HUNTINGDON COUNTY
NATURAL HERITAGE INVENTORY

Prepared for:

The Huntingdon County Planning Commission
205 Penn Street, Suite 3
Huntingdon, PA 16652

Prepared by:

Western Pennsylvania Conservancy
209 Fourth Avenue
Pittsburgh, Pennsylvania 15222

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PREFACE

The Huntingdon County Natural Heritage Inventory identifies and maps Huntingdon County's most significant natural places. The study investigated plant and animal species and natural communities that are unique or uncommon in the county; it also explored areas important for general wildlife habitat and scientific study.

The inventory does not confer protection to any of the areas listed in the report. It is, however, a tool for informed and responsible decision-making. Public and private organizations may use the inventory to guide land acquisition and conservation decisions. Local municipalities and the County may use it to help with comprehensive planning, zoning, and the review of development proposals. Developers, utility companies, and government agencies alike may benefit from access to this environmental information prior to the creation of detailed development plans.

Although the inventory was conducted using a tested and proven methodology, it is best viewed as a preliminary report rather than the final word on the subject of Huntingdon County's natural heritage. Further investigations could potentially uncover previously unidentified Natural Heritage Areas. Likewise, in-depth investigations of sites listed in this report could reveal features of further or greater significance than have been documented. Some of the areas described here are privately owned. In such cases, anyone wishing to visit these areas should obtain permission from the property owner(s) prior to visitation.

The Western Pennsylvania Conservancy served as the principal investigator for the study and prepared the report and maps that are the products of the study. Established in 1932, Western Pennsylvania Conservancy is a private non-profit natural resource conservation organization headquartered in Pittsburgh. WPC's mission is to save the places we care about by connecting people to the natural world. As part of its mission, WPC works to sustain the natural heritage of Commonwealth: its native plant, animal, and habitat resources. To reach its goals, WPC initiates conservation projects independently and establishes partnerships with agencies and organizations having similar interests. County Natural Heritage Inventories are conducted by WPC through such partnerships. Any questions concerning sites or updates to the inventory may be addressed to the Western Pennsylvania Conservancy, 209 Fourth Avenue, Pittsburgh, PA 15222; phone: (412) 288-2777.

The Huntingdon County Planning Commission administered this study. Requests for copies of the inventory can be addressed to the Huntingdon County Planning Commission, 205 Penn Street, Suite 3, Huntingdon, PA 16652, phone: (814) 643-5091, email: planning@huntingdoncounty.net.

ACKNOWLEDGEMENTS

We would like to acknowledge the many citizens and landowners of the county and surrounding areas who volunteered information, time, and effort to the inventory and granted permission to access land.

We especially thank:

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Many others contributed to the inventory effort. Without their help, the inventory would not have seen completion.

Beth Brokaw
Ecologist
Western Pennsylvania Conservancy

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EXECUTIVE SUMMARY

Introduction

The first steps in ensuring protection of environmentally sensitive/ecologically important areas are identifying them and determining their importance. The Huntingdon County Natural Heritage Inventory and the update to the inventory are designed to identify and map important biotic (living) and ecological resources present in Huntingdon County. This information helps county, state, and municipal government, the public, and business interests plan development with the preservation of these environmentally important sites in mind. The biotic resources inherited by the citizens of this region include:

- Lands that support important components of Pennsylvania's native species biodiversity
- Populations of species that are facing imperilment at a state and/or global level, and their habitats.
- Natural communities (assemblages of plants and animals) that are regionally important to biodiversity because they are exceptionally undisturbed and/or unique within the state.
- Areas important for general wildlife habitat, open space, education, scientific study, and recreation.
- Areas that have been left relatively undisturbed by human activity
- Potential habitats for species of special concern

This Natural Heritage Inventory focuses on areas that are the best examples of living *ecological resources* in Huntingdon County. Although agricultural lands and open space may be included as part of inventory areas, the emphasis of the designation and delineation of the areas are the ecological values present. Important selection criteria for Natural Heritage Areas are the existence of habitat for plants and animals of special concern, the existence of uncommon or especially important natural communities, and the size and landscape context of a site containing good quality natural features. Large areas and areas that are minimally disturbed by development provide the backbone that links habitats and allows plants and animals to shift and move across sizable portions of the landscape. There are many important resources in Huntingdon County not addressed in this inventory. Historic, cultural, geologic, educational, water supply, agricultural and scenic resources are among many the county will address through other projects and programs.

Natural Heritage Area Classification

The following classification provides definitions and examples of the two types of Natural Heritage Areas, as well as two other designations from other sources that are included in the report due to their ecological significance.

NATURAL HERITAGE AREAS

BIOLOGICAL DIVERSITY AREA (BDA):
An area containing plants or animals of special concern at state or federal levels, exemplary natural communities, or exceptional native diversity. BDAs include both the immediate habitat and surrounding lands important in the support of these special elements.

LANDSCAPE CONSERVATION AREA (LCA):
A large contiguous area that is important because of its size, open space, habitats, and/or inclusion of one or more Biological Diversity Areas. Although an

LCA includes a variety of land uses, it typically has not been heavily disturbed and thus retains much of its natural character.

OTHER DESIGNATIONS

MANAGED LANDS:

Managed Lands are owned or leased properties with importance, or potential importance, to the overall maintenance and protection of ecological resources in Huntingdon County. Managed Lands include:

- Public properties established and managed to a large extent for natural resources. These properties have the potential to be managed in order to maintain or enhance important ecological assets in the county, and by this evaluation are deemed to be among the most ecologically valuable of public properties. Examples include state game lands, state forests, state parks, national historic sites, and county or municipal parklands.
- Private properties held by private organizations concerned with the management and protection of natural resources, and which upon evaluation have been selected to be among the most ecologically "valuable" of such properties. Examples include: private nature preserves, and private environmental education centers.
- Dedicated Area (DA): Managed lands (public or private), possibly disturbed in the past, where the owner's stated objectives are to protect and maintain the ecological integrity and biological diversity of the property. This is usually done largely through a hands-off management approach, with intervention only when there are demonstrable threats to the ecology of the area.

IMPORTANT BIRD AREAS (IBA):

The Pennsylvania Important Bird Area Program is administered by the Pennsylvania Audubon Society. Pennsylvania Audubon defines an IBA as "a site that is part of a global network of places recognized for their outstanding value to bird conservation. An IBA can be large or small, public or private and must meet one of several objective criteria. Since the IBA program is voluntary, there are no legal or regulatory restrictions."

Methods

Presently, thirty-eight County Inventories have been completed throughout Pennsylvania. The Huntingdon County Natural Heritage Inventory followed the same methodologies as previous inventories, which proceeded in the following stages:

- site selection
- ground survey
- data analysis

Site Selection

A review of the Pennsylvania Natural Diversity Inventory (PNDI) database (see Appendix II) determined what, if any, sites for special concern species and important natural communities were known to exist in Huntingdon County. Knowledgeable individuals were consulted concerning the occurrence of rare plants and unique natural communities in the county. Geological maps, USGS topographical maps, National Wetlands Inventory maps, USDA soil surveys, recent aerial photos, and published materials were also used to identify areas of potential ecological significance (Reschke, 1990). Once preliminary site selection was completed, reconnaissance flights over

chosen areas of the county were conducted. Shale barrens, limestone outcrops and cliffs, and vernal pools were of primary interest during fly-overs in Huntingdon County.

Ground Survey

Areas identified as potential sites were scheduled for ground surveys. After obtaining permission from landowners, sites were examined to evaluate the condition and quality of the habitat and to classify the communities present. Field survey forms (Appendix III) were completed for each site. The flora, fauna, level of disturbance, approximate age of community and local threats were among the most important data recorded for each site. In cases where permission to visit a site was denied, when enough information was available from other sources, or when time did not permit, sites were not ground surveyed.

Data Analysis

Data obtained during the 2001 and 2002 field seasons was combined with prior existing data and summarized. All sites with tracked elements, as well as exceptional examples of more common natural communities were selected as Biological Diversity Areas (BDAs). Spatial data on the elements of concern were then compiled in a geographic information system (GIS) format using ESRI ArcView 3.2a software. The boundaries defining each BDA were based on physical and ecological factors, and specifications provided by jurisdictional government agencies. The BDAs were then assigned a significance rank based on size, condition, rarity of the unique feature, and the quality of the surrounding landscape (see Appendix I for further description of ranks). Landscape Conservation Areas were designated around landscape features that provide a uniting element within a collection of BDAs, or large blocks of contiguous forest identified using GIS-based spatial analysis.
County municipalities served as the organizing unit for the data. Municipalities were subsequently grouped by planning region (as shown in Figure 2).

Results

The Huntingdon County Natural Heritage Inventory recognizes 85 areas of ecological significance— 80 Biological Diversity Areas and 5 Landscape Conservation Areas.

The results of the Natural Heritage Inventory for Huntingdon County are summarized below in tabular form. Table 1 lists the Natural Heritage Areas in order of their significance to the protection of the biological diversity and ecological integrity of the region. Significance ranks are **Exceptional**, **High**, **Notable**, and **County** (for a full explanation of these ranks, see Appendix I)

Table 1. Natural Heritage Areas categorized by significance.

Site	Municipality	Description	Page No.
Exceptional Significance			
Alan Seeger Natural Area BDA	Jackson Township	Bureau of Forestry Natural Area containing two mature forest communities and kidney-leaved twayblade, a plant species of special concern.	88

Table 1. (continued)

Site	Municipality	Description	Page No.
Exceptional Significance			
Aughwick Creek LCA	Cromwell Township, Shirley Township, Shirleysburg Borough, Springfield Township	Watershed that contains numerous natural communities, plants and animals of special concern, and smaller-scale BDAs.	16
Bear Meadows Natural Area BDA	Jackson Township	A relict bog that provides habitat for at least two plant species of special concern in Pennsylvania	89
Beaver Pond Bog BDA	Jackson Township	Habitat for a bog community that supports three invertebrate species of concern.	90
Blacklog LCA	Cromwell Township, Shirley Township, Tell Township	Landscape containing contiguous forest covering areas up to 10,000 acres, and 3 BDAs.	17
Butler Knob BDA	Cromwell Township, Cass Township	Habitat for the northeastern bulrush, a federally endangered plant species.	119
Colerain Ice Holes BDA	Franklin Township, Spruce Creek Township	Unusual forest community supporting twinflower, a plant species of special concern.	131
Deeter Hollow BDA	Union Township	Forested hollow supporting an unusually large population of thick-leaved meadow rue, a plant species of special concern.	158
Dungarvin Ponds BDA	Franklin Township	Vernal pool habitat supporting populations of weak rush and clasping-leaved St. John's wort, and surrounding xeric forest that includes pitch-pine - scrub oak woodland.	132
Jacks Mountain LCA	Brady Township, Cass Township, Clay Township, Cromwell Township, Mount Union Borough, Saltillo Borough, Shirley Township, Three Springs Borough, Union Township	Landscape containing contiguous forest covering areas greater than 10,000 acres, and 4 BDAs.	17
Maddensville BDA	SpringfieldTownship	Habitat occupied by an animal species of state and global concern.	126
Martin Gap BDA	Miller Township	Bureau of Forestry Natural Area containing two plant species of special concern.	98
Meadow Gap BDA	Springfield Township	Shale barren community and stream habitat supporting two plant species of special concern and three animal species of special concern.	126

Table 1. (continued)

Site	Municipality	Description	Page No.
Exceptional Significance			
Miranda Hill BDA	Cromwell Township, Shirley Township	Stream habitat supporting three animal species of special concern.	122
Neff Limestone Barren BDA	Porter Township	Calcareous rocky slope that provides habitat for a regionally rare natural community, four plant species of special concern, and four invertebrate species of special concern.	61
Petersburg Limestone Cliff BDA	Porter Township	Calcareous cliff community that supports two plant species of special concern.	62
Pogue BDA	Cromwell Township	A landscape that contains a regionally rare community type, two plant species of special concern, and two animal species of special concern.	122
Raystown Dam BDA	Juniata Township, Henderson Township, Smithfield Township	A landscape that contains a variety of habitats that support a regionally rare natural community, four plant species of special concern, and seven animal species of special concern.	162
Raystown Lake LCA	Cass Township, Henderson Township, Hopewell Township, Juniata Township, Lincoln Township, Penn Township, Todd Township	Landscape surrounding Raystown Lake that contains numerous natural communities, plants and animals of special concern, and smaller-scale BDAs.	18
Rockhill BDA	Cromwell Township	A landscape that contains a regionally rare community type, shale-barren evening primrose - a plant endemic to shale barrens, and a globally rare animal.	122
Rogers Hill Road BDA	Cromwell Township	Roadside shale barrens hosting round-headed gayflower and shale-barren evening primrose, plant species of special concern.	121
Sand Knob BDA	Jackson Township	Habitat for yellow fringed orchid, a plant speciesof concern, and two invertebrate species of special concern.	95
Sheep Rock - Chiniotta Barrens BDA	Penn Township	Shale barrens and adjoining forest that support a regionally rare community type, four plant species of special concern, and three animal species of special concern.	170

Table 1. (continued)

Site	Municipality	Description	Page No.
Exceptional Significance			
Sideling Hill Creek BDA	Clay Township	Habitat for a globally rare animal species of special concern.	114
Stone Mountain LCA	Brady Township, Henderson Township, Jackson Township, Miller Township	Landscape containing contiguous forest covering areas greater than 10,000 acres, and 3 BDAs.	17
Tram Road BDA	Logan Township, West Township	Habitat for the northeastern bulrush, a Federally Endangered plant species	56
Union Furnace BDA	Morris Township	Calcareous slope supporting the only known occurrence of white camus in the state.	138
Warriors Ridge Barrens BDA	Logan Township, Oneida Township	Forested landscape supporting habitat for two plant species of special concern: lupine, and northeastern bulrush, a Federally Endangered species.	57
Whisper Rocks BDA	Porter Township	Habitat for a globally rare clubmoss and and the eastern small-footed myotis, a globally rare animal species of special concern.	63
High Significance			
Aughwick Ford BDA	SpringfieldTownship	Habitat for a globally rare animal species of special concern.	126
Barree Limestone Barren BDA	Logan Township, Porter Township	Calcareous rocky slope that provides habitat for a round-head gayflower, a plant species of special concern.	55
Blacklog Mountain BDA	Shirley Township	Habitat occupied by the Allegheny woodrat, an animal species of state and global concern.	77
Birmingham BDA	Warriors Mark Township	Calcareous rocky slope that supports spreading rockcress and brome grass, two plant species of special concern.	145
Cave Hill BDA	Clay Township	Habitat occupied by the northern myotis, an animal species of special concern.	114
Center Union Wetlands BDA	Oneida Township	Forested floodplain supporting a small population of thick-leaved meadow rue, a plant species of special concern.	44
Flemings Water Cave BDA	Tell Township	Habitat occupied by the northern myotis, an animal species of special concern.	110

Table 1. (continued)

Site	Municipality	Description	Page No.
High Significance			
Genismore BDA	Spruce Creek Township, Warriors Mark Township	Limestone bank that provides habitat for three-flowered melic-grass, a plant species of special concern.	141
Greenlee Run BDA	Jackson Township	Forested floodplain supporting a small population of thick-leaved meadow rue, a plant species of special concern.	92
Greenwood Furnace Iron Mine BDA	Jackson Township	Habitat occupied by the northern myotis, an animal species of special concern.	93
Grove Barrens North BDA	Penn Township	Shale barren community supporting a population of shale-barren evening-primrose, a state-threatened plant species.	170
Hall Cave BDA	Porter Township, Walker Township	Habitat occupied by the northern myotis, an animal species of special concern.	61
Hesston Cave BDA	Penn Township	Habitat occupied by the northern myotis, an animal species of special concern.	170
Hill Valley BDA	Cromwell Township	Shale barren community supporting a population of shale-barren evening-primrose, a state-threatened plant species.	120
Huntingdon Furnace BDA	Franklin Township	Forested habitat supporting mountain phlox, a state-endangered plant species.	133
Huntingdon Rocks BDA	Huntingdon Borough, Smithfield Township	Habitat occupied by the eastern small-footed myotis, a state and globally rare animal species.	45
Jacks Narrows BDA	Brady Township	River floodplain, talus slopes, and upland riparian forest habitat occupied by Virginia mallow, thick-leaved meadow rue, and the Allegheny woodrat.	67
Johnson Ridge BDA	Cromwell Township	Roadside shale bank and adjoining dry oak – heath forest habitat supporting populations of round-head gayflower and shale-barren evening-primrose.	121
Kenrock BDA	Carbon Township	Habitat occupied by the Allegheny woodrat, an animal species of state and global concern.	32
Laurel Run BDA	Jackson Township	Forested stream valley that is home to the state-endangered Roger's clubtail dragonfly.	93

Table 1. (continued)

Site	Municipality	Description	Page No.
High Significance			
Long Cock Cave BDA	Cromwell Township	Habitat occupied by the northern myotis, an animal species of special concern.	121
Maddensville Quarry BDA	SpringfieldTownship	Habitat occupied by the northern myotis, an animal species of special concern.	127
McFadden Cave BDA	Cromwell Township	Habitat occupied by the northern myotis, an animal species of special concern.	121
Mill Creek Hollow BDA	Henderson Township	Forested slope on State Game Land #112 that supports a population of the state rare Hooker's orchid.	72
Neelyton BDA	Dublin Township	Habitat occupied by the Allegheny woodrat, an animal species of state and global concern.	106
Pennsylvania Furnace BDA	Franklin Township	Marsh habitat supporting populations of Torrey's rush and marsh bedstraw, both plants of concern in PA.	133
Petersburg Cave BDA	Logan Township, Oneida Township, Porter Township	Habitat occupied by the eastern small-footed myotis, an animal species of state and global concern.	55
Piney Ridge BDA	Penn Township	Seasonal floodplain wetland that supports Curtis's goldenrod, a species of special concern.	172
Rays Hill BDA	Wood Township	Habitat occupied by the Allegheny woodrat, an animal species of state and global concern.	40
Ross Spring BDA	Franklin Township	Habitat for kidney-leaved twayblade, a plant species of special concern.	94
Ruth Cave BDA	Spruce Creek Township	Habitat occupied by two animal species of special concern.	141
Shaver Creek Wetland BDA	Barree Township	Depression wetland within the Stone Valley Experimental Forest that is home to false hop sedge, a plant species of state concern.	82
Shy Beaver BDA	Hopewell Township	Forested habitat overlooking Raystown Lake that supports the federally endangered bald eagle.	36
Snyders Run BDA	Smithfield Township	Old-field habitat supporting Virginia mallow, a plant species of global and state concern.	48

Table 1. (continued)

Site	Municipality	Description	Page No.
High Significance			
Standing Stone Creek BDA	Oneida Township	Riparian habitat supporting a population of wild rice, a plant species of concern.	44
Stone Mountain BDA	Miller Township	Forested stream valley within State Game Land #112 that provides habitat for puttyroot, an orchid species of concern.	98
Weaver Bridge BDA	Hopewell Township	Old-field habitat supporting Virginia mallow, a plant species of global and state concern.	36
Notable Significance			
Aitch Barrens Natural Area BDA	Lincoln Township	Shale barren communities on steep, south-facing slopes along Raystown Lake.	166
Ardenheim Railroad BDA	Henderson Township	Shale bank along Juniata River that provides habitat for shale-barren evening-primrose, a plant species of global and state concern.	72
Aughwick Creek Benchmark BDA	Cromwell Township	Riparian woodland along Auchwick Creek that supports a small population of thick-leaved meadow-rue, a species of state concern.	119
Big Flat Laurel Natural Area BDA	Jackson Township	A scrub oak – shrubland community of local significance.	90
Detweiler Run BDA	Jackson Township	A forest community complex within the Detweiler Run Natural Area that contains a small patch of old-growth hemlock-tuliptree-birch forest.	91
Field Station Shale Barren BDA	Penn Township, Lincoln Township	Small shale barren community on a steep, south-facing slope along Raystown Lake.	166
Genismore Run BDA	Warriors Mark Township	Seepage wetland habitat occupied by cattail sedge, a plant of state concern.	145
James Creek Inlet BDA	Penn Township	Forested riparian habitat supporting thick-leaved meadow-rue, a plant species of state concern.	171
Joller BDA	Todd Township	Habitat occupied by the Allegheny woodrat, an animal species of state and global concern.	153
Mill Creek BDA	Brady Township	Old-field habitat supporting Virginia mallow, a plant species of global and state concern.	68
Owl Gap BDA	Jackson Township	Forested stream valley providing habitat for the northern pigmy clubtail, a state rare dragonfly.	94

Table 1. (continued)

Site	Municipality	Description	Page No.
Notable Significance			
Seven Stars BDA	Franklin Township	Old-growth dry oak – heath forest community on western slope of Tussey Mountain.	134
Shirleysburg BDA	Shirley Township	Aquatic habitat supporting a population of Illinois pondweed, a state rare plant species.	78
Snyders Run BDA	Smithfield Township	Roadside thicket occupied by Virginia mallow, a plant species of global and state concern.	48
Sugar Grove Run BDA	Henderson Township	Roadside shale bank providing habitat for a population of round-head gayflower.	73
Trough Creek Confluence BDA	Cass Township, Todd Township	Riparian habitat in an agricultural area that supports a small population of thick-leaved meadow-rue, a state-threatened plant species.	150
Trough Creek South BDA	Todd Township	Riparian forest that provides habitat for thick-leaved meadow rue, a state-threatened plant species.	155
County Significance			
Chestnut Spring BDA	Jackson Township	Forested headwaters of Standing Stone Creek.	91
Dungarvin Ponds North BDA	Franklin Township, Warriors Mark Township	Complex of vernal pools.	132
Lodge Shale Barren BDA	Lincoln Township	Small shale barren community on a steep, south-facing slope along Raystown Lake.	166
Mothersbaugh Swamp BDA	Barree Township, Jackson Township	Large wetland supporting a unique community complex.	82
Trough Creek Gorge BDA	Cass Township, Penn Township, Todd Township	Steep gorge with interesting geologic features and diverse natural communities.	154

Discussion and Recommendations

Status of natural features today

The landscape of Huntingdon County has undergone considerable change over the course of human settlement, most notably from agriculture, timber extraction, and mining. Agriculture remains prevalent in the limestone valleys of the county, while along ridgelines, forests have been regenerating from general clear-cutting and widespread fires in the early 20th century. The condition of Huntingdon County's

ecological resources today closely reflects the history of human land use.

Natural communities have redeveloped across large swaths of the landscape previously used for timber extraction, coal mining, and iron mining. The ridges in the eastern part of the county today have large areas of contiguous forest that provide abundant habitat for forest dwelling species. These areas also help to maintain water quality in streams.

The condition of forest communities varies across the county. While many areas have re-grown, and redeveloped a broad ecological spectrum of natural forest communities, some areas remain fragmented by roads, artificial clearings, utility rights-of-way, and other management practices. Over-browsing by deer also poses a threat to biological diversity and forest regeneration in some regions of the county. However, despite the variable condition of the forests, the contiguity of land in natural condition across the ridges is a great asset to the county's ecological integrity and overall habitat value. Contiguous forested areas offer enhanced habitat value over fragmented forested areas. While a number of generalist species can succeed and reproduce in small patches of forest, many species can only utilize large, unbroken tracts of forest. Because many of the forested areas in Huntingdon County today are large, contiguous patches, they support species which are declining in other areas of the state and the continent due to lack of habitat.

The forests of Huntingdon County have the potential for even greater significance to biodiversity in the future. Some species can only find appropriate habitat in old-growth forests, because the structures they need for shelter or the food sources they require are not present in younger forests. While there are several areas in Huntingdon County today that are old growth, the large expanses of younger forests provide the potential for the future development - in ecologically strategic areas - of prime old growth habitat that can host species that are today in decline throughout the continent due to lack of habitat.

Within the matrix of forest in the county, unique communities including scrub oak shrublands, vernal pools and headwaters shrub swamps occur in conjunction with specific topographic or geologic conditions. Although these communities are limited in their extent, occupying a comparatively small portion of the natural landscape in the county, they are of particular value to the county's biodiversity because they support groups of specialist species—such as amphibians that breed only in vernal ponds, or butterflies and moths that require scrub oak shrubland habitat—that would otherwise not be present in the county. The Barrens area is especially notable for its ecological significance to the county and the region.

As agricultural cultivation is extensive in the limestone valleys of the county, few examples of the rich forest communities that once occupied these valleys remain. The rich soils and riparian settings that prevail in the valleys are distinctive from those found on the ridges and uplands of the county. The fragments of these communities that remain are facing new challenges from development and expanding infrastructure. Limestone solutional cave habitats, some of which are utilized by animal species that are rare within the state—are exceptional ecological features within the valleys of Huntingdon County.

<u>Planning for biodiversity and ecological health tomorrow</u>

Provision for the future health of ecological resources in Huntingdon County will require a combination of efforts to steward specific sites that host unique species and communities, and broader-scale efforts to

consider ecologically important landscapes and processes when developing municipal and regional land use plans.

Forests—contiguity and connectivity

In the forested landscapes, objectives for large-scale planning should include maintaining the contiguity and connectivity of natural land. Contiguity is important for the enhanced habitat values outlined above; however, for many species, it is equally critical that natural corridors are maintained that span between forest patches and that connect forests, wetlands, and waterways. The county's forested ridgelines are regionally significant migration routes for raptors and neotropical migrant bird species because they form corridors of unbroken forest. Many species—examples abound among birds, amphibians, and dragonflies— use an aquatic or wetland habitat in one phase of their life, then migrate to an upland, forested habitat for their adult life. Either habitat alone cannot be utilized unless a corridor exists between them.

Valley landscapes—ecological regeneration, water quality

Broad-scale planning efforts for the ecological health of the valley landscapes should work towards the restoration of water quality in major streams and groundwater aquifers, and the development of an ecologically designed greenway network based along riparian corridors and associated areas of riparian hydrology. Natural areas remaining in the landscape today are often isolated, and their potential to support wildlife and native biodiversity could be greatly enhanced by establishing connective corridors between them. Restoration of native vegetation to riparian corridors and buffers will help greatly in improving water quality and enhancing the habitat value of the waterways for various aquatic and semi-aquatic species. Reduction in the release of pollutants into runoff, including sediments, nutrients, and chemical contaminants, will also be necessary to improve water quality. Attending to the basic ecological functions of streams and wetlands will pay dividends by ensuring the continued capacity of the land in supporting agriculture, maintaining healthy fisheries, and providing the quality of the life for which the region is known.

<u>Evaluating proposed activity within Natural Heritage Areas</u>

A very important part of encouraging conservation of the Natural Heritage Areas identified within the Huntingdon County Natural Heritage Inventory is the careful review of proposed land use changes or development activities that overlap with Natural Heritage Areas. The following overview should provide guidance in the review of these projects or activities.

Always contact the Huntingdon County Planning Office. The County Planning Office should be aware of all activities that may occur within Natural Heritage Areas in the county, so that they may interface with the County Conservation District and other necessary organizations or agencies to better understand the implications of proposed activities. They also can supply guidance to the landowners, developers, or project managers as to possible conflicts and courses of action.

Once informed of the proposed activity, the County Planning Office should then contact Western Pennsylvania Conservancy (WPC) for direction in arranging further review of the activity. Depending upon the resources contained within the Natural Heritage Area, the agencies/entities responsible for the resource will then be contacted. The points of contact and arrangements for that contact will be determined on a case-by-case basis by the County and WPC. In general, the responsibility for reviewing natural

resources is partitioned among agencies in the following manner:

- *U.S. Fish and Wildlife Service* for all federally listed plants or animals.
- *Pennsylvania Game Commission* for all state and federally listed terrestrial vertebrate animals.
- *Pennsylvania Fish and Boat Commission* for all state and federally listed aquatic vertebrate and invertebrate animals.
- *Pennsylvania Bureau of Forestry* for all state and federally listed plants.
- *Western Pennsylvania Conservancy* for all natural communities, terrestrial invertebrates and non-listed species.

WPC and agency biologists can provide more detailed information with regard to the

location of the natural resources of concern in a project area, the needs of the particular resources in question, and about potential impacts of the project to those resources.

If a ground survey is necessary to determine whether significant natural resources are present in the area of the project, WPC or an agency biologist will recommend a survey be conducted. WPC or other knowledgeable contractors can be retained for this purpose. Early consideration of natural resource impacts is recommended to allow sufficient time for thorough evaluation. Given that some species are only observable or identifiable during certain phases of their life cycle (i.e., the flowering season of a plant or the flight period of a butterfly), a survey may need to be scheduled for a particular time of year.

If the decision is made to move forward with a project in a sensitive area, WPC can continue to work with municipal officials and project personnel during the design process to develop strategies for minimizing the project's ecological impact while meeting the project's objectives. The resource agencies in the state may do likewise.

Note that projects involving numerous activities that will require state permits will require a PNDI review. Consultation with WPC or another agency does not take the place of the PNDI review. However, early consultation and planning as detailed above can provide for a more efficient and better integrated permit review, and a better understanding among the parties involved as to the scope of any needed project modifications.

INTRODUCTION

The first steps in ensuring the protection of environmentally sensitive/ecologically important areas are identifying them and determining their importance. This information helps county, state, and municipal government, the public, and business interests plan development with the preservation of these environmentally important sites in mind. The Huntingdon County Natural Heritage Inventory identifies and maps important biotic (living) and ecological resources present in Huntingdon County. The biotic resources inherited by the citizens of this region include: areas that are left relatively undisturbed by human activity, potential habitats for species of special concern [species facing imperilment at a state and/or global level (i.e., endangered, threatened, etc.)], significant natural communities (assemblages of plants and animals), and areas important for general wildlife habitat, open space, education, scientific study, and recreation.

Many important resources present in Huntingdon County are not addressed in this inventory. Historic, cultural, educational, water supply, agricultural and scenic resources are among many the county will address through other projects and programs. This Natural Heritage Inventory focuses on the best examples of living *ecological resources* in Huntingdon County. Although agricultural lands and open space may be included as part of inventory areas, the emphasis of the designation and delineation of the areas are the ecological values present. The existence of habitat for specific plants and animals and the rarity within the state of an area's natural communities are important selection criteria for Natural Heritage Areas, but equally important is the size and contiguousness of an area containing good quality natural features. Large areas provide the backbone that links habitats and allows plants and animals to shift and move across sizable portions of the landscape.

The Natural Heritage Inventory presents the known outstanding natural features – floral, faunal, and geologic within Huntingdon County. The Inventory provides maps of the best natural communities (habitats) and all the known locations of animal and plant species of special concern (rare, threatened, or endangered) in the county. The maps do not pinpoint the site of the species of concern but rather represent critical habitat and a surrounding buffer zone intended to provide insulation between sensitive species or natural communities and existing or potential negative disturbances nearby. A summary table and a written description of the sites 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.

Particular species names, common and scientific, are provided in coordination with the appropriate jurisdictional agency. The U. S. Fish and Wildlife Service oversees the protection of federally threatened and endangered species. On the state level, plants and terrestrial invertebrates are under the jurisdiction of the Pennsylvania Department of Conservation and Natural Resources (DCNR). Mammals and birds are under the protection of the Pennsylvania Game Commission (PGC). Reptiles and aquatic animals are under the jurisdiction of the Pennsylvania Fish and Boat Commission (PFBC), and are frequently subject to unauthorized collection or poaching. They are therefore not identified within the text of this report in order to provide some measure of protection for the species.

Copies of the Natural Heritage Inventory are provided to each municipality in the county. The inventory is one tool that will aid in the creation of municipal and county comprehensive plans, and the emphasis on biological diversity should inform county and regional open space

plans already underway. Huntingdon County, its municipalities, land trusts, watershed groups, and other organizations can also use the Natural Heritage 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 the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, assists landowners in creating management plans. Such plans are based on landowner objectives (e.g. wildlife or timber management). Land managers may wish to consult this report and the Pennsylvania Natural Heritage Program (PNHP) in an effort to avoid potential conflicts within areas with species of special concern and/or identify ways of enhancing or protecting a resource.

OVERVIEW OF HUNTINGDON COUNTY NATURAL FEATURES

The climate, topography, geology and soils are particularly important in the development of ecosystems (forests, fields, wetlands) and physical features (streams, rivers, mountains) that occur in Huntingdon County. Disturbance, both natural and anthropogenic, has been influential in forming and altering many of Huntingdon County's ecosystems, causing extinction 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 physiology, soils, surface water, and vegetation of Huntingdon County.

Physiography and Geology

A physiographic province is a geographic region in which all parts are similar in geologic structure and climate and which has a unified geomorphic or surficial history. 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 regimes, certain plant communities would be expected to occur within some provinces and not others.

Huntingdon County lies entirely within the Appalachian Mountain Section of the Ridge and Valley Physiographic Province (Figure 1). The Ridge and Valley Province is distinguished by a belt of long, narrow forested ridges and broad agricultural valleys that sweep diagonally through central Pennsylvania. The ridges of this province are composed of sandstone with elevations ranging between 800-1200 feet above sea level. The valleys that dominate in this region, however, are variable depending on the type of rock that underlies them. In general, the broad valleys of the northwestern section of Huntingdon County are characterized by limestone and shale bedrock, while the valleys of the central and southeastern sections are dominated by shale bedrock.

Several habitat types in Huntingdon County are directly linked to the geology and geomorphic history of the Ridge and Valley Province, and include caves, shale barrens, and limestone

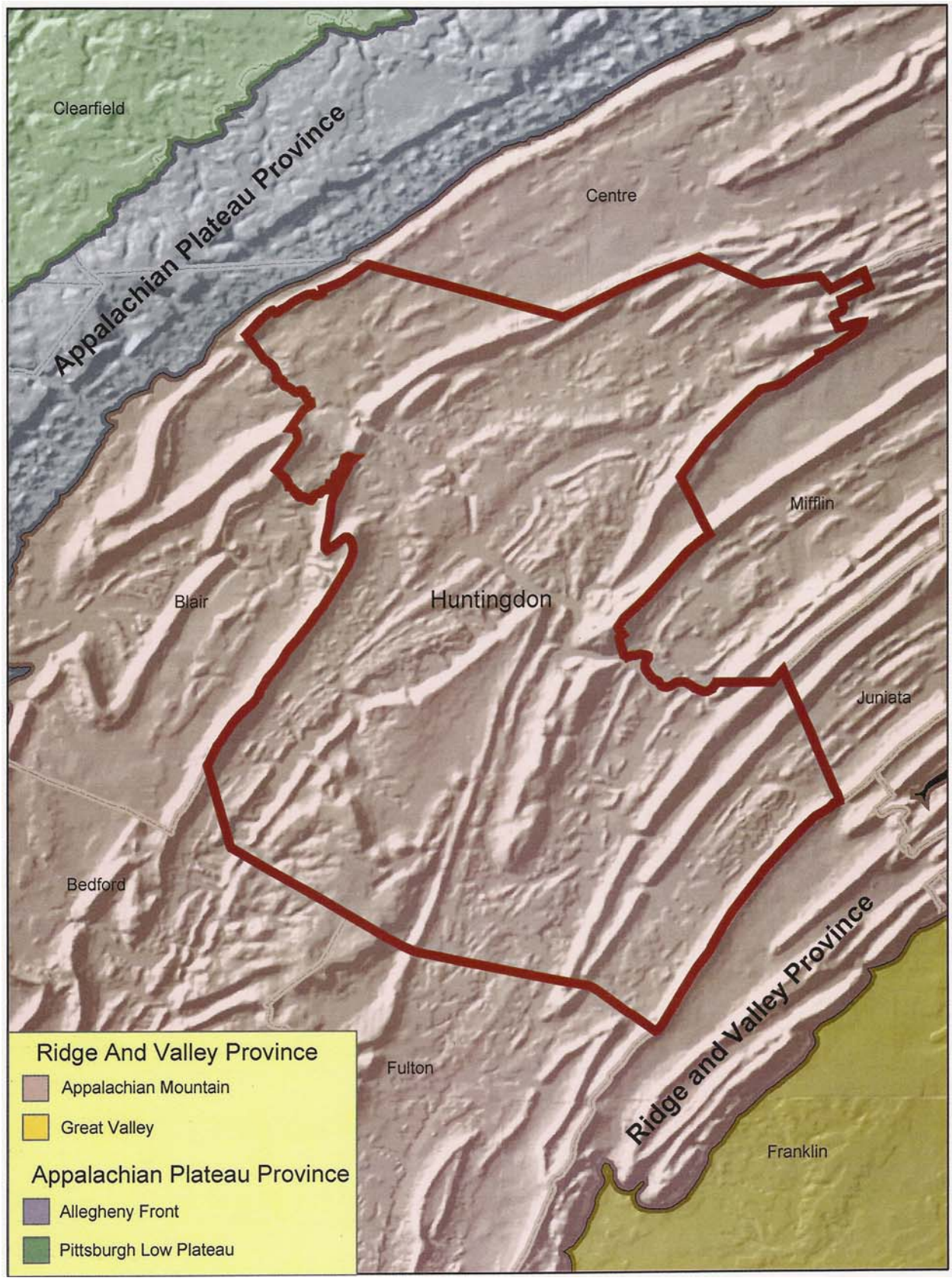


Figure 1. Physiographic provinces of Huntingdon County and surrounding areas.

barrens. These habitat types occur as discrete patches within the surrounding landscape.

Three types of caves occur within Pennsylvania: solution caves formed in limestone or dolomite by the dissolving action of water, talus caves formed within loose piles of scree and boulders on mountainsides, and tectonic caves resulting from the mechanical slippage of rock masses. The limestone valleys of the Appalachian Section of the Ridge and Valley Province host the greatest concentration of caves within the state. Huntingdon County has 104 documented caves, the highest number of any Pennsylvania county, closely followed by Centre County with 103 caves (White & White, 1999). Caves play an important ecological role by providing a necessary habitat component for a variety of wildlife. Snakes, woodrats, and other small mammals, along with an assortment of invertebrates utilize caves. Bats, the animals the general public most closely associates with caves, rely on undisturbed caverns for winter survival. Fish which dwell in underground waterways may represent special communities adapted to unique subterranean habitats (Goodrich et al. 2003).

The term 'shale barren' refers to "…certain shale slopes of the mid-Appalachian region which support a sparse scrubby growth of oak, pine, juniper, and other woody plants and between which exists an open herbaceous cover dominated shiefly by several endemic or near-endemic species" (Platt 1951). Mid-Appalachian shale barrens range from south-central Pennsylvania to southwestern Virginia and adjacent West Virginia. These barrens are restricted to the Ridge and Valley Province and generally occur on hills or ridges ranging from 300 to 700 meters (1000 to 2300 feet) in elevation (Keener 1983). The defining topographic features of a typical shale barren include: 1) a southern exposure, 2) slopes generally between 20° and 70°, 3) a covering of lithographically hard and weather resistant shale fragments, and 4) relatively sparse vegetation (Keener 1983, Dix 1990). Shale barrens are also typically undercut by a stream (Keener 1983, Dix 1990). The south-facing slopes of shale barrens receiving direct sunlight experience surface temperatures lethal to plant seedlings typical of the surrounding forest (Dix 1990). However, plant species endemic to shale barrens have adapted to survive under these harsh conditions.

Limestone barrens share a number of the physical characteristics described above for shale barrens. The shared features include: a similar elevation range of 400 to 800 meters, south-facing slopes, and vegetation tolerant of xeric conditions resulting from high surface temperatures (Bartgis 1993, Dix 1990). Limestone barrens support shale barren flora and endemics as well as endemic calciphilic species such as tall larkspur (*Delphinium exaltum*) and ebony sedge (*Carex eburnea*). As the names imply, geology is the primary distinguishing element separating limestone barrens from shale barrens.

Soils

A soil association is a natural grouping of soils based on similarities in climatic or physiographic factors and soil parent materials. It may include a number of soil types provided they are all present in significant proportions (Canadian Soil Information System 2003). The soils of Huntingdon County have been described in Soil Survey of Huntingdon County, Pennsylvania (USDA 1978). The nine soil associations recognized within the county are described in Table 2 and represented in Figure 2.

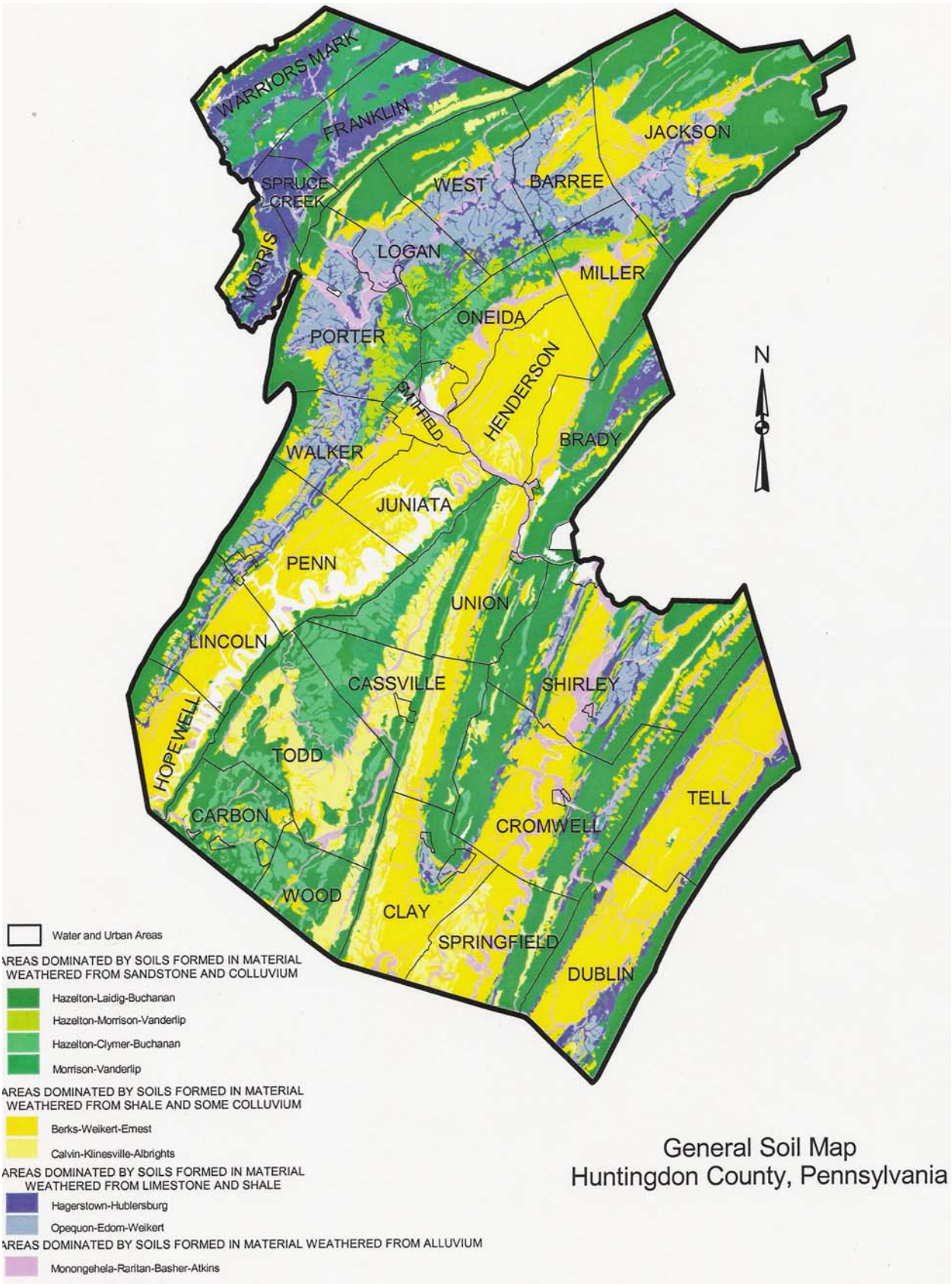


Figure 2. Soil associations of Huntingdon County.

Table 2. Soil associations of Huntingdon County.

Soil Association	Parent Materials	Description	Percentage of County	Land Use
Hazelton-Laidig-Buchanan	Sandstone, shale and colluvium	Sloping to steep, seep, well-drained to somewhat poorly-drained soils with loamy subsoil; on mountain ridges and foot slopes.	33	Primarily forest, a few small areas on foot slopes used for hay and pasture. Use limitations are slope, stones, depth to bedrock and seasonal high water table.
Hazelton-Morrison-Vanderlip	Sandstone and colluvium	Sloping to steep, deep, well-drained soils with sandy and loamy subsoil; in intermountain valleys.	9	Primarily forest; typically too stony and steep for other uses –crop cultivation limited to Morrison soils; a few areas of Vanderlip soils used for fruit orchards and as a source of sand. Use limitations are slope, depth to bedrock, hazard of groundwater contamination, and moderately rapidly to rapidly permeable subsoil.
Hazelton-Clymer-Buchanan	Sandstone, shale and colluvium	Gently sloping to moderately steep, deep well-drained to somewhat poorly-drained soils with loamy subsoil; mostly on broad mountaintops.	5	Primarily forest; best suited to trees, wildlife habitat, recreation, watershed management; farming generally limited to Clymer soils which are suitable for most crops. Strip mining within the county occurs in this association. Use limitations are slope, seasonal high water table, stones.
Morrison-Vanderlip	Sandstone and dolomitic limestone	Gently sloping to moderately steep, deep well-drained soils with loamy and sandy subsoil; in intermountain valleys.	2	Primarily forest; some areas used for crops associated with dairy farming or pasture, some areas also used as a source for sand. Use limitations are moderately rapidly to rapidly permeable subsoil, steep slopes, and hazard of groundwater contamination.
Berks-Weikert-Ernest	Shale and colluvium	Sloping to steep, shallow to deep, well-drained soils with loamy subsoil; on intermountain ridges and foot slopes.	25	Primarily forest or successional old-field. Use limitations are depth to bedrock, slope, seasonal high water table, moderately rapid permeability.
Calvin-Klinesville-Allbrights	Shale, sandstone, and colluvium	Sloping to steep, shallow to deep, well-drained to somewhat poorly- drained soils with loamy subsoil; on intermountain ridges and foot slopes.	9	Primarily forest, some successional old-field, scattered areas used for farming; best suited to trees, wildlife habitat, and recreation. Use limitations are depth to bedrock, slope, seasonal high water table, moderately rapid permeability.
Opequon-Edom-Weikert	Limestone and shale	Sloping to moderately steep, shallow and deep, well-drained soils with loamy and clayey subsoil; in valleys.	8	Principally crops. Use limitations are hazard of groundwater contamination, slope, and depth of bedrock.
Hagerstown-Hublersburg	Limestone	Gently sloping and sloping, deep, well-drained soils with loamy and clayey subsoil; in valleys.	7	Principally crops; this association has the largest area of highly productive soils that can be intensively farmed with minimum erosion protection. Use limitations are depth to bedrock, slope, hazard of groundwater contamination.
Monongahela-Raritan-Basher-Atkins	Alluvium	Gently sloping and nearly level, deep, moderately well-drained and poorly-drained soils with loamy subsoil; on terraces and flood plains.	2	Mainly crops or urban land. Use limitations are slowly permeable subsoil, seasonal high water table, flooding.

Vegetation

Forest Communities

The ridgelines hold the largest, contiguous blocks of forest in the county. As is true for other sections of the Ridge and Valley, these forests are composed largely of second growth forest stands. However, on the some of the steeper slopes, ravines, and scree (sandstone rock fields and slides) slopes, small sections of old growth forest exist. After the loss of the American Chestnut in the 1930's, oak (red, black, white, scarlet, and chestnut) came to dominate the forests on the ridges. Such is still the case in many areas but with widespread loss due to gypsy moth infestation and second and third rounds of logging, forest compositions are again changing.

Typically, chestnut oak and scarlet oak along with pitch pine, black gum, sassafras, and a mix of heaths (blueberry, huckleberry, mountain laurel) occupy the driest sites, especially high elevation southern and western exposures (Braun 1950). These oak-pine communities often become dwarfed in the places where thin soils, extreme exposure to wind and sun, and low moisture combine. Fairly extensive at high elevations in the southern Appalachians, only on several of the highest ridgetops in the county do communities approach this condition.

Moving downslope from the highest elevations, the diversity of vegetation increases with higher moisture levels. Red, black and white oak, along with hickories (shagbark, pignut, bitternut), black birch, red maple, striped maple, and witch hazel become dominate. Herbaceous growth becomes more prominent where the heath layer thins. Massive rock slides or "talus" often occur at these intermediate elevations. Prominent from many highways in the county, blocks of Tuscarora sandstone, rich in quartzite, form these talus slopes. Typically, they are lacking in vegetation except for the moss and lichen that colonize the rock faces. On northern slopes, hemlock and fern (intermediate wood fern, especially) often surround these slopes, establishing where substrate becomes available. On southern slopes, black birch and chestnut oak grow around and occasionally clustered within these formations. On the lower slopes, the mesic forest communities of red and white oak, sugar maple, basswood, white ash, and tulip become established. Often on northern slopes and in water gaps, hemlock and white pine will mix with the usually deciduous slope forests. Yellow birch, beech, and rhododendron are very common in these cool, moist communities that are distinctly like the conifer-hardwood forests of the Northeast.

The extent of remaining forest within the valleys of Huntingdon County, and within Pennsylvania as a whole, is very small. Rich, alluvial soils deposited from streams and deep colluvial soils from the erosion of the lower slopes of the ridges h made the valleys in the county prime agricultural areas. The remaining wooded groves and scattered individual trees indicate that white oak was clearly a dominant tree in these low elevation communities (Braun, 1950). Today, the largest sections of forest in these valleys follow the rivers and streams of the county.

Wetland Communities

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

pools.Floodplain forests occur along rivers and streams in low-lying areas. These locations are periodically inundated by the floodwaters of spring runoff or runoff from intense storm events. In central Pennsylvania, these forests are characterized by a canopy containing some combination of silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), tulip poplar (*Liriodendron tulipifera*), black willow (*Salix nigra*), green ash (*Fraxinus pensylvanica*), American elm (*Ulnus americana*), or box-elder (*Acer negundo*). Shrubs and vines common to these forests include spicebush (*Lindera benzoin*), ninebark (*Physocarpus opulifolius*), silky dogwood (*Cornus amomum*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicidendron radicans*). Floodplain forest communities receive severe disturbances from floodwaters including erosion, scouring by ice and debris, and/or deposition of considerable quantities of sediment and debris. Only species with adaptations or tolerance for these kinds of conditions can survive here.

Floodplains on smaller waterways receive less intense disturbances but are still periodically flooded which limits the kinds of vegetation that can occur on them. Pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), silver maple, red maple, ash, sycamore, and black walnut (*Juglans nigra*) are frequent on wetter bottomland soils associated with smaller creeks. Understory species include spicebush, violets (*Viola spp.*), nettles (*Urtica dioica, Laportea canadensis*), cut-leaved coneflower (*Rudbeckia laciniata*), golden alexanders (*Zizea aurea*) and many other wildflowers. Several species of special concern are frequently found in these habitats. In addition, floodplain forests also serve as a protective buffer against erosion; help provide cooling shade to the waterway; filter pollutants and excessive nutrients from runoff; and help alleviate flood damage along many of the area's creeks. Areas that have a history of flooding are poor choices for building sites, and are best left as natural floodplain.

Graminoid marshes are wetlands dominated by grasslike plants such as cattails (*Typha latifolia*), sedges (*Carex spp.*), and grasses. These wetlands may be found in association with streams or in areas with ground water seepages. Graminoid marshes in the county are frequently formed as successional communities following beaver dams or other impoundments. These wetlands are frequently rich in species diversity, and provide important breeding habitat for numerous amphibians, reptiles and birds.

Seepage swamps are relatively small forested or shrub-dominated wetlands found on lower slopes where water emerges at the surface in a diffuse flow. These seep areas are frequently dominated by hemlock, yellow birch and red maple, with a thick understory of rhododendron, swamp azalea (*Rhododendron viscosum*), spicebush, and/or highbush blueberry (*Vaccinium corymbosum*). Common herbs in these seepage wetlands include skunk cabbage (*Symplocarpus foetidus*), violets, manna grass (*Glyceria spp.*), various sedges (*Carex spp.*), and ferns, including cinnamon fern *(Osmunda cinnamomea*), royal fern (*O. regalis*), and sensitive fern (*Onoclea sensibilis*). Sphagnum (*Sphagnum spp.)* and other mosses typically form a thick mat in these wetlands.

Ephemeral/fluctuating or vernal pools are wetlands that fill annually from precipitation, surface water runoff, and rising groundwater (Kenney and Burne, 2000). The pools typically become completely dry through evaporation by late spring or summer. Since these ponds dry up during a portion of the year, they cannot support fish populations. During the brief time the pools contain water, and in the absence of fish, they become important breeding areas for a multitude of amphibian species (e.g., spotted salamanders, *Ambystoma maculatum*), many of which breed

solely in vernal pools. In Huntingdon County, vernal pool communities are most often found in areas underlain by the Gatesburg geologic formation.

Because wetlands are relatively rare in central Pennsylvania, they are an important refuge for plants as well as important habitat for nesting and migrating birds. Many other animals groups such as amphibians, reptiles, dragonflies, damselflies, moths, and butterflies also depend on specific wetland habitats for all or a portion of their life cycles.

Disturbance

Disturbances, whether natural or man-made, are pivotal in shaping many natural communities. The nature, scale, and frequency of disturbance are influential in the evolution and occurrence of natural communities and associated rare species. Examples of natural and anthropogenic disturbance events are presented below in Table 3.

Natural Disturbances

Natural disturbances such as fire and flooding can benefit certain natural communities and species. For example, periodic fires are needed to maintain pitch pine (*Pinus rigida*) and scrub oak (*Quercus illicifolia*) barrens. Burns in such areas stimulate new growth in these species and exclude 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.

In contrast, deer have been blamed for a number of negative impacts on Pennsylvania flora and fauna (Rhoads and Klein, 1993). Over-browsing can result in a lack of forest regeneration, a reduction in the diversity and density of forest understory, decreased songbird diversity, and a direct loss of rare plants (Yahner, 1995). For example, forests that were once dominated by oak are now converting to red maple in large part because of deer pressure (Abrams, 1998).

Anthropogenic Disturbances

In many cases, human-caused disturbance has been clearly destructive to natural habitats and the species associated with them. In Huntingdon County, logging and mining have played a major role in altering the landscape. Old-growth forest now only occurs as a few small remnant patches in Rothrock State Forest. Mining, which has altered topography and vegetation, is not as

Table 3. Examples of natural and anthropogenic disturbances (adapted from Scott et.al. 1999)*

Natural Events	*Anthropogenic Events*
fire	residential development
disease epidemic	road, trail, railroad line
flood	telephone line, utility line
drought	dam, canal
hurricane/tornado/landslide	commercial development
landslide	modern agriculture
ice storm	mining
	logging
	grazing

*Entries in italics connote reversible disturbances, while those in roman usually represent long-term

active in the county as it once was. Reclaimed mine lands now provide valuable nesting and wintering habitat for grassland bird species such as the short-eared owl (*Asio flammeus*), northern harrier (*Circus cyaneus*), eastern meadowlark (*Sturnella magna*), and Henslow's sparrow (*Ammodramus henslowii*).

Although some species, including several rare species, are aided by on-site disturbance (e.g. clearing or mowing), in general, human-caused disturbance negatively impacts natural systems. With wide-ranging anthropogenic disturbance, some plant and animal species may be completely extirpated from an area because they cannot compete or survive under newly created conditions. Human disturbances are a permanent part of the landscape, but decisions about the type, timing, and extent of future disturbances are important to the natural ecological diversity that remains.

NATURAL HERITAGE AREA CLASSIFICATION

The Natural Heritage Areas identified in this report are recognized according to the classification below. Sites chosen are those that are believed to be of sufficient size and quality (i.e., the natural systems are relatively intact) to continue as viable communities in the foreseeable future.

The inventory identifies ecologically important sites that are of significance in Huntingdon County. Some sites are significant at the state level, due to rarity or quality of their features. Also included are sites whose features may be common in the region or state, but are unique or uncommon in this county. For example, a floodplain forest along a medium-sized stream is not so uncommon within Pennsylvania that it is considered a rare community type, but there are very few of these communities remaining in Huntingdon County.

The following classification provides definitions and examples of the two types of Natural Heritage Areas designated in this report, as well as several other designations generated by other sources but mapped in this report due to their ecological significance.

Natural Heritage Areas:

BIOLOGICAL DIVERSITY AREA (BDA): An area containing and important in the support of plants or animals of special concern at state or federal levels, exemplary natural communities, or exceptional native diversity.

LANDSCAPE CONSERVATION AREAS (LCA): A large contiguous area; important because of its size, contiguous forest, open space, habitats, and/or inclusion of one or more Biological Diversity Areas, and although including a variety of land uses, has not been heavily disturbed and thus retains much of its natural character.

Other Designations:

MANAGED LANDS: owned or leased properties that are included in this report because of their importance, or potential importance, to the overall maintenance and protection of ecological resources in Huntingdon County. Managed lands include:

- Public properties established and managed to a large extent for natural resources, and/or those that have the potential to manage such resources in order to maintain or enhance important ecological assets in the county, and by this evaluation are deemed to be among the most ecologically valuable of public properties. Examples include: state game lands, state forests, state parks, national historic sites, county or municipal park lands.

- Private properties held by private organizations concerned with the management and protection of natural resources, and which upon evaluation are selected to be among the most ecologically "valuable" of such properties. Examples include: private nature preserves, private environmental education centers.

- Dedicated Areas are managed lands, public or private, where the owners' stated management objectives are the protection of natural ecological systems and biological diversity. Dedicated Areas are among the most important managed lands since plans to protect the ecological resources therein already exist. An evaluation of the stated management criteria and existing practices of the owner/manager determines whether a site is a Dedicated Area.

Managed Lands do not necessarily include, nor are they necessarily included within, identified Biological Diversity Areas. However, these properties are often large (e.g., essentially all state game lands) and, for this and potentially other reasons, are ecologically important in a general sense. The ecological importance and value of some Managed Lands stems from their association with an area identified for natural heritage significance, e.g., a Managed Land within the boundaries of a Biological Diversity Area. Managed Lands are legally bounded properties, and are not to be confused with areas of natural heritage importance, which are identified by their ecological significance. Many Managed Lands have the potential to become even more ecologically valuable if their management becomes more sensitive to biological diversity issues and protection.

IMPORTANT BIRD AREA (IBA): a site that is part of a global network of places recognized for their outstanding value to bird conservation. An IBA can be large or small, public or private and must meet one of several objective criteria. Since the IBA program is voluntary, there are no legal or regulatory restrictions.

The Pennsylvania Important Bird Area Program is administered by the Pennsylvania Audubon Society. The information and definitions presented here are from their brochure and book, available on their website (Audubon 2002).

To qualify as an IBA in Pennsylvania, a site must satisfy at least one of several criteria, as follows (Crossley 1998):

1. Any site having exceptional concentration* and/or diversity of birdlife when breeding, in winter, or during migration
2. Sites supporting state or federal endangered or threatened species
3. Sites supporting one or more species on Pennsylvania's "special concern" list
4. Sites containing representative, rare, threatened, or unique habitats, with birds characteristic of those habitats

5. Sites where long-term avian research or monitoring is in process

   *Defined as: 2,000 waterfowl (at one time), 100 shorebirds (at once), 50 breeding pairs of wading birds, or 10,000 migrant raptors/season.

Background:

Pennsylvania's Important Bird Area (IBA) Program is part of a dynamic worldwide effort to identify and protect outstanding habitats for birds and all wildlife. The IBA concept was first developed in Europe (in 1985) by BirdLife International. The program's resounding success in the Old World quickly spread to North America, where the IBA Program has become pivotal to a continent-wide bird conservation strategy. Working in partnership with the American Bird Conservancy, the National Audubon Society has already identified over 400 Important Bird Areas in the U.S.

Pennsylvania was the first state to develop an IBA program in the United States. Based on strict scientific criteria (given above), a group of scientific advisors (known as the Ornithological Technical Committee) selected 73 IBA sites encompassing over one million acres of public and private lands. These areas include migratory staging areas, winter feeding areas and roost sites, and prime breeding areas for songbirds, wading birds and other species. They also include critical habitats, such as spruce-fir bogs, tidal salt marsh lands, bottomland hardwood swamps, and open grasslands. The technical committee, on an ongoing basis, will select additional IBA sites in Pennsylvania.

More information on the Important Bird Area program in Pennsylvania can be found on their website, at http://pa.audubon.org/Ibamain.htm.

GEOLOGIC FEATURES include those areas that illustrate regional geologic processes, landforms or scenery and are those that are recognized as outstanding in Pennsylvania by Geyer and Bolles (1979, 1987). These places are not necessarily of importance to biological diversity and are therefore not considered Natural Heritage Areas. However, they are included as natural history features in the county.

METHODS

The methods used in the Huntingdon County Natural Heritage Inventory followed established Pennsylvania Natural Heritage Program procedures, which are based on those used by Anonymous (1985), G.A. Reese et al. (1988), and A.F. Davis et al. (1990). Natural Heritage Inventories proceed in three stages: 1) site selection based on existing data, map and aerial photo interpretation, recommendations from local experts, and aerial reconnaissance; 2) ground surveys; and 3) data analysis and mapping.

Site Selection

Inventory site selection is guided by information from a variety of sources. A review of the Pennsylvania Natural Diversity Inventory database (see Appendix II) determined what locations were previously known for species of special concern and important natural communities in

Huntingdon County. Local citizens knowledgeable about the flora and fauna of Huntingdon County were contacted for site suggestions. Individuals from academic institutions and state and federal agencies that steward natural resources (Penn State University, Juniata College, PA Game Commission, PA Bureau of Forestry, US Army Corp of Engineers) were also contacted to obtain information about lands or resources they manage. National wetland inventory maps, compiled by the US Fish and Wildlife Service, were used to locate wetlands of potential ecological significance within the county. General information from other sources such as soil maps, geology maps, earlier field studies, and published materials on the natural history of the area helped to provide a better understanding of the area's natural environment.

Aerial photographs were reviewed to identify sites for ground survey. Initial study of aerial photos revealed large-scale natural features (e.g., contiguous forest, wetlands, vernal pools, shale barrens), disturbances (e.g., utility line rights-of-way, strip mines, timbered areas) and a variety of easily interpretable features. Some sites could be eliminated from consideration if they proved to be highly disturbed or fragmented or purely attributable to human-made features (e.g., impoundments, clearings, farm fields).

Once preliminary site selection was completed, reconnaissance flights over chosen areas of the county were undertaken. Information concerning extent, quality, and context within the landscape can be gathered easily from the air. Shale barrens, limestone outcrops and cliffs, and vernal pools were of primary interest during fly-overs in Huntingdon County. Based on these aerial surveys, some sites were eliminated from consideration if they proved to be highly disturbed, fragmented, or lacked the targeted natural feature.

Ground Surveys

Areas that were selected as inventory sites were scheduled for ground surveys. Biologists conducted numerous field surveys throughout Huntingdon County during 2001 and 2002. Landowners were contacted and the sites were examined to evaluate the condition and quality of the habitat and to classify the plant communities present. Field survey forms (Appendix III) were completed for each site. Boundaries for each site were drawn on USGS 1:24,000 topographic maps. If any species of special concern was documented, and if the population was of sufficient size and vigor, a voucher specimen was collected to be archived in the herbarium of the Carnegie Museum of Natural History.

The flora, fauna, level of disturbance, approximate age of forest community, and local threats were among the most important data recorded for each site. In cases where landowner permission for site visits was not obtained, or enough information was available from other sources, sites were not ground surveyed.

Data Analysis

Data on species of special concern and natural communities obtained during the 2001 and 2002 field seasons was combined with prior existing data and summarized. All sites with rare species and/or natural communities, as well as exceptional examples of more common natural communities were selected for inclusion in Biological Diversity Areas (BDAs). Data on the core habitat area for each site selected was then compiled in a GIS format using ESRI ArcView 3.2a software. The boundaries defining each BDA were determined based upon physical factors (e.g.,

slope, aspect, hydrology), ecological factors (e.g., species composition, disturbance regime), and buffer specifications provided by jurisdictional government agencies. Buffers tend to vary in size and extent depending on the physical characteristics and ecological factors in any given site. For instance, two wetlands of exactly the same size occurring in the same region may require very different buffers if one receives mostly ground water and the other mostly surface water, or if one supports migratory waterfowl and the other does not. BDAs were then assigned a significance rank to help prioritize future conservation efforts. This ranking is based on the extent, condition, and rarity of the unique feature, as well as the quality of the surrounding landscape (see Appendix I for further description of ranks).

Landscape Conservations Areas (LCAs) were designated around landscape features that function as a linking element within an aggregation of BDAs, and/or large blocks of contiguous forest. LCAs designated around contiguous forest were identified by means of GIS analysis. Forested areas in Huntingdon County were first identified through a classification of Pennsylvania's National Land Cover Database, downloaded from the Pennsylvania Spatial Data Access website (http://pasda.psu.edu). Data regarding the location of roads and power line and utility rights-of-way, provided by the Huntingdon County Planning Office, were then factored into the analysis to identify contiguous blocks of forest. The identified forest blocks were segregated into six size classes: 0-1500 ac., 1501-3000 ac., 3001-4500 ac., 4501-6,000 ac., 6,001-10,000 ac., 10,000+ ac. Contiguous forest blocks greater than 4500 ac., located along some linking landscape feature, such as a mountain ridge or stream, were considered for inclusion in an LCA.

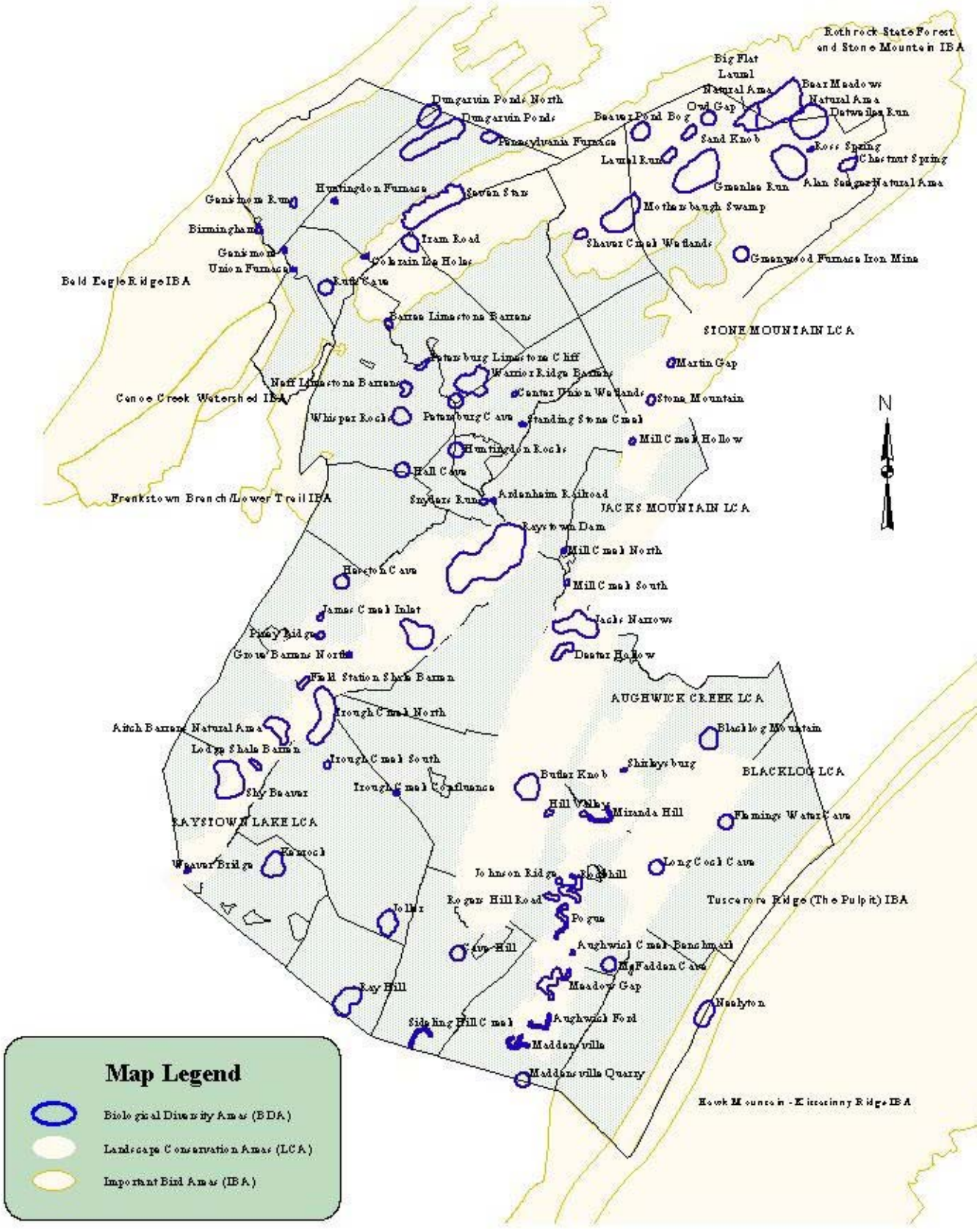


Figure 3. Biologiscal Diversity Areas, Landscape Conservation Areas, and Important Bird Areas in Huntingdon County, Pennsylvania.

RESULTS

DESCRIPTION OF BROAD-SCALE CONSERVATION AREAS

LANDSCAPE CONSERVATION AREAS

Landscape Conservation Areas (LCAs) represent large areas of the landscape that are of higher ecological quality than other areas of similar size. Five LCAs containing a high number of rare element occurrences and/or large areas of unfragmented forest habitat have been designated in Huntingdon County.

Aughwick Creek LCA

The boundary of this LCA follows the watershed boundary of Aughwick Creek within Huntingdon County. This area captures the numerous shale barrens with their associated endemic species and the high-quality aquatic communities that occur in Aughwick Creek. Of the 14 species of mussels that occur in the Atlantic Slope drainage, seven species are found in Aughwick Creek, including 4 state rare species. The free-flowing character of the stream maintains habitat able to support the rich diversity of freshwater mussels, and allows for the continued evolution of the geomorphic features that are so important to the ecological areas linked to the stream (meanders, steep, down-cut slopes, and riparian habitats). It also supports a rich diversity of freshwater snails, some of which are indicative of very high quality environments.

Threats and Stresses

The presence of dense freshwater mussel populations throughout the length of Aughwick Creek is indicative of high water quality. Freshwater mussel populations have been declining over the past century throughout North America. Generally, in smaller watersheds the reason for this decline has been largely attributed to increased sedimentation, which renders stream bottoms unsuitable as mussel habitat. Increases in siltation can also indirectly impact freshwater mussel communities by interfering with host fish – mussel interactions. Increased sedimentation can reduce the abundance, diversity, and reproduction of fish, including the host fish that are necessary for protection and dispersal of virtually all freshwater mussels during their larval stage. The increased turbidity associated with suspended sediment loads also interferes with the visual cues used by both adult mussels and host fish in the transfer of the glochidia or mussel larvae (Brim-Box and Mossa 1999).

The invasive plant species Japanese knotweed (*Polygonum cuspidatum*) and purple loosestrife (*Lythrum salicaria*) are established along the lower reaches of Aughwick Creek, roughly from Shirleysburg on downstream.

Recommendations

Landowners with streamside property within the Aughwick Creek watershed might want to consider enrolling in a privately funded stream bank fencing program currently administered by the Western Pennsylvania Conservancy's Watershed Assistance Center. Benefits of increased stream fencing would include a reduction in stream bank erosion, improved water quality

through the reduction of siltation and nutrient runoff, and improved herd health through the prevention of black leg, mastitis and other ailments.

Invasive species need to be monitored along the length of the creek and efforts taken to prevent their spread to other parts of the creek.

Currently, land use within the watershed is compatable with maintaining the high-quality conditions within Aughwick Creek. Any planning of future development within the watershed should seek to avoid potential impacts to both the physical character and water quality of Aughwick Creek.

Blacklog LCA
Jacks Mountain LCA
Stone Mountain LCA

These areas have been designated as LCAs in recognition of the extensive areas of contiguous forest contained within their boundaries. These areas of contiguous forest range from 6000 to 10,000+ acres and represent some of the most ecologically significant regions of the county.

Forest can be divided into two categories: edge and core. Today, the majority of Pennsylvania's forests are considered edge forest (occurring within 100 meters of a forest edge), adjacent to fields, rights-of-way, roads, railroads, residential and commercial developments, or other non-forest lands. Edge forest habitat is used by adaptable, generalist species that prey upon, compete with, or disrupt the nesting of interior forest birds such as scarlet tanagers, black-throated blue warblers, ovenbirds, and wood thrushes. The result is that 11 percent of Pennsylvania's woodland nesting bird species have declined significantly since 1980. The number of woodland salamander is also reduced in fragmented forests where changes in moisture and cover reduce habitat quality (Goodrich et al. 2003). Smaller forest fragments tend to support higher numbers of white-footed mice, which is linked to a higher incidence of Lyme-infested ticks (Allan 2003).

The unfragmented forest contained within these LCAs represents a high percentage of core forest relative to edge forest. Seventy percent of the core forest remaining in the state is found in patches of 5,000 acres or less (Goodrich et al. 2003). Given that context, it is hard to place too much emphasis on the importance of the core forests within these BDAs. Many animal species need blocks of forest larger than 5,000 acres to maintain viable populations, including goshawk, fisher, barred owl, and bobcat (Goodrich et al. 2003). Such areas are also important for the preservation of relatively pristine original habitat that supports neotropical migrating songbirds, small mammals, and invertebrates (Heilman et al. 2002). Large areas of contiguous forest are also important for the maintenance of vital ecosystem processes such as nutrient cycling, pollination, predator-prey interactions, and natural disturbance regimes (Heilman et al. 2002). In addition, large forested areas also serve to filter and regulate the flows of watersheds and store large quantities of carbon.

Threats and Stresses

Activities such as development, road building, and large-scale timber harvesting that result in forest fragmentation will reduce the contiguity that makes these LCAs ecologically significant. A significant portion of the land encompassed by these LCAs is under private ownership (see

Table 4. Ownership of lands within forested Landscape Conservation Areas.

Landscape Conservation Area	Total Area	Private Ownership	Public Ownership	
			State Game Lands	State Forests
Blacklog	15,731 acres	15,244 acres	0 acres	487 acres
Jacks Mountain	34,662 acres	13,402 acres	614 acres	20,646 acres
Stone Mountain	11,565 acres	6003 acres	1856 acres	3706 acres

Table 4 for a breakdown of private and public ownership of lands within these LCAs), which presents special challenges with regard to biodiversity conservation. The current national trend is toward fragmentation of forest ownership; both the number of forest owners and the number of parcels of forest land under 50 acres are increasing (Best and Wayburn 2001). Unfortunately, the fragmentation of larger forest tracts into smaller parcels is both an expression of and fuel for further development of other uses in forest areas (Best and Wayburn 2001). Fragmentation affects the ecological functions of both the fragmented parcel and its neighbors, even if those tracts are sizable and well forested. However, the good news is that a survey conducted in the early 1990s revealed that 79 percent of non-industrial private forest owners in Pennsylvania thought that "Forests have a right to exist for their own sake," and only nine percent of listed timber sale as a primary reason for owning forest (A.E. Luloff, cited in PA Wildlands Recovery Project 2003).

Recommendations

A number of resources, listed in Appendix VIII, are available to private landowners interested in sustainably managing their forestlands for biodiversity conservation, forest health, and forest products including timber, mushrooms, and high-value medicinal herbs. A good place to start is the Forest Stewardship Program, which assists landowners in developing a forest management plan based on their envisioned goals for their land.

The Bureau of Forestry, which manages a significant portion of the lands contained within these LCAs, recognizes sustainability as the overarching goal of the management of state forests. The Pennsylvania Game Commission, also responsible for managing public lands within these LCAs, focuses on management practices aimed at enhancing habitat for wildlife. Both of these agencies should take into consideration the uniqueness of the contiguous forest contained within these areas during management decision-making.

Raystown Lake LCA

This area encompasses the numerous shale barrens with their associated endemic species, floodplain habitat, and contiguous upland forest areas surrounding Raystown Lake and the Raystown Branch of the Juniata River between the dam and the Juniata River. The majority of this LCA falls within public lands managed by the Army Corp of Engineers, the Bureau of Forestry, and the Bureau of State Parks.

Threats and Stresses

A number of potential threats to the species and natural communities identified within this LCA have been described under the description of the Raystown Dam Biological Diversity Area, on page 48. However, this area is currently under no imminent threat. The bulk of this LCA, and all but one of the individual species occurrences, are located on lands managed by the Army Corp of Engineers. The Corp is aware of the presence of the rare species and communities, and is managing for their conservation. The shale barrens within the site have been designated as Natural Areas.

Recommendations

Any proposed development projects within this LCA should be carefully reviewed for potential impacts to the rare species and exemplary natural communities linked to Raystown Lake, Trough Creek, and surrounding landscape.

IMPORTANT BIRD AREAS OF HUNTINGDON COUNTY

Huntingdon County includes portions of four Important Bird Areas (see page pg. 11 for background regarding the IBA designation, including selection criteria). As these areas typically span several municipal divisions, they are described separately from the results grouped by municipality. As can be seen in Figure 3, several IBAs extend beyond Huntingdon County; features described below pertain to the entire area and are not necessarily confined to Huntingdon County.

Note: the following information is adapted from the Audubon Society of Pennsylvania IBA site descriptions (Audubon 2002).

Bald Eagle Ridge

Bald Eagle Ridge has varied habitats, including mature forests, late successional stage fields, wetlands, perennial and intermittent streams, and hillside seeps. In some areas, it appears that the entire side of the ridge is seeping water. These areas remain open all year and are important for amphibians, turkeys, grouse, woodcock, and other species that are dependent on open water for survival during the winter. The large expanses of unfragmented forest are important habitat for breeding Neotropical migrant species such as Cerulean Warbler, Worm-eating Warbler, Wood Thrush, Scarlet Tanager, and Ovenbird. Bald Eagle Ridge is also an important flyway for raptors. Counts of Golden Eagles are some of the highest recorded in eastern North America and consistently exceed those of migration count sites along the Kittatinny Ridge.

This area satisfies the following IBA criteria:

- Exceptional concentration/diversity of birdlife: It is a major flyway for raptor migration in the northeastern US. 174 species of birds have been documented along this ridge, including high counts of Golden Eagle and Broad – winged Hawk.

- Unique or representative habitat: The area provides large expanse of unbroken forest for forest interior species, such as Cerulean Warbler and Worm – eating Warbler, and provides spring seeps valuable to Woodcock and Turkey.

Conservation Concerns
PennDOT plans to construct a Traffic Improvement Project on Rt. 220 in Huntingdon and Blair counties. Part of this project is an alignment including 17.5 miles of limited-access highway on the ridgetop of Bald Eagle Mountain. The Fish and Wildlife Service has stated that this project "will have substantial adverse effects on aquatic and terrestrial wildlife habitat that will not, and in some cases cannot, be mitigated." In October 1997, the Federal Highway Administration approved the building of the four-lane highway up and over the mountain. The only hurdle now left for this project is approval from the Army Corps of Engineers. There is no official management plan for this area, other than Game Commmission management of SGL 278.

Frankstown Branch

The site is an outstanding example of a Ridge and Valley riparian forest. The combination of steep, wooded slopes, floodplain forests, and high soil moisture produces a diverse, healthy lowland riparian ecosystem. The site includes an 11-mile stretch of the Frankstown Branch of the Juniata River between Water Street and Williamsburg. A Rails-to-Trails, known as the "Lower Trail" follows the riverbank the entire way. To the west the site boundary is a low ridge. To the east, the site boundary is the high ridgeline of Tussey Mountain, up to 1500 feet above the river. Along the northern boundary of the site the river valley is quite narrow, with little human disturbance other than the trail. To the south, the river meanders through mostly forested riparian habitat that contains some agriculture and sparse human settlements. The site contains historic remains of early transportation and industry.

This site hosts an impressive concentration of breeding riparian species. Breeding bird counts of up to 200 per hour have been tallied during walking tours along the Lower Trail. Species present at exceptional breeding concentrations include E. Wood-Pewee, Acadian Flycatcher, Warbling Vireo, Red-eyed Vireo, Blue-gray Gnatcatcher, Wood Thrush, Yellow Warbler, Cerulean Warbler, American Redstart, Louisiana Waterthrush, and Baltimore Oriole. Other breeding birds include Wood Duck, Least Flycatcher, Yellow-throated Vireo, Winter Wren, Northern Parula Warbler, Yellow-throated Warbler, Worm-eating Warbler, and Orchard Oriole. In addition to breeding birds, the number of Neotropical migrants during the early portion of spring migration is typically much higher at this site than in surrounding areas due to early leaf-out along the river. This site hosts one of Pennsylvania's most important Cerulean Warbler breeding areas, with estimates of 50-60 breeding pairs along this 11-mile corridor.

This area satisfies the following criteria:

- Exceptional concentration of riparian species breeding, and high diversity and abundance of birds in migration. Surveys in 1998 and 2000 found 36 and 43 territorial male Cerulean Warblers, respectively.

- Exceptionally diverse Ridge and Valley forest ecosystem, including mature riparian, steep slope, and ridgetop.

Conservation Concerns
This site was identified as an Important Bird Area by the Ornithological Technical Committee in October 2001. Land use includes agriculture, residential development, recreation and wildlife conservation. Habitat destruction from residential development is a threat to some portions of

this site. The Juniata Valley Audubon Society has officially "adopted" this site for the purpose of stewardship and bird monitoring.

Rothrock State Forest (part) and Stone Mountain

This site includes Thickhead Wild Area and Alan Seeger Natural Area in the heart of Rothrock State Forest, southeast of State College, as well as the Stone Mountain ridgeline. Thickhead Wild Area is a mountainous region of unfragmented deciduous and mixed forest. It contains three natural areas; Detweiler Run Natural Area, an isolated forest/stream site characterized by virgin white pine and eastern hemlock along with a heavy undergrowth of rhododendron; Bear Meadows Natural Area, an unusual boreal conifer/shrub swamp; and Big Flat Laurel Viewing Area, an area of high plateau pine, heath, and mountain laurel. The 390-acre Alan Seeger Natural Area consists of virgin oak-hickory, maple, and hemlock-pine forest with rhododendron understory.

The Thickhead Wild Area contains some of the best remaining stands of old-growth in central Pennsylvania and large sections of unfragmented forest important for forest-interior species. Stone Mountain ridgeline is one in the system of ridges funneling southbound migrant raptors. Documented numbers average 2,000-4,000 in fall migration; however, the area is not monitored daily, so numbers are likely higher.

This area satisfies the following IBA criteria:

- Exceptional concentration/diversity of birdlife: large numbers of Raptors (fall migration: 5000+ est., 2000+ recorded), including Broad-winged Hawk (1000+), Red-tailed Hawk (1000+), Sharp-shinned Hawk (1000+), and American Kestrel (100+).

- Special Concern Species: Osprey (fall migration: ~78), Bald Eagle (fall migration: ~7), Northern Goshawk (B – 2 pair), Northern Harrier (B – 2 pair).

- Unique or representative habitat: the area contains a large block of representative natural forest habitat. Species dependent on this habitat that have been documented from the area include: Acadian Flycatcher, Red-eyed Vireo, Blackburnian Warbler, Ovenbird, Canada Warbler, Scarlet Tanager, Solitary Vireo, Black-throated Blue Warbler.

- Long term avian research: three Breeding Bird Survey routes are conducted within the forest along with a Breeding Bird Census and two special areas projects.

Conservation Concerns

Development pressure from State College for commercial, residential, and recreational use is a threat. Recreational overuse is a growing problem with the use of ATVs. A large deer population contributes to forest understory degradation. Access is limited or difficult in much of the area. Detweiler Run Natural Area, Bear Meadows Natural Area, and Big Flat Laurel Natural Area could be expanded into surrounding Rothrock Sate Forest land to provide more quality habitat for interior forest-nesting species and neotropical migrants. Land acquisitions surrounding these areas also would greatly increase the value to interior forest-nesting species and neotropical migrants in these high-quality sites.

Tuscarora Ridge (The Pulpit)

Tuscarora Ridge, known by birders as "The Pulpit," lies at the southern end (in Pennsylvania) of a ridge system that acts as a major migratory funnel for raptors. Tuscarora Ridge extends from Juniata County in central Pennsylvania into Maryland. Farther east lies Kittatinny Ridge, which includes Hawk Mountain and Waggoner's Gap, and many fall migrants from there and other westerly ridges converge near Tuscarora Summit. The Pu;pit is a rocky mountaintop area with great visibility for hawk-watching.
Average numbers of migrant raptors for the years 1973-1995 were greater than 6,000 in the fall, with a high of over 12,000 in 1978. Seventeen species are regularly observed. Spring migration numbers averaged about 1,000 for all species between 1977 and 1995, with a high of over 2,300 in 1979.

This area satisfies the following IBA criteria:

- Exceptional concentration/diversity of birdlife: large numbers of Raptors (fall migration: 6000 ±; spring migration: 1000 +), including Broad-winged Hawk (fall migration: 2,500; spring migration: 500), Sharp-shinned Hawk (fall migration: 1,800; spring migration: 125) and Red-tailed Hawk (fall migration: 1,260; spring migration: 200). 17 species of birds have been observed along this ridge.

- Special Concern Species: Northern Harrier (fall migration: 150; spring migration: 25) Bald Eagle (fall migration: 100; spring migration: 2), Osprey (fall migration: 150; spring migration: 90), and Peregrine Falcon (fall migration: 15; spring migration: 2).

- Long-term raptor monitoring conducted daily during fall migration for the past 25+ years.

Conservation Concerns
Conservation of this IBA should be focused on the entire ridge system, not only the immediate site, which is highlighted for expediency only. The hawkwatch site is owned by the Maryland Hang Gliding Association and is used for recreation and birding. The surrounding area includes both public (state forest) and private lands. Forest pests and disease, recreational development/overuse, and excessive or inappropriate forestry practices could potentially affect the use of the larger ridge system by migrants.

RESULTS BY MUNICIPALITY

Detailed maps and description of Huntingdon County's Natural Heritage Areas follow, organized by township. For each township a map, a summary table, and full report are provided. Townships are grouped by planning region (see Figure 4), and arranged alphabetically within each region. Boroughs are treated together with an adjacent township due to their small size. A summary of Natural Heritage Areas organized by planning regions is presented in Table 4.

Biological Diversity Areas, Landscape Conservation Areas, Managed Lands, Dedicated Areas, and Important Bird Areas are indicated on the municipality maps and are labeled in bold. Plant species nomenclature follows Rhoads and Block (2000).

SUMMARY TABLE CONVENTIONS

A summary table of sites precedes each map and lists identified Biological Diversity Areas, Landscape Conservation Areas, and Managed Lands.

- Managed lands are listed after the Natural Heritage Areas; among managed lands, Dedicated Areas are denoted by "DA".
- Following each site name is the site's relative significance. Table 1 (pg. xii) summarizes sites by significance category. Definitions of the significance categories are outlined in Appendix I.
- Listed under each site name are any state-significant natural communities and species of special concern that have been documented within the area.
    - see Appendix IV for a list of Natural Communities recognized in Pennsylvania.
    - Some species perceived to be highly vulnerable to intentional disturbance are referred to as "special animals" or "special plants" rather than by their species name. Within each site these species are numbered.
    - The PNDI (Pennsylvania Natural Diversity Inventory) ranks and current legal status (detailed in Appendix V) are listed for each community and species.
- The text that follows each table discusses the natural qualities of the site and includes descriptions, potential threats, and recommendations for protection.

This report does not intend to encourage visitation of private lands without explicit permission of the landowner. Also, the report does not contain all the detailed information required to manage the species of special concern. If more information is needed, ecological professionals at the Western Pennsylvania Conservancy or at the state natural resource agencies should be contacted. Hopefully, this report will encourage communication between ecological professionals—at the Conservancy and within state natural resource agencies—and municipalities, organizations, and individuals.

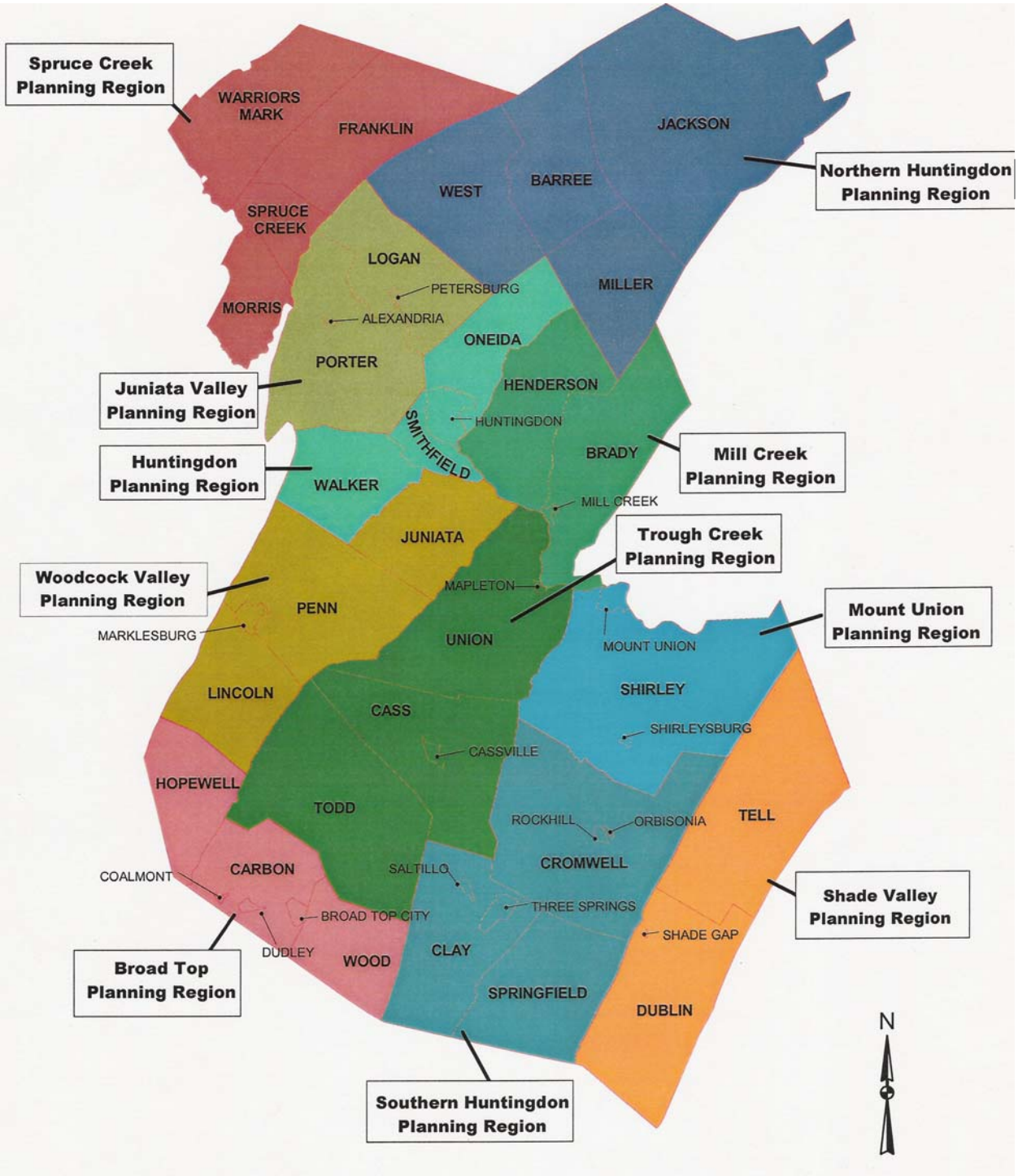


Figure 4. Huntingdon County planning regions.

Table 5. Natural Heritage Areas organized by planning region.

Planning Region	*Municipality*	*Natural Heritage Areas*	*Page Number*
Broad Top	Broad Top City Borough	*none*	30
	Coalmont Borough	*none*	30
	Carbon Township	Kenrock BDA	30
		Raystown Lake LCA	
	Dudley Borough	none	30
	Hopewell Township	Shy Beaver BDA	34
		Weaver Bridge BDA	
		Raystown Lake LCA	
	Wood Township	Rays Hill BDA	38
Huntingdon	Huntingdon Borough	Huntingdon Rocks BDA	42
	Oneida Township	Center Union Wetlands BDA	42
		Petersburg Cave BDA	
		Standing Stone Creek BDA	
		Warrior Ridge Barrens BDA	
	Smithfield Township	Huntingdon Rocks BDA	46
		Snyders Run BDA	
		Raystown Dam BDA	
		Raystown Lake LCA	
	Walker Township	Hall Cave BDA	49
Juniata Valley	Alexandria Borough	*none*	58
	Logan Township	Barree Limestone Barren BDA	53
		Petersburg Cave BDA	
		Tram Road BDA	
		Warriors Ridge Barrens BDA	
	Petersburg Borough	*none*	58
	Porter Township	Barree Limestone Barren BDA	58
		Hall Cave BDA	
		Neff Limestone Barren BDA	
		Petyersburg Cave BDA	
		Petersburg Limestone Cliff BDA	
		Whisper Rocks BDA	
Mill Creek	Brady Township	Jacks Narrows BDA	65
		Mill Creek North BDA	
		Mill Creek South BDA	
		Jacks Mountain LCA	
		Stone Mountain LCA	
	Henderson Township	Ardenheim Railroad BDA	70
		Mill Creek Hollow BDA	
		Mill Creek North BDA	
		Raystown Dam BDA	
		Raystown Lake LCA	
		Stone Mountain LCA	

Table 4. (continued)

Planning Region	*Municipality*	*Natural Heritage Areas*	*Page Number*
Mill Creek	Mill Creek Borough	*none*	65
Mount Union	Mount Union Borough	Jacks Mountain LCA	75
	Shirley Township	Blacklog Mountain BDA	75
		Miranda Hill BDA	
		Shirleysburg BDA	
		Aughwick Creek LCA	
		Jacks Mountain LCA	
	Shirleysburg Borough	*none*	75
Northern Huntingdon	Barree Township	Motherbaugh Swamp BDA	80
		Shaver Creek Wetland BDA	
	Jackson Township	Alan Seeger Natural Area BDA	84
		Beaver Pond Bog BDA	
		Chestnut Spring BDA	
		Detweiler Run BDA	
		Greenlee Run BDA	
		Greenwood Furnace Iron Mine BDA	
		Laurel Run BDA	
		Motherbaugh Swamp BDA	
		Owl Gap BDA	
		Ross Spring BDA	
		Sand Knob BDA	
	Miller Township	Martin Gap BDA	96
		Stone Mountain BDA	
		Stone Mountain LCA	
	West Township	*none*	100
Shade Valley	Dublin Township	Neelyton BDA	104
		Blacklog LCA	
	Shade Gap Borough	none	104
	Tell Township	Flemings Water Cave BDA	108
		Blacklog LCA	
Southern Huntingdon	Clay Township	Cave Hill BDA	112
		Sideling Hill Creek BDA	
		Jacks Mountain LCA	
	Cromwell Township	Aughwick Creek Benchmark BDA	116
		Butler Knob BDA	
		Hill Valley BDA	
		Johnson Ridge BDA	
		Long Cock Cave BDA	
		McFadden Cave BDA	
		Miranda Hill BDA	
		Pogue BDA	
		Rockhill BDA	

Table 4. (continued)

Planning Region	*Municipality*	*Natural Heritage Areas*	*Page Number*
Southern Huntingdon	Cromwell Township	Rogers Hill Road BDA	116
		Aughwick Creek LCA	
		Blacklog LCA	
		Jacks Mountain LCA	
		State Game Land #99	
	Orbisonia Borough	*none*	116
	Rockhill Borough	*none*	116
	Saltillo Borough	Jacks Mountain LCA	112
		State Game Land #99	
	SpringfieldTownship	Aughwick Ford BDA	124
		Maddensville BDA	
		Maddensville Quarry BDA	
		Meadow Gap BDA	
		Aughwick Creek LCA	
	Three Springs Borough	*none*	112
Spruce Creek	Birmingham Borough	*none*	143
	Franklin Township	Colerain Ice Holes BDA	129
		Dungarvin Ponds BDA	
		Dungarvin Ponds North BDA	
		Huntingdon Furnace BDA	
		Pennsylvania Furnace BDA	
		Seven Stars BDA	
	Morris Township	Union Furnace BDA	136
		Rothrock State Forest	
	Spruce Creek Township	Colerain Ice Holes BDA	139
		Genismore BDA	
		Ruth Cave BDA	
	Warriors Mark Township	Birmingham BDA	143
		Dungarvin Ponds North BDA	
		Genismore Run BDA	
Trough Creek	Cassville Borough	*none*	148
	Cass Township	Trough Creek Confluence BDA	148
		Trough Creek Gorge BDA	
		Jacks Mountain LCA	
		Raystown Lake LCA	
		Raystown Lake	
	Mapleton Borough	*none*	156
	Todd Township	Joller BDA	151
		Trough Creek Confluence BDA	
		Trough Creek Gorge BDA	
		Trough Creek South BDA	
		Raystown Lake LCA	
	Union Township	Deeter Hollow BDA	156
		Jacks Mountain LCA	

Table 4. (continued)

Planning Region	*Municipality*	*Natural Heritage Areas*	*Page Number*
Trough Creek	Union Township	Raystown Lake LCA	156
Woodcock Valley	Juniata Township	Raystown Dam BDA	160
		Raystown Lake LCA	
	Lincoln Township	Aitch Barrens Natural Area BDA	164
		Field Station Shale Barren BDA	
		Lodge Shale Barren BDA	
		Raystown Lake LCA	
	Marklesburg Borough	Raystown Lake LCA	167
	Penn Township	Field Station Shale Barren BDA	167
		Grove Barrens North BDA	
		Hesston Cave BDA	
		James Creek Inlet BDA	
		Sheep Rock - Chiniotta Barrens BDA	
		Trough Creek Gorge BDA	
		Raystown Lake LCA	
		Raystown Lake	
		Rothrock State Forest	
		State Game Land #73	

Broad Top Region

- Broad Top City Borough
- Carbon Township
- Coalmont Borough
- Dudley Borough
- Hopewell Township
- Wood Township

Virginia mallow (*Sida hermaphrodita*)

Bald eagle (*Haliaeetus leucocephalus*)

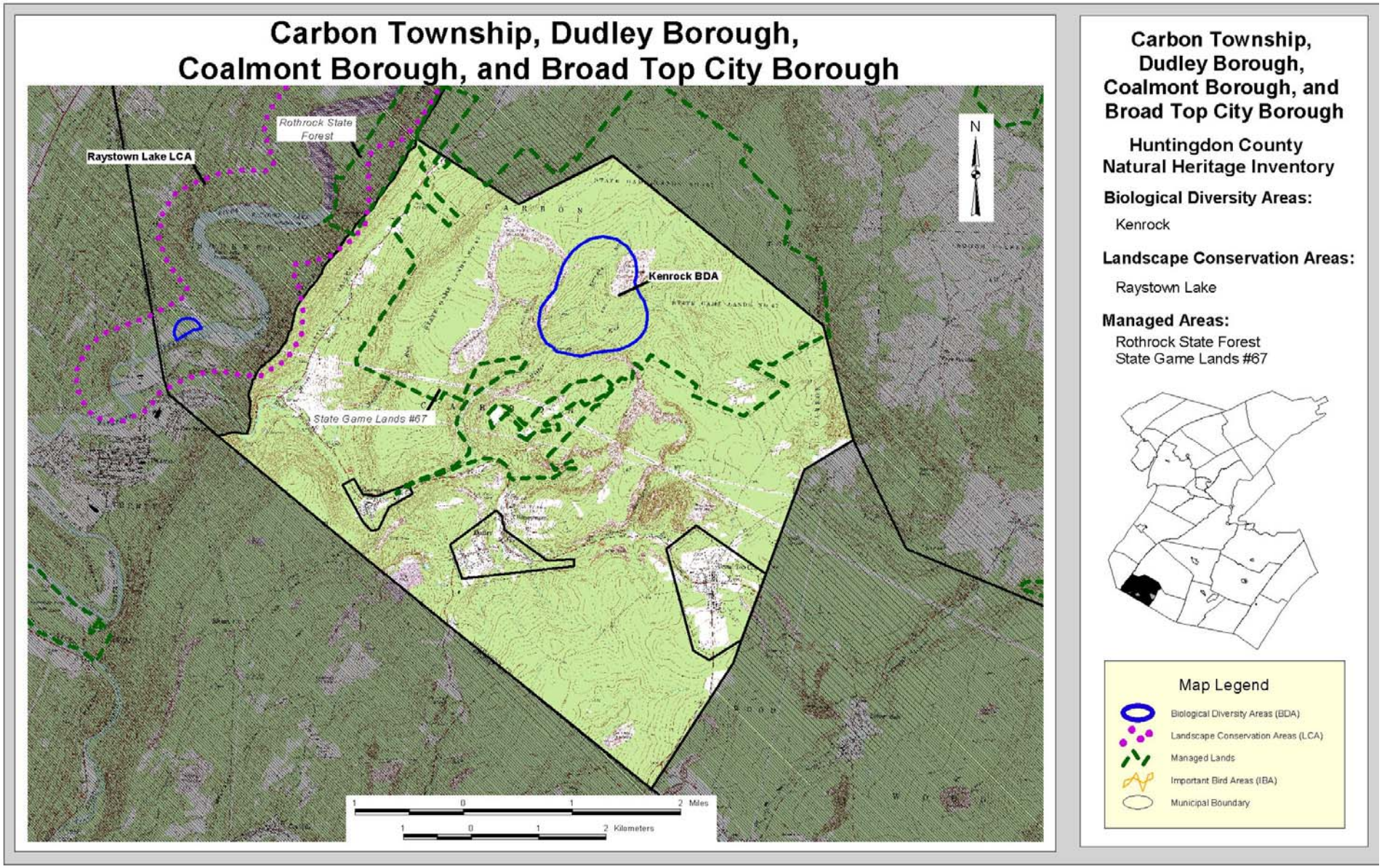
Carbon Township, Broad Top City Borough, Coalmont Borough & Dudley Borough

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Kenrock BDA		*High Significance*		
Allegheny woodrat (*Neotoma magister*)	G3G4	S1		PT
Raystown Lake LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *Rothrock State Forest*
State Game Land #67

GEOLOGIC FEATURES: *none*


Carbon Township, Dudley Borough,
Coalmont Borough, and Broad Top City Borough
Rothrock State Forest
Raystown Lake LCA
Kenrock BDA
State Game Lands #67
N
1 0 1 2 Miles
1 0 1 2 Kilometers
Carbon Township,
Dudley Borough,
Coalmont Borough, and
Broad Top City Borough
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Kenrock
Landscape Conservation Areas:
Raystown Lake
Managed Areas:
Rothrock State Forest
State Game Lands #67
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

CARBON TOWNSHIP

Carbon Township runs along the Bedford/Huntingdon County line to the southwest and the ridgeline of Terrace Mountain to the west. The Broad Top bituminous coal field underlies virtually the entire area of this township. Consequently, a large portion of the township has been strip-mined.

Kenrock BDA

This BDA lies entirely within State Game Land #67. The upland regions of this site support a dry oak – heath forest and the grasslands of a reclaimed strip-mine. The ground is quite rocky throughout the forested area, providing habitat for the **Allegheny woodrat** (*Neotoma magister*), a species endemic to the eastern United States. The woodrat nests in rocky habitats to avoid predators, and forages nocturnally for leaves; berries; nuts (particularly acorns); the stalks and fruits of pokeweed; the fruits of sassafras, dogwood, mountain ash, cherry, red maple, and serviceberry; ferns and other plants; and fungi (Fergus 2000).

Threats and Stresses

Several studies provide evidence that a variety of factors are contributing to the observed declines in Allegheny woodrat populations. Some populations appear to have suffered heavy mortality from the raccoon roundworm (*Baylisascaris procyonis*). The raccoon roundworm is rarely fatal to raccoons, but can cause cerebrospinal nematodiasis in other species (Kazacos, 1983). Raccoons are habitat generalists that tolerate or even benefit from habitat fragmentation and disturbance. Human-caused fragmentation and disturbance have likely created conditions that increase the exposure of woodrats to the parasite and thus led to woodrat population declines. Another factor that may play a role in the decline is change in the availability of viable food resources. Chestnut blight (*Cryphonectria parasitica*), oak infestation by gypsy moths (*Lymantria dispar*), changes in forest composition due to increased deer herbivory, and short-rotation forest management may have significantly reduced the amount of hard mast food that is available to the woodrat (Hassinger et al. 1996, Castleberry 2000). Weather may also play a role in the decline since the sharpest drops in populations have occurred in the northern part of the range, and records in Pennsylvania and West Virginia suggest that below normal winter temperatures in the past 30 years have coincided with the shrinkage in range (Natureserve 2002). Strip mining of coal and limestone may degrade viable woodrat habitat and isolate populations.

Recommendations

Forest cover is important in maintaining the microhabitat conditions and the food sources utilized by Allegheny woodrats. Oak trees are especially important because of the mast they provide and should not be removed. Fragmentation and disturbance within the area should be avoided. The PA Game Commission has developed further recommendations regarding management of woodrat habitat, which may be available upon request.

BROAD TOP CITY BOROUGH

Broad Top City is located near the southwestern boundary of the county, at the intersection of State Highway 913 and State Road 3017. It encompasses an area of .68 square miles and in 1996 had a population of 344. No Natural Heritage Areas were identified within this municipality.

COALMONT BOROUGH & DUDLEY BOROUGH

Coalmont and Dudley are small towns located along State Highway 913, where it parallels Shoup Run west of Broad Top City. No Natural Heritage Areas were identified within these boroughs.

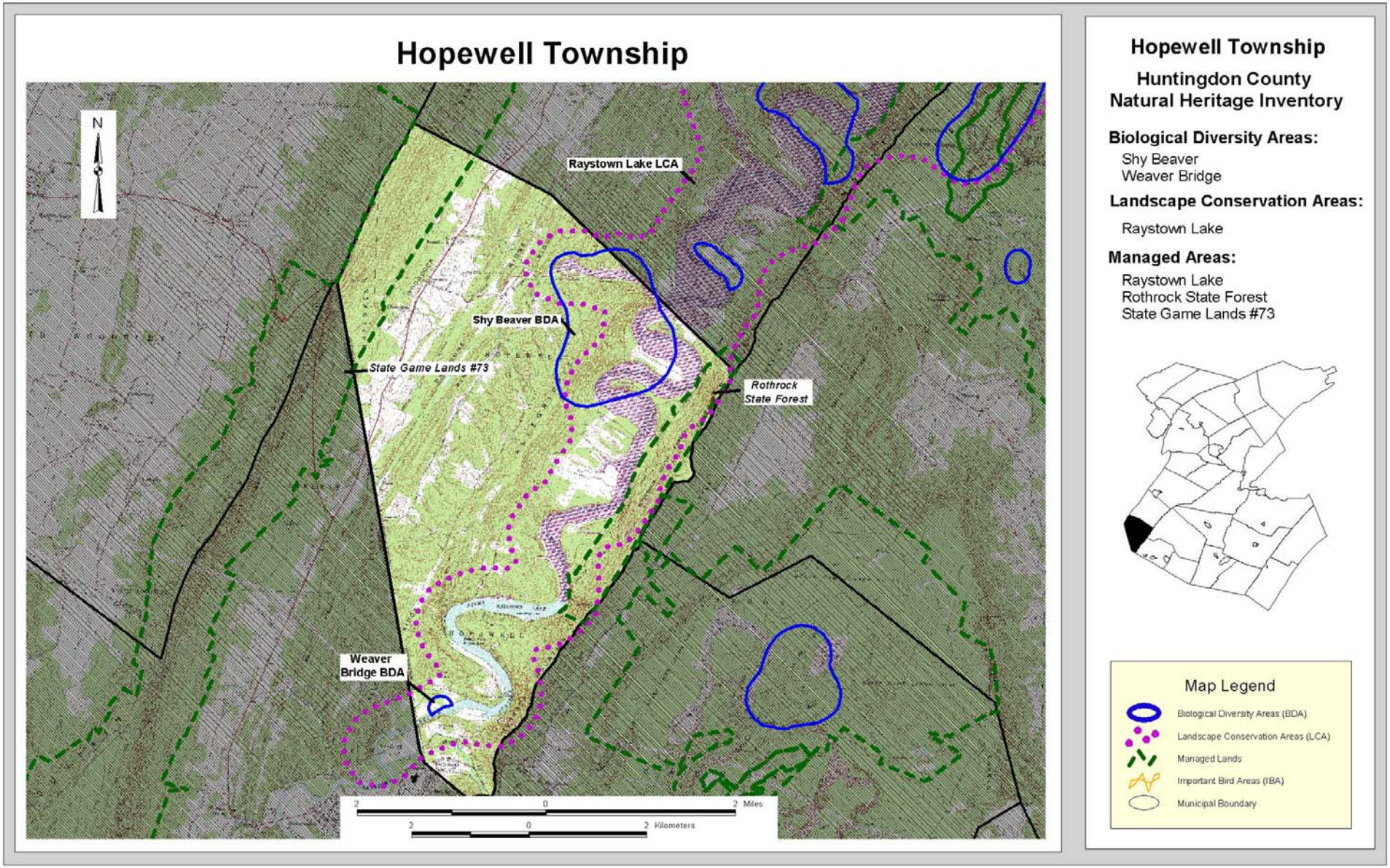
Hopewell Township

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Shy Beaver BDA		*High Significance*		
Bald eagle (*Haliaeetus leucocephalus*)	G4	S2B	PS:LT	PE
Weaver Bridge BDA		*High Significance*		
Virginia mallow (*Sida hermaphrodita*)	G2	S2		PE
Raystown Lake LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *Raystown Lake*
Rothrock State Forest
State Game Land #73

GEOLOGIC FEATURES: *none*


Hopewell Township
N
Raystown Lake LCA
Shy Beaver BDA
State Game Lands #73
Rothrock
State Forest
Weaver
Bridge BDA
2 0 2 Miles
2 0 2 Kilometers
Hopewell Township
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Shy Beaver
Weaver Bridge
Landscape Conservation Areas:
Raystown Lake
Managed Areas:
Raystown Lake
Rothrock State Forest
State Game Lands #73
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

HOPEWELL TOWNSHIP

Hopewell Township is located at the southwest corner of the county, bordering both Bedford and Blair Counties. Raystown Lake lies along the eastern edge of the township, in the valley between Terrace Mountain and Allegrippis Ridge. This township is predominantly forested, with the exceptions of the area covered by the lake and Woodcock Valley, where land use is primarily agricultural.

Shy Beaver BDA

This site, located along Raystown Lake, supports a nesting pair of **bald eagle** (*Haliaeetus leucocephalus*) – a species of both federal and state concern. Eagles typically nest in tall trees or on cliffs near large bodies of water, and the same nest may be used year after year or the breeding pair may alternate between two nest sites in successive years. The bald eagle feeds opportunistically on fishes, injured waterfowl and seabirds, various mammals, and carrion (NatureServe, 2000).

Threats and Stresses

Major threats to the bald eagle include disturbance by humans, pesticide contamination, habitat loss, decreasing food supply, and illegal shooting (NatureServe, 2000). The eagle is a large predator that occupies the top trophic level of the food-web. Since each trophic level tends to concentrate toxic chemicals from the lower trophic level, predators that function in the top trophic level are most vulnerable to accumulated toxins. This vulnerability was demonstrated by the dramatic decline in eagle numbers following the widespread use of the pesticide DDT after World War II. Human intrusion, particularly during the period between breeding and the fledging of the young eaglets, can have a negative impact. Eagles generally show a high degree of adaptability and tolerance if the human activity is not directed toward them. However, chronic disturbance results in the disuse of areas by eagles (NatureServe 2000).

Recommendations

Eagle nesting territories generally extend a mile or more from the nest site. Human intrusion and disturbance in the surrounding area should be kept to a minimum, particularly during the nesting period when eagles are most sensitive to intrusions. The Army Corp of Engineers, the agency responsible for the lands surrounding the lake, is aware of the nest and is managing the area accordingly.

Weaver Bridge BDA

This site is located in the riparian zone of Raystown Branch where the transition from river to lake begins. A population of **Virginia mallow** (*Sida hermaphrodita*) – a plant species of both global and state concern – occurs old-field habitat within a power line right-of-way that crosses the BDA. This plant is typically found on periodically flooded riverbanks in loose, sandy, or rocky soil, often in rich alluvial floodplains and bottomlands. It may also be found growing along roadsides and railroad banks, in open to partially shaded, disturbed soil. The wooded riparian area both within and outside of the site also supports an extensive population of

American beakgrain (*Diarrhena obovata*), a species of grass that, until just recently, was considered rare within Pennsylvania.

Threats and Stresses

Flood control on many rivers has eliminated the periodically flooded banks that Virginia mallow requires. This, along with development along river corridors, has resulted in the loss of natural habitat. Increased competition for resources by invasive exotic plant species, which typically colonize disturbed habitats favored by *S. hermaphrodita* such as streambanks, roadsides, and rights-of-way, also poses a major threat.

Recommendations

Maintenance of the power line right-of-way should be restricted to mowing. Mowing should not occur until after the plants have flowered and the seeds have matured, in order to ensure a viable seed bank for maintanance or expansion of the population. Non-native weedy vines such as Japanese honeysuckle (*Lonicera japonica*) can choke out Virginia mallow, and should be removed if possible.

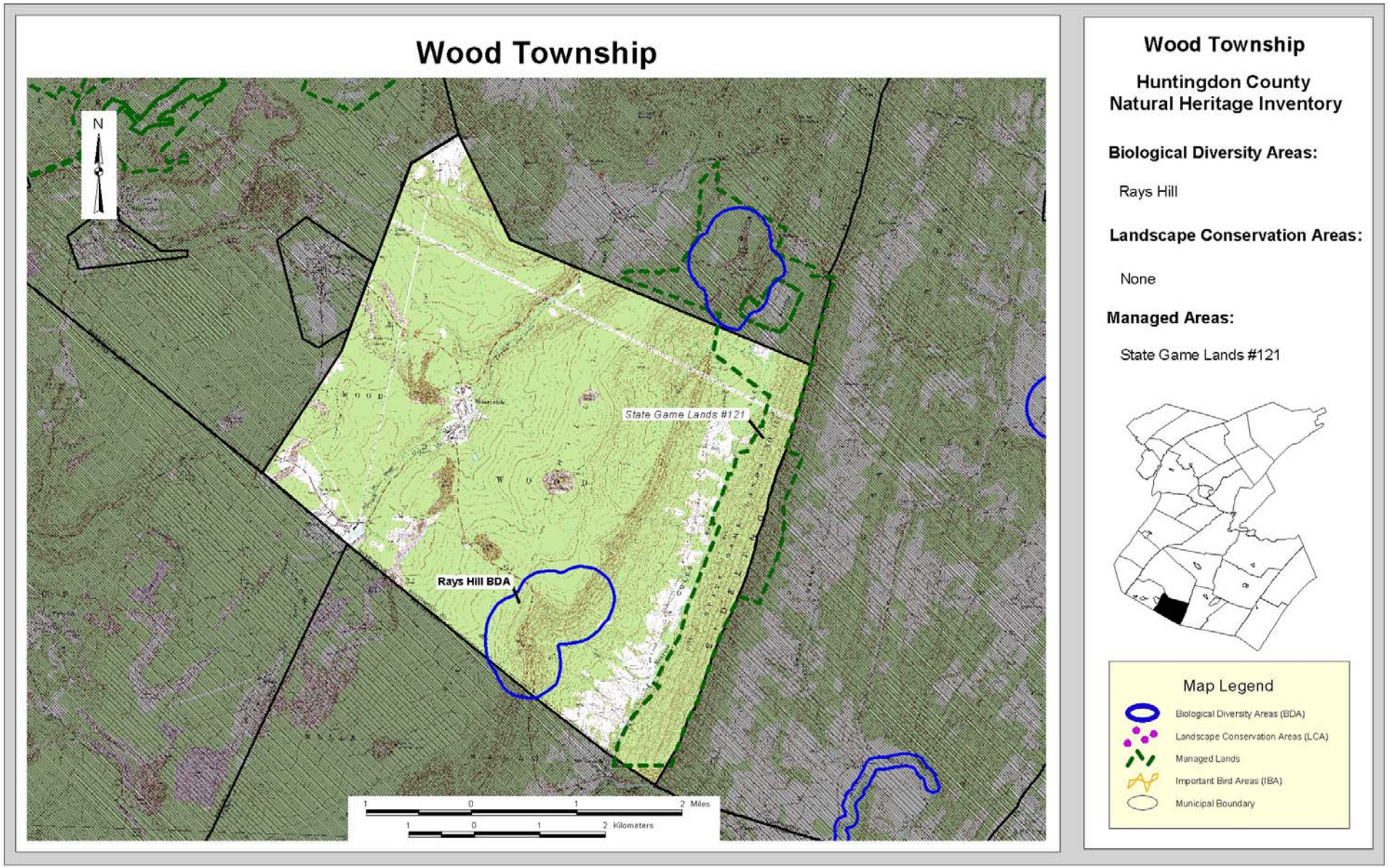
Wood Township

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Rays Hill BDA		*High Significance*		
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *State Game Land #121*

GEOLOGIC FEATURES: *none*


Wood Township
N
State Game Lands #121
Rays Hill BDA
1 0 1 2 Miles
1 0 1 2 Kilometers
Wood Township
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Rays Hill
Landscape Conservation Areas:
None
Managed Areas:
State Game Lands #121
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

WOOD TOWNSHIP

Wood Township is bounded to the south by Bedford and Fulton Counties, and extends east to the ridgeline of Sideling Hill. The township is underlain in part by the Broad Top bituminous coal field, and areas in the southern portion of the township have been strip-mined. Great Trough Creek flows through the center of Wood Township and has likely been impacted by the surrounding strip mines. Roaring Run flows through Coles Valley along the toe slope of Sideling Hill.

Rays Hill BDA

This site is located on the forested, east-facing slope of Rays Hill. The rugged terrain and oak-dominated forest provide habitat for the **Allegheny woodrat** (*Neotoma magister*) – a species of global and state concern. Unlike the voracious, non-native Norway rat (*Rattus norvegicus*), the woodrat is entirely herbivorous and dependent upon acorns for a large part of its diet (Fergus 2000). In Pennsylvania, *N. magister* is now at the northern extent of its geographic range; populations have disappeared in Connecticut, New York, and much of eastern Pennsylvania (NatureServe 2000).

Threats and Stresses

Several studies provide evidence that a variety of factors are contributing to the observed declines in Allegheny woodrat populations. Some populations appear to have suffered heavy mortality from raccoon roundworm (*Baylisascaris procyonis*). Raccoon roundworm is rarely fatal to raccoons, but can cause cerebrospinal nematodiasis in other species (Kazacos, 1983). Raccoons are habitat generalists that tolerate or even benefit from habitat fragmentation and disturbance. Human-caused fragmentation and disturbance have likely created conditions that increase the exposure of woodrats to the parasite and thus led to woodrat population declines. Another factor that may play a role in the decline is change in the availability of viable food resources. Chestnut blight (*Cryphonectria parasitica*), oak infestation by gypsy moths (*Lymantria dispar*), changes in forest composition due to increased deer herbivory, and short-rotation forest management may have significantly reduced the amount of hard mast food that is available to the woodrat (Hassinger et al. 1996, Castleberry 2000). Weather may also play a role in the decline since the sharpest drops in populations have occurred in the northern part of the range and records in Pennsylvania and West Virginia suggest that below normal winter temperatures in the past 30 years have coincided with the shrinkage in range (Natureserve 2002). Strip mining of coal and limestone may degrade viable woodrat habitat and isolate populations.

Recommendations

Forest cover is important in maintaining the microhabitat conditions and the food sources utilized by Allegheny woodrats. Oak trees are especially important because of the mast they provide and should not be removed. Fragmentation and disturbance within the area should be avoided. The PA Game Commission has developed further recommendations regarding management of woodrat habitat, which may be available upon request.

Huntingdon Region

- Huntingdon Borough
- Oneida Township
- Smithfield Township
- Walker Township

Northeastern bulrush
Scirpus ancistrochaetus

Kate's mountain clover
Trifolium virginicum

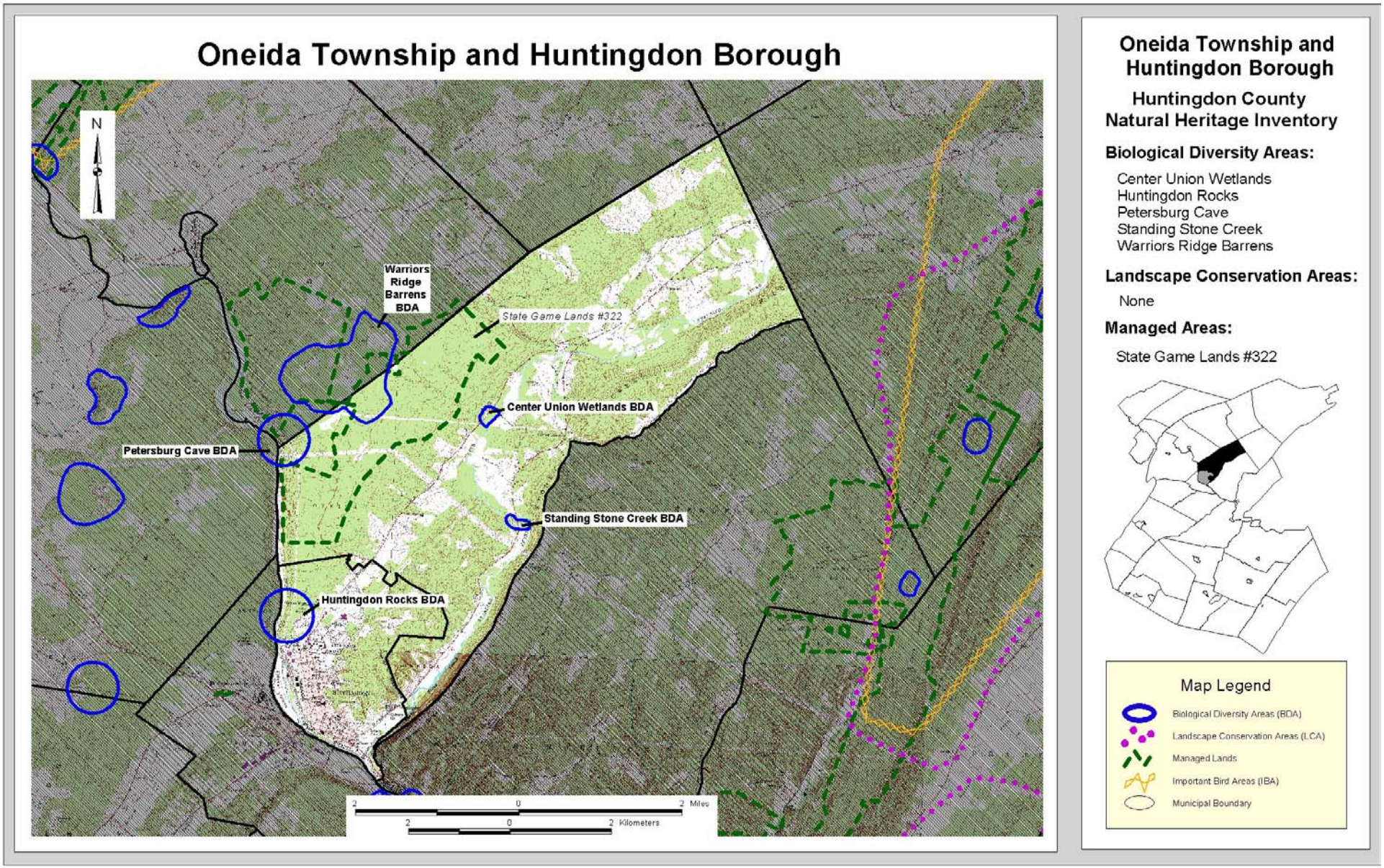
Northern bat
Myotis septentrionalis

Oneida Township & Huntingdon Borough

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Center Union Wetlands BDA		*High Significance*		
Thick-leaved meadow rue (*Thalictrum coriaceum*)	G4	S2		PE
Huntingdon Rocks BDA		*High Significance*		
Eastern small-footed bat (*Myotis leibii*)	G3	S1B,S1N		
Petersburg Cave BDA		*High Significance*		
Eastern small-footed bat (*Myotis leibii*)	G3	S1B,S1N		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
Standing Stone Creek BDA		*High Significance*		
Indian wild rice (*Zizania aquatica*)	G5	S3		PR
Warriors Ridge Barrens BDA		*Exceptional Significance*		
Northeastern bulrush (*Scirpus ancistrochaetus*)	G3	S3	LE	PE
Wild lupine (*Lupinus perennis*)	G5	S3		PR

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *State Game Land #322*


Oneida Township and Huntingdon Borough
N
Warriors Ridge Barrens BDA
State Game Lands #322
Center Union Wetlands BDA
Petersburg Cave BDA
Standing Stone Creek BDA
Huntingdon Rocks BDA
2 0 2 Miles
2 0 2 Kilometers
Oneida Township and Huntingdon Borough
Huntingdon County Natural Heritage Inventory
Biological Diversity Areas:
Center Union Wetlands
Huntingdon Rocks
Petersburg Cave
Standing Stone Creek
Warriors Ridge Barrens
Landscape Conservation Areas:
None
Managed Areas:
State Game Lands #322
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

ONEIDA TOWNSHIP

Large order streams and extensive forest comprise the most notable features of Oneida Township. Standing Stone Creek Ridge and Murray Run bound the township to the east, and the Juniata River forms a portion of the western boundary. Agriculture in the township occurs primarily in the limestone-underlain valley of Standing Stone Creek.

Center Union Wetlands BDA

This forested wetland is located in the floodplain of Standing Stone Creek and supports a small population of **thick-leaved meadow rue** (*Thalictrum coriaceum*). Not much is known about this infrequently occurring species, but observations of *T. coriaceum* suggest that this plant requires mineral soil for germination. In Huntingdon County, *T. coriaceum* is typically found growing in forested sites where some degree of disturbance occurs periodically, such as along streams, roadside ditches, and trails. Within this site, the small population is growing in a peaty area with a dense shrub understory that shows evidence of periodic scouring by floods.

Threats and Stresses

The habitat supporting *T. coriaceum* is in good condition, but adjoins a utility right-of-way and State Road 1009. A small trash dump along the southeast shoulder of State Road 1009 spills over into the edge of the wetland.

Recommendations

Alterations to the stream-flow regime that would eliminate flood events that serve to scour the forest floor along Standing Stone Creek should be avoided. The utility right-of-way should be maintained by mowing rather than by the application of herbicides. Cleanup of the roadside dump area should be considered, and further dumping discouraged.

Petersburg Cave BDA

This BDA is discussed under Logan Township.

Standing Stone Creek BDA

The mucky gravel bars along the banks of Standing Stone Creek provide habitat for **wild rice** (*Zizania aquatica*), a plant of special concern in Pennsylvania. Contrary to what the common name implies, wild rice is not related to white rice (*Oryza sativa*) except by virtue of being a member of the Grass family. *Z. aquatica* is an annual that grows in fresh to brackish still waters, often in marshes and river mouths (Brown 1979).

Threats and Stresses

Within the site, State Road 26 crosses over Standing Stone Creek. Road bank maintenance activities such as mowing and herbicide spraying could potentially impact the wild rice population.

Recommendations

The Pennsylvania Department of Transportation should be made aware of this population of *Z. aquatica* so that care can be taken to protect the stream during road maintenance activities. Mowing rather than herbicide application should be used to control roadside vegetation in the vicinity of the creek.

Warriors Ridge Barrens BDA

Please see discussion of this BDA under Logan Township.

HUNTINGDON BOROUGH

Approximately half of Huntingdon Borough is occupied by urban and residential development. The Juniata River forms the western boundary of the borough, and the mixed limestone and sandstone ridge overlooking the river harbors a species of global and state concern.

Huntingdon Rocks BDA

The **eastern small-footed bat** (*Myotis leibii*), a species of both global and state concern, has been observed hibernating within this site. This species has a wide distribution across southeastern Canada and the eastern United States, but populations appear to be scattered and small throughout its range (NatureServe 2002). Isolated colonies of *M. leibii* are particularly vulnerable to local extinction by chance events, especially when concentrated during winter months. The eastern small-footed bat tends to hibernate near cave entrances, thus it may be susceptible to freezing during abnormally severe winters.

Threats and Stresses

In general, the most serious threat to cave-dwelling bats is human disturbance during hibernation. Very low levels of noise, light, and heat from lanterns are sufficient to awaken hibernating bats, which then expend energy moving about and deplete critical reserves of body fat. When such disturbance is repeated, bats (especially juveniles) are likely to weaken and perish. Logging above and around bat caves can alter cave temperature, humidity, and air and water flow. Some forest cover around the cave entrance and foraging area may offer significant protection from both predators and periods of exceptionally cold spring weather (NatureServe 2002).

Recommendations

Given the vulnerability of the eastern small-footed bat during hibernation, the hibernacula must be protected from disturbance November through March. If necessary, the entrance should be gated. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Smithfield Township

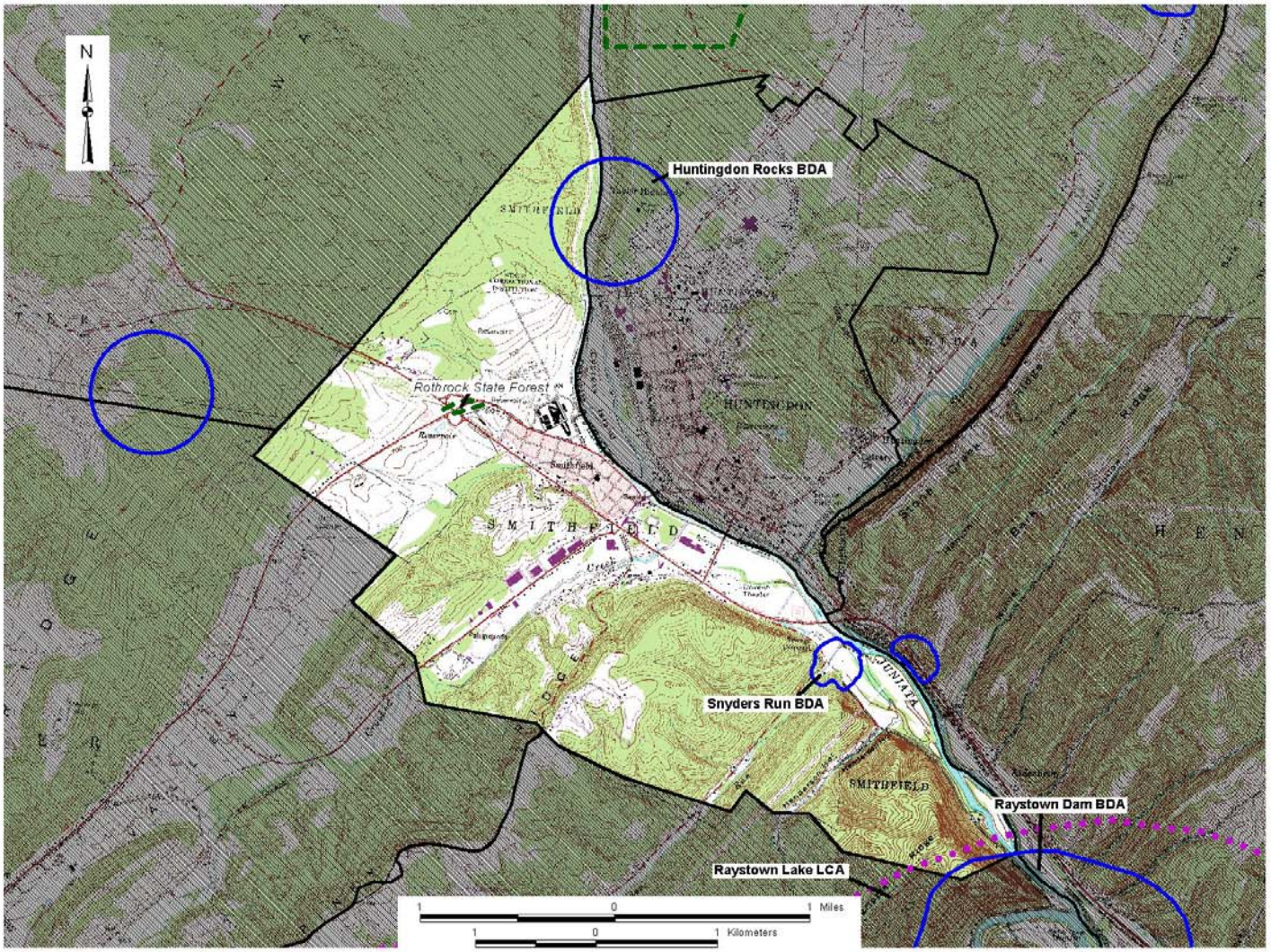
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Huntingdon Rocks BDA		*High Significance*		
Eastern small-footed bat (*Myotis leibii*)	G3	S1B,S1N		
Raystown Dam BDA		*Exceptional Significance*		
Shale-barren evening primrose (*Oenothera argillicola*)	G3G4	S2		PT
Illinois pondweed (*Potamogeton illinoensis*)	G5	S3S4		TU
Virginia mallow (*Sida hermaphrodita*)	G2	S2		PE
Kate's mountain clover (*Trifolium virginicum*)	G3	S1		PE
Bald Eagle (*Haliaeetus leucocephalus*)	G4	S2B	PS:LT	PE
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT
Appalachian jewelwing (*Calopteryx angustipennis*)	G4	SU		
Southern pine looper moth (*Caripeta aretaria*)	G4	S1		
Promiscuous angle (*Semiothisa promiscuata*)	G4	S1		
A noctuid moth (*Properigea sp.*)	G2G3Q	S1		
Southern grizzled skipper (*Pyrgus wyandot*)	G2	S1		
Red-cedar - mixed hardwood rich shale woodland community		S1S2		
Snyders Run BDA		*High Significance*		
Virginia mallow (*Sida hermaphrodita*)	G2	S2		PE
Raystown Lake LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *Rothrock State Forest*

GEOLOGIC FEATURES: *none*

Smithfield Township



Smithfield Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

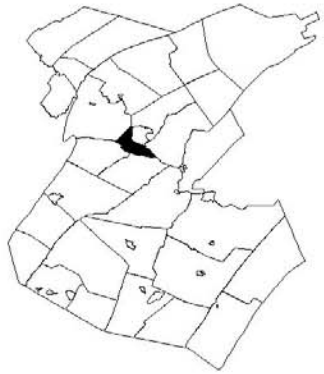
Huntingdon Rocks
Raystown Dam
Synders Run

Landscape Conservation Areas:

Raystown Lake

Managed Areas:

Rothrock State Forest



Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

SMITHFIELD TOWNSHIP

Smithfield is a small township bounded along the length of its northeastern edge by the Juniata River. Crooked Creek, Snyders Run, and several unnamed streams flow through four major valleys on their way to the river. Piney Ridge and Allegrippis Ridge provide topographic relief, rising 400 to 500 feet above the valley floors.

Huntingdon Rocks BDA

This BDA is discussed under Huntingdon Borough.

Raystown Dam BDA

This BDA is discussed under Juniata Township.

Snyders Run BDA

This site, primarily located within the floodplain of Snyder's Run and the Juniata River, encompasses old-field habitat and the thickets bordering Snyder's Run Road that supports a population of **Virginia mallow** (*Sida hermaphrodita*), a plant species of global and state concern. This plant is typically found on periodically flooded riverbanks in loose, sandy, or rocky soil, often in rich alluvial floodplains and bottomlands. It may also be found growing along roadsides and railroad banks, in open to partially shaded disturbed soil.

Threats and Stresses

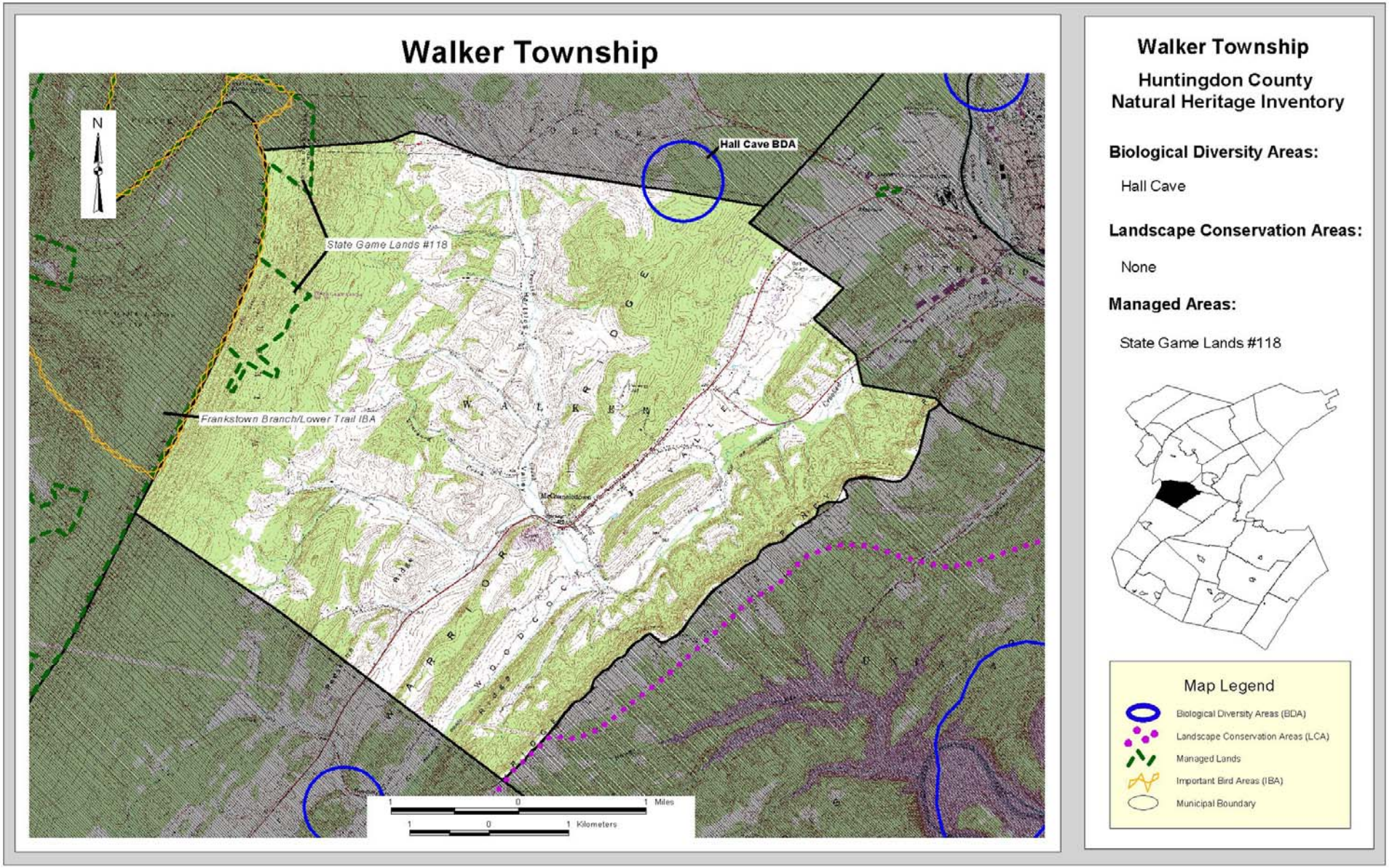
Given the roadside location of this population, herbicide spraying and mowing by road maintenance crews and disturbance by landowners pose the greatest threats to the Virginia mallow at this site. Increased competition for resources by invasive exotic plant species, which typically colonize disturbed habitats, also poses a major threat.

Recommendations

Workers involved in roadside right-of-way maintenance within the site should be informed of the presence of this rare plant species. The application of herbicides should be avoided and mowing should not occur until after the plants have flowered and the seeds have matured, in order to ensure a viable seed bank for maintanance or expansion of the population. Landowners should be informed of the significance of the plants and be encouraged not to remove them. Non-native, invasive plants such as multiflora rose (*Rosa multiflora*) and Japanese honeysuckle (*Lonicera japonica*) that can choke out Virginia mallow should be removed if possible.

Walker Township

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Hall Cave BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B,S3N		
OTHER CONSERVATION AREAS:	*none*			
MANAGED LANDS:	*State Game Land #118*			
GEOLOGIC FEATURES:	*none*			


Walker Township
N
Hall Cave BDA
State Game Lands #118
Frankstown Branch/Lower Trail IBA
1 0 1 Miles
1 0 1 Kilometers
Walker Township
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Hall Cave
Landscape Conservation Areas:
None
Managed Areas:
State Game Lands #118
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

WALKER TOWNSHIP

Walker Township borders Blair County to the west and extends eastward to the crest of Piney Ridge. Land use within the township is divided between agriculture, forest, and residential development. Agriculture is concentrated in the foothills of Tussey Mountain and Warrior Ridge, while residential development has primarily occurred in Woodcock Valley, north of McConnellstown. The uplands remain largely forested.

Hall Cave BDA

Please see discussion of this Natural Heritage Area under Porter Township.

Juniata Valley Region

- Alexandria Borough
- Logan Township
- Petersburg Borough
- Porter Township

Round-head gayflower
Liatris scariosa

Vernal pond

Logan Township

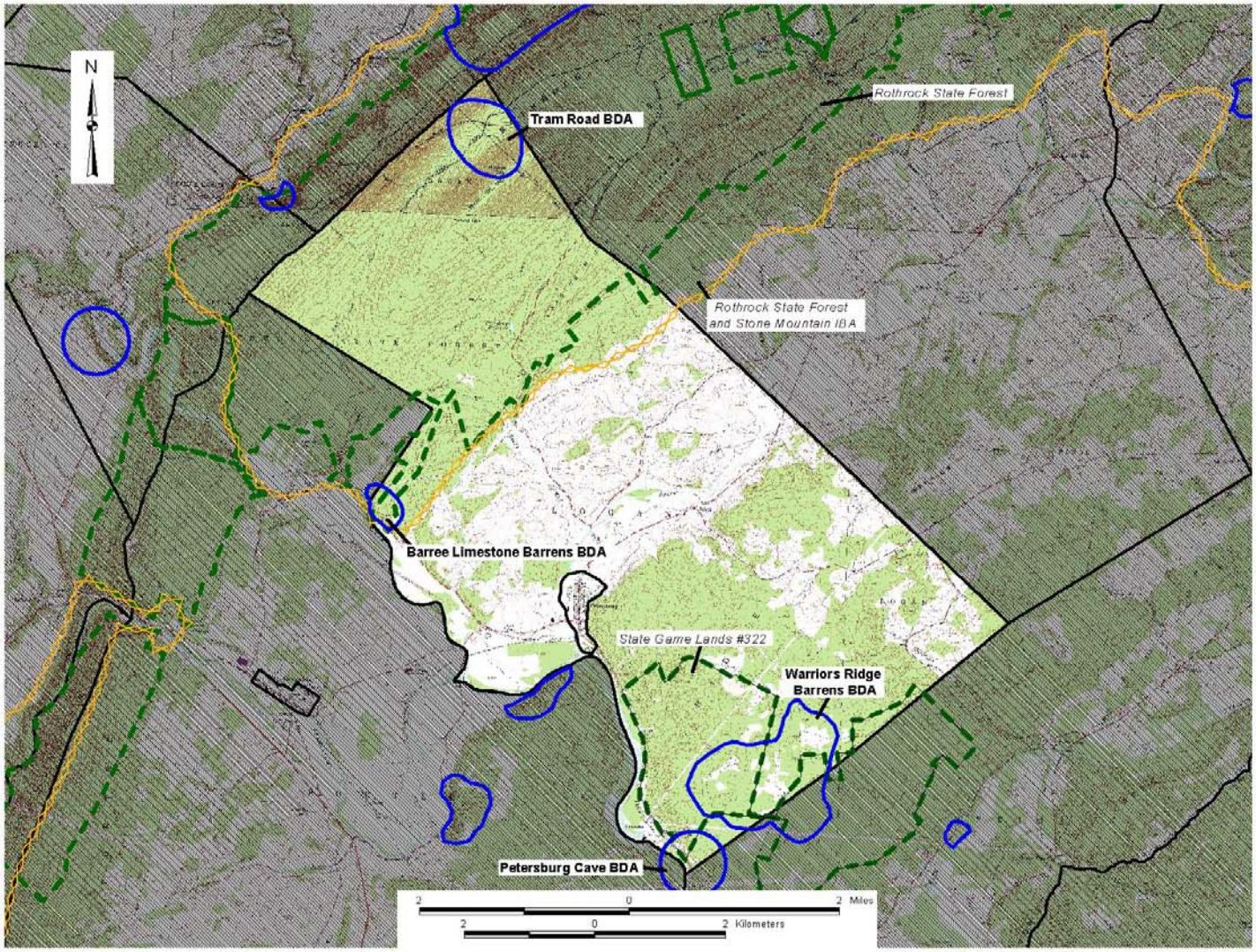
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Barree Limestone Barren BDA		*High Significance*		
Round-head gayflower (*Liatris scariosa*)	G5?	S2		N
Petersburg Cave BDA		*High Significance*		
Eastern small-footed bat (*Myotis leibii*)	G3	S1B,S1N		
Northern bat (*Myotis septentrionalis*)	G4	S3B,S3N		
Tram Road BDA		*Exceptional Significance*		
Northeastern bulrush (*Scirpus ancistrochaetus*)	G3	S3	LE	PE
Herbaceous vernal pond community		S3S4		
Warriors Ridge Barrens BDA		*Exceptional Significance*		
Northeastern bulrush (*Scirpus ancistrochaetus*)	G3	S3	LE	PE
Wild lupine (*Lupinus perennis*)	G5	S3		PR
Herbaceous vernal pond community		S3S4		

OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS: *Rothrock State Forest*
State Game Land #322

GEOLOGIC FEATURES: *none*

Logan Township and Petersburg Borough



Logan Township and Petersburg Borough

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Barree Limestone Barren
Petersburg Cave
Tram Road
Warriors Ridge Barrens

Landscape Conservation Areas:

None

Managed Areas:

Rothrock State Forest
State Game Lands #322

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

LOGAN TOWNSHIP

Little Juniata River and Frankstown Branch come together to form the Juniata River along the southern boundary of Logan Township. Shaver Creek flows southwest through the township and into the Juniata River south of Petersburg. Agriculture is concentrated in the limestone-underlain Shaver Creek valley and the rolling hills to the west. The western portion of the township lies within the Rothrock State Forest and has been recognized by the Pennsylvania Audubon society as important habitat for birds.

Barree Limestone Barren BDA

The core of this site is a xeric calcareous shale slope resulting from the downcutting action of the Little Juniata River over the course of geologic time. A dry oak – heath forest dominated by chestnut oak (*Quercus montana*), red oak (*Quercus rubra*), and blueberry (*Vaccinium sp*.) shares the site with a population of **round-head gayflower** (*Liatris scariosa*). Adjacent lands in the Little Juniata River floodplain are in agricultural production, whereas the surrounding uplands are largely forested. The site itself is located almost entirely within the Rothrock State Forest.

Threats and Stresses

State Road 4004 passes between the river and across the toe of the slope. The concave morphology of the slope here suggests that landslides occur periodically. The clearing of rock and other debris from the road nibble away at the toe slope, causing slope failure over time. Prior to the construction of the road, such landslides probably still occurred here due to the lateral cutting action of the river. Logging on the uplands adjoining the site could potentially alter the hydrology, resulting in a much greater frequency of slope failures.

Recommendations

Any logging proposed for the area should take into consideration potential hydrological impacts to the site resulting from canopy removal along the top of the bluff. Slope instability should be taken into account during road maintenance activities.

Petersburg Cave BDA

The forested limestone slope overlooking the village of Warrior Ridge is the location of a cave that serves as a winter hiburnaculum for the globally rare **small-footed bat** (*Myotis leibii*) and Pennsylvania rare **northern bat** (*Myotis septentrionalis*). In 1998, this cave was recorded as being the largest *M. leibii* hiburnaculum in the state. Other bat species using this hiburnaculum include the little brown bat (*Myotis lucifugus*), the big brown bat (*Eptesicus fuscus*), and the eastern pipistrelle (*Pipistrellus subflavus*).

The eastern small-footed bat has a wide distribution across southeastern Canada and the eastern United States, but populations appear to be scattered and small throughout its range (NatureServe 2002). Isolated colonies of *M. leibii* are particularly vulnerable to local extinction by chance events, especially when concentrated during winter months. The eastern small-footed bat tends to hibernate near cave entrances, thus it may be susceptible to freezing during abnormally severe winters.

The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants.

Threats and Stresses

In general, the most serious threat to cave-dwelling bats is human disturbance during hibernation. Very low levels of noise, light, and heat from lanterns are sufficient to awaken hibernating bats, which then expend energy moving about and deplete critical reserves of body fat. When such disturbance is repeated, bats (especially juveniles) are likely to weaken and perish. Logging above and around bat caves can alter cave temperature, humidity, and air and water flow. Some forest cover around the cave entrance and foraging area may offer significant protection from both predators and periods of exceptionally cold spring weather (NatureServe, 2002).

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Tram Road BDA

This site encompasses a complex of vernal pools located in a forested, high-elevation saddle between Tussey Mountain and Round Top. One of the pools supports a small population of **northeastern bulrush** (*Scirpus ancistroch*aetus), a globally rare plant species. *S. ancistrochaetus* is only known to occur within the northeastern Appalachian Mountains. The section of the Appalachians crossing Pennsylvania appears to be the global center of this species range – 62% of all known populations fall within the state. In Pennsylvania, *S. ancistrochaetus* is most frequently associated with vernal ponds. The exact composition of plant communities varies among ponds; species commonly present include sharp-flowered manna grass (*Glyceria acutiflora*), sedges (*Carex canescens, Carex lupulina, Carex intumescens*), woolgrass (*Scirpus cyperinus*), beggar-ticks (*Bidens sp.*), and fireweed (*Erechtites hieracifolia*). In addition, these **herbaceous vernal pond communities** also provide unique habitat for invertebrate and amphibian species.

Threats and Stresses

Changes in hydrological pattern, light levels, or the contiguity of surrounding forest habitat may negatively impact the species and natural communities within this BDA. The vernal pools are fed by surface runoff from the entire watershed area above them. Any activity resulting in earth disturbance could affect the current hydrological pattern at this site and potentially alter

conditions within the vernal pools. Such a change could impact the success of the northeastern bulrush population because the species appears to be very sensitive to alterations of the water regime in its habitat. Changes in light levels may also impact *S. ancistrochaetus*. Additionally, disruptions to the forest within 500 m of a pond may impact amphibian populations associated with the vernal pools (Semlitsch 1998). Conditions on the forest floor, including the presence of woody debris and leaf litter, moisture levels, and temperature, are important to the ability of amphibians to use this habitat.

Recommendations

In order to avoid disrupting natural hydrological patterns in the ponds and to avoid impacts to potential amphibian populations, activities that remove forest canopy or result in earth disturbance should be avoided within 500 meters of the ponds. Where roads, clearings, or staging areas have already been constructed within this BDA, ditching and other drainage solutions should be directed toward preserving the natural drainage of the site and provide effective erosion control. Inventories for invertebrates and amphibians should be conducted.

Warrior Ridge Barrens BDA

Pine-oak woods with scattered openings, mesic hardwood forest, and vernal and permanent ponds characterize this site. Several of the **herbaceous vernal pond communities** support **northeastern bulrush** (*Scirpus ancistrochaetus*), a plant species of federal and state concern. The area encompassed by this BDA is underlain by sandstone, and the resulting nutrient-poor, sandy soils support two populations of **wild lupine** (*Lupinus perennis*). Lupine is a host plant for several rare and endangered butterflies. The larval stage of the karner blue butterfly (*Lycaeides melissa samuelis*), a species currently believed extirpated in Pennsylvania, is known to feed only on *L. perennis*. The frosted elfin butterfly, a species of global and state concern, also utilizes wild blue lupine as a host plant.

Threats and Stresses

Wild lupine is an early successional species that does not reproduce in dense shade. Several species of pines, oaks, and shrubs are adapted to the same soils and habitats as lupine, and without disturbances, they will close the canopy, shading and suppressing lupine (USFWS 1997). One published study indicates that lupine responds favorably to periodic burning (Grigore and Tramer 1996). Please see above description of Tram Road BDA for threats to vernal pool communities.

Recommendations

Activities that remove forest canopy or result in earth disturbance should be avoided within a 500 m buffer of the ponds, in order to avoid disrupting natural hydrological patterns in the ponds and to avoid impacts to potential amphibian populations. In areas where wild lupine occurs, disturbances that reduce tree and shrub canopy cover are necessary for lupine to persist, and under conditions of high grass and sedge production, occasional disturbances that remove the litter layer are needed for lupine regeneration (USFWS 1997). Such intentional disturbances should include periodic controlled burns.

Porter Township, Alexandria Borough, & Petersburg Borough

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Barree Limestone Barren BDA		*High Significance*		
Round-head gayflower (*Liatris scariosa*)	G5?	S2		N
Yellow oak - redbud woodland community		S2		
Hall Cave BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B,S3N		
Neff Limestone Barren BDA		*Exceptional Significance*		
Tall larkspur (*Delphinium exaltum*)	G3	S1		PE
Round-head gayflower (*Liatris scariosa*)	G5?	S2		N
Hoary puccoon (*Lithospermum canescens*)	G5	S2		N
False gromwell (*Onosmodium molle* var *hispidulum*)	G4G5T4	S1		PE
Columbine duskywing butterfly (*Erynnis lucilius*)	G4	S1S2		
A moth (*Hydraecia stramentosa*)	G4	SU		
A noctuid moth (*Properigea sp*.)	G2G3Q	S1		
A noctuid moth (*Richia grotei*)	G4	S1		
Promiscuous angle (*Semiothisa promiscuata*)	G4	S1		
Yellow oak - redbud woodland community		S2		
Petersburg Cave BDA		*High Significance*		
Eastern small-footed bat (*Myotis leibii*)	G3	S1B,S1N		
Northern bat (*Myotis septentrionalis*)	G4	S3B,S3N		
Petersburg Limestone Cliff BDA		*Exceptional Significance*		
Ebony sedge (*Carex eburnea*)	G5	S1		PE
Round-head gayflower (*Liatris scariosa*)	G5?	S2		N

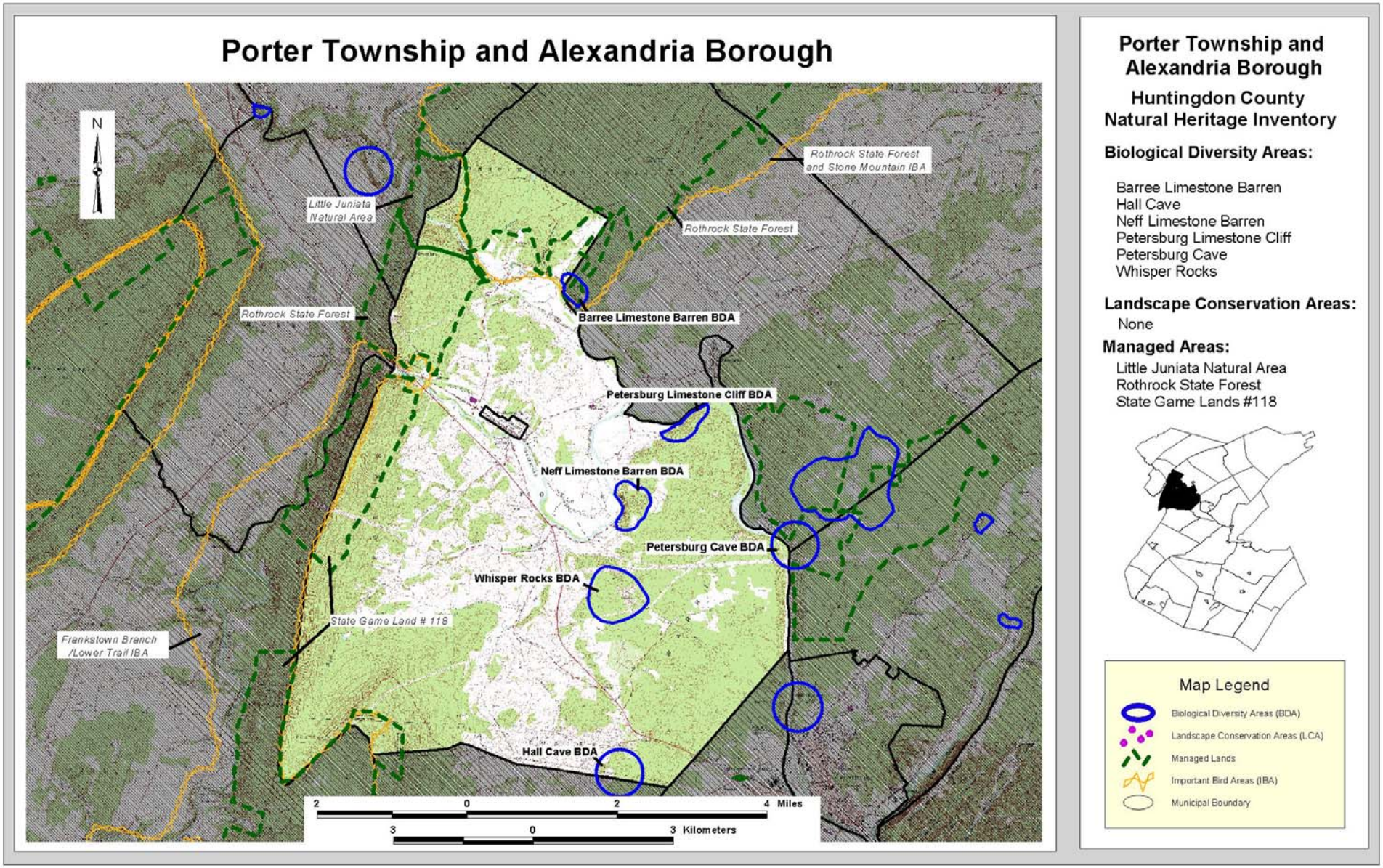
Porter Township, Alexandria Borough, & Petersburg Borough (con't.)

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Whisper Rocks BDA		*Exceptional Significance*		
Eastern small-footed bat (*Myotis leibii*)	G3	S1B,S1N		

OTHER CONSERVATION AREAS: *Frankstown Branch/Lower Trail IBA*
Rothrock State Forest and Stone Mountain IBA

MANAGED LANDS: *Rothrock State Forest*
State Game Land #118
Little Juniata Natural Area DA

GEOLOGIC FEATURES: *Pulpit Rocks (erosional remnant)*


Porter Township and Alexandria Borough
N
Little Juniata Natural Area
Rothrock State Forest and Stone Mountain IBA
Rothrock State Forest
Rothrock State Forest
Barree Limestone Barren BDA
Petersburg Limestone Cliff BDA
Neff Limestone Barren BDA
Petersburg Cave BDA
Whisper Rocks BDA
State Game Land # 118
Frankstown Branch /Lower Trail IBA
Hall Cave BDA
2 0 2 4 Miles
3 0 3 Kilometers
Porter Township and Alexandria Borough
Huntingdon County Natural Heritage Inventory
Biological Diversity Areas:
Barree Limestone Barren
Hall Cave
Neff Limestone Barren
Petersburg Limestone Cliff
Petersburg Cave
Whisper Rocks
Landscape Conservation Areas:
None
Managed Areas:
Little Juniata Natural Area
Rothrock State Forest
State Game Lands #118
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

PORTER TOWNSHIP

Porter Township extends from the border of Blair County eastward to the Juniata River. The calcareous soils of the Robinson Run and Emma Creek valleys support agricultural production within the township. The regions to the east and west of these valleys are primarily forested. The Frankstown Branch/Lower Trail and Rothrock State Forest and Stone Mountain Important Bird Areas extend into the township along its western border.

Barree Limestone Barren BDA

Please see discussion of this Natural Heritage Area under Logan Township.

Hall Cave BDA

Hall Cave serves as a winter hiburnaculum for the **northern bat** (*Myotis septentrionalis*). The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants. As with all bats, if individuals of this species are disturbed during hibernation, they will become active and may use up critical fat stores needed to survive the winter. Juveniles can perish from repeated disturbances, and individuals may be weakened such that they do not have the energy to forage successfully in the spring.

Threats and Stresses

The northern bats and other bats using the cave will be negatively impacted by disturbance in the cave during the winter months. Even small amounts of light, noise, or heat will be enough to bring the animals out of hibernation. Any physical alteration to the cave entrance or the rock surrounding the cave could alter the patterns of air and water flow that currently create a suitable microclimate for the species, and render the habitat unusable.

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Neff Limestone Barren BDA

The core of this site is a xeric calcareous slope that harbors a number of rare elements. The four plant species of special concern found here include: globally rare **tall larkspur** (*Delphinium exaltum*), **round-head gayflower** (*Liatris scariosa*), **hoary puccoon** (*Lithospermum canescens*), and **false gromwell** (*Onosmodium molle* var *hispidulum*). The five rare invertebrate species

collected at the site using light traps are: **columbine duskywing butterfly** (*Erynnis lucilius*), a **moth** (*Hydraecia stramentosa*), two **noctuid moths** (*Properigea sp*., *Richia grotei*), and **promiscuous angle** (*Semiothisa promiscuata*). The sparse forest present is typical of a **yellow oak – redbud woodland community**.

Threats and Stresses

State Road 4003 passes along the base of the slope along the Frankstown Branch of the Juniata River. A small side road roughly bisects the site. Two quarry cuts are present near the intersection of the two roads. Use of the quarries appears to be infrequent and may possibly benefit the species present by introducing limited disturbance and opening the canopy. Logging of the surrounding forest may impact the rare invertebrate species by removing foraging territory.

Recommendations

Quarrying of limestone within the site should remain at or below present levels. Increased levels of disturbance might threaten the rare plant populations to the point of extirpation. Neither the site nor the surrounding forest should undergo pesticide spraying for the control of the gypsy moth because of the potential impact to the rare invertebrate species foraging in this area.

Petersburg Cave BDA

Please see the discussion of this Natural Heritage Area under Logan Township.

Petersburg Limestone Cliff BDA

Between Barree and Petersburg, the Little Juniata River flows through a broad, flat valley. Just upstream of the confluence with Shaver Creek, the river cuts into a steep, north-facing slope. Composed of limestone, the outcrops and bluffs along this slope form the core of the Petersburg Limestone Cliff BDA and support a **calcareous opening/cliff community**. Two plant species of special concern occur in this habitat: **ebony sedge** (*Carex eburnea*) and **round-head gayflower** (*Liatris scariosa*).

Threats and Stresses

The calcareous opening/cliff community and the rare plants found there require conditions that reduce competition from other plants, particularly those that thrive in open, disturbed habitats. Specifically, the xeric conditions and thin soils over limestone on steep slopes supply key ingredients for keeping competition low. Anthropogenic disturbance to the slope presents the most critical threat at this site. However, given the relative inaccessibility due to the steepness of the slope and proximity to the river, such disturbance is unlikely.

Recommendations

Timber harvesting and residential development, with their potential for altering the shade and hydrologic conditions that largely determine the composition of the vegetation growing on the face of the cliff, should be avoided along the top of the bluff. The diversity of rare invertebrates

found at a nearby limestone barren indicates that, with the landowner's permission, an invertebrate inventory should be conducted at this site.

Whisper Rocks BDA

The core of this site is a cave in the vicinity of an abandoned strip mine that serves as a winter hiburnaculum for the **eastern small-footed bat** (*Myotis leibii*), a species of both global and state concern. This species has a wide distribution across southeastern Canada and the eastern United States, but populations appear to be scattered and small throughout its range (NatureServe 2002). Isolated colonies of *M. leibii* are particularly vulnerable to local extinction by chance events, especially when concentrated during winter months. The eastern small-footed bat tends to hibernate near cave entrances, thus it may be susceptible to freezing during abnormally severe winters.

Threats and Stresses

In general, the most serious threat to cave-dwelling bats is human disturbance during hibernation. Very low levels of noise, light, and heat from lanterns are sufficient to awaken hibernating bats, which then expend energy moving about and deplete critical reserves of body fat. When such disturbance is repeated, bats (especially juveniles) are likely to weaken and perish. Logging above and around bat caves can alter cave temperature, humidity, and air and water flow. Some forest cover around the cave entrance and foraging area may offer significant protection from both predators and periods of exceptionally cold spring weather (NatureServe 2002).

Recommendations

Given the vulnerability of the eastern small-footed bat during hibernation, the hibernacula must be protected from disturbance November through March. If necessary, the entrance should be gated. Foraging areas (mostly streams and ponds) should be protected from pesticides and herbicides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

ALEXANDRIA BOROUGH

Alexandria is located along Frankstown Branch, at the crossroad of State Highway 305 and State Road 4005. No Natural Heritage Areas were identified within this municipality.

PETERSBURG BOROUGH

Petersburg lies along Shaver Creek, directly upstream of the confluence with the Juniata River. No Natural Heritage Areas were identified within this municipality.

Mill Creek Region

- Brady Township
- Henderson Township
- Mill Creek Borough

Southern grizzled skipper butterfly
(*Pyrgus wyandot*)

Hooker's orchid (*Platanthera hookeri*)

Brady Township & Mill Creek Borough

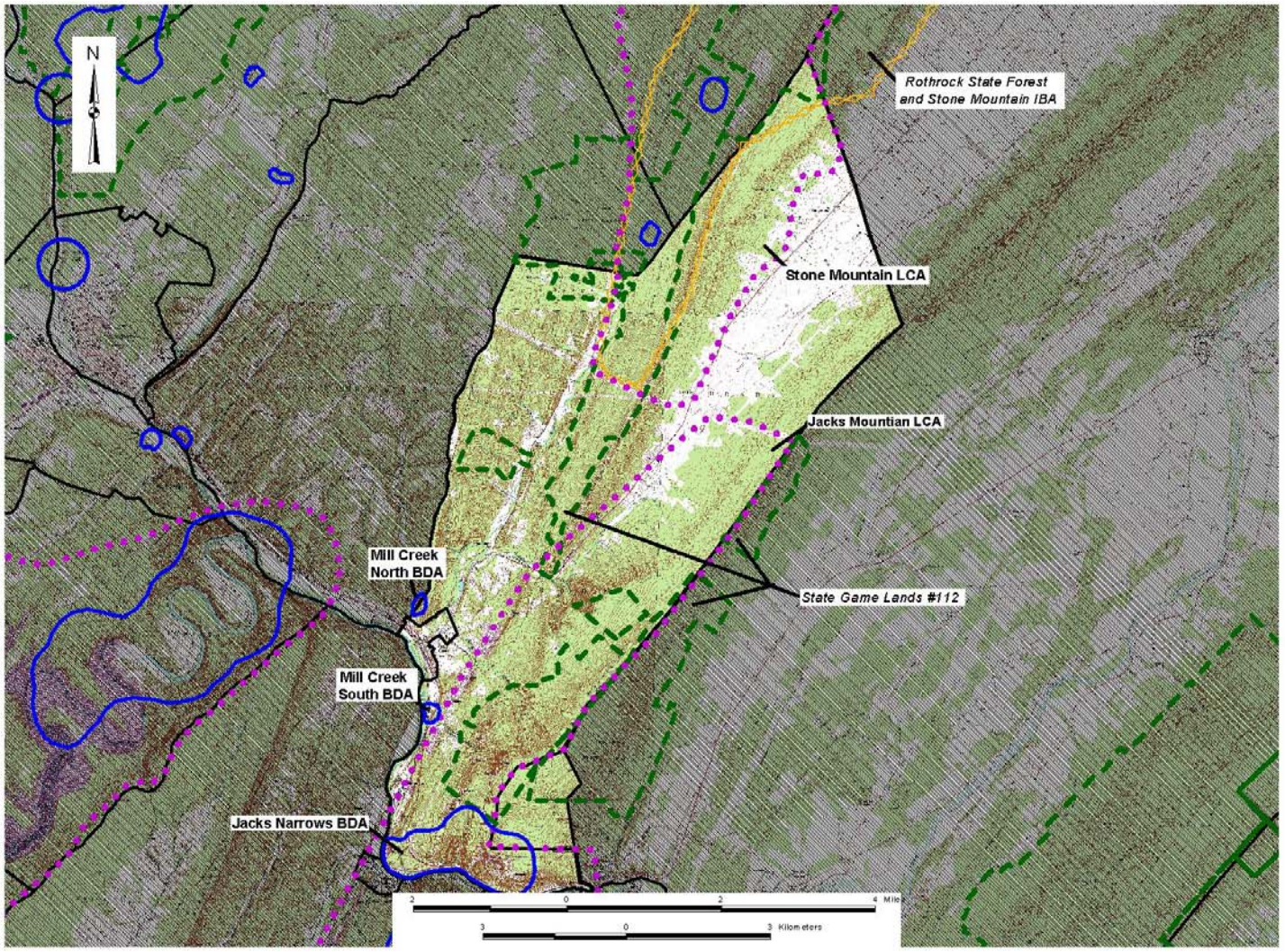
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Jacks Narrows BDA		*High Significance*		
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT
Thick-leaved meadow rue (*Thalictrum coriaceum*)	G4	S2		PE
Virginia mallow (*Sida hermaphrodita*)	G2	S2		PE
Mill Creek BDA		*High Significance*		
Virginia mallow (*Sida hermaphrodita*)	G2	S2		PE
Shaughnessy Run BDA		*Notable Significance*		
Round-head gayflower (*Liatris scariosa*)	G5?	S2		N
Jacks Mountain LCA		*Exceptional Significance*		
Stone Mountain LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS: *Rothrock State Forest*
State Game Land #112

GEOLOGIC FEATURES: *none*

Brady Township and Mill Creek Borough



Brady Township and Mill Creek Borough

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Jacks Narrows
Mill Creek North
Mill Creek South

Landscape Conservation Areas:

Jacks Mountain
Stone Mountain

Managed Areas:

State Game Lands #112

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

BRADY TOWNSHIP

Brady Township lies along the Huntingdon/Mifflin County line to the east and the Juniata River defines its boundary to the south. The topography of the township is quite characteristic of the Ridge and Valley Physiographic Province; alternating ridges and valleys extend northward from Mapleton. Mill Creek and Saddler Run flow through the two major valleys before entering the Juniata River. Roughly, one third of the township is taken up by State Game Lands #112. Perhaps the most notable ecological feature of the township is the large component of contiguous forest that remains along both Jacks Mountain and Stone Mountain. Indeed, a section of the township along the western slope of Stone Mountain has been recognized by the Pennsylvania Audubon Society as habitat important for birds.

Jacks Narrows BDA

This site lies along the Juniata River and extends north into oak-dominated forest uplands underlain by sandstone. The Thousand Steps Natural Area, encompassed within this BDA, was extensively quarried between 1900 and 1952 for gannister, a Tuscarora sandstone, used in the production of heat-resistant silica bricks for steel, glass, iron, and other industries. Thousand Steps and the surrounding area are now managed by the Pennsylvania Game Commission. This site supports several occurrences each of **Allegheny woodrat** (*Neotoma magister*) and **thick-leaved meadow rue** (*Thalictrum coriaceum*), and a population of **Virginia mallow** (*Sida hermaphrodita*). The uplands in this site provide prime habitat for the Allegheny woodrat: oak-forested talus slopes that offer both nesting areas and a supply of acorns that comprise a large part of its diet. Thick-leaved meadow rue is typically found growing in forested sites where some degree of disturbance occurs periodically, such as along streams, roadside ditches, and trails. Within this site, small populations have been found growing along an old railroad grade that now serves as a trail, and along a rocky, intermittent streambed. The population of Virginia mallow is growing in old-field habitat in the floodplain of the Juniata River, along a partially shaded road bank and open right-of-way dominated by herbs and shrubs.

Threats and Stresses

Several studies provide evidence that a variety of factors are contributing to the observed declines in Allegheny woodrat populations. Some populations appear to have suffered heavy mortality from the raccoon roundworm (*Baylisascaris procyonis*). The raccoon roundworm is rarely fatal to raccoons, but can cause cerebrospinal nematodiasis in other species (Kazacos, 1983). Raccoons are habitat generalists that tolerate or even benefit from habitat fragmentation and disturbance. Human-caused fragmentation and disturbance have likely created conditions that increase the exposure of woodrats to the parasite and thus led to woodrat population declines. Another factor that may play a role in the decline is change in the availability of viable food resources. Chestnut blight (*Cryphonectria parasitica*), oak infestation by gypsy moths (*Lymantria dispar*), changes in forest composition due to increased deer herbivory, and short-rotation forest management may have significantly reduced the amount of hard mast food that is available to the woodrat (Hassinger et al. 1996, Castleberry 2000). Weather may also play a role in the decline since the sharpest drops in populations have occurred in the northern part of the range and records in Pennsylvania and West Virginia suggest that below normal winter temperatures in the past 30 years have coincided with the shrinkage in range (Natureserve 2002).

Flood control on many rivers has eliminated the periodically flooded banks that Virginia mallow requires. This, along with development along river corridors, has resulted in the loss of natural habitat. Increased competition for resources by invasive exotic plant species, which typically colonize disturbed habitats, also poses a major threat (NatureServe 2002).

The habitat supporting the thick-leaved meadow rue is in relatively good condition, but deer browsing may present a threat to successful reproduction.

Recommendations

Forest cover is important in maintaining the microhabitat conditions and the food sources utilized by Allegheny woodrats. Oak trees are especially important because of the mast they provide and should not be removed. Fragmentation and disturbance within the area should be avoided. Maintenance of the power line right-of-way should be restricted to mowing. Mowing should not occur until after the Virginia mallow has flowered and the seeds have matured, in order to ensure a viable population. Non-native, weedy plants such as Japanese honeysuckle (*Lonicera japonica*) and multiflora rose (*Rosa multiflora*) that have been observed within this site can choke out Virginia mallow, and should be removed if possible.

Mill Creek BDA

This site is located within the floodplain of the Juniata River. A population of **Virginia Mallow (*Sida hermaphrodita)*** – a plant species of both federal and state concern – is growing in a successional old-field community located along old Route 22 (which is now closed and gated). This plant is typically found on periodically flooded riverbanks in loose, sandy, or rocky soil, often in rich alluvial floodplains and bottomlands. It can also be found growing along roadsides and railroad banks, in open to partially shaded, disturbed soil.

Threats and Stresses

Flood control on many rivers has largely eliminated the periodically flooded banks that Virginia mallow requires. This, along with development along river corridors, has resulted in the loss of natural habitat. Increased competition for resources by invasive exotic plant species, which typically colonize disturbed habitats, also poses a major threat (NatureServe 2002). ATV traffic is evident within this site, although not in the area where Virginia mallow occurs.

Recommendations

Multiflora rose, an exceedingly invasive non-native species, is present within this site, but is still limited in extent. Measures should be taken to eradicate it from the site, if possible. This site is located in the midst of a major highway and rail transportation corridor, with the US Silica sand quarrying and processing operation just to the south. Any further development in the near vicinity should be avoided. ATV traffic should be actively discouraged.

Sugar Grove Run BDA

This BDA is discussed under Henderson Township.

MILL CREEK BOROUGH

The borough of Mill Creek is located at the confluence of Mill Creek and the Juniata River, near the foot of Jacks Mountain. No Natural Heritage Areas are located within this municipality.

Henderson Township

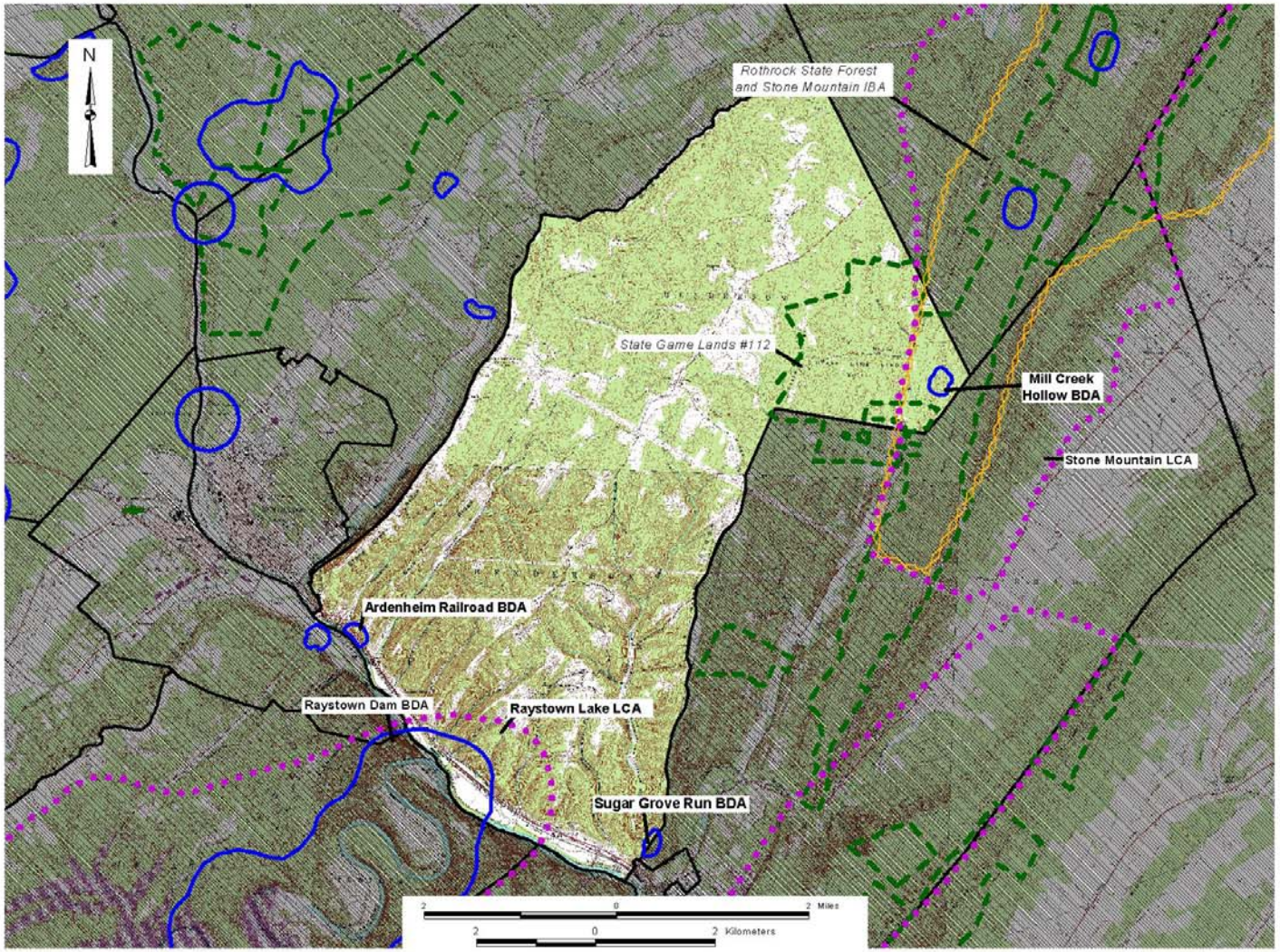
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Ardenheim Railroad BDA		*Notable Significance*		
Shale-barren evening primrose (*Oenothera argillicola*)	G3G4	S2		PT
Mill Creek Hollow BDA		*High Significance*		
Hooker's orchid (*Platanthera hookeri*)	G5	S1		TU
Raystown Dam BDA		*Exceptional Significance*		
Shale-barren evening primrose (*Oenothera argillicola*)	G3G4	S2		PT
Illinois pondweed (*Potamogeton illinoensis*)	G5	S3S4		TU
Virginia mallow (*Sida hermaphrodita*)	G2	S2		PE
Kate's mountain clover (*Trifolium virginicum*)	G3	S1		PE
Bald Eagle (*Haliaeetus leucocephalus*)	G4	S2B	PS:LT	PE
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT
Appalachian jewelwing (*Calopteryx angustipennis*)	G4	SU		
Southern pine looper moth (*Caripeta aretaria*)	G4	S1		
Promiscuous angle (*Semiothisa promiscuata*)	G4	S1		
A noctuid moth (*Properigea sp.*)	G2G3Q	S1		
Southern grizzled skipper (*Pyrgus wyandot*)	G2	S1		
Red-cedar - mixed hardwood rich shale woodland community		S1S2		
Sugar Grove Run BDA		*Notable Significance*		
Round-head gayflower (*Liatris scariosa*)	G5?	S2		N
Raystown Lake LCA		*Exceptional Significance*		
Stone Mountain LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS: *State Game Land #112*

GEOLOGIC FEATURES: *none*

Henderson Township



Henderson Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Ardenheim Railroad
Mill Creek Hollow
Raystown Dam
Sugar Grove Run

Landscape Conservation Areas:

Raystown Lake

Managed Areas:

State Game Lands #112

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

HENDERSON TOWNSHIP

Henderson Township is bounded to the west by Stone Creek Ridge and Murray Run, and extends south to the Juniata River. The township is almost entirely forested, with relatively little residential or agricultural development. A number of streams drain the region, flowing south before entering the Juniata. State Game Land # 112 occupies the northeast corner of the township.

Ardenheim Railroad BDA

This BDA extends from a shaly, fossil rich slope along the Juniata River upslope into the surrounding forest. The core area of this site is a shale bank that supports a population of **shale-barren evening primrose** (*Oenothera argillicola*), a plant species of state concern. *O. argillicola* is endemic to shale barrens, being well-adapted to survive the extreme environmental conditions which characterize such barrens.

Threats and Stresses

Hot, dry conditions help create the characteristic structure and composition of the shale barren community containing shale-barren evening primrose. Disturbance that can lead to the introduction and encouragement of exotic and aggressive plant species is one of the largest threats. Changes in surface flow of water, direct disturbance to the slope habitat, and increased input of nutrients would all impact the community. Maintenance activities associated with either the railroad or U.S. Route 22 could impact the barrens.

Recommendations

Protection of this site would likely involve the landowner, the county, and Pennsylvania Department of Transportation. Providing an awareness of the presence of the community and working to reduce possible erosion or inputs from the uplands, to establish a reasonable buffer, and to keep maintenance crews aware of the sensitivity of the area, would go a long way in protecting this area.

Mill Creek Hollow BDA

This site is located on State Game Land #112, on the western slope of Stone Mountain. The mixed hardwood forest is dominated by black birch (*Betula lenta*), yellow poplar (*Liriodendron tulipifera*), and sugar maple (*Acer saccharum*), with scattered hemlocks (*Tsuga canadensis*) along an intermittent drainage. **Hooker's orchid** (*Platanthera hookeri*), a species of special concern in Pennsylvania, occurs on a boulder-strewn section of slope along with three other orchid species (*Goodyera pubescens*, *Isotria verticillata*, *Cypripedium acuale*).

Threats and Stresses

The Hooker's orchid in this location is currently under no imminent threat, given that the BDA and adjacent lands are managed by the Pennsylvania Game Commission, which is aware of the plant's presence.

Recommendations

The status of the orchid should be monitored yearly.

Raystown Dam BDA

This BDA is discussed under Juniata Township.

Sugar Grove Run BDA

This BDA lies within the forested valley of Sugar Grove Run. State Road 1003 parallels the stream for a distance, cutting into a Devonian sandstone and shale slope. An exposed, roadside shale bank provides habitat for a small population of **round-head gayflower** (*Liatris scariosa*), a species of state concern.

Threats and Stresses

Roadside spraying of herbicides presents the most direct threat to the gayflower population. Any other road maintenance activities that result in the removal of material from the base of the slope could cause slope failure from which the *L. scariosa* might not recover. Logging on the uplands above the exposed shale bank might also result in the degradation of the gayflower habitat.

Recommendations

Effective protection of this site would likely involve the landowner, the county, and Pennsylvania Department of Transportation. Providing an awareness of the presence of the element and working to establish a reasonable buffer, and to keep maintenance crews aware of the sensitivity of the area, should be key in protecting this area.

Mount Union Region

- Mount Union Borough
- Shirleysburg Borough
- Shirley Township

Illinois pondweed (*Potamogeton illinoensis*)

Sampling mussels in Aughwick Creek

Shirley Township, Mount Union Borough & Shirleysburg Borough

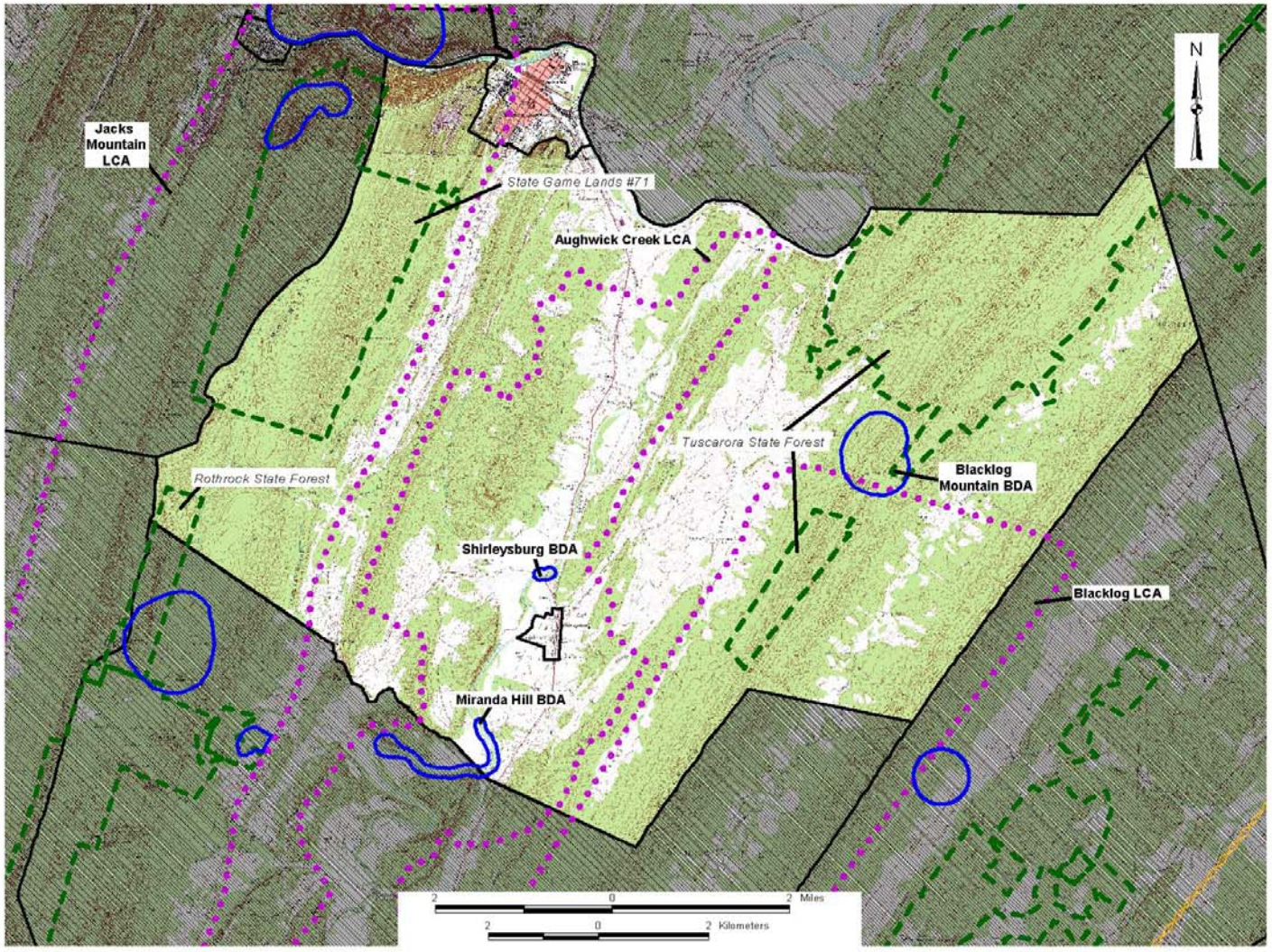
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Blacklog Mountain BDA		*High Significance*		
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT
Miranda Hill BDA		*Exceptional Significance*		
Special animal 1	G3	S2		PE
Special animal 2	G5	S1		PE
Shirleysburg BDA		*Notable Significance*		
Illinois pondweed (*Potamogeton illinoensis*)	G5	S3S4		TU
Aughwick Creek LCA		*Exceptional Significance*		
Blacklog LCA		*Exceptional Significance*		
Jacks Mountain LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *Rothrock State Forest*
State Game Land #71
Tuscarora State Forest

GEOLOGIC FEATURES: *none*

Shirley Township, Shirleysburg Borough, and Mount Union Borough



Shirley Township, Shirleysburg Borough and Mount Union Borough

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Blacklog Mountain
Miranda Hill
Shirleysburg

Landscape Conservation Areas:

Aughwick Creek
Blacklog
Jacks Mountain

Managed Areas:

Rothrock State Forest
State Game Lands #71
Tuscarora State Forest

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

SHIRLEY TOWNSHIP

Shirley Township lies south of the Juniata River, and forms the southernmost section of the Huntingdon/Mifflin County line. Shade Mountain and Jacks Mountain define the eastern and western boundaries of the township, respectively. Aughwick Creek flows north through a broad agricultural valley in the central region of the township.

Blacklog Mountain BDA

This site is located along the crest of Blacklog Mountain, in an area that lies between two disjunct sections of the Tuscarora State Forest. The rugged, forested terrain provides habitat for the **Allegheny woodrat** (*Neotoma magister*), a species of both global and state concern. Unlike the voracious non-native Norway rat (*Rattus norvegicus*), the woodrat is entirely herbivorous and dependent on acorns for a large part of its diet (Fergus 2000). In Pennsylvania, *Neotoma* is now at the northern extent of its geographic range; populations have disappeared in Connecticut, New York, and much of eastern Pennsylvania (NatureServe 2000).

Threats and Stresses

Several different studies provide evidence that a variety of factors are contributing to the observed declines in Allegheny woodrat populations. Some populations appear to have suffered heavy mortality from the raccoon roundworm (*Baylisascaris procyonis*). The raccoon roundworm is rarely fatal to raccoons, but can cause cerebrospinal nematodiasis in other species (Kazacos, 1983). Raccoons are habitat generalists that tolerate or even benefit from habitat fragmentation and disturbance. Human-caused fragmentation and disturbance have likely created conditions that increase the exposure of woodrats to the parasite and thus led to woodrat population declines. Another factor that may play a role in the decline is change in the availability of viable food resources. Chestnut blight (*Cryphonectria parasitica*), oak infestation by gypsy moths (*Lymantria dispar*), changes in forest composition due to increased deer herbivory, and short-rotation forest management may have significantly reduced the amount of hard mast food that is available to the woodrat (Hassinger et al. 1996, Castleberry 2000). Weather may also play a role in the decline since the sharpest drops in populations have occurred in the northern part of the range and records in Pennsylvania and West Virginia suggest that below normal winter temperatures in the past 30 years have coincided with the shrinkage in range (Natureserve 2002).

Recommendations

Forest cover is important in maintaining the microhabitat conditions and the food sources utilized by Allegheny woodrats. Oak trees are especially important because of the mast they provide and should not be removed. Fragmentation and disturbance within the area should be avoided. The PA Game Commission has developed further recommendations regarding management of woodrat habitat, which may be available upon request.

Miranda Hill BDA

This BDA is discussed under Cromwell Township.

Shirleysburg BDA

The core of this BDA is the section of Aughwick Creek in the vicinity of the U.S. Route 522 bridge. **Illinois pondweed** (*Potamogeton illinoensis*), a species of state concern, grows within this reach of the creek. *P. illinoensis* is a perennial aquatic herb that is rooted in the streambed, with two types of leaves: submersed and floating. The flowers of this particular species of *Potamogeton* project above the surface of the water (Rhoads and Block 2000).

Threats and Stresses

The population of Illinois pondweed is dependent upon the quality of the stream community, thus activities that lead to degradation of in-stream water quality would likely have a negative impact on this species.

Recommendations

Activities that result in siltation, eutrophication, or hydrologic alterations should be avoided within 50 meters of the stream. Since agriculture is the primary land use in the area surrounding this BDA, maintaining forested riparian buffers key to preserving high water quality within the stream. Periodic monitoring of the Illinois pondweed is desirable, and further surveys for this species should be conducted.

MOUNT UNION BOROUGH

Mount Union is located on the banks of the Juniata River, along the eastern boundary of the county. It is a large town with a population of slightly more than 2700 residents and encompasses an area of 1.26 square miles. No Natural Heritage Areas occur in this municipality.

SHIRLEYSBURG BOROUGH

Shirleysburg is located in the Aughwick Creek valley, directly upstream of where Fork Run flows into Aughwick Creek. No Natural Heritage Areas occur in these municipalities.

Northern Huntingdon Region

- Barree Township
- Jackson Township
- Miller Township
- West Township

Alan Seeger Natural Area,
Rothrock State Forest

Long-legged green darner (*Anax longipes*)

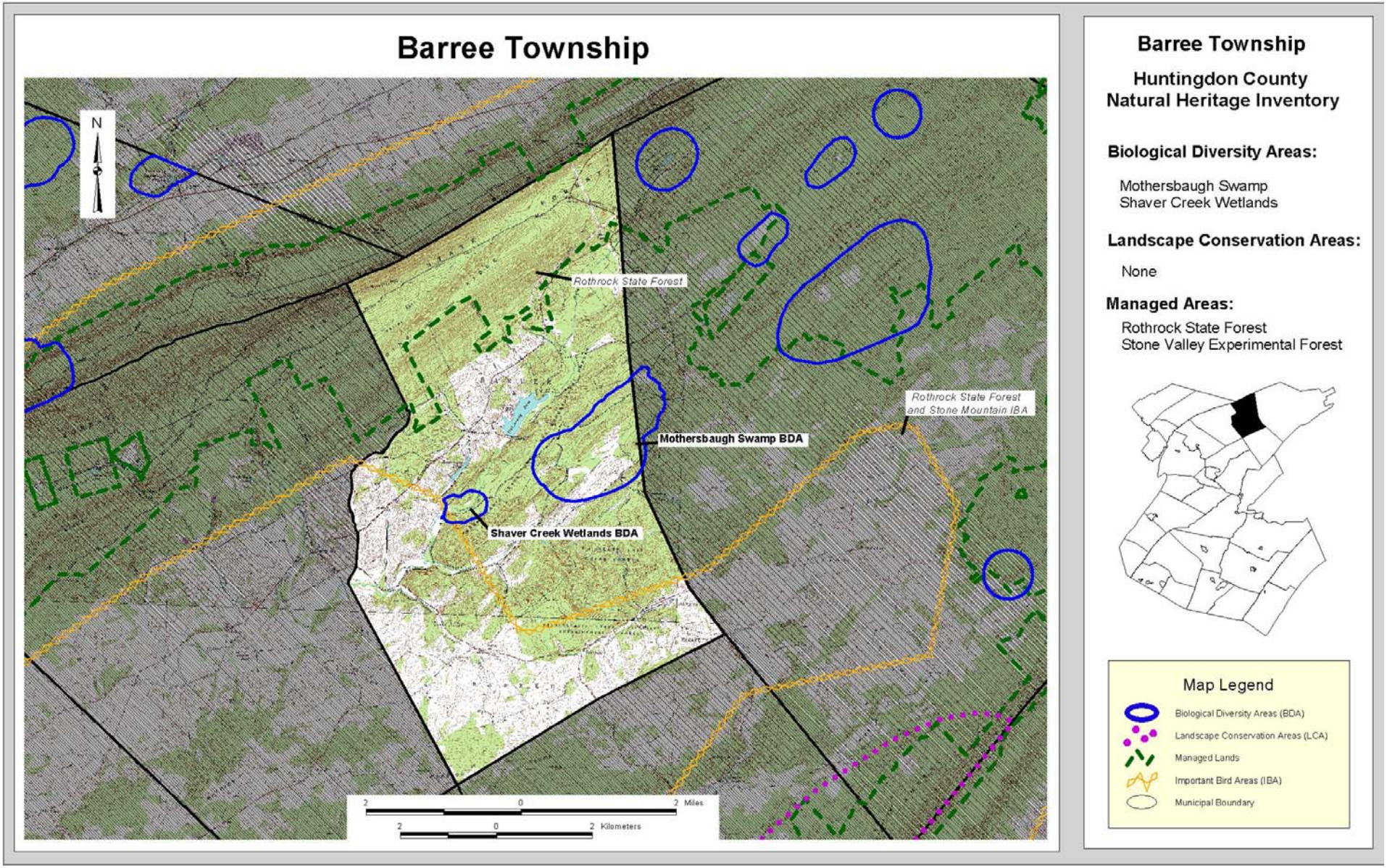
Barree Township

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Mothersbaugh Swamp BDA		*County Significance*		
Shaver Creek Wetland BDA		*High Significance*		
False hop sedge (*Carex lupuliformis*)	G4	S1		TU
Rich hemlock - mesic hardwoods forest community		S2S3		

OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS: *Rothrock State Forest*
Stone Valley Experimental Forest

GEOLOGIC FEATURES: *none*


Barree Township
N
Rothrock State Forest
Rothrock State Forest and Stone Mountain IBA
Mothersbaugh Swamp BDA
Shaver Creek Wetlands BDA
2 0 2 Miles
2 0 2 Kilometers
Barree Township
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Mothersbaugh Swamp
Shaver Creek Wetlands
Landscape Conservation Areas:
None
Managed Areas:
Rothrock State Forest
Stone Valley Experimental Forest
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

BARREE TOWNSHIP

Barree Township lies in the northcentral region of the county, and forms part of the Huntingdon/Centre County line. Approximately two thirds of the township is forest located within either the Rothrock State Forest or Penn State University's Stone Valley Experimental Forest. The Rothrock State Forest and Stone Mountain Important Bird Area extends across roughly three-quarters of the township.

Mothersbaugh Swamp BDA

Mothersbaugh Swamp is the largest wetland complex in the county, covering an area of approximately 40 acres within the Stone Valley Experimental Forest. A small, slow-flowing stream bisects the wetland, and forms a shallow pond adjacent to an inactive beaver dam at the lower end of the site. During the survey of the site, a common snapping turtle (*Chelydra serpentina serpentina*), red-spotted newts (*Notophthalmus viridescens viridescens*), and possibly several painted turtles (*Chrysemys picta*) were observed in the pond. Evidence of past tree cutting by beavers along the perimeter of the wetland and the remains of several former dams suggest that the majority of the wetland has been altered by beaver activity at various times.

Several vegetation communities occur within the swamp. Major plant species occurring in the mixed forb marsh portion include: three-way sedge (*Dulichium arundinaceum*), tear-thumb (*Polygonum saggitatum, P. arifolium*), spike-rush (*Eleocharis spp*.), sensitive fern (*Onoclea sensibilis*), goldenrod (*Solidago spp*.), and blue vervain (*Verbena hastata*). Cattail marsh, characteristically dominated by common cattail (*Typha latifolia*), occurs in several regions of the wetland. An alder-sphagnum wetland community extends throughout the upper half of the swamp. Township Road 538 defines the western extent of Mothersbaugh Swamp, and serves as an avenue of introduction for a number of invasive plant species, including multiflora rose (*Rosa multiflora*), Tartarian honeysuckle (*Lonicera tatarica*), and autumn olive (*Eleagnus umbellata*).

Threats and Stresses

Township Road 538, with its potential to introduce disturbance in the form of maintenance activities, run-off, and non-native plants, presents the largest threat to the wetland. Residences within the immediate watershed may be a source of eutrophication through septic inputs.

Recommendations

Forest cover should be left intact in the area surrounding the wetland, because alterations in the light levels and temperature along the margins of the swamp could possibly alter the hydrology of the site. The status of the alien shrub species mentioned above should be monitored yearly. Inventories for reptiles, amphibians, dragonflies, and butterflies should be conducted.

Shaver Creek Wetland BDA

The core of this site is a series of forested seasonal wetlands located within the riparian zone of Shaver Creek. This section of Shaver Creek flows through a **rich hemlock – mesic hardwoods forest** characterized by the presence of eastern hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*), northern red oak (*Quercus rubra*), red maple (*Acer rubrum*), basswood (*Tilia americana*), and shagbark hickory (*Carya ovata*). The site possesses a diversity of stream-

related habitats that include a rocky streambed, alluvial islands, and back channels. One of the back channels supports a vernal wetland in which a small population of **false hop sedge** (*Carex lupuliformis*), a new Huntingdon County record, occurs. Several species of invasive, non-native shrubs were also found growing within the site, including multiflora rose (Rosa multiflora), Japanese barberry (*Berberis thunbergii*), and a honeysuckle (*Lonicera* sp.).

Threats and Stresses

A gravel road parallels Shaver Creek through the length of the site, and may facilitate the introduction of alien species. Multiflora rose (*Rosa multiflora*) and Japanese barberry (*Berberis thunbergii*), both highly invasive shrubs, were found within the riparian forest. Loss of tree canopy, through logging or road maintenance, could have a major effect on the forest community.

Recommendations

Forest cover should be left intact along the stream and the wetlands to prevserve the hydrologic conditions that support the riparian communities within this site. Other human-caused disturbances such as road maintenance activities that impinge on the riparian forest should be kept to a minimum. The status of the alien shrub species should be monitored yearly.

Jackson Township

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Alan Seeger Natural Area BDA		*Exceptional Significance*		
Checkered rattlesnake-plantain (*Goodyera tesselata*)	G5	S1		TU
Kidney-leaved twayblade (*Listera smallii*)	G4	S1		PE
Hemlock - tuliptree - birch forest community		S4		
Red oak - mixed hardwood forest community		S5		
Big Flat Natural Area BDA		*Notable Significance*		
Dry oak - heath woodland community		S3		
Scrub oak shrubland community		S3		
Bear Meadows Natural Area BDA		*Exceptional Significance*		
Heart-leaved twayblade (*Listera cordata*)	G5	S1		PE
Kidney-leaved twayblade (*Listera smallii*)	G4	S1		PE
Black spruce - tamarack palustrine woodland	G?	S2		
Highbush blueberry - sphagnum wetland	G?	S4		
Beaver Pond Bog BDA		*Exceptional Significance*		
Long-legged green darner (*Anax longipes*)	G5	S1S2		
Roger's clubtail dragonfly (*Gomphus rogersi*)	G4	S1		
Thorey's grayback dragonfly (*Tachopteryx thoreyi*)	G4	S3		
Chestnut Spring BDA		*County Significant*		
Hemlock (white pine) - red oak - mixed hardwood forest community		S4		
Detweiler Run BDA		*Notable Significance*		
Hemlock - tuliptree - birch forest community		S4		

Jackson Township (con't.)

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Greenlee Run BDA		*High Significance*		
Thorey's grayback dragonfly (*Tachopteryx thoreyi*)	G4	S3		
Greenwood Furnace Iron Mine BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
Laurel Run BDA		*High Significance*		
Roger's clubtail dragonfly (*Gomphus rogersi*)	G4	S1		
Mothersbaugh Swamp BDA		*County Significance*		
Owl Gap BDA		*Notable Significance*		
Zorro clubtail (*Lanthus parvulus*)	G4	S3S4		
Ross Spring BDA		*High Significance*		
Kidney-leaved twayblade (*Listera smallii*)	G4	S1		PE
Sand Knob BDA		*Exceptional Significance*		
Yellow-fringed orchid (*Platanthera ciliaris*)	G5	S2		TU
Sky-tailed emerald dragonfly (*Somatochlora elongata*)	G5	S2		
Thorey's grayback dragonfly (*Tachopteryx thoreyi*)	G4	S3		
Jacks Mountain LCA		*Exceptional Significance*		

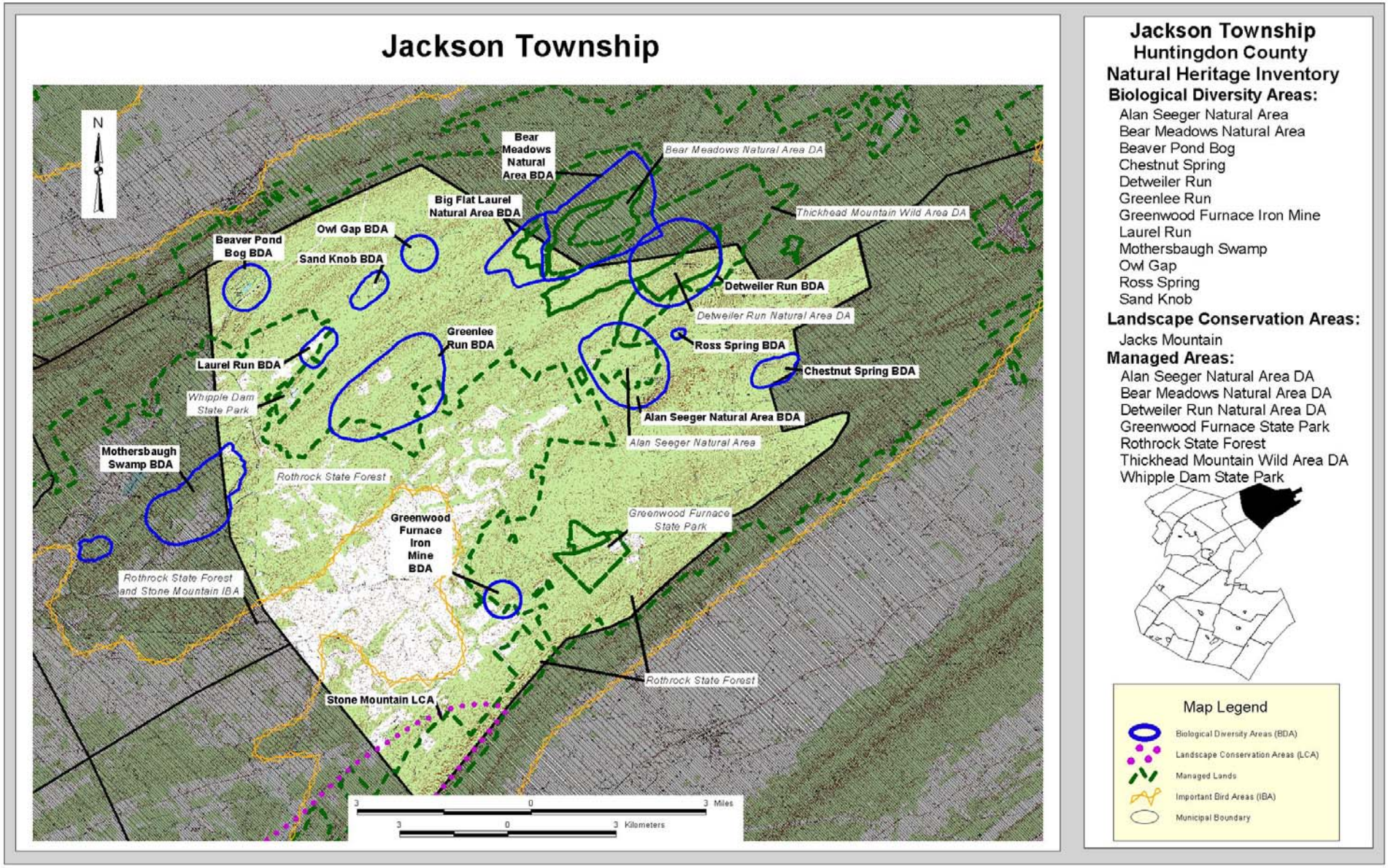
OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS:

Greenwood Furnace State Park
Rothrock State Forest
Whipple Dam State Park
Alan Seeger Natural Area DA

Jackson Township (con't.)

MANAGED LANDS (con't):	*Bear Meadows Natural Area DA*
	Big Flat Laurel Natural Area DA
	Detweiler Run Natural Area DA
	Thickhead Mountain Wild Area DA
GEOLOGIC FEATURES:	*Big Kettle (basin)*
	Chestnut Spring
	Little Kettle (basin)
	Ross Spring
	Treaster Kettle (basin)


Jackson Township
N
Bear Meadows Natural Area BDA
Bear Meadows Natural Area DA
Big Flat Laurel Natural Area BDA
Thickhead Mountain Wild Area DA
Owl Gap BDA
Beaver Pond Bog BDA
Sand Knob BDA
Detweiler Run BDA
Detweiler Run Natural Area DA
Greenlee Run BDA
Ross Spring BDA
Laurel Run BDA
Chestnut Spring BDA
Whipple Dam State Park
Alan Seeger Natural Area BDA
Alan Seeger Natural Area
Mothersbaugh Swamp BDA
Rothrock State Forest
Greenwood Furnace State Park
Greenwood Furnace Iron Mine BDA
Rothrock State Forest and Stone Mountain IBA
Rothrock State Forest
Stone Mountain LCA
3 0 3 Miles
3 0 3 Kilometers
Jackson Township
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Alan Seeger Natural Area
Bear Meadows Natural Area
Beaver Pond Bog
Chestnut Spring
Detweiler Run
Greenlee Run
Greenwood Furnace Iron Mine
Laurel Run
Mothersbaugh Swamp
Owl Gap
Ross Spring
Sand Knob
Landscape Conservation Areas:
Jacks Mountain
Managed Areas:
Alan Seeger Natural Area DA
Bear Meadows Natural Area DA
Detweiler Run Natural Area DA
Greenwood Furnace State Park
Rothrock State Forest
Thickhead Mountain Wild Area DA
Whipple Dam State Park
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

JACKSON TOWNSHIP

Jackson Township forms the northeastern corner of Huntingdon County, bordering both Centre and Mifflin Counties. Approximately eighty percent of the township is forested, with half of those forested lands falling within the Rothrock State Forest. Numerous headwater streams flow through narrow forested valleys before entering Standing Stone Creek or Shaver Creek. The Pennsylvania Audubon Society has identified a large portion of the township as important bird habitat.

Alan Seeger Natural Area BDA

The core of this BDA is the broad alluvial stream valley surrounding the confluence of Detweiler Run and Standing Stone Creek. A small stand of old-growth hemlock (white pine) – red oak – mixed hardwood forest occurs along Standing Stone Creek. The dominant canopy species are hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*), while the understory is dominated by rhododendron (*Rhododendron maximum*). This patch of old-growth supports a population of **kidney-leaved twayblade** (*Listera smallii*), a plant of state concern in Pennsylvania. This diminutive orchid grows in sphagnum mats under the dense understory. Another state-endangered orchid, the **checkered rattlesnake-plantain** (*Goodyera tesselata*), occurs in thin, coniferous forest along a low ridge northwest of the valley.

A high-quality red oak – mixed hardwood forest grows on the north-facing slopes above Standing Stone Creek. The dominant tree species are northern red oak (*Quercus rubra*), tuliptree (*Liriodendron tulipifera*), and red maple (*Acer rubrum*). Minor canopy species include black cherry (*Prunus serotina*), sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and hickory (*Carya sp*.) The trees are old and large, but the absence of standing snags and large woody debris on the forest floor characteristic of old-growth, indicates that this section of the site is not truly ancient forest.

Threats and Stresses

The westward migration of the hemlock wooly adelgid (*Adelges tsugae*), currently documented in 35 counties in Pennsylvania, poses a potential threat to the hemlock trees in the region (PA Bureau of Forestry 2003?). The hemlock wooly adelgid, native to Asia, is a sap-feeding insect that attacks both the eastern hemlock and the Carolina hemlock (*Tsuga caroliniana*). Heavily infested trees may lose most of their needles, and can die if other stresses, such as drought, affect them (PA Bureau of Forestry 2003?). The oak forest described above may be vulnerable to gypsy moth (*Lymantria dispar*) outbreaks. However, given the presence of a fungus and a virus in forested landscapes that helps to control the extent gypsy moth infestations, mortality due to gypsy moth defoliation may actually aid in re-establishing structural components such as standing snags and coarse woody debris that characterize old-growth (Schowalter and Whitmore 2002).

Recommendations

Management of the forests in this area should include periodic monitoring for the hemlock wooly adelgid and other non-native forest pests. Any proposed treatments for insect outbreaks should take into consideration impacts to other forest organisms.

Bear Meadows Natural Area BDA

This BDA was identified as part the Centre County Natural Heritage Inventory (1991, 2002). Bear Meadows is probably the most famous state-designated natural area in central Pennsylvania. It is a mountain bog located in a horseshoe-shaped valley between two "C" shaped ridges. The resulting valley has developed a deep, poorly drained bog famous for its relict boreal forest and highbush blueberries. The black spruce – tamarack palustrine woodland community is located in one arm of the horseshoe where the land is flat, the soil is high in organic material and the drainage is poor. This unique stand consists of balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*), with rhododendron (*Rhododendron maximum*) and eastern hemlock (*Tsuga canadensis*) as associates. Though it has been cut, the community is well recovered and shows excellent regeneration of both major species. Drier areas in the western part of the swamp also support red maple (*Acer rubrum*), white pine (*Pinus strobus*) and yellow birch (*Betula allegheniensis*).

The central part of the natural area consists of a highbush blueberry – sphagnum wetland community that has a peat deposit recorded at over 9 1/2 feet deep (Dunson and Martin 1973). The open bog community is predominantly mosses (*Sphagnum spp.*), sedges and shrubs (*Vaccinium sp., Alnus sp., Viburnum sp.*). Tannic acid leached from the peat turns the water a dark brown color. The tannins make the water too acidic for fish— but amphibians, dragonflies and other insects thrive here. At the edge of the bog is a swampy forest that supports two very diminutive orchid species, the **heart-leaved twayblade** (*Listera cordata*) and the **kidney-leaved twayblade** (*Listera smallii*).

The third community type found in the area is the forest that grows on the edges of the open bog. This is probably the smallest community, since most of the surrounding area is second growth dry oak forest, but the forest on the southernmost edge of the bog is a well-developed hemlock – northern hardwoods community with red oak (*Quercus borealis*), white oak (*Q. alba*), and red maple, that appears more mature than the surrounding forests. This community type is not tracked as rare.

Wildlife species are also extremely abundant here. It is known among birding enthusiasts and insect collectors as an extremely rich site. The Bear Meadows Natural Area has been designated as a National Natural Landmark by the Department of the Interior since 1966.

Threats and Stresses

The area is protected from most threats by its designation as a Bureau of Forestry Natural Area. Though the area is heavily used as a recreation site, no major impacts are apparent from this use. There is some problem with trash dumping and some trampling of the delicate peat. Though there is an excellent, if damp, trail through the natural area, many people prefer to walk on the peat mats in the pursuit of blueberries. Human traffic does not appear to be a problem outside of the blueberry bog.

Recommendations

An evaluation of the problem of peat damage in the area of the blueberries should be conducted in order to devise a solution that protects the peat from trampling. One option for consideration would be to build a spur trail leading to blueberry areas.

Big Flat Laurel Natural Area BDA

This BDA was identified as part the Centre County Natural Heritage Inventory (1991, 2002). Above Bear Meadows, the Pennsylvania Department of Environmental Resources has designated an area located at the highest elevations of Greenlee Mountain as the Big Flat Laurel Natural Area. Notable features within this Natural Area are a **dry oak - heath woodland community** and a **scrub oak shrubland community**. This area was heavily logged and the wood was used to produce charcoal on the site. In some parts of the flat, the charcoal pits are still evident. Despite this activity, the stunted chestnut oak (*Quercus montana*), scrub oak (*Quercus ilicifolia*) and mountain laurel (*Kalmia latifolia*) community present today is probably representative of that which it originally supported. The soil is extremely thin on this flat ridge. Rocky outcrops are common, as are shallow depressions where rainwater collects to form an almost swampy habitat in this otherwise extremely dry community. Sassafras (*Sassafras albidium*) and ericaceous shrubs such as black huckleberry (*Gaylussacia baccata*) and lowbush blueberry (*Vaccinium angustifolium*) are also common, as well as black gum (*Nyssa sylvatica*), which thrives in the shallow depressions.

This community is restricted to the highest elevations on Greenlee Mountain. A more disturbed example is found to the north on Little Flat, where the center of the natural community has been cleared for a radio tower.

Threats and Stresses

There are few threats to this community other than the roads that cut through it. There is some evidence of dumping, but it is restricted to the roadway. At some point, there was an effort by the Bureau of Forestry to reforest the Big Flat with non-native conifer species—Norway spruce (*Picea abies*) and European larch (*Larix decidua*). A few of these specimens are persisting and there is apparently some regeneration. The dryness of the area and the species present suggest a higher than normal susceptibility to fire. Periodic fire may have functioned historically in maintaining both the dry oak – woodland and scrub oak shrubland communities within this site.

Recommendations

Dumping should be monitored in the area. It may also be beneficial to further assess the influence of the non-native conifers on the community; if assessment suggests they are influencing soil chemistry or regenerating to comprise a substantial portion of the community, the natural ecosystem may benefit from their removal. The Bureau of Forestry may want to consider prescribed burns as a component of the management of this Natural Area.

Beaver Pond Bog BDA

The core of this site is a former impoundment, known as the "Beaver Pond", which now supports a community complex unique in Huntingdon County. Community types present include a graminoid marsh, an acidic shrub swamp, and a cranberry bog. Dominant species include steeplebush (*Spirea tomentosa*), woolgrass (*Scirpus cyperinus*), three-way sedge (*Dulichium arundinaceum*), and rattlesnake mannagrass (*Glyceria canadensis*). A large section of the wetland is dominated by a sedge (*Carex sp.*) that had no reproductive parts at the time of the field visit, and so was not identified to species. A small, meandering stream, fed by several

spring runs, bisects the site. Three dragonflies species of special concern have been documented within the wetland: **long-legged green darner** (*Anax longipes*), **Roger's clubtail** (*Gomphus rogersi*), and **Thorey's grayback** (*Tachopteryx thoreyi*). These species are associated with clean, high-quality forested streams and hillside seepages in deciduous forest.

Threats and Stresses

This site, located within Rothrock State Forest, is under no imminent threat. The largely contiguous forest that covers the entire upstream section of the watershed ensures the high quality of the water entering the wetland. Timber harvesting of the surrounding forest would likely alter the local hydrology and degrade habitat that now supports the rare dragonflies.

Recommendations

The current management program meets the ecological needs of the natural communities and species present in the area.

Chestnut Spring BDA

This BDA encompasses the watershed of Chestnut Spring. The spring, which originates near the base of a large topographic basin known as Big Kettle, is the headwater of one of the many first-order streams in the immediate area that flow into Standing Stone Creek. The surrounding hemlock (white pine) – red oak – mixed hardwood forest is dominated by hemlock (*Tsuga canadensis*), black birch (*Betula lenta*), red maple (*Acer rubrum*), and chestnut oak (*Quercus montana*). The impenetrably dense rhododendron (*Rhododendron maximum*) understory has resulted in an exceptionally sparse herbaceous layer. The forest floor in the vicinity of the spring is quite rocky, and the soil, where present, is thin and sandy. The spring emerges at several points along the slope, and the resultant high-gradient clearwater stream flows underground in places.

Threats and Stresses

A hiking trail is located adjacent to the spring, and portions of the trail actually lie within the streambed below the spring. However, trail use appears to be light, and impacts are minimal. Activities associated with loss of canopy and increased light levels would likely alter hydrology, forest and stream community composition, and negatively impact water quality.

Recommendations

The current management program meets the ecological needs of the natural communities and protects stream quality in the area.

Detweiler Run BDA

An ancient stand of hemlock (*Tsuga Canadensis*) – tuliptree (*Liriodendron tulipifera*) – birch (*Betula spp*) forest grows in the narrow forested valley through which Detweiler Run flows. Within this stand are magnificent hemlock and white pine (*Pinus strobus*), some of which are nearly 36 inches in diameter. Only the center of the natural area is old growth forest, but the surrounding forest community is maturing into an impressive forest. In addition to the conifers, the stand has a thick understory of rhododendron (*Rhododendron maximum*), with a sparse

herbaceous layer of Jack-in-the-pulpit (*Arisaema triphyllum*), goldthread (*Coptis trifolia*), and red trillium (*Trillium erectum*). Though no rare amphibians are known to inhabit the area, there is a large population of the common red spotted newt (*Notophthalmus viridescens viridescens*) present in the ravine.

Old-growth forests serve a number of ecological functions not necessarily filled by second or third growth forests. These functions include, but are not limited to: providing habitat for organisms ranging from birds, mammals, amphibians and reptiles, insects, gastropods, plants, fungi, lichens, and microbes; groundwater purification and storage; the formation of optimal forest soils through the accumulation of humus in the upper soil horizons, periodic mixing of horizons by uprooting of trees, and the formation of macropores – linear openings in the soil, having much greater permeability than the surrounding material overlying the bedrock; flood control by through means of maximal absorptive capabilities and stream bank stabilization; protecting water quality through prevention of siltation; providing a dependable source of coarse woody debris essential to the functioning of woodland stream ecosystems (Pennsylvania Wildlands Recovery Project 2003).

Threats and Stresses

The westward migration of the hemlock wooly adelgid (*Adelges tsugae*), a species currently documented in 35 counties in Pennsylvania, poses a potential threat to the hemlock trees in the region (PA Bureau of Forestry 2003?). The hemlock wooly adelgid, native to Asia, is a sap-feeding insect that attacks both the eastern hemlock and the Carolina hemlock (*Tsuga caroliniana*). Heavily infested trees may lose most of their needles, and can die if other stresses, such as drought, affect them (PA Bureau of Forestry 2003?).

Recommendations

Management of the forests in this area should include periodic monitoring for the hemlock wooly adelgid and other non-native forest pests. Any proposed treatments for insect outbreaks should take into consideration impacts to other forest organisms.

Greenlee Run BDA

This site falls largely within the Rothrock State Forest, and is centered along a 2.5-mile section of Greenlee Run. The high-gradient clearwater stream, fed by spring runs within the site, and the surrounding forest provide habitat for **Thorey's grayback dragonfly** (*Tachopteryx thoreyi*), a species of special concern in Pennsylvania. *T. thoreyi* is one of the most primitive dragonfly species in North America, and is found near hillside seeps and steep ravines in deciduous forest.

Dragonflies, as with other members of the Order Odonata, have three stages in their life cycle: egg, nymph, and adult. Dragonflies lay their eggs in water. After the eggs hatch, the nymphs remain in the water through several instars, feeding on small aquatic organisms until they eventually grow wings and emerge from the water as terrestrial adults. The adults perch on tree trunks and fallen logs, and feed on small insects.

Threats and Stresses

Activities such as timber harvesting and road-building that remove forest canopy and increase sediment loading in streams degrades habitat utilized by Thorey's grayback dragonfly.

Application of pesticides for the control of gypsy moth (*Lymantria dispar*) and other forest pests may also negatively impact odonate populations.

Recommendations

Best Management Practices (BMPs) and timber harvesting methods that minimize impacts to habitat utilized by *T. thoreyi* should be followed within the site. A forested buffer of 50 meters on either side of the stream should be maintained to protect the quality of the stream for aquatic organisms (U.S. Forest Service 1991).

Greenwood Furnace Iron Mine BDA

This inactive mine is used as a winter hiburnaculum by the **northern bat** (*Myotis septentrionalis*), an animal species of special concern in Pennsylvania. This species has specific environmental requirements with regard to suitable hibernation habitat, and its use of the Greenwood Furnace iron mine is evidence that the mine contains areas with the appropriate temperature and humidity conditions. The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants. As with all bats, if individuals of this species are disturbed during hibernation, they will become active and may use up critical fat stores needed to survive the winter. Juveniles can perish from repeated disturbances, and individuals may be weakened such that they do not have the energy to forage successfully in the spring.

Threats and Stresses

As is the case with all cave-hibernating bats, the northern bat can be negatively impacted by disturbances in the cave during the winter months. Even low levels of noise, heat, or light can be sufficient to disturb this species. Physical disturbance of the rock surrounding the mine or the mine entrance could alter environmental conditions within, which may make it unusable for this and other bat species.

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Laurel Run BDA

The streams, forest, and open meadows of this BDA provide habitat for the state-endangered **Roger's clubtail dragonfly** (*Gomphus rogersi*). This species breeds in clean, high-gradient forested streams, where the sandy substrate serves as habitat for the larval stage of the dragonfly.

Adults forage for food above riffle areas in the streams, and roost in nearby trees. Males disperse to open fields or follow stream corridors in search of mates.

Threats and Stresses

The natural communities and species that inhabit these mountain streams depend upon high water quality, the regulation of light and temperature levels provided by forest cover, and the input of detritus and other organic material supplied from the forest. Inputs of silt or nutrients from activities in the watershed would be deleterious to the health of the stream. Changes in the stream environment associated with loss of canopy and increased light levels would impact the stream negatively.

Recommendations

Forestry BMPs and timber harvesting methods that minimize impacts to habitat utilized by *G. rogersi* should be followed within the site. A forested stream buffer should be maintained to protect the quality of the stream for aquatic organisms.

Mothersbaugh Swamp BDA

Please see the discussion of this BDA under Barree Township.

Owl Gap BDA

The streams and forest within this BDA provide habitat for the **zorro clubtail dragonfly** (*Lanthus parvulus*), a species of special concern in Pennsylvania. The zorro clubtail breeds in clean, high-gradient forested streams, where the sandy substrate serves as habitat for the larval stage of the dragonfly. Adults forage for food above riffle areas in the streams, and roost in nearby trees. Males disperse to open fields or follow stream corridors in search of mates.

Threats and Stresses

The natural communities and species that inhabit these mountain streams depend upon high water quality, the regulation of light and temperature levels provided by forest cover, and the input of detritus and other organic material supplied from the forest. Inputs of silt or nutrients from activities in the watershed would be deleterious to the health of the stream. Changes in the stream environment associated with loss of canopy and increased light levels would impact the stream negatively.

Recommendations

Forestry Best Management Practices (BMPs) and timber harvesting methods that minimize impacts to habitat utilized by *L. parvulis* should be followed within the site. Forested stream buffers should be maintained to protect the quality of the streams for aquatic organisms.

Ross Spring BDA

The core of this site is Ross Spring, which originates from a single point at the base of a quartzite ridge. The surrounding palustrine forest is dominated by hemlock (*Tsuga canadensis*), yellow

birch (*Betula allegheniensis*), and red maple (*Acer rubrum*), with rhododendron (*Rhododendron maximum*) in the understory. **Kidney-leaved twayblade** (*Listera smallii*) was found growing in sphagnum moss near the spring.

Threats and Stresses

In spite of being located within five meters of Stone Creek Road, the spring is difficult to find and any impacts to the spring or *L. smallii* population are minimal. Runoff and road maintenance may pose some threat.

Recommendations

This site lies within Rothrock State Forest, and current management of the area appears to meet the ecological needs of the orchid and associated natural community.

Sand Knob BDA

This site, located in the Laurel Run valley in Rothrock State Forest, supports three populations of species of special concern: **sky-tailed emerald dragonfly** (Somatochlora elongata), **Thorey's grayback dragonfly** (*Tachopteryx thoreyi*), and **yellow-fringed orchid** (*Platanthera ciliaris*). Laurel Run and associated hemlock seeps provide breeding and foraging habitat for the dragonflies. The dense shrub layer of mountain laurel (*Kalmia latifolia*) in the surrounding hemlock (white pine) – red oak – mixed hardwood forest shelters a small population of yellow-fringed orchid.

Threats and Stresses

The species that inhabit these mountain streams depend upon high water quality, the regulation of light and temperature levels provided by forest cover, and the input of detritus and other organic material supplied from the forest. Inputs of silt or nutrients from activities in the watershed would be deleterious to the health of the stream. Because their larvae over-winter in streams for a span of several years, the sky-tailed emerald dragonfly is particularly sensitive to changes in water quality.
Mowing and herbicide application, conducted as part of road and power line right-of-way maintenance, pose a direct threat to the yellow-fringed orchid population. Over-collection by orchid enthusiasts also poses a threat to rare orchids.

Recommendations

Large-scale forest cover removal should be avoided within the bounds of this site in order to preserve dragonfly habitat and prevent silt inputs to the stream. In those areas where forest cover has already been removed, erosion control measures should be implemented if not already in place. Forested stream buffers should be maintained to protect the quality of the streams for aquatic organisms. Workers involved in right-of-way maintenance within the site should be provided with guidance from the Pennsylvania Bureau of Forestry with regard to preventing damage to the orchid population.

Miller Township

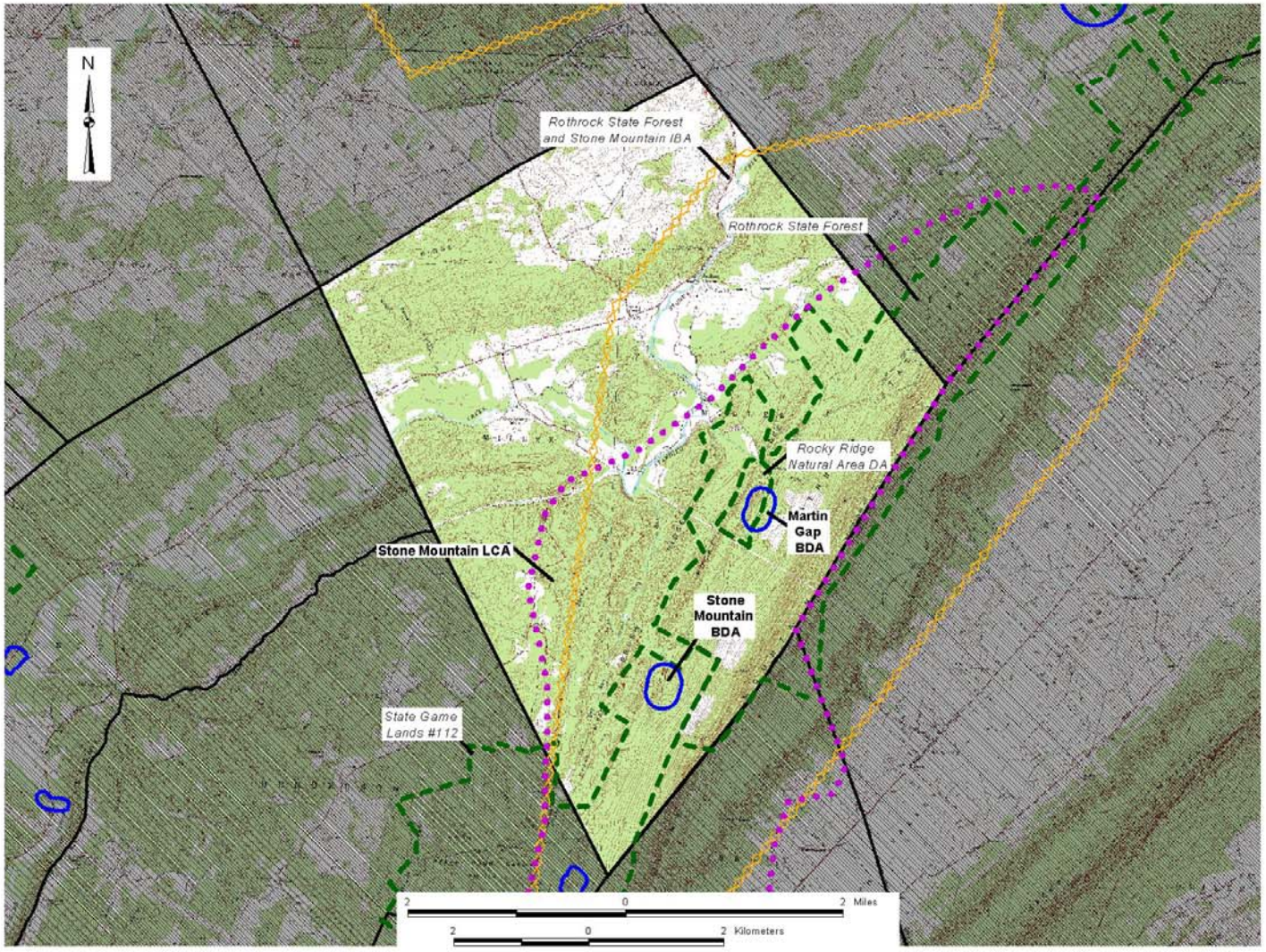
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Martin Gap BDA		*Exceptional Significance*		
Puttyroot (*Aplectrum hyemale*)	G5	S3		PE
Adder's tongue fern (*Ophioglossum vulgatum*)	G5	S1		PT
Stone Mountain BDA		*High Significance*		
Puttyroot (*Aplectrum hyemale*)	G5	S3		PE
Stone Mountain LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS: *Rothrock State Forest*
State Game Land #112
Rocky Ridge Natural Area DA

GEOLOGIC FEATURES: *none*

Miller Township



Miller Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Martin Gap
Stone Mountain

Landscape Conservation Areas:

Stone Mountain

Managed Areas:

Rocky Ridge Natural Area DA
Rothrock State Forest
State Game Lands #112

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

MILLER TOWNSHIP

The eastern boundary of Miller Township follows the crest of Stone Mountain and forms part of the Huntingdon/Mifflin County line. Numerous forested ridges and valleys characterize the eastern half of the township, whereas agriculture is primarily centered in the Standing Stone Creek valley and the rolling hills to the west. Most of the western slope of Stone Mountain in Miller Township falls within the boundaries of either Rothrock State Forest or State Game Land #112. The Pennsylvania Audubon Society has recognized the eastern half of the township as habitat important to birds.

Martin Gap BDA

This site, located in part within the Rocky Ridge Natural Area in Rothrock State Forest, supports populations of two plant species of special concern. **Puttyroot** (*Aplectrum hyemale*) and **adder's tongue fern** (*Ophioglossum vulgatum*) occur in the mature red oak – mixed hardwood forest surrounding a small, intermittent stream. Scattered beech (*Fagus grandifolia*) saplings and spicebush (***Lindera benzoin***) dominate the sparse understory. Ten species of ferns were recorded within this site, an unusual richness in fern diversity for Huntingdon County. The puttyroot occurs primarily in fern-free openings. A small population of adder's tongue fern (a new Huntingdon County record) was found growing in a moist depression in an old roadbed in the mesic forest bordering the stream.

Threats and Stresses

Puttyroot appears to be quite sensitive to forest disturbance. In an area adjoining the site, a selective/regeneration timber harvest apparently caused a number of puttyroot plants to die out. This may have been due, in part, to impacts to mycorrhizal fungi associated with intact forest. The seeds of *A. hyemale*, as with other orchids, depend on mycorrhizal fungi for at least part of their nourishment after germination (Henry, et al., 1975). Defoliation by the gypsy moth (*Lymantria dispar*) may also pose a threat. The opening of the overstory canopy and the resultant increase in sunlight reaching the forest floor would likely cause an increase in the density of the shrub layer, creating conditions unfavorable for puttyroot. Such disturbances to the forest would also likely impact the population of adder's tongue fern.

Recommendations

Forest adjoining the protected Natural Area should be left intact, in order to assure the preservation of conditions favorable for puttyroot. Any treatment for gypsy moth infestations should employ low-impact biological control methods. The plant species of concern within the site should be monitored periodically.

Stone Mountain BDA

This site is located within State Game Land # 112, along the eastern slope of Rocky Ridge. The mixed mesophytic forest of the lower slope supports a population of **puttyroot**. The forest canopy is dominated by red maple (*Acer rubrum*), sugar maple (*A. saccharum*), white oak (*Quercus alba*), black oak (*Q. velutina*), cucumber-tree (*Magnolia acuminata*), and hickory (*Carya sp.*). A shrub layer is lacking in this lower region of the slope. A small, intermittent

stream flows through the narrow valley between Rocky Ridge and Stone Mountain, and is roughly paralleled by a hiking trail.

Threats and Stresses

This site is quite similar to the Martin Gap BDA, and potential threats are the same as those described above.

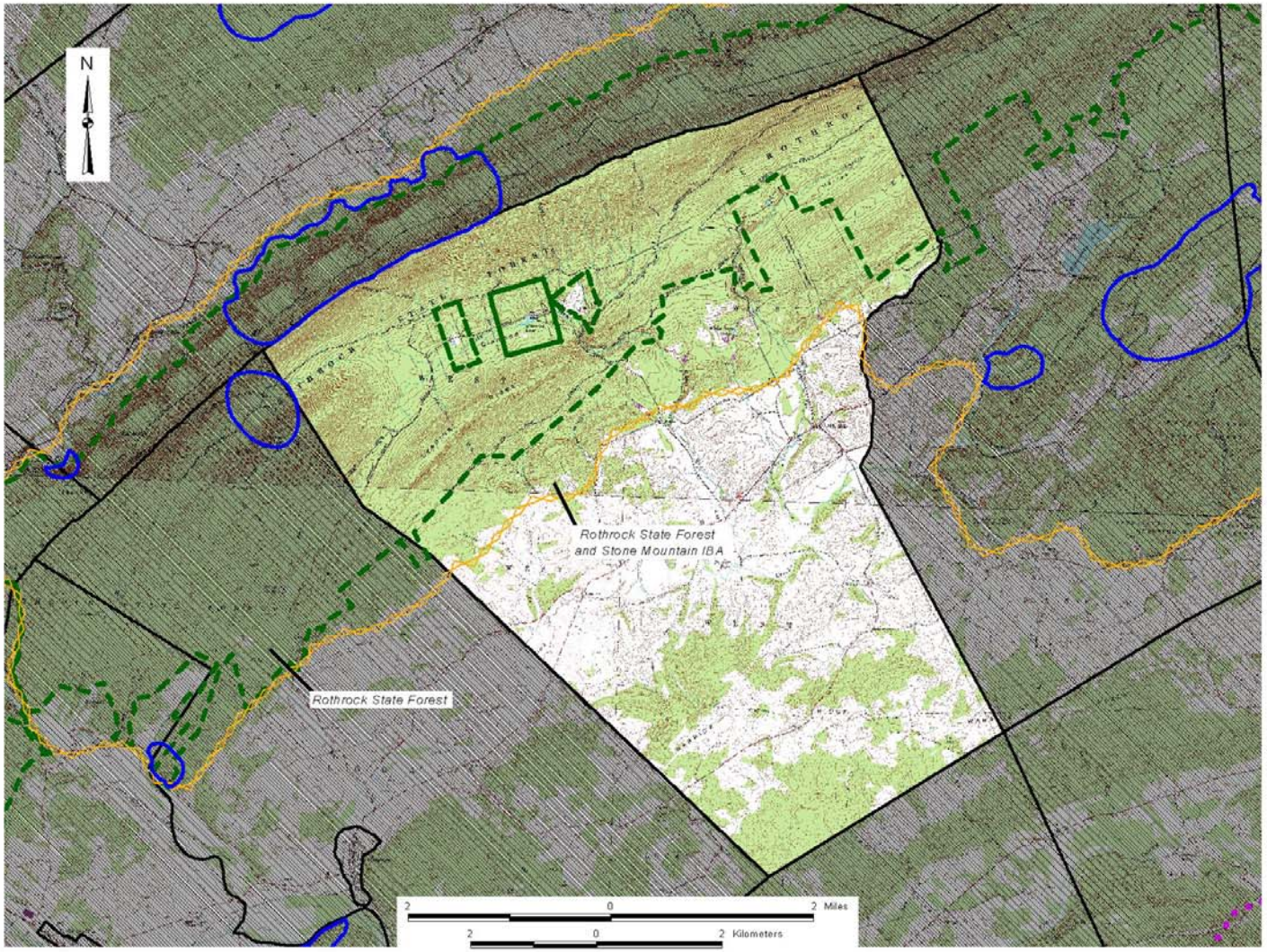
Recommendations

As above, logging within the site should be avoided and low-impact biological control methods should be used in any treatment of gypsy moth infestations. The *A. hyemale* population should be monitored periodically.

West Township

NATURAL HERITAGE AREAS:	*none*
OTHER CONSERVATION AREAS:	*Rothrock State Forest and Stone Mountain IBA*
MANAGED LANDS:	*Rothrock State Forest*
GEOLOGIC FEATURES:	*none*

West Township



West Township
Huntingdon County
Natural Heritage Inventory

Biological Diversity Areas:

None

Landscape Conservation Areas:

None

Managed Areas:

Rothrock State Forest

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

WEST TOWNSHIP

West Township is located in the north-central region of the county. The crest of Tussey Mountain defines its northwestern boundary. Approximately one third of the township lies within Rothrock State Forest, and the Pennsylvania Audubon Society has recognized this area as important bird habitat. No Natural Heritage Areas were identified in this municipality.

Shade Valley Region

- Dublin Township
- Shade Gap Borough
- Tell Township

Mixed oak forest

Allegheny Woodrat (*Neotoma magister*)

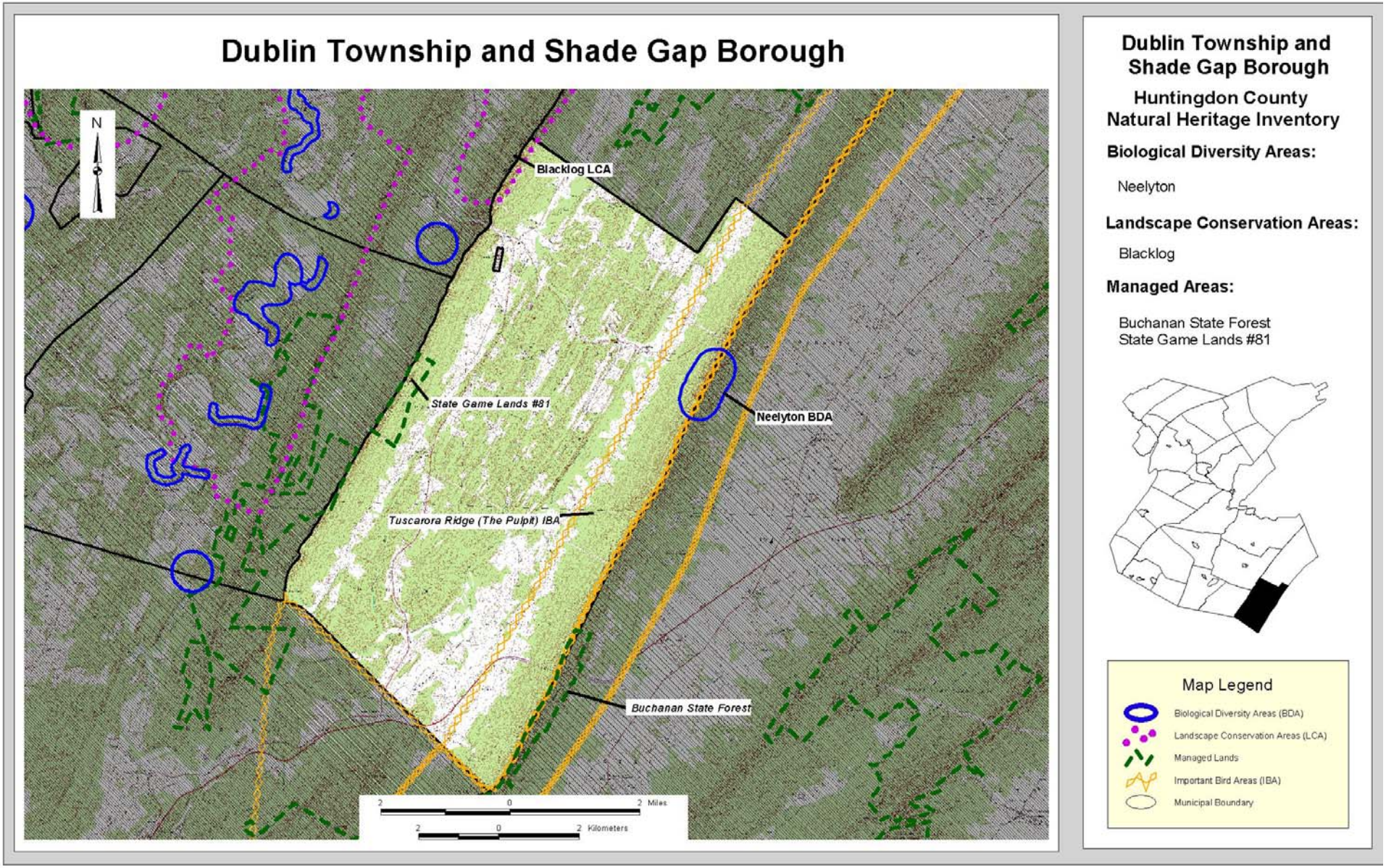
Dublin Township & Shade Gap Borough

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Neelyton BDA		*High Significance*		
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT
Blacklog LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *Tuscarora Ridge (The Pulpit) IBA*

MANAGED LANDS: *Buchanon State Forest*
State Game Land #81

GEOLOGIC FEATURES: *none*


Dublin Township and Shade Gap Borough
N
Blacklog LCA
State Game Lands #81
Neelyton BDA
Tuscarora Ridge (The Pulpit) IBA
Buchanan State Forest
2 0 2 Miles
2 0 2 Kilometers
Dublin Township and Shade Gap Borough
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Neelyton
Landscape Conservation Areas:
Blacklog
Managed Areas:
Buchanan State Forest
State Game Lands #81
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

DUBLIN TOWNSHIP

Dublin Township lies at the southernmost tip of Huntingdon County, bordering both Franklin and Fulton Counties. The township falls between the ridgelines of Shade Mountain and Tuscarora Mountain. The forested corridor along Tuscarora Mountain is an important flyway for migrating raptors, and has been recognized by the Pennsylvania Audubon Society as the Tuscarora Ridge (The Pulpit) Important Bird Area. A portion of State Game Land #81 is located within the township, along the eastern slope of Shade Mountain.

Neelyton BDA

Extensive forest and rocky outcrops at the top of Tuscarora Mountain provide habitat for the **Allegheny woodrat** (*Neotoma magister*), a species endemic to the eastern United States. The woodrat nests in rocky habitats to avoid predators, and forages nocturnally for leaves; berries; nuts (particularly acorns); the stalks and fruits of pokeweed; the fruits of sassafras, dogwood, mountain ash, cherry, red maple, and serviceberry; ferns and other plants; and fungi (Fergus 2000).

Threats and Stresses

Several studies provide evidence that a variety of factors are contributing to the observed declines in Allegheny woodrat populations. Some populations appear to have suffered heavy mortality from raccoon roundworm (*Baylisascaris procyonis*). Raccoon roundworm is rarely fatal to raccoons, but can cause cerebrospinal nematodiasis in other species (Kazacos, 1983). Raccoons are habitat generalists that tolerate or even benefit from habitat fragmentation and disturbance. Human-caused fragmentation and disturbance have likely created conditions that increase the exposure of woodrats to the parasite and thus led to woodrat population declines. Another factor that may play a role in the decline is change in the availability of viable food resources. Chestnut blight (*Cryphonectria parasitica*), oak infestation by gypsy moths (*Lymantria dispar*), changes in forest composition due to increased deer herbivory, and short-rotation forest management may have significantly reduced the amount of hard mast food that is available to the woodrat (Hassinger et al. 1996, Castleberry 2000). Weather may also play a role in the decline since the sharpest drops in populations have occurred in the northern part of the range and records in Pennsylvania and West Virginia suggest that below normal winter temperatures in the past 30 years have coincided with the shrinkage in range (Natureserve 2002). Strip mining of coal and limestone may degrade viable woodrat habitat and isolate populations.

Recommendations

Forest cover is important in maintaining the microhabitat conditions and the food sources utilized by Allegheny woodrats. Oak trees are especially important because of the mast they provide and should not be removed. Any future timber harvests within this site should, if possible, minimize fragmentation and avoid disturbance in the vicinity of woodrat nesting habitat. The PA Game Commission has developed further recommendations regarding management of woodrat habitat, which may be available upon request.

SHADE GAP BOROUGH

Shade Gap, a small town with a population of approximately 115, is located along Township Road 358, near the intersection of U.S. Route 522 and State Highway 35. No Natural Heritage Areas were identified within this municipality.

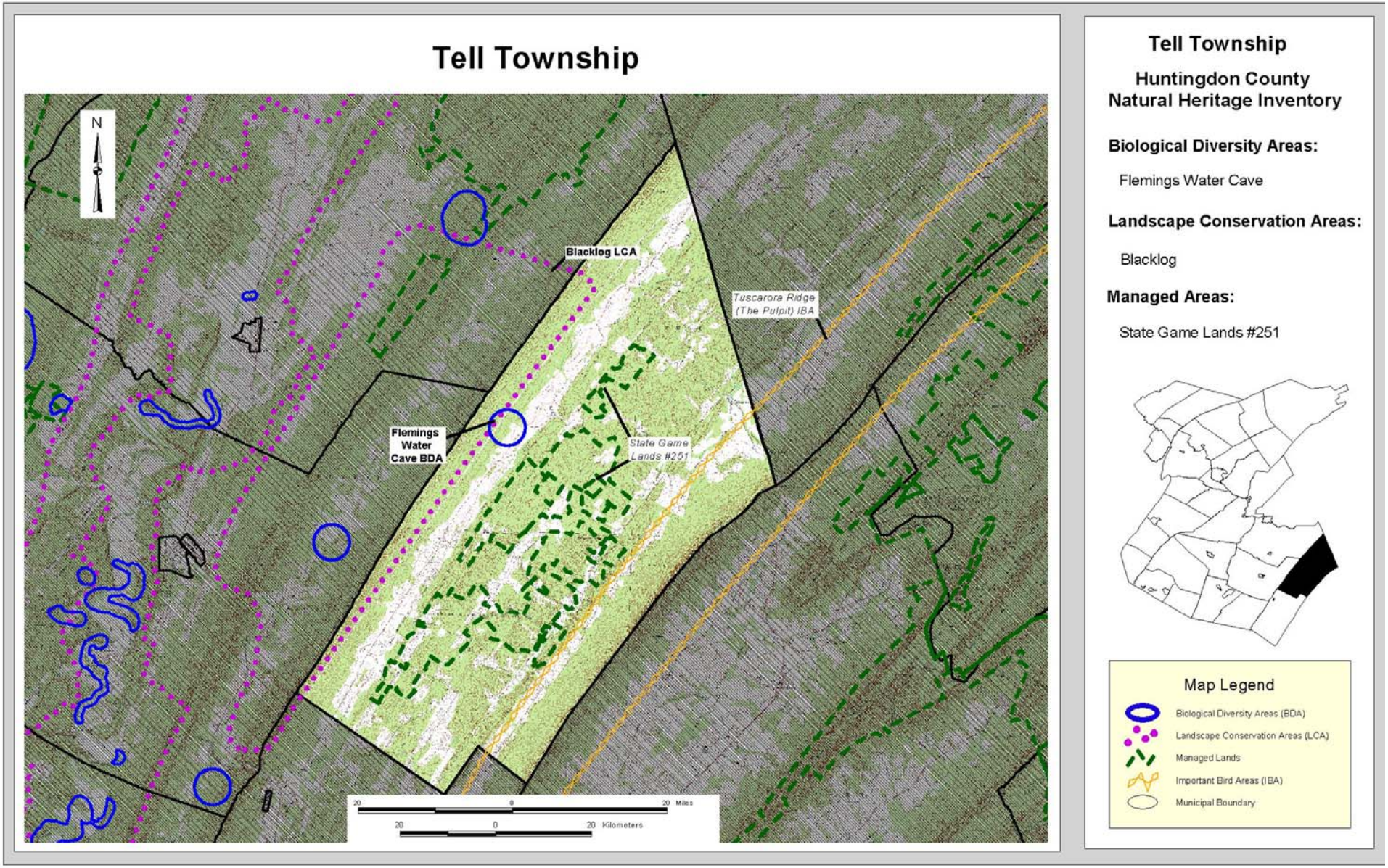
Tell Township

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Flemings Water Cave BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
Blacklog LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *Tuscarora Ridge (The Pulpit) IBA*

MANAGED LANDS: *State Game Land #251*

GEOLOGIC FEATURES: *Concord Narrows (water gap)*


Tell Township
N
Blacklog LCA
Tuscarora Ridge
(The Pulpit) IBA
Flemings
Water
Cave BDA
State Game
Lands #251
20 0 20 Miles
20 0 20 Kilometers
Tell Township
Huntingdon County
Natural Heritage Inventory
Biological Diversity Areas:
Flemings Water Cave
Landscape Conservation Areas:
Blacklog
Managed Areas:
State Game Lands #251
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

TELL TOWNSHIP

Tell Township extends from the ridgeline of Shade Mountain eastward to the crest of Tuscarora Mountain. The eastern boundary of the township borders both Juniata and Franklin Counties. The township is largely forested, with the exception of Shade Valley and the foothills of Big Ridge and Tuscarora Mountain. The forested corridor along Tuscarora Mountain is an important flyway for migrating raptors, and has been recognized by the Pennsylvania Audubon Society as the Tuscarora Ridge (The Pulpit) Important Bird Area. State Game Land #251 covers slightly over 4,200 acres in the central region of the township.

Flemings Water Cave BDA

The deciduous forest bordering Shade Valley shelters a cave that serves as a winter hiburnaculum for the state rare **northern bat** (*Myotis septentrionalis*). The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants. As with all bats, if individuals of this species are disturbed during hibernation, they will become active and may use up critical fat stores needed to survive the winter. Juveniles can perish from repeated disturbances, and individuals may be weakened such that they do not have the energy to forage successfully in the spring.

Threats and Stresses

As is the case with all cave-hibernating bats, the northern long-eared bat can be negatively impacted by disturbances in the cave during the winter months. Even low levels of noise, heat, or light can be sufficient to disturb this species. Physical disturbance of the rock surrounding the mine or the mine entrance could alter environmental conditions within, which may make it unusable for this and other bat species.

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Southern Huntingdon Region

- Clay Township
- Cromwell Township
- Orbisonia Borough
- Rockhill Borough
- Saltillo Borough
- Springfield Township
- Three Springs Borough

Puttyroot (*Aplectrum hyemale*)

Prickly-pear cactus (*Opuntia humifusa*)

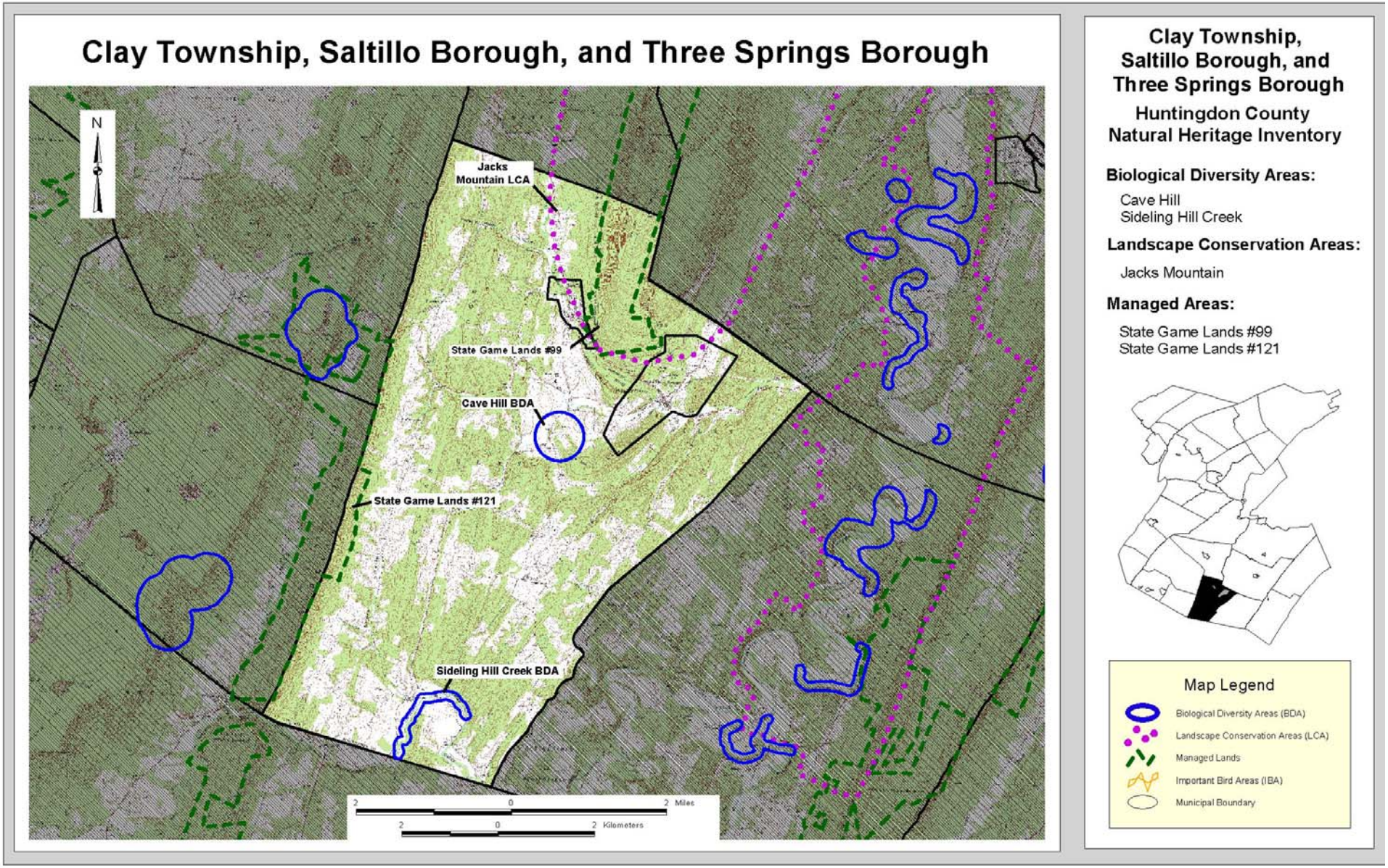
Clay Township, Saltillo Borough & Three Springs Borough

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Cave Hill BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
Sideling Hill Creek BDA		*Exceptional Significance*		
Special animal 1	G3	S2		
Jacks Mountain LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *State Game Land #99*
State Game Land #121

GEOLOGIC FEATURES: *none*


Clay Township, Saltillo Borough, and Three Springs Borough
N
Jacks Mountain LCA
State Game Lands #99
Cave Hill BDA
State Game Lands #121
Sideling Hill Creek BDA
2 0 2 Miles
2 0 2 Kilometers
Clay Township, Saltillo Borough, and Three Springs Borough
Huntingdon County Natural Heritage Inventory
Biological Diversity Areas:
Cave Hill
Sideling Hill Creek
Landscape Conservation Areas:
Jacks Mountain
Managed Areas:
State Game Lands #99
State Game Lands #121
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

CLAY TOWNSHIP

Clay Township is located in the lower half of Huntingdon County, and the southern boundary of the township defines part of the Huntingdon/Fulton County line. Numerous small tributaries, as well as the main stems of Sideling Hill Creek and Spring Creek flow through the township. Portions of State Game Land # 99 and #121 are located in the township along sections of Sideling Hill and Jacks Mountain.

Cave Hill BDA

An inactive mine within this site serves as a winter hiburnaculum for the state rare **northern bat** (*Myotis septentrionalis*), as well as the more common little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), and eastern pipistrelle (*Pipistrellus subflavus*). The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants. As with all bats, if individuals of this species are disturbed during hibernation, they will become active and may use up critical fat stores needed to survive the winter. Juveniles can perish from repeated disturbances, and individuals may be weakened such that they do not have the energy to forage successfully in the spring.

Threats and Stresses

As is the case with all cave-hibernating bats, the northern bat can be negatively impacted by disturbances in the mine during the winter months. Even low levels of noise, heat, or light can be sufficient to disturb this species. Physical disturbance of the rock surrounding the mine or the mine entrance could alter environmental conditions within, which may make it unusable for this and other bat species.

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Sideling Hill Creek BDA

Sideling Hill Creek is the core of this site, and serves as habitat for globally rare **special animal 1**. Meandering west through the lower portion of the township, the creek flows through a broad agricultural valley before it butts against steep, shale slopes. The creek is characterized by a cobble substrate, riffles and pools, and high water quality, all of which are critical habitat components required by the animal species of concern.

Threats and Stresses

Agricultural practices and road maintenance/improvement are two prominent areas of activity that could contribute negatively to the protection of this BDA if not carefully managed. Grading of roads and crossing of streams can produce tremendous amounts of silt. Crossing of streams can not only generate silt, but also create run-off channels and directly disturb riffles and other stream features that are important for freshwater invertebrates. Improperly managed agricultural nutrients, either from storage facility leaks or from application problems, can be directly toxic to aquatic organisms and can contribute to eutrophication of streams and pools, producing algae blooms and lowering oxygen levels in the stream.

Recommendations

Working with municipalities to establish careful road maintenance procedures and riparian zones and buffers adjacent to roads would help to limit the input of sediment to the creek and its tributaries. Encouraging landowners to adopt best management practices (BMPs) and increase riparian buffers would lower the risk of storm events precipitating large nutrient and sediment slugs to the stream.

SALTILLO BOROUGH & THREE SPRINGS BOROUGH

Saltillo lies along North Spring Branch, at the intersection of State Highway 655 and State Road 2022. The borough of Three Springs is located downstream, along Three Springs Creek at the intersection of State Highways 747 and 994. No Natural Heritage Areas occur in these municipalities.

Cromwell Township, Orbisonia Borough, & Rockhill Borough

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Aughwick Creek Benchmark BDA		*Notable Significance*		
Thick-leaved meadow rue (*Thalictrum coriaceum*)	G4	S2		PE
Butler Knob BDA		*Exceptional Significance*		
Northeastern bulrush (*Scirpus ancistrochaetus*)	G3	S3	LE	PE
Hill Valley BDA		*High Significance*		
Puttyroot (*Aplectrum hyemale*)	G5	S3		PE
Johnson Ridge BDA		*High Significance*		
Round-head gayflower (*Liatris scariosa*)	G5?	S2		N
Long Cock Cave BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
McFadden Cave BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
Miranda Hill BDA		*Exceptional Significance*		
Special animal I	G3	S2		
Special animal II	G5	S1		
Pogue BDA		*Exceptional Significance*		
Shale-barren evening primrose (*Oenothera argillicola*)	G3G4	S2		PT
Prickly-pear cactus (Opuntia humifusa)	G5	S3		PR
Special animal I	G3	S2		
Special animal II	G3G4	S3S4		

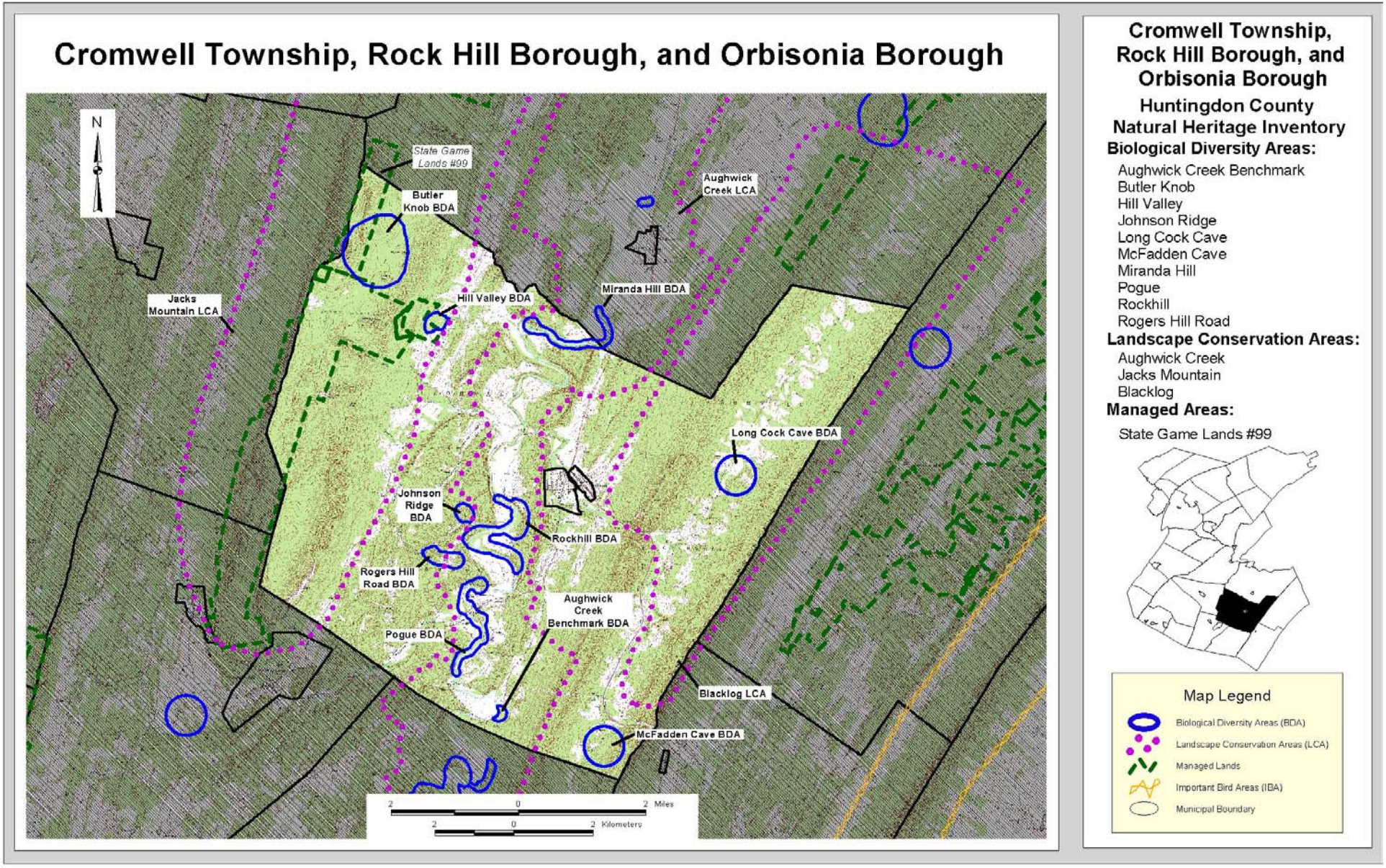
Cromwell Township, Orbisonia Borough, & Rockhill Borough (con't.)

	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Rockhill BDA		*Exceptional Significance*		
Shale-barren evening primrose (*Oenothera argillicola*)	G3G4	S2		PT
Special animal I	G3	S2		
Virginia pine - mixed hardwood shale woodland community		S2		
Rogers Hill Road BDA		*Exceptional Significance*		
Round-head gayfeather (*Liatris scariosa*)	G5?	S2		N
Shale-barren evening primrose (*Oenothera argillicola*)	G3G4	S2		PT
Dry oak - mixed hardwood forest community		S3		
Aughwick Creek LCA		*Exceptional Significance*		
Blacklog BDA		*Exceptional Significance*		
Jacks Mountain LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *State Game Land #99*

GEOLOGIC FEATURES: *none*


Cromwell Township, Rock Hill Borough, and Orbisonia Borough
N
State Game Lands #99
Butler Knob BDA
Aughwick Creek LCA
Jacks Mountain LCA
Hill Valley BDA
Miranda Hill BDA
Long Cock Cave BDA
Johnson Ridge BDA
Rockhill BDA
Rogers Hill Road BDA
Aughwick Creek Benchmark BDA
Pogue BDA
Blacklog LCA
McFadden Cave BDA
2 0 2 Miles
2 0 2 Kilometers
Cromwell Township, Rock Hill Borough, and Orbisonia Borough
Huntingdon County Natural Heritage Inventory
Biological Diversity Areas:
Aughwick Creek Benchmark
Butler Knob
Hill Valley
Johnson Ridge
Long Cock Cave
McFadden Cave
Miranda Hill
Pogue
Rockhill
Rogers Hill Road
Landscape Conservation Areas:
Aughwick Creek
Jacks Mountain
Blacklog
Managed Areas:
State Game Lands #99
Map Legend
Biological Diversity Areas (BDA)
Landscape Conservation Areas (LCA)
Managed Lands
Important Bird Areas (IBA)
Municipal Boundary

CROMWELL TOWNSHIP

Cromwell Township extends from the crest of Jacks Mountain eastward to the ridgeline of Shade Mountain. Aughwick Creek flows north through the center of the township, meandering past agricultural lands and steep shale slopes. Rothrock State Forest and State Game Land #99 encompass much of the eastern face of Jacks Mountain within the township.

Aughwick Creek Benchmark BDA

This site, located along Aughwick Creek, supports a population of **thick-leaved meadow rue** (*Thalictrum coriaceum*). Not much is known about this infrequently occurring species, but observations of *T. coriaceum* suggest that this plant requires mineral soil for germination. In Huntingdon County, *T. coriaceum* is typically found growing in forested sites where some degree of disturbance occurs periodically, such as along streams, roadside ditches, and trails. Within this site, the small population is growing at the edge of a drainage ditch within the riparian forest. The wooded riparian area both within and outside of the site also supports an extensive population of **American beakgrain** (*Diarrhena obovata*), a species of grass that was considered rare within Pennsylvania until just recently.

Threats and Stresses

The habitat supporting *T. coriaceum* is in good condition, but adjoins State Road 475. Run-off from the road and roadside maintenance activities pose a potential threat to the population.

Recommendations

Workers involved in road right-of-way maintenance within the site should be informed of the presence of a threatened plant species. The application of herbicides should be avoided and mowing should be used to control roadside vegetation.

Butler Knob BDA

This site encompasses a high-elevation graminoid marsh and several vernal ponds that provide habitat for **northeastern bulrush** (*Scirpus ancistrochaetus*), a federally endangered plant. The northeastern bulrush is a species of sedge that is only known to inhabit the northeastern Appalachian Mountains. Furthermore, the portion of the Appalachians occurring in Pennsylvania appears to be the global center of this species' range, as over half (62%) of all known locations fall within Pennsylvania. The species is frequently associated with vernal pools, although elsewhere in its range it is known from other types of habitat. The various habitats all appear to share the characteristic of seasonally fluctuating water levels. Within Pennsylvania, very few occurrences are known from habitats other than vernal pools. As evidenced by this site, vernal pools frequently develop in broad, flat mountain saddles as accumulation points for surface water runoff.

The forest surrounding the graminoid marsh and vernal ponds has experienced mortality due to gypsy moth infestation. Once oak-dominated, the overstory is now predominately composed of red maple (*Acer rubrum*) and black birch (*Betula lenta*). The forest in the vicinity of the marsh

has also been clearcut within the past ten years, with the logged area extending to within 20 meters of one of the vernal ponds.

Threats and Stresses

Changes in hydrological pattern, light levels, and forest continuity would negatively impact the species and natural communities within this BDA. The northeastern bulrush appears to be very sensitive to alterations of the water regime in its habitat, although it is not known what conditions are optimal.

Recommendations

Activities that remove forest canopy or result in earth disturbance should be avoided within a 500 meter buffer of the marsh and ponds, in order to avoid disrupting natural hydrological patterns, altering light levels, and impacting potential amphibian populations. A fuller understanding of the animal species utilizing these vernal habitats would be gained through invertebrate and amphibian surveys. Knowledge thus gained would provide an important basis for site-specific conservation planning.

Hill Valley BDA

This site is located partly within State Game Land #99, at the foot of Jacks Mountain, where the tuliptree – beech – maple forest serves as habitat for several colonies of **puttyroot** (*Aplectrum hyemale*), a state rare orchid. Orchids produce thousands of minute seeds. These seeds, among the smallest produced by any flowering plant, may be as small as one-hundredth of an inch and lack endosperm, the food-storing tissue typically found in seeds (Constanz, 1994). Instead, they depend on mycorrhizal fungi for at least part of their nourishment after germination (Henry, et al., 1975).

Threats and Stresses

Puttyroot appears to be quite sensitive to forest disturbance. In an area elsewhere in the county, a selective/regeneration timber harvest apparently caused a number of puttyroot plants to die out. This may have been due, in part, to impacts to mycorrhizal fungi associated with intact forest. In addition, logging establishes openings in the overstory canopy and the resulting increase in sunlight reaching the forest floor would likely cause an increase in the density of the shrub layer, creating conditions unfavorable for puttyroot. The puttyroot colonies in this site are located within State Game Land #99, and the land manager is aware of the plant and actively managing for its conservation.

Recommendations

Any proposed timber harvesting on the private lands within the site should avoid the areas in the vicinity occupied by puttyroot for the reasons stated above. Roadbuilding activities, and any other activities that result in soil compaction and resulting impacts to mycorrhizal fungi, should be directed away from areas occupied by puttyroot. The population of puttyroot should be monitored periodically.

Johnson Ridge BDA
Rogers Hill Road BDA

These sites are comprised of exposed Devonian shale along southwest-facing upper roadbanks along Chilcote Ridge Road and Rogers Hill Road. The sparse vegetation of the roadbanks includes forked chickweed (*Paronychia canadensis*), American pennyroyal (*Hedeoma pulegioides*), common dittany (*Cunila oreganoides*), and woodland sunflower (*Helianthus divaricatus*). The dry, acidic soil of the adjoining uplands supports a dry oak – heath forest characterized by the presence of chestnut oak (*Quercus montana*), black gum (*Nyssa sylvatica*), sassafras (*Sassafras albidum*), and Virginia pine (*Pinus virginiana*).

Both sites support small populations of **round-head gayflower** (*Liatris scariosa*), a state-imperiled plant. Rogers Hill Road BDA also harbors **shale-barren evening primrose** (*Oenothera argillicola*), a plant species endemic to shale barrens. Shale is apparently quarried periodically from the bank where *O. argillicola* is growing, but does not appear to have adversely impacted the population.

Threats and Stresses

Shale-barren evening primrose and round-head gayflower require open habitats on shale substrates where competition from other plant species is low. Competition from aggressive exotic species like spotted knapweed (*Centaurea maculosa*), which are present at the sites, may pose a threat. Application of herbicide to control roadside vegetation may also threaten the rare plant populations.

Recommendations

Workers involved in road maintenance within the site should be informed of the presence of a threatened plant species. The application of herbicides should be avoided and mowing should be used to control roadside vegetation. Slope instability should also be taken into account during road maintenance activities. Any logging proposed in the upland areas of the site should take into consideration potential hydrological alterations to the shale slopes resulting from canopy removal along the tops of the shale banks.

Long Cock Cave BDA
McFadden Cave BDA

Both of these caves serve as winter hibernaculums for the state rare **northern bat** (*Myotis septentrionalis*), as well as more common bats. The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants. As with all bats, if individuals of this species are disturbed during hibernation, they will become active and may use up critical fat stores needed to survive the winter. Juveniles can perish from repeated disturbances, and individuals may be weakened such that they do not have the energy to forage successfully in the spring.

Threats and Stresses

As is the case with all cave-hibernating bats, the northern bat can be negatively impacted by disturbances in the mine during the winter months. Even low levels of noise, heat, or light can be sufficient to disturb this species. Physical disturbance of the rock surrounding the mine or the mine entrance could alter environmental conditions within, which may make it unusable for this and other bat species.

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Miranda Hill BDA
Pogue BDA
Rockhill BDA

Aughwich Creek forms the core of each of these sites. Over geologic time, the creek has downcut through Devonian shale, exposing open shale slopes, and carving broad floodplains that are well suited to agricultural production. Some of the south-facing slopes support shale barren communities. Steep, with blocks of shale outcrops and a partial canopy of chestnut oak (*Quercus prinus*), hickories (*Carya ovata, C. ovalis*), eastern red cedar (*Juniperus virginiana*), and Virginia pine (*Pinus virginiana*), these slopes appear shrubby and rugged. Aughwick Creek is characterized by a cobble substrate, riffles and pools, and high water quality, all of which are critical habitat components required by **special animal I** and **special animal II**, special concern species found in these sites. The wooded riparian area along Aughwick Creek also supports an extensive population of **American beakgrain** (*Diarrhena obovata*), a species of grass that was considered rare within Pennsylvania until just recently.

Miranda Hill BDA and Pogue BDA both support two special animal species, and one special animal species is found within Rockhill BDA. Pogue BDA includes an exposed shale outcrop and slope where **prickly-pear cactus** (*Opuntia humifusa*) and **shale-barren evening primrose** (*Oenothera argillicola*) grow. Rockhill BDA also supports a population of shale-barren evening primrose and a **Virginia pine – mixed hardwood shale woodland community**.

Threats and Stresses

Important for both their terrestrial and aquatic elements, these Natural Heritage Areas could be adversely impacted by activities that contribute to soil loss, input of nutrients to barrens habitats and into ground and surface waters, and direct disturbance of stream or terrestrial habitats. Agricultural practices and road maintenance/improvement are two prominent areas of activity that could contribute negatively to the protection of these BDA if not carefully managed. Road

grading and stream crossings can produce tremendous amounts of silt. Crossing of streams can also create run-off channels and directly disturb riffles and other stream features that are important for freshwater invertebrates. Improperly managed agricultural nutrients, either from storage facility leaks or from application problems, can be directly toxic to aquatic organisms and can contribute to eutrophication of streams and pools, producing algae blooms and lowering oxygen levels in the stream.

Recommendations

Working with municipalities to establish careful road maintenance procedures and sufficient riparian zones and buffers adjacent to roads would help to limit the input of sediment to the creek and its tributaries. Encouraging landowners to adopt best management practices (BMPs) and increase riparian buffers would lower the risk of storm events precipitating large nutrient and sediment inputs to the stream. Establishing forested buffers in upland areas adjacent to shale barrens would help to reduce the potential for invasion by aggressive species and would help to reduce impacts from activities near barrens.

ROCKHILL BOROUGH & ORBISONIA BOROUGH

Rockhill and Orbisonia lie adjacent to one another, separated by Blacklog Creek. No Natural Heritage Areas occur within these municipalities.

Springfield Township

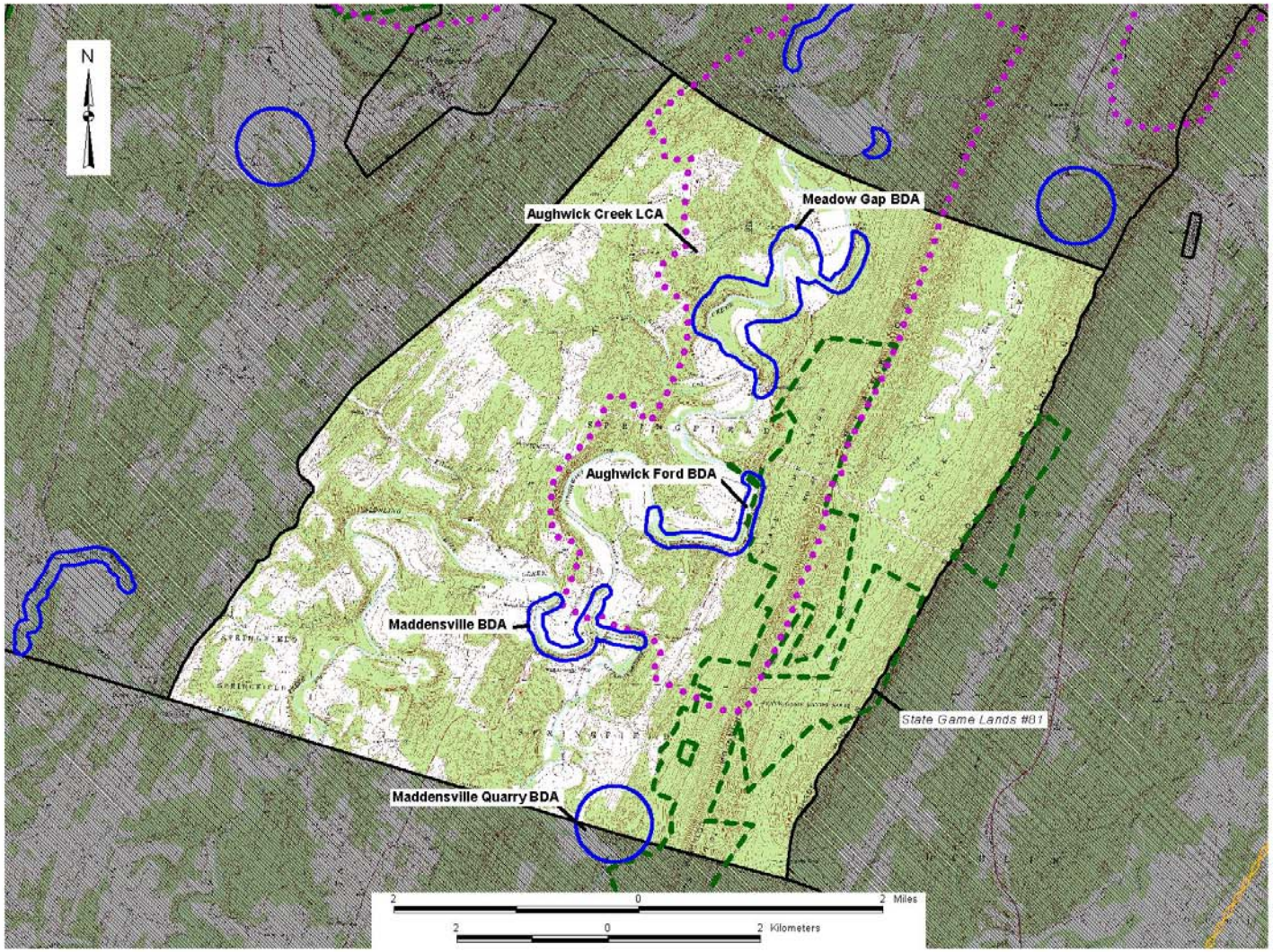
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Aughwick Ford BDA		*High Significance*		
Special animal 1	G3G4	S3S4		
Maddensville BDA		*Exceptional Significance*		
Special animal 1	G3	S2		
Maddensville Quarry BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
Meadow Gap BDA		*Exceptional Significance*		
Shale-barren evening primrose (*Oenothera argillicola*)	G3G4	S2		PT
Thick-leaved meadow rue (*Thalictrum coriaceum*)	G4	S2		PE
Special animal 1	G3G4	S3S4		
Virginia pine - mixed hardwood shale woodland community		S2		
Aughwick Creek LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *State Game Land #81*

GEOLOGIC FEATURES: *none*

Springfield Township



Springfield Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

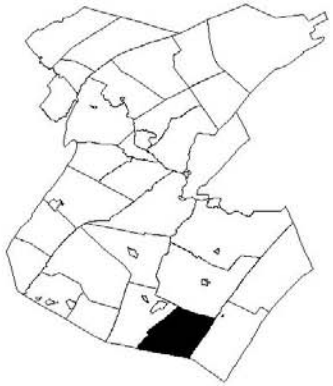
Aughwick Ford
Maddensville
Maddensville Quarry
Meadow Gap

Landscape Conservation Areas:

Aughwick Creek

Managed Areas:

State Game Lands #81



Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

SPRINGFIELD TOWNSHIP

Springfield Township is bounded to the south by Fulton County, and extends east to the ridgeline of Shade Mountain. Sideling Hill Creek and Little Aughwick Creek flow north from Fulton County and come together in the southern portion of Springfield Township to form Aughwick Creek. Aughwick Creek then meanders northward thru the center of the township. The bulk of State Game Land #81 is located within Springfield Township, on the slopes of Blacklog Mountain.

Aughwick Ford BDA
Maddensville BDA
Meadow Gap BDA

Aughwick Creek is central to each of these Natural Heritage Areas. Over geologic time, the creek has downcut through Devonian shale, exposing open shale slopes and carving broad floodplains well suited for agriculture. The steep, sparsely vegetated, south-facing shale slopes along Aughwick Creek typically support **Virginia pine – mixed hardwood shale woodland communities**. A cobble substrate, riffles and pools, low sediment inputs, and high water quality, all of which are critical habitat components required by the animals of concern found in these sites, characterize Aughwick Creek. The wooded riparian area along Aughwick Creek also supports an extensive population of **American beakgrain** (*Diarrhena obovata*), a species of grass that was considered rare within Pennsylvania until just recently.

All of these BDAs support a globally rare animal species of special concern. Meadow Gap BDA also encompasses several shale barrens, one of which harbors a population of **shale-barren evening primrose** (*Oenothera argillicola*) growing within a **Virginia pine – mixed hardwood shale woodland community**. Dominant species within the open woodland include several species of oaks (*Quercus montana*, *Q. alba, Q. illicifolia*), and pines (*Pinus virginiana, P. strobus*). **Thick-leaved meadow rue** (*Thalictrum coriaceum*) grows in the forested riparian area in the northern region of Meadow Gap BDA.

Threats and Stresses

Important for both their terrestrial and aquatic elements, these Natural Heritage Areas could be adversely impacted by activities that contribute to soil loss, input of nutrients on to barrens habitats and into ground and surface waters, and direct disturbance of stream or terrestrisal habitat. Agricultural practices and road maintenance/improvement are two prominent areas of activity that could contribute negatively to the protection of these BDAs if not carefully managed. Road grading and stream crossings can produce tremendous amounts of silt. Crossing of streams can also create run-off channels and directly disturb riffles and other stream features that are important for freshwater invertebrates. Improperly managed agricultural nutrients, either from storage facility leaks or from application problems, can be directly toxic to aquatic organisms and can contribute to eutrophication of streams and pools, producing algae blooms and lowering oxygen levels in the stream.

Recommendations

Working with municipalities to establish careful road maintenance procedures and riparian zones and buffers adjacent to roads would help to limit the input of sediment to the creek and its tributaries. Encouraging landowners to adopt best management practices (BMPs) and increase riparian buffers would lower the risk of storm events precipitating large nutrient and sediment slugs to the stream. Establishing forested buffers in upland areas adjacent to shale barrens would help to reduce the potential for invasion by aggressive species and would help to reduce impacts from activities near barrens.

Maddensville Quarry BDA

A small cave within the site serves as a winter hibernaculum for the state rare **northern bat** (*Myotis septentrionalis*), as well as the more common big brown bat (*Eptesicus fuscus*) and eastern pipistrelle (*Pipistrellus subflavus*). The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants. As with all bats, if individuals of this species are disturbed during hibernation, they will become active and may use up critical fat stores needed to survive the winter. Juveniles can perish from repeated disturbances, and individuals may be weakened such that they do not have the energy to forage successfully in the spring.

Threats and Stresses

As is the case with all cave-hibernating bats, the northern bat can be negatively impacted by disturbances in the mine during the winter months. Even low levels of noise, heat, or light can be sufficient to disturb this species. Physical disturbance of the rock surrounding the mine or the mine entrance could alter environmental conditions within, which may make it unusable for this and other bat species.

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Spruce Creek Region

- Birmingham Borough
- Franklin Township
- Morris Township
- Spruce Creek Township
- Warriors Mark Township

Colerain Ice Holes,
Rothrock State Forest

White camas (*Zigadenus glaucus*)

Franklin Township

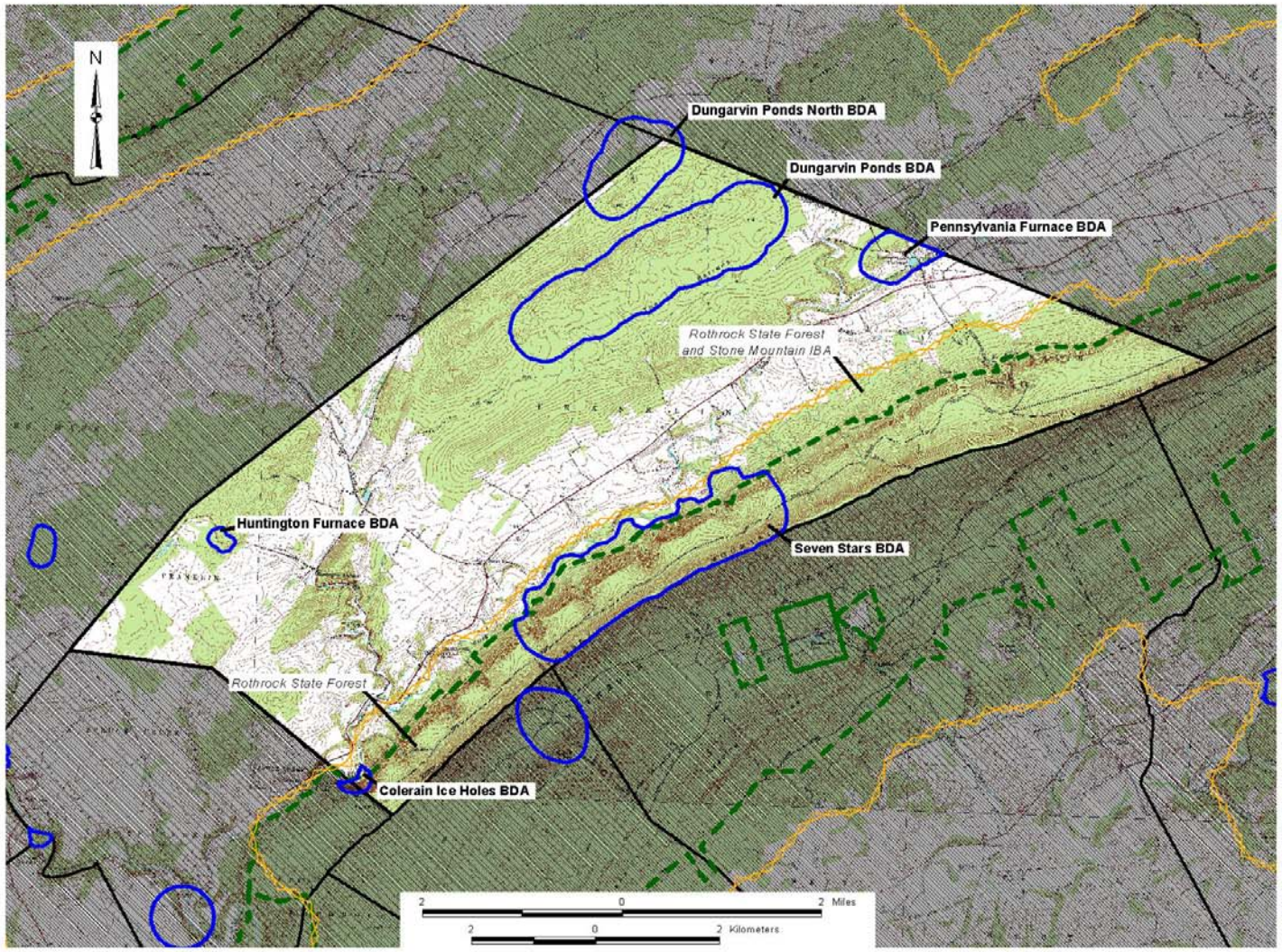
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Colerain Ice Holes BDA		*Exceptional Significance*		
Twinflower (*Linnaea borealis*)	G5	S1		PT
Rich hemlock - mesic hardwoods forest community		S2S3		
Dungarvin Ponds BDA		*Exceptional Significance*		
Clasping-leaved St. John's wort (*Hypericum gymnanthum*)	G4	S1		PE
Weak rush (*Juncus debilis*)	G5	S3		N
Herbaceous vernal pond community		S3S4		
Dungarvin Ponds North BDA		*Notable Significance*		
Dry oak - mixed hardwood forest community		S3		
Herbaceous vernal pond community		S3S4		
Huntingdon Furnace BDA		*High Significance*		
Mountain phlox (*Phlox ovata*)	G4	S1		PE
Pennsylvania Furnace BDA		*High Significance*		
Marsh bedstraw (*Galium trifidum*)	G5	S2		N
Torrey's rush (*Juncus torreyi*)	G5	S2		PT
Seven Stars BDA		*Notable Significance*		
Dry oak - heath forest community		S4S5		

OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS: *Rothrock State Forest*

GEOLOGIC FEATURES: *none*

Franklin Township



Franklin Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Colerain Ice Holes
Dungarvin Ponds
Dungarvin Ponds North
Huntingdon Furnace
Pennsylvania Furnace
Seven Stars

Landscape Conservation Areas:

None

Managed Areas:

Rothrock State Forest

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

FRANKLIN TOWNSHIP

Franklin Township lies in the northwestern portion of the county, where its northern boundary forms part of the Huntingdon/Centre County line. Spruce Creek, a stream renowned for its trout fishery, flows through a rich limestone valley that runs the length of the township. At the eastern extent of the township, the forested slopes of Tussey Mountain make up part of the Rothrock State Forest and Stone Mountain Important Bird Area identified by the Pennsylvania Audubon Society.

Colerain Ice Holes BDA

The Colerain Ice Holes are located at the base of Tussey Mountain, at the foot of a steep, northwest-facing talus slope. The morphology of the slope produces an interesting phenomenon suggested by the site's name. The "ice holes" are a result of heating and cooling processes characteristic of large boulder fields. On sunny days, the top surfaces of the rocks heat up, and the resulting warm air rises, while the cooler air contained within the rock crevices settles to the base of the steep slope. The ice holes occur where deep spaces between rocks provide areas protected from sun and wind, and the cool air pools. Because of the consistently cool temperatures, such areas harbor plant species that are normally found much further north, or at much higher elevations (Thompson and Sorenson, 2000). The ice holes, in combination with the hemlock overstory, maintain growing conditions favorable to **twinflower** (*Linnaea borealis*), a state rare plant. Linnaeus, the father of modern systematic botany, first discovered this tiny evergreen shrub during a botanical exploration of Lapland he conducted for the Swedish Academy of Sciences in 1732. He chose to name the plant after himself (Coffey, 1993).

The natural community in the vicinity of the ice holes approximates the **rich hemlock – mesic hardwoods forest** described in Fike (1999). Hemlock (*Tsuga canadensis*) is the dominant overstory species, while minor canopy species include black birch (*Betula lenta*), yellow birch (*Betula allegheniensis*), and sugar maple (*Acer saccharum*). Species with a generally more northern affinity growing at the base of the talus slope include mountain ash (*Sorbus americana*), American yew (*Taxus canadensis*), skunk currant (*Ribes glandulosum*), and twinflower.

Threats and Stresses

This site falls largely within the riparian zone of Spruce Creek and is protected as part of Rothrock State Forest. The westward migration of the hemlock wooly adelgid (*Adelges tsugae*), a species currently documented in 35 counties in Pennsylvania, poses a potential threat to the hemlock trees in the region (PA Bureau of Forestry 2003?). The hemlock wooly adelgid, native to Asia, is a sap-feeding insect that attacks both the eastern hemlock and the Carolina hemlock (*Tsuga caroliniana*). Heavily infested trees may lose most of their needles, and can die if other stresses, such as drought, affect them (PA Bureau of Forestry 2003).

Recommendations

Management of the forests in this area should include periodic monitoring for the hemlock wooly adelgid and other non-native forest pests. Any proposed treatments for insect outbreaks should take into consideration impacts to other forest organisms. Periodic monitoring of the *L. borealis*

population should continue. Given the uniqueness of the natural community described above, inventories of other taxa, including invertebrates, lichens, mosses, and liverworts are desirable.

Dungarvin Ponds BDA
Dungarvin Ponds North BDA

These sites are located in a section of Franklin Township known as "The Barrens", a low ridge underlain by the Gatesburg geologic formation. The Gatesburg formation is composed of layers of sandstone, limestone, and dolomite, and is associated with ecologically unique barrens and pool habitats. The soils of The Barrens are naturally sandy, well drained, low in organic minerals, and give rise to plant communities dominated by species that are highly tolerant of drought and low nutrient availability. According to W.F. Westerfield (1954, 1959), "Clearcutting of the original timber, development of the iron industry with its railroads, production of charcoal, and frequent fires all contributed to the destruction of the original vegetative cover, the humus, and what little fertility the soil possessed." However, the communities present today broadly resemble those found in similar barrens habitats elsewhere. The dry oak – heath forest which dominates much of the barrens area is characterized by the frequent occurrence of chestnut oak (*Quercus montana*), white oak (*Q. alba*), and black oak (*Q. velutina*) in the overstory, while pitch pine (*Pinus rigida*), scrub oak (*Q. ilicifolia*), and heath shrubs such as huckleberry (*Gaylusaccia baccata*), lowbush blueberry (*Vaccinium angustifolium*), and mountain laurel (*Kalmia latifolia*) are common in the understory and shrub layer. The forest canopy is patchy, with some areas dominated by extensive shrub thickets and scattered pockets where only herbaceous vegetation grows. The open, scrubby character and difficult growing conditions gave rise to the term "barrens" – used both colloquially to refer to the area as well as more broadly to describe similar community types. Barrens habitats typically experience frequent fires, which helps to maintain the open character of the vegetation.

In contrast with the xerophytic terrestrial communities, another key feature of the landscape is the frequent occurrence of vernal pools or shallow depressions that hold water seasonally, particularly in the spring and early summer. These vernal wetlands often support variable and diverse herbaceous communities. The ponds vary in size and the degree of saturation they experience throughout the year. Some are mostly unvegetated, others are dominated by graminoids (sedges, rushes, and grasses), and some contain a mixture of herbaceous species including sedges, grasses, marsh St. Johnswort (*Triadenum virginicum*), smartweeds (*Polygonum* spp.), and beggar-ticks (*Bidens* spp.). Larger ponds that do not contain standing water all year may contain shrubs such as buttonbush (*Cephalanthus occidentalis*), chokeberry (*Aronia* sp.), and winterberry (*Ilex verticillata*).

Several vernal pools within the Dungarvin Ponds North BDA support populations of **weak rush** (*Juncus debilis*) and **clasping-leaved St. John's wort** (*Hypericum gymnanthum*). The presence of the clasping-leaved St. John's wort is particularly notable. Until the discovery of this population, it was believed that *H. gymnanthum* was extirpated from Pennsylvania. Currently, this population remains the only known occurrence in the state.

Threats and Stresses

Changes in hydrological pattern, light levels, or the contiguity of surrounding forest habitat may negatively impact the species and natural communities within this BDA. The vernal pools are

fed by surface runoff from the entire watershed area above them. Any activity resulting in earth disturbance could affect the current hydrological pattern at this site and potentially alter conditions within the vernal pools. Additionally, disruptions to the forest within 500 meters of a pond may impact amphibian populations associated with the vernal pools (Semlitsch 1998). Conditions on the forest floor, including the presence of woody debris and leaf litter, moisture levels, and temperature, are important to the ability of amphibians to use this habitat.

Recommendations

Activities that remove forest canopy or result in earth disturbance should be avoided within a 500 meters of the ponds, in order to avoid disrupting natural hydrological patterns in the ponds and to avoid impacts to potential amphibian populations. Where roads, clearings, or staging areas have already been constructed within this BDA, ditching and other drainage solutions should be directed toward preserving the natural drainage of the site and provide effective erosion control. Inventories for invertebrates and amphibians should be conducted.

Huntingdon Furnace BDA

The area encompassed by this site is part of "The Barrens", characterized by well-drained, sandy, acidic soils (see above for a more detailed description of The Barrens). The roadside habitat and adjacent dry-oak heath forest within this site support a small population of **mountain phlox** (*Phlox ovata*), a species of special concern. Mountain phlox, a perennial herb, is occasionally found growing in openings and edges in dry, sandy woods (Rhoads and Klein 1993, Rhoads and Block 2000).

Threats and Stresses

Virtually no information on the ecology and conservation of mountain phlox exists. However, given the roadside location of this occurrence, potential direct threats to this population include surface run-off from the road and roadside maintenance activities.

Recommendations

Workers involved in roadside right-of-way maintenance within the site should be informed of the presence of a rare plant species. Roadside vegetation should be controlled by mowing, rather than by the application of herbicides.

Pennsylvania Furnace BDA

The core of this site is a cattail marsh that provides habitat for populations of **marsh bedstraw** (*Galium trifidum*) and **Torrey's rush** (*Juncus torreyi*), both of which are plants of special concern in Pennsylvania. As the name implies, cattail (*Typha latifolia, T. angustifolia*) is the dominant species in a cattail marsh. Both cattail species spread aggressively by rhizomes and form extensive colonies. The density of the cattails serves to restrict other plant species from establishing in large numbers (Thompson and Sorenson 2000). Other species associated with cattail marshes include: bulrush (*Scirpus* spp.), bur-reed (*Sparganium americanum*), sensitive fern (*Onoclea sensibilis*), jewelweed (*Impatiens* spp.), arrowhead (*Sagittaria latifolia*), beggar-ticks (*Bidens* spp.), smartweeds (*Polygonum* spp.), and sedges (*Carex* spp.).

Threats and Stresses

Cattail marshes are generally considered resilient to human disturbance. However, alterations in the hydrologic regime and run-off from surrounding lands can reduce species diversity within a marsh, resulting in a virtual cattail monoculture (Thompson and Sorenson 2000). Cattail marshes are also vulnerable to colonization by common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*), both highly invasive species (Fike 1999). *Phragmites* is a native grass whose spread throughout the Northeast appears to be linked with increased industrialization and urbanization, and thus is a symptom of anthropogenic disturbance (Brown 1979). There is also some suspicion that although the species itself is indigenous to North America, new, more invasive genotype(s) were introduced from the Old World (Marks et al. 1993). Purple loosestrife is a showy flower first introduced from Europe in the 1800s as an ornamental garden plant. Colonization by purple loosestrife into human disturbed wetlands follows a pattern of establishment, maintenance at low numbers, and then dramatic population increases when conditions are optimal (Bender 1987). The common reed and loosestrife crowd or shade out native species and eventually create virtual monospecific stands. The loss of species diversity from any of the scenarios described would undoubtedly result in the extirpation of rare species from this site.

Recommendations

If the site and the species are to be protected, the landowner should be made aware of the potential threats. Alterations to the hydrologic regime of the marsh and adjoining pond should be avoided, to both preserve the populations of marsh bedstraw and Torrey's rush and to prevent the establishment of invasive species. The marsh should be monitored periodically for the presence of invasive species. Eradication efforts should be undertaken at the first appearance of either *Phragmites* or *Lythrum*. See Appendix VII for sources of information on control methods.

Seven Stars BDA

The core of this BDA is a patch of approximately 150 acres of old-growth **dry oak – heath forest**. This old-growth remnant is located on a broad, relatively level shelf that extends along the northwestern slope Tussey Mountain. The forest floor is predominantly covered by sandstone talus and the soil is thin where present. Given the talus and poor soil, the trees are not particularly large, but key structural characteristics such as standing snags, abundant large woody debris on the forest floor, and gnarly growth form in trees suggest that this is old-growth forest (Leverett 1996, Rooney 1995).

Several streams originate along the edge of the shelf and flow directly downslope before entering Spruce Creek. Over geologic time, the downcutting action of the streams has carved keyhole-shaped depressions where they drop over the edge of the shelf. These depressions provide a variety of slope aspects that support a number of distinct community types. The southwest-facing slopes are dominated by chestnut oak (*Quercus montana*), red oak (*Q. rubra*), table-mountain pine (*Pinus pungens*), and mountain laurel (*Kalmia latifolia*). On the northwest-facing slopes, red maple (*Acer rubrum*) increases in dominance and the shrub layer becomes denser. On the mesic northeast-facing slopes, the overstory is dominated by hemlock (*Tsuga canadensis*), basswood

(*Tilia americana*), and black birch (*Betula lenta*). The understory is dominated by black birch, basswood, and witch-hazel (*Hamamelis virginiana*); mountain laurel is absent.

Old-growth and younger forests typically differ in their age-structure, or the range of tree ages. Due to timber harvesting and subsequent regeneration in any given area, second- and third-growth forests typically have trees that are the same age. In comparison, old-growth forest that has been left in a natural state has trees that span a range of ages. Over time, natural disturbances such as wind, ice storms, insect and disease mortality, and fire result in openings in the canopy where regeneration starts anew, creating a mosaic of different-aged patches and the structural complexity that characterizes old-growth.

Old-growth forests also serve a number of ecological functions not necessarily filled by second- or third-growth forests. These functions include, but are not limited to: providing habitat for organisms ranging from birds, mammals, amphibians and reptiles, insects, gastropods, plants, fungi, lichens, and microbes; groundwater purification and storage; the formation of optimal forest soils through the accumulation of humus in the upper soil horizons, periodic mixing of horizons by uprooting of trees, and the formation of macropores – linear openings in the soil, having much greater permeability than the surrounding material overlying the bedrock; flood control by means of maximal absorptive capabilities and stream bank stabilization; protecting water quality through prevention of siltation; providing a dependable source of coarse woody debris essential to the functioning of woodland stream ecosystems (Pennsylvania Wildlands Recovery Project 2003).

Threats and Stresses

This site should be under no imminent threat, given its location in the Rothrock State Forest. The majority of the area encompassed by this BDA has been set aside by the Bureau of Forestry for old-growth protection and management.

Typically, forest management occurs at the stand level. From this perspective, any area that exhibits the structural characteristics of old-growth, regardless of the area encompassed or proximity to other similar stands, would be considered old-growth. However, this stand level perspective does not take into account the scale-dependent processes, such as the natural disturbances described above, that influence the viability of old-growth and old-growth associated species. A landscape level approach to old-growth restoration considers the number, size, and distribution of stands that possess the necessary structural characteristics. Thus, from a landscape perspective, the protection or restoration of one stand is considered insufficient because it would not have necessarily included the processes that allow for the continued viability of the stand (Trombulak 1996).

Recommendations

Further evaluation of the forest within this site should be conducted by experts to determine the actual boundaries of the old-growth. Because of the dynamics of natural disturbance and issues of scale, old-growth oak forests can be difficult to identify. Paradoxically, the forest can be older than the current generation of trees on the site (White and White 1996). Surveys of lepidoptera within the site are also desirable.

Morris Township

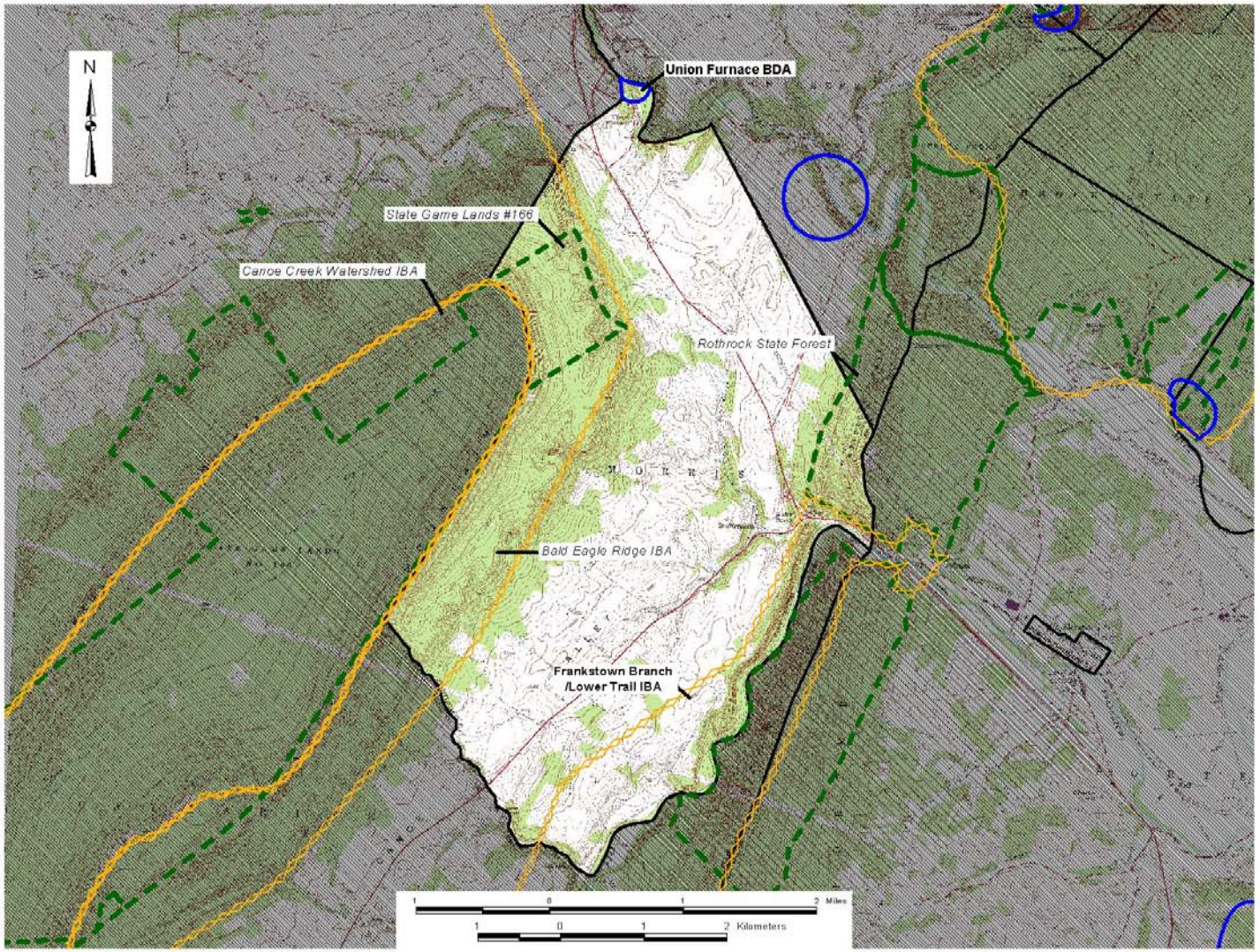
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Union Furnace BDA		*Exceptional Significance*		
White camus (*Zigadenus glaucus*)	G4G5	S1		N
Calcareous opening/cliff community		S2		

OTHER CONSERVATION AREAS: *Bald Eagle Ridge IBA*
Frankstown Branch/Lower Trail IBA

MANAGED LANDS: *Rothrock State Forest*
State Game Land #166

GEOLOGIC FEATURES: *none*

Morris Township



Morris Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Union Furnace

Landscape Conservation Areas:

None

Managed Areas:

Rothrock State Forest
State Game Lands #166

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

MORRIS TOWNSHIP

Morris Township lies along the western edge of Huntingdon County, where it is surrounded on three sides by Blair County. The township is bounded to the north by the Little Juniata River, to the east by Short Mountain and the Frankstown Branch of the Juniata River, and partly by the ridgeline of Canoe Mountain to the west. The rich, calcareous soils that cover much of the central region of the township are well suited to agriculture, the primary land use in the township. The Pennsylvania Audubon Society has identifies the forested slopes of Canoe Mountain and the Frankstown Branch corridor as important bird habitat.

Union Furnace BDA

This site is designated around a mesic, north-facing limestone cliff overlooking the Little Juniata River, the location of the only population of **white camus** (*Zigadenus glaucus*) known to occur in Pennsylvania. The plants are scattered across the cliff, growing from crevices in the exposed limestone. A number of seeps drain down the face of the cliff, creating moist growing conditions favorable for the white camus.

Threats and Stresses

This plant of special concern depends upon the exposed bedrock, moist, cool conditions of the slope, and the resulting structure of the vegetation on the slope. An increase in the amount of light (and heat) or direct disturbance to the habitat would have a negative impact upon the community and species growing on the slope. Also, a loss of forested buffer above the slope could allow a greater influx of aggressive species, resulting in greater competition for the habitat used by native species.

Recommendations

The cliff habitat is located on a piece of land that is a virtual island, separated from the surrounding landscape by the Little Juniata River and a railroad grade. Timber harvesting or quarrying of the underlying limestone would pose a direct threat to the white camas population and should be avoided within this site.

Spruce Creek Township

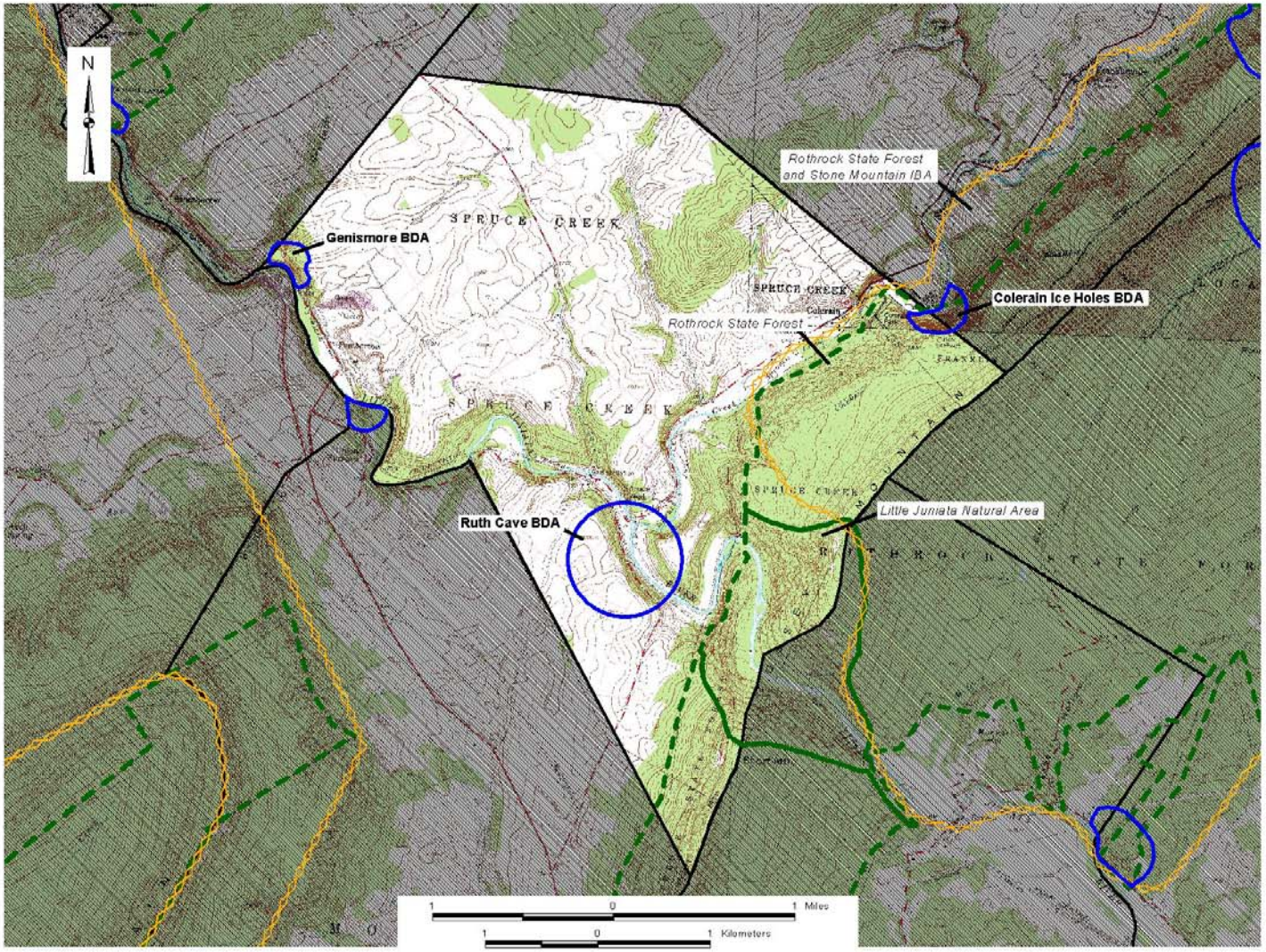
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Colerain Ice Holes BDA		*Exceptional Significance*		
Twinflower (*Linnaea borealis*)	G5	S1		PT
Rich hemlock - mesic hardwoods forest community		S2S3		
Genismore BDA		*High Significance*		
Three-flowered melic grass (*Melica nitens*)	G5	S2		PT
Ruth Cave BDA		*High Significance*		
Easten small-footed bat (*Myotis leibii*)	G3	S1B, S1N		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		

OTHER CONSERVATION AREAS: *Rothrock State Forest and Stone Mountain IBA*

MANAGED LANDS: *Rothrock State Forest*
Little Juniata Natural Area DA

GEOLOGIC FEATURES: *none*

Spruce Creek Township



Spruce Creek Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Colerain Ice Holes
Genismore
Ruth Cave

Landscape Conservation Areas:

None

Managed Areas:

Little Juniata Natural Area
Rothrock State Forest

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

SPRUCE CREEK TOWNSHIP

Spruce Creek Township is located in the northwestern portion of Huntingdon County. With the exception of the forested slopes of Tussey Mountain and Short Mountain to the east, virtually all the township is in agricultural production. Spruce Creek flows along the foot of Tussey Mountain from the north before joining with Little Juniata River at the village of Spruce Creek. Downstream from the confluence, the Little Juniata has carved a water gap through Tussey Mountain. The Little Juniata Natural Area has been designated around the water gap.

Colerain Ice Holes BDA

This BDA is discussed under Franklin Township.

Genismore BDA

The core of this site is a wooded, southwest-facing limestone bank overlooking the Little Juniata River that provides habitat for **three-flowered melic grass** (*Melica nitens*), a plant of special concern in Pennsylvania. Three-flowered melic grass is a perennial grass that occasionally occurs on steep, rocky slopes and riverbanks in the south-central region of the state (Rhoads and Klein 1993).

Threats and Stresses

Areas near or above roads often meet the requirement of open habitat with minimal competition for available space, light, and nutrients. Disturbance of the plants from activities associated with road maintenance represents the most immediate possible source of stress for this population.

Recommendations

Pennsylvania Department of Transportation and township road maintenance workers should be made aware of the plants to allow protection of the plant population to be incorporated into management plans and general road maintenance procedures.

Ruth Cave BDA

A steep, forested limestone slope overlooking the Little Juniata River is the location of a cave that serves as a winter hibernaculum for the globally rare **eastern small-footed bat** (*Myotis leibii*) and state rare **northern bat** (*Myotis septentrionalis*). Other bat species using this hibernaculum include the little brown bat (*Myotis lucifugus*), the big brown bat (*Eptesicus fuscus*), and the eastern pipistrelle (*Pipistrellus subflavus*).

The eastern small-footed bat has a wide distribution across southeastern Canada and the eastern United States, but populations appear to be scattered and small throughout its range (NatureServe 2002). Isolated colonies of *M. leibii* are particularly vulnerable to local extinction by chance events, especially when concentrated during winter months. This species of bat tends to hibernate near cave entrances, thus it may be susceptible to freezing during abnormally severe winters.

The northern bat hibernates in relatively small groups compared to other bat species and thus is more difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants.

Threats and Stresses

In general, the most serious threat to cave-dwelling bats is human disturbance during hibernation. Very low levels of noise, light, and heat from lanterns are sufficient to awaken hibernating bats, which then expend energy moving about and deplete critical reserves of body fat. When such disturbance is repeated, bats (especially juveniles) are likely to weaken and perish. Logging above and around bat caves can alter cave temperature, humidity, and air and water flow. Some forest cover around the cave entrance and foraging area may offer significant protection from both predators and periods of exceptionally cold spring weather (NatureServe, 2002).

Recommendations

Given the vulnerability of bats during hibernation, the hibernaculum must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can be a deterrent. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

Warriors Mark Township & Birmingham Borough

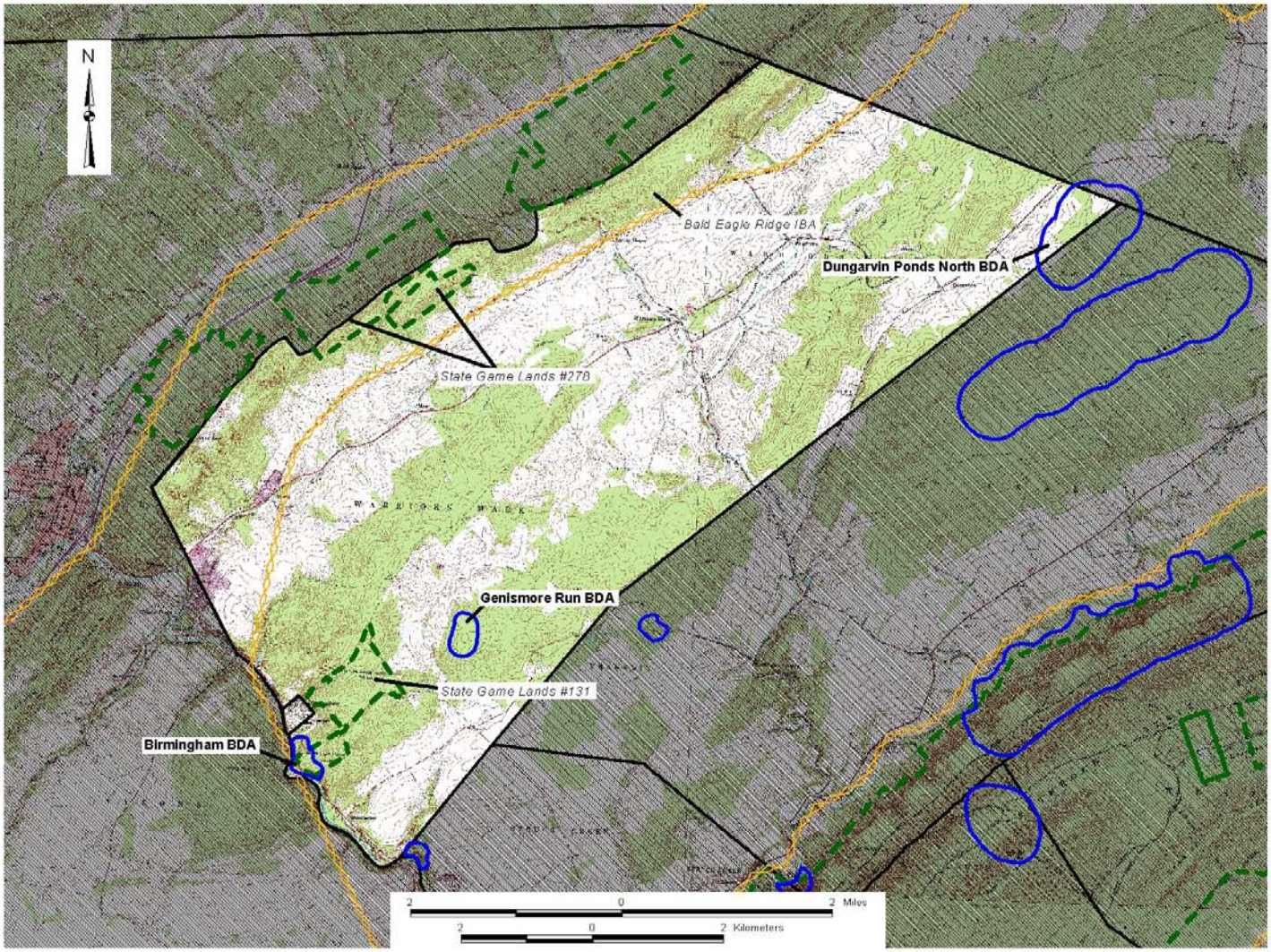
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Birmingham BDA		*High Significance*		
Spreading rockcress (*Arabis patens*)	G3	S2		N
Brome grass (*Bromus kalmii*)	G5	S3		N
Dungarvin Ponds North BDA		*Notable Significance*		
Herbaceous vernal pond community		S3S4		
Genismore Run BDA		*High Significance*		
Cattail sedge (*Carex typhina*)	G5	S2		PE

OTHER CONSERVATION AREAS: *Bald Eagle Ridge IBA*

MANAGED LANDS: *State Game Land #131*
State Game Land #278

GEOLOGIC FEATURES: *none*

Warriors Mark Township and Birmingham Borough



Warriors Mark Township and Birmingham Borough

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Birmingham
Dungarvin Ponds North
Genismore Run

Landscape Conservation Areas:

None

Managed Areas:

State Game Lands #131
State Game Lands #278

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

WARRIORS MARK TOWNSHIP

Warriors Mark Township defines the northwest "ear" of the county, bordering Centre County to the north and Blair County to the west and south. Agriculture in the township is primarily in areas adjacent to the valleys of Spring Run and Warriors Mark Run, where the soils are derived from limestone. The Gatesburg geologic formation, associated with ecologically unique barrens and pools, underlies the majority of the forested areas in the township.

Birmingham BDA

This site is delineated around limestone bluffs adjacent to State Highway 453, south of the village of Birmingham. **Spreading rockcress** (*Arabis patens*), a globally rare plant, has colonized the exposed rock at the crest of the bluff, a habitat unsuitable for most plant species. A small population of state rare **brome grass** (*Bromus kalmii*) is sparsely scattered throughout the dry oak – heath woodland at the top of the bluff. The presence of an old roadbed and invasive alien shrub species such as jetbead (*Rhodotypos scandens*) and privet (*Ligustrum* sp.) provide evidence of past disturbances in the area along the top of the bluff.

Threats and Stresses

Direct disturbance from timber harvest and increased competition due to the spread of the invasive shrubs pose potential threats to the population of brome grass. The spreading rockcress, because of the inhospitable habitat it favors, appears to be under no imminent threat.

Recommendations

Approximately half of the site falls within State Game Land #131, thus providing some measure of protection for the site. The owner of the private lands involved should be informed of the presence of the rare plants. Any proposed timber harvesting within the site should be directed away from the top of the bluffs to avoid altering the habitat occupied by the rare species. Management of the site should include periodic monitoring of the rare plant populations.

Dungarvin Ponds North BDA

This Natural Heritage Area is discussed under Franklin Township.

Genismore Run BDA

A slight seepage in a forested saddle between two hills provides habitat for a population of **cattail sedge** (*Carex typhina*), a state rare plant species. Cattail sedge is a wetland plant that is typically found in calcareous bottomlands, swamps, and wet woods (Rhoads and Block 2000). Its presence at this site is somewhat unusual given that the sandy soil and associated flora are not typically associated with wetlands or *C. typhina* habitat.

Threats and Stresses

The site has undergone some disturbance in the recent past. Logging and windthrow have created an open canopy in the deciduous forest surrounding the seepage area, which might possibly benefit the sedge.

Recommendations

Activities that result in earth disturbance should be avoided in the vicinity of the seepage, in order to avoid disrupting natural hydrological patterns in the immediate area. With permission of the landowner, additional surveys for other cattail sedge occurrences should be conducted.

BIRMINGHAM BOROUGH

Birmingham, a small town with a population of approximately 110, lies along State Highway 453, overlookings the Little Juniata River. No Natural Heritage Areas occur in this municipality.

Trough Creek Region

- Cassville Borough
- Cass Township
- Mapleton Borough
- Todd Township
- Union Township

Rainbow Falls,
Trough Creek State Park

Hillslope carpeted with thick-leaved meadow rue (*Thalictrum coriaceum*),
State Game Land #71

Cass Township & Cassville Borough

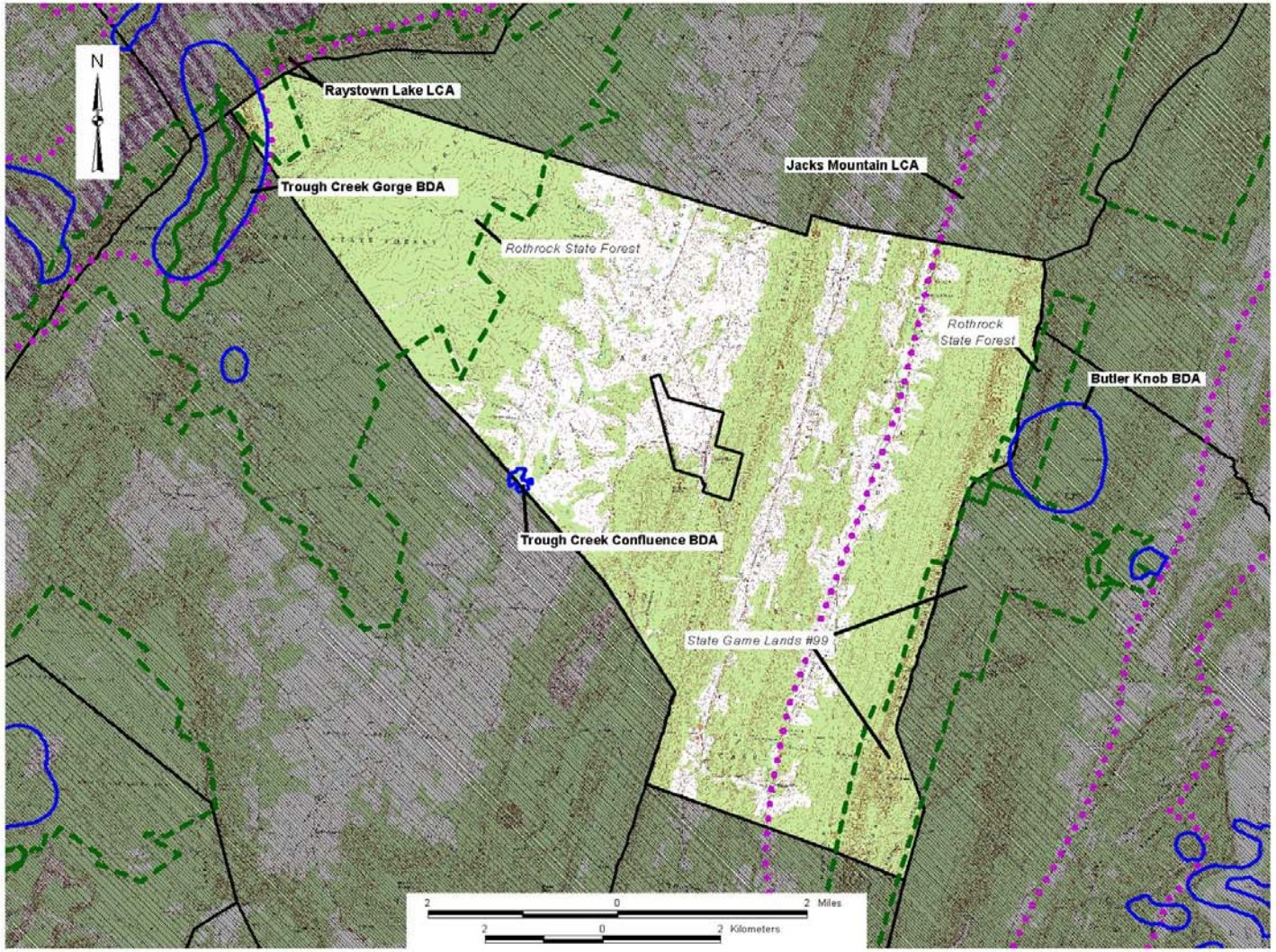
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Trough Creek Confluence BDA		*Notable Significance*		
Thick-leaved meadow rue (*Thalictrum coriaceum*)	G4	S2		PE
Trough Creek Gorge BDA		*County Significance*		
Jacks Mountain LCA		*Exceptional Significance*		
Raystown Lake LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *Raystown Lake*
Rothrock State Forest
State Game Land #99

GEOLOGIC FEATURES: *Butler Knob (erosional feature)*

Cass Township and Cassville Borough



CassTownship and Cassville Borough

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

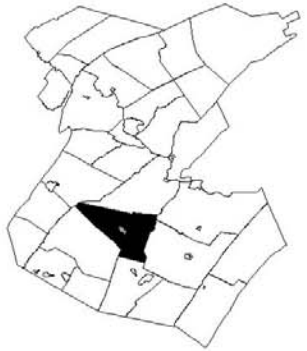
Butler Knob
Trough Creek Confluence
Trough Creek North

Landscape Conservation Areas:

Jacks Mountain
Raystown Lake

Managed Areas:

Rothrock State Forest
State Game Lands #99



Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

CASS TOWNSHIP

Cass Township extends from Jacks Mountain westward to Terrace Mountain, just above where Trough Creek drains into Raystown Lake. Agriculture within the township is concentrated in Trough Creek Valley, Smith Valley, and Hares Valley. The higher elevation regions of the township remain in forest.

Trough Creek Confluence BDA

The core of this site is the confluence of Little Trough Creek and Great Trough Creek, home to a small population of **thick-leaved meadow rue** (*Thalictrum coriaceum*). Not much is known about this infrequently occurring species, but observations of *T. coriaceum* suggest that this plant requires mineral soil for germination. In Huntingdon County, *T. coriaceum* is typically found growing in forested sites where some degree of disturbance occurs periodically, such as along streams, roadside ditches, and trails. Within this site, the small population is growing on a wooded bank of Great Trough Creek.

Threats and Stresses

The land surrounding the confluence is currently being used as pasture for cattle. Some of the meadow rue showed signs of browsing, most likely by cattle, but did not appear to be overly damaged. The streams within the pastureland are partially fenced, limiting access to the cattle. Stream banks that are accessible to the cattle, however, are relatively bare of vegetation and eroding.

Recommendations

The landowner might want to consider enrolling in a privately funded Stream bank fencing program currently administered by the Western Pennsylvania Conservancy's Watershed Assistance Center. Benefits of increased stream fencing would include a reduction in stream bank erosion, improved water quality, and improved herd health through the prevention of black leg, mastitis and other ailments.

Trough Creek Gorge BDA

This Natural Heritage Area is discussed under Todd Township.

CASSVILLE BOROUGH

The village of Cassville lies at the western foot of Sideling Hill, at the intersection of State Highway 829 and State Road 3019. No Natural Heritage Areas occur in this municipality.

Todd Township

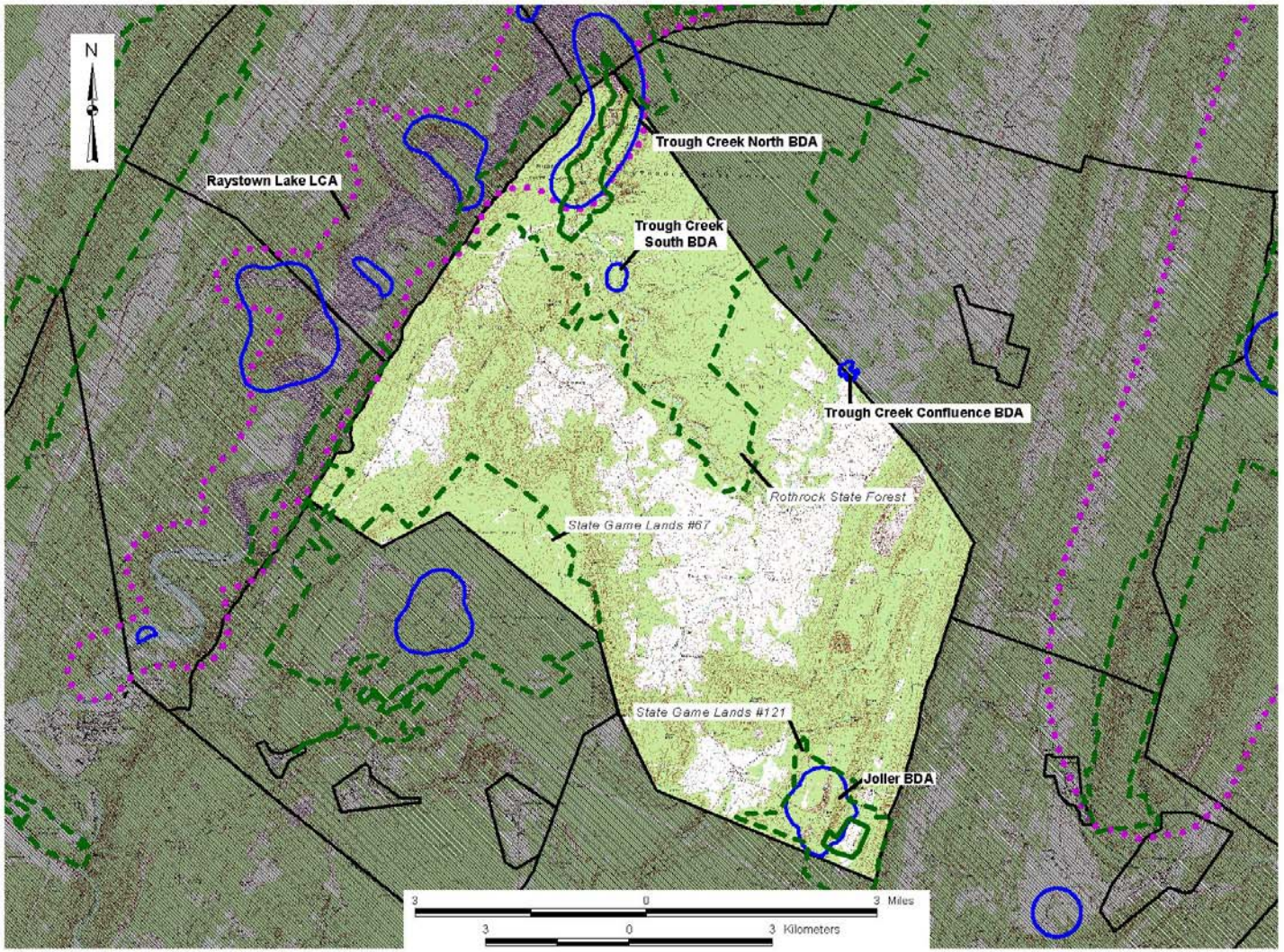
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Joller BDA		*Notable Significance*		
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT
Trough Creek Confluence BDA		*Notable Significance*		
Thick-leaved meadow-rue (*Thalictrum coriaceum*)	G4	S2		PE
Trough Creek Gorge BDA		*County Significance*		
Trough Creek South BDA		*Notable Significance*		
Thick-leaved meadow-rue (*Thalictrum coriaceum*)	G4	S2		PE
Raystown Lake LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS:
Rothrock State Forest
State Game Land #67
State Game Land #121
Trough Creek State Park

GEOLOGIC FEATURES:
Balanced Rock
Copperas Rock
Ice Cave
Trough Creek Gorge

Todd Township



Todd Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Joller
Trough Creek Confluence
Trough Creek North
Trough Creek South

Landscape Conservation Areas:

Raystown Lake

Managed Areas:

Rothrock State Forest
State Game Lands #67
State Game Lands #121

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

TODD TOWNSHIP

Todd Township lies in the southwestern portion of the county, and extends from the ridgeline of Terrace Mountain eastward to the ridge of Sideling Hill. Agriculture within the township is largely restricted to Trough Creek Valley, Little Valley, and the open, rolling hills between the villages of Newburg and Todd. Great Trough Creek, flowing almost entirely within the eastern and northern forested regions, drains a large portion of the township before entering Raystown Lake.

Joller BDA

The core of this site is a highly disturbed area along the eastern ridge of Rays Hill within State Game Land #121. Rocks exposed by a road cut and abandoned railroad cut on top of the mountain have created habitat for the **Allegheny woodrat** (*Neotoma magister*), a species endemic to the eastern United States. The mature forest surrounding the woodrat habitat is dominated by chestnut oak (*Quercus montana*), with black birch (*Betula lenta*), hickory (*Carya sp*.), red oak (*Q. rubra*), and black cherry (*Prunus serotina*) among the minor canopy species. A patchy shrub layer includes blackberry (*Rubus* sp.), blueberry (*Vacinium* sp.), and greenbriar (*Smilax rotundifolia*). The woodrat nests in rocky habitats to avoid predators, and forages nocturnally for leaves; berries; nuts (particularly acorns); the stalks and fruits of pokeweed; the fruits of sassafras, dogwood, mountain ash, cherry, red maple, and serviceberry; ferns and other plants; and fungi (Fergus 2000). In Pennsylvania, *N. magister* is now at the northern extent of its geographic range; populations have disappeared in Connecticut, New York, and much of eastern Pennsylvania (NatureServe 2000).

Threats and Stresses

Several studies provide evidence that a variety of factors are contributing to the observed declines in Allegheny woodrat populations. Some populations appear to have suffered heavy mortality from the raccoon roundworm (*Baylisascaris procyonis*). The raccoon roundworm is rarely fatal to raccoons, but can cause cerebrospinal nematodiasis in other species (Kazacos, 1983). Raccoons are habitat generalists that tolerate or even benefit from habitat fragmentation and disturbance. Human-caused fragmentation and disturbance have likely created conditions that increase the exposure of woodrats to the parasite and thus led to woodrat population declines. Another factor that may play a role in the decline is change in the availability of viable food resources. Chestnut blight (*Cryphonectria parasitica*), oak infestation by gypsy moths (*Lymantria dispar*), changes in forest composition due to increased deer herbivory, and short-rotation forest management may have significantly reduced the amount of hard mast food that is available to the woodrat (Hassinger et al. 1996, Castleberry 2000). Weather may also play a role in the decline since the sharpest drops in populations have occurred in the northern part of the range, and records in Pennsylvania and West Virginia suggest that below normal winter temperatures in the past 30 years have coincided with the shrinkage in range (Natureserve 2002). Strip mining of coal and limestone may degrade viable woodrat habitat and isolate populations.

Within this site, fragmentation is extensive. The uplands adjacent to the woodrat habitat have been strip-mined and are now grasslands. The state road and abandoned railroad grades that pass through the site have functioned as corridors of introduction for invasive, non-native plants such

as multiflora rose (*Rosa multiflora*), privet (*Ligustrum* sp.), garlic mustard (*Alliaria petiolata*), and mugwort (*Artemesia vulgaris*).

Recommendations

The current management of this site by the Pennsylvania Game Commission appears to meet the needs of the woodrat population. The spread of invasive species within the site should be monitored periodically.

Trough Creek Confluence BDA

This Natural Heritage Area is discussed under Cass Township.

Trough Creek Gorge BDA

Over geologic time, Great Trough Creek has carved a steep gorge through horizontally bedded sandstones of the Pocono geologic formation. The gorge, with its variety of exposures and elevations, is home to a diversity of natural communities and several interesting geologic features. The ridgetops typically support either a dry oak – heath forest community dominated by chestnut oak (*Quercus montana*) and blueberry (*Vaccinium* sp.), or a dry oak – mixed hardwood forest composed primarily of various oaks (*Q. alba, Q. velutina, Q. rubra*), maples (*Acer rubrum, A. saccharum*), and hickories (*Carya cordiformis, C. glabra*). The mesic east-and north-facing lower slopes and streamside areas are rich hemlock – mesic hardwoods forest communities characterized by the presence of hemlock (*Tsuga canadensis*), tuliptree (*Liriodendron tulipifera*), maples, red oak (*Q. rubra*), basswood (*Tilia americana*), black birch (*Betula lenta*), and a species-rich herbaceous layer.

The eroding action of the creek has created several notable geologic features within the gorge. Balanced Rock, located along the western rim of the gorge, is a result of the eroding away of the softer rock supporting it. Over time, the undercutting action of the stream nibbled away at the underlying soft rock, leaving the large block of resistant sandstone perched on the edge of a cliff. The same process is occurring at Copperas Rock where narrow ledges can be seen jutting out over the stream. The Ice Mine exhibits the same type of phenomenon as that described for the Colerain Ice Holes (page 123). The mine was probably originally dug as an unproductive iron prospect hole, and now serves to capture cold air flowing down the mountainside.

Threats and Stresses

Given that this BDA is located entirely within public lands, there are no imminent threats to this Natural Heritage Area.

Recommendations

The current management program meets the ecological needs of the area.

Trough Creek South BDA

This site is located along Great Trough Creek within Rothrock State Forest, just upstream of Trough Creek State Park. A slightly eroded trail leading down through riparian forest to the creek provides habitat for a small population of **thick-leaved meadow rue** (*Thalictrum coriaceum*). Not much is known about this infrequently occurring species, but observations of *T. coriaceum* suggest that this plant requires mineral soil for germination. In Huntingdon County, *T. coriaceum* is typically found growing in forested sites where some degree of disturbance occurs periodically, such as along streams, roadside ditches, and trails.

Threats and Stresses

The habitat supporting *T. coriaceum* is in good condition, but is adjacent to Trough Creek Drive.

Recommendations

Workers involved in road right-of-way maintenance within the site should be informed of the presence of a threatened plant species. The application of herbicides should be avoided and mowing should be used to control roadside vegetation.

Union Township & Mapleton Borough

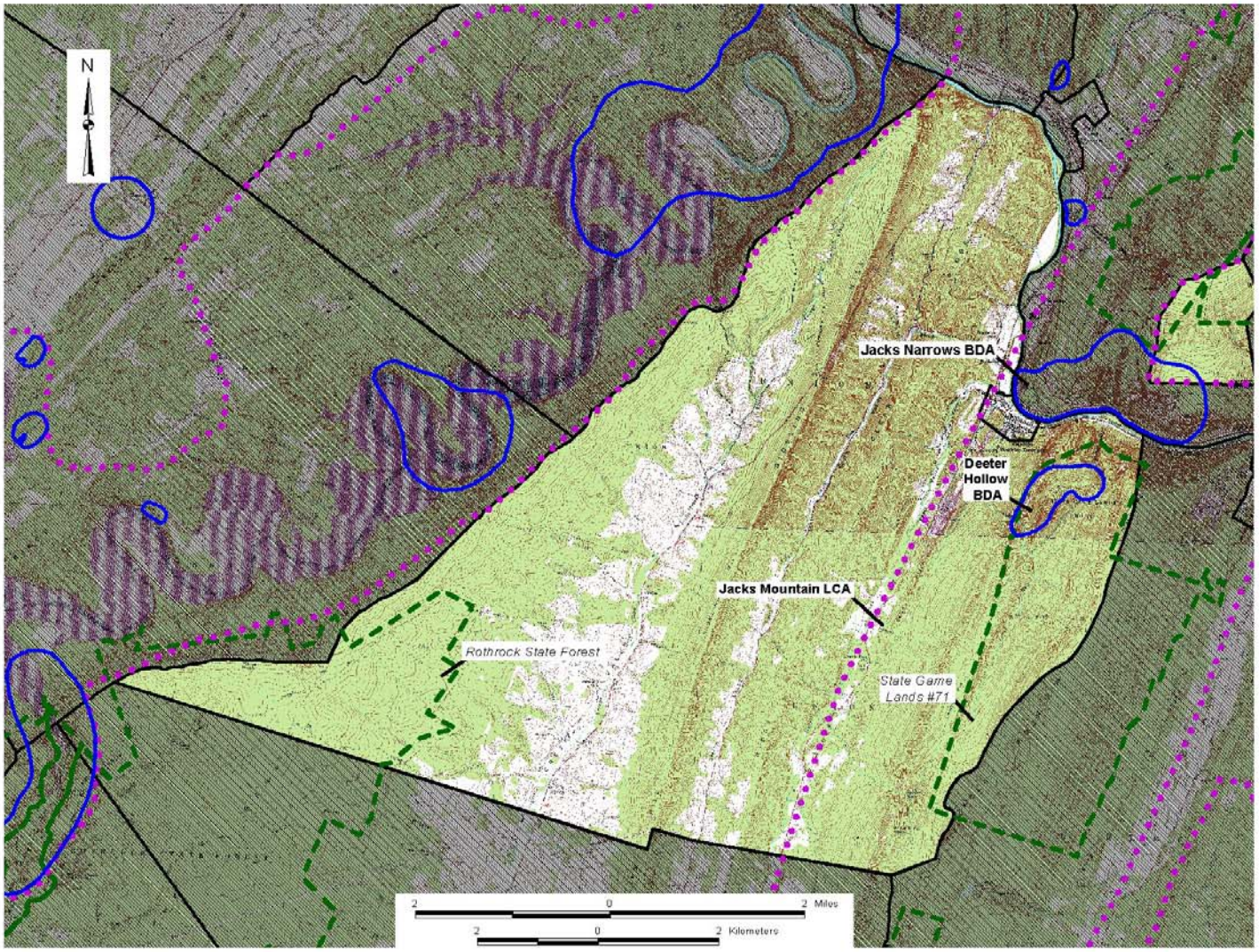
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Deeter Hollow BDA			*Exceptional Significance*	
Thick-leaved meadow-rue (*Thalictrum coriaceum*)	G4	S2		PE
Jacks Mountain LCA			*Exceptional Significance*	
Raystown Lake LCA			*Exceptional Significance*	

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS: *Rothrock State Forest*
State Game Land #71

GEOLOGIC FEATURES: *Jacks Narrows (gorge)*

Union Township and Mapleton Borough



Union Township and Mapleton Borough

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Deeter Hollow
Jacks Narrows

Landscape Conservation Areas:

Jacks Mountain

Managed Areas:

Rothrock State Forest
State Game Lands #71

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

UNION TOWNSHIP

Union Township extends from Terrace Mountain eastward to the crest of Jacks Mountain. With the exception of Trough Creek Valley and portions of Smith Valley and Hares Valley, the township is almost entirely forested.

Deeter Hollow BDA

This site, located within State Game Land #71, supports two exceptionally large and robust populations of **thick-leaved meadow rue** (*Thalictrum coriaceum*). Not much is known about this infrequently occurring species, but observations of *T. coriaceum* suggest that this plant requires mineral soil for germination. Typically, *T. coriaceum* occurs as small populations in forested sites with a periodic disturbance regime, such as along streams, roadside ditches, and trails. The oak-dominated forest within this site first experienced defoliation and subsequent mortality resulting from gypsy moth (*Lymantria dispar*) infestation, and then burned several years later. The open forest created by these events now supports thousands of thick-leaved meadow rue plants at a density of up to 30 stems per meter – a density seen nowhere else in the state.

Threats and Stresses

Given that this BDA is located entirely within public lands and the land manager is aware of the presence of the rare plant populations, no threats to the site are imminent.

Recommendations

The current management program meets the ecological needs of the area. Periodic monitoring of the site should continue.

Woodcock Valley Region

- Juniata Township
- Lincolnl Township
- Markleburg Borough
- Penn Township

Southern Pine Looper Moth
(*Caripeta aretaria*)

Sheep Rock Barrens overlooking Raystown Lake

Juniata Township

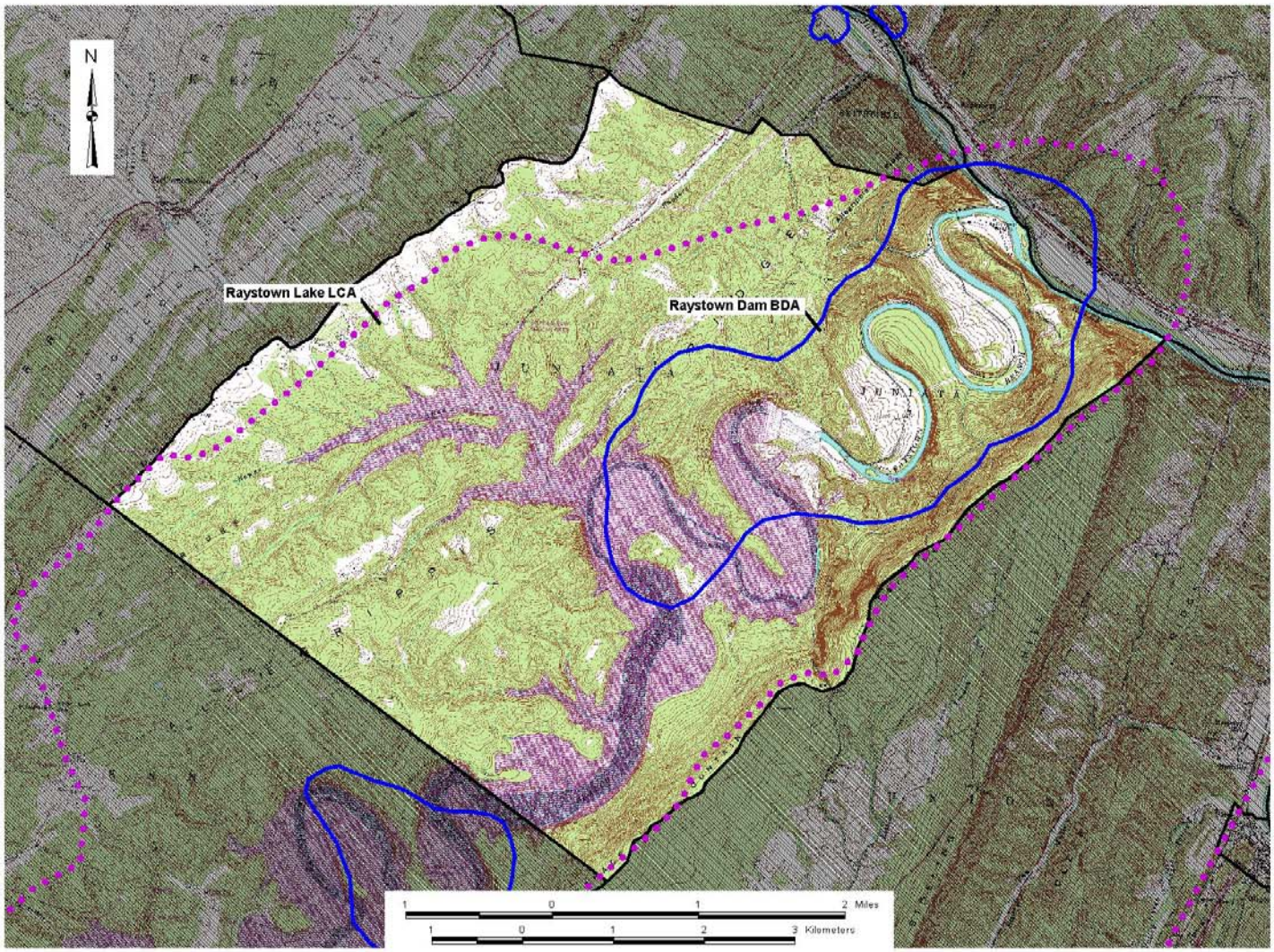
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Raystown Dam BDA		*Exceptional Significance*		
Shale-barren evening-primrose (*Oenothera argillicola*)	G3G4	S2		PT
Illinois pondweed (*Potamogeton illinoensis*)	G5	S3S4		TU
Virginia mallow (*Sida hermaphrodita*)	G2	S2		PE
Kate's mountain clover (*Trifolium virginicum*)	G3	S1		PE
Bald Eagle (*Haliaeetus leucocephalus*)	G4	S2B	PS:LT	PE
Allegheny woodrat (*Neotoma magister*)	G3G4	S3		PT
Appalachian jewelwing (*Calopteryx angustipennis*)	G4	SU		
Southern pine looper moth (*Caripeta aretaria*)	G4	S1		
Promiscuous angle (*Semiothisa promiscuata*)	G4	S1		
A noctuid moth (*Properigea* sp.)	G2G3Q	S1		
Southern grizzled skipper (*Pyrgus wyandot*)	G2	S1		
Red-cedar - mixed hardwood rich shale woodland community		S1S2		
Virginia pine – mixed hardwood shale woodland community		S2		
Raystown Lake LCA		*Exceptional Significance*		

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS:
Raystown Lake
Byes Barren Natural Area DA
Enyeart Barrens Natural Area DA
Hawns Bridge Barrens Natural Area DA
Huntingdon Barrens Natural Area DA
Sheep Rock Barrens Natural Area DA

GEOLOGIC FEATURES: *Ridenour Overlook*

Juniata Township



Juniata Township

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

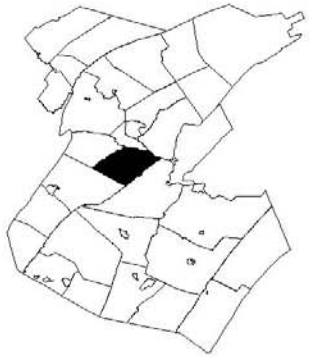
Raystown Dam

Landscape Conservation Areas:

Raystown Lake

Managed Areas:

Raystown Lake



Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

JUNIATA TOWNSHIP

Juniata Township is bounded by Piney Ridge to the west, the Juniata River to the north, and Terrace Mountain to the east. Raystown Lake and Raystown Branch dominate the center of the township, while the remainder is primarily forested uplands. Agriculture in the township is restricted to the top of Piney Ridge and portions of the Juniata River floodplain.

Raystown Dam BDA

This site encompasses a range of habitats that include successional old-field floodplain, riparian forest, shale barrens, and upland forest. The **red-cedar – mixed hardwood rich shale woodland** and **Virginia pine – mixed hardwood shale woodland communities** support two plant species endemic to shale barrens, **shale-barren evening-primrose** (*Oenothera argillicola*) and **Kate's mountain clover** (*Trifolium virginicum*), and several invertebrate species associated with shale barrens and the surrounding xeric forest, including **southern pine looper moth** (*Caripeta aretaria*), **promiscuous angle** (*Semiothisa promisuata*), and a **noctuid moth** (*Properigea* sp.). The **Allegheny woodrat** (*Neotoma magister*) has also been found within two of the shale barrens overlooking the lake.

Several locations in the Raystown Branch floodplain below the dam support populations of **Virginia mallow** (*Sida hermaphrodita*). The upland forest and lake provide nesting and foraging habitat for the **bald eagle** (*Haliaeetus leucocephalus*). The **southern grizzled skipper** (*Pyrgus wyandot*) and **Illinois pondweed** (*Potamogeton illinoensis*) have also been found within this site. The wooded riparian area also supports an extensive population of **American beakgrain** (*Diarrhena obovata*), a species of grass that was considered rare within Pennsylvania until just recently.

Threats and Stresses

The shale barren communities and associated plant species depend upon the harsh conditions found on these steep, dry slopes where competition from other species is low. Disturbances that can lead to the introduction of exotic and aggressive species are one of the largest threats. Changes in surface flow of water and direct disturbance to the slope habitat could be detrimental to these communities.

Flood control on many rivers has eliminated the periodically flooded banks that Virginia mallow requires. This, along with development along river corridors, has resulted in the loss of natural habitat. Increased competition for resources by invasive exotic plant species, which typically colonize disturbed habitats, also poses a major threat.

Major threats to the bald eagle include disturbance by humans, biocide contamination, habitat loss, decreasing food supply, and illegal shooting (NatureServe, 2000). The eagle is a large predator that occupies the top trophic level of the food-web. Since each trophic level tends to concentrate toxic chemicals from the lower trophic level, predators that function in the top trophic level are most vulnerable to accumulated toxins. Human intrusion, particularly during the period between breeding and the fledging of the young eaglets, can have a negative impact. Eagles generally show a high degree of adaptability and tolerance if the human activity is not

directed toward them. However, chronic disturbance results in the disuse of an area by eagles (NatureServe, 2000).

Recommendations

The bulk of the BDA, and all but one of the individual species occurrences, are located on lands managed by the Army Corp of Engineers. The Corp is aware of the presence of the rare species and communities, and is managing for their conservation. The shale barrens within the site have been designated as Natural Areas.

Lincoln Township

	PNDI Rank		Legal Status	
	Global	State	Federal	State

NATURAL HERITAGE AREAS:

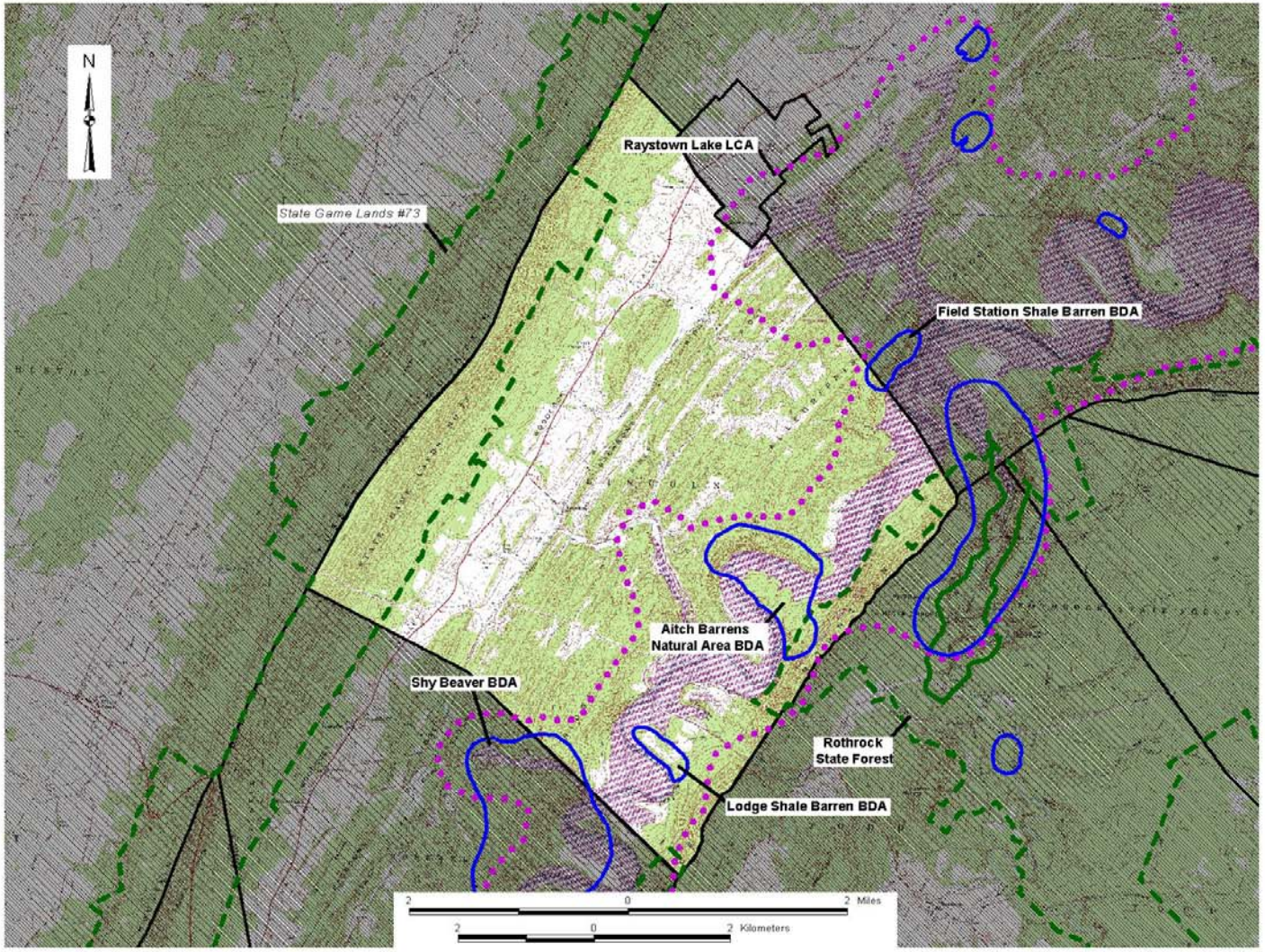
Aitch Barrens Natural Area BDA		*High Significance*
Virginia pine - mixed hardwood shale woodland community	S2	
Field Station Shale Barren BDA		*High Significance*
Virginia pine - mixed hardwood shale woodland community	S2	
Lodge Shale Barren BDA		*Notable Significance*
Virginia pine - mixed hardwood shale woodland community	S2	
Raystown Lake LCA		*Exceptional Significance*

OTHER CONSERVATION AREAS: *none*

MANAGED LANDS:
Raystown Lake
Rothrock State Forest
State Game Land #73
Aitch Barrens Natural Area DA

GEOLOGIC FEATURES: *none*

Lincoln Township



Lincoln Township

Huntingdon County
Natural Heritage Inventory

Biological Diversity Areas:

Aitch Barrens Natural Area
Field Station Shale Barren
Lodge Shale Barren

Landscape Conservation Areas:

Raystown Lake

Managed Areas:

Raystown Lake
Rothrock State Forest
State Game Lands #73

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

LINCOLN TOWNSHIP

Lincoln Township borders Blair County, extending from the crest of Tussey Mountain eastward to the ridgeline of Terrace Mountain. Raystown Lake fills the eastern section of the township, meandering along the foot of Terrace Mountain. Forest covers the rugged terrain of the uplands, whereas agriculture is largely restricted to Woodcock Valley.

Aitch Barrens Natural Area BDA
Field Station BDA
Lodge Shale Barren BDA

These sites have been designated around shale barrens adjacent to Raystown Lake. Over geologic time, Raystown Branch has carved down through the shale-bearing Foreknobs and Catskill geologic formations, exposing the shale slopes. Each site supports a **Virginia pine – mixed hardwood shale woodland community** characteristic of central Appalachian shale barrens. Typical canopy species within this community type include Virginia pine (*Pinus virginiana*), chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), black gum (*Nyssa sylvatica*), and red maple (*Acer rubrum*). The shrub layer is generally sparse and often includes blueberry (*Vaccinium* spp.).

Threats and Stresses

The Aitch Barrens Natural Area and Field Station barrens are both located in relatively remote areas and managed for conservation of the habitat, and therefore face no imminent threat. The Lodge shale barren, however, has experienced a great deal of anthropogenic disturbance due to its proximity to resort lodgings. The upper slope directly behind the lodge has been heavily impacted by tree removal to create a vista for the benefit of guests. A badly eroding trail leading to the lake winds through the barren. In addition, large patches of escaped ornamental mossy stonecrop (*Sedum acre*) are now established within the barren.

Recommendations

The current management of the Aitch Natural Area and Field Station sites meets the ecological needs of those areas. Although significantly degraded, the Lodge Shale Barren still represents potential habitat for endemic shale barren species found elsewhere along Raystown Lake. Removal of encroaching exotic plants and prevention of any further human-caused disturbance will facilitate the recovery of the site to a more natural state.

Penn Township & Marklesburg Borough

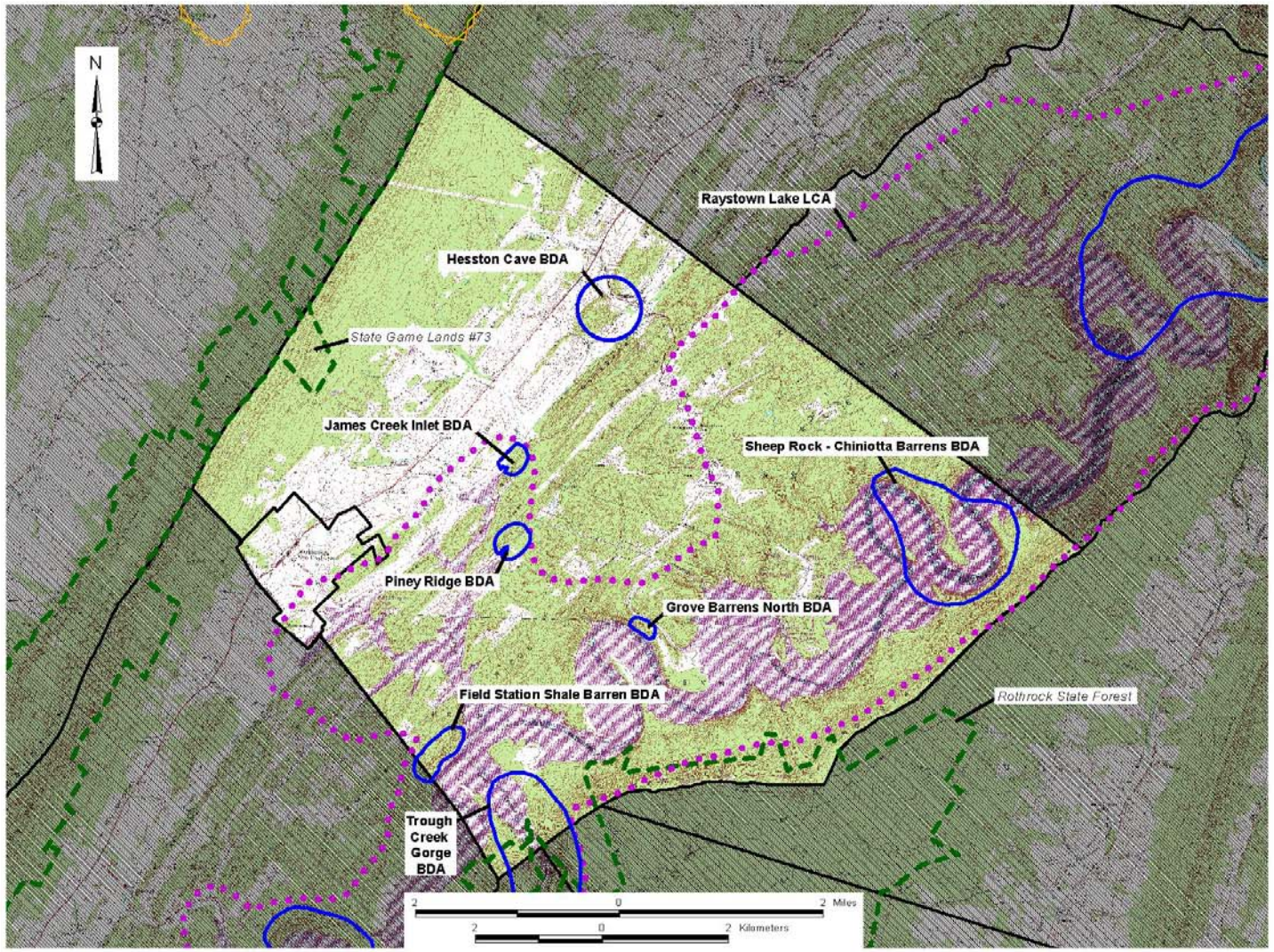
	PNDI Rank		Legal Status	
	Global	State	Federal	State
NATURAL HERITAGE AREAS:				
Field Station Shale Barren BDA		*High Significance*		
Virginia pine - mixed hardwood shale woodland community		S2		
Grove Barrens North BDA		*High Significance*		
Shale-barren evening-primrose (*Oenothera argillicola*)	G3G4	S2		PT
Virginia pine - mixed hardwood shale woodland community		S2		
Hesston Cave BDA		*High Significance*		
Northern bat (*Myotis septentrionalis*)	G4	S3B, S3N		
James Creek Inlet BDA		*Notable Significance*		
Thick-leaved meadow rue (*Thalictrum coriaceum*)	G4	S2		PE
Piney Ridge BDA		*High Significance*		
Curtis's goldenrod (*Solidago curtisii*)	G4G5	S1		PE
Sheep Rock - Chiniotta Barrens BDA		*Exceptional Significance*		
Shale-barren evening-primrose (*Oenothera argillicola*)	G3G4	S2		PT
Kate's mountain clover (*Trifolium virginicum*)	G3	S1		PE
A noctuid moth (*Properigea sp.*)	G2G3Q	S1		
A zale moth (*Zale metata*)	G5	S?		
Red cedar - mixed hardwood rich shale woodland community		S1S2		
Trough Creek Gorge BDA		*County Significance*		
Raystown Lake LCA		*Exceptional Significance*		

Penn Township & Marklesburg Borough (con't)

OTHER CONSERVATION AREAS:	*none*
MANAGED LANDS:	*Raystown Lake* *Rothrock State Forest* *State Game Land #73* *Chiniotta Barrens Natural Area DA** *Garner Barrens Natural Area DA** *Grove Barrens North Natural Area DA** *Grove Barrens South Natural Area DA** *Lenape Barrens Natural Island DA** *Sheep Rock Barrens Natural Area DA**
GEOLOGIC FEATURES:	*none*

*Denotes areas too small in scale to appear on the map.

Penn Township and Marklesburg Borough



Penn Township and Marklesburg Borough

Huntingdon County Natural Heritage Inventory

Biological Diversity Areas:

Field Station Shale Barrens
Grove Barrens North
Hesston Cave
James Creek Inlet
Piney Ridge
Sheep Rock - Chiniotta Barrens
Trough Creek Gorge

Landscape Conservation Areas:

Raystown Lake

Managed Areas:

Rothrock State Forest
State Game Lands #73

Map Legend

- Biological Diversity Areas (BDA)
- Landscape Conservation Areas (LCA)
- Managed Lands
- Important Bird Areas (IBA)
- Municipal Boundary

PENN TOWNSHIP

Like Lincoln Township, located directly to the south, Penn Township borders Blair County, extending from the crest of Tussey Mountain eastward to the ridgeline of Terrace Mountain. Raystown Lake fills the eastern section of the township, meandering along the foot of Terrace Mountain. Forest covers the rugged terrain of the uplands, whereas agriculture is largely restricted to Woodcock Valley.

Field Station Shale Barren BDA

This Natural Heritage Area is described under Lincoln Township.

Grove Barrens North BDA
Sheep Rock – Chiniotta Barrens BDA

These sites are located along the shoreline of Raystown Lake. Over geologic time, Raystown Branch has carved down through the shale-bearing Foreknobs and Catskill geologic formations, exposing the shale slopes. The Grove Barrens North BDA supports a **Virginia pine – mixed hardwood shale woodland community** and a population of **shale-barren evening primrose** (*Oenothera argillicola*), a species endemic to shale barrens.

The Sheep Rock – Chiniotta Barrens BDA extends across the lake to include shale barren habitats along both shorelines. The shale barrens within this site supports a **red cedar – mixed hardwood rich shale woodland community**, two plant species endemic to shale barrens: **shale-barren evening-primrose** (*Oenothera argillicola*) and **Kate's mountain clover** (*Trifolium virginicum*), and two invertebrate species associated with shale barrens and the surrounding forest: a **noctuid moth** (*Properigea* sp.) and a **zale moth** (*Zale metata*).

Threats and Stresses

The shale barren communities and associated plant species depend upon the harsh conditions found on these steep, dry slopes where competition from other species is low. Disturbances that can lead to the introduction of exotic and aggressive species are one of the largest threats. Changes in surface flow of water and direct disturbance to the slope habitat could be detrimental to these communities.

Recommendations

These sites are located on lands managed by the Army Corp of Engineers. The Corp is aware of the presence of rare species and communities, and manages for their conservation. Additionally, several of the shale barrens within these BDAs have been designated as Natural Areas.

Hesston Cave BDA

Hesston Cave is inhabited by the **northern bat** (*Myotis septentrionalis*), as well as the more common little brown bat (*Myotis lucifugus*) and eastern pipistrelle (*Pipistrellus subflavus*). The northern bat hibernates in relatively small groups compared to other bat species and thus is more

difficult to locate than more colonial species. The BDA boundary is drawn to include both the cave and a buffer area within which activities may impact the cave's inhabitants. As with all bats, if individuals of this species are disturbed during hibernation, they will become active and may use up critical fat stores needed to survive the winter. Juveniles can perish from repeated disturbances, and individuals may be weakened such that they do not have the energy to forage successfully in the spring.

Threats and Stresses

The northern bats and other bats using the cave will be negatively impacted by disturbance in the cave during the winter months. Even small amounts of light, noise, or heat will be enough to bring the animals out of hibernation. Any physical alteration to the cave entrance or the rock surrounding the cave could alter the patterns of air and water flow that currently create a suitable microclimate for the species, and render the habitat unusable.

Recommendations

Given the vulnerability of bats during hibernation, the hibernacula must be protected from disturbance November through March. If human traffic is a problem, the installation of a special bat gate can regulate access during the critical winter months. However, the gate must be carefully installed or it may render the cave unusable to bats. More information on bat gate installation is available through the Pennsylvania Game Commission. Foraging areas (mostly streams and ponds) should be protected from biocides that might adversely affect production of the bat's insect food. Forests should be left intact above and around the hibernacula and foraging areas.

James Creek Inlet BDA

Within this site, a red oak – mixed hardwood forest community and an old-field successional community in a utility right-of-way provide habitat for a small, scattered population of **thick-leaved meadow rue** (*Thalictrum coriaceum*). Not much is known about this infrequently occurring species, but observations of *T. coriaceum* suggest that this plant requires mineral soil for germination. In Huntingdon County, *T. coriaceum* is typically found growing in forested sites where some degree of disturbance occurs periodically, such as along streams, roadside ditches, and trails.

The riparian forest canopy is dominated by shagbark hickory (*Carya ovata*), sugar maple (Acer *saccharum*), red oak (*Quercus rubra*), and ash (*Fraxinus* sp.). Minor canopy species include Virginia pine (Pinus virginiana), pitch pine (*P. rigida*), and black walnut (*Juglans nigra*). Major ground layer species include sessile bellflower (*Uvularia sessilifolia*), wrinkle-leaf goldenrod (*Solidago rugosa*), false nettle (*Boehmeria cylindrica*), and clearweed (*Pilea pumila*).

Threats and Stresses

Multiflora rose (*Rosa multiflora*) and autumn olive (*Eleagnus umbellata*), both highly invasive shrub species, are well established within the riparian forest and utility right-of-way. The continued spread of these species has the potential to out-compete the *T. coriaceum* population for space, light, and available nutrients.

Recommendations

Periodic monitoring of the thick-leaved meadow rue population is desirable. Monitoring of the spread of invasive plants within the site is also desirable. If the encroachment of invasive species threatens the extirpation of the T. coriaceum, eradication of such invasive species should be considered.

Piney Ridge BDA

The core of this site is a riparian forest bordering a small stream that flows into Raystown Lake. The floodplain forest provides habitat for **Curtis's goldenrod** (*Solidago curtisii*), a state rare species that reaches the northern extent of its range in Pennsylvania.

The forest canopy along the stream is dominated by white oak (*Quercus alba*) and hemlock (*Tsuga canadensis*). Other minor canopy species include shagbark hickory (*Carya ovata*), white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), red oak (*Q. rubra*), and red maple (*A. rubrum*). The shrub layer is composed of spicebush (*Lindera benzoin*), maple-leaf viburnum (*Viburnum acerifolium*), mountain laurel (*Kalmia latifolia*), blackberry (*Rubus* sp.), and multiflora rose (*Rosa multiflora*).

Threats and Stresses

Multiflora rose, a highly invasive species, likely poses the greatest threat to the population of Curtis's goldenrod. Plants compete for space, light, and available nutrients. The multiflora rose is well established in the riparian zone, and its continued spread has the potential to overrun the rare goldenrod.

Recommendations

Periodic monitoring of the Curtis's goldenrod population is desirable. Monitoring of the spread of multiflora rose within the site is also desirable. If its continued spread threatens the extirpation of the *S. curtisii*, removal of the multiflora rose should be considered.

Trough Creek Gorge BDA

See Todd Township for a discussion of this Natural Heritage Area.

GENERAL RECOMMENDATIONS FOR THE PROTECTION OF NATURAL HERITAGE AREAS

The inventory identifies significant Natural Heritage Areas in order to promote their protection. Specific site recommendations for the maintenance of these important biotic and ecological resources are made based upon (1) the classification as to type of Natural Heritage Area [i.e., Biological Diversity Area (BDA) or Landscape Conservation Area (LCA)]; (2) the ecological characteristics of each site; (3) evidence of past or present disturbance within the site; and (4) the potential effects of the land-use activities that surround the site. Thus, these recommendations and site mapping recognize the interaction between the site's biotic resources and the natural ecosystems and/or land-use activities in proximity to the site. The general recommendations furnished below are meant to further clarify the differences between the various sites and to provide a general framework into which specific management recommendations can be made.

Natural Heritage Areas

Biological Diversity Areas

Biological Diversity Areas include those sites that are recognized as supporting populations of state, national or globally significant species or natural communities, high quality examples of natural communities or ecosystems, or exceptional native diversity. Occasionally these areas require some form of management in order to maintain suitable conditions for the species, group of species, or natural communities (e.g. removal of exotic plant species that are threatening the integrity of the natural community may be an acceptable practice, whereas, spraying for gypsy moth probably would not be considering the broad scale effects of the pesticide). Actions and projects impacting BDAs should take into consideration the ecological requirements of the species/community present in the area. When activities threaten to impact ecological features, the responsible agency should be contacted. If no jurisdictional agency exists or cannot be contacted, private groups such as conservancies, land trusts, and watershed associations should be sought for ecological consultation and specific protection recommendations.

Landscape Conservation Areas

Landscape Conservation Areas recognize large pieces of the landscape that are of higher ecological quality than other areas of similar size. Contiguous natural communities, minimal human disturbance and often the presence of Biological Diversity Areas within the LCA facilitate the functioning of ecological processes across an entire landscape. Management requirements for LCAs are less stringent than those for BDAs because they encompass a variety of land uses, some of which are not directly involved in the protection of specific species or communities. Within LCAs, disturbances should be considered on a broad scale in terms of fragmentation and general habitat integrity. Sustainable land-uses that are sensitive to the natural features within the LCA are essential for the long-term preservation of the natural qualities recognized by the LCA. Construction of new roads and utility corridors, non-conservation timber harvesting, clearing or disruption of large pieces of land, and other activities that divide and alter the character of the landscape decrease the integrity and value of LCAs. People and human-created features are part of LCAs but do not dominate the landscape. By limiting the amount of land in intensive use (agricultural zones, residential zones, etc.) and by compressing development into already disturbed areas (villages, roads, existing ROWs, etc.), large pieces of

the landscape can be maintained intact. Some LCAs are designed with aquatic resources in mind, and in those cases, a watershed boundary may be used to identify the LCA.

Other Recommendations

Exotic Invasive Species

An increasing threat to natural communities and habitats is the introduction and spread of exotic (i.e. non-native) invasive species across the landscape. These species can dominate habitats that support native species and disrupt the integrity of the ecosystems involved. Non-native plants such as Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*), and garlic mustard (*Alliaria petiolata*) have become commonplace in disturbed woodlands, often to the point of altering the composition of native plant communities. In wetlands and along streams, purple loosestrife (*Lythrum salicaria*), Japanese knotweed (*Polygonum cuspidatum*), and mile-a-minute weed (*Polygonum perfoliatum*) are aggressive, weedy species that follow in the wake of disturbance. The natural disturbances of flooding and scouring that occur along the county's rivers and creeks have helped to facilitate the invasion and colonization of many exotic species. There are few, if any, plant communities along major river corridors that do not have significant components of invasive species. The aquatic habitats of rivers, streams, and lakes are also vulnerable to invasion by exotics. For example, in Huntingdon County the Asian clam (*Corbicula fluminea*) has become established in the lower reaches of Aughwick Creek.

Control of these problematic, non-native species is necessary for the long-term maintenance of high quality natural systems. Discouraging the use of potentially weedy exotics can help to prevent further encroachment. Some nurseries now carry a selection of tree, shrub, and herbaceous species that are native to Pennsylvania, and these are recommended where plantings are desired. Prevention is the best avenue of defense against invasive species, and land managers should be vigilant inspectors of the landscape to spot new outbreaks of species harmful to natural communities. It is much more cost effective to halt an invasive species outbreak early in its colonization rather than to try to remove long-established infestations. The Vascular Flora of Pennsylvania (Rhodes and Klein, 1993) is a helpful reference for determining whether a plant species is native to the state or not. A number of other sources of information on exotic species are listed in Appendix VII.

GLOSSARY

Alluvium: detrital deposits made by streams on riverbeds, flood plains, and alluvial fans; Especially a deposit of silt or silty clay laid down during time of flood.

Ambystomid: a small to moderate-sized terrestrial or semiaquatic New World salamander. Ambistomid salamanders possess lungs, as compared to plethodontid salamanders, which do not.

Anthropogenic: human caused.

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

Biocide: a natural or synthetic substance toxic to living organisms. Some ecologists advocate the use of this term instead of 'pesticides', since most pesticides are also toxic to species other than the target pest species. Indirectly, pesticides may also affect non-target organisms detrimentally in many other ways (e.g. by loss of food species or loss of shelter) so that the effects of pesticides may also be felt throughout a whole ecosystem. The term 'biocide' indicates this property more clearly than 'pesticide'.

Biological Diversity Area (BDA): An area containing and important in the support of plants or animals of special concern at state or federal levels, exemplary natural communities, or exceptional native diversity.

Bituminous coal: coal that contains more than 14% volatile matter. It is dark brown to black and burns with a smoky flame. Bituminous coal is the most abundant type of coal.

Bog: a low-nutrient, highly acidic wetland where sphagnum peat accumulates to the point where plant roots have minimal contact with either surface water or groundwater.

Calcareous: containing calcium carbonate. When the term is used to describe a type of rock, it implies that as much as 50% of the rock is calcium carbonate. Limestone is the most important and widely distributed of the carbonate rocks.

Calciphilic: thriving in environments rich in calcium salts.

Colluvium: weathered rock debris that has moved down a hill slope chiefly by gravity; includes talus and cliff debris.

Ecology: the study of relations between organisms and their natural environment, living and nonliving.

Ecosystem: The biotic (living) community and its abiotic (nonliving) environment functioning as a system.

Endemic: a species or other taxonomic group that is restricted to a particular geographic region, owing to such factors as isolation or response to soil or climatic conditions.

Eutrophication: the process of nutrient enrichment (usually by nitrates and phosphates) in aquatic ecosystems, such that the productivity of the system ceases to be limited by the availability of nutrients. It occurs naturally over geologic time, but may be accelerated by human activities (e.g., sewage disposal or agricultural run-off).

Food-web: a conceptual diagram that represents the feeding relationships of organisms within an ecosystem. It consists of a series of interconnecting food-chains, and shows the transfer of energy from primary producers (green plants) through a series of organisms that eat and are eaten. Only some of the many possible relationships can be shown in such a diagram and it is usual to include only one or two carnivores at the highest trophic levels.

Geomorphic: pertaining to the form of the earth or of its surface features.

Instar: an insect larva that is between one moult (ecdysis) of its exoskeleton and another, or between the final ecdysis and its emergence in the adult form. Instars are numbered and there are usually several during larval development.

Landscape Conservation Area (LCA): A large contiguous area; important because of its size, contiguous forest, open space, habitats, and/or inclusion of one or more Biological Diversity Areas, and although including a variety of land uses, has not been heavily disturbed and thus retains much of its natural character.

Mast: a fruit, especially of beech, but also of oak, elm, and other forest trees.

Mesic: refers to an environment that is neither extremely wet (hydric) nor extremely dry (xeric).

Mineral soil: a soil composed predominantly of, and having its properties determined Predominantly by, mineral matter. Usually contains < 20 percent organic matter, but may contain an organic surface layer up to 30 centimeters thick.

Mycorrhiza: a close physical association between a fungus and the roots of a plant, from which both fungus and plant appear to benefit; a mycorrhizal root takes up nutrients more efficiently than does an uninfected root. A very wide range of plants can form mycorrhizas of one form or another and some plants appear incapable of normal development in the absence of their mycorrhizal fungi.

Old-field ecosystem: develops on abandoned farmland as the land gradually reverts to forest.

Physiographic Province: A region of which all parts are similar in geologic structure and Climate and which has consequently had a unified geomorphic history; a region whose relief features and landforms differ significantly from that of adjacent regions.

Riparian: pertaining to or situated on the bank of a body of water, especially of a river.

Toe slope: The lowest part of a slope or cliff; the downslope end of an alluvial fan.

Trophic level: A step in the transfer of energy within a food-web. There may be several trophic levels within a system, for example: producers (autotrophs), primary consumers (herbivores), and secondary consumers (carnivores); further carnivores may form fourth and fifth levels.

Vernal: occurring in the spring.

Xeric: a dry, as opposed to a wet (hydric) or intermediate (mesic) environment.

Xerophyte: a plant that can grow in very dry conditions and is able to withstand periods of drought.

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APPENDIX I

SIGNIFICANCE RANKS

The Natural Heritage Areas that have qualified for inclusion in this report are ranked according to their significance as areas of importance to the biological diversity and ecological integrity of Mercer County. The four significance ranks are: **Excellent**, **High**, **Notable**, and **County** significance. These ranks have been used to prioritize all identified sites and suggest the relative attention that sites should receive for protection.

Exceptional: Sites that are of exceptional importance for the biological diversity and ecological integrity of the county or region. Sites in this category contain one or more occurrences of state or national species of special concern or a rare natural community type that are of a good size and extent and are in a relatively undisturbed condition. Sites of exceptional significance merit quick, strong and complete protection.

High: Sites that are of high importance for the biological diversity and ecological integrity of the county or region. These sites contain species of special concern or natural communities that are highly ranked, and because of their size or extent, relatively undisturbed setting, or a combination of these factors, rate as areas with high potential for protecting ecological resources in the county. Sites of high significance merit strong protection in the future.

Notable: Sites that are important for the biological diversity and ecological integrity of the county or region. Sites in this category contain occurrences of species of special concern or natural communities that are either of lower rank (G and S rank) or smaller size and extent than exceptional or high ranked areas, or are compromised in quality by activity or disturbance. Sites of notable significance merit protection within the context of their quality and degree of disturbance.

County: Sites that have great potential for protecting biodiversity in the county but are not, as yet, known to contain species of special concern or state significant natural communities. Often recognized because of their size, undisturbed character, or proximity to areas of known significance, these sites invite further survey and investigation. In some cases, these sites could be revealed as high or exceptional sites.

APPENDIX II

PENNSYLVANIA NATURAL HERITAGE PROGRAM (PNHP)

The Pennsylvania Natural Heritage Program (PNHP) was established in 1982 as a joint effort of the Western Pennsylvania Conservancy, the Pennsylvania Department of Conservation and Natural Resources (formerly the Pennsylvania Department of Environmental Resources), the Bureau of Forestry, and the Pennsylvania Science Office of The Nature Conservancy. PNHP is part of a network of "Natural Heritage Programs" that utilize common methodology developed by The Nature Conservancy and refined through NatureServe – the organization that represents the network of Natural Heritage Programs – and the individual programs themselves. Natural Heritage Programs have been established in each of the 50 United States, as well as in Canada and Latin America.

PNHP collects and stores locational and baseline ecological information about rare plants, rare animals, unique plant communities, significant habitats, and geologic features in Pennsylvania. Presently, the PNHP database is Pennsylvania's chief storehouse of such information with approximately 9,000 detailed occurrence records that are stored as computer files. Additional data are stored in extensive manual files documenting over 150 natural community types, more than 800 plant and animal species, and about 1100 managed areas. As part of its function, PNHP provides reviews of projects that require permits as issued by the Pennsylvania Department of Environmental Protection (DEP). This environmental review function of the PNHP is referred to as PNDI or the Pennsylvania Natural Diversity Inventory.

As part of the information maintained by PNHP, a system of "global ranks" and "state ranks" is used to describe the relative degree of rarity for species and natural communities. This system is especially useful in understanding how imperiled a resource is throughout its range, as well as understanding the state rarity for resources that do not have official state status such as invertebrate animals and natural communities of organisms. A summary of global and state ranks can be found in Appendix V.

PNHP is valuable for its ability to supply technically sound data that can be applied in making natural resource decisions, thereby streamlining the decision making process. Information on the occurrences of elements (species and natural communities) of special concern gathered from museums, universities, colleges, and recent fieldwork by professionals throughout the state is used by Western Pennsylvania Conservancy to identify the areas of highest natural integrity and significance in Huntingdon County.

APPENDIX III

HUNTINGDON COUNTY NATURAL HERITAGE INVENTORY
SITE SURVEY FORM

Site Name: _____

County:_____Municipality: _____

Quad Name: _____Quad Code: _____10,10:_____

Land Owners (include best method of contact, date contacted, and method of permission):

Directions to Site:

Site Elevation:_____ Site Size:_____ Aspect: _____

Aerial Photo Int. Air Photo #:_____ Photo Type: _____
Comments from Aerial Photo Interpretation:

Aerial Reconnaissance Date:_____ Team: _____
Comments from Aerial Survey:

Ground Survey Date:_____ Team: _____
Community Type(s):

Setting of Community(s):

Conditions:

Description of site (quality, vegetation, significant species, aquatic features, notable landforms, natural hazards, age, etc.):

Evidence of Disturbance (logging, grazing, mining, past agriculture, erosion, sedimentation, filling, draining, exotic flora, etc.):

Recovery Potential:

Surrounding Land Use:

Threats to Site and Management/Protection:

Previously Identified EO's:

Species:

****

Accepted for inclusion in report: _____ Rejected: _____ Date:
Reason:

APPENDIX IV

CLASSIFICATION OF NATURAL COMMUNITIES IN PENNSYLVANIA

CNHIs and the status of natural community classification in Pennsylvania:

Terrestrial & Palustrine Plant Communities of Pennsylvania (Fike 1999) is the most current community classification system for Pennsylvania's palustrine and terrestrial plant communities. This report was developed by the Pennsylvania Natural Diversity Inventory (PNDI) to update and refine Smith's 1991 report Classification of natural communities in Pennsylvania (draft), the first effort dedicated specifically to the classification of natural communities in Pennsylvania. Work is ongoing to improve the current classification system. Future editions may define new community types or alter currently defined types. Aquatic communities (lakes, streams, and rivers), communities where vegetation is absent or not a definitive characteristic (caves, scree slopes), and communities resulting from extensive human disturbance (early stages of forest regrowth, old agricultural fields, manmade wetlands, etc.), are not addressed in this classification. Until more extensive classification work can be completed to define these types of communities and incorporate them into a single state-wide framework, the County Natural Heritage Inventory reports will provisionally refer to features of ecological interest that fall outside the Fike 1999 system using categories described in Smith 1991.

Community Ranks

As with species that are of concern, ranks have been assigned to rate the rarity of each natural community type identified for Pennsylvania. Appendices Vc and Vd list criteria for global and state ranks. In most cases, the global extent of these communities has yet to be fully evaluated, and no global rarity rank has been assigned. Work is ongoing to refine these ranks and to further develop the ranking system to rate the relative quality of communities within a type.

FIKE 1999 TYPES

COMMUNITY NAME	GLOBAL RANK	STATE RANK
TERRESTRIAL FORESTS:		
Hemlock (white pine) forest	G5	S4
Serpentine pitch pine – oak forest	G2	S1
Serpentine Virginia pine – oak forest	G2	S1
Pitch Pine – mixed oak forest	G?	S4
Virginia pine – mixed hardwood forest	G?	S5
Dry white pine (hemlock) – oak forest	G?	S4
Hemlock (white pine) – northern hardwood forest	G?	S5
Hemlock (white pine) – red oak – mixed hardwood forest	G?	S4

COMMUNITY NAME	GLOBAL RANK	STATE RANK
TERRESTRIAL FORESTS (con't.):		
Hemlock – tuliptree – birch forest	G?	S4
Rich hemlock – mesic hardwoods forest	G?	S2S3
Dry oak –heath forest	G?	S4S5
Dry oak – mixed hardwood forest	G?	S3
Red oak – mixed hardwood forest	G?	S5
Northern hardwood forest	G?	S4
Black cherry – northern hardwood forest	G?	S4
Tuliptree – beech – maple forest	G?	S4
Sugar maple – basswood forest	G?	S4
Mixed mesophytic forest	G?	S1S2
Sweet gum – oak coastal plain forest	G?	S1
Red maple (terrestrial) forest	G?	S5
Black-gum ridgetop forest	G?	S3
Aspen/gray (paper) birch forest	G?	S?
Black locust forest	G?	SW
PALUSTRINE FORESTS:		
Black Spruce- tamarack peatland forest	G?	S3
Red Spruce palustrine forest	G?	S3
Hemlock palustrine forest	G5	S3
Hemlock – mixed hardwood palustrine forest	G?	S3S4
Red spruce – mixed hardwood palustrine forest	G?	S3
Bottomland oak – hardwood palustrine forest	G5	S2
Red maple – black-gum palustrine forest	G5	S3S4
Red maple – black ash palustrine forest	G?	S2S3
Red maple – magnolia Coastal Plain palustrine forest	G?	S1
Great Lakes Region lakeplain palustrine forest	G?	S1
Sycamore – (river birch)- box elder floodplain forest	G?	S3
Silver maple floodplain forest	G?	S3
Red maple – elm – willow floodplain swamp	G?	S2
TERRESTRIAL WOODLANDS:		
Pitch pine – heath woodland	G4	S2
Pitch pine – scrub oak woodland	G4	S2
Red spruce rocky summit	G?	S1
Pitch pine – rhodora – scrub oak woodland	G?	S1
Pitch pine – mixed hardwood woodland	G4	S2S3

COMMUNITY NAME	GLOBAL RANK	STATE RANK
TERRESTRIAL WOODLANDS (con't):		
Virginia pine – mixed hardwood shale woodland	G?	S2
Red-cedar – mixed hardwood rich shale woodland	G?	S1S2
Dry oak – heath woodland	G4	S3
Birch (black-gum) rocky slope woodland	G?	S2
Yellow oak – redbud woodland	G?	S2
Great Lakes Region scarp woodland	G?	S1S2
Great Lakes Region bayberry – cottonwood community	G?	S1
PALUSTRINE WOODLANDS:		
Pitch pine – leatherleaf woodland	G?	S2
Black spruce – tamarack palustrine woodland	G?	S2
Red spruce palustrine woodland	G?	S2S3
Red maple – highbush blueberry palustrine woodland	G5	S4
Red maple – sedge palustrine woodland	G5	S4
Red maple – mixed shrub palustrine woodland	G?	S4
TERRESTRIAL SHRUBLANDS:		
Red-cedar – prickly pear shale shrubland	G?	S2
Red-cedar – pine serpentine shrubland	G2	S1
Red-cedar – redbud shrubland	G?	S2
Low heath shrubland	G4	S1
Low heath – mountain ash shrubland	G?	S2
Scrub oak shrubland	G4	S3
Rhodora – mixed heath – scrub oak shrubland	G?	S1
PALUSTRINE SHRUBLANDS:		
Buttonbush wetland	G?	S4
Alder – ninebark wetland	G?	S3
Alder – sphagnum wetland	G5	S4
Highbush blueberry – meadow-sweet wetland	G5	S5
Highbush blueberry – sphagnum wetland	G?	S5
Leatherleaf – sedge wetland	G?	S3
Leatherleaf – bog rosemary	G?	S2
Leatherleaf – cranberry peatland	G?	S2S3
Water-willow (*Decodon verticillatus*) shrub wetland	G?	S3
River birch – sycamore floodplain scrub	G?	S4
Poison sumac – red-cedar – bayberry fen	G2	S1
Buckthorn – sedge (*Carex interior*) – golden ragwort fen	G2G3	S1
Great Lakes Region scarp seep	G?	S1
Great Lakes Region bayberry – mixed shrub palustrine shrubland	G?	S1

COMMUNITY NAME	GLOBAL RANK	STATE RANK
TERRESTRIAL HERBACEOUS OPENINGS:		
Side-oats gramma calcareous grassland	G2	S1
Calcareous opening/cliff	G?	S2
Serpentine grassland	G?	S1
Serpentine gravel forb community	G?	S1
Great Lakes Region dry sandplain	G?	S1
HERBACEOUS WETLANDS:		
Bluejoint – reed canary grass marsh	G?	S5
Cat-tail marsh	G?	S5
Tussock sedge marsh	G?	S3
Mixed forb marsh	G3G4	S3
Herbaceous vernal pond	G?	S3S4
Wet meadow	G?	S5
Bulrush marsh	G?	S3
Great Lakes Region palustrine sandplain	G?	S1
Prairie sedge – spotted joe – pye – weed marsh	G?	S1S2
Open sedge (*Carex stricta*, *C. prairea*, *C. lacustris*) fen	G?	S1
Golden Saxifrage – sedge rich seep	G?	S2
Skunk cabbage – golden saxifrage forest seep	G?	S4S5
Serpentine seepage wetland	G?	S1
Golden saxifrage – Pennsylvania bitter-cress spring run	G?	S3S4
Sphagnum – beaked rush peatland	G?	S3
Many fruited sedge – bladderwort peatland	G?	S2
Water-willow (*Justicia americana*) – smartweed riverbed community	G?	S4
Riverside ice scour community	G?	S1S2
Big bluestem – Indian grass river grassland	G?	S3
Pickerel-weed – arrow-arum – arrowhead wetland	G3G4	S4
Spatterdock – water lily wetland	G?	S4
COMMUNITY COMPLEXES:	Complexes not ranked	
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		

SMITH 1991 TYPES

COMMUNITY NAME	GLOBAL RANK	STATE RANK
SUBTERRANEAN COMMUNITIES:		
Solution Cave Terrestrial Community	G?	S3
Solution Cave Aquatic Community	G?	S3
Tectonic Cave Community	G?	S3S4
Talus Cave Community	G?	S2S4
DISTURBED COMMUNITIES:		
Bare Soil	G?	S?
Meadow/Pastureland	G?	S?
Cultivated Land	G?	S?
Successional Field	G?	S?
Young Miscellaneous Forest	G?	S?
Conifer Plantation	G?	S?
ESTUARINE COMMUNITIES:		
Deepwater Subtidal Community	G?	S1
Shallow-Water Subtidal Community	G?	S1
Freshwater Intertidal Mudflat	G3G4	S1
Freshwater Intertidal Marsh	G3G4	S1
RIVERINE COMMUNITIES:		
Low-Gradient Ephemeral/Intermittent Creek	G?	S5
Low-Gradient Clearwater Creek	G?	S3S4
Low-Gradient Clearwater River	G?	S2S3
Low-Gradient Brownwater Creek	G?	S2S3
Medium-Gradient Ephemeral/Intermittent Creek	G?	S5
Medium-Gradient Clearwater Creek	G?	S3
Medium-Gradient Clearwater River	G?	S?
Medium-Gradient Brownwater Creek	G?	S3
High-Gradient Ephemeral /Intermittent Creek	G?	S5
High-Gradient Clearwater Creek	G?	S3
High-Gradient Clearwater River	G?	S?
High-Gradient Brownwater Creek	G?	S?
Waterfall and Plungepool	G?	S3S4
Spring Community	G?	S1S2
Spring Run Community	G?	S1S2

COMMUNITY NAME	GLOBAL RANK	STATE RANK
LACUSTRINE COMMUNITIES:		
Glacial Lake	G?	S1
Nonglacial Lake	G?	S2
Artificial Lake	---	---
Natural Pond	G?	S2S3
Artificial Pond	---	---
Stable Natural Pool	G?	S?
Ephemeral/Fluctuating Natural Pool	G?	S1
Artificial Pool	---	---
Ephemeral/Fluctuating Limestone Sinkhole	G?	S1

APPENDIX V

FEDERAL AND STATE ENDANGERED SPECIES CATEGORIES, GLOBAL AND STATE ELEMENT RANKS

Several federal and state legislative acts have provided the authority and means for the designation of endangered, threatened, rare, etc. species lists. Those acts and status summaries follow. However, not all of the species or natural communities considered by conservation biologists (e.g., Pennsylvania Biological Survey) as "special concern resources" are included on the state or federal lists. In this county inventory report, "N" denotes those special concern species that are not officially recognized by state or federal agencies. Therefore: N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Heritage Program for more information.

APPENDIX V_a

FEDERAL STATUS

All Plants and Animals: Legislative Authority: U.S. Endangered Species Act (1973), U.S. Fish and Wildlife Service, February 21, 1990, Federal Register.

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

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

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

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

{N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Diversity Inventory for more information.}

APPENDIX V_b

PENNSYLVANIA STATUS

Native Plant Species: Legislative Authority: Title 25 Chapter 82, Conservation of Native Wild Plants, January 1, 1988; 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 are classified as Pennsylvania Extirpated, but which subsequently are found to exist in this Commonwealth.

PT = Pennsylvania Threatened - Plant species which may become endangered throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained to prevent their future decline, or if the species is greatly exploited by man.

PR = Pennsylvania Rare - Plant species which are uncommon within this Commonwealth because they may be found in restricted geographic areas or in low numbers throughout this Commonwealth.

PX = Pennsylvania Extirpated - Plant species believed by the Department to be extinct within this Commonwealth. These plants may or may not be in existence outside the Commonwealth.

PV = Pennsylvania Vulnerable - Plant species which are in danger of population decline within this Commonwealth because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.

TU = Tentatively Undetermined - A classification of plant species which are believed to be in danger of population decline, but which cannot presently be included within another classification due to taxonomic uncertainties, limited evidence within historical records, or insufficient data.

{N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Heritage Program for more information.}

Animals - The following state statuses are used by the Pennsylvania Game Commission (Legislative Authority: Title 34, Chapter 133 pertaining to wild birds and mammals, Game and Wildlife Code, revised Dec. 1, 1990) and by the Pennsylvania Fish and Boat Commission (Legislative Authority: Title 30 Chapter 75 pertaining to fish, amphibians, reptiles and aquatic organisms, Fish and Boat Code, revised February 9, 1991):

PE = Pennsylvania Endangered

Birds & mammals - 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 is 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 are 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, amphibians, reptiles & aquatic organisms - All species declared by: 1) the Secretary of the United States Department of the Interior to be threatened with extinction and appear on the Endangered Species List or the Native Endangered Species List published in the Federal Register; or 2) are declared by the Pennsylvania Fish and Boat Commission, Executive Director to be threatened with extinction and appear on the Pennsylvania Endangered Species List published by the Pennsylvania Bulletin.

PT = Pennsylvania Threatened

Birds & mammals - Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the organism are abated. These are: 1) species whose population within the Commonwealth are decreasing or are heavily depleted by adverse factors and while not actually endangered, are still in critical condition; 2) species whose populations may be relatively abundant in the Commonwealth but are under severe threat from serious adverse factors that are 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, amphibians, reptiles & aquatic organisms - All species declared by: 1) the Secretary of the United States Department of the Interior to be in such small numbers throughout their range that they may become endangered if their environment worsens, and appear on a Threatened Species List published in the Federal Register; or 2) are declared by the Pennsylvania Fish and Boat Commission Executive Director to be in such

small numbers throughout their range that they may become endangered if their environment worsens and appear on the Pennsylvania Threatened Species List published in the Pennsylvania Bulletin.

{N = No current legal status, but is considered to be of special concern in Pennsylvania, or is under review for such consideration, by conservation biologists. Contact the Pennsylvania Natural Heritage Program for more information.}

Internal Fish and Boat Commission Status Category:

PC = Pennsylvania Candidate - Species that exhibit the potential to become Endangered or Threatened in the future. Pennsylvania populations of these taxa are: 1) "rare" due to their decline, distribution, restricted habitat, etc.; 2) are "at risk" due to aspects of their biology, certain types of human exploitation, or environmental modification; or, 3) are considered "undetermined" because adequate data is not available to assign an accurate status.

This category is unofficial and has no basis in any law (i. e., Chapter 75, Fish and Boat Code), as do the Endangered and Threatened categories.

Invertebrates - Pennsylvania Status: No state agency is assigned to develop regulations to protect terrestrial invertebrates, although a federal status may exist for some species. Aquatic invertebrates are regulated by the Pennsylvania Fish And Boat Commission, but have not been listed to date.

Although no invertebrate species are presently state listed, conservation biologists unofficially assign numerous state status and/or state rank designations. NOTE: Invertebrate species are regularly considered under the U.S. Endangered Species Act for federal status assignments.

APPENDIX V_c

GLOBAL AND STATE RANKING

Global and State Ranking is a system utilized by the network of 50 state natural heritage programs in the United States. Although similar to the federal and state status designations, the ranking scheme allows the use of one comparative system to "rank" all species in a relative format. Unlike state or federal status designation guidelines, the heritage ranking procedures are also applied to natural community resources. Global ranks consider the imperilment of a species or community throughout its range, while state ranks provide the same assessment within each state. Although there is only one global rank used by the heritage network, state ranks are developed by each state and allow a "one-system" comparison of a species or communities imperilment state by state. For more information, contact the Pennsylvania Natural Heritage Program.

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.

G? = Not ranked to date.

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 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 (occurring only once or a few times) or casual (occurring more regularly But not every year) 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 or catalpa in eastern states).

SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, and suspected to be still extant.

SN = Regularly occurring, usually migratory and typically nonbreeding 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.

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

SX = Apparently extirpated from the state.

SZ= Not of significant conservation concern in the state, invariably because there are no (zero) definable element occurrences in the state, although the taxon is native and appears regularly in the state.

S? = Not ranked to date.

NOTE: The study of naturally occurring biological communities is complex and natural community classification is unresolved both regionally and within Pennsylvania. The Global and State Ranking of natural communities also remains difficult and incomplete. Although many natural community types are clearly identifiable and are ranked, others are still under review and appear as G? and/or S?

APPENDIX VI

PLANTS AND ANIMALS OF SPECIAL CONCERN IN HUNTINGDON COUNTY

Documented by the Pennsylvania Natural Diversity Inventory since 1960

Scientific Name	Common Name
Animals	
Accipiter gentilis	northern goshawk
Alasmidonta varicosa	brook floater mussel
Anax longipes	long-legged green darner
Calopteryx angustipennis	Appalachian jewelwing
Caripeta aretaria	southern pine looper moth
Erynnis lucilius	columbine duskywing butterfly
Gomphus rogersi	Roger's clubtail dragonfly
Haliaeetus leucocephalus	bald eagle
Heterodon platirhinos	eastern hognose snake
Hydraecia stramentosa	a moth
Lampsilis cariosa	brook floater mussel
Lanthus parvulus	northern pygmy clubtail
Lasmigona subviridis	green floater mussel
Myotis leibii	eastern small-footed myotis
Myotis septentrionalis	northern myotis
Neotoma magister	Allegheny woodrat
Properigea sp.	a noctuid moth
Pyrgus wyandot	southern grizzled skipper
Richia grotei	a noctuid moth
Semiothisa promiscuata	promiscuous angle
Somatochlora elongata	sky-tailed emerald dragonfly
Speyeria idalia	regal fritallary butterfly
Tachopteryx thoreyi	Thorey's grayback dragonfly
Villosa iris	rainbow mussel
Zale metata	a zale moth
Plants	
Aplectrum hyemale	puttyroot
Arabis patens	spreading rockcress
Bromus kalmii	brome grass
Carex eburnea	ebony sedge
Carex lupuliformis	false hop sedge
Carex typhina	cattail sedge
Delphinium exaltum	tall larkspur
Galium trifidum	marsh bedstraw
Goodyera tesselata	checkered rattlesnake-plantain

Scientific Name	Common Name
	Plants (con't.)
Hypericum gymnanthum	clasping-leaved St. John's wort
Juncus debilis	weak rush
Juncus torreyi	Torrey's rush
Liatris scariosa	round-headed gayfeather
Linnaea borealis	twinflower
Listera smallii	kidney-leaved twayblade
Lithospermum canescens	hoary puccoon
Lycopodiella margueritae	northern appressed clubmoss
Melica nitens	three-flowered melic-grass
Oenothera argillicola	shale-barren evening-primrose
Onosmodium molle var *hispidissimum*	false gromwell
Ophioglossum vulgatum	adder's tongue fern
Opuntia humifusa	prickly-pear cactus
Phlox ovata	mountain phlox
Platanthera ciliaris	yellow-fringed orchid
Platanthera hookeri	Hooker's orchid
Potamogeton gramineus	grassy pondweed
Potamogeton illinoensis	Illinois pondweed
Rudbeckia fulgida	eastern coneflower
Schoenoplectus torreyi	Torrey's bulrush
Scirpus ancistrochaetus	northeasten bulrush
Sida hermaphrodita	Virginia mallow
Solidago speciosa var *speciosa*	showy goldenrod
Symphyotrichum ericoides	white heath aster
Thalictrum coriaceum	thick-leaved meadow-rue
Trifolium virginicum	Kate's mountain clover
Zigadenus glaucus	white camus
Zizania aquatica	Indian wild rice

APPENDIX VII

INVASIVE SPECIES INFORMATION SOURCES

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

Several excellent web sites exist to provide information about invasive exotic species. The following sources provide individual species profiles for the most troublesome invaders, with information such as the species' country of origin, ecological impact, geographic distribution, as well as an evaluation of possible control techniques.

The Nature Conservancy's Weeds on the Web at
http://tncweeds.ucdavis.edu/

The Virginia Natural Heritage Program's invasive plant page at
http://www.dcr.state.va.us/dnh/invinfo.htm

The Missouri Department of Conservation's Missouri Vegetation Management Manual at
http://www.conservation.state.mo.us/nathis/exotic/vegman/

The following site is a national invasive species information clearinghouse listing numerous other resources on a variety of related topics
http://www.invasivespecies.gov/

APPENDIX VIII

SUSTAINABLE FORESTRY INFORMATION SOURCES

The ***Pennsylvania Forest Stewardship Program*** is a voluntary program that assists forest landowners in better managing their forestlands by providing information, education, and technical assistance. Participation in the program is open to private landowners who own between 5 and 1,000 acres of forestland. For more information, go to http://www.cas.psu.edu/docs/CASDEPT/FOREST/Stewardship/1page.html or contact:

Jim Finley, Assistant Director for Extension
The Pennsylvania State University
School of Forest Resources
7 Ferguson Building
University Park, PA 16802
(814) 863-0401
E-mail: fj4@psu.edu

The ***Forest Land Enhancement Program*** complements the Forest Stewardship Program by providing landowners with cost-share dollars to implement their management plans and follow-up technical assistance to encourage the achievement of their long-term forest management goals. For more information, contact:

Jim Stiehler, Forest Stewardship Coordinator
DCNR - Bureau of Forestry
6th Floor, Rachel Carson State Office Building
P.O. Box 8552
Harrisburg, PA 17105-8552
(717) 787-4777

The ***Forest Legacy Program*** acts to purchase conservation easements or title from willing private landowners. In this program, federal funding is administered through the state Bureau of Forestry to foster protection and continued use of forested lands that are threatened with conversion to non-forest uses. Emphasis is given to lands of regional or national significance. For more information, go to http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml or contact:

Gene Odato, Chief, Rural & Community Forestry Station
DCNR – Bureau of Forestry
6th Floor, Rachel Carson State Office Building
P.O. Box 8552
Harrisburg, PA 17105-8552
(717) 787-6460
E-mail: godato@state.pa.us

The ***Sustainable Forestry Initiative*** (SFI) program is a voluntary, industry-driven effort developed to ensure that future generations will have the same abundant, healthy, and productive resources we enjoy today. Created in 1995 by the American Forest and Paper Association (the national trade organization representing the United States forest products industry), SFI is a program of comprehensive forestry and conservation practices. Through the SFI of PA program, landowners receive the information they need to enhance their ability to make good forest management decisions, and loggers learn safer, more productive skills and proper environmental practices. For more information, go to http://www.sfiofpa.org/ or contact:

SFI® of PA
315 S. Allen Street, Suite 418
State College, PA 16801
(814) 867-9299 or (888) 734-9366
E-mail: sfi@penn.com

Forest Landowner Associations provide information and educational programs to help members better manage their forest resources. Currently, there are no such organizations within Huntingdon County, but several adjoining counties do have forest landowner associations. For more information, contact:

Woodland Owners of Centre County
Box 403
Huntingdon, PA 16652

Mifflin County Forest Landowners' Association
152 East Market Street, Suite 100
Lewistown, PA 17044

Woodland Owners of the Southern Alleghenies
c/o Christine T. Gruitt, Secretary
1482 Town Creek Road
Clearville, PA 15535
E-mail: dgruitt@mindspring.com
(Bedford and Fulton Counties)

The ***Forest Stewardship Volunteer Initiative Project*** has an excellent web site providing general information and links to publications on sustainable forestry.
http://vip.cas.psu.edu/index.html