G5	S3S4	N	7/29/2004	Е

Liberty Township is located on the western edge of the county bordering Northumberland County. This township is mainly agricultural to the north, but with an important complex of marsh/forested wetland at Mexico Road Marsh/BucknellPreserve. Bucknell Preserve is an important natural area for Montour County due to the relatively high biodiversity that occurs there. This area is a calcareous forested area and contains many species uncommon in Montour County. Mexico Road Marsh also contains two rare marsh-dependent bird species, Sora and Marsh Wren. Marsh habitat is decreasing in Pennsylvania, and the conservation of all marshes is important to providing critical habitat for these and other wetland dependant bird species. This township also contains a portion of the Chillisquaque Creek, which is an important natural area for this county as it is the county's main tributary to the Susquehanna River. Several studies and inventories have been conducted in Chillisquaque Creek, and several mussel species dependent on good water quality have been documented in this creek. This creek and Beaver Run would benefit from streamside buffer restoration where a forested buffer is lacking. Planting native trees along Chillisquaque Creek and Beaver Run would decrease the amount of non-point source pollution entering the stream, and subsequently, improve water quality.

Locally Significant: None

Managed Lands: State Game Lands #115

<u>Landscape Corridors</u>: **Montour Ridge Landscape Corridor Derry Landscape Corridor**

Other: Chillisquaque Creek

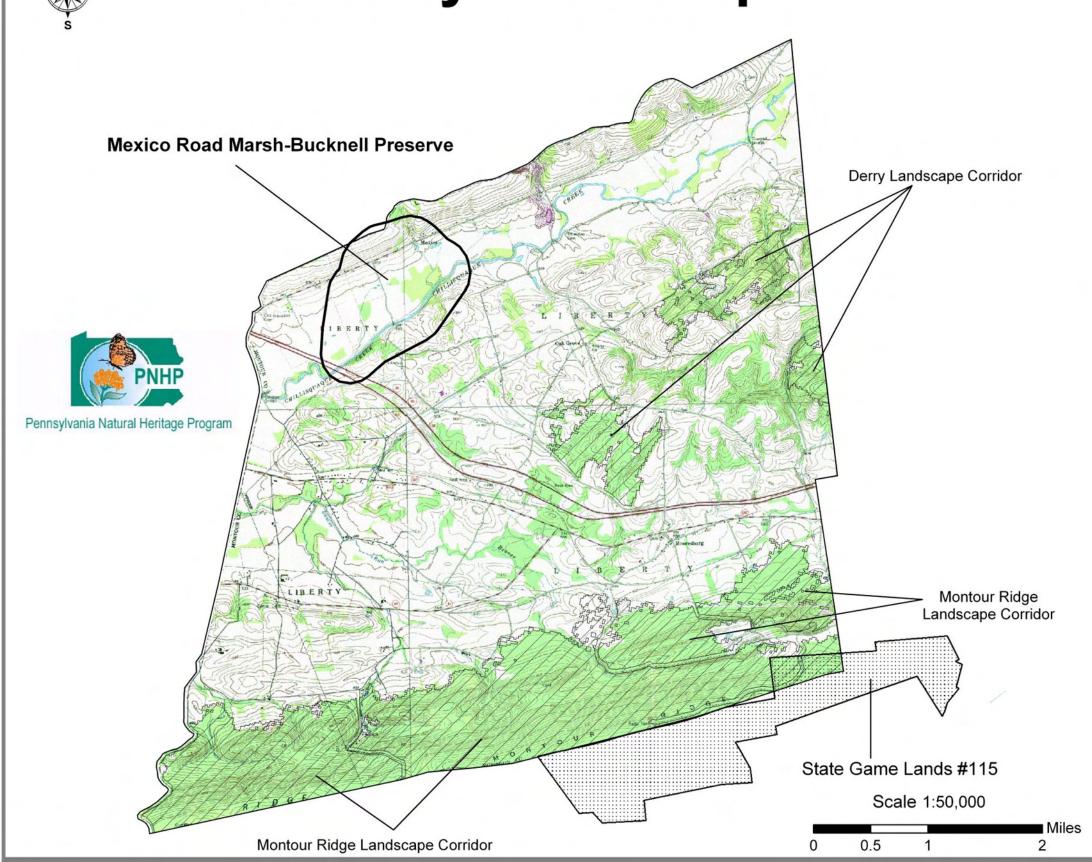
Insert Liberty Township Map

^{*} Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.

W E

Liberty Township



Liberty Township

Montour County Natural Areas Inventory

Natural Areas:

Mexico Road Marsh-Bucknell Preserve

Managed Areas:

State Game Lands #115

Landscape Corridor:

Derry Landscape Corridor Montour Ridge Landscape Corridor



Legend					
Natural Area or Locally Significant Site	l				
Landscape Corridor					
Managed Area	l				

LIBERTY TOWNSHIP

MEXICO ROAD MARSH/BUCKNELL PRESERVE (Liberty and Limestone Townships)

This site, also known as "Tobias Marsh", contains two bird species of concern, an aquatic animal species of concern and a plant species of concern. During a survey of this marsh along Mexico Road, a territorial singing Marsh Wren (Cistothorus palustris), a G5, S2S3 animal species of concern, was seen during the safe dates of breeding for this species. In addition, calling Soras (Porzana carolina), a G5, S3B animal species of concern, were also heard during this survey during the safe breeding dates of this species. A third species, Virginia Rail (Rallus limicola), a G5 S3B animal species of concern, has been documented at this site in the past during surveys in 1980 and 1984, but was not located during this survey. It is probable that this species is still breeding here, but due to the extremely secretive nature of rails, the species was not found. In addition, a G5 S3S4 aquatic animal species of concern was found at this site. This species prefers slow aquatic environments with emergent vegetation. This site also contains a fair to good quality population of cat-tail sedge (Carex typhina), a G5 S2 Pennsylvania plant species of concern. This species was found in a deciduous bottomland forest along Chillisquaque Creek. This area also has several intermittent and permanent pools and channels, and slightly higher areas have more of a mesic forest.

Threats and Disturbances

A portion of this area is privately owned and development is a threat to this marsh. Also, the spread of reed canary-grass is evident and could threaten the integrity of the marsh, which would make unfavorable conditions for birds such as Soras and Marsh Wrens. Disturbances to the hydrology of the site would likely detrimentally impact this habitat. Exotic plant species are a potential threat to the Bucknell Preserve where the rare sedge occurs. This area contains many exotic plant species such as garlic mustard and Japanese barberry. These species could threaten the ecological integrity of the site.

Conservation Recommendations

It is recommended that this area be surveyed further in subsequent years of the 2nd Breeding Bird Atlas to determine if Soras and Marsh Wrens are continuing to use the site for breeding. It would be also be advantageous to confirm breeding at this site. Continued monitoring of this site for vegetation changes and hydrology changes is also recommended. Already, reed canarygrass has spread in parts of this marsh, and the continued spread would make unfavorable conditions for all marsh bird species. More surveys are needed to determine whether other marsh bird species use this area.

Freshwater marshes are one of the most endangered wetland types in the state and every effort should be taken to facilitate a conservation strategy to help preserve the last remaining ones. Soras will benefit from policies and management that eliminate or minimize effects of wetland draining and filling, of siltation, eutrophication, and other forms of pollution, and of invasion by invasive plants (Melvin and Gibbs, 1996).

Wetland habitat management to benefit Soras and other marsh birds should encourage diverse stands of both fine-leaved and robust emergent plant species, including sedges, bulrushes, and especially cattails, as well as moist-soil annuals around the edges of the wetlands. In addition, management should maximize the interspersion of emergent vegetation and open water areas,

due to the fact that Soras seem most abundant near edges of cover types such as at the edge of vegetation and open water.

More marsh bird surveys should be conducted during the breeding season to determine the population of Soras and other marsh birds that use this wetland. Forested buffers should be secured in order to protect the ecological integrity of the wetland and the hydrology. Invasive plant surveys should be conducted as well.

For the Bucknell site, this area is protected and owned by Bucknell University where many research projects have been undertaken. This area should be monitored for the spread of exotic plant species and if necessary, actions should be taken for biological control of these invasive plants. Additional surveys for species of concern in these areas are encouraged.

Site dominant species list:

Trees						
red maple	Acer rubrum		black cherry	Prunus serotina		
sugar maple	Acer saccharum		swamp white oak	Quercus bicolor		
shellbark hickory	Carex laciniosa		pin oak	Quercus palustris		
musclewood	Carpinus caroliniana		red oak	Quercus rubra		
American beech	Fagus grandifolia		American basswood	Tilia americana		
white ash	Fraxinus americana		American elm	Ulmus americana		
green ash	Fraxinus pennsylvanica					
Shrubs						
smooth alder	Alnus serrulata		spicebush	Lindera benzoin		
Japanese barberry	Berberis thumbergii		swamp rose	Rosa palustris		
buttonbush	Cephalanthus occidentalis		American elderberry	Sambucus canadensis		
gray dogwood	Cornus racemosa		black haw	Viburnum prunifolium		
	F	ler	bs			
southern agrimony	Agrimonia parviflora		wood geranium	Geranium maculatum		
green-dragon	Arisaema dracontium		moneywort	Lysimachia nummularia		
sedge	Carex gracillima		sensitive fern	Onoclea sensibilis		
sedge	Carex granularis		reed canary-grass	Phalaris arundinacea		
sedge	Carex lupulina		solomon's seal	Polygonatum pubescens		
sedge	Carex rosea		pickerel-weed	Pontederia cordata		
sedge	Carex scoparia		bloodroot	Sanguinaria canadensis		
sedge	Carex stipata var. maxima		black bulrush	Scirpus atrovirens		
sedge	Carex vulpinoidea		water-parsnip	Sium suave		
blue cohosh	Caulophyllum thalictroides		meadowsweet	Spiraea alba		
wood reedgrass	Cinna arundinacea		skunk-cabbage	Symplocarpus foetidus		
bedstraw	Galium aparine		common cat-tail	Typha latifolia		
marsh bedstraw	Galium obtusum		false hellebore	Veratrum viride		
sweet-scented bedstraw	Galium triflorum		northern arrow-wood	Viburnum recognitum		
	I	Bire	ds			
Indigo Bunting	Passerina cyanea		American Redstart	Setophaga ruticilla		
Gray Catbird	Dumetella carolinensis		Eastern Wood-Pewee	Contopus virens		
Swamp Sparrow	Melospiza georgiana		Pileated Woodpecker	Dryocopus pileatus		
Wood Thrush	Hylocichla mustelina		Carolina Wren	Thryothorus ludovicianus		
Scarlet Tanager	Piranga olivaceus		Red-bellied Woodpecker	Melanerpes carolinus		
Common Grackle	Quiscalus quiscula		Common Yellowthroat	Geothlypis trichas		
Baltimore Oriole	Icterus galbula					

Derry Landscape Corridor

This natural corridor begins in Columbia County and continues west through West Hemlock Township. This corridor is much narrower and much more fragmented than Muncy Hills landscape corridor. However, the area is fairly uninterrupted as it heads west towards Derry Township and into Valley Township. The natural corridor is severely interrupted at Route 54, but enough forested areas occur on the west side of Route 54 for the natural corridor to continue. However, the natural corridor becomes very fragmented and is lost before the village of Oak Grove. A large block of forest south of Oak Grove is completely interrupted before Interstate 80. This corridor, which begins in Columbia County, is not as extensive in area or length as the Muncy Hills Corridor. Opportunities do exist to reconnect interrupted areas of this corridor by replanting trees where forested areas are fragmented and by installing wildlife corridors below major roads that connect forested corridor areas. In addition, agricultural lands may also serve as wildlife corridors, connecting forested areas and streams. The County Conservation District can be very helpful in providing recommendations and potential funding to enhance wildlife corridors on agricultural and other rural lands.

Montour Ridge Landscape Corridor

This landscape corridor begins in Hemlock Township in Columbia County just west of Bloomsburg and continues with some interruption to West Hemlock and Cooper Townships in Montour County. This corridor almost disappears around the village of Kaseville in Valley Township. A few opportunities exist to construct wildlife corridors underneath rural roads to connect the existing corridor to the Geisinger Trails Natural Area (a locally significant site) in Mahoning Township. This site is a large forested area and continues the landscape corridor all the way west to Route 54 just north of the Borough of Danville. Route 54 is a major interruption to this forested/landscape corridor. However, on the west side of Route 54 is the start of a large contiguous forested area including the natural areas of Mahoning Creek Floodplain & Slopes and **Bald Top.** One challenge is somehow to link the forested areas east of Route 54 with the forested areas west of 54. Constructing wildlife corridors underneath Route 54 to a partly forested area would allow some wildlife to cross the barrier of Route 54 and nearby development. The forested corridor continues across the natural area of Bald Top and becomes less fragmented until it crosses Montour Ridge in Liberty Township. Montour Ridge is still fairly forested, but development along the ridge has severely fragmented this forest block. This easily broken portion of the forested corridor continues past areas of development and becomes much less fragmented on the western side of Montour Ridge, State Game Lands #115 and eventually, Northumberland County. Overall, this forested corridor is large and extensive, with definite wildlife connections through the landscape. The challenge will be finding ways to overcome the large barriers of Route 54 and nearby development in order to make wildlife-friendly passageways.

LIMESTONE TOWNSHIP

Site Name	Special Species / Community Type	PNHP Global	Ranks* State	State Status	Last Seen	Quality**
Mexico Road Marsh/Bucknell	Cattail Sedge (Carex typhina)	G5	S2	PE	8/10/2004	ВС
	Sora (Porzana carolina)	G5	S3B	CR	6/08/2004	Е
Preserve	Marsh Wren (Cistothorus palustris)	G5	S2S3B	CR	6/08/2004	Е
	Animal species of concern	G5	S3S4	N	7/29/2004	Е

Limestone Township is located in the northwest portion of the county and is adjacent to Northumberland County to the west and Anthony and Derry Townships to the west. The majority of this township is agricultural, and only a very small portion of the **Mexico Road Marsh/Bucknell Preserve** is present in this township. Portions of Limestone Ridge were also surveyed and found to contain a large amount of exotic plant species, some of which were abundant. However, some areas of Limestone Ridge warrant further investigation, and some trees in this area were quite large. The potential for rare limestone dependent plants is still possible within this area. Finally, creeks such as **Limestone Run**, **Beaver Run**, and **County Line Run** would benefit from the planting of native trees to buffer the creeks. Buffering these creeks would improve water quality and provide corridors for wildlife in this township. Programs such as **CREP** (**Conservation Reserve Enhancement Program**) can assist landowners with restoration of creeks.

Locally Significant: None

Managed Lands: None

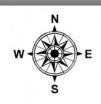
Landscape Corridors: None

MEXICO ROAD MARSH/BUCKNELL PRESERVE (Liberty and Limestone Townships)
Only a small portion of this site occurs in Limestone Township. See Liberty Township for a complete description of this site.

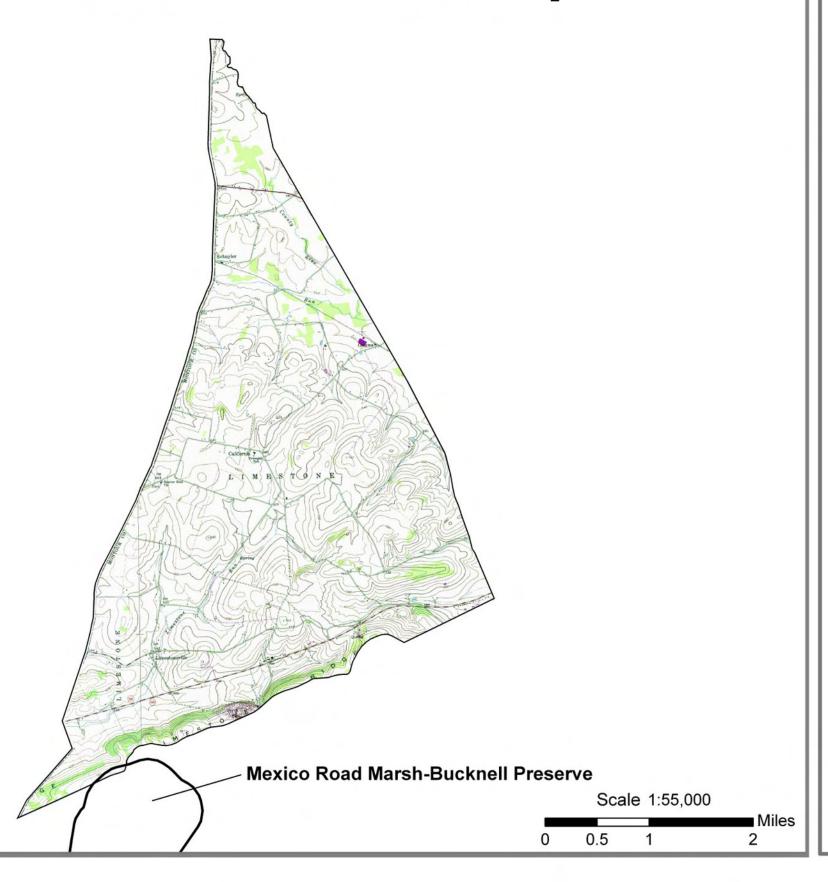
Insert Limestone Township Map

^{*} Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



Limestone Township



Limestone Township

Montour County Natural Areas Inventory

Natural Areas:

Mexico Road Marsh-Bucknell Preserve





Natural Area or Locally Significant Site

Landscape Corridor



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 competitors, 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)

Forest Interior Birds

Various Warblers, Vireos, Thrushes, Tanagers, Flycatchers, etc.

Pennsylvania Animal fact sheets

Introduction

Neo-tropical migrant landbirds are birds that breed in temperate North America and spend the non-breeding season mainly in South and Central America, the Caribbean Islands, and extreme southern United States. There has been concern over long-term declines of neo-tropical migratory birds since the 1960's. Determining the main causes of the decline is difficult due to the fact that these birds occupy critical habitats over the entire western hemisphere. Loss of suitable breeding habitat, wintering habitat and stopover habitat, and pesticides are the most frequently known causes of the declines. Neo-tropical migrant landbirds will breed in a variety of different habitats, from early successional old-field settings to forested wetlands to open wetlands to large forest interior. The purpose of this fact sheet is to understand more about forest interior bird species and why conserving large amounts of land is crucial for their continued success.

Forest Interior

Forest interior is defined as unbroken forest at least 200-300 feet from habitat edges and usually is related to size of a patch of forests (large patch size, more forest interior). Forest interior migrant landbirds usually avoid forest edges during nesting and are adapted to forested interior conditions. Consequently, these birds will usually avoid nesting in smaller fragmented landscapes. Studies in the Midwestern United States have documented that forest interior species may not successfully breed in small patches of otherwise suitable habitat. As the threat of suburban development continues to decrease the size of woodlots, forest interior species may have trouble finding enough suitable habitat.

Forest Interior Bird Species in Pennsylvania

Many forest interior bird species occur in Pennsylvania, where large contiguous and diverse forests and wetlands still occur. These species have different types of habitat requirements but all prefer large, contiguous forests with little fragmentation. Several species of commonly occurring forest birds in Pennsylvania are high priorities in the multi-agency PIF (Partners in Flight) program launched to identify declining populations if migratory birds and address the conservation and management needs of species before they become threatened or endangered. Forest-interior bird species on the PIF list occurring in Pennsylvania include Kentucky Warbler (Oporornis formosus), Worm-eating Warbler (Helmitherus vermivorus), Wood Thrush (Hylocichla mustelina), Canada Warbler (Wilsonia canadensis), Cerulean Warbler (Dendroica caerulea), and Prothonotary Warbler (Protonotaria citrea). Other forest interior songbirds occurring relatively commonly in Pennsylvania include Scarlet Tanager (Piranga olivacea), Blue-headed Vireo (Vireo solitarius), Ovenbird (Seiurus aurocapilla), Acadian Flycatcher (Empidonax virescens), Hooded Warbler (Wilsonia citrina), Black-throated Blue Warbler (Dendroica caerulescens), Black-throated Green Warbler (Dendroica virens), and Louisiana Waterthrush (Seiurus motacilla). Several species, such as Louisiana Waterthrush, Cerulean Warbler, Worm-eating Warbler, Canada Warbler, and Black-throated Blue Warbler, are priority species in PIF



Acadian Flycatcher photo: Ron Austing



Scarlet Tanager photo: Ron Austing



Louisiana Waterthrush photo: Ron Austing



Hooded Warbler photo: Ron Austing

conservation plans for the Allegheny Plateau and/or Northern Ridge and Valley physiographic areas. Rare birds that are state-listed/candidates that rely on forest interior include Prothonotary Warbler, Yellow-bellied Flycatcher (*Empidonax flavescens*), Northern Goshawk (*Accipiter gentilis*), and perhaps Swainson's Thrush (*Catharus ustulatus*), who may also use forest edge and second growth conifer woodland.

Management Recommendations

Many different species of birds will require different stages of forest succession. It is important to know the forested area that management is to be conducted. For instance, it is vital to know what type of wetlands, uplands, forest cover types, and streams/rivers are on a particular piece of property. It is also important to know the size of the forested area, and if it is

contiguous with other forested areas. The larger the forest involved, and the more types of habitats within the forested areas, the more management can be conducted. Forest interior birds require large amounts of forested areas, and typically avoid edges of forests. Many forest interior birds, however, require different microhabitat conditions. A mosaic of structural diversity throughout the forest is ideal along with creating openings that do not create edge effects. Edges are often associated with higher amounts of nest predation and brood parasitism, fewer food resources for some species, warmer air and soil temperatures, drier conditions, and more wind than interior forest. Some birds forage or nest only in small saplings or shrubs, whereas other birds spend most of their time high in the forest canopy. It is possible to create more foraging and nesting opportunities for birds by retaining trees, saplings and shrubs in a variety of class sizes that result in providing more vertical layers of forest. Specifically, the following recommendations can increase chances of attracting forest interior birds to a particular forested area.

- 1) Enhance vertical structure within the forest stand
- 2) Keep forest buffers along streams
- 3) Do not harvest all trees
- 4) Retain decaying and standing dead trees (snags)
- 5) Create irregular edges when harvesting stands
- 6) Leave large patches of forest close to other forest patches
- 7) Maximize the forest interior area of unharvested stands
- 8) Keep your cats inside
- 9) Allow hunting to reduce White-tailed Deer population

Keeping Common Birds Common

Projects such as Partners in Flight and Cornell's "A Land Manager's Guide to Improving Habitat for Scarlet Tanagers and other forest interior Birds" focus efforts on reversing the population decline of Neo-tropical migrant landbirds. Many of these species mentioned above are still relatively common throughout their breeding range. However, if declines continue throughout the species breeding range, these birds could become rare in the future. The goal of these programs is to keep common bird species common by identifying concentrations, population goals, and active management of vulnerable target species of conservation concern. In addition to critical breeding habitat, PIF is identifying critical migratory habitat in the ridges and valleys of Pennsylvania. Forest interior bird species are, as a whole, a good indicator of habitat quality and forest health. A healthy forest will contain good populations of forest songbirds, healthy insect populations, and a good forest structure.

References:

Rodewald, A. D. 2001. Ohio State University Extension Fact Sheet. Managing for Forest Songbirds. http://ohioline.osu.edu/w-fact/0006.html

Austen, M. J. W., C. M. Francis, D. M. Burke, and M. S. W. Bradstreet. 2001. Landscape Context and Fragmentation- Effects on Forest Birds in Southern Ontario. The Condor: Vol. 103, No. 4, pp. 701-714.

Brand, L. A. and T. L. George. 2001. Response of passerine birds to forest edge in coast redwood forest fragments Lewis, J. P., S. A. Miller, J. R. Robb, and T. Vanesdol-Lewis. 1998 Annual Report. Productivity of Interior Forest and Grassland Birds on Jefferson Proving Ground. US Fish and Wildlife Service.

Gough, G.A., Sauer, J.R., Iliff, M. *Patuxent Bird Identification Infocenter*. 1998. Version 97.1. Patuxent Wildlife Research Center, Laurel, MD. http://www.mbr-pwrc.usgs.gov/Infocenter/infocenter.html

Hoover, J. P., M. C. Brittingham, and L. J. Goodrich. 1995. Effects of forest patch size on nesting success of Wood Thrushes. Auk 112: 146-155.

Rosenberg, K.V., R.W. Rohrbaugh, Jr., S.E. Barker, J.D. Lowe, R.S. Hames, and A.A. Dhondt. 1999. A Land Manager's Guide to Improving Habitat for Scarlet Tanagers and other Forest-Interior Birds. Cornell Lab of Ornithology.

Pashley, D.N., C.J. Beardmore, J.A. Fitzgerald, R.P. Ford, W.C. Hunter, M.S. Morrison, and K.V. Rosenberg. 2000. Partners in Flight: Conservation of the landbirds of the United States. American Bird Conservancy, The Plains, VA.

Carter, M.E., W.C. Hunter, D.N. Pashley, and K.V. Rosenberg. 2000. Setting Conservation Priorities for landbirds in the United States: The Partners in Flight Approach. The Auk 117 (2): pgs 541-548





MAHONING TOWNSHIP AND DANVILLE BOROUGH

Site Name	Special Species / Community Type	PNHP Global	Ranks* State	State Status	Last Seen	Quality**
Danville Floodplain	Silver Maple Floodplain Natural Community		S3	N	2004	Е
	Animal species of concern	G4	S2B	PE	8/11/04	Е
Susquehanna River in Montour County	Animal species of concern	G3G4	S3S4	N	9/28/95	Е
	Animal species of concern	G3	S2	N	9/28/95	Е

Mahoning Township, including Danville Borough is the main metropolitan center of the county and is located in the south central portion. The Susquehanna River shaped this township and remains a very important area for biodiversity. Steps could be taken to improve water quality and provide some forested buffers along the river.

This township is also rich in locally significant areas that contain large forested areas representing good areas for biodiversity in the county. Areas such as **Mahoning Creek Floodplain and Slopes** provide recreational and important contiguous forested habitats. **Bald Top** is an extensive ridge of forested areas with a few fragmented portions. **Geisinger Recreational Trails** is a large forested area that has several good populations of uncommon plant species, and is part of the **Montour Ridge Landscape Corridor**, which extends intermittently from east to west through this township. **Sechler Run** is a nice natural area within the heart of the Borough of Danville. This creek would benefit from restoration such as planting additional trees to buffer the stream from non-point pollution. Several other locally significant areas also occur in the township that contribute to the biodiversity of the county. Any other small streams in this township would also benefit from restoration.

Locally Significant: Mahoning Creek Floodplain and Slopes

Bald Top/Montour Ridge Geisinger Recreational Trails

Sechler Run

Toby Run Ravines

Susquehanna River Shale Cliffs

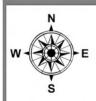
Managed Lands: None

Landscape Corridors: Montour Ridge Landscape Corridor

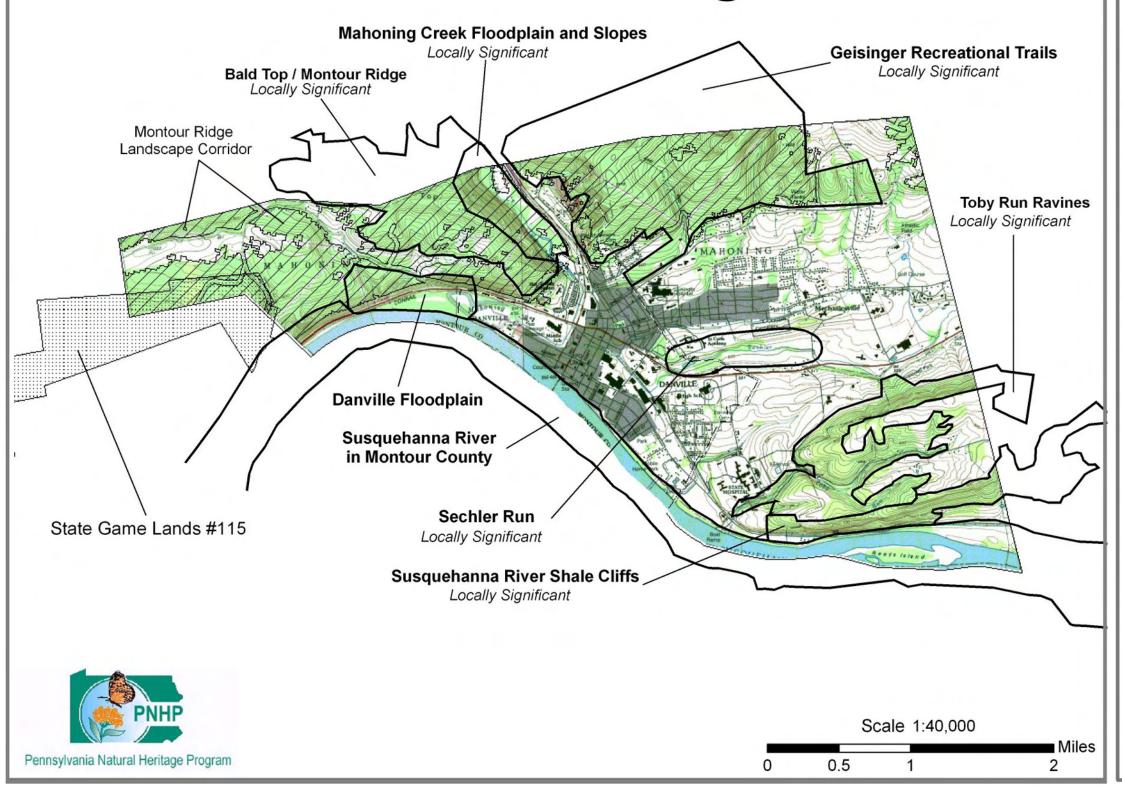
Insert Mahoning Township Map

^{*} Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



Mahoning Township Danville Borough



Mahoning Township Danville Borough

Montour County Natural Areas Inventory

Natural Areas:

Danville Floodplain Susquehanna River in Montour County

Locally Significant Sites:

Bald Top / Montour Ridge Geisinger Recreational Trails Mahoning Creek Floodplain and Slopes Sechler Run Susquehanna River Shale Cliffs Toby Run Ravines

Managed Areas:

State Game Lands #115

Landscape Corridor:

Montour Ridge Landscape Corridor



Legend
Natural Area or Locally Significant Site
Landscape Corridor
L ^I Borough Boundary
Managed Area

MAHONING TOWNSHIP AND DANVILLE BOROUGH

Bald Top/Montour Ridge (Valley and Mahoning Townships)

This **Locally Significant** site is a large forested block that contains hemlock slopes and ravines, and an extensive dry-oak heath forest. This area is locally significant due to the fact that it is one of the largest forested blocks in Montour County and because of the variety of habitats that occur here.

Threats and Disturbances

The main threats to this site include infestation of hemlock woolly adelgid aphid that seriously threatens the hemlocks on the slope. This site is fragmented by roads and residential development. Invasive plants are also a threat to some of the areas. Encroaching development is a long-term threat and disturbance to the overall area.

Conservation Recommendations

It is recommended that more plant and animal surveys be conducted in this area for a more complete and thorough inventory.

DANVILLE FLOODPLAIN (Mahoning Township, Danville Borough) A "Silver Maple Floodplain Natural Community" is located along the Susquehanna River in Danville. Though this community is considered poor quality, it remains an important component along the Susquehanna River floodplain. The canopy is almost completely composed of silver maple, some of which are older, large trees. The herbaceous layer at this location is dominated by introduced species of plants. Floodplains provide important riparian buffers for the river and help to reduce runoff into the river, limit flooding and provide important habitat for plants and animals. Many birds use riparian forests for breeding and during migration, such as flycatchers, warblers and woodpeckers. Frogs and toads may also use small pools left after flooding and rain for breeding habitat. Some plants found in these habitats, including silver maple and river birch depend on the disturbance from flooding to provide optimal habitat conditions. Overall, riparian forests are very important for a variety of reasons. These communities are also currently threatened by development and invasive species.

	Trees					
silver maple	Acer saccharinum					
		Shrı	ubs			
spicebush	Lindera benzoin		multiflora rose	Rosa multiflora		
	·	Her	·bs			
garlic mustard	Alliaria officinalis		jewelweed	Impatiens spp.		
cow parsley	Anthriscus sylvestris		Japanese stiltgrass	Microstegium vimineum		
Jack-in-the-pulpit	Arisaema triphyllum		Virginia creeper	Parthenocissus quinquefolia		
horsetail	Equisetum spp.		Japanese knotweed	Polygonum cuspidatum		
trout lily	Erythronium sp.		spotted lady's thumb	Polygonum persicaria		
bedstraw	Galium spp.		smartweed	Polygonum spp.		
white avens	Geum canadense		skunk cabbage	Symplocarpus foetidus		
ground-ivy	Glechoma hederacea		poison ivy	Toxicodendron radicans		
waterleaf	Hydrophyllum spp.		violet	Viola spp.		

Threats and Disturbances

Disturbances at the site include natural disturbances such as flooding, as well as man-made disturbances from the nearby highway and residential development. The widening of Route 11 would threaten this community. Invasive species are a big threat to all floodplain communities. Japanese knotweed is quickly spreading throughout Pennsylvania and is found frequently along the Susquehanna River. Other non-native invasive plants that threaten this site include cow parsley,

Japanese stilt-grass, Dame's rocket and garlic mustard. Cell tower development of the upland area could increase exotic plant species invasions, and further fragment existing forests.

Conservation Recommendations

Monitor invasive species at the site and implement control measure where possible. This community is small and in close proximity to development. However, it provides important habitat and good recreational opportunities for the community. Preserving this community would be beneficial to the residents of Danville as well as the landscape of Montour County.

Geisinger Recreational Trails (Mahoning Township, Valley Township)

This area is a large forested block north of the Borough of Danville that contains several different natural communities, including a ridgetop "Virginia Pine-mixed hardwood forest", "Red Oak-mixed hardwood forest", and a streamside deciduous forest. The actual forest types in this area are not of conservation concern at the state level, but the size and diversity of the site warrants locally significant status. This area has a good population of pink lady's slipper (*Cypripedium acaule*), and good bird diversity, including some high quality habitat indicator species.

	Trees						
red maple	Acer rubrum	table mountain pine	Pinus pungens				
sugar maple	Acer saccharum	Virginia pine	Pinus virginiana				
serviceberry	Amelanchier spp.	chestnut oak	Quercus montana				
white ash	Fraxinus americanus	red oak	Quercus rubra				
eastern hop-hornbeam	Ostrya virginiana	American basswood	Tilia americana				
Shrubs							
black huckleberry	Gaylussacia baccata	lowbush blueberry	Vaccinium angustifolium				
spicebush	picebush Lindera benzoin						
]	Herbs	•				
white baneberry	Actaea pachypoda	Canada mayflower	Maianthemum canadense				
pink lady's slipper	Cypripedium acaule	may-apple	Podophyllum peltatum				
marginal shield fern	Dryopteris marginalis	false solomon's seal	Smilacina racemosa				
rattlesnake-plaintain	Goodyera pubescens	twisted-stalk	Streptopus roseus				
whorled loosestrife	Lysimachia quadrifolia						
		Birds					
Worm-eating Warbler	Helmitherus vermivora	Scarlet Tanager	Piranga olivaceus				
American Redstart	Setophaga motacilla	Wood Thrush	Hylocichla mustelina				
Ovenbird	Seiurus aurocapillus	Red-eyed Vireo	Vireo olivaceus				
Hooded Warbler (4)	Wilsonia citrina	Eastern Towhee	Pipilo erythrophthalmus				
Veery	Catharus fuscescens						

Threats and Disturbances

The main threats and disturbances to this site include invasive plant species such as Japanese barberry (*Berberis thumbergii*), multiflora rose (*Rosa multiflora*), and tree-of-heaven (*Ailanthus altissima*). These species could colonize the understory and threaten the ecological integrity of the area. Other disturbances include additional trail blazing, and logging from adjacent properties.

Conservation Recommendations

More plant and bird surveys are needed for this area. The area was surveyed in mid to late May, but a survey in late June may yield an even more variety of species. In addition, a later bird survey would document breeding birds rather than migrating bird species. Since this area has abundant exotic plant species, continued monitoring of the invasive plant species mentioned above should be conducted along with the possibility of some herbicide application to get rid of the most severe invasive populations.

Mahoning Creek Floodplain and Slopes (Mahoning Township)

This **locally significant area** contains an extensive floodplain area, hemlock slopes, and a deciduous streamside forest. Mahoning Creek is a well-forested area with trails and a good diversity of spring wildflowers and good overall plant diversity. Also, in this area, is a Silver Maple (*Acer saccharinum*)-River Birch (*Betula nigra*)-Silky Dogwood (*Cornus amomum*) floodplain forest, which contained abundant exotic plants. However, the area still has good plant diversity and potential for rare species. The slopes are mainly eastern hemlock (*Tsuga canadensis*), and many of these individual trees are affected with the woolly adelgid aphid (*Adelges tsugae*). However, the slopes are still intact.

Site dominant species list:

Site dominant species list.					
	Tre	ees			
sugar maple	Acer saccharum		river birch	Betula nigra	
silver maple	Acer saccharinum		American basswood	Tilia americana	
	Shr	ub	s		
smooth alder	Alnus serrulata		spicebush	Lindera benzoin	
silky dogwood	Cornus amomum		American elderberry	Sambucus canadensis	
gray dogwood	Cornus racemosa				
	He	rbs	S		
wood anenome	Anenome quinquefolia		sensitive fern	Onoclea sensibilis	
jack-in-the-pulpit	Arisaema triphyllum		bloodroot	Sanguinaria canadensis	
sedge	Carex lurida		woolgrass	Scirpus cyperinus	
spring-beauty	Claytonia virginica		golden ragwort	Senecio aureus	
two-leaved toothwort	Dentaria diphylla		skunk cabbage	Symplocarpus foetidus	
trout lily	Erythronium americanum				
	Bir	rds	;		
Scarlet Tanager	Piranga olivaceus		Gray Catbird	Dumetella carolinensis	
Black-throated Green Warbler	Dendroica virens		Black-capped Chickadee	Poecile atricapilla	
Wood Thrush	Hylocichla mustelina		Eastern Wood-Pewee	Contopus virens	
Louisiana Waterthrush	Seiurus motacilla		Belted Kingfisher	Ceryle alcyon	

Threats and Disturbances

The main threats to this area include invasive exotic plant species such as Japanese Knotweed, garlic mustard (*Alliaria petiolata*), and multiflora rose (*Rosa multiflora*). The continued spread of invasive plants could threaten the ecological integrity of the site. Other threats and disturbances include possible encroachment of development, and water quality changes and sedimentation of Mahoning Creek. Cell tower development could threaten the ecological integrity of the slopes/ridgetop above the floodplain by increasing exotic plant species and further fragmenting the forest.

Conservation Recommendations

The creek in the spring season is fairly rich in wildflower diversity and every step should be taken to conserve the natural aspect of this area. The floodplain is quite weedy, and narrow, but the site warrants noteworthy conservation value due to some potential for rare plants. The woolly adelgid aphid affects the hemlocks at this site, so even though it could be extremely costly, steps could be taken to attempt to eradicate this destructive pest before it is too late. Another recommendation should be to reforest some of the edges of the floodplain forest by planting trees. A forested buffer would help minimize invasive plant species in the core area of the floodplain.

Montour Ridge Landscape Corridor

This landscape corridor begins in Hemlock Township in Columbia County just west of Bloomsburg and continues with some interruption to West Hemlock and Cooper Townships in Montour County. This corridor almost disappears around the village of Kaseville in Valley Township. A few opportunities exist to construct wildlife corridors underneath rural roads to connect the existing corridor to the Geisinger Trails Natural Area (a locally significant site) in Mahoning Township. This site is a large forested area and continues the landscape corridor all the way west to Route 54 just north of the Borough of Danville. Route 54 is a major interruption to this forested/landscape corridor. However, on the west side of Route 54 is the start of a large contiguous forested area including the natural areas of Mahoning Creek Floodplain & Slopes and Bald Top. One challenge is somehow to link the forested areas east of Route 54 with the forested areas west of 54. Constructing wildlife corridors underneath Route 54 to a partly forested area would allow some wildlife to cross the barrier of Route 54 and nearby development. The forested corridor continues across the natural area of Bald Top and becomes less fragmented until it crosses Montour Ridge in Liberty Township. Montour Ridge is still fairly forested, but development along the ridge has severely fragmented this forest block. This easily broken portion of the forested corridor continues past areas of development and becomes much less fragmented on the western side of Montour Ridge, State Game Lands #115 and eventually, Northumberland County. Overall, this forested corridor is large and extensive, with definite wildlife connections through the landscape. The challenge will be finding ways to overcome the large barriers of Route 54 and nearby development in order to make wildlife friendly passageways.

Sechler Run (Danville Borough, Mahoning Township)

Located within the borough of Danville, the stretch of Sechler Run is a locally significant site due to the good diversity of plants and animals that live there. The area is a streamside community with pockets of shrub wetlands and mesic woods. This place is interesting due to the fact that it is situated within the Borough of Danville, but yet still has the natural qualities of an ecologically significant area.

	T	rees	
box-elder	Acer negundo	white ash	Fraxinus americana
Norway maple	Acer platanoides	tulip poplar	Liriodendron tulipifera
silver maple	Acer saccharinum	black gum	Nyssa sylvatica
sugar maple	Acer saccharum	Norway spruce	Picea abies
black birch	Betula lenta	black cherry	Prunus serotina
shagbark hickory	Carya ovata	eastern hemlock	Tsuga canadensis
American beech	Fagus grandifolia	red elm	Ulmus rubra
	St	nrubs	•
Japanese barberry	Berberis thunbergii	multiflora rose	Rosa multiflora
witch-hazel	Hamamelis virginiana	common blackberry	Rubus alleghaniensis
staghorn sumac	Rhus typhina		
	H	lerbs	•
garlic mustard	Alliaria petiolata	Virginia creeper	Parthenocissus quinquefolia
wild sarsaparilla	Aralia nudicaulis	may-apple	Podophyllum peltatum
toothwort	Cardamine spp.	solomon's seal	Polygonatum biflorum
gray dogwood	Cornus racemosa	Christmas fern	Polystichum acrostichoides
trout lily	Erythronium americanum	false solomon's seal	Smilacina racemosa
liverleaf	Hepatica robilis	skunk cabbage	Symplocarpus foetidus
orange jewelweed	Impatiens capensis	common cat-tail	Typha latifolia
Canada mayflower	Maianthemum canadense		
	В	Birds	
American Goldfinch	Cardeulis tristis	Eastern Phoebe	Sayornis phoebe
Red-winged Blackbird	Agelaius phoeniceus	Song Sparrow	Melospiza melodia
Northern Flicker	Colaptes auratus	Gray Catbird	Dumetella carolinensis
Broad-winged Hawk	Buteo platypterus	House Wren	Troglodytes aedon

Threats and Disturbances

The main threat to this area is the spread of invasive plant species such as multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thumbergii*), garlic mustard (*Alliaria petiolata*), and Japanese knotweed (*Polygonum cuspidatum*). These species have infiltrated the understory in many locations at this site, and the continued spread could threaten the ecological integrity. The site is already extremely fragmented by roads and development.

Conservation Recommendations

This area is locally significant due to the site's proximity within the Borough of Danville. It is recommended that a more thorough survey be conducted to determine the best remaining locations within this site. The majority of Sechler Run is disturbed throughout, but still represents a diverse area for being so urban. Keeping the area more natural will increase the biodiversity, and the possibility of using herbicides to control the invasive plants could be considered too.

SUSQUEHANNA RIVER IN MONTOUR COUNTY (Cooper, Mayberry, and Mahoning Townships, Danville Borough, and Columbia & Northumberland Counties).

The **Susquehanna River** is one of Pennsylvania's greatest resources. The protection of this water source is critical to the survival of the many aquatic and terrestrial species that depend on this river system. Freshwater mussels have the highest current and future rate of extinction of any animal group in North America (Stein and Flack 1997). Some populations are found almost entirely within the Susquehanna River drainage. The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species. Protecting the quality of the Susquehanna River in Montour County is a top priority.

This site contains unknown quality populations of **three animal species** of concern that utilize the habitat associated with the Susquehanna River. Along this stretch of river, **one species of concern, a G4 S2B animal species**, uses islands as sites for breeding and at times will forage great distances up and down the river. This species has made a dramatic comeback in Pennsylvania and continues to increase in population. **Two globally vulnerable aquatic animal species of concern** were also documented in the Susquehanna River in Montour County.

Threats and Disturbances

There are numerous examples of disturbances along the Susquehanna River. Two of these animal species of concern are especially affected by numerous non-point sources of pollution including sedimentation from cultivated and developed land along the river, runoff from roadways, pesticide runoff from agricultural fields, discharge of chemical pollutants, and thermal pollution. The main threat to these animals is reduction of water quality. The banks, floodplains, and islands of the river are in areas infested with the invasive introduced plant species, Japanese knotweed and purple loosestrife. Control of established populations of these species is very difficult, so eradication of pioneer populations is the best way to control the spread of these species of plants. The **G4 S2B animal species of concern** in this area is extremely sensitive to human disturbance during the breeding season.

Conservation Recommendations

Any of the above types of disturbances should be minimized wherever possible. Also, monitoring of these populations of animal species of concern should continue into the future. Loss of individuals and reductions in population sizes should lead to an investigation into possible causes. Water quality should be monitored and pollution sources should be identified where possible. Forested buffers should be maintained and created where absent along the length of the river with logging operations refraining from cutting within 100 feet of the river edge. River bank forests help buffer the

watershed from the effects of non-point sources of pollution including runoff from agricultural, residential, and roadway settings. In addition, the river floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Maintaining an intact, forested floodplain along the river can preserve much of the area's important biodiversity. The effectiveness of the forested riverbanks as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses, businesses and additional roadways along the river. Local planning should discourage construction of new structures and roadways along the river, adjacent slopes and floodplain.

Susquehanna River Shale Cliffs (Mahoning Township, Cooper Township)

Rocky, shale cliffs are the key feature for this site along with a fossil area near the base of the cliff. The main characteristics of this area are the open Virginia pine woodlands that have potential to contain some interesting shale cliff plant species. A good variety of plants occur here and the cliffs are fairly extensive from west to east.

Threats and Disturbances

This site is adjacent to a road and exotic plant species are already a nuisance to the site. The continued spread of exotic plant species is a threat to the ecological integrity of the site. No other threats and disturbances were noted at this site.

Conservation Recommendations

This area is significant due to the potential for having interesting shale cliff plant species. However, as more invasive plant species colonize the site, the less chance one will find uncommon plants. It is recommended that an invasive plant management plan be written to protect the area from further ecological invasions. Future surveys for species of concern in this area are recommended.

		Tre	ees	
Norway maple	Acer platanoides		American beech	Fagus grandifolia
red maple	Acer rubrum		Virginia pine	Pinus virginiana
sugar maple	Acer saccharum		black cherry	Prunus serotina
serviceberry	Amelanchier spp.		chestnut oak	Quercus montana
black birch	Betula lenta		red oak	Quercus rubra
pignut hickory	Carya glabra		black oak	Quercus velutina
mockernut hickory	Carya tomentosa		sassafras	Sassafras albidum
hackberry	Celtis occidentalis		eastern hemlock	Tsuga canadensis
flowering dogwood	Cornus florida			
		Shrı	ıbs	
witch-hazel	Hamamelis virginiana			
		Her	bs	
garlic mustard	Alliaria petiolata		pennyroyal	Hedeoma pulegioides
wild columbine	Aquilegia canadensis		alum-root	Heuchera americana
maidenhair spleenwort	Asplenium trichomanes		Japanese honeysuckle	Lonicera japonica
white wood-aster	Aster divaricatus		Indian pipe	Monotropa uniflora
Sedge	Carex swanii		Virginia creeper	Parthenocissus quinquefolia
spotted wintergreen	Chimaphila maculata		Christmas fern	Polystichum acrostichoides
horseweed	Conyza canadensis		early saxifrage	Saxifraga virginiensis
common dittany	Cunila origanoides		blue-stem goldenrod	Solidago caesia
bladder fern	Cystopteris tenuis		clasping aster	Symphyotrichum patens
			poison-ivy	Toxicodendron radicans

Toby Run Ravine (Mahoning Township, Cooper Township)

This locally significant site is primarily on the Danville State Hospital grounds, and includes the narrow ravine of Toby Run. This hemlock-dominated ravine has an interesting and diverse assemblage of primarily natural vegetation. The thick hemlock-northern hardwood canopy creates a cool shaded habitat for a thick cover of ferns and typical woodland wildflower species. Large tree specimens such as hemlock, tulip poplar, sugar maple and beech frequent the slopes and bottomland of this gorge. Additional surveys of this and adjacent areas for species of concern are recommended.

Dominant plant species:

2 omnum prami speciest	Trees						
box elder	Acer negundo	white ash	Fraxinus americana				
Norway maple	Acer platanoides	Kentucky coffee-tree	Gymnocladus dioica				
red maple	Acer rubrum	tulip poplar	Liriodendron tulipifera				
sugar maple	Acer saccharum	chestnut oak	Quercus montana				
tree-of-heaven	Ailanthus altissima	American basswood	Tilia americana				
black birch	Betula lenta	eastern hemlock	Tsuga canadensis				
American beech	Fagus grandifolia	American elm	Ulmus americana				
	St	rubs					
alternate-leaved dogwood	Cornus alternifolia	wild hydrangea	Hydrangea arborescens				
silky dogwood	Cornus amomum	spicebush	Lindera benzoin				
autumn olive	Elaeagnus umbellata	multiflora rose	Rosa multiflora				
witch- hazel	Hamamelis virginiana	American elderberry	Sambucus canadensis				
	H	lerbs	•				
garlic mustard	Alliaria petiolata	dame's rocket	Hesperis matronalis				
jack-in-the-pulpit	Arisaema triphyllum	jewelweed	Impatiens sp.				
wild ginger	Asarum canadensis	Indian cucumber-root	Medeola virginiana				
northern lady fern	Athyrium felix-femina	partridge-berry	Mitchella repens				
false nettle	Boehmeria cylindrica	sensitive fern	Onoclea sensibilis				
turtlehead	Chelone glabra	may-apple	Podophyllum peltatum				
common wood fern	Dryopteris intermedia	bird-on-the-wing	Polygala paucifolia				
trout-lily	Erythronium americanum	Christmas fern	Polystichum acrostichoides				
wood geranium	Geranium maculatum	false solomon's-seal	Smilacina racemosa				
white-avens	Geum canadense	skunk-cabbage	Symplocarpus foetidus				

Threats and Disturbances

The area has been degraded by the gradual but persistent invasion of introduced plants such as Norway maple, tree-of-heaven, autumn olive, multiflora rose and garlic mustard. A devastating introduced insect pest, the hemlock woolly adelgid, has infested the hemlocks of this forest. Left unchecked, this pest could destroy the hemlock component of the forest, which would likely dramatically alter the present habitat conditions, allowing increased sunlight, and with it, more introduced species to colonize this habitat.

Conservation Recommendations

The PA Bureau of Forestry has released a biological control for the hemlock woolly adelgid in several locations statewide. Its effectiveness at controlling this destructive insect pest in the state is, as yet, uncertain. Chemical controls for this pest are expensive and fairly impractical for large areas. There may be no viable solution to this infestation, and it may need to "run its course". Control of the invasive plants can be similarly labor or cost intensive. Aggressive removal of pioneer populations early in their colonization can be the most effective way of reducing the impact of these species on natural habitats.



Pink lady's slipper, a spectacular, though not rare wildflower, occurs occasionally in Montour County. Photo: PA Science Office of The Nature Conservancy

Sharp Ridge Oxbow





Sharp Ridge (above) divides Roaring Creek from the adjacent oxbow that was its former path to the Susquehanna River. The oxbow is now a large wetland providing excellent habitat to a high diversity of native plants and animals. Marshy habitat similar to that found at this site is the preferred nesting habitat for many wetland dependent bird species including Soras, which were documented at this location during this survey. The ragged-fringed orchid (left) is part of the diverse assemblage of wetland plant species documented at the site.

MAYBERRY TOWNSHIP

Site Name	Special Species / Community Type	PNHP Global	Ranks* State	State Status	Last Seen	Quality**
Doowing Check Director	Jeweled Shooting-star (Dodecatheon radicatum)	G?	S2	PT	5/11/2004	ВС
Roaring Creek Bluffs	Jeweled Shooting-star (Dodecatheon radicatum)	G?	S2	PT	5/11//2004	ВС
	Sora (Porzana carolina)	G5	S3B	CR	6/15/2004	Е
Sharp Ridge Oxbow	Animal species of concern	G5	S3S4	N	7/7/2004	Е
	Animal species of concern	G5	S3S4	N	7/28/2004	Е
	Animal species of concern	G4	S2B	PE	8/11/04	Е
Susquehanna River in Montour County	Animal species of concern	G3G4	S3S4	N	9/28/95	Е
	Animal species of concern	G3	S2	N	9/28/95	Е

Mayberry Township is located in the southeast part of Montour County and is bordered by Columbia County to the east and Northumberland County to the west. This township is more agricultural than forested, but several large remaining natural areas remain. **Sharp Ridge Oxbow** is the most important wetland in the county, and has a large variety of plants and animals that live there. This area should warrant immediate conservation value for Montour County. **Roaring Creek Bluffs** provide critical habitat for jeweled shooting-star. There are other possible areas within this township that should be surveyed for rare plants and animals. Portions of **Little Roaring Creek** along the border with Northumberland County are in need of forested buffer repair. Planting native trees along the creek would help decrease non-point sources of pollution and improve water quality.

Locally Significant: None

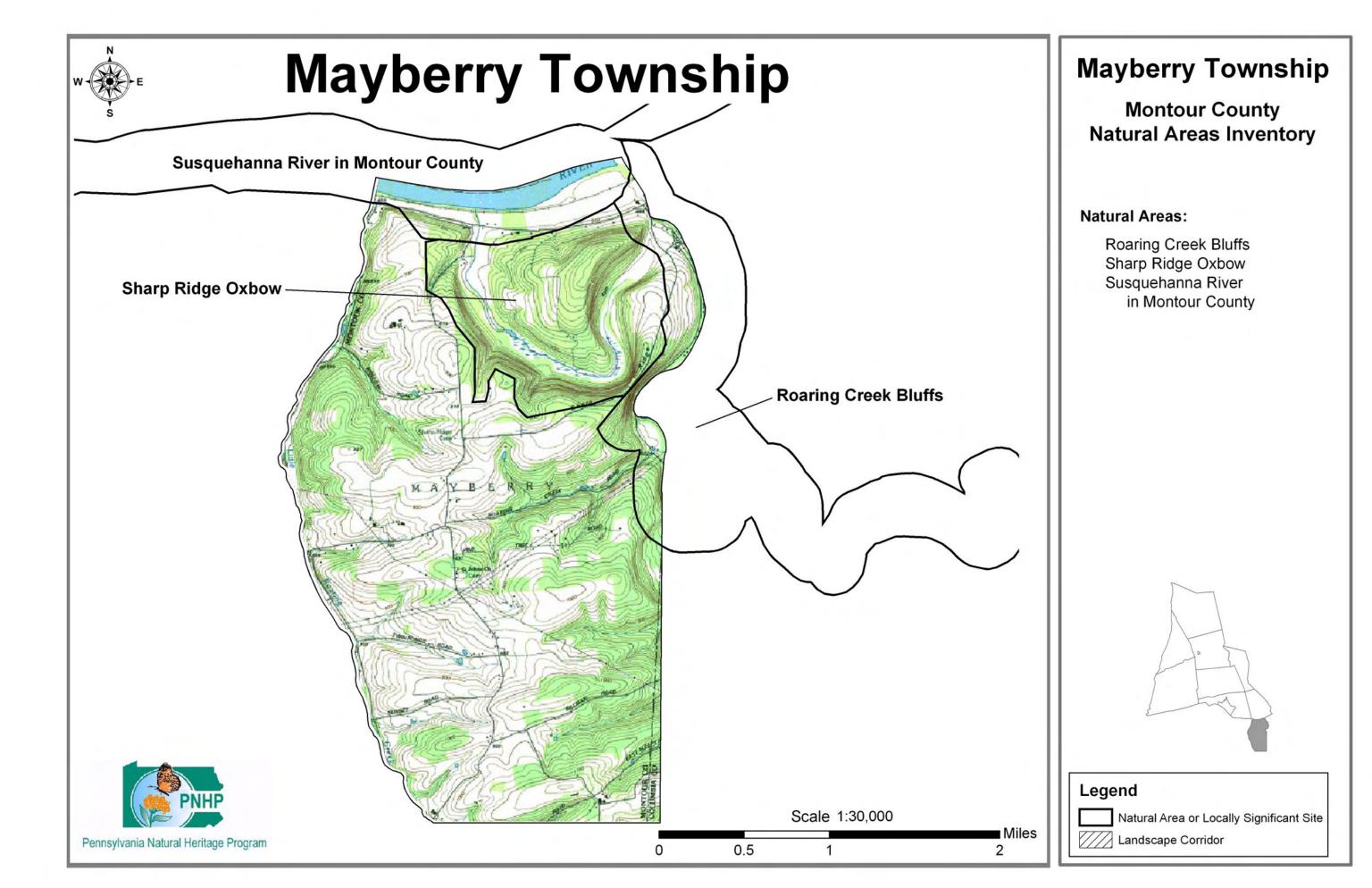
Managed Lands: None

Natural Corridor Linkages: None

Insert Mayberry Township Map

^{*}Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



MAYBERRY TOWNSHIP

ROARING CREEK BLUFFS (Mayberry Township and Columbia County)

The wet, limestone influenced ledges along Roaring Creek provide habitat for several populations of **jeweled shooting-star** (*Dodecatheon radicatum*) a G?, S2 PA-threatened plant species. There are several populations of this species within the area that is delineated on the map, and there is potential for additional populations as well.

Threats and Disturbances

An old mill and a road cause some disturbance to the site, and a few weedy species are beginning to grow. However, there are no major threats to the site and the population seems to be secure.

Conservation Recommendations

The site should be monitored to assure these plants are not replaced with non-native invasives. Weed control along the cliffs should not include the use of herbicides.

SHARP RIDGE OXBOW (Mayberry Township)

This site contains an unknown quality population of a breeding **Sora** (*Porzana carolina*), a G5, S3B animal species of concern and **two aquatic animal species of concern** that was also documented here. The Sora was found in a cattail-dominated marsh. This species was flushed in a survey within the marsh but was not seen. This species prefers shallow areas of robust or fine-leaved emergent vegetation, especially cattails, sedges, burreeds and bulrushes. Associated species with the Sora included Swamp Sparrow, Common Yellowthroat, Red-winged Blackbird, Wood Thrush, Ovenbird and Black-throated Green Warbler.

This site also contains an unknown quality population of **two different G5 S3S4 Pennsylvania animal species of concern**. These two species inhabit marshes, marsh-bordered ponds and rivers, bogs, and fens (Burne et al., 2003). Adults of these species tend to forage over fields and clearings, sometimes far from water. Behavior includes adults flying slowly in and out of emergent vegetation along the shore or in close grassy fields.

Trees							
red maple	Acer rubrum	table mountain pine	Pinus pungens				
tree-of-heaven	Ailanthus altissima	white pine	Pinus strobus				
black birch	Betula lenta	Virginia Pine	Pinus virginiana				
pignut hickory	Carya ovata	red oak	Quercus rubra				
red cedar	Juniperus virginiana	eastern hemlock	Tsuga canadensis				
black tupelo	Nyssa sylvatica						
	•	Shrubs					
striped maple	Acer pensylvanicum	swamp dewberry	Rubus hispidus				
buttonbush	Cephalanthus occidentalis	multiflora rose	Rosa multiflora				
bush-honeysuckle	Diervilla lonicera	swamp rose	Rosa palustris				
wild hydrangea	Hydrangea arborescens	highbush blueberry	Vaccinium corymbosum				
winterberry	Ilex verticillata	poison sumac	Toxicodendron vernix				
mountain holly	Nemopanthus mucronatus	northern arrow-wood	Viburnum recognitum				
		Herbs	•				
Alleghany-vine	Adlumia fungosa	path rush	Juncus tenuis				

garlic mustard	Alliaria petiolata	cutgrass	Leersia virginica
smooth alder	Alnus serrulata	spicebush	Lindera benzoin
wild columbine	Aquilegia canadensis	seedbox	Ludwigia alternifolia
maidenhair spleenwort	Asplenium trichomanes	marsh purslane	Ludwigia palustris
white wood aster	Aster divaricatus	ground-pine	Lycopodium dendroideum
false nettle	Boehmeria cylindrica	whorled loosestrife	Lysimachia quadrifolia
sedge	Carex atlantica	Canada mayflower	Maianthemum canadense
sedge	Carex crinita	stiltgrass	Microstegium vimineum
sedge	Carex debilis	winged- monkey flower	Mimulus alatus
sedge	Carex gynandra	Indian-pipe	Monotropa uniflora
sedge	Carex intumescens	sensitive fern	Onoclea sensibilis
sedge	Carex leptalea	cinnamon fern	Osmunda cinnamomea
sedge	Carex lupulina	Virginia Creeper	Parthenocissus quinquefolia
sedge	Carex lurida	ragged fringed-orchid	Platanthera lacera
sedge	Carex stipata	May-apple	Podophyllum peltatum
sedge	Carex swanii	halberd-leaved tearthumb	Polygonum arifolium
sedge	Carex vulpinoidea	arrow-leaved tearthumb	Polygonum sagittatum
enchanter's nightshade	Circaea lutetiana	rock-cap fern	Polypodium virginianum
poverty grass	Danthonia spicata	Christmas fern	Polystichum acrostichoides
southern ground-cedar	Diphasiastrum digitatum	common smartweed	Polygonum hydropiper
crested shield fern	Dryopteris cristata	great bulrush	Schoenoplectus tabernaemontani
marginal shield fern	Dryopteris marginalis	woolgrass	Scirpus cyperinus
woodland horsetail	Equisetum sylvaticum	skunk cabbage	Symplocarpus foetidus
boneset	Eupatorium perfoliatum	marsh fern	Thelypteris palustris
grass-leaved goldenrod	Euthamia graminifolia	swamp St. John's-wort	Triadenum virginicum
fowl mannagrass	Glyceria striata	common cat-tail	Typha latifolia
alum-root	Heuchera americana	blue vervain	Verbena hastata
jewelweed	Impatiens sp.	jack-in-the-pulpit	Arisaema triphyllum
soft rush	Juncus effusus		
		Animals	
Scarlet Tanager	Piranga olivaceus	Indigo Bunting	Passerina cyanea
Common Yellowthroat	Geothlypis trichas	Eastern Tufted Titmouse	Baeolophus bicolor
Ovenbird	Seiurus aurocapillus	Red-eyed Vireo	Vireo olivaceus
Prairie Warbler	Dendroica discolor	Pileated Woodpecker	Dryocopus pileatus
Field Sparrow	Spizella pusilla	Worm-eating Warbler	Helmitheros vermivorus
Swamp Sparrow	Melospiza georgiana	Eastern Wood-Pewee	Contopus virens
Song Sparrow	Melospiza melodia	Wood Thrush	Hylocichla mustelina
Blue-headed Vireo	Vireo solitarius	Black-throated Green	Dendroica virens
Eastern Pondhawk	Erythemis simplicollis	Spangled Skimmer	Libellula cyanea
Fragile Forktail	Ischnura posita	Great Blue Skimmer	Libellula vibrans
Slender Spreadwing	Lestes rectangularis	Ruby Meadowhawk	Sympetrum rubicundulum

Threats and Disturbances

Sharp Ridge is a large and extensive marsh that is largely free of invasive plant species. Threats and disturbances include hydrology changes, future invasive plants draining and possible future development.

Conservation Recommendations

Freshwater marshes are one of most endangered wetlands in the state and every effort should be taken to facilitate a conservation strategy to help preserve the last remaining ones. Sharp Ridge could be one of the best examples of a large wetland with extensive herbaceous vegetation in the area. Soras will benefit from policies and management that eliminate or minimize effects of wetland draining and filling, of siltation, eutrophication, and other forms of pollution, and of invasion by invasive plants (Melvin and Gibbs, 1996).

Wetland habitat management to benefit Soras and other marsh birds should encourage diverse stands of both fine-leaved and robust emergent vegetation, including sedges, bulrushes, and especially cattails, as well as moist-soil annuals around the edges of the wetlands. In addition, management should maximize the interspersion of emergent vegetation and open water areas, due to the fact that Soras seem most abundant near edges of cover types, for example, vegetation and open water. More marsh bird surveys should be conducted during the breeding season to determine the population of Soras and other marsh birds that use this wetland.

Forested buffers should be maintained around the wetland to protect the ecological integrity of the wetland and its hydrology. Conservation easements or other tax-deferring incentives should be employed to encourage preservation of this site in its natural condition. Conservation of this area as a natural area is strongly encouraged. Invasive plant surveys should be conducted as periodically and introduced species of plants removed as they appear. Additional surveys for species of concern in this area are encouraged.



Jeweled Shooting Star

Several populations of the jeweled-shooting star (*Dodecatheon radicatum*), a PA-Threatened species of concern, occur on rocky outcrops in Montour County. Photo: PA Science Office of The Nature Conservancy

SUSQUEHANNA RIVER IN MONTOUR COUNTY (Cooper, Mayberry, and Mahoning Townships, Danville Borough, and Columbia & Northumberland Counties).

The **Susquehanna River** is one of Pennsylvania's greatest resources. The protection of this water source is critical to the survival of the many aquatic and terrestrial species that depend on this river system. Freshwater mussels have the highest current and future rate of extinction of any animal group in North America (Stein and Flack 1997). Some populations are found almost entirely within the Susquehanna River drainage. The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species. Protecting the quality of the Susquehanna River in Montour County is a top priority.

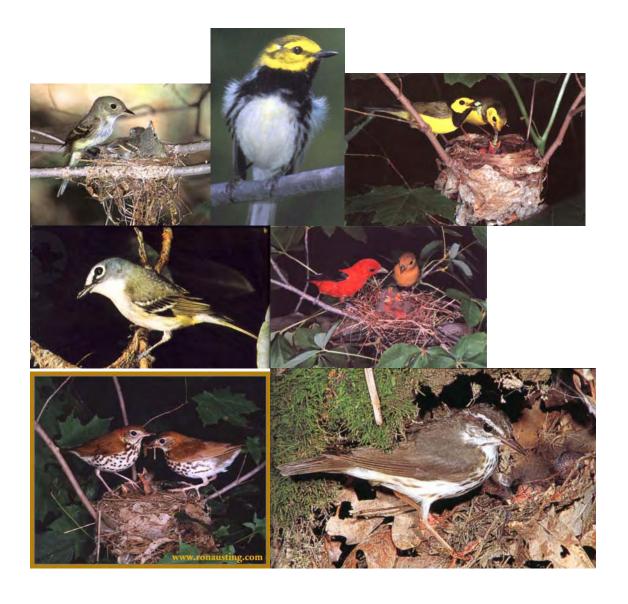
This site contains unknown quality populations of **three animal species** of concern that utilize the habitat associated with the Susquehanna River. Along this stretch of river, **one species of concern, a G4 S2B animal species**, uses islands as sites for breeding and at times will forage great distances up and down the river. This species has made a dramatic comeback in Pennsylvania and continues to increase in population. **Two globally vulnerable aquatic animal species of concern** were also documented in the Susquehanna River in Montour County.

Threats and Disturbances

There are numerous examples of disturbances along the Susquehanna River. Two of these animal species of concern are especially affected by numerous non-point sources of pollution including sedimentation from cultivated and developed land along the river, runoff from roadways, pesticide runoff from agricultural fields, discharge of chemical pollutants, and thermal pollution. The main threat to these animals is reduction of water quality. The banks, floodplains, and islands of the river are in areas infested with the invasive introduced plant species, Japanese knotweed and purple loosestrife. Control of established populations of these species is very difficult, so eradication of pioneer populations is the best way to control the spread of these species of plants. The **G4 S2B animal species of concern** in this area is extremely sensitive to human disturbance during the breeding season.

Conservation Recommendations

Any of the above types of disturbances should be minimized wherever possible. Also, monitoring of these populations of animal species of concern should continue into the future. Loss of individuals and reductions in population sizes should lead to an investigation into possible causes. Water quality should be monitored and pollution sources should be identified where possible. Forested buffers should be maintained and created where absent along the length of the river with logging operations refraining from cutting within 100 feet of the river edge. River bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential, and roadway settings. In addition, the river floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Maintaining an intact, forested floodplain along the river can preserve much of the area's important biodiversity. The effectiveness of the forested riverbanks as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses, businesses and additional roadways along the river, adjacent slopes and floodplain.



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) **Blueheaded 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 Contiguous forests in Montour 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 Columbia County and Pennsylvania. (Photos by Ron Austing).

VALLEY TOWNSHIP

Site Name	Special Species / Community Type	PNHP Global	Ranks* State	State Status	Last Seen	Quality**
Mausdale Quarry	Backward Sedge (Carex retrorsa)	G5	S1	PE	9/1/2004	ВС

Valley Township is located in the central portion of the county. This area is forested on the southern and northern parts of the township, and is generally developed where Route 54 and Interstate 80 interchange. Development from the Borough of Danville is expanding to this area, but quality natural areas remain. The northern portions of **Bald Top** and **Geisinger Recreational Trails** occur in the southern part of Valley Township, and other areas such as **Valley Ridge and Slopes** occur northeast. One large corridor, **Montour Ridge Landscape Corridor**, is broken by Route 54. Another corridor, **Derry Landscape Corridor**, passes through the northeast corner of this township near the **Valley Ridge and Slopes**. This long ridge is still an important long forested corridor for the township and for the county. The lone rare plant found here at **Mausdale Quarry**, *Carex retrorsa*, warrants more surveys in similar areas that have better ecological condition. Other areas in the Township are also in need of more rare plant and animal surveys. Finally, an area known as **Indian Creek**, is of ecological value, but was not surveyed during the field season of 2004. This area needs future surveys to determine its ecological value to the county. Maintaining forested buffers along this creek would protect the creek from non-point sources of pollution from the adjacent road and also improve water quality.

<u>Locally Significant</u>: Bald Top/Montour Ridge Valley Ridge and Slopes

Geisinger Recreational Trails

Managed Lands: None

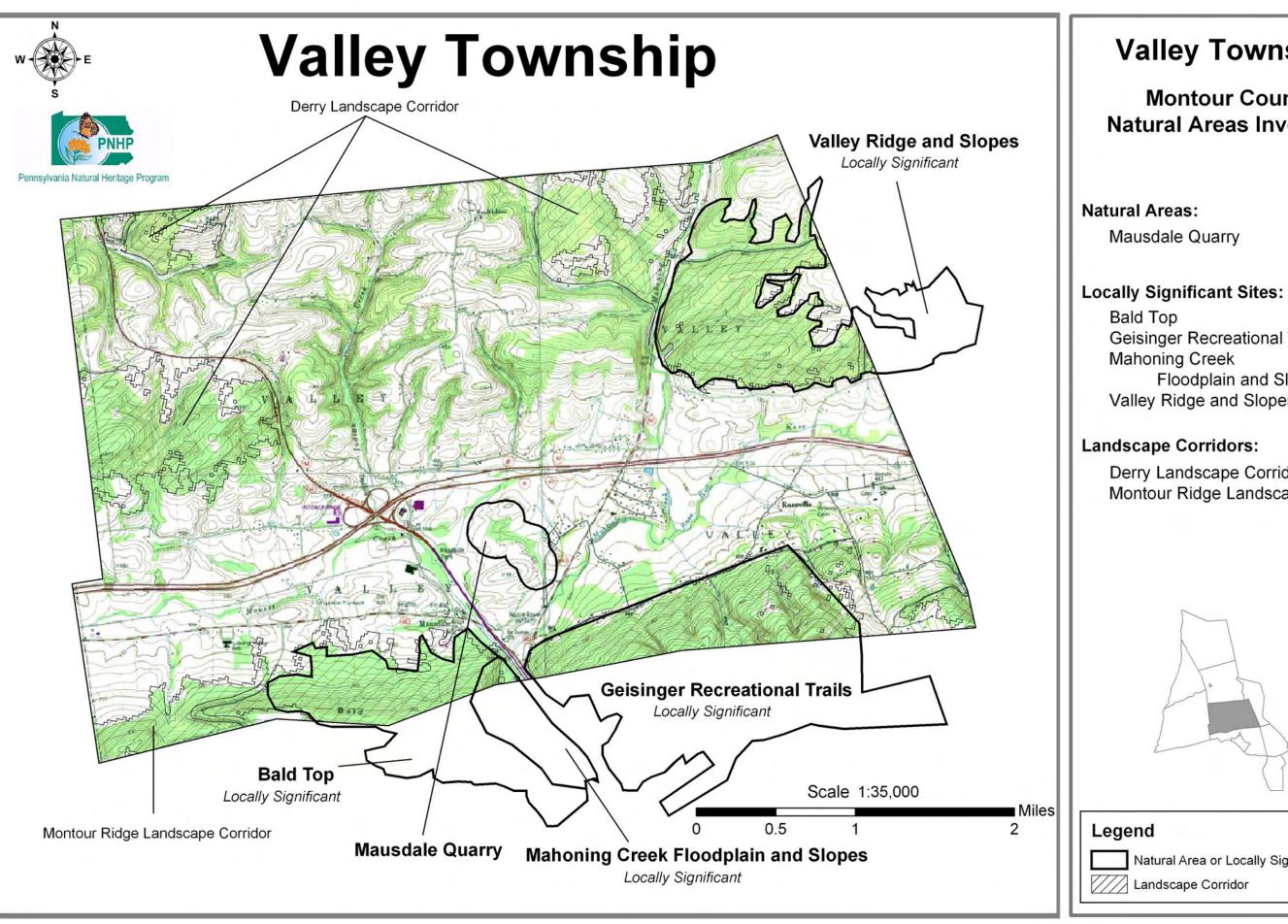
Natural Corridor Linkages: Derry Landscape Corridor

Montour Ridge Landscape Corridor

Insert Valley Township Map

^{*} Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



Valley Township

Montour County Natural Areas Inventory

Geisinger Recreational Trails Floodplain and Slopes Valley Ridge and Slopes

Derry Landscape Corridor Montour Ridge Landscape Corridor



Legend	
Natural Area or Locally Significant Site	
Landscape Corridor	

VALLEY TOWNSHIP

Bald Top/Montour Ridge (Valley and Mahoning Townships)

This **Locally Significant** site is a large forested block that contains hemlock slopes and ravines, and an extensive dry-oak heath forest. This area is locally significant due to the fact that it is one of the largest forested blocks in Montour County and because of the variety of habitats that occur here.

Threats and Disturbances

The main threats to this site include infestation of hemlock woolly adelgid aphid that seriously threatens the hemlocks on the slope. This site is fragmented by roads and residential development. Invasive plants are also a threat to some of the areas. Encroaching development is a long-term threat and disturbance to the overall area.

Conservation Recommendations

It is recommended that more plant and animal surveys be conducted in this area for a more complete and thorough inventory.

Dominant plant species:

	Trees						
sugar maple	Acer saccharum		table mountain pine	Pinus pungens			
shagbark hickory	Carya ovata		chestnut oak	Quercus montana			
American beech	Fagus grandifolia		red oak	Quercus rubra			
white ash	Fraxinus americana		eastern hemlock	Tsuga canadensis			
	Shrubs						
witch-hazel	Hamamelis virginiana		lowbush blueberry	Vaccinium pallidum			
	H	[er	bs				
wild ginger	Asarum canadense		partridgeberry	Mitchella repens			
white wood aster	Aster divaricatus		bishop's cap	Mitella diphylla			
bedstraw	Galium spp.		solomon's seal	Polygonatum biflorum			
rattlesnake plaintain	Goodyera pubescens		bloodroot	Sanguinaria canadensis			
liverleaf	Hepatica nobilis		false solomon's seal	Smilacina racemosa			
Canada mayflower	Maianthemum canadense						

Derry Landscape Corridor

This natural corridor begins in Columbia County and continues west through West Hemlock Township. This corridor is much narrower and much more fragmented than Muncy Hills landscape corridor. However, the area is fairly uninterrupted as it heads west towards Derry Township and into Valley Township. The natural corridor is severely interrupted at Route 54, but enough forested areas occur on the west side of Route 54 for the natural corridor to continue. However, the natural corridor becomes very fragmented and is lost before the village of Oak Grove. A large block of forest south of Oak Grove is completely interrupted before Interstate 80. This corridor, which begins in Columbia County, is not as extensive in area or length as the Muncy Hills Corridor. Opportunities do exist to reconnect interrupted areas of this corridor by replanting trees where forested areas are fragmented and by installing wildlife corridors below major roads that connect forested corridor areas. In addition, agricultural lands may also serve as wildlife corridors, connecting forested areas and streams. The County Conservation District can be very helpful in providing recommendations and potential funding to enhance wildlife corridors on agricultural and other rural lands.

Geisinger Recreational Trails (Mahoning Township, Valley Township)

This area is a large forested block north of the Borough of Danville that contains several different communities, including a ridgetop "Virginia Pine-mixed hardwood forest", "Red Oak-mixed hardwood forest", and a streamside deciduous forest. The actual forest types in this area are not of conservation concern at the state level, but the size and diversity of the site warrants locally significant status. This area also has a good population of pink lady's slipper (*Cypripedium acaule*), and good bird diversity, including some high quality habitat indicator species.

Associated plants:

71330Clated plants.						
	<u> </u>	Гrее	es			
red maple	Acer rubrum		table mountain pine	Pinus pungens		
sugar maple	Acer saccharum		Virginia pine	Pinus virginiana		
serviceberry	Amelanchier spp.		chestnut oak	Quercus montana		
white ash	Fraxinus americana		red oak	Quercus rubra		
eastern hop-hornbeam	Ostrya virginiana		American basswood	Tilia americana		
Shrubs						
black huckleberry	Gaylussacia baccata		lowbush blueberry	Vaccinium angustifolium		
spicebush	Lindera benzoin	1 [
Herbs						
white baneberry	Actaea pachypoda		Canada mayflower	Maianthemum canadense		
pink lady's slipper	Cypripedium acaule	1 [may-apple	Podophyllum peltatum		
marginal shield fern	Dryopteris marginalis	1 [false solomon's seal	Smilacina racemosa		
rattlesnake-plantain	Goodyera spp.	1 [twisted-stalk	Streptopus roseus		
whorled loosestrife	Lysimachia quadrifolia	1 [
	F	Bird	ls			
Veery	Catharus fuscescens		Ovenbird	Seiurus aurocapillus		
Worm-eating Warbler	Helmitheros vermivora] [American Redstart	Setophaga motacilla		
Wood Thrush	Hylocichla mustelina	1 [Red-eyed Vireo	Vireo olivaceus		
Eastern Towhee	Pipilo erythrophthalmus	1 [Hooded Warbler (4)	Wilsonia citrina		
Scarlet Tanager	Piranga olivaceus] [

Threats and Disturbances

The main threats and disturbances to this site include invasive plant species such as Japanese barberry (*Berberis thumbergii*), multiflora rose (*Rosa multiflora*), and tree-of-heaven (*Ailanthus altissima*). These species could infiltrate the understory and threaten the ecological integrity of the area. Other disturbances include additional trail blazing, and logging from adjacent properties.

Conservation Recommendations

More plant and bird surveys are needed for this area. The area was surveyed in mid to late May, but a survey in late June may yield an even a greater number of species. In addition, a later bird survey would document breeding birds rather than migrating bird species. Since this area has abundant exotic plant species, continued monitoring of the invasive plant species mentioned above should be conducted along with the possibility of some herbicide application to get rid of the most severe invasive populations.



While the crest of Montour Ridge (Bald Top) has been fragmented by numerous roads and residential development, the north side of the mountain remains remarkably intact. Flanked by the Mahoning Creek, the slopes on the north side of Montour ridge contain a rich diversity of native spring wildflowers among large hemlocks and mixed hardwoods. Introduced species of plants threaten the ecological integrity of this otherwise vigorous natural community. Photo: PA Science Office of The Nature Conservancy



Unfortunately, ATV damage of sensitive natural areas like this is an increasing problem on public and private lands all across Pennsylvania. Better enforcement and stiff penalties of ATV trespassing and destruction would discourage people from driving ATV's on private property and in the process, keep natural areas from having erosion problems and keeping them scenic for all to enjoy. Photo: PA Science Office of The Nature Conservancy

MAUSDALE QUARRY (Valley Township)

This site contains a fair to good quality population of backward sedge (*Carex retrorsa*), a G5, S1 plant species of concern. This plant occurs in an abandoned limestone quarry, now revegetated with a hardwood forest and a dense shrub layer dominated by honeysuckle (*Lonicera maackii*) and other exotic plant species. The quarry floor is occasionally inundated and the vegetation of the quarry includes both native and exotic species. Exotic plant species are particularly common in the shrub and ground layers.

Trees								
tree-of-heaven	Ailanthus altissima	eastern hemlock	Tsuga canadensis					
white ash	Fraxinus americana	American elm	Ulmus americana					
black walnut	Juglans nigra							
	Shrubs							
Japanese barberry	Berberis thumbergii	honeysuckle	Lonicera maackii					
autumn olive	Elaeagnus umbellata							
Herbs								
garlic mustard	Alliaria petiolata	wood-nettle	Laportea canadensis					
beggar-ticks	Bidens spp.	rice cutgrass	Leersia virginica					
bog-hemp	Boehmeria cylindrica	sweet cicely	Osmorhiza claytonii					
Asiatic dayflower	Commelina communis	clearweed	Pilea pumila					
common dittany	Cunila origanoides	Christmas fern	Polystichum acrostichoides					
white-snakeroot	Eupatorium rugosum	giant foxtail	Setaria faberii					
sweet-scented bedstraw	Galim triflorum	bittersweet nightshade	Solanum dulcamara					
alum-root	Heuchera americana	blue-stem goldenrod	Solidago caesia					
orange jewelweed	Impatiens capensis	poison-ivy	Toxicodendron radicans					

Threats and Disturbances

This sedge species tends to be a calciphile that is tolerant of occasional inundation, but otherwise this is certainly not a typical habitat for the species. The site itself is a disturbance, and it is extremely fragmented with abundant exotic plant species. The main threat to the site is exotic plant species and dumped garbage. This site was created by disturbance, and hence, the sedge could probably exist even with further disturbance.

Conservation Recommendations

Due to the extreme fragmentation and ecological condition of the site, it is recommended that this site be not considered a top priority for the county. However, the site contains a fairly good population of a rare plant species, and therefore, this species should be surveyed for in adjacent suitable habitats.

Montour Ridge Landscape Corridor

This landscape corridor begins in Hemlock Township in Columbia County just west of Bloomsburg and continues with some interruption to **West Hemlock and Cooper Townships** in Montour County. This corridor almost disappears around the village of Kaseville in **Valley Township**. A few opportunities exist to construct wildlife corridors underneath rural roads to connect the existing corridor to the **Geisinger Trails Natural Area** (a locally significant site) in Mahoning Township. This site is a large forested area and continues the landscape corridor all the way west to Route 54 just north of the Borough of Danville. Route 54 is a major interruption to this forested/landscape corridor. However, on the west side of Route 54 is the start of a large contiguous forested area including the natural areas of **Mahoning Creek Floodplain & Slopes** and **Bald Top**. One challenge

is somehow to link the forested areas east of Route 54 with the forested areas west of 54. Constructing wildlife corridors underneath Route 54 to a partly forested area would allow some wildlife to cross the barrier of Route 54 and nearby development. The forested corridor continues across the natural area of Bald Top and becomes less fragmented until it crosses Montour Ridge in **Liberty Township**. Montour Ridge is still fairly forested, but development along the ridge has severely fragmented this forest block. This easily broken portion of the forested corridor continues past areas of development and becomes much less fragmented on the western side of Montour Ridge, State Game Lands #115 and eventually, Northumberland County. Overall, this forested corridor is large and extensive, with definite wildlife connections through the landscape. The challenge will be finding ways to overcome the large barriers of Route 54 and nearby development in order to make wildlife friendly passageways.

Valley Ridge and Slopes (Valley Township, West Hemlock Township)

This area is characterized by hemlock slopes, a hemlock dominated streamside forest and a mixed pine-oak forested slope with some herbaceous openings. This area is interesting due to the large forested area and the interesting herbaceous openings on the south facing slopes. Much of the hemlock area is degraded due to the hemlock woolly adelgid aphid.

Trees						
red maple	Acer rubrum		white pine	Pinus strobus		
tree-of-heaven	Ailanthus altissima		Virginia pine	Pinus virginiana		
black birch	Betula lenta		chestnut oak	Quercus montana		
musclewood	Carpinus caroliniana		red oak	Quercus rubra		
pignut hickory	Carya glabra		eastern hemlock	Tsuga canadensis		
Shrubs						
pasture rose	Rosa carolina		lowbush blueberry	Vaccinium angustifolium		
multiflora rose	Rosa multiflora		maple-leaved viburnum	Viburnum acerifolium		
		He	rbs			
garlic mustard	Alliaria petiolata		hawkweed	Hieracium spp.		
wild sarsaparilla	Aralia nudicaulis		yellow sorrel	Oxalis stricta		
pink-lady's slipper	Cypripedium acaule		climbing false-buckwheat	Polygonum scandens		
American pennyroyal	Hedeoma pulegioides		skunk cabbage	Symplocarpus foetidus		

Threats and Disturbances

The overbrowsing of understory plants by deer is a threat to the ecological integrity of the site. Serious overbrowsing of understory plants was observed during the survey. Another possible threat to this area is the continued spread of tree-of-heaven (*Ailanthus altissima*), an extremely opportunistic invasive plant species. In some areas of this site, tree-of-heaven has infiltrated an area formerly filled by eastern hemlock. Other disturbances include possible trail development, logging, and encroaching development.

Conservation Recommendations

It is recommended that some of the invasive plant species be brought under control if possible. The death of many of the hemlocks in parts of this area is a sign that habitat conditions here are about to change. Without hemlock along the streams and slopes, many invasive plants may take over and the forest composition will soon change. Also, as the hemlocks die, light will infiltrate the understory of the forest and the stream will begin to warm. Consequently, the water chemistry will change to allow a different assortment of organisms to adapt to the surroundings. Many organisms, such as trout, may be unable to adapt to such changing conditions. Another conservation recommendation is to resist heavy logging along the south facing slopes.

Ovenbird Nest



A clutch of eggs are cleverly hidden in this Ovenbird nest (above). Upon closer inspection, the eggs are of two types, from two separate bird species. The Ovenbird nest has been parasitized by a Brown-headed Cowbird, which lays its eggs in the nests of other birds. Forest fragmentation has been shown to cause declines in Ovenbird populations, and cowbird parasitism increases in fragmented forests. Photos: PA Science Office of The Nature Conservancy





At the time the first European settlers began entering Pennsylvania, riverine habitats were a stronghold for nesting Bald Eagles. However, pesticide poisoning such as from DDT was a major cause of Bald Eagle decline in the United States. The Bald Eagle is now recovering from low numbers, and once again, is not a rare site nesting along the Susquehanna River.

WEST HEMLOCK TOWNSHIP

	Special Species /	PNHP Ranks*		State	Last	
Site Name	Community Type	Global	State	Status	Seen	Quality**
NONE						

West Hemlock Township is located in the eastern portion of Montour County. The township is composed of mostly agricultural and residential areas with a significant amount of fairly intact, forested tracts. No species of concern were identified in the Township during this survey. However, several forested areas remain, including the eastern portion of the locally significant site, Valley Ridge and Slopes. This site was identified by aerial photo interpretation. This area is important because it connects a long east to west natural corridor that extends from near Bloomsburg in Columbia County to the west near Danville. Future field studies may be successful in identifying important ecological features in these habitats. Additional surveys of forested slopes, ravines and streams in this township are encouraged. Finally, several streams would benefit from restoration of forested buffers in this township. Portions of Mahoning Creek, Kase Run, and other small streams should be replanted with native trees where forested buffers are missing to decrease non-point sources of pollution and improve water quality for the township.

Locally Significant: Valley Ridge and Slopes

Managed Lands: None

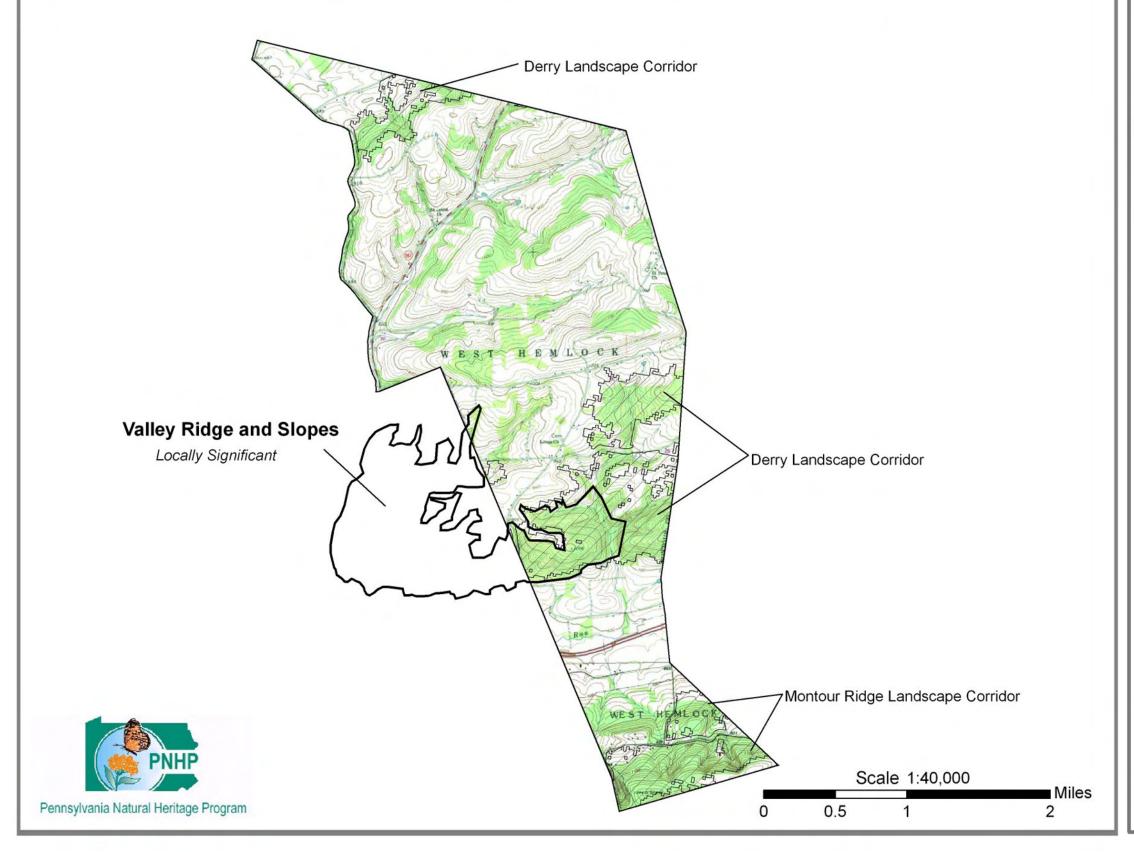
<u>Landscape Corridor</u>: **Montour Ridge Landscape Corridor Derry Landscape Corridor**

^{**}Please refer to Appendix IV for an explanation of TNC Ranks and State Status.

^{**}Please refer to Appendix V for an explanation of Quality Ranks.



West Hemlock Township



West Hemlock Twp.

Montour County Natural Areas Inventory

Locally Significant Sites:

Valley Ridge and Slopes

Landscape Corridors:

Derry Lanscape Corridor Montour Ridge Landscape Corridor



Legend						
		Natural Area or Locally Significant Site Landscape Corridor				
		Landscape Corridor				



The middle branch of the Chillisquaque Creek Headwaters was considered locally significant due to the very rich and diverse riparian forest community, and the good forest structure with a plentiful understory. This area had a high degree of native plants and supports a good diversity of birds that depend upon a well developed understory for nesting (Photo by the PA Science Office of The Nature Conservancy).

WEST HEMLOCK TOWNSHIP

Derry Landscape Corridor

This natural corridor begins in Columbia County and continues west through West Hemlock Township. This corridor is much narrower and much more fragmented than Muncy Hills landscape corridor. However, the area is fairly uninterrupted as it heads west towards Derry Township and into Valley Township. The natural corridor is severely interrupted at Route 54, but enough forested areas occur on the west side of Route 54 for the natural corridor to continue. However, the natural corridor becomes very fragmented and is lost before the village of Oak Grove. A large block of forest south of Oak Grove is completely interrupted before Interstate 80. This corridor, which begins in Columbia County, is not as extensive in area or length as the Muncy Hills Corridor. Opportunities do exist to reconnect interrupted areas of this corridor by replanting trees where forested areas are fragmented and by installing wildlife corridors below major roads that connect forested corridor areas. In addition, agricultural lands may also serve as wildlife corridors, connecting forested areas and streams. The County Conservation District can be very helpful in providing recommendations and potential funding to enhance wildlife corridors on agricultural and other rural lands.

Montour Ridge Landscape Corridor

This landscape corridor begins in Hemlock Township in Columbia County just west of Bloomsburg and continues with some interruption to West Hemlock and Cooper Townships in Montour County. This corridor almost disappears around the village of Kaseville in Valley Township. A few opportunities exist to construct wildlife corridors underneath rural roads to connect the existing corridor to the Geisinger Trails Natural Area (a locally significant site) in Mahoning Township. This site is a large forested area and continues the landscape corridor all the way west to Route 54 just north of the Borough of Danville. Route 54 is a major interruption to this forested/landscape corridor. However, on the west side of Route 54 is the start of a large contiguous forested area including the natural areas of Mahoning Creek Floodplain & Slopes and Bald Top. One challenge is somehow to link the forested areas east of Route 54 with the forested areas west of 54. Constructing wildlife corridors underneath Route 54 to a partly forested area would allow some wildlife to cross the barrier of Route 54 and nearby development. The forested corridor continues across the natural area of Bald Top and becomes less fragmented until it crosses Montour Ridge in Liberty Township. Montour Ridge is still fairly forested, but development along the ridge has severely fragmented this forest block. This easily broken portion of the forested corridor continues past areas of development and becomes much less fragmented on the western side of Montour Ridge, State Game Lands #115 and eventually, Northumberland County. Overall, this forested corridor is large and extensive, with definite wildlife connections through the landscape. The challenge will be finding ways to overcome the large barriers of Route 54 and nearby development in order to make wildlife friendly passageways.

Valley Ridge and Slopes (Valley Township, West Hemlock Township)

This area is characterized by hemlock slopes, a hemlock dominated streamside forest and a mixed pine-oak forested slope with some herbaceous openings. This area is interesting due to the large forested area and the interesting herbaceous openings on the south facing slopes. Much of the hemlock area is degraded due to the hemlock woolly adelgid aphid infestation, but some areas remain that warrant conservation value.

Threats and Disturbances

The overbrowsing of understory plants by deer is a threat to the ecological integrity of the site. Serious overbrowsing of understory plants was observed during the survey. Another possible threat to this area is the continued spread of tree-of-heaven (*Ailanthus altissima*), an extremely opportunistic invasive plant species. In some areas of this site, tree-of-heaven has infiltrated an area

formerly filled by eastern hemlock. Other disturbances include possible trail development, logging, and encroaching development.

Conservation Recommendations

It is recommended that some of the invasive plant species be brought under control if possible. The death of many of the hemlocks in parts of this area is a sign that habitat conditions here are about to change. Without hemlock along the streams and slopes, many invasive plants may take over and the forest composition will likely soon change. Also, as the hemlocks die, light will infiltrate the understory of the forest and the stream will begin to warm. Consequently, the water chemistry may change to allow a different assortment of organisms to adapt to the surroundings. Many organisms, such as trout, may be unable to adapt to such changing conditions. Another conservation recommendation is to resist heavy logging along the south facing slopes.

Trees						
red maple	Acer rubrum		Virginia pine	Pinus virginiana		
tree-of-heaven	Ailanthus altissima		chestnut oak	Quercus montana		
black birch	Betula lenta		red oak	Quercus rubra		
pignut hickory	Carya glabra		eastern hemlock	Tsuga canadensis		
white pine	Pinus strobus					
Shrubs						
musclewood	Carpinus caroliniana		lowbush blueberry	Vaccinium angustifolium		
pasture rose	Rosa carolina		maple-leaved viburnum	Viburnum acerifolium		
multiflora rose	Rosa multiflora					
]	Her	bs			
garlic mustard	Alliaria petiolata		hawkweed	Hieracium spp.		
wild sarsaparilla	Aralia nudicaulis		yellow sorrel	Oxalis stricta		
pink-lady's slipper	Cypripedium acaule		climbing false-buckwheat	Polygonum scandens		
American pennyroyal	Hedeoma pulegioides		skunk cabbage	Symplocarpus foetidus		

Glossary

<u>Alluvium</u> – material such as sand, silt, or clay that is deposited on land by streams.

Anthropogenic - human caused.

<u>Aphid</u>- Any of various small, soft-bodied insects of the family Aphididae that have mouthparts specially adapted for piercing and feed by sucking sap from plants. Also called *plant louse*.

ATV – all-terrain-vehicle.

Bedrock- The solid rock that underlies loose material, such as soil, sand, clay, or gravel.

<u>Bog</u> – a nutrient poor, acidic peatland that receives water primarily from direct rainfall with little or no input from groundwater or runoff; vegetation consists primarily of peat moss and ericaceous shrubs.

<u>Calcareous</u>- composed of, containing, or characteristic of calcium carbonate, calcium, or limestone; chalky.

Canopy – the layer formed by the tallest vegetation.

<u>Circumneutral</u> – pH between 5.5 and 7.

<u>Co-dominant</u> – where several species together comprise the dominant layer (see "dominant" below).

<u>Community</u> – 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.

<u>Diabase</u> – a dark gray igneous rock. The chemical composition of diabase may support unusual plant communities.

<u>Dominant</u>– the species (usually plant) exerting the greatest influence on a given community either by numerical dominance or influence on microclimate, soils and other species.

Ecosystem- an ecological community together with its environment, functioning as a unit.

<u>Element</u> – all-inclusive term for species of special concern and exemplary natural communities.

<u>Ericaceous</u> – members of the heath family including blueberries, huckleberries, rhododendrons, and azaleas; these plants are adapted to living in acidic soils.

<u>Exotic</u> – 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.

<u>Fen</u>- open-canopy peatland that has developed under the influence of basic-rich waters

<u>Floodplain</u> – low-lying land generally along streams or rivers that receives periodic flooding.

<u>Forb</u> – non-grass herbaceous plant such as goldenrod.

<u>Fragipan</u>- a very dense soil layer that prevents water from draining quickly through the soil.

Graminoid – grass or grass-like plant such as a sedge or a rush.

<u>Ground cover</u> – low shrubs, herbs and mosses that are found at or close to the ground surface.

<u>Hydrology</u> – water system of an area including both surface water and ground water.

<u>Igneous</u>-formed by solidification from a molten state. Used of rocks.

<u>Kettle</u> – a depression left in a mass of glacial drift, apparently formed by the melting of an isolated block of glacial ice.

Lepidoptera – moths and butterflies.

<u>Listed species</u> – species that is monitored and considered to be of concern by PNDI.

Mesic – moist, not saturated.

<u>Minerotrophic</u> – groundwater fed; influenced by water that has been in contact with bedrock or soil, and is richer in mineral content than rainwater.

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

<u>Natural area</u> – 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.

<u>Neo-tropical</u>- referring to the tropical locations in the new world; Mexico, Caribbean Islands, and Central and parts of Northern South America.

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

Obligate species- able to exist or survive only in a particular environment or by assuming a particular role

<u>Oligotrophic</u> – poor to extremely poor in nutrients; typically describes dilute waters with low base metal ion concentrations.

<u>Palustrine</u>- describes wetlands; areas intermediate between aquatic and terrestrial habitats, supporting predominately hydrophytic vegetation, where conditions are at least periodically wet enough during the growing season to produced anaerobic soil conditions and thereby influence plant growth.

<u>Peat</u> – partially decomposed remains of plant material in which at least some of the plant parts are still distinguishable.

POSCIP – Plant of Special Concern in Pennsylvania.

<u>Potential Natural Area</u> – 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).

<u>Prescribed burning</u> – burning under controlled conditions; needed to maintain communities such as limestone glades and pitch pine barrens.

Riparian - streamside.

<u>R-O-W</u> – strip of land occupied or intended to be occupied by a street, crosswalk, railroad, electric transmission line, oil or gas pipeline, water main, sanitary or storm sewer line, or other special use.

<u>Sedge</u>- grasslike herbaceous plant of the family *Cyperaceae*, especially members of the genus *Carex*.

<u>Seeps</u> – where water flows from the ground in a diffuse pattern and saturates the soil; lush herbaceous vegetation often grows in these wet areas.

<u>Shrub</u> – a perennial, woody plant that differs from a tree in its short stature (less than five meters in height) and typically multi-growth form.

<u>Soil association</u> – a group of soils that is geographically associated in a characteristic repeating pattern and defined and delineated as a single unit.

<u>Soil series</u> – 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.

<u>Subcanopy</u> – in a forest community, the tops and branches of the small trees and tall shrubs that form a distinct layer beneath the high tree canopy and above the shrub layer (if present).

<u>Swamp</u> – a wooded wetland, intermittently or permanently flooded

<u>Succession</u> – 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.

<u>Wetlands</u>- areas 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.

<u>Vernal</u> – occurring in the spring.

<u>Xeric</u> – extremely dry or droughty.

References and Literature Cited

- Anonymous. 1985. A Preliminary Inventory of Natural Areas on the Hoosier National Forest. Indiana Dept. of Natural Resources, Indianapolis, Indiana. Unpublished Report. 197 pp.
- Berg, T.M., J.H. Barnes, W.D. Sevon, V.W. Skema, J.P. Wilshusen and D.S. Yannacci. 1989. Physiographic Map of Pennsylvania. Map #13. PA Dept. Environ. Resources, Bureau of Topo. And Geol. Survey, Harrisburg, PA.
- Berg, T.M., W.E. Edwards, A.R.Geyer, A.D. Glover, D.M. Hoskins, D.B. Maclachlan, S.I. Root, W.D. Savon and A.A. Socolow. 1980. Geologic Map of Pennsylvania. PA Dept. Environ. Resources, Bureau of Topo. And Geol. Survey, Harrisburg, PA.
- Braun, E.L. 1950. Deciduous Forests of Eastern North America. The Free Press, MacMillan Publ. Co., New York. 596 pp.
- Brauning, D.W. (ed.). 1992. Atlas of Breeding Birds in Pennsylvania Univ. of Pittsburgh Press, Pittsburgh, PA. 484 pp.
- Covell, C.V. 1984. A Field Guide to the Moths. Houghton Mifflin Co., Boston. 496 pp.
- Crossley, G.J. 1999. A Guide to Critical Bird Habitat in Pennsylvania. Pennsylvania Important Bird Areas. Pennsylvania Audubon Society, Harrisburg, PA. 219 pp.
- Cuff, D.J., W.J. Young, E.K. Muller, W. Zelinsk, R.F. Abler, (eds.) 1989. The Atlas of Pennsylvania. Temple Univ. Press, Philadelphia, PA. 288 pp.
- DeGraaf, R.M. and D.D. Rudis. 1981. Forest Habitat for Reptiles and Amphibians of the Northeast. U.S. Dept. of Agric., Forest Service, Northeastern Forest Exper. Sta. 239 pp.
- Department of Conservation and Natural Resources. Hemlock woolly adelgid web site. http://www.dcnr.state.pa.us/forestry/woollyadelgid/index.htm.
- Department of Conservation and Natural Resources. 2004. Invasive Plants in Pennsylvania. Commonwealth of Pennsylvania.
- Department of Conservation and Natural Resources. 2004. Landscaping with Native Plants in Pennsylvania. Commonwealth of Pennsylvania.
- Department of Conservation and Natural Resources. 1982. Geologic map of Pennsylvania. DCNR, Bureau of Topographic and Geologic Survey, Map 7.
- Department of Environmental Protection. 1999. Commonwealth of Pennsylvania, Pennsylvania Code, Title 25. Environmental Resources, Chapter 93. Water Quality Standards. Bureau of Water Quality Management.
- Dunkle, S.W. 2000. Dragonflies Through Binoculars. Oxford University Press, New York, New York. 266 pp.
- Fernald, M.L. 1970. Gray's Manual of Botany. D. Van Nostrand Co., New York. 1632 pp.
- Fike, J. 1999. Terrestrial & Palustrine Plant Communities of Pennsylvania. PA Dept. of Conservation and Natural Resources, The Nature Conservancy, Western PA Conservancy. 87 pp.
- Geyer, A.R. and W.H. Bolles. 1979. Outstanding Scenic Geological Features of Pennsylvania. Environ. Geol. Rept. 7, PA Dept. Environ. Resour. Bur. Topo. Surv. 508 pp.
- Geyer, A.R. and W.H. Bolles. 1987. Outstanding Scenic Geological Features of Pennsylvania, Vol 2. Environ. Geol. Rept. 7, PA Dept. Environ. Resour. Bur. Topo. Surv. 270 pp.
- Glassberg, J. 1993. Butterflies Through Binoculars. Oxford University Press, New York, New York. 160pp. plus color plates.

- Gleason, H.A. 1952. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. Hafner Press, New York. 3 volumes.
- Gleason, H.A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Canada, 2nd Edition. The New York Botanical Garden, Bronx, New York. 910 pp.
- Haney, C. J. and C. P. Schaadt. 1996. Functional roles of eastern old growth in promoting forest bird diversity, Chapter 6, pages 76-88 *In* Eastern Old Growth, Prospects for Rediscovery and Recovery (M. B. Davis, editor), Island Press, Washington D.C.
- Harlow, W.H. 1957. Trees of the Eastern and Central United States and Canada. Dover Publications, Inc., New York. 288 pp.
- Holmgren, N.H. 1998. The Illustrated Companion to Gleason and Cronquist's Manual. The New York Botanical Garden, Bronx, New York. 937 pp.
- Hulse, A.C., C.J. McCoy, and E.J. Censky. 2001. Amphibians and Reptiles of Pennsylvania and the Northeast. Cornell University Press, Ithaca, NY. 419 pp.
- Kenney, L.P. and M.R. Burne. 2000. A Field Guide to Vernal Pools. Massachusetts Division of Fisheries & Wildlife, Natural Heritage & Endangered Species Program., Westborough, Massachusetts. 73 pp.
- Kroodsma, Donald E. and J. Verner. 1997. The Birds of North America, Marsh Wren (Cistothorus palustris): No. 350.
- Lash, G.G. 1986. Sedimentologic and Geochemical Evidence for Middle Ordovician Near-trench Volcanism in the Central Appalachian Region. Journal of Geology vol.94, p.91-107. University of Chicago.
- Lohman, S.W. 1957. Groundwater in northeastern Pennsylvania. DCNR, Bureau of Topographic and Geologic Survey, Bulletin W 4.
- Merritt, J.F. 1987. Guide to the Mammals of Pennsylvania. University of Pittsburgh Press for the Carnegie Museum of Natural History. 408 pp.
- Melvin, Scott M. and J. P. Gibbs. 1996. The Birds of North America, Sora (Porzana carolina): No. 250.
- Myer, G.H. 1989. Geology. Pp 12-17 <u>in</u> D.J. Cuff, W.J. Young, E.K. Muller, W. Zelinsk, R.F. Abler, (eds.), The Atlas of Pennsylvania. Temple Univ. Press, Philadelphia, PA. 288 pp.
- The Nature Conservancy. 1988. Natural Heritage Operations Manual. The Nature Conservancy, Arlington, VA.
- Newcomb, L. 1977. Newcomb's Wildflower Guide. Little, Brown, & Company, Toronto, Canada. 490 pp.
- Opler, P.A. and G.O. Krizek. 1984. Butterflies East of the Great Plains. The Johns Hopkins Univ. Press, Baltimore, MD. 294 pp.
- Opler, P.A. and V. Malikul. 1992. A Field Guide to Eastern Butterflies. The Peterson Field Guide Series, Houghton-Mifflin Co., Boston, MA. 396 pp.
- Pennsylvania Audubon, 2000. http://pa.audubon.org/deerinfopage.htm
- Pennsylvania Historical and Museum Commission. Pennsylvania State Archives. http://www.phmc.state.pa.us/bah/dam/counties/browse.asp?catid=47
- Pennsylvania Geological Survey and Pittsburgh Geological Survey. 1999. The Geology of Pennsylvania. Charles H. Shultz (ed.). Boyer Printing, Lebanon, PA. 888 pp.
- Peterson, R.T. 1980. Eastern Birds. Peterson Field Guides. Houghton Mifflin Company, New York, New York. 384 pp.
- Peterson, R.T. and McKenny. 1968. Wildflowers of Northeastern and Northcentral North America. Peterson Field Guides. Houghton Mifflin Company, New York, New York. 420 pp.

- Podniesinski, G. and J. Wagner. 2002. Classification, Assessment and Protection of Forested Floodplain Wetlands of the Susquehanna Drainage. Report to the US EPA and the PA DCNR Bureau of Forestry, Forestry Advisory Services. 160 pp.
- Rhoads, A.F and T.A.Block. 2000. The Plants of Pennsylvania, an Illustrated Manual. University of Pennsylvania Press, Philadelphia, PA. 1061 pp.
- Rhoads, A.F. and W.M. Klein, Jr. 1993. The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas. American Philosophical Society, Philadelphia, PA. 636 pp.
- Schweitzer, D.F. 1981. Species Accounts for Species of Special Concern Book (unpubl. Draft).
- Serrao, J. 2000. The Reptiles and Amphibians of the Poconos and Northeastern Pennsylvania. 48pp.
- Sevan, W.D. 2000. Physiographic provinces of Pennsylvania. DCNR, Bureau of Topographic and Geologic Survey, Map 13.
- Shaffer, L.L. 1991. Pennsylvania Amphibians & Reptiles. The Pennsylvania Fish & Boat Commission, Harrisburg, PA. 161 pp.
- Shertzer, R.H., ed. 1992. Special Protection Waters Implementation Handbook. PA. Dept. EnvironResources, Harrisburg, PA.
- Strausbaugh, P.D. and E.L. Core. 1964. Flora of West Virginia, 2nd Edition. Seneca Books, Morgantown, West Virginia. 1079 pp.
- Treadwell, Judy C. 1996. http://www.highlandschamber.org/events/theamericanchestnuttree.html
- United States Department of Agriculture, Soil Conservation Service. 1985. Soil Survey of Lebanon County, Pennsylvania. 178 pp plus figures.
- White, J. 1978. Illinois Natural Areas Inventory Technical Report. Volume I: Survey Methods and Results. Illinois Natural Areas Inventory, Urbana, Illinois. 426 pp.

Appendix I: Natural Area Survey Form
Surveyor: Address & Phone:
Date of ObservationSite 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

90

of The Nature Conservancy, 208 Airport Drive, Middletown, PA 17057 (717) 948-3962. Additional forms may be obtained from this office.

Appendix II: 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	04
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 hardwoods forest	S2S3
BROADLEAF TERRESTRIAL FORESTS	0200
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	CONOT TRACKED
CONIFEROUS PALUSTRINE FORESTS	
Black spruce - tamarack peatland forest	S3
Red spruce palustrine forest	S3
Hemlock palustrine forest	S3
CONIFER – BROADLEAF PALUSTRINE FORESTS	33
Hemlock - mixed hardwood palustrine forest	S3S4
Red spruce - mixed hardwood palustrine forest	S3
BROADLEAF PALUSTRINE FORESTS	33
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
	S2
Red maple - elm - willow floodplain swamp Terrestrial Woodlands	SZ
CONIFEROUS WOODLANDS	00
Pitch pine - heath woodland	S2
Pitch pine - scrub oak woodland 91	S2S3
/1	

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	S 3
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 TOWNSHIP COUNTYCODE LAT: LONG: **DIRECTIONS:** Global PA EORANK: **EORANK COMMENTS:** DATA: **HABITAT DESCRIPTION:** MISCELLANEOUS: DATA SENSITIVITY: **OWNERCODE REASON FOR DATA OWNER** SENSITIVITY: HABITAT SKETCH:

Appendix IV: Federal and State Status, TNC Global Ranks & PNHP State 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** <u>Listed Endangered</u> Taxa in danger of extinction throughout all or a significant portion of their ranges.
- **LT** <u>Listed Threatened</u> Taxa that are likely to become endangered within the foreseeable future through all or a significant portion of their ranges.
- **PE** <u>Proposed Endangered</u> 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 that 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 cultivars, or other factors which indicate that persons may seek to remove these species from their native habitats.
- TU <u>Tentatively Undetermined</u> 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 <u>None</u> 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 – <u>Pennsylvania Threatened</u>

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)

TNC 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 are 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 VI: Special Plants And Animals Of Montour County

Animals of Special Concern

Scientific Name	Common Name	
Porzana carolina	Sora	
Cistothorus palustris	Marsh Wren	
Sympetrum semicinctum	band-winged meadowhawk	
Haliaeetus leucocephalus	Bald Eagle	
Lampsilis cariosa	yellow lamp mussel	
Lasmigona subviridis	green floater	
Lestes forcipatus	sweetflag spreadwing	
Enallagma basidens	double-striped bluet	

Plants of Special Concern

Scientific Name	State Common Name	
Carex retrorsa	backward sedge	
Rotala ramosior	toothcup	
Carex typhina	cat-tail sedge	
Dodecatheon radicatum	jeweled shooting-star	

Natural Communities of Special Concern

Natural Community Name
Silver Maple Floodplain

Appendix VII: Master plant/animal list of Montour County

Trees-43 species			
eastern hemlock	Tsuga canadensis	table mountain pine	Pinus pungens
black birch	Betula lenta	tree-of-heaven	Ailanthus altissima
red maple	Acer rubrum	shagbark hickory	Carya ovata
red oak	Quercus rubra	white ash	Fraxinus americana
chestnut oak	Ouercus montana	Norway maple	Acer platanoides
white pine	Pinus strobus	black cherry	Prunus serotina
pignut hickory	Carya glabra	American basswood	Tilia americana
Virginia pine	Pinus virginiana	yellow birch	Betula allegheniensis
sugar maple	Acer saccharum	pin oak	Quercus palustris
silver maple	Acer saccharinum	red elm	Ulmus rubra
American beech	Fagus grandifolia	black ash	Fraxinus nigra
black tupelo	Nyssa sylvatica	eastern hop-hornbeam	Ostrya virginiana
American basswood	Tilia americana	box-elder	Acer negundo
musclewood	Carpinus caroliniana	white oak	Quercus alba
American sycamore	Platanus occidentalis	tulip poplar	Liriodendron tulipifera
shellbark hickory	Carya laciniosa	striped maple	Acer pensylvanicum
swamp white oak	Quercus bicolor	sassafras	Sassafras albidum
river birch	Betula nigra	flowering dogwood	Cornus florida
mockernut hickory	Carya tomentosa	serviceberry	Amelanchier spp.
Black oak	Quercus velutina	Kentucky coffee-tree	Gymnocladus dioica
American elm	Ulmus americana	hackberry	Celtis occidentalis
honey-locust	Gleditsia triacanthos		
Shrubs-33 species		L	
blackberry	Rubus alleghaniensis	pasture rose	Rosa carolina
maple-leaved viburnum	Viburnum acerifolium	autumn olive	Elaeagnus umbellata
multiflora rose	Rosa multiflora	Japanese barberry	Berberis thumbergii
lowbush blueberry	Vaccinium angustifolium	black haw	Viburnum prunifolium
striped maple	Acer pensylvanicum	black huckleberry	Gaylussacia baccata
buttonbush	Cephalanthus occidentalis	multiflora rose	Rosa multiflora
bush-honeysuckle	Diervilla lonicera	swamp rose	Rosa palustris
wild hydrangea	Hydrangea arborescens	swamp dewberry	Rubus hispidus
silky dogwood	Cornus amomum	alternate-leaved	Cornus alternifolia
, ,		dogwood	
winterberry holly	Ilex verticillata	Morrow's honeysuckle	Lonicera morrowii
nannyberry	Viburnum lentago	spicebush	Lindera benzoin
mountain laurel	Kalmia latifolia	mountain holly	Nemopanthus mucronatus
speckled alder	Alnus incana	gray dogwood	Cornus racemosa
American elderberry	Sambucus canadensis	witch-hazel	Hamamelis virginiana
smooth alder	Alnus serrulata	lowbush blueberry	Vaccinium pallidum
wild hydrangea	Hydrangea arborescens	cockspur hawthorn	Crataegus crus-galli
Amur honeysuckle	Lonicera maackii	northern arrow-wood	Viburnum recognitum
poison ivy	Toxicodendron radicans	Japanese honeysuckle	Lonicera japonica
meadowsweet	Spiraea alba	steeplebush	Spiraea tomentosa
Herbs-177 species		•	
monkey flower	Mimulus ringens	bird-on-the-wing	Polygala paucifolia
Alleghany-vine	Adlumia fungosa	bishop's cap	Mitella diphylla
alum-root	Heuchera americana	black bulrush	Scirpus atrovirens
American pennyroyal	Hedeoma pulegioides	bladder fern	Cystopteris protrusa
aniseroot	Osmorhiza longistylis	bloodroot	Sanguinaria canadensis
	Ŭ i		
arrow-leaved tearthumb	Polygonum sagittatum	blue cohosh	Caulophyllum thalictroides
arrow-leaved teartnumb	Polygonum sagittatum Viburnum recognitum	blue conosn blue vervain	Verbena hastata

bellwort	Uvularia sessilifolia	boneset	Eupatorium perfoliatum
bog-hemp	Boehmeria cylindrica	clearweed	Pilea pumila
common cat-tail	Typha latifolia	buttercup	Ranunculus spp.
common dittany	Cunila origanoides	Canada mayflower	Maianthemum canadense
common smartweed	Polygonum hydropiper	Canada rush	Juncus canadensis
common wood fern	Dryopteris intermedia	Christmas fern	Polystichum acrostichoides
cow parsley	Anthriscus sylvestris	cinnamon fern	Osmunda cinnamomea
cress	Rorippa spp.	Clasping aster	Symphyotrichum patens
crested shield fern	Dryopteris cristata	climbing false-	Polygonum scandens
		buckwheat	
beggar-ticks	Bidens spp.	enchanter's nightshade	Circaea lutetiana
cutgrass	Leersia virginica	false hellebore	Veratrum viride
dame's rocket	Hesperis matronalis	false nettle	Boehmeria cylindrica
dwarf ginseng	Panax trifolius	false solomon's seal	Smilacina racemosa
early goldenrod	Solidago juncea	Flat-topped goldenrod	Euthamia graminifolia
blue-stem goldenrod	Solidago caesia	fleabane	Erigeron spp.
goldenrod	Solidago spp.	fowl mannagrass	Glyceria striata
grass-leaved goldenrod	Euthamia graminifolia	foxtail	Setaria spp.
grass-leaved rush	Juncus marginatus	fragile fern	Cystopteris fragilis
green-dragon	Arisaema dracontium	garlic mustard	Alliaria petiolata
ground-ivy	Glechoma hederacea	golden ragwort	Senecio aureus
ground-pine	Lycopodium clavatum	golden saxifrage	Chrysosplenium americanum
halberd-leaved	Polygonum arifolium	ironweed	Vernonia noveboracensis
tearthumb	1 otygonum artjottum	nonweed	vernonia noveboracensis
hawkweed	Hieracium spp.	Jack-in-the-pulpit	Arisaema triphyllum
hay-scented fern	Dennstaedtia punctilobula	Japanese knotweed	Polygonum cuspidatum
hepatica	Hepatica nobilis	Japanese stiltgrass	Microstegium vimineum
horsetail	Equisetum spp.	jewelweed	Impatiens spp.
horseweed	Conyza canadensis	Jeweled shooting-star	Dodecatheon radicatum
Indian cucumber	Medeola virginiana	liverleaf	Hepatica nobilis
Indian pipe	Monotropa uniflora	long-spurred violet	Viola rostrata
northern lady fern	Athyrium felix-femina	maidenhair spleenwort	Asplenium trichomanes
orange jewelweed	Impatiens capensis	marginal shield fern	Dryopteris marginata
partridgeberry	Mitchella repens	marsh bedstraw	Galium obtusum
path rush	Juncus tenuis	marsh blue violet	Viola cucullata
pennyroyal	Hedeoma pulegioides	marsh purslane	Ludwigia palustris
pickerel-weed	Pontederia cordata	may-apple	Podophyllum peltatum
pink-lady's slipper	Cypripedium acaule	meadow rue	Thalictrum dioicum
pokeweed	Phytolacca americana	toothcup	Rotala ramosior
poverty grass	Danthonia spicata	moneywort	Lysimachia nummularia
purple-stemmed	Solidago caesia	trout lily	Erythronium americanum
goldenrod	o l		
marsh fern	Thelypteris palustris	turtlehead	Chelone glabra
ragged fringed-orchid	Platanthera lacera	two-leaved toothwort	Dentaria diphylla
rattlesnake fern	Botrychium virginianum	umbrella sedge	Cyperus spp.
rattlesnake plaintain	Goodyera spp.	veined skullcap	Scutellaria nervosa
reed canary-grass	Phalaris arundinacea	violet	Viola spp.
rock-cap fern	Polypdoium virginianum	Virginia creeper	Parthenocissus quinquefolia
rue anemone	Thalictrum thalictroides	great bulrush	Schoenoplectus
			tabernaemontani
sedge	Carex annectens	water-horehound	Lycopus americanus
sedge	Carex vulpinoidea	waterleaf	Hydrophyllum spp.
sedge	C	water-parsnip	Sium suave
	Carex lupulina		Start Start
sedge	Carex granularis	white wood aster	Aster divaricatus
sedge	•		Aster divaricatus Geum canadense
	Carex granularis	white wood aster	Aster divaricatus

wild basil	Clinopodium vulgare
wild columbine	Aquilegia canadensis
wild geranium	Geranium maculatum
wild ginger	Asarum canadense
wild leeks	Allium tricoccum
<u></u>	Aralia nudicaulis
wild sarsaparilla	
willow-herb	Epilobium spp.
winged monkeyflower	Mimulus alatus
wood anenome	Anemone quinquefolia
wood nettle	Laportea canadensis
wood sorrel	Oxalis spp.
yellow sorrel	Oxalis stricta
zig-zag aster	Symphyotrichum
	prenanthoides
blue waxweed	Cuphea viscosissima
rice cutgrass	Leersia virginica
giant foxtail	Setaria faberii

Birds			
Scarlet Tanager	Piranga olivaceus	Indigo Bunting	Passerina cyanea
Common Yellowthroat	Geothlypis trichas	Eastern Tufted Titmouse	Baeolophus bicolor
Ovenbird	Seiurus aurocapillus	Red-eyed Vireo	Vireo olivaceus
Prairie Warbler	Dendroica discolor	Pileated Woodpecker	Dryocopus pileatus
Field Sparrow	Spizella pusilla	Worm-eating Warbler	Helmitheros vermivorus
Swamp Sparrow	Melospiza georgiana	Eastern Wood-Pewee	Contopus virens
Song Sparrow	Melospiza melodia	Wood Thrush	Hylocichla mustelina
Blue-headed Vireo	Vireo solitarius	Black-throated Green Warbler	Dendroica virens
Sora	Porzana carolina	Marsh Wren	Cistothorus palustris
Bobolink	Dolichonyx oryzivorus	Red-winged Blackbird	Agelaius phoeniceus
Gray Catbird	Dumetella carolinensis	White-breasted Nuthatch	Sitta carolinensis
Common Grackle	Quiscalus quiscula	American Redstart	Setophaga ruticilla
Downy Woodpecker	Picoides pubescens	Wood Thrush	Hylocichla mustelina
Carolina Wren	Thryothorus ludovicianus	Red-bellied Woodpecker	Melanerpes carolinus
Northern Rough-winged Swallow	Stelgidopteryx serripennis	Eastern Tufted Titmouse	Baeolophus bicolor
Worm-eating Warbler	Helmitheros vermivorus	Wood Duck	Aix sponsa
Ruffed Grouse	Bonasa umbellus	Northern Harrier	Circus cyaneus
Eastern Meadowlark	Sturnella magna	Louisiana Waterthrush	Seiurus motacilla
Belted Kingfisher	Ceryle alcyon	House Wren	Troglodytes aedon
Spotted Sandpiper	Actitis macularia	Least Sandpiper	Calidris minutilla
Great Egret	Ardea alba	Black-capped Chickadee	Poecile atricapilla
American Goldfinch	Carduelis tristis	Bald Eagle	Haliaeetus leucocephalus
Baltimore Oriole	Icterus galbula	Barn Swallow	Hirundo rustica
Green Heron	Butorides virescens	American Robin	Turdus migratorius
Blue Jay	Cyanocitta cristata	Hooded Warbler	Wilsonia citrina
Veery	Catharus fuscescens	Black-throated Blue Warbler	Dendroica caerulescens
Blue-gray Gnatcatcher	Polioptila caerulea	Black-and-white Warbler	Mniotilta varia
Red-tailed Hawk	Buteo jamaicensis	Tree Swallow	Tachycineta bicolor



One of the few silver maple (*Acer saccharinum*) dominated floodplains in the area, the Danville Park Floodplain was identified as a significant natural community in Montour County in 2004 (Photo by The Nature Conservancy).

Grassland-dependent bird species

*Upland Sandpiper (Bartramia longicauda)

*Dickcissel (Spiza americana)

Henslow's Sparrow (Ammodramus henslowii)

Grasshopper Sparrow (Ammodramus savannarum)

Savannah Sparrow (Passerculus sandwichensis)

Vesper Sparrow (Pooecetes gramineus)

Eastern Meadowlark (Sturnella magna)

Bobolink (Dolichonyx oryzivorus)

*Short-eared Owl (Asio flammeus)

Pennsylvania Animal fact sheets *Denotes species of concern in Pennsylvania

Introduction

Many bird species depend on early-successional habitats such as hayfields, open grasslands and prairies, abandoned strip-mines, and air fields. These species are habitat specialists, and the specificity of their habitat choices has deemed them a species group of management concern. Many of these species cannot tolerate land use changes from open grassland/pasture to row crop agriculture such as cornfields and soybean fields. In Pennsylvania, many of these species are quite unpredictable in their range and site fidelity. Species, such as Dickcissel, for example, occur unpredictably on the fringe of their range. Other species, such as Henslow's Sparrow, may have increased in Pennsylvania due to the reclaiming of abandoned strip mines into grassland habitats. The historic extent of the distribution of grassland-bird dependent species in Pennsylvania is relatively unknown, but indications are that prior to European settlement, grassland bird species were fairly rare in Pennsylvania. However, as forests were cleared in the



1800's, and by 1840, almost half of Pennsylvania was farmland. This cleared the way for grassland bird species to increase in numbers, and become somewhat common up until the mid 1900's. However, by 1980, only 26 percent of the land remained in agricultural production. Many grassland bird species are now decreasing in Pennsylvania and throughout their range. There is hope in programs such as CREP (Conservation Reserve Enhancement Programs), and reclaiming of strip mines into grassland, which have assisted in restoring habitat for these grassland-dependent species.

Species specific habitat requirements:

*Upland Sandpiper-areas with low to moderate forb cover, low woody cover, moderate grass cover, moderate to high litter cover, and little bare ground (fence posts and display perches may be important components of suitable habitat)- they use native and tame grasslands, wet meadows, hayland, pastures, planted cover, highway and railroad rights-of-way, and grassy areas of airports. The Upland Sandpiper is a Partners in Flight (PIF) priority species in the regional conservation plans for physiographic regions Allegheny Plateau and Northern Ridge and Valley.

Henslow's Sparrow- fallow weedy fields, often with broomsedge (Andropogan spp.) grasses, reclaimed strip mines, use grasslands that have well-developed litter, relatively high cover of standing dead residual vegetation, tall dense vegetation, and generally low woody stem densities. They may use idle hayfields, CREP lands, or wet meadows. The Henslow's Sparrow is listed on the Partners in Flight (PIF) watch list as a highest concern species and is a priority target species in the regional conservation plans for physiographic regions Allegheny Plateau and Northern Ridge and Valley.

*Dickcissel- prefers habitat with dense, moderate to tall vegetation and moderately deep litter. Suitable habitats are found in oldfields, hayfields (especially alfalfa), fencerows, hedgerows, road rights-of-way, planted cover, CREP fields and dense nesting cover, and moderately grazed and idle prairie. The Dickcissel is listed on the Partners in Flight (PIF) watch list as threatened and declining.

Grasshopper Sparrow- generally prefers moderately open grasslands and prairies with patchy bare ground, selects different components of vegetation, depending on grassland ecosystem. This species generally avoids grasslands with extensive shrub cover but regularly occurs in hayfields, dry pastures, and reclaimed strip mines.

Savannah Sparrow- occupies similar habitats to Grasshopper Sparrow such as hayfields and pastures, but also may occur in wet meadows. In Pennsylvania, the species occurs in meadows, cultivated fields, grasslands, hayfields, and reclaimed strip mines.

Vesper Sparrow- prefer extensive meadowlands or even croplands, cornfields, alfalfa fields, hayfields, reclaimed strip mines. They require elevated perches from which to sing from such as isolated trees, power lines, or tall grass.

Eastern Meadowlark- grazed and ungrazed pastures, hayfields, winter wheatfields, idle or fallow areas, reclaimed strip mines. Males prefer areas with an elevated perch, such as a tree or utility perch.

Bobolink- prefers open fields, moist meadows with heavy stands of hay, clover, alfalfa, or weeds, and reclaimed strip mines. The Bobolink is a Partners in Flight (PIF) priority species in the regional conservation plans for physiographic region Northern Ridge and Valley.

*Short-eared Owl- reclaimed strip mines, field stubble and grasslands, and originally, and possibly still, open marshlands. Within such areas, these owls require cover, dense thickets, grassy tussocks, clumps of rushes or reeds, and even dense evergreen, and an abundance of mammalian prey. The Short-eared Owl is listed on the Partners in Flight (PIF) watch list as threatened and declining.

Conservation/Management Recommendations

Many of the above species depend heavily on some type of agricultural practice for maintenance of their preferred breeding habitats. The loss of pasture and hayfields to suburban development and succession of abandoned pasture and hayfields to old-field and woodland habitat are two of the biggest threats to these species in Pennsylvania. Many of the above species nest in active hayfields and pasture, and early mowing and harvesting of these fields in the summer will destroy many nests. It is recommended, if possible and feasible, that farmers delay mowing and harvesting hayfields until late July to give these species juveniles time to fledge. Selling of farms to developers is a process that is occurring most frequently in southern Pennsylvania, where development pressure is high. Reclaimed strip mines may be a harbor for some of these grassland species, especially ones that have been applied proper management. However, there are far too few of these reclaimed strip mines to support healthy populations of these species. Conservation Reserve Enhancement Programs (CREP) have also been proving beneficial to restoring some breeding areas for many of these species, and one of the goals of this program is to provide financial and technical assistance for Pennsylvania farmers to voluntarily restore wetlands, riparian areas and grasslands by enrolling up to 200,000 acres of farmland in CREP. For more information on how to enroll in CREP, visit http://www.fsa.usda.gov/pas/publications/facts/html/creppa03.htm. This program will hopefully give farmers incentives to plant native grasses and help the populations of grassland birds reach a healthy level.

Partners in Flight Goals

Partners in Flight has identified the Northern Ridge and Valley and Allegheny Plateau physiographic provinces as high priorities for conserving grassland bird species. In Northern Ridge and Valley, one objective of Partners in Flight is to identify, and either acquire, manage, or restore grasslands greater than 50 hectares with potential to support Henslow's Sparrow or Upland Sandpiper. Another objective is for 13,000 hectares of pastureland could be required to support 12,000 pairs of Bobolinks and other grassland species, and at least 1,000 hectares should be in patches large enough to support 50+ pairs of Upland Sandpipers and potentially Henslow's Sparrow.

References:

Brauning, D.W. (ed.). 1992. Atlas of Breeding Birds in Pennsylvania Univ. of Pittsburgh Press, Pittsburgh, PA. 484 pp.

Vickery, P. D. 1996. The Birds of North America, Life Histories of the 21st Century, No. 239: Grasshopper Sparrow (*Ammodramus savannarum*).

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, A. L. Zimmerman and B. R. Euliss. 2003. Effects of Management practices on Grassland Birds: Dickcissel. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Home Page.

Dechant, J. A. M. F. Dinkins, D.H. Johnson, L. D. Igl, C. M. Goldade, B.D. Parkins, and B.R. Euliss. 1999 (revised, 2003). Effects of Management practices on Grassland Birds: Upland Sandpiper. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Home Page.

Herkert, J. R. 2003. Effects of management practices on grassland birds: Henslow's Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. Jamestown, ND: Northern Prairie Wildlife Center Home Page.

Bowen, D. E. Jr., and C. S. Houston. 2001. The Birds of North America, Life Histories for the 21st Century: Upland Sandpiper (*Bartramia longicauda*), No. 580.

Pashley, D.N., C.J. Beardmore, J.A. Fitzgerald, R.P. Ford, W.C. Hunter, M.S. Morrison and K.V. Rosenberg. 2000. Partners in Flight: Conservation of the landbirds of the United States. American Bird Conservancy, The Plains, VA.



Yellow Lampmussel Lampsilis cariosa

Freshwater Mussel Species of Concern State Rank: S3S4 Global Rank: G3G4

Identification

The yellow lampmussel (*Lampsilis cariosa*) is a bright yellow, medium-sized freshwater mussel that can reach lengths of up to five inches. The mussel has an ovate to elliptical shell and the valves appear inflated in cross section. The shell is thick and strong. The bright yellow coloration makes it fairly easy to distinguish from other freshwater mussels in Pennsylvania but it may be confused with the eastern lampmussel (*Lampsilis radiata*). The presence of abundant rays on the outer shell of the eastern lampmussel is usually a key to distinguishing these two species. The yellow lampmussel is also more ovate and is more inflated in cross section.



Habitat

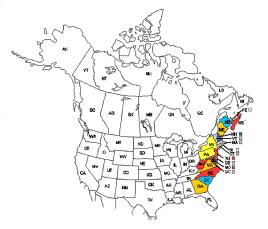
The yellow lampmussel inhabits medium to large rivers throughout most of its range, but is known from lakes and ponds in the north. In Pennsylvania, the yellow lampmussel is found within the Susquehanna and Delaware River drainages. This species occurs in a variety of substrate types including sand, silt, cobble and gravel.

Status

Lampsilis cariosa ranges from Nova Scotia to Georgia and west to West Virginia. Little is known about the status of freshwater mussels in Pennsylvania and the United States. The state status of the yellow

lampmussel is condition undetermined (CU) due to lack of information for this species. Though it appears to be relatively abundant in the Susquehanna River, thus far it is not present or less common in other river systems in the state. More surveys are required to determine the status of this species and other freshwater mussels in Pennsylvania.

Freshwater mussels have the highest current and future rate of extinction of any animal group in North America. In Pennsylvania, 75% of the mussel fauna is of conservation concern. One of the biggest threats to freshwater mussel populations throughout North America is a reduction in water quality. The protection Pennsylvania's aquatic habitat is critical to the survival of this species and the many other aquatic and terrestrial species that depend on these systems.





References

NatureServe Explorer: An online encyclopedia of life [web application]. 2002. Version 1.6. Arlington, Virginia. Website: www.natureserve.org/explorer.



Nedeau, E.J, M.A. McCollough, and B.I. Swartz. 2000. The Freshwater Mussels of Maine. Maine Dept. of Inland Fisheries and Wildlife, Augusta, Maine.

Stein, B.A. and S.R. Flack. 1997. 1997 Species Report Card: The State of U.S. Plants and Animals. The Nature Conservancy, Arlington, Virginia.

Green Floater *Lasmigona subviridis*

Freshwater Mussel Species of Concern State Rank: S2 Global Rank: G3

Identification

The green floater (*Lasmigona subviridis*) is a small mussel, usually less that 55 mm in length. The shell is thin and the mussel has a subovate or trapezoidal shape. The color varies from a dull yellow to green with many dark green rays visible, especially in young individuals. This species may be confused with the creek heelsplitter (*Lasmigona compressa*). The creek heelsplitter is larger, thicker shelled and less ovate. Also, the creek heelsplitter has only been found in the Ohio River Drainage while the green floater is also present in the Susquehanna and Delaware River Drainages.

Habitat

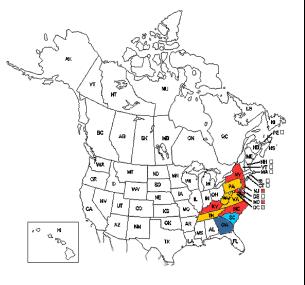
The green floater is often found in small creeks and large rivers and sometimes canals. This species is intolerant of strong currents and is often found in pools and other calm water areas. Preferred substrate is gravel and sand in water depths of one to four feet. This species is more likely to be found in hydrologically stable streams, not those prone to flooding and drying. Good water quality is also important to this mussel species of concern.

Status

Lasmigona subviridis ranges from New York to Georgia and West to Tennessee. This species is not very common in Pennsylvania, but has been found in the Susquehanna, Delaware and Ohio River Drainages. Little is known about the status of freshwater mussels in Pennsylvania and North America. The state status of the green floater is condition undetermined (CU) due to a lack of information for this species. The small size of this species may also make it more difficult to locate during surveys. More extensive surveys are necessary to determine the current status of this species in Pennsylvania and the United States.

Freshwater mussels have the highest current and future rate of extinction of any animal group in North America. In Pennsylvania, 75% of the mussel fauna is of conservation concern. One of the biggest threats to freshwater mussel populations throughout North America is a reduction in water quality. The protection Pennsylvania's aquatic habitat is critical to the survival of this species and the many other aquatic and terrestrial species that depend on these systems.





References



NatureServe Explorer: An online encyclopedia of life [web application]. 2002. Version 1.6. Arlington, Virginia. Website: www.natureserve.org/explorer.

North Carolina Mussel Atlas, Species Information and Status. Website: www.ncwildlife.org/pg07 WildlifeSpeciesCon/pg7b1a1 9.htm

Stein, B.A. and S.R. Flack. 1997. 1997 Species Report Card: The State of U.S. Plants and Animals. The Nature Conservancy, Arlington, Virginia.



Strayer, D.L. and K.J. Jirka. 1997. The Pearly Mussels of New York State. The New York State Education Dept., Albany, N.Y. 113pp and plates.