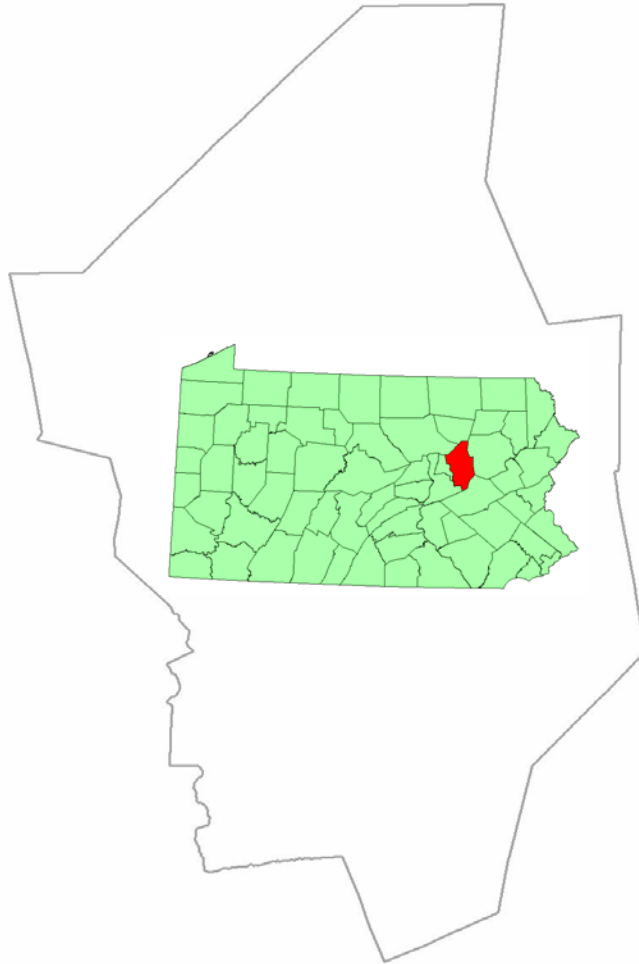


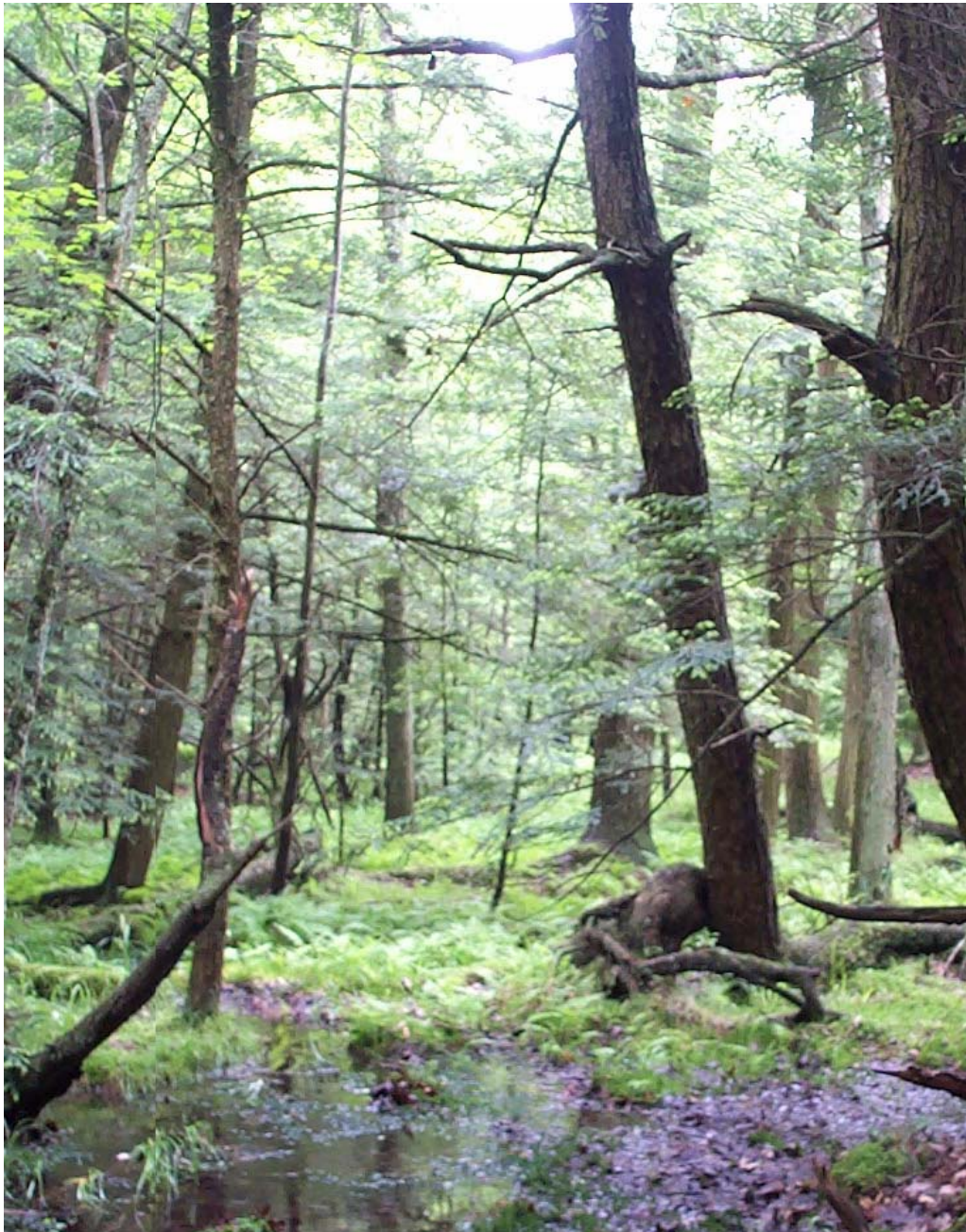
Columbia County Natural Areas Inventory 2004



Submitted to:
The Columbia County Planning Commission
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Bloomsburg, PA 17815

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



The South Branch Roaring Creek watershed spans the length of southern Columbia County. The hemlock palustrine forest in the headwaters of this creek represents one of Columbia County's best natural areas.

Photo: PA Science Office of The Nature Conservancy

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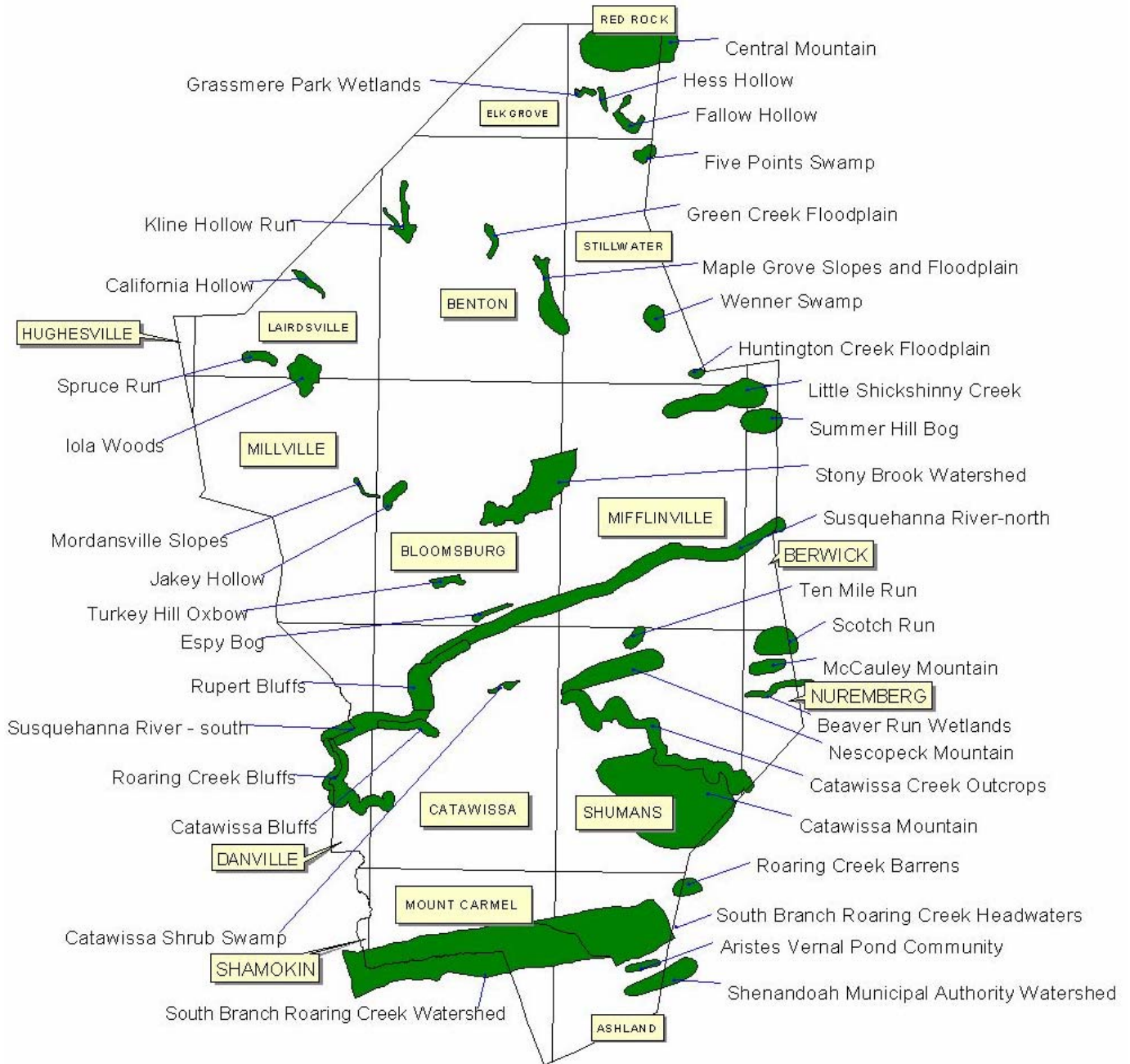
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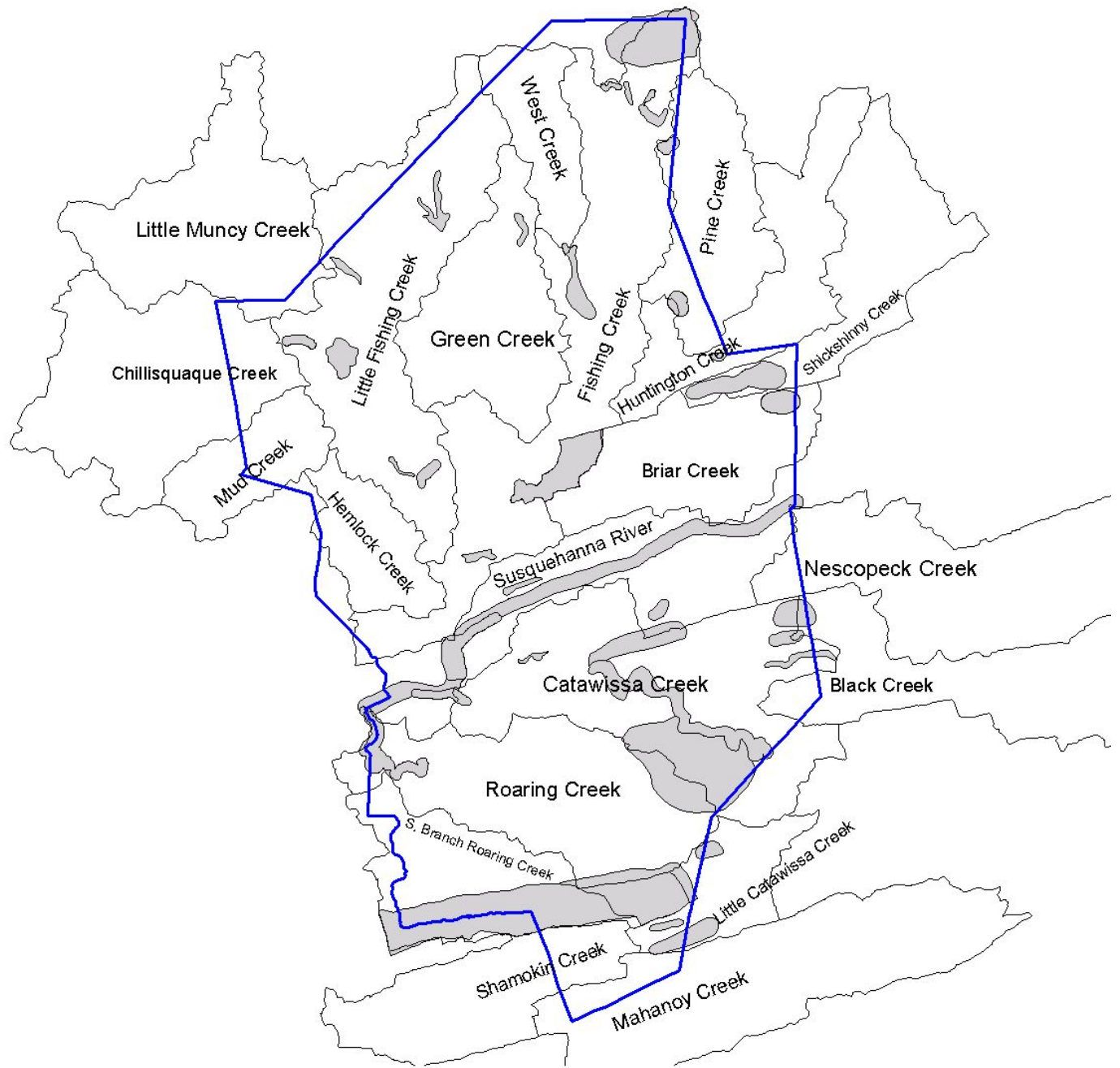


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Major Watersheds of Columbia County



PREFACE

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

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

The implementation of these recommendations is left to the discretion of the landowners. However, the cooperative protection of these rare and endangered plant and animal species, and high quality natural areas is greatly encouraged through site-specific management plans. Landowners who design site-specific management plans for areas described in this document are encouraged to contact the Pennsylvania Science Office of the Nature Conservancy for further information.

Although every attempt was made through advertising, public meetings, research, and informal communications to locate the sites most important to the conservation of biodiversity within the county, it is likely that many areas may have been overlooked. Anyone with information on sites that may have been overlooked should contact the Columbia County Planning Commission (see address on following page). This Natural Areas Inventory will be updated within five years, and additional sites may be included at that time.

ACKNOWLEDGEMENTS

This project was funded in part by state grants from the Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Recreation and Conservation, Wild Resources Conservation Program and Community Conservation Partnerships Program. Additional funding came from a State Wildlife Grant administered by the Pennsylvania Game Commission. We wish to thank the Columbia County Commissioners for their support of this project. Thanks to everyone who provided financial and administrative support for the inventory. Without your help, this study would not have been possible.

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

The report benefited from the help of local naturalists and conservationists who gave generously of their time. We especially wish to thank Douglas Gross for ornithological surveys and for providing many of the site descriptions. Robert Angst and Robert Huntington and everyone else in the Columbia County Planning Commission for provided help with site suggestions, contact information and GIS tax map information. Dr. Carol Loeffler was our pilot for low altitude aerial reconnaissance. We appreciate the assistance of Bob and Tonya Sagar for site suggestions and contact information. Many other private citizens contacted our office with information on natural areas.

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

Copies of this document may be obtained from:

The Columbia County Planning Commission
702 Sawmill Road, Suite 104
Bloomsburg, PA 17815

INTRODUCTION

Columbia County was formed on March 22, 1813 after separating itself from nearby Northumberland County (Bloomsburg Area Chamber of Commerce, 2003). Iron ore was discovered in the county and the first Iron Ore furnace opened in Mainville in 1815 (Columbia County Historical and Genealogical Society 2003). Southern Columbia County's landscape has also been altered by the extraction of coal. The history of mining in the county leads to some environmental problems today. Acid mine drainage (AMD) causes damage to streams and wetlands in this part of the county. Catawissa Creek, for example, is highly acidic and though beautifully clear, supports no aquatic life. According to the Catawissa Creek Restoration Association (www.columbiapa.org/ccra/Home.htm), the Audenried Tunnel, Catawissa Tunnel, & Green Mt. Tunnel are old mine sites that are major contributors to pollution in the watershed. This is a good example of how AMD can affect the natural life in a stream. Some areas are beginning to recover from the damage of mining practices, with some efforts to restore watersheds throughout the state.

Agriculture is also an important industry in the county, with 22% of the total acreage or 77,760 acres in farmland in 1997 (Penn State Timber Market Report 1997). However, that has decreased significantly from 170,068 acres in farmland in 1959 (Soil Survey of Columbia County 1967). Timber is another important industry in the county. In 1997, 53% of Columbia County or 164,861 acres was forested. Of that acreage, 85% of the land is privately owned (Penn State Timber Market Report 1997).

Despite the heavy influence of agriculture and mining on natural areas, several large tracts of relatively undisturbed land still remain. The northern portion of the county is cloaked in extensive northern hardwood forests where the Allegheny Front rises in elevation at Central Mountain. Huntington, Catawissa and Nescopeck Mountains are also prime examples of relatively intact undisturbed oak-mixed hardwood forests in the county. The South Branch Roaring Creek watershed includes an entire valley and the adjacent Big and Little Mountains that have until recently been strictly protected as a municipal water supply watershed. This rich bottomland and adjacent slopes span the width of southern Columbia County, and represent the best natural habitat in the county.

The natural areas of Columbia County are used for boating, hunting, fishing, hiking, biking, birdwatching, and other activities that make the region an attractive place to live. The same pieces of the landscape that provide scenic and recreational opportunities also function as habitat for a great diversity of plants and animals, [including rare, threatened and endangered species](#). This Natural Areas Inventory documented many examples of intact natural communities and sites for species rarely found in the state.

Columbia County's population has risen slightly from 61,967 in 1980, 63,202 in 1990, to 64,151 in 2000 (United States Census Bureau). Though the population is rising slowly, with this increase comes increased development pressure on some of the sensitive natural areas of the county. With this rise in population, many farms are in danger of being sold to developers for housing. Farms represent many generations of cultural heritage and some farms contain a natural component or are adjacent to a natural area. The natural areas that comprise the natural heritage of Columbia County can be easily lost without careful planning of growth and development; ironically the scenic

and remote nature of these areas may make them prime targets for residential developments. Protecting the integrity of these natural systems provides benefits to humans as well as providing for the survival of all flora and fauna, rare and otherwise. Planning for long-term sustainability can maintain open space, including natural environments and the plants and animals associated with them. Using a Natural Areas Inventory as a conservation tool can steer development away from environmentally sensitive areas, creating a needed balance between growth and the conservation of scenic and natural resources.

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

The Natural Areas Inventory (NAI) report presents the known outstanding natural features – floral, faunal and geologic in Columbia County. The Inventory provides maps of the best natural communities (habitats) and the locations of animal and plant species of special concern (endangered, threatened, or rare) in Columbia County. Due to budget and time constraints, many sites in the county may have been missed. The maps do not pinpoint the site of the species of concern but rather represent a zone of potential impacts within the site’s watershed. A written description and a summary table of the sites, including quality, degree of rarity, and last-observed date, accompany each map. Potential threats and some suggestions for protection of the rare plants or animals at the site are included in the individual site descriptions.

Particular species names, common and scientific, are provided in coordination with the appropriate jurisdictional agency. Plants and terrestrial invertebrate animals are under the jurisdiction of the PA Department of Conservation and Natural Resources (DCNR). Mammals and bird are under the jurisdiction of the PA Game Commission (PGC). Aquatic animals are under the jurisdiction of the PA Fish and Boat Commission (PFBC), and are subject to unauthorized collection. They are therefore not identified in the text of this report in order to provide some measure of protection for the species.

Selected geologic features of statewide significance are also noted. In addition, the inventory describes locations of areas that are significant on a county-wide scale, but cannot be deemed exemplary natural communities because of past disturbances. These "locally significant" sites represent good examples of habitats that are relatively rare in the county, support an uncommon diversity of plant species, and/or provide valuable wildlife habitat on a local level.

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

The Natural Areas Inventory will be provided to each municipality through the Columbia County Planning Commission. The Inventory is a conservation tool that will aid in the creation of municipal, county and comprehensive plans, and the emphasis on biological diversity should inform county and regional open space plans already underway. Columbia County, its municipalities, land trusts, and other organizations can also use the Natural Areas Inventory to identify potential protection projects that may be eligible for funding through state or community grant programs such as Growing Greener. Landowners will also find this inventory useful in managing and planning for the use of their land; it gives them the opportunity to explore alternatives that will provide for their needs and still protect the species and habitats that occur on their land. For example, the Forest Stewardship program, coordinated by PA Department of Conservation and Natural Resources, Bureau of Forestry, assists landowners in creating management plans. This plan is developed based on landowner objectives (e.g., wildlife or timber management). Recommendations for best management practices for timber harvesting as well as management plans for private forested property can be obtained from a number of sources including the Service Forester for your area through the PA Bureau of Forestry. On line publications of forest management practices in wetland and streamside settings can be viewed at: http://www.na.fs.fed.us/spfo/pubs/n_resource/wetlands/
<http://pubs.cas.psu.edu/FreePubs/pdfs/uh093.pdf>

Agricultural landowners may wish to enroll in the Conservation reserve Program (CRP) and Conservation Reserve Enhancement Programs (CREP) to receive financial assistance for conservation projects. CREP is a voluntary program for agricultural landowners. Unique state and federal partnerships allow agricultural landowners to receive incentive payments for installing specific conservation practices. Through the CREP, farmers can receive annual rental payments and cost-share assistance to establish long-term, resource-conserving covers on eligible land. (For more information on this program contact your local County Conservation District, or go to the USDA web page at: <http://www.fsa.usda.gov/dafp/cepd/default.htm>

Land managers may wish to consult this report and the Pennsylvania Natural Heritage Program (PNHP) in an effort to avoid potential conflicts in areas with species of special concern and/or identify ways of enhancing or protecting this resource. Users of this document are encouraged to contact the Pennsylvania Science Office (717) 948-3962) of The Nature Conservancy for additional information.

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

NATURAL HISTORY OVERVIEW OF THE COUNTY

The climate, topography, geology, and soils have been particularly important in development of ecosystems (forests, fields, wetlands) and physical features (streams, rivers, mountains) that occur in Columbia County. Many disturbances, both natural and human, have been influential in forming and altering many of Columbia Counties' ecosystems, causing extirpation of some species and the introduction of others. These combined factors provide the framework for locating and identifying exemplary natural communities and species of special concern in the county. The following sections provide a brief overview of the physiography, geology, soils, surface water, and vegetation of Columbia County.

● **Physiography and Geology**

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

Most of Columbia County lies within the Ridge and Valley Physiographic province (Pennsylvania Atlas 1982). This region forms a belt of long, wooded ridges and valleys dominated by agriculture. The valley in which Columbia County lies is predominately shale, with thin and scattered limestone spread throughout. Sandstone underlies many of the ridges and a coal basin lies in the southern part of the county. The very northern part of Columbia County lies within the High Plateaus section of the Allegheny Plateaus. This region is the largest landform in the Appalachian Mountains and consists of rolling uplands and deep, steep stream valleys (PA Atlas 1982). Beneath the rugged plateau, different rock types are laid down upon each other. The High Plateaus section contains some of the highest elevations in PA. Most of Columbia County has been affected by glaciation, further shaping the landscape and adding to the geologic characteristics of the county.

● **Soils**

A soil association is a group of soils with a distinctive, proportional pattern of occurrence in the landscape (USDA 1967). The soils of Columbia County have been described in *The Soil Survey of Columbia County* (USDA, 1967). There are twelve mapped soil associations for Columbia County. They include: 1) The Lordstown-Oquaga Association, 2) The Wellsboro-Morris-Oquaga Association, 3) The Oquaga-Wellsboro-Morris Association, 4) The Chenango-Barbour-Pekin Association, 5) The Wooster-Ravenna-Lordstown Association, 6) The Weikert-Hartleton Association, 7) The Berks-Watson Association, 8) The Westmoreland-Litz Association, 9) The Klinesville-Leck-Kill Association, 10) The Dekalb-Edgemont Association, 11) The Laidig-

Buchanan Association, and 12) The Strip Mines-Made Land Association. Table 1 describes more detailed information on the twelve types of soil associations in Columbia County (USDA, 1967). More detailed information for each of the associations can be obtained by consulting the *Soil Survey*.

TABLE 1- SOIL TYPES OF COLUMBIA COUNTY

Soil Association	Description	Land Use
Lordstown-Oquaga	Steep, gray and red stony soils of the ridges and valley walls in the extreme northern part of the county.	Primarily woodland used for wildlife habitat and recreational activities.
Wellsboro-Morris-Oquaga	Gently sloping and nearly level soils in reddish till in the northern and central parts of the county.	Primarily woodlands and grasslands with some agriculture potential.
Oquaga-Wellsboro-Morris	Nearly level to steep soils in reddish till on low ridges and the sides of valley in the northern part of the county.	Primarily used as woodland with some potential for agriculture.
Chenango-Barbour-Pekin	Nearly level and level soils on terraces and floodplains.	Primarily used for agriculture.
Wooster-Ravenna-Lordstown	Rolling grayish soils in glacial till in the northern part of the county.	Primarily used for agriculture and woodlands.
Weikert-Hartleton	Grayish soils in gently rolling to hilly areas underlain by shale, mostly in the central part of the county.	Primarily used for farming, forestry and development.
Berks-Watson	Brownish soils on undulating and rolling hills in the northwest part of the county.	Primarily used for farming, forestry and development.
Westmoreland-Litz	Gently sloping, silty, loamy soils over calcareous rocks in valleys in the central part of county.	Primarily used for development and agriculture.

Klinesville-Leck-Kill	Red soils on rolling shale hills in the central and southern parts of the county.	Primarily used for farming. Some development potential.
Dekalb-Edgemont	Steep to gently sloping, yellowish stony soils on the mountains and ridges in the central and southern parts of the county.	Primarily used for timber and recreation.
Laidig-Buchanan	Moderately sloping, deep soils on colluvium at the foot of the mountains and in the southern part of the county.	Primarily used for farmland and woodlands.
Strip Mines-Made Land	Gently sloping to steep areas where the soil has been disturbed by surface mining or other activity.	Primarily used for wildlife habitat and recreation after reclamation.

• Vegetation

Upland Forest Communities

The American Chestnut (*Castanea dentata*) once dominated many of the Eastern North American Hardwood Forests from Maine to Michigan to Alabama (Treadwell, 1996). However, around 1904, a Chestnut Blight (*Cryphonectria parasitica*) was introduced to North America from Asia. The blight spread from the Bronx Zoo northward and southward, and by 1960, there were basically no mature chestnuts left standing (Treadwell, 1996). Today, young sprouts and shoots still remain, but very few will ever reach maturity due to the blight. The loss of the Chestnut from the canopy left huge breaks all across the eastern United States. These holes have since filled with many of the Chestnut's associate species, including species of oak (*Quercus* sp.). These oak species comprise the Appalachian Oak Forest, which is the dominant vegetation type in the uplands of Columbia County (The Pennsylvania Atlas, 1982). White Oak (*Quercus alba*), Northern Red Oak (*Quercus rubra*), and Chestnut Oak (*Quercus montana*) dominate the upland forest communities along with an array of other hardwood species. Hardwood associates such as Scarlet Oak (*Quercus coccinea*), Black Birch (*Betula lenta*), Red Maple (*Acer rubrum*), Black Gum (*Nyssa sylvatica*), Hickory (*Carya* sp.), American Beech (*Fagus grandifolia*) and Tulip Poplar (*Liriodendron tulipifera*) are the major associates within an Appalachian Oak Forest (The Pennsylvania Atlas, 1982). The understory of Appalachian Oak Forests typically consists of Mountain Laurel (*Kalmia latifolia*), low sweet blueberry (*Vaccinium angustifolium*), Lowbush blueberry (*Vaccinium pallidum*), Black Huckleberry (*Gaylussacia baccata*), Witch Hazel (*Hamamelis virginiana*), and other species. A good example of an Appalachian Oak Forest in Columbia County includes the forested slopes of Catawissa and Nescopeck Mountains.

● Wetlands

Even though wetlands account for only two percent total of Pennsylvania's area, they are home to a diverse array of rare plants and animals and are an extremely productive part of the landscape as a whole (The Pennsylvania Atlas, 1982). Wetlands differ in size, structure and species diversity. Wetlands also differ according to their placement on the landscape – at stream headwaters, dips in valleys, adjacent to tidal rivers, or on slopes where ground water discharges and whether the water contained is flowing or stagnant. These different scenarios result in bogs and fens, marshes, swamps, floodplain forests, forested wetlands, wet meadows, and seeps. Wetlands differ also in vegetative species cover. Trees such as Red Maple (*Acer rubrum*), Yellow Birch (*Betula alleghaniensis*), Eastern Hemlock (*Tsuga canadensis*), and Ash species (*Fraxinus* spp.) usually dominate forested swamps. The understory consists of shrub species such as Spicebush (*Lindera benzoin*), Rhododendron and Azaleas (*Rhododendron* spp.), Winterberry Holly (*Ilex verticillata*), Alders (*Alnus* spp.), Swamp Rose (*Rosa palustris*), Sedges (*Carex* spp.), and many others.

Graminoid marshes are wetlands dominated by grasses, sedges and rushes. These wetlands may be found in association with streams or in areas with ground water seepages. Graminoid marshes in the county are usually formed as successional communities following beaver dams or other impoundments.

Seeps and wet meadows are small wetlands that are generally fed by ground water coming to the surface in a diffuse flow (The Pennsylvania Atlas, 1982). These wetlands are a common sight in Columbia County. These areas consist of species such as Skunk Cabbage (*Symplocarpus foetidus*), Cinnamon Fern (*Osmunda cinnamomea*), Sensitive Fern (*Onoclea sensibilis*), Jewelweed (*Impatiens capensis*), Sedges (*Carex* spp.), Blue Grasses (*Poa* spp.), Manna Grass (*Glyceria* spp.), Reed Canary Grass (*Phalaris arundinacea*), and Red Maple (*Acer rubrum*).

Shrub Swamps are wetlands occurring on mineral soils with water near or above the surface most of the year (The Pennsylvania Atlas, 1982). Shrubs under 20 feet tall dominate the wetland. Frequent species of shrub swamps include Buttonbush (*Cephalanthus occidentalis*), Swamp Rose (*Rosa palustris*), Meadowsweet and Steeplebush (*Spiraea latifolia* and *S. tomentosa*), Silky Dogwood (*Cornus amomum*), willows (*Salix* spp.), Ninebark (*Physocarpus opulifolius*), sedges (*Carex* spp.), alder (*Alnus* spp.), and Highbush Blueberry (*Vaccinium corymbosum*). A fine example of this habitat in Columbia County is Beaver Run Wetlands in Beaver Township.

Ephemeral or vernal pools are wetlands that fill with water on an intermittent basis due to annual precipitation, rising groundwater, or surface water runoff (Kenney and Burne, 2000). These pools become almost completely dry in most years, losing water through transpiration and evaporation. These pools, due to being ephemeral and virtually free of breeding fish, attract many species of breeding salamanders, turtles, frogs and toads. Some species, like the Spotted Salamander (*Ambystoma maculatum*), are obligate vernal pool species. This species and other *Ambystoma* species lay eggs only in vernal pools. In Columbia County, this habitat can be seen on Catawissa Mountain in State Game Lands #58, Beaver and Roaring Creek Townships.

Due to the rarity of wetlands in Columbia County and central Pennsylvania, all these habitats should be preserved whenever possible. Wetlands provide valuable habitat for breeding and migrating

birds, mammals, reptiles, amphibians, and many insects, including dragonflies. Wetlands also provide a refuge for many species of rare plants.

● **Disturbance**

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

Natural disturbances such as fire and flooding can actually benefit certain natural communities and species. Periodic fires are needed to maintain Pitch Pine (*Pinus rigida*) and Scrub Oak (*Quercus ilicifolia*) barren areas in order to sprout new growth of these species and keep out other successional species. Floodplain forests benefit from the periodic scouring and deposition of sediments as streams overtop their banks. At the same time, streamside wetland communities hold excess water, thus reducing the scale of flooding downstream.

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

In many cases, human disturbances have directly affected natural communities and animal and plant species in certain areas. In Columbia County, farming and urbanization have created biological “islands” where small natural areas are surrounded by agriculture or development. This isolates gene pools of wildlife and/or plant species, inhibiting their gene flow between populations. In addition, logging and mining can affect forest age and natural community structure. For example, the amount of old-growth forests has virtually disappeared despite the fact that some scattered old trees remain. Mining has not had as great of an effect on the landscape in Columbia County as some surrounding counties like Schuylkill and Northumberland. However, mining operations in the county have left long lasting effects such as Acid Mine Drainage (AMD) and alteration of the landscape. Areas around Centralia and Aristes have been nearly abandoned due to active underground coal fires. It will take an extremely long time for these former natural areas that were subjected to mining operations to recover from these disturbances.

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

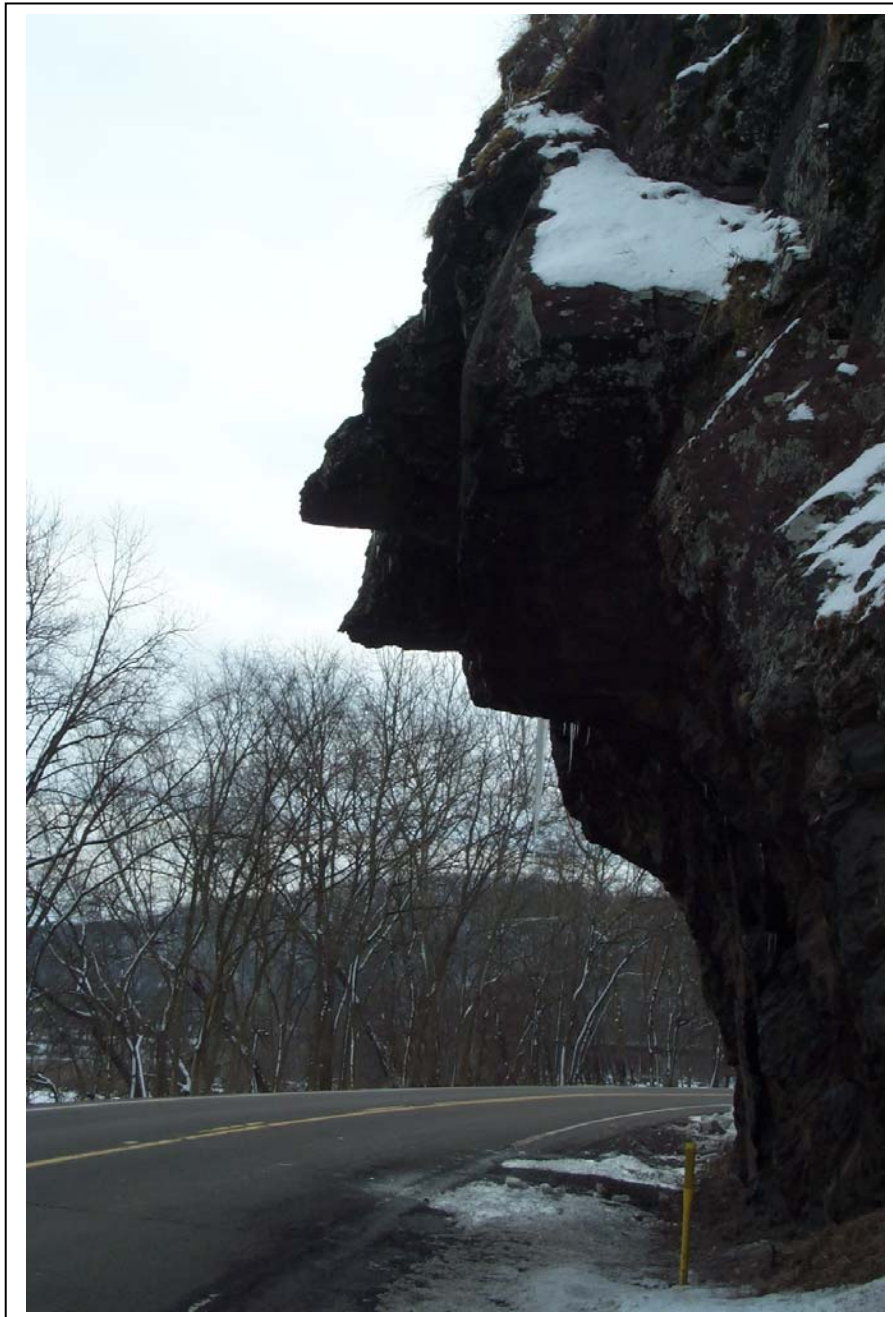
Probably the most detrimental indirect effect that human disturbance has had on natural communities and associated species is the spread of non-native (i.e. exotic) invasive species in natural areas. Many of these invasive species, including the chestnut blight that changed the composition of eastern forests, have caused such widespread problems that they are now out-competing native species and decreasing overall quality of natural areas. Non-native plants such as Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), tree-of-heaven (*Ailanthus altissima*), garlic mustard (*Alliaria petiolata*), and autumn olive (*Elaeagnus umbellata*) have become commonplace in disturbed woodlands, often to the point of excluding some of the native plants. In wetlands and along streams, Common Reed (*Phragmites australis*), European buckthorn (*Rhamnus frangula*), purple loosestrife (*Lythrum salicaria*), Japanese knotweed (*Polygonum cuspidatum*), and mile-a-minute weed (*Polygonum perfoliatum*) are aggressive, weedy species that follow in the wake of disturbance and crowd out native species.

Some of these non-native invasive plants have become serious threats to ecosystems in Columbia and in all counties in Pennsylvania. One major threat in the county is the spread of invasive species along rivers and streams. Many floodplain forests and river islands are being overtaken by invasive plant species. Two of the worst offenders are Japanese knotweed (*Polygonum cuspidatum*) and purple loosestrife (*Lythrum salicaria*). Japanese knotweed quickly spreads through vegetative propagation and seed dispersal. It forms dense stands acting as a thick canopy over native species, quickly excluding them. It is very difficult to remove and poses a severe threat to riparian ecosystems. The plant is able to withstand extended periods of flooding and can quickly colonize scoured banks and islands. The effect of this plant is evident in many areas along the Susquehanna River and Fishing Creek. Purple loosestrife is another serious threat to aquatic ecosystems. It spreads rapidly to natural and disturbed wetlands and riparian areas. This plant is able to out-compete native species and form dense stands of vegetation. This is also detrimental to wildlife species because purple loosestrife doesn't provide the high quality food source and habitat that the native vegetation provided. This species is a serious threat to wetlands and riparian areas throughout the United States. (Plant Conservation Alliance, Alien Plant Fact Sheets <http://www.nps.gov/plants/alien/fact.htm>).

Control of these invasive plants is needed, especially in or adjacent to areas that have been categorized as high quality natural areas to help control further encroachment. Some nurseries in Pennsylvania now carry a selection of tree, shrub and herbaceous species that are native to Pennsylvania, and these are recommended where plantings are necessary in, or adjacent to, natural areas. *The Vascular Flora of Pennsylvania* (Rhoades and Klein 1993) is a helpful reference for determining whether a plant species is native to the state or not. Additional references include two PA Department of Conservation and Natural Resources publications: *Invasive Plants in Pennsylvania* and *Landscaping with Native Plants in Pennsylvania*.

An introduced insect pest of hemlocks has the potential to severely impact the state tree of Pennsylvania. A hemlock pest accidentally introduced from Asia, the hemlock wooly adelgid, has detrimentally impacted hemlock stands throughout the mid-Atlantic states and New England. These small, aphid-like insects are covered with a cottony mass giving them a wooly appearance. They suck sap from the young twigs of hemlock trees resulting in the loss of needles and new growth. Without new shoot growth to support photosynthesis, tree health is seriously impaired, leading to defoliation and tree death within several years. This pest has the potential to severely alter hemlock-dominated habitats. As mature hemlock stands are defoliated, the cool, moist microclimate created

by their deep shade ceases to exist. Plant and animal species that are adapted to this environment will, in effect, be homeless. The stable temperatures and hydrology of hemlock-dominated streams are the preferred habitat of native brook trout. Brook trout (*Salvelinus fontinalis*) were found to be two and a half times as likely to occur in hemlock streams than in hardwood streams, and were also found to be twice as abundant in hemlock streams (Snyder & Ross). Work is ongoing to identify and distribute natural predators of the woolly adelgid. This approach, known as biological control, is the only likely way to control this widespread pest. A small lady beetle (*Pseudoscymnus tsugae*) has been the focus of the biological control effort so far. This species, a natural predator of woolly adelgid in Japan, has proven effective in controlling this pest in its native setting. This woolly adelgid predator has been released at various sites in infested areas since 1995. Though initial results from these field releases have been encouraging, it will likely take many years to determine if this predator can be an effective control of the hemlock woolly adelgid in North America. In the meantime, hemlock dominated habitats are in serious danger from this pest.



Indian Head Rock, a geologic icon of Columbia County.
Photo: PA Science Office of The Nature Conservancy

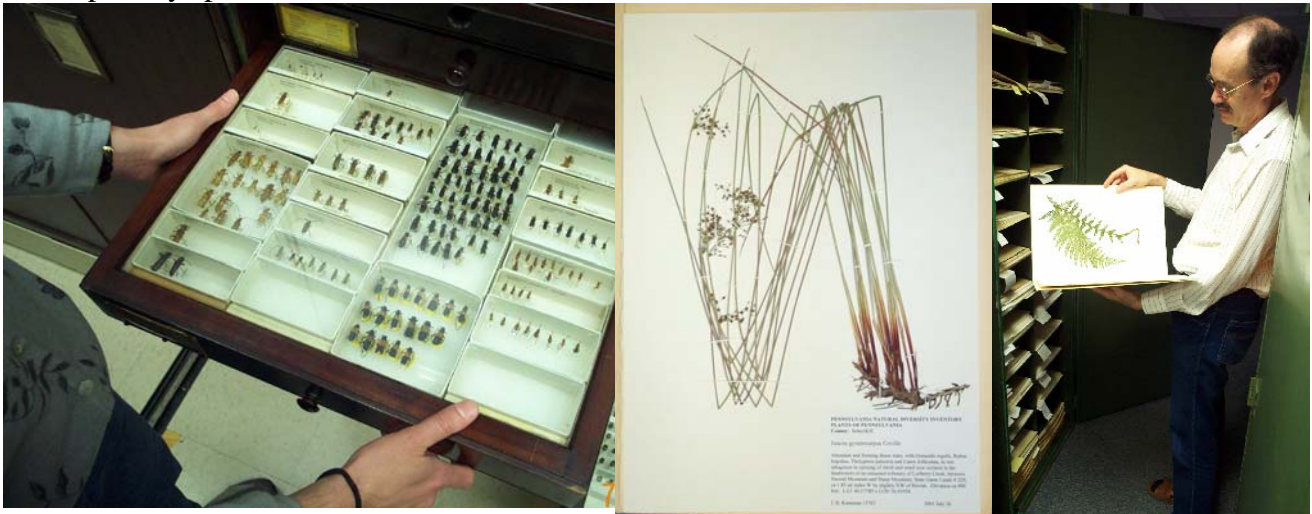
NATURAL AREAS INVENTORY METHODS

Methods used in the Columbia County Natural Areas Inventory followed PNDI procedures and those developed in Illinois (White 1978) and Indiana (Anonymous 1985). The inventory proceeds in three stages: 1) information is gathered from the PNDI data-base files, local experts, and map and air photo interpretation; 2) a low level aerial reconnaissance flight is followed by many days of ground surveys; and 3) data are analyzed and mapped.

- **Pennsylvania Natural Diversity Inventory Data System**

In order to conduct an inventory of significant flora, fauna, and natural communities in the county, scientists from The Nature Conservancy PA Science Office (PSO) first consulted the Pennsylvania Natural Diversity Inventory (PNDI) database. PNDI was established in 1982 as a joint venture between the Pennsylvania Science Office (PSO), the Western Pennsylvania Conservancy (WPC) and the PA Department of Conservation and Natural Resources. In its 20 years of operation, the PNDI database has become Pennsylvania's chief storehouse of information on outstanding natural habitat types (natural communities), sensitive plants and animals (species of special concern). Several other noteworthy natural features are also mapped including Department of Environmental Protection designated Exceptional Value Streams (Shertzer 1992) and outstanding geologic features (based on recommendations from Geyer and Bolles (1979 and 1987)).

PNDI has collected existing data on occurrences of species and communities (elements) of special concern, drawing from publications, herbarium and museum specimens, and the knowledge of expert botanists, zoologists, ecologists, and naturalists. From this foundation, PNDI has focused its efforts on, and conducts systematic inventories for, the best occurrences of the priority species and natural communities.



PNDI has recorded over 15,000-detailed occurrences of species and communities of special concern, largely the result of field surveys. These are stored in computer and manual files and denoted on topographic maps. Additional data are stored in extensive manual and digital files set up for over 200 natural community types, 1400 animals, and 3500 plants. These files are organized by each of Pennsylvania's 881 7 ½ USGS topographic quadrangle maps using a geographic information system (GIS).

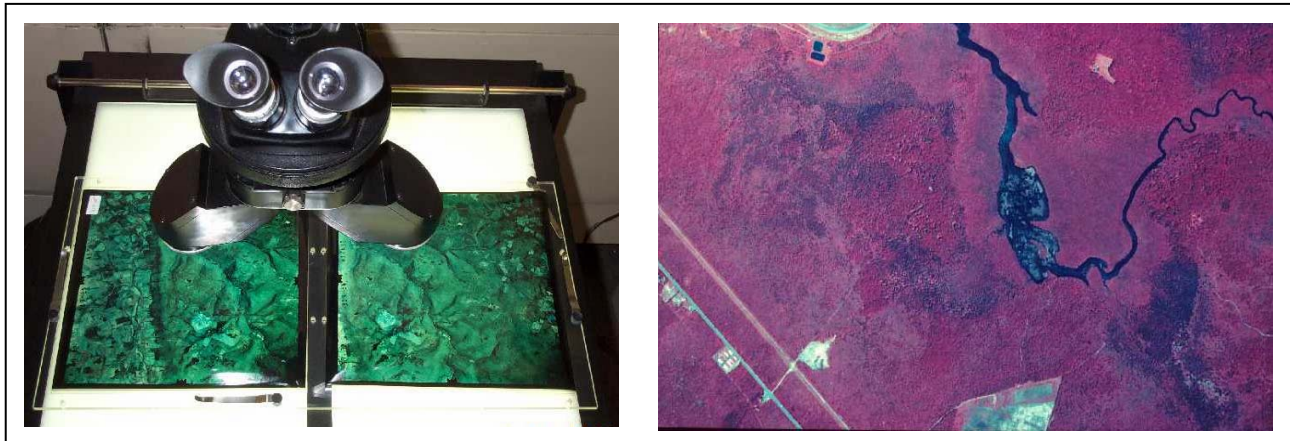
The PA Science Office has used this systematic inventory approach to identify the areas of highest natural integrity in Columbia County. The natural community and sensitive species data are the basis for judging the biological values of sites within the County. Protecting the sites with the best occurrences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

- **Information Gathering**

A list of natural features found in each county was prepared from the PNDI database and supplemented with information volunteered by local individuals and organizations familiar with Columbia County. In April 2003, a public meeting was held and recommended Natural Area Survey Forms (Appendix I) were distributed to facilitate public input. TNC staff solicited information about potential natural communities, plant species of special concern and important wildlife breeding areas from knowledgeable individuals and local conservation groups. A number of potential natural areas were identified by audience members and scheduled for field surveys.

- **Map and Air Photo Interpretation**

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



Work progressed systematically within the area encompassed by each USGS topographic map. The natural area potential of all parcels of land was assessed using aerial photographs. Areas continuing into adjacent counties were examined in their entirety. Topographic maps used during field surveys were marked to indicate locations and types of potential natural areas based

on characteristics observed on the photos. For example, an uneven canopy with tall canopy trees could indicate an older forest; a forest opening, combined with information from geology and soils maps, could indicate a seepage swamp community with potential for several rare plant species. Baseline information on sites appearing to have good quality communities or potential for rare species was compiled to help prioritize fieldwork.

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

● **Field Work**

Experienced PSO biologists and contractors conducted numerous field surveys throughout Columbia County during 2003. Biologists evaluated the degree of naturalness of habitats (including assessment of percent of native vs. non-native plant species, degree of human disturbance, age of trees, etc.) and searched for plant and animal species of special concern. Workers also categorized the vegetation of each potential natural area visited. An evaluation of quality was made for each potential natural community element, with care being taken to give reasons for the quality rank. Boundaries of the community types were redrawn, if needed, based on new field information. Community information recorded included the dominant, common, and other species, as well as disturbances to the community. Field forms were completed for all occurrences of sensitive plant and animal species and natural communities (see sample Plant & Animal Survey Form, Appendix III), the quality of each population or community was assessed, and locations were marked on USGS topographic quadrangle maps.

In April of 2002, one low altitude reconnaissance flight was flown over the county to provide a more accurate overview of the current condition and extent of known natural areas and to assess the potential of any additional areas.

● **Data Analysis**

To organize the natural features data and set conservation priorities, each natural community or species (element) is ranked using factors of rarity and threat on a state-wide (state element ranking) and range-wide (global element ranking) basis (see Appendix IV). Each location of a species (an element occurrence) is ranked according to naturalness, its potential for future survival or recovery, its extent or population size, and any threats to it. An explanation of the five element occurrence quality ranks is given in Appendix V. The element-ranking and element occurrence-ranking systems help PSO personnel to simultaneously gauge the singular importance of each occurrence of, for example, an Ephemeral/Fluctuating Pool Natural Community or yellow-fringed orchid occurrence in Columbia County, as well as the state-wide or world-wide importance of these natural features. Obviously, sites with a greater number of highly-ranked elements merit more immediate attention than sites with a smaller number of lower ranked elements.

Field data for natural communities of C-rank or better and for all plant and animal species of concern found were combined with existing data and summarized on PNDI Element Occurrence Records for mapping and computerization. Mapped locations of natural features, including approximate watershed or subwatershed boundaries, were then created and added electronically to PNDI's GIS layer.

Information on the needs of the rare species in this report has come from a variety of sources, including field guides and research publications. Names for vascular plants are consistent with [“The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas”](#) by Rhoads and Klein (1993). For reptiles and amphibians, the major sources are with “Amphibians and Reptiles of Pennsylvania and the Northeast” by Arthur Hulse et. al. (2001). and DeGraaf and Rudis (1981); for birds, “Atlas of Breeding Birds in Pennsylvania” by Daniel Brauning, Editor (1992); for moths, Covell (1984); for butterflies, Opler and Krizek (1984) and Opler and Malikul (1992); Schweitzer (1981) provided much of the information on rare moth and butterfly species in Pennsylvania. Natural community names and descriptions are intended to be consistent with [“Terrestrial & Palustrine Plant Communities of Pennsylvania”](#) by Jean Fike (1999). A list of Plant and Animals of Special Concern in Columbia County is provided in Appendix VI.



Large, relatively unfragmented forested areas still exist in Columbia County including Catawissa Mountain, part of State Game Land #58.

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



CONSERVATION RECOMMENDATIONS

Columbia County has a number of groups pursuing the protection of natural areas within the county. The following are general recommendations for protecting biological diversity within the county.

- 1. All sites that are ranked 1 or 2 should be considered immediately for protection and/or management of the site and the surrounding lands.** Privately owned lands at these sites may be protected through a combination of conservation easements and acquisition to encourage current land use or make improvements in land use where needed.
- 2. Management plans on public and private lands should address species of special concern and natural communities and assess the need for additional acres to complete protection.** Each species of concern located within a given site will need to be addressed in new management plans for that area. Many of the already-protected sites are in need of additional land to complete protection and/or are in need of management to ensure the continued existence of the associated natural elements. Efforts are already underway to refine management plans for some of the high quality natural areas on public lands in the counties.
- 3. Conservation easements or other low cost protection can be pursued on lower-ranked sites.** All sites of lower rank but with good to excellent populations of species of special concern or good natural communities on private land should receive protection too, but conservation easement or some type of tax incentive may be more appropriate. Conservation easements are designed to allow landowners the current use of their land while protecting the owner and the resource from outside development pressure. Management plans will be needed to ensure that these sites remain high-quality natural areas. Where easements are not possible, any proposals for significant land use changes should be scrutinized carefully by county and municipal planners.
- 4. Low quality sites (e.g., with marginal or poor populations of listed species in marginal areas) should be carefully assessed before pursuing protection or management efforts.** The rare elements may be important for the maintenance of biological diversity at the local level, but costs and efforts for protecting these sites need to be weighed against other sites that will be left unprotected which truly have the potential for long-term viability of elements. However, these sites may have other qualities, such as scenic or recreation value, that make them worth protecting.
- 5. Locally Significant sites may be protected as higher priority sites are completed or as new information emerges.** These are sites in the counties that do not have exemplary natural communities or known occurrences of rare species, but that could be excellent sites for county or township parks or as natural areas within existing parks (sites within existing managed areas will need to be included in management plans). Those that can serve more than one purpose such as recreation, environmental education, wildlife habitat, flood and sediment control, and water supply, are ideal. Species of special concern that may be found in some of these areas in future surveys can fit into county park or preserve plans.
- 6. Protection of the reservoirs, wetlands, rivers, and creeks of Columbia County is vital, especially those that protect biodiversity, supply drinking water, and are attractive recreational resources.** Many of the sites containing rare species, natural communities or

locally significant habitats in Columbia County are associated with water. Protection of these watersheds is the only way to ensure the viability of natural habitats and water quality. Cooperative efforts on land use among municipal, county, state, and federal agencies, developers, and residents can lessen the impact of development on the watersheds and plant communities of Columbia County. Protecting natural areas around municipal water supply watersheds provides an additional protective buffer around the water supply, habitat for wildlife, and may also provide low-impact recreation opportunities.

7. **Minimize encroachment on the parks and conservation lands throughout Columbia County.** Existing parks and conservation lands provide habitat for a number of plant and animal species and may be important not only on a county-wide level, but also on a regional scale. For example, they may serve as nesting or wintering areas for birds or as stopover areas during migration. Where appropriate, more land should be added or agreements worked out with abutting landowners to minimize encroachments that may threaten native flora and fauna.
8. **County and township officials can encourage landowners whose land includes waterways to maintain vegetated buffer zones along shorelines.** Vegetated buffers (preferably of PA-native plant species) help reduce erosion and sedimentation and help to shade and cool the water. This in turn benefits aquatic animal life, including the fisheries. These buffers also provide habitat for other wildlife species and help to create a diversity of habitats along the creek or stream. Enrolment in CRP or CREP programs can help provide financial incentive to landowners interested in removing lands adjacent to creeks from cultivation.
9. **Scrutinize development proposals for their impact on entire watersheds not just the immediate impact area.** Certainly, new housing and commercial development can be given close scrutiny before it is allowed in the areas outlined in this report and careful review can be required within any watershed in the county. Townships can also require minimum setbacks from all water bodies to help protect water quality. Landowners within any particular watershed can act on their own to protect water by forming watershed associations to voluntarily monitor and screen proposals in their localities.
10. **Development plans should provide for creating natural buffers between the development and the core preserve area, be it a barrens community, wetland, water body, or forest.** Care should be taken to ensure that protected natural areas do not become "islands" surrounded by development. When a wetland or woodland is completely surrounded by development, even if there are no direct impacts, the site is effectively isolated and its value for wildlife is reduced. If possible, networks or corridors of woodlands or greenspace should be preserved linking sensitive natural areas to each other. Cluster development could be used to allow the same amount of development on much less land in such areas, but most importantly, leave much of the land intact as corridors for wildlife and native plants.
11. **Grassroots organizations are needed.** County and municipal governments can do much of the work necessary to plan for the protection and management of the natural areas identified in this report. However, grassroots organizations are needed to assist with identifying landowners who wish to protect their land, providing information about easements to landowners, land acquisition, and management and stewardship of protected sites. Increasingly, local watershed organizations and land trusts are taking proactive steps to accomplish conservation at the local

level. This report is intended as a tool to help these organizations as well as other local watershed associations and land trusts in their efforts.

12. Encourage development in sites that have already seen past disturbances. Careful planning can maintain open space, including natural environments and the plants and animals associated with them. A balance between growth and the conservation of scenic and natural resources can be achieved by guiding development away from the most environmentally sensitive areas. The reclamation of previously disturbed areas for residential, commercial and industrial development presents a logical way to accommodate economic growth while allowing ecologically sensitive areas to remain undisturbed.

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

We wish to emphasize that this Natural Areas Inventory is only a beginning. New sites with good natural communities and species of special concern wait to be discovered. Plant communities and plant and animal populations are dynamic, constantly changing with time and conditions. As this information is received and updated in the Pennsylvania Natural Diversity Inventory database, so too will the Natural Areas Inventories. If there are any questions about the impact of the proposed development or other activity, we suggest that our office, the Pennsylvania Science Office of The Nature Conservancy, be consulted at (717) 948-3962. Questions regarding protection methods and tools for planning should be directed to the Columbia County Planning Commission at (570) 389-9146.



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

RESULTS

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

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

- 1) sites of **STATEWIDE IMPORTANCE**
- 2) sites of **Local Significance**

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

Surveys conducted during the scope of the Columbia County Natural Areas Inventory documented 15 sites of statewide importance that contain rare species of plants, animals or natural communities. Seven different animal species of concern, three plant species of concern and five tracked natural community types were documented (Appendix VI). The report also highlights 22 sites considered locally significant.

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

Top Priority Natural Areas in Columbia County:

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

CENTRAL MOUNTAIN (Sugarloaf Township, and Sullivan and Luzerne Counties) – Central Mountain is located in the northern portion of Columbia County. This extensive forested area at the edge of the Allegheny Plateau physiographic province rises dramatically from the adjacent southern lowlands and is considered one of the most important areas for conservation in the county. This area contains an **Ephemeral/Fluctuating Pool Natural Community**, a **Hemlock Palustrine Forest Natural Community** and **northeastern bulrush (*Scirpus ancistrochaetus*)** a G3, S3 Federally–Endangered plant species of concern. The Federally endangered status of this plant indicates that the species may be in danger of extinction throughout all or a significant portion of its range. The northeastern bulrush is primarily found in temporary ponds and other pools with fluctuating water levels. These ponds also typically provide important breeding habitat for forest dwelling amphibians such as wood frogs (*Rana sylvatica*), and spotted salamanders (*Ambystoma maculatum*). The Hemlock Palustrine Forest Natural Community contains forested wetlands dominated by a hemlock canopy. The forested wetlands give way to open sedge meadows in several locations. The water-saturated deep-muck soils are covered in layers of sphagnum moss and mounds of sedges and other herbaceous species. This large forested area provides habitat for a variety of species and is an important natural habitat in Columbia County.

SOUTH BRANCH ROARING CREEK HEADWATERS (Conyngham, Locust and Roaring Creek Townships) – The South Branch Roaring Creek Headwaters is the portion of the watershed east of Route-42. While the western portion of the watershed has several artificially created reservoirs, the headwaters have never been significantly modified. The sand-bottomed springs in this area are the source for much of the clean water supplying the Consumers PA Water Company reservoirs. Three different **G5, S3S4 animal species of concern** were also documented at this site in the summer of 2003. The headwaters have a good quality **Hemlock Palustrine Forest Natural Community**, a type of forested wetland. This habitat is exceptionally scenic as well as fragile, and would be easily degraded by roads, logging or other alterations of the topography.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Catawissa, Main, Mifflin, Scott, and South Centre Townships) - The Susquehanna River drains a large percentage of Pennsylvania, including all of Columbia County. In Columbia County, the Susquehanna River is fairly shallow with rocky shoals and small islands prone to flooding. The south shore is often relatively steep while the north shore is relatively flat and open in aspect. The south shore between Mifflinburg and Rupert includes a considerable stretch of forest with limited development and road fragmentation. Bald Eagles and Ospreys have been sighted along this stretch of river, but no recent nesting sites have been documented. The lower slope of “river hill” is surprisingly cool and shaded, providing a micro-climate for hemlock, rhododendron, and

mountain laurel. Species normally associated with higher elevations and wilder landscapes can be found here. The shallow waters around the islands are home to many freshwater mussels. Two different **animal species of concern** were documented at this site. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice has created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem-Indian grass river grasslands”, which are natural tall grassland communities created as the result of these natural disturbances. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

SOUTH BRANCH ROARING CREEK WATERSHEDS (Cleveland, Conyngham and Locust Townships & Northumberland County) – A significant portion of Columbia County has been disturbed either by agriculture, mining or development. In the context of the modified nature of the surrounding lands, the extensive forests of the 10-mile long, 9000 acre Trout Run and South Branch Roaring Creek Watersheds are clearly important for their ecoregional significance. This watershed is part of a continuously forested ridge and valley complex connecting Moosic Mountain in Lackawanna County, through Luzerne County to Nescopeck and Catawissa Mountains, finally connecting with the Susquehanna River. It is the continuously forested nature of this mountainous system that is its biggest attribute. Trout Run and South Branch Roaring Creek Watersheds provide an essential link in the chain of forested habitats from the Pocono Mountains to the Susquehanna River. This green corridor provides habitat and an avenue of migration for many species of animals and plants. If the continuity of this forested corridor is broken by additional roadways and development, the protected portions could become more isolated from the supporting landscape, reducing their viability as a functioning ecosystem. This area also provides great opportunities for outdoor recreation for local residents including hunting, hiking, birdwatching, and many other outdoor activities. It is the contiguous and relatively undisturbed nature of these watersheds that make this area one of the top sites in the county for preservation. Two animal species of concern were identified during brief surveys near Trout Run. The **northern long-eared bat (*Myotis septentrionalis*)**, a G4, S3 species of concern, is using the Trout Run and South Branch Roaring Creek stream corridors for feeding and is using the trees for raising their young. Another G4, S3 animal species of concern, the **long-tailed shrew (*Sorex dispar*)**, was also documented from this site during a small mammal survey in 2001. Additional surveys in other parts of both watersheds are recommended.

Table 2. Summary of Natural Areas in Columbia County

Summary of the sites for the protection of biological diversity in Columbia County in approximate order of priority from the most important (rank = 1) to the least (rank = 5). More in-depth information on each site including detailed site descriptions and management recommendations can be found in the text of the report following the maps for each municipality.

County Rank ¹	Site Name	Municipality-(ies)	PA Heritage Ranks ² and Site Importance
1	CENTRAL MOUNTAIN	Sugarloaf Twp., & Sullivan and Luzerne Counties	This area is mostly forested and is considered one of the most important areas for conservation in the county. This area contains an Ephemeral/Fluctuating Pool Natural Community , a Hemlock Palustrine Forest Natural Community and northeastern bulrush (<i>Scirpus ancistrochaetus</i>) a G3, S3 Federally-Endangered plant species of concern.
1	SOUTH BRANCH ROARING CREEK HEADWATERS	Conyngham, Locust and Roaring Creek Twps.	Three different G5, S3S4 animal species of concern were documented in this watershed in 2003. Also at this site is a good quality Hemlock Palustrine Forest Natural Community .
1	SUSQUEHANNA RIVER	Catawissa, Main, Mifflin, Scott, and South Centre Townships; Bloomsburg & Berwick Boroughs	Two different animal species of concern were identified at this site. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river.
1	SOUTH BRANCH ROARING CREEK WATERSHED	Cleveland, Conyngham and Locust Twps., & Northumberland County	Two animal species of concern were identified during brief surveys near Trout Run. The northern long-eared bat (<i>Myotis septentrionalis</i>) , a G4, S3 species of concern, and the long-tailed shrew (<i>Sorex dispar</i>) , a G4, S3 animal species of concern were documented from this site during a small mammal survey in 2001. Additional surveys in other parts of both watersheds are recommended.
2	CATAWISSA BLUFFS	Catawissa and Franklin Twps., and Catawissa Borough	Several populations of jeweled shooting-star (<i>Dodecatheon radicum</i>) , a G?, S2 PA-Threatened plant species of concern, are found on wet, extremely steep limestone cliffs dominating the Susquehanna River and Catawissa Creek in this area.
2	LITTLE SHICKSHINNY CREEK	Briar Creek Twp.	This site contains a diverse array of habitats including a ' Hemlock Palustrine Forest Natural Community ', a 'red maple swamp', a 'dry oak-heath forest', a reservoir, and a 'highbush blueberry shrub swamp'. The headwaters of the Little Shickshinny Creek also contain a good degree of plant diversity in a relatively undisturbed forested matrix. This area is host to an exceptional diversity of bird species.
2	ROARING CREEK BLUFFS	Franklin Twp. and Montour County	These wet, limestone ledges along Roaring Creek provide habitat for several populations of a G?, S2 PA-Threatened plant species, jeweled shooting-star (<i>Dodecatheon radicum</i>) .
2	RUPERT BLUFFS	Catawissa and Montour Twps.	Several good quality populations of the jeweled shooting star (<i>Dodecatheon radicum</i>) , a G?, S2 PA-Threatened species, can be found along wet portions of these cliffs and rocky outcrops on both sides of the Susquehanna River and near the Indian Head rock outcrop overhanging Rt. 42 north of Catawissa.

County Rank ¹	Site Name	Municipality-(ies)	PA Heritage Ranks ² and Site Importance
3	CATAWISSA MOUNTAIN	Beaver & Roaring Creek Twps.	This portion of Catawissa Mountain is home to an unknown quality population of an S3S4 animal species of concern . This species requires rocky outcrops as its primary habitat. An Ephemeral/Fluctuating Pool Natural Community was also located at this site. These ponds serve as important breeding areas for amphibians.
3	IOLA WOODS	Madison and Pine Twps.	An unnamed tributary of Spruce Run, located in a portion of State Game Lands #226, has a good quality occurrence of a G5, S3 PA-Rare plant species of special concern, puttyroot (<i>Aplectrum hyemale</i>).
3	NESCOPECK MOUNTAIN	Beaver Twp.	Nescopeck Mountain is home to an unknown quality population of an S3S4 animal species of concern . More surveys are necessary to determine the extent of the population in this area.
3	ROARING CREEK BARRENS	Roaring Creek Twp. & Schuylkill County	A small Scrub Oak Shrubland Natural Community was documented at this site in 2003. Local planning should discourage the construction of additional residences and roads in this fire-prone habitat. Additional surveys for barrens-dependent species of concern are recommended.
4	ARISTES VERNAL POND COMMUNITY	Conyngham Twp.	An Ephemeral/Fluctuating Pool Natural Community was documented in this area during surveys in 2003. These ponds provide important habitat for breeding amphibians and a variety of other species.
4	Beaver Run Wetlands	Beaver Twp. & Luzerne County	This locally significant site contains an extensive and diverse wetland that is one of the better quality wetlands in Columbia County. The largest component of this wetland complex mosaic is an extensive “highbush blueberry – meadow-sweet shrub swamp”.
4	Catawissa Creek Outcrops	Beaver and Main Twps.	This locally significant site contains several massive rock outcrops that occur at bends in the creek. These outcrops provide unique habitat conditions depending on the degree of moisture, solar exposure and bedrock substrate of which the outcrops are composed. The forested slopes along the creek act as a buffer to the waterway, filtering runoff, providing shade to the creek and acting as an essential corridor of habitat to terrestrial animal and plant life.
4	Catawissa Shrub Swamp	Catawissa and Main Twps.	This locally significant site is a shrub swamp floodplain area along the Catawissa Creek. This area was identified from aerial photography. Future ground surveys are recommended to describe the quality and type of natural community found along the creek in this area.
4	Espy Wetlands	Scott Twp.	This locally significant site is composed of the lake and adjacent wetlands sandwiched between the borough of Espy and Rt.-11. The open water lake may be manmade, or possibly impounded as the result of the construction of the adjacent railroad and roadway. This wetland complex has good plant and animal diversity.
4	Fallow Hollow	Sugarloaf Twp.	This locally significant site contains a diverse wetland with a good variety of birds and plants. The diverse habitats at this site include a graminoid/forb opening, a wooded ravine, a shrub swamp, a pond, and deciduous, seepy woods with a dense fern understory.
4	Grassmere Park Wetlands	Sugarloaf Twp.	This locally significant site contains a large, open-water lake and an extensive sedge and herbaceous wetland that were likely the result of past beaver impoundment and human enhancement.

County Rank ¹	Site Name	Municipality-(ies)	PA Heritage Ranks ² and Site Importance
4	Hess Hollow	Sugarloaf Twp.	This locally significant site contains a small meandering stream, with pockets of forested wetlands and small open graminoid marshes.
4	JAKEY HOLLOW	Hemlock, Madison and Mt. Pleasant Twps.	Jakey Hollow is a Northern Conifer Forest Natural Community adjacent to Fishing Creek. The 60-acre tract was purchased by DCNR in 1990 and is designated as a Natural Area. The site is home to an excellent mixed stand of second growth eastern hemlock (<i>Tsuga canadensis</i>) and hardwoods, with a small area of virgin hemlock.
4	Maple Grove Slopes	Benton and Fishing Creek Twps.	This locally significant site is composed of the Fishing creek floodplain and forested slopes between Benton and Stillwater. The shrub layer along the hillside includes an excellent quality population of the uncommon shrub species American yew (<i>Taxus canadensis</i>).
4	SCOTCH RUN	Beaver Twp.	An Ephemeral/Fluctuating Pool Natural Community was documented at this site. These pools provide important breeding habitat for amphibians.
4	Shenandoah Municipal Authority	Conyngham Twp. & Schuylkill County	This locally significant site contains the forested seeps, streams and creeks leading into Shenandoah Reservoir #6.
4	Spruce Run	Madison Twp.	This locally significant site includes the upper sections of Spruce Run in State Game Lands # 226. This area contains fine local examples of hemlock and mixed hardwood forest with good herbaceous layer and bird diversity.
4	Stony Brook Watershed	North Centre & Orange Twps.	This locally significant site is a steep, narrow, forested ravine that has seen little recent disturbance. The entire watershed of Stony Brook from its source to the confluence with Fishing Creek is considered an Exceptional Value Stream by the PA Department of Environmental Protection.
4	Ten Mile Run	Mifflin Twp.	This locally significant site contains a high-quality cold-water fishery stream (DEP), which runs through a hemlock-mixed hardwood palustrine forest and shrub swamp with good bird diversity.
4	Wenner Swamp	Fishing Creek Twp.	This locally significant site represents a remnant of a bog-like natural community that has seen extensive past disturbances. This degraded natural community will take many years to recover from these disturbances.
5	California Hollow	Pine Twp.	This locally significant site is a narrow valley with a hemlock and white pine canopy along the slopes of the West Branch Little Fishing Creek. This relatively undisturbed narrow creek valley is one of the few in Columbia County that does not have a road adjacent to the creek.
5	Five Points Swamp	Sugarloaf Twp. and Luzerne County	This locally significant site was identified from aerial photography. This area appears to have a conifer-dominated palustrine forest and an adjacent shrub wetland. Ground surveys are recommended to determine the quality of these habitats.
5	Green Creek Floodplain	Jackson Twp.	This locally significant site consists of the hemlock forested floodplain along a portion of Green Creek. This area was identified from aerial photography, and a ground survey is necessary to determine the quality of this habitat.

County Rank ¹	Site Name	Municipality-(ies)	PA Heritage Ranks ² and Site Importance
5	Huntington Creek Floodplain	Fishing Creek Twp.	This locally significant site consists of the floodplain, meanders and oxbows formed in this slow moving portion of Huntington Creek. This area was identified from aerial photography, and a ground survey is necessary to determine the quality of this habitat.
5	Kline Hollow Run	Pine Twp.	This locally significant site includes a large, relatively undisturbed forested block and the two stream systems Kline Hollow Run and Devil Hole Run. Both of these hemlock-dominated streams suggest a high quality natural habitat.
5	McCauley Mountain	Beaver Twp.	This locally significant site was identified from aerial photographs. This portion of McCauley Mountain appears to have a series of wetlands, some of which were likely created as the result of mining exploration, but others appear to be naturally occurring vernal ponds. Ground surveys are recommended to determine the quality of these habitats.
5	Mordansville Slopes	Madison & Mt. Pleasant Twps.	This locally significant site contains a population of the recently delisted shrub species American yew (<i>Taxus canadensis</i>).
5	Summer Hill Bog	Briar Creek Twp. and Luzerne County	This locally significant site is a wetland habitat identified from aerial photographs and as part of a low-level reconnaissance flight over the county. A ground survey of this site is needed to verify the type of habitat, and to identify the species composition of the wetland. A survey for wetland birds is also recommended.
5	Turkey Hill Oxbow	Bloomsburg Borough, Mt.Pleasant and Scott Twps.	This locally significant site is an oxbow of Fishing Creek that occurs between the forested slopes of Turkey Hill and I-80. The hemlock – hardwood slopes have several skunk cabbage seeps that feed the floodplain wetlands below. The extensive wetlands are forested wetlands, shrub swamps, graminoid openings and areas of open water, as well as the floodplain of the former creek bed.

Ephemeral / Fluctuating Pool Natural Communities

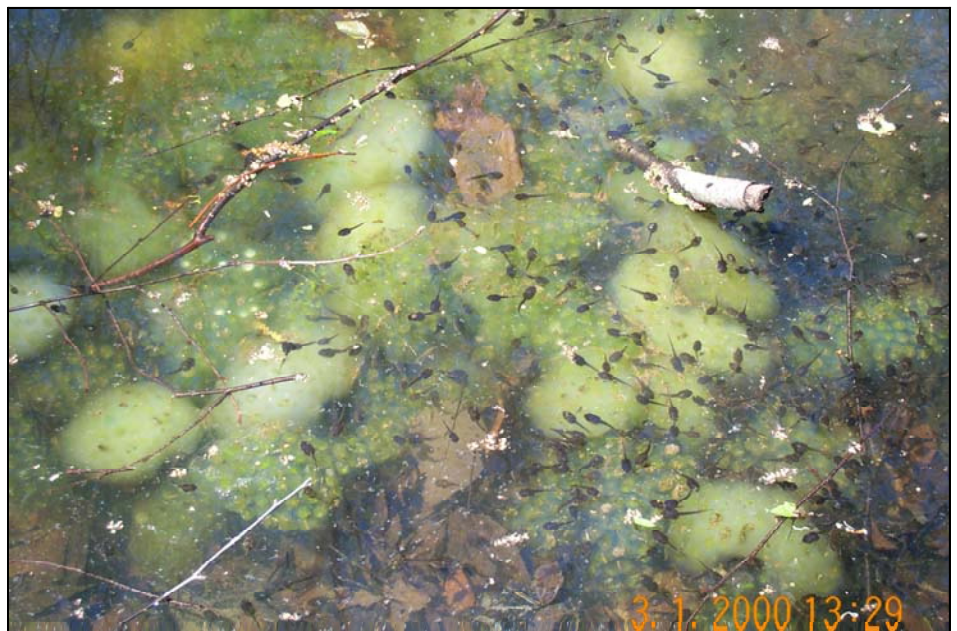


Ephemeral/fluctuating or vernal pools are wetlands that fill annually from precipitation, surface water runoff, and rising groundwater, to appear pond-like during the winter and spring months.

These 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 variety of amphibian species such as wood frogs and spotted salamanders, many of which breed solely in vernal pools. (Photos by the PA Science Office of The Nature Conservancy)



Fisher

Martes pennanti

Pennsylvania Mammal Species of Concern

State Rank: SC, Global Rank: G45

Identification:

The fisher (*Martes pennanti*) is the largest member of the weasel family, with long bodies and short legs and a pronounced bushy tail, but appear stocky compared to other members of the weasel family. Males measure up to 36 inches in length and often weigh 10 to 12 pounds. The females are smaller, usually weighing about a 1/3 of the average weight of males. Fishers have dark brown fur with two small white patches in the front armpit area.

Habitat – Behavior:

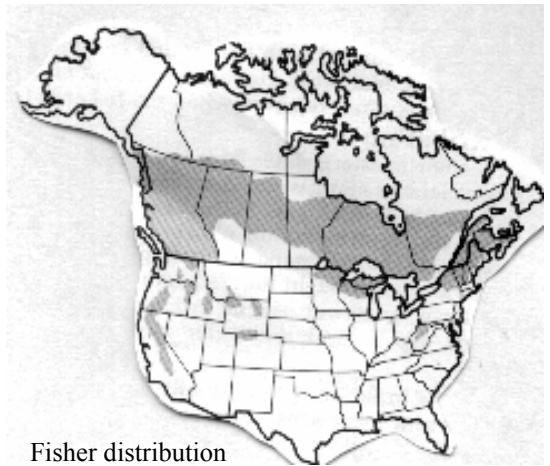
Fishers occur only in North America and historically occupied most of the northern boreal forest of Canada, extending south along the mountain ranges of California, the Rocky Mountains and the northern Appalachians. The fisher is considered an animal of bad temper that inhabits large blocks of primarily coniferous but also deciduous forest. Fishers are highly skilled carnivores that feed on many smaller animals, but are particularly skilled at killing porcupines. Males typically hunt a 30 square mile area, while 10 square miles is typical for females. Fishers breed from late February to May and gestation lasts one year. Young are typically weaned in 2.5 to 4 months and are usually independent by August or September.

Status:

By the early 1900s, particularly in the southern part of their original range, the removal of forests through logging, fire, and settlement reduced the occurrence of fishers. This habitat loss, along with trapping severely reduced or eliminated fishers from much of their original range. Fishers were extirpated from Pennsylvania in the early 1900s, but a reintroduction program was started in 1994, when 22 fishers were released on the Sproul State Forest in Centre and Clinton counties. Overall, 190 fishers were released in Pennsylvania as part of a reintroduction program partnered by the Pennsylvania Game Commission, Frostburg State University and Pennsylvania State University. Optimal habitat for fishers is unbroken forest with dense canopy cover of at least 250 acres with corridors to similar patches of forest. They prefer large hollow trees for dens, but will also utilize downed logs and ground or rocky crevices.



Photo: Jerry Hassinger



Fisher distribution



References:

NatureServe. 2004. NatureServe Explorer: An online encyclopedia of life [web application]. Version 3.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer/> (Accessed: May 21, 2004).

Pennsylvania Game Commission 2003 Press Releases. Press Release #036-03. <http://www.pgc.state.pa.us/pgc/cwp/view.asp?A=11&Q=157811>

Green Floater

Lasmigona subviridis

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

Identification

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



Photo: PA Science Office

Habitat

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

Status

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

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



References

- NatureServe Explorer: An online encyclopedia of life [web application]. 2002. Version 1.6. Arlington, Virginia. Website: www.natureserve.org/explorer.
- North Carolina Mussel Atlas, Species Information and Status. Website: www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7b1a1_9.htm
- Stein, B.A. and S.R. Flack. 1997. 1997 Species Report Card: The State of U.S. Plants and Animals. The Nature Conservancy, Arlington, Virginia.
- Strayer, D.L. and K.J. Jirka. 1997. The Pearly Mussels of New York State. The New York State Education Dept., Albany, N.Y. 113pp and plates.



Pennsylvania Natural Heritage Program



SAVING THE LAST GREAT PLACES ON EARTH

Northern Myotis

Myotis septentrionalis

Pennsylvania Mammal Species of Concern
State Rank: S3B, S3N Global Rank: G4

Identification

The northern myotis (*Myotis septentrionalis*) is also known as the northern long-eared myotis for its long-rounded ears that when folded forward, extend beyond the tip of the nose. Also, the shape of the tragus, the flap of skin inside the ear area, is long and dagger shaped compared to the little brown bats curved and blunted tragus. This species has a longer tail and larger wing area than other similar sized bats in this genus. The fur is dull yellow/brown above and a pale gray on the belly. Another characteristic of this species is that the calcar, a spur extending from the foot, lacks a keel. These bats weigh only 6 to 8 grams and have a wingspan of 9 to 10 inches.



Photo: Aura Stauffer

Habitat/Behavior

In the more northern parts of their range the northern long-eared bat is associated with boreal forests. In Pennsylvania, this bat is found in forests around the state. Northern myotis hunt at night over small ponds, in forest clearings, at tree top level and along forest edges. They eat a variety of night-flying insects including caddisflies, moths, beetles, flies, and leafhoppers. This species uses caves and underground mines for hibernation and individuals may travel up to 56 kilometers from their summer habitat for hibernation. Maternity roosts are located in tree cavities, under exfoliating tree bark and in buildings.

Status

The status of the northern myotis in Pennsylvania is uncertain. The state status of this species currently is candidate rare (CR). More information is needed before adequate management decisions can be made. It occurs throughout Pennsylvania, but has been found in relatively low numbers. Traditionally, bats have been unpopular with the public because of a misunderstanding of their ecology and due to their presence as pests in homes and barns. However, bats play a very important role in the environment by eating large amounts of insects. For example, a single little brown bat (*Myotis lucifugus*) can eat up to 1,200 mosquito-sized insects in just one hour!



More than 50% of American bat species are rapidly declining or already listed as endangered. The loss of bat species in Pennsylvania could greatly affect our ability to protect our plants from pests and enjoy the outdoors. For more information on bats and bat houses visit the Bat Conservation International website at <http://www.batcon.org/>.



Pennsylvania Natural Heritage Program



SAVING THE LAST GREAT PLACES ON EARTH

References

- Bat Conservation International, Inc. 2002. "Bat Species: U.S. Bats: *Myotis septentrionalis*" Website: <http://www.batcon.org/discover/species/mystep.html>.
- Ollendorff, J. 2002. "*Myotis septentrionalis*" (On-line), Animal Diversity Web. Accessed February 25, 2004 at [Http://animaldiversity.ummz.umich.edu/site/accounts/information/Myotis_septentrionalis.htm](http://animaldiversity.ummz.umich.edu/site/accounts/information/Myotis_septentrionalis.htm).

Timber Rattlesnake

Crotalus horridus

Pennsylvania Reptile Species of Concern
State Rank: S3S4 Global Rank: G4

Identification

Timber rattlesnakes (*Crotalus horridus*) are easily distinguished from other snakes in Pennsylvania. Timber rattlesnakes are stout-bodied, large snakes reaching lengths of up to 5 feet. Color is extremely variable but usually consists of brown or black bands on bright yellow to black coloration. The head is triangular in shape and a black rattle is present at the end of the tail. This species may be confused with the less common eastern massasauga (*Sistrurus catenatus catenatus*) only present in the western portion of the state. The timber rattlesnake can be distinguished from the massasauga by the lack of white facial lines, completely black tail and scale-covered head.



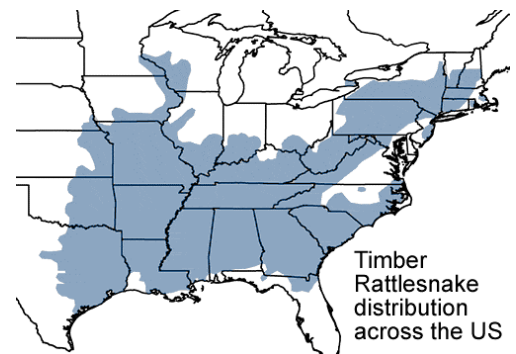
Habitat/Behavior

Crotalus horridus is associated with deciduous forests and rocky outcrops. Hibernacula are usually found on south-facing rocky slopes with adequate crevices to provide shelter during the winter months. Males may travel far from the den site in the summer, moving into valleys and low-lying areas. Gravid females are far less mobile and tend to stay within a short distance of the den. Timber rattlesnakes are venomous, however are generally mild-mannered and not likely to strike.

Status

Timber rattlesnake numbers have decreased significantly from historic records. This species was once widespread across the state. The remaining populations are usually found in remote, isolated areas. Collection and destruction of habitat are likely the main reasons for reductions in population size. Den sites have been targets for collection and should be the focus of conservation efforts for this species. The state status of the timber rattlesnake is candidate at risk (CA). Though this species is still relatively abundant across the state, it remains vulnerable to exploitation.

Permits are now required to collect rattlesnakes and only one snake can be taken each year. Snake hunts still occur in the state but after capture, snakes must be marked and release and the site of capture. Biologists are gathering information from collectors and individual studies to determine the current status of this species in the state.



References

- Genoway, H.H. and F.J. Brenner. 1985. Species of Special Concern in Pennsylvania. Carnegie Museum of Natural History. Pittsburgh, PA. 430pp.
- Hulse, A.C., C.J. McCoy and E.J. Censky. 2001. Amphibians and Reptiles of Pennsylvania and the Northeast. Cornell University Press, New York. 419pp.
- The Center for Reptile and Amphibian Conservation and Management. Species Accounts: Timber Rattlesnake. Website: http://herpcenter.ipfw.edu/outreach/accounts/reptiles/snakes/Timber_Rattlesnake/

Yellow Lampmussel

Lampsilis cariosa

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

Identification

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



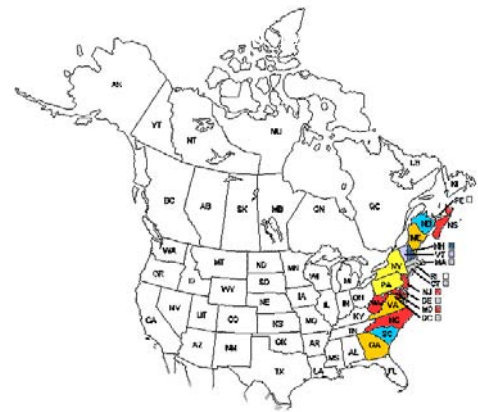
Habitat

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

Status

Lampsilis cariosa ranges from Nova Scotia to Georgia and west to West Virginia. Little is known about the status of freshwater mussels in Pennsylvania and the United States. The state status of the yellow lampmussel is condition undetermined (CU) due to lack of information for this species. Though it appears to be relatively abundant in the Susquehanna River, thus far it is not present or less common in other river systems in the state. More surveys are required to determine the status of this species and other freshwater mussels in Pennsylvania.

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



References

- NatureServe Explorer: An online encyclopedia of life [web application]. 2002. Version 1.6. Arlington, Virginia. Website: www.natureserve.org/explorer.
- Nedeau, E.J, M.A. McCollough, and B.I. Swartz. 2000. The Freshwater Mussels of Maine. Maine Dept. of Inland Fisheries and Wildlife, Augusta, Maine.
- Stein, B.A. and S.R. Flack. 1997. 1997 Species Report Card: The State of U.S. Plants and Animals. The Nature Conservancy, Arlington, Virginia.



Forest Interior Birds

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

Pennsylvania Animal fact sheets

Introduction

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

Forest Interior

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

Forest Interior Bird Species in Pennsylvania

Many forest interior bird species occur in Pennsylvania, where large contiguous and diverse forests and wetlands still occur. These species have different types of habitat requirements but all prefer large, contiguous forests with little fragmentation. Several species of commonly occurring forest birds in Pennsylvania are high priorities in the multi-agency PIF (Partners in Flight) program launched to identify declining populations of migratory birds and address the conservation and management needs of species before they become threatened or endangered. Forest-interior bird species on the PIF list occurring in Pennsylvania include Kentucky Warbler (*Oporornis formosus*), Worm-eating Warbler (*Helmitherus vermivorus*), Wood Thrush (*Hylocichla mustelina*), Canada Warbler (*Wilsonia canadensis*), Cerulean Warbler (*Dendroica caerulea*), and Prothonotary Warbler (*Protonotaria citrea*). Other forest interior songbirds occurring relatively commonly in Pennsylvania include Scarlet Tanager (*Piranga olivacea*), Blue-headed Vireo (*Vireo solitarius*), Ovenbird (*Seiurus aurocapilla*), Acadian Flycatcher (*Empidonax vireescens*), Hooded Warbler (*Wilsonia citrina*), Black-throated Blue Warbler (*Dendroica caerulescens*), Black-throated Green Warbler (*Dendroica virens*), and Louisiana Waterthrush (*Seiurus motacilla*). Several species, such as Louisiana Waterthrush, Cerulean Warbler, Worm-eating Warbler, Canada Warbler, and Black-throated Blue Warbler, are priority species in PIF conservation plans for the Allegheny Plateau and/or Northern Ridge and Valley physiographic areas. Rare birds that are state-listed/candidates that rely on forest interior include Prothonotary Warbler, Yellow-bellied Flycatcher (*Empidonax flavescens*), Northern Goshawk (*Accipiter gentilis*), and perhaps Swainson's Thrush (*Catharus ustulatus*), who may also use forest edge and second growth conifer woodland.

Management Recommendations

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



Acadian Flycatcher Photo by Ron Austing



Scarlet Tanager photo by Ron Austing



Louisiana Waterthrush photo by Ron Austing



Hooded Warbler photo by Ron Austing

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

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

Keeping Common Birds Common

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

References

Rodewald, A. D. 2001. Ohio State University Extension Fact Sheet. Managing for Forest Songbirds.

<http://ohioline.osu.edu/w-fact/0006.html>

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

Brand, L. A. and T. L. George. 2001. Response of passerine birds to forest edge in coast redwood forest fragments

Lewis, J. P., S. A. Miller, J. R. Robb, and T. Vanesdol-Lewis. 1998 Annual Report. Productivity of Interior Forest and Grassland Birds on Jefferson Proving Ground. US Fish and Wildlife Service.

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

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

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

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

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



The Barrens Moths

Pennsylvania animal species of concern

Introduction/Description

Nestled within the Pocono Mountains in Monroe and Carbon Counties is home to large examples of Pitch Pine (*Pinus rigida*)/Scrub Oak (*Quercus ilicifolia*) Barrens and associated Rhodora (*Rhodora canadense*) barrens. However, other types of barrens are scattered throughout the state, including Moosic Mountain Barrens in Lackawanna County, and an extensive Ridgetop dwarf tree community in Schuylkill County. Other examples of barrens communities occur in Columbia, Luzerne, Franklin, Cumberland, Centre, and others. These barrens are home to many rare plants, animals and natural communities, including some rare moths that are globally threatened.

There are at least 18 state-listed moths that inhabit areas in the barrens and ridgetop dwarf tree natural communities in Pennsylvania. Some of these species rely solely on barrens areas for every stage of their life cycle. Listings of these moths and their habitat requirements are summarized below.

Moth Species of Concern/Habitats:

- Barrens Chaetagnela** (*Chaetagnela tremula*)- Xeric sites with abundant scrubby oaks and low ericaceous shrubs
- A Sallow Moth** (*Chaetagnela cerata*)- Pitch Pine/Scrub Oak Barrens
- Pine Devil** (*Citheronia sepulchralis*)- Pitch Pine Barrens, forests, occasional plantations
- Barrens Dagger** (*Acronicta albarufa*)- Dry-Oak habitats, including black oak /bur oak, Pitch Pine/Scrub Oak barrens
- Pointed Sallow** (*Epiglaea apiata*)- Cranberry patches in bogs and northern pitch pine/scrub oak barrens
- Blueberry Gray** (*Glena cognataria*)- Bogs and Blueberry (*Vaccinium spp.*) dominated barrens
- Esther Moth** (*Hypagyrtis esther*)- Pitch Pine Barrens
- Barrens Itame** (*Itame spp. 1*)- Pine Barrens with sandy soils
- Black-waved Flannel Moth** (*Lagoa crispata*)- restricted to Pitch Pine/Oak Woods or Pitch Pine/Scrub Oak barrens
- Twilight Moth** (*Lycia rachelae*)- Sand plain pine barrens as well as some dry, acidic, scrubby ridges in P A and MA
- Footpath Sallow** (*Metaxagnela semitaria*)- Bogs, acidic swamps, barrens with extensive blueberry patches
- Fly-poison Borer Moth** (*Papaipema sp. 1*)- Fly-poison (*Amianthium muscaetoxicum*) dominated areas
- A noctuid moth** (*Platyperigea meralis*)- dry, sandy sites such as pine barrens
- Broad Sallow Moth** (*Xylotype capax*)- Barrens, oak-pine woods, acidic swamps, with abundant pitch pine
- Pine Barrens Zale** (*Zale spp.*)- exclusively Pine Barrens



Barrens Buckmoth (*Hemileuca maia*)-Pitch Pine/Scrub Oak or Blackjack Barrens

Photo by Connecticut Agricultural Experiment Station



Zale Moth larvae (*Zale curema*)- Pitch Pine Barrens/hard pines

Photo by Connecticut Agricultural Experiment Station



Zale Moth larvae (*Zale submediana*)-Hard Pines/Pitch Pine areas

Photo by Connecticut Agricultural Experiment Station

Range

Some of these moths are more widespread and occur in throughout the eastern United States, while the Fly-poison Borer Moth (*Papaipema sp. 1*), is known to occur only in Pennsylvania. There is also little information on the full ranges for some of these species, but some are extremely restricted in habitat, which restricts their distribution as well.

Conservation/Status

Conservation of these moth species depends on the protection of the habitat to which they depend on for all stages of their life cycles. Fire and microclimate are important factors in helping to maintain these community types. The pitch pine barrens are disturbance dependent ecosystems and the development of a prescribed burn management program would help maintain the quality of this naturally occurring community. Without periodic fires, the scrub habitat would succeed to other hardwood and pine species. Some area of the barrens have seen heavy industrial/residential/commercial development in the past couple of years, so it is critical to protect the remaining best examples of Pitch Pine/Scrub Oak Barrens in the state in order to fully protect the rare moths that depend upon this natural community. Additional inventories and monitoring are needed to determine the extent of the population and occurrences of many different species of moths in many different barrens communities in Pennsylvania.

References

Barton, Barb. Unknown date. Animal Survey Information, Volume 1. The Nature Conservancy, Pennsylvania Science Office.

Cameron, D. S., A. F. Davis, B. Barton, J. R. Belfonti, N. Clupper, J. L. Farber, J. R. Kunsman, A. Leimanis, and R. M. Ring. 1997. A Natural Areas Inventory of Lackawanna County, Pennsylvania.

The Nature Conservancy, The Pennsylvania Science Office. 2003. A Natural Areas Inventory of Schuylkill County, Pennsylvania.



Pennsylvania Natural Heritage Program



Hemlock Wooly Adelgid



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



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



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

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

Natural Areas of Columbia County by Township



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

BEAVER TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Catawissa Mountain State Game Lands #58	Animal:	G4	S3S4	PC	2003-07-29	E
	Ephemeral/Fluctuating Pool Natural Community	G?	S3	N	2003-04-24	E
Nescopeck Mountain State Game Lands #58	Animal:	G4	S3S4	PC	2003-07-29	E
Scotch Run	Ephemeral/Fluctuating Pool Natural Community	G?	S3	N	2003-05-08	E

Locally Significant Areas: Beaver Run Wetlands
Catawissa Creek Outcrops
McCauley Mountain

Managed Areas: State Game Lands #58

Beaver Township is located in the southeast portion of the county. A small part of the landscape has been altered by mining activities, including portions of Buck and McCauley Mountains. Past mining activities throughout the Catawissa Creek watershed (Luzerne, Schuylkill and Columbia Counties) have severely impacted the Catawissa Creek watershed. Aquatic life is absent in the highly acidic creek because of runoff from past mining practices in the watershed. Efforts are being made to restore the watershed and with increased Acid Mine Drainage (AMD) remediation, return the stream to a more natural state. This scenic creek could be a magnet for trout fishing enthusiasts across the state if the effects of AMD can be reversed and life restored to this aquatic system.

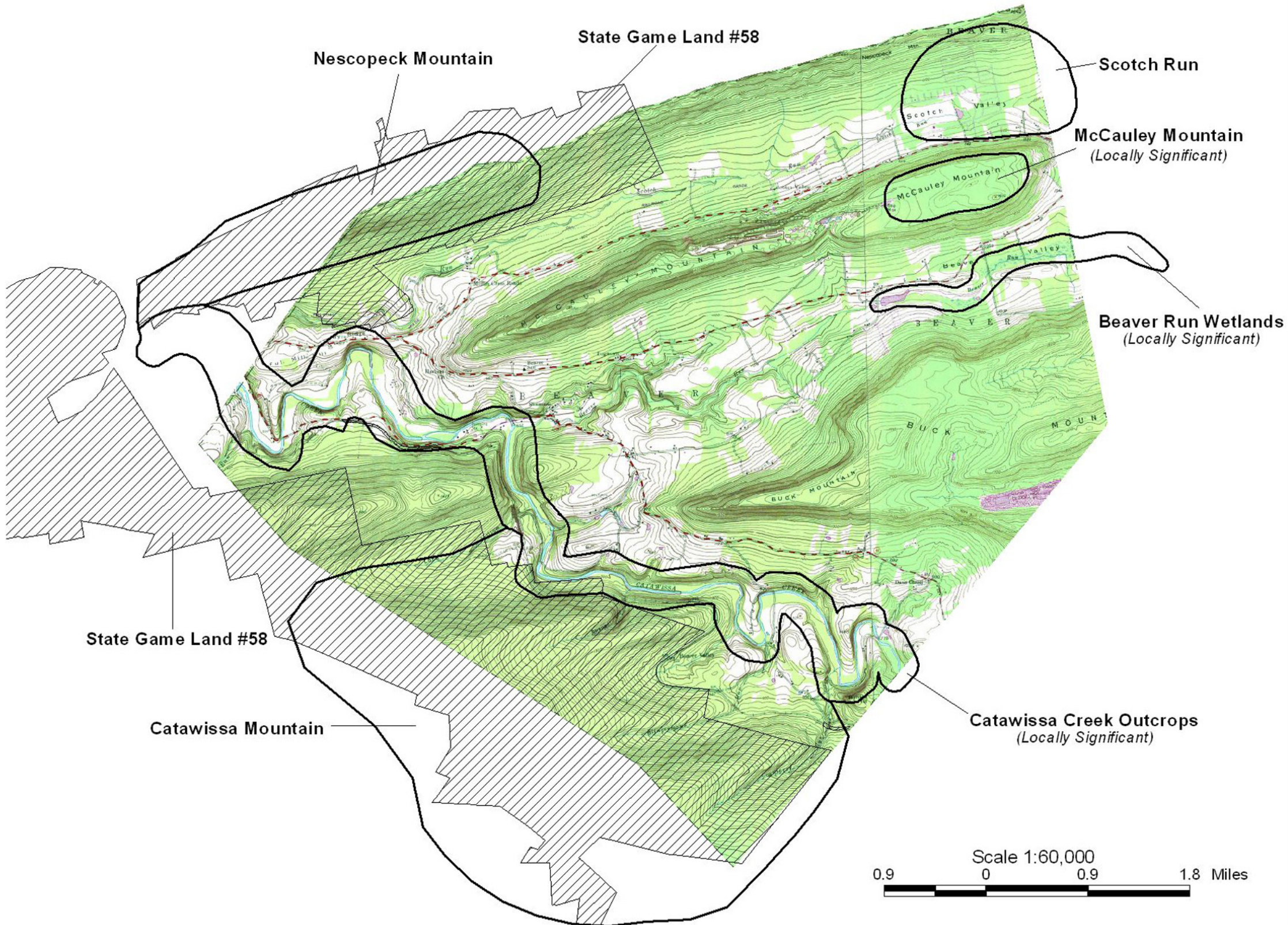
A large percentage of the township remains forested. These large forested tracts, including State Game Lands #58, are extremely important corridors for movement of animals through the landscape. Though no surveys were completed on Buck and McCauley Mountains, the areas provide important habitat for a variety of species. These may include animals that require rocky outcrop habitats on the ridgetops, such as the Allegheny woodrat (*Neotoma magister*). Large forested areas also provide critical breeding habitat for interior forest birds including Scarlet Tanager (*Piranga olivacea*), Worm-eating Warbler (*Helmitheros vermivorus*), Wood Thrush (*Hylocichla mustelina*) and Barred Owl (*Strix varia*). Continued preservation of large habitat patches will increase protection for these valuable natural resources in Columbia County, and provide an attractive landscape in which to live and work.

Insert map [BEAVER TOWNSHIP](#)

Beaver Township



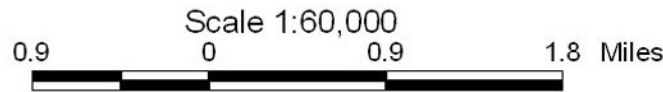
Beaver Township Columbia County Natural Areas Inventory



Natural Areas:
Catawissa Mountain
Nescopeck Mountain
Scotch Run

Locally Significant Sites:
Beaver Run Wetlands
Catawissa Creek Outcrops
McCauley Mountain

Managed Areas:
State Game Land #58



Legend

- Managed Area
- Natural Area or Locally Significant Site

(Beaver Twp. continued)

State Game Land #58 is one of the largest tracts of forest remaining in Columbia County. It is part of a continuously forested ridge and valley complex connecting Moosic Mountain in Lackawanna County, through Luzerne County to Nesciopeck Mountain and into the Roaring Creek watershed, finally connecting with the Susquehanna River. It is the continuously forested nature of this mountainous system that is its biggest attribute. State Game Land #58 provides an essential link in the chain of forested habitats from the Pocono Mountains to the Susquehanna River. This green corridor provides essential habitat and an avenue of migration for many species of animals and plants. If the continuity of this forested corridor is broken by additional roadways and development, the protected portions would become virtual islands, isolated from the supporting landscape, reducing its viability as a functioning ecosystem. This area also provides great opportunities for outdoor recreation for local residents including hunting, hiking, birdwatching, and many other outdoor activities. Much of this corridor is in public lands in Columbia County. Additional connecting parcels should be purchased for conservation purposes if the opportunity arises.

State Game Lands #58 contains 12,646 acres of mountainous forest dissected by small streams that flow into the Catawissa Creek watershed. The area is primarily deciduous forest dominated by a 'dry oak-heath' and 'dry oak-mixed hardwood' forest types but also includes pockets of 'hemlock-hardwood forest' and 'pitch pine-mixed oak forest' (Fike 1999).

State Game Lands #58 is an important component in the landscape for many reasons. A good diversity of bird species were observed in during surveys in portions of the game lands. Bird species documented include Scarlet Tanager (*Piranga olivacea*), Wood Thrush (*Hylocichla mustelina*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*), Eastern Wood-Pewee (*Contopus virens*), Red-eyed Vireo (*Vireo olivaceus*), Black-throated Blue Warbler (*Dendroica caerulescens*), Canada Warbler (*Wilsonia canadensis*), Blue-headed Vireo (*Vireo solitarius*), Magnolia Warbler (*Dendroica magnolia*), Blackburnian Warbler (*Dendroica fusca*), Barred Owl (*Strix varia*), White-breasted Nuthatch (*Sitta carolinensis*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Hooded Warbler (*Wilsonia citrina*), and Black-and-white Warbler (*Mniotilta varia*). Other animal species observed include box turtle (*Terrapene carolina*), wood frog (*Rana sylvatica*), American toad (*Bufo americanus*), spotted salamander (*Ambystoma maculatum*), garter snake (*Thamnophis sirtalis*), eastern chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), red-backed vole (*Clethrionomys gapperi*), short-tailed shrew (*Blarina brevicauda*), black swallowtail (*Papilio polyxenes*) and tiger swallowtail (*Papilio glaucas*). The landscape has been altered by food plots and grassy strips, both of which can provide valuable habitat for wildlife. Some rocky outcrops are evident on mountaintops and many of the ravines and streams are lined with hemlocks

CATAWISSA MOUNTAIN - STATE GAME LANDS #58 (Beaver and Roaring Creek Townships) – This portion of Catawissa Mountain is home to an unknown quality population of an **S3S4 animal species of concern** that was documented here in the summer of 2003. This species requires rocky outcrops as its primary habitat. These animals commonly move through lower elevation habitats during the summer months. Forest composition is a mixed hardwood/heath community, which includes species such as chestnut oak (*Quercus montana*), scarlet oak (*Quercus coccinea*), red maple (*Acer rubrum*), lowbush blueberry (*Vaccinium pallidum*), mountain laurel (*Kalmia latifolia*), and black huckleberry (*Gaylussacia baccata*).

(Beaver Twp. continued)

An **Ephemeral/Fluctuating Pool Natural Community** was also located at this site during surveys in 2003. These ponds serve as important breeding areas for amphibians such as wood frogs (*Rana sylvatica*), spotted salamanders (*Ambystoma maculatum*) and American toad (*Bufo americanus*). Plant species associated with the ponds include cranberry (*Vaccinium macrocarpon*), greenbriar (*Smilax* spp.), royal fern (*Osmunda regalis*), tussock sedge (*Carex stricta*), cinnamon fern (*Osmunda cinnamomea*), woolgrass (*Scirpus cyperinus*), and sphagnum moss (*Sphagnum* spp.). Canopy trees and shrubs ringing the ponds include blackgum (*Nyssa sylvatica*), white oak (*Quercus alba*), red maple (*Acer rubrum*), pitch pine (*Pinus rigida*), sassafras (*Sassafras albidum*), witch-hazel (*Hamamelis virginiana*), highbush blueberry (*Vaccinium corymbosum*), sheep's laurel (*Kalmia angustifolia*) and low sweet blueberry (*Vaccinium angustifolium*).

Threats and Disturbances

There are no direct threats to this site; however, future land use changes could affect the species of concern and the natural community. The increased use of All Terrain Vehicles (ATVs) in public forest property poses a potential threat to the site.

Conservation Recommendations

More surveys are necessary to determine the primary habitat for the species of concern and relative health of the population. Any future logging along the ridgetops should occur only during the winter months, and undisturbed forested buffers should surround rock outcrops and rock scree areas, the primary habitat of this species of concern. Future placement of any communication towers and access roadways should avoid these same habitats. Access roadways should be kept to a minimum to avoid unnecessary fragmentation of the habitat. New access roads typically inject numerous introduced invasive species into previously undisturbed habitats, potentially upsetting regional ecological processes. If logging should occur near the ephemeral pool natural community, undisturbed forested buffers around the ponds are necessary to protect the integrity of this community. The site should be monitored for ATV traffic, and ATV trails near the disturbance-sensitive ponds and rock outcrops blocked as they appear. Additional surveys for species of concern in this area are encouraged.

NESCOPECK MOUNTAIN STATE GAME LANDS #58 (Beaver, Main and Mifflin Townships) - Nescopeck Mountain is home to an unknown quality population of an **S3S4 animal species of concern** that was documented there in the summer of 2003. Two individuals were found in rocky outcrop habitat along the slopes of the mountain. Forest composition is a "dry oak/heath community" which includes species such as red oak (*Quercus rubra*), chestnut oak (*Quercus montana*), scarlet oak (*Quercus coccinea*), black birch (*Betula lenta*), red maple (*Acer rubrum*), pitch pine (*Pinus rigida*), American chestnut (*Castanea dentata*), serviceberry (*Amelanchier* spp.), lowbush blueberry (*Vaccinium pallidum*), mountain laurel (*Kalmia latifolia*), sheep's laurel (*Kalmia angustifolia*), black huckleberry (*Gaylussacia baccata*), bracken fern (*Pteridium aquilinum*), Virginia creeper (*Parthenocissus quinquefolia*), and wild sarsaparilla (*Aralia nudicaulis*).

Threats and Disturbances

There were no observed direct threats to this site; however, it has had some recent disturbance from logging. There is increasing pressure on these habitats to be used as communication tower sites. Additionally, other utility right-of-ways (ROWs) fragment the continuity of the generally undisturbed habitat. These activities detrimentally impact the quality of this natural habitat.

(Beaver Twp. continued)

Conservation Recommendations

More surveys are necessary to determine the extent of the population of the animal species of concern found in this area. Any future ridgetop logging should occur only during the winter months and undisturbed forested buffers should surround rock outcrops and rock scree fields, the primary habitat of this species of concern. Future placement of any communication towers, utility ROWs and access roadways should avoid these same habitats. Access roadways should be kept to a minimum to avoid unnecessary fragmentation of the habitat. New access roads typically inject numerous introduced invasive species into previously undisturbed habitats, potentially upsetting ecological processes.

SCOTCH RUN - (Beaver Township) - An Ephemeral/Fluctuating Pool Natural Community was documented at this site during surveys in 2003. Scotch Run was dammed and a reservoir established in the past. A small residential community with a fairly extensive road system is now located along Scotch Run and around this reservoir. The “hemlock-mixed hardwood palustrine forest” east of the reservoir contains numerous forested wetlands and vernal pools. These pools provide important breeding habitat for amphibians such as wood frogs (*Rana sylvatica*), spring peepers (*Pseudacris crucifer*) and spotted salamanders (*Ambystoma maculatum*). A variety of plant species are also in this forest including eastern hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), white oak (*Quercus alba*), American beech (*Fagus grandifolia*), red oak (*Quercus rubra*), rhododendron (*Rhododendron maximum*), skunk cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), false hellebore (*Veratrum viride*), goldthread (*Coptis trifolia*), wood anemone (*Anemone quinquefolia*), teaberry (*Gaultheria procumbens*) and sphagnum moss (*Sphagnum* spp.).

Threats and Disturbances

This biggest threat to this community is destruction of vernal ponds during construction of new houses. These small wetlands are often filled and developed, destroying the natural community and important breeding habitat for amphibians. Disturbances include numerous dirt roads bisecting the habitat and separating vernal pools. The proximity of these ponds to residential development may lead to abuses such as dumping of household waste, lawn clippings and other debris. The ponds may also be perceived as mosquito breeding areas, with accompanying demands for pesticide application to reduce insect populations. Introduced invasive species of plants can threaten the natural character and diversity of this site. The increased use of All Terrain Vehicles (ATVs) in forested property poses a potential threat to the site.

Conservation Recommendations

An undisturbed forested buffer between nearby residences and the ponds should be established. Local planning should discourage further development near this sensitive wetland community. Residents of Scotch Valley will benefit from preservation of natural resources in this area. Not only will the natural beauty of the area be preserved, but ecological services such as flood control will also be beneficial for residents. The site should be monitored for ATV traffic, and trails blocked as they appear. Aquatic pesticide applications for mosquito control should be avoided in these ponds, as this would disrupt the food cycle necessary to maintain amphibian populations. Additional surveys for species of concern in this area are encouraged.

(Beaver Twp. continued)

LOCALLY SIGNIFICANT AREAS:

Beaver Run Wetlands (Beaver Township, Luzerne County) - This **locally significant site** contains an extensive and diverse wetland that is one of the better quality wetlands in Columbia County. The largest component of this wetland complex mosaic is an extensive “highbush blueberry – meadow-sweet shrub swamp”. Other characteristic wetland plant species found at this site include the shrubs northern arrow-wood (*Viburnum recognitum*), speckled alder (*Alnus incana*), poison sumac (*Toxicodendron vernix*), black ash (*Fraxinus nigra*), mountain holly (*Nemopanthus mucronatus*), red elderberry (*Sambucus racemosa*), buttonbush (*Cephalanthus occidentalis*), and steeple-bush (*Spiraea tomentosa*). Associated herbaceous species include skunk cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), cattail (*Typha latifolia*), yellow pond lily (*Nuphar lutea*), soft rush (*Juncus effusus*), marsh St.-John’s-wort (*Triadenum virginicum*), smooth goldenrod (*Solidago gigantea*), fowl mannagrass (*Glyceria striata*), rattlesnake grass (*Glyceria canadensis*), sedge (*Carex lacustris*), sedge (*Carex lurida*), swamp candles (*Lysimachia terrestris*), Canada bluejoint (*Calamagrostis canadensis*), woolgrass (*Scirpus cyperinus*), iris (*Iris versicolor*) and prickly sedge (*Carex echinata*).

The shrub swamp is alongside slow-moving Beaver Run, which is fairly wide in some places dominated by yellow pond lily. Another component of this extensive swamp is a “red maple-yellow birch-eastern hemlock palustrine forest”. Additional plant species not found in the above shrub swamp include false hellebore (*Veratrum viride*), orange jewelweed (*Impatiens capensis*), Jack-in-the-pulpit (*Arisaema triphyllum*), black tupelo (*Nyssa sylvatica*), Canada mayflower (*Maianthemum canadense*), Solomon’s seal (*Polygonatum pubescens*), halberd-leaved tearthumb (*Polygonum arifolium*), cinnamon fern (*Osmunda cinnamomea*), partridgeberry (*Mitchella repens*), and white pine (*Pinus strobus*). Yet another similar component of this shrub swamp is a cattail marsh (*Typha latifolia*) and “buttonbush - highbush blueberry shrub swamp”. A few of the species found in this swamp that are absent from the site above include swamp rose (*Rosa palustris*), winterberry holly (*Ilex verticillata*), and hawthorn (*Crataegus* sp.).

Some species of birds found within this wetland complex include Yellow Warbler (*Dendroica petechia*), Common Yellowthroat (*Geothlypis trichata*), Ovenbird (*Seiurus aurocapillus*), House Wren (*Troglodytes aedon*), Gray Catbird (*Dumetella carolinensis*), and Swamp Sparrow (*Melospiza georgiana*). Also documented here is Spangled Skimmer (*Libellula cyanea*), a species of dragonfly.

Threats and Disturbances

Any land use changes in the surrounding area could affect the hydrology of the wetland. Runoff from the nearby roadway is a disturbance that could change the natural state of the wetland. The surrounding agricultural and residential landuse may not provide an adequate protective buffer to this important habitat. Runoff from residences, streets and agricultural fields could impair the water quality of the wetland. The spread of invasive plant species into the wetland could displace much of the native diversity within this habitat.

Conservation Recommendations

Some areas adjacent to the wetland require additional forested buffers to minimize the impact of non-point sources of pollution. Forested buffers provide critical protection to streams by reducing nutrient, sediment and toxic runoff from roads, residences and agricultural fields.

(Beaver Twp. continued)

Monitoring for invasive species of plants is also recommended. Populations of invasive species removed as they first appear are far more easily and effectively eliminated than established populations. A program could be initiated to monitor the wetland, hydrology and surrounding land use. This would ensure the integrity of one of the best examples of a shrub swamp in the county.

Catawissa Creek Outcrops – (Beaver and Main Townships) - This **locally significant site** includes the forested slopes along the Catawissa Creek from where it enters the county at the Schuylkill County border to the mountain gap at Mainville. Along the banks of the creek, which are exceptionally scenic, the hemlock and hardwood forests are underlain with thick stands of rhododendron. Stony outcrops flank the water at the many sharp bends in the creek. The clear waters, at first appearing sparkingly clean, at closer inspection reveal an aquatic ecosystem nearly devoid of life. One would expect to find numerous stonefly and mayfly nymphs, snails and other aquatic invertebrates attached to the underside of rocks within the creek. Fish, crayfish and submerged aquatic vegetation should be easily observed while turning over stones in the creek. None of these simple signs of life are easily found in this nearly sterile aquatic ecosystem. As a result, many other common animals further up the food chain are absent as well. Birds and mammals that feed on the fish, aquatic insects and other aquatic invertebrates are also lacking from this environment. Acid mine drainage (AMD) from coal mines long since abandoned, has greatly impacted this otherwise beautiful stretch of creek.

Despite this unfortunate and difficult-to-remedy aquatic impairment, the forested slopes along the creek act as a buffer to the waterway, filtering runoff, providing shade to the creek and acting as an essential corridor of habitat to terrestrial animal life. Several interesting plant species were noted along the banks of the creek. A large population of the relatively uncommon evergreen shrub American yew (*Taxus canadensis*) was observed hanging onto rock outcrops shaded by overarching hemlocks. This species was recently removed from the plant species of concern list based on updated statewide population estimates. Yew has been in decline over much of its range in the state due to habitat loss and over-browsing by deer (Rhoads and Block 2000). Recent documentation of several excellent quality populations of yew in Columbia County may suggest this species is truly on the rebound. The golden club (*Orontium aquaticum*) is another plant species that was recently removed from the species of concern list that was observed along the Catawissa Creek. This emergent aquatic plant species is spectacular when in bloom with its foot-long yellow club-like flower. A fair-quality population of this plant was found growing out of cracks in the creek bank bedrock.

Several massive rock outcrops occur at bends in the creek. These outcrops provide unique habitat conditions depending on the degree of moisture, solar exposure and bedrock substrate of which the outcrops are composed. Southerly-facing outcrops tend to be dry, with a very different plant community than typically cooler, moister northerly-facing cliffs. Most of the smaller outcrops along the creek have a similar plant community with early spring wildflowers such as columbine (*Aquilegia canadensis*), alum-root (*Heuchera americana*), early saxifrage (*Saxifraga virginensis*), miterwort (*Mitella diphylla*), moss pink (*Phlox subulata*), and a good variety of ferns including marginal wood fern (*Dryopteris marginalis*), spinulose wood fern (*D. carthusiana*), evergreen wood fern (*D. intermedia*), rock polypody (*Polypody virginianum*), Christmas fern (*Polystichum acrostichoides*), maidenhair spleenwort (*Asplenium trichomanes*), fragile fern (*Cystopteris tenuis*), New York fern (*Thelypteris noveboracensis*) and silvery glade fern (*Deparia acrostichoides*). Shrubs on these outcrops typically include wild hydrangea

(Beaver Twp. continued)

(*Hydrangea arborescens*), purple-flowering raspberry (*Rubus odoratus*), wild gooseberry (*Ribes rotundifolium*), pinxter-flower (*Rhododendron periclymenoides*), rosebay (*Rhododendron maximum*), elderberry (*Sambucus canadensis*) and two native bush honeysuckles (*Diervilla lonicera* & *Lonicera canadensis*). The tree canopy overarching these smaller outcrops consists primarily of Hemlock and mixed hardwoods including black birch (*Betula lenta*), river birch (*B. nigra*), basswood (*Tilia americana*), ash (*Fraxinus* sp.), red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), American elm (*Ulmus americana*), black cherry (*Prunus serotina*), choke cherry (*P. virginiana*), hackberry (*Celtis occidentalis*) and hop-hornbeam (*Ostrya virginiana*).

A very large and steep, dry outcrop along the creek has an interesting plant composition. Walking fern (*Asplenium rhizophyllum*), which is typically found on limestone, red cedar (*Juniperus virginiana*) and dwarf hackberry (*Celtis tenuifolia*) are typically found on dry sites, and American yew, which is usually found beneath the cool shade of hemlock are all growing on the same outcrop. This large, dry, loose-shale outcrop near the confluence with Mine Run was not adequately surveyed at the time of the creek survey and merits future investigations.

Another very steep and high outcrop occurs further downstream at the confluence with Scotch Run. This cliff has a northerly exposure, and is very wet. The cool, shaded conditions at his location provide habitat for a different plant community. Herbaceous species found at the site include swamp saxifrage (*Saxifraga pennsylvanica*), early saxifrage (*Saxifraga virginensis*), Virginia waterleaf (*Hydrophyllum virginianum*), golden saxifrage (*Chrysosplenium americanum*), Pennsylvania bittercress (*Cardamine pennsylvanica*), zigzag goldenrod (*Solidago flexicaulis*) and a variety of liverworts and moss species, which cover much of the dripping wet rock surface.

Threats and Disturbances:

The degraded condition of the watershed due to acid mine drainage is the main disturbance to this otherwise quality habitat. Logging to the creek edge was observed in some areas. New houses built on the banks of the creek fragment the continuity of the habitat, interrupting its effect as a wildlife corridor, and potentially introduce invasive species of plants into the habitat.

Conservation Recommendations:

The Catawissa Creek Restoration Association (CCRA) has been very active in implementing measures designed to diminish the effects of acid mine drainage on this aquatic system. A method employed by the CCRA, along with a contingent of volunteer organizations and individuals, has been to buffer the acidity of the water with the addition of many hundreds of tons of limestone sand to the creek bed. Plans for AMD pond filtration systems are being developed for some of the major AMD sources. Forested buffers should remain intact for the length of the creek with logging operations refraining from cutting within 50 to 100 feet of the creek bank. Stream bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential and roadway settings. In addition, the stream bank floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Much of the area's important biodiversity can be preserved by maintaining an intact, forested floodplain along the creek. The effectiveness of the forested creek as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses and additional roadways along the creek. Local planning should discourage construction of new residences and roadways along the creek, adjacent slopes and floodplain.

(Beaver Twp. continued)

McCauley Mountain (Beaver Township) – This **locally significant site** was delineated from aerial photography. This portion of McCauley Mountain appears to have a series of wetlands, some of which were likely created as the result of mining exploration, but others appear to be naturally occurring vernal ponds. Several of the ponds are ringed in hemlocks and surrounded in a relatively undisturbed deciduous forest matrix.

Disturbances and Threats

Nearby mining activities have disturbed adjacent portions of McCauley Mountain, but there appears to be little recent disturbance to this section of the mountain. Development pressure as well as pressure for utility ROWs and communications towers are additional potential threats to this site.

Conservation Recommendations

Future placement of any communication towers and access roadways should avoid these habitats. Access roadways should be kept to a minimum to avoid unnecessary fragmentation of the habitat. New access roads typically inject numerous introduced invasive species into previously undisturbed habitats, potentially upsetting regional ecological processes. If logging should occur near the ephemeral pool natural community, undisturbed forested buffers around the ponds are necessary to protect the integrity of this community. The site should be monitored for ATV traffic, and trails near the disturbance-sensitive ponds blocked as they appear. Ground surveys in this area are encouraged.



Golden-club (*Orontium aquaticum*) was found emerging between cracks in the bedrock along the Catawissa Creek. This species was recently removed from the PA species of concern list due to updated statewide population estimates.

Photo: PA Science Office of The Nature Conservancy

BENTON TOWNSHIP and Benton Borough

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

Locally Significant Areas: Maple Grove Slopes and Floodplain

Managed Areas: None

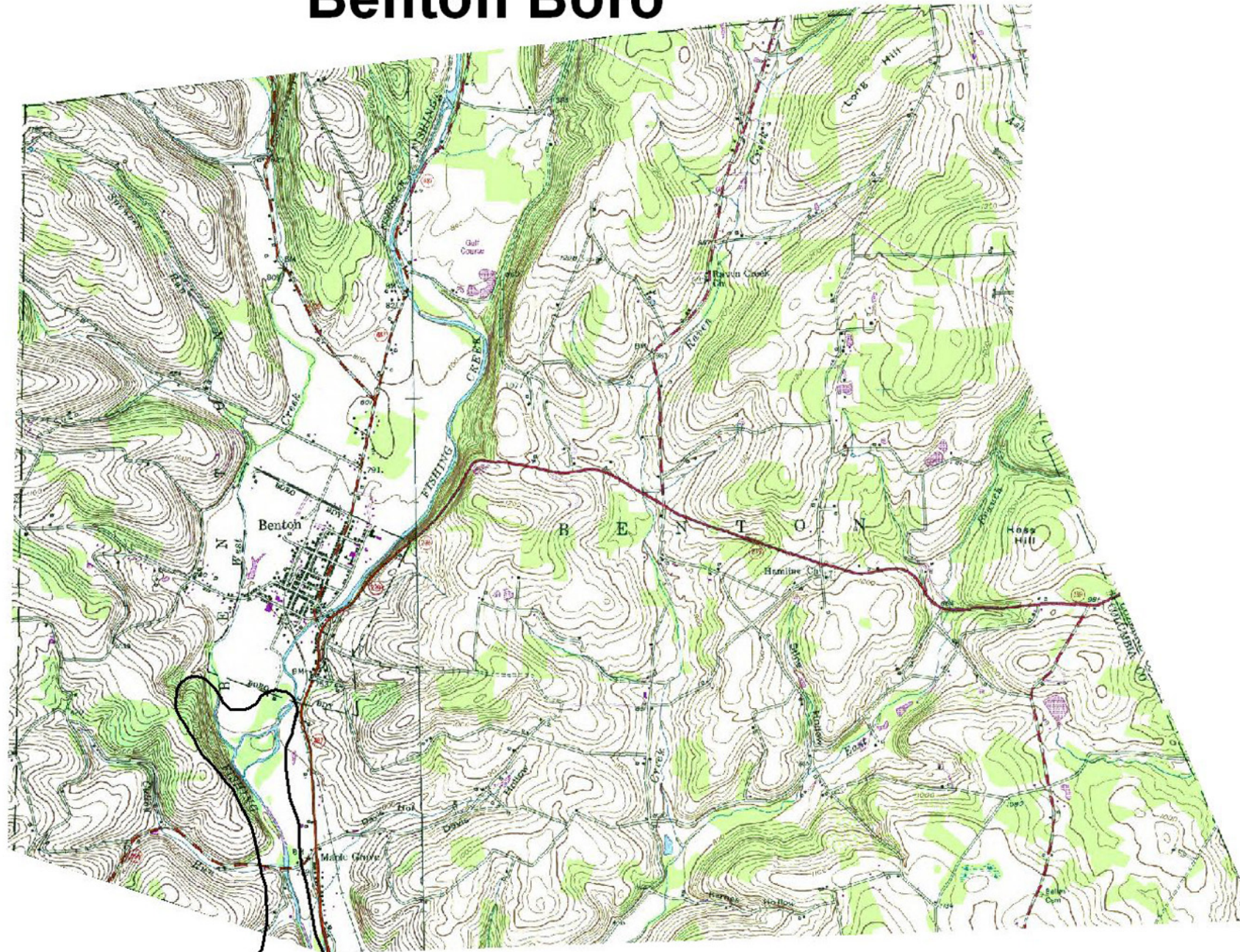
Benton Township is located in the northeast corner of the county. Though the landscape is largely agricultural, some significant forested patches remain. Field surveys did not identify any species of concern in this township, however much of the area was not included in the ground surveys. Some of the most important features in this township include forested slopes, such as the locally significant **Maple Grove Slopes and Floodplain**. The forested slopes along Fishing Creek are important to protect water quality in the watershed. The township is entirely within Fishing Creek watershed and activities in the area will directly affect the creek. It is important to retain forested buffers along the creek whenever possible. It is also important to protect tributaries of the creek including **Culley Run, Spencer Run, Raven Creek and West Creek**. Logging on the steep slopes along creeks increases soil erosion and agricultural runoff, decreasing water quality in the creek. Restoration of forested buffers along streams is an excellent way to help increase water quality in the watershed, as well as increase productivity of fisheries. Additional surveys of forested slopes, ravines and streams in this township are encouraged.



Insert map [BENTON TOWNSHIP](#) Excellent quality populations of American yew (*Taxus canadensis*) were found in several locations in Columbia County. This species was recently removed from the PA species of concern list due to updated statewide population estimates.



Benton Township Benton Boro



Maple Grove Slopes and Floodplain
(Locally Significant)

Scale 1:40,000




Benton Township and Benton Boro

Columbia County
Natural Areas Inventory

Locally Significant Sites:
Maple Grove Slopes and Floodplain



Legend

 Natural Area or Locally Significant Site

(Benton Twp. continued)

LOCALLY SIGNIFICANT AREAS:

Maple Grove Slopes and Floodplain – (Benton and Fishing Creek Townships) – This **locally significant site** is composed of the Fishing Creek floodplain and forested slopes between Benton and Stillwater. The floodplain broadens in areas to create islands within the meandering confines of the creek bed. These floodplain areas typically harbor a rich herbaceous flora and higher biodiversity than the surrounding uplands. Herbaceous vegetation along the floodplain of Fishing Creek in this area included twisted sedge (*Carex torta*), long sedge (*Carex folliculata*), large water-starwort (*Callitriche heterophylla*), blue cohosh (*Caulophyllum thalictroides*), white turtlehead (*Chelone glabra*), horse-balm (*Collinsonia canadensis*), sweet joe-pye weed (*Eupatorium purpureum*), flat-top goldenrod (*Euthamia graminifolia*), spotted jewel-weed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*), arrow-leaved tearthumb (*Polygonum sagittatum*), cut-leaved coneflower (*Rudbeckia laciniata*), jack-in-the-pulpit (*Arisaema triphyllum*), stinging nettle (*Urtica dioica*), true forget-me-not (*Myosotis scorpioides*), lady's thumb (*Polygonum persicaria*) and the invasive introduced species Japanese knotweed (*Polygonum cuspidatum*).

The slopes of the adjacent hillsides have a mixed coniferous-deciduous canopy dominated by hemlock (*Tsuga canadensis*) but include sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), beech (*Fagus grandifolia*), basswood (*Tilia americana*), tulip poplar (*Liriodendron tulipifera*) and black cherry (*Prunus serotina*). The shrub layer is composed of the aforementioned tree seedlings as well as hop-hornbeam (*Ostrya virginiana*), striped maple (*Acer pensylvanicum*), mountain maple (*Acer spicatum*), wild hydrangea (*Hydrangea arborescens*), maple-leaf viburnum (*Viburnum acerifolium*), elderberry (*Sambucus canadensis*), black raspberry (*Rubus occidentalis*), purple flowering raspberry (*Rubus odoratus*) and two native bush honeysuckle species northern bush-honeysuckle (*Diervilla lonicera*) and fly-honeysuckle (*Lonicera canadensis*). The shrub layer along the hillside also includes an excellent quality population of the relatively uncommon shrub species American yew (*Taxus canadensis*). This species was recently removed from the plant species of concern list based on updated statewide population estimates. Yew has been in decline over much of its range in the state due to habitat loss and over-browsing by deer (Rhoads and Block 2000). Recent documentation of several excellent quality populations of yew in Columbia County may suggest this species is truly on the rebound.

The herbaceous layer on the forested slopes has a rich mixture of woodland wildflower including climbing fumitory (*Adlumia fungosa*), Canada mayflower (*Maianthemum canadense*), partridgeberry (*Mitchella repens*), heart-leaved foam-flower (*Tiarella cordifolia*) and downy Solomon's-seal (*Polygonatum pubescens*). Along with these herbaceous species is a diverse fern flora including maidenhair spleenwort (*Asplenium trichomanes*), lady-fern (*Athyrium filix-femina*), rattlesnake fern (*Botrychium virginianum*), three varieties of wood ferns (*Dryopteris carthusiana*, *D. intermedia*, *D. marginalis*), northern oak fern (*Gymnocarpium dryopteris*), rock polypody (*Polypodium virginianum*) and Christmas fern (*Polystichum acrostichoides*). A historic population of the fern species of concern, Braun's holly fern (*Polystichum braunii*), had been reported from near Benton. This species was not located during a survey of the area, but the excellent population of yew at this location suggests a relatively undisturbed high quality habitat remains along these slopes. Additional surveys for Braun's holly fern and other species of concern are encouraged along the forested slopes in this area.

(Benton Twp. continued)

Threats and Disturbances

The floodplain of Fishing Creek appears to be in good condition though encroaching development and agricultural fields have removed the forest buffer in some areas. A high deer population could severely impact the regrowth of tree seedlings and herbaceous species. Indiscriminate logging could severely diminish the quality of this habitat by allowing invasive species of plants a foothold in the otherwise unfragmented forest canopy.

Conservation Recommendations

Forested buffers should be maintained along the creek and adjacent to floodplains of Fishing Creek. Development in the floodplain should be strongly discouraged. Where buffers are absent, property owners could be encouraged to enroll in streamside erosion reduction programs like the Conservation Reserve Program (CRP and CREP). Clear cut lumbering operations should be discouraged in favor of selectively managed forestry practices which may include the harvesting of lower quality trees while allowing the higher quality trees to continue to act as a seed source for the area.



Rocky outcrops on the slopes along Fishing Creek south of Benton.

(Benton Twp. continued)



Wood turtles (top) and spotted turtles (bottom) are two common though declining species of turtles encountered during surveys in Columbia County.
Photos: PA Science Office of The Nature Conservancy

BRIAR CREEK TOWNSHIP; Briar Creek & Berwick Boroughs

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Little Shickshinny Creek	Hemlock Palustrine Forest Natural Community	G5	S3	N	2003-06-11	D
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: Summer Hill Bog

Managed Areas: Briar Creek State Park
State Game Lands #55

Briar Creek Township is located in the eastern portion of Columbia County. In addition to the sites identified on the map, some of the most important features in this township are the forested corridors along **Briar Creek** and the **East Branch of Briar Creek**. The forested areas along the creek serve to protect water quality in the streams as well as connecting these riparian habitats to the larger forested areas of **Lee Mountain** and State Game Lands #55. Retaining this landscape connectivity is crucial in preserving natural resources in Briar Creek Township and Columbia County. Though much of the land use in the township is agricultural and residential, these remaining forested habitats remain connected and allow for a natural flow of life across the landscape. We urge township residents to work to protect these important natural features in their landscape. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

LITTLE SHICKSHINNY CREEK (Briar Creek Township) - This site contains a diverse array of habitats including a '**Hemlock Palustrine Forest Natural Community**', a 'red maple swamp', a 'dry oak-heath forest', a reservoir, and a 'highbush blueberry shrub swamp'. The headwaters of the Little Shickshinny Creek also contain a good degree of plant diversity in a relatively undisturbed forested matrix. Species associated with the hemlock palustrine forest, along with the dominant tree species eastern hemlock (*Tsuga canadensis*), include yellow birch (*Betula alleghaniensis*), black gum (*Nyssa sylvatica*), beech (*Fagus grandifolia*), white pine (*Pinus strobus*), sensitive fern (*Onoclea sensibilis*), skunk cabbage (*Symplocarpus foetidus*), hay-scented fern (*Dennstaedtia punctilobula*), rhododendron (*Rhododendron maximum*), mountain laurel (*Kalmia latifolia*), and Jack-in-the-pulpit (*Arisaema triphyllum*). Species associated with the red maple swamp and the shrub swamp include royal fern (*Osmunda regalis*), silky dogwood

Insert map [BRIAR CREEK TOWNSHIP](#)



Briar Creek Township Briar Creek and Berwick Boro

Briar Creek Township and Briar Creek Boro and Berwick Boro

Columbia County Natural Areas Inventory

Natural Areas:

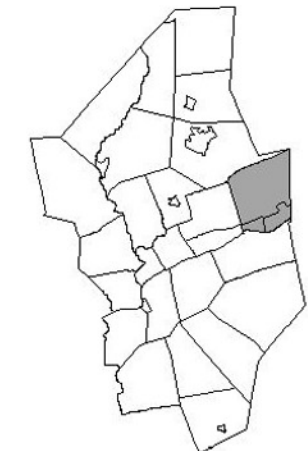
- Little Shickshinny Creek
- Susquehanna River (North)

Locally Significant Sites:

- Summer Hill Bog

Managed Areas:

- Briar Creek State Park
- State Game Land #55



Legend

- Managed Area
- Natural Area or Locally Significant Site

(Briar Creek Twp. continued)

(*Cornus amomum*), cinnamon fern (*Osmunda cinnamomea*), meadow-sweet (*Spiraea latifolia*), swamp dewberry (*Rubus hispidus*), starflower (*Trientalis borealis*), sedge (*Carex folliculata*), winterberry holly (*Ilex verticillata*), gray birch (*Betula populifolia*), pink azalea (*Rhododendron periclymenoides*), speckled alder (*Alnus incana*), soft rush (*Juncus effusus*), and wild calla (*Calla palustris*).

Little Shickshinny and its tributaries are well shaded by hemlocks (*Tsuga canadensis*), providing superior conditions for trout and other stream-dwelling species. Plant species found along the creek include yellow birch (*Betula allegheniensis*), blackgum (*Nyssa sylvatica*), rhododendron (*Rhododendron maximum*), Canada mayflower (*Maianthemum canadense*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), partridge berry (*Mitchella repens*), skunk cabbage (*Symplocarpus foetidus*), dwarf ginseng (*Panax trifolius*), pink lady's-slipper (*Cypripedium acaule*) and starflower (*Trientalis borealis*).

The ridgetop area in the State Game Lands represents dry oak/heath forest dominated by species such as red oak (*Quercus rubra*), black oak (*Quercus velutina*), chestnut oak (*Quercus montana*), red maple (*Acer rubrum*), black birch (*Betula lenta*), sassafras (*Sassafras albidum*), white pine (*Pinus strobus*), hemlock (*Tsuga canadensis*), mountain laurel (*Kalmia latifolia*), low sweet blueberry (*Vaccinium angustifolium*), witch hazel (*Hamamelis virginiana*), and pinxter flower (*Rhododendron periclymenoides*).

The bird diversity was exceptional for the area. Bird species documented include Song Sparrow (*Melospiza melodia*), Cerulean Warbler (*Dendroica cerulea*), Acadian Flycatcher (*Empidonax virescens*), Louisiana Waterthrush (*Seiurus motacilla*), Black-throated Green Warbler (*Dendroica virens*), Black-throated Blue Warbler (*Dendroica caerulescens*), Nashville Warbler (*Vermivora ruficapilla*), Dark-eyed Junco (*Junco hyemalis*), Veery (*Catharus fuscescens*), Wood Thrush (*Hylocichla mustelina*), Hermit Thrush (*Catharus guttatus*), Barred Owl (*Strix varia*), Common Yellowthroat (*Geothlypis trachias*), Yellow-rumped Warbler (*Dendroica coronata coronata*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Brown Creeper (*Certhia americana*), Blue-headed Vireo (*Vireo solitarius*), Ovenbird (*Seiurus aurocapillus*), Scarlet Tanager (*Piranga olivaceus*), American Redstart (*Setophaga ruticilla*), Black-and-white Warbler (*Mniotilta varia*), Eastern Towhee (*Pipilo erythrophthalmus*), Black-capped Chickadee (*Poecile atricapilla*), Great Crested Flycatcher (*Myiarchus crinitus*), Northern Flicker (*Colaptes auratus*), Blackburnian Warbler (*Dendroica fusca*), Alder Flycatcher (*Empidonax alnorium*), Hooded Warbler (*Wilsonia pusilla*), Worm-eating Warbler (*Helmitheros vermivorus*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*), Magnolia Warbler (*Dendroica magnolia*), and Red-eyed Vireo (*Vireo olivaceus*).

Besides the exceptional bird diversity, the variety of habitats constitutes a good place for other fauna. The wetland areas also have potential to support rare plants. Despite the light disturbance, this area is excellent habitat and is important on a landscape level because it forms part of a continuously forested ridgeline which stretches into the Pocono Mountains. This area includes land under the jurisdiction of the Camp Louise Girl Scout Camp and State Game Lands #55.

Threats and Disturbances

The hemlock wooly adelgid (*Adelges tsugae*) threatens the conifer component of this site. Exotic invasive plant species are also a threat to this site. Disturbances within this area include scattered campsites and outbuildings. Light development is a disturbance more than a threat to

(Briar Creek Twp. continued)

many bird species and to the hydrology of the swamp. An increase in development throughout the area may alter the natural state of the wetlands and the hemlock palustrine forest and subsequently decrease the diversity of birds of the area. Littering is also a problem at this site.

Conservation Recommendations

It is recommended that development around sensitive areas such as the hemlock palustrine forest, shrub swamp, and the hemlock dominated forested areas be minimal. Management of the hemlock woolly adelgid through biological controls is an option that local land managers are considering for preservation of the 80 acre tract of hemlock-palustrine forest. This would protect valuable habitat for the diverse community of birds and other species dependant on the hemlocks. Control of exotic plant species is recommended to prevent further spread into the interior of the State Game Lands. Finally, education programs held at Camp Louise Girl Scout Camp about the flora, fauna, and natural communities around the area help to ensure the natural state of the camp and promote the area as one of the natural gems in Columbia County.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Briar Creek, Catawissa, Main, Mifflin, Montour, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site:

http://midwest.fws.gov/mussel/life_history.html.

The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species.

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands” natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp (*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases, providing drier habitat. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

Threats and Disturbances

There are numerous examples of disturbance along the Susquehanna River. These animal species of concern are affected by numerous non-point sources of pollution including sedimentation from cultivated and developed land along the river, runoff from roadways, pesticide runoff from agricultural fields, discharge of chemical pollutants and thermal pollution. The main threat to these animals is reduction of water quality. The banks, floodplains and islands of the river are in areas infested with the invasive introduced plant species Japanese knotweed

(Briar Creek Twp. continued)

(*Polygonum cuspidatum*) and purple loosestrife (*Lythrum salicaria*). Control of established populations of these species is very difficult, so eradication of pioneer populations is the best way to control the spread of these species of plants.

Conservation Recommendations

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

LOCALLY SIGNIFICANT SITE:

Summer Hill Bog - (Briar Creek Township and Luzerne County) – This **locally significant site** is a wetland habitat identified from aerial photographs and as part of a low-level reconnaissance flight over the county. The approximately 25 acre wetland at this site appears to be fairly well buffered by forests to the north and east, with agricultural fields adjacent to the south and west edges. Besides an apparent ditch running down the center of the wetland, the site appears to have had little recent disturbance. The wetland may be the result of, or enhanced by, beaver activity. There appears to be a ring of thick shrubs surrounding the edge of the wetland, with the expansive inner portions composed primarily of short shrubs and herbaceous vegetation, and may have floating vegetation mats.

Threats and Disturbances

A change in the hydrology of the wetland by damming or draining is the biggest threat to this site. There is an additional risk to the wetland from the potential loss of the forested buffer or the development of the adjacent agricultural landscape. Invasive species of plants are common detractors of otherwise quality habitats.

Conservation Recommendations

Modification of the existing hydrology should be strongly discouraged. This habitat would be severely degraded either by the construction of a dam to create a lake or by the draining of the wetland. The protection of existing forested buffers, and the creation of additional forested buffers will best protect this wetland habitat from all sources of disturbance. A ground survey of this site is needed to verify the type of habitat, and to identify the species composition of the wetland. A survey for wetland birds is also recommended.

CATAWISSA TOWNSHIP and Catawissa Borough

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Catawissa Bluffs	Jeweled Shooting-star (<i>Dodecatheon radicans</i>)	G?	S2	PT	2003-05-13	B
Rupert Bluffs	Northern Appalachian Shale Cliff Community	G?	S2	N	1997-05-13	BC
	Jeweled Shooting-star (<i>Dodecatheon radicans</i>)	G?	S2	PT	2003-05-07	B
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: Catawissa Shrub Swamp

Managed Areas: State Game Land #58

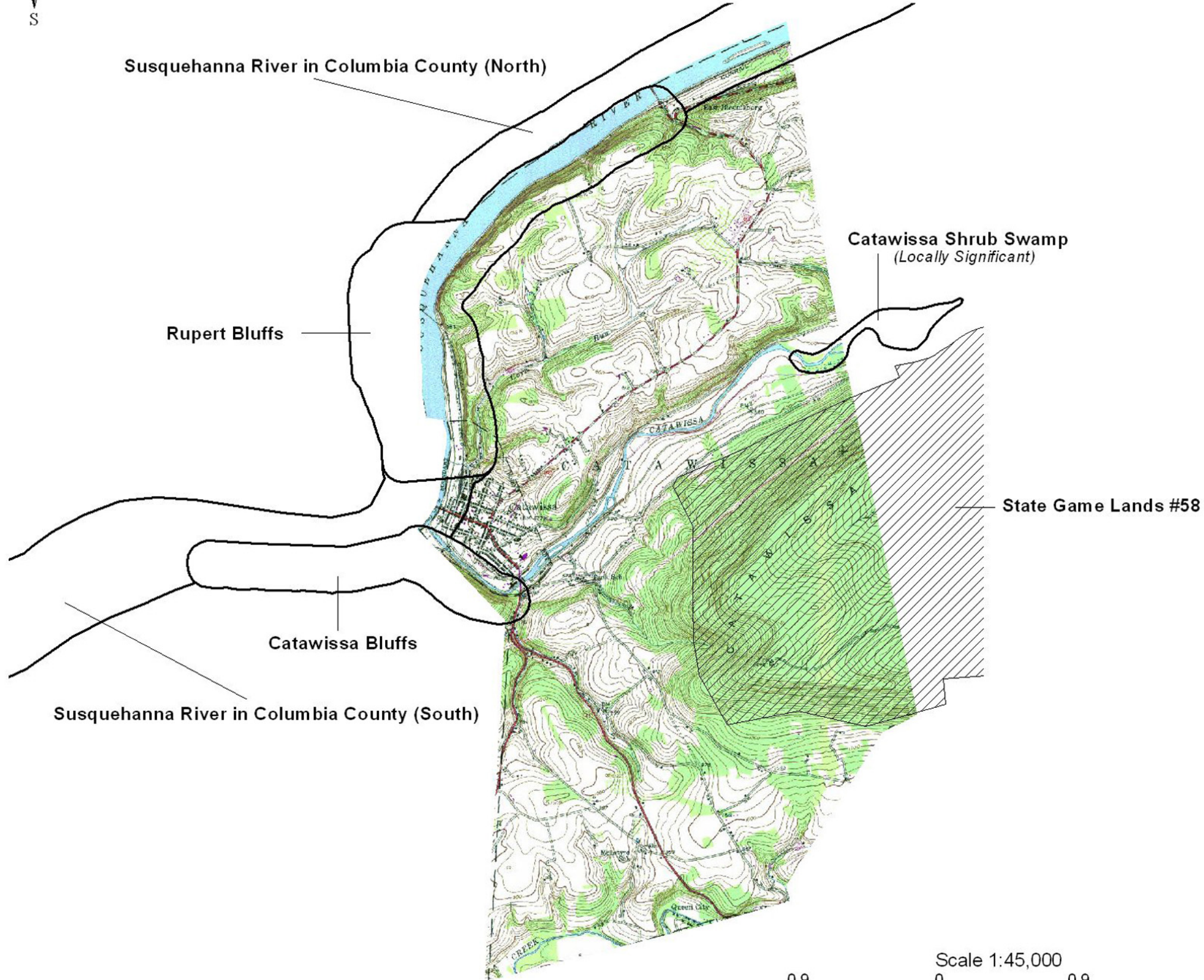
Catawissa Township is located in south central Columbia County. The majority of the township is within the **Catawissa Creek** watershed. This watershed reflects the negative impacts of mining in the area. Aquatic life is absent in the highly acidic creek because of runoff from mining practices in the watershed. Efforts are being made to restore the watershed and with increased protection, in the future the stream to return to a more natural state. Residents of the township and county should work to restore this important natural feature. Contact the Catawissa Creek Restoration Association (<http://www.columbiapa.org/ccra/Home.htm>) for more information. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [CATAWISSA TOWNSHIP](#)

Catawissa Township Catawissa Boro



Susquehanna River in Columbia County (North)



Catawissa Shrub Swamp
(Locally Significant)

State Game Lands #58

Rupert Bluffs

Catawissa Bluffs

Susquehanna River in Columbia County (South)

Catawissa Township and Catawissa Boro

Columbia County Natural Areas Inventory

Natural Areas:

- Catawissa Bluffs
- Rupert Bluffs
- Susquehanna River (North)
- Susquehanna River (South)

Locally Significant Sites:

- Catawissa Shrub Swamp

Managed Areas:

- State Game Land #58



Legend

- Managed Area
- Natural Area or Locally Significant Site

Scale 1:45,000



(Catawissa Twp. continued)

CATAWISSA BLUFFS (Catawissa and Franklin Townships, and Catawissa Borough) – Several populations of **jeweled shooting-star** (*Dodecatheon radicans*), an S2 PA-Threatened plant species of concern, are found on wet, extremely steep limestone cliffs dominating the Susquehanna River and Catawissa Creek in this area. The moist, north-facing cliffs provide an excellent quality habitat for the jeweled shooting-star. Most of the plants of these populations are in cracks and crevices high on the sheer rock face and only accessible by rock climbing equipment. This aspect of the site will help protect these populations from potential collection by garden enthusiasts. The Columbia County populations of the jeweled shooting-star represent the northernmost occurrences of this species in the state (Rhoads and Klein 1993). The hemlock (*Tsuga canadensis*) and yellow birch (*Betula allegheniensis*) forested slopes adjacent to and at the top of the bluffs overlooking the river act as a buffer to degradation of the cliffside community. The cliff face is mostly unvegetated, but the few associated species at this site include mosses (bryophytes), poison-ivy (*Toxicodendron radicans*), wild hydrangea (*Hydrangea arborescens*), lyrate rockcress (*Arabis lyrata*), coral bells (*Heuchera* spp.), fragile fern (*Cystopteris fragilis*), wild columbine (*Aquilegia canadensis*), early saxifrage (*Saxifraga virginensis*) and asters (*Aster* spp.).

Threats and Disturbances

Disturbances to this site include the adjacent railroad tracks, potential expansion of the lane at the bottom of the slope, potential development of the bluff top, and invasion of exotic species. Exotic species spread rapidly along routes of disturbance including railroad tracks. Another threat to this species is the use of herbicides for weed control. Removal or fragmentation of the forested buffers by additional roads or structures would decrease the quality of the habitat.

Conservation Recommendations

The site should be monitored to assure these plants are not replaced with non-native invasive species of plants. Weed control along the cliffs should not include the use of herbicides. Local planning should guide development away from this sensitive natural feature. A wider forested buffer may need to be established in some areas at the top of the bluffs to protect the cliff community from the effects of introduced species of plants.

RUPERT BLUFFS (Catawissa and Montour Townships) – Portions of these steeply sloping areas along the Susquehanna River have been described as a **Northern Appalachian Shale Cliff Natural Community** (Smith, 1991). These communities are composed of vertical exposures of resistant shale bedrock, associated ledges and open talus. The small ledges and crevices formed in this rock substrate provide microhabitats for a restricted range of plant species. This community type is typically restricted to the major river valleys in Pennsylvania where extensive cliffs have formed (Smith, 1991). Several good quality populations of the **jeweled shooting star** (*Dodecatheon radicans*), a PA-Threatened species, can be found along wet portions of these cliffs and rocky outcrops on both sides of the Susquehanna River and near the Indian Head rock outcrop overhanging Rt. 42 north of Catawissa. The Columbia County populations of this PA-Threatened plant species of concern represent the northernmost occurrences in the state (Rhoads and Klein 1993) This plant species is part of a Sugar Maple-Basswood Forest Natural Community (Fike 1999), which includes the steep shale and sandstone cliffs. Associated species at this site include columbine (*Aquilegia canadensis*), lyre-leaved rock-cress (*Arabis lyrata*), alum-root (*Heuchera americana*), maidenhair spleenwort (*Asplenium trichomanes*) and the invasive species garlic mustard (*Alliaria petiolata*). The canopy tree and shrub species at this site include sugar maple (*Acer saccharum*), basswood (*Tilia americana*), white ash (*Fraxinus*

(Catawissa Twp. continued)

americana), hemlock (*Tsuga canadensis*), table-mountain pine (*Pinus pungens*) and Virginia pine (*Pinus virginiana*).

Threats and Stresses

Road maintenance along the adjacent roadway (Rt. 42) may impact this species occurrence. Salt applied to the roadway in winter as a deicing agent likely impacts the lower reaches of the cliff face. Attempts to widen this busy road might impact the plant population along with its landmark Indian Head outcrop. Introduced invasive plant species such as garlic mustard are increasing in the area along the roadway at this site.

Conservation Recommendations

An alternative to rock salt as a deicing agent, such as Calcium Magnesium Acetate, sand and cinders, or grooved pavement applied along Rt. 42 in the vicinity of Indian Head would help provide a level of protection to the plant species of concern from the threat of salt spray. Any future road widening projects considered for this area should explore expanding towards the adjacent railroad bed, leaving the rock outcrop intact. Non-chemical means of weed control along the roadside can help control the spread of invasive plant species.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Briar Creek, Catawissa, Main, Mifflin, Montour, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site:

http://midwest.fws.gov/mussel/life_history.html.

The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species.

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands” natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp (*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases, providing drier habitat. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

Threats and Disturbances

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

(Catawissa Twp. continued)

pesticide runoff from agricultural fields, discharge of chemical pollutants and thermal pollution. The main threat to these animals is reduction of water quality. The banks, floodplains and islands of the river are in areas infested with the invasive introduced plant species Japanese knotweed (*Polygonum cuspidatum*) and purple loosestrife (*Lythrum salicaria*). Control of established populations of these species is very difficult, so eradication of pioneer populations is the best way to control the spread of these species of plants.

Conservation Recommendations

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

LOCALLY SIGNIFICANT AREA:

Catawissa Shrub Swamp – (Catawissa and Main Townships) – This locally significant site is a shrub swamp floodplain area along the Catawissa Creek. This area was identified from aerial photography. The area appears to be an open graminoid-dominated wetland ringed by tall and short shrubs, likely including highbush blueberry and winterberry holly. Future ground surveys are recommended to describe the quality and type of natural community found along the creek in this area. Forested buffers should be maintained along the creek and adjacent to floodplains of Catawissa Creek. Development in the floodplain should be strongly discouraged. Where buffers are absent, property could be encouraged to enroll in streamside erosion reduction programs like the Conservation Reserve Program (CRP and CREP).



A decommissioned iron railroad bridge over the Susquehanna River near Catawissa would make a good addition to a rail-trail through the county.

CLEVELAND TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
South Branch Roaring Creek Watershed	Long-tailed Shrew (<i>Sorex dispar</i>)	G4	S3	N	2001-06-20	E
	Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	G4	S3B,S3N	N	2001-06-20	E

Locally Significant Areas: None

Managed Areas: None

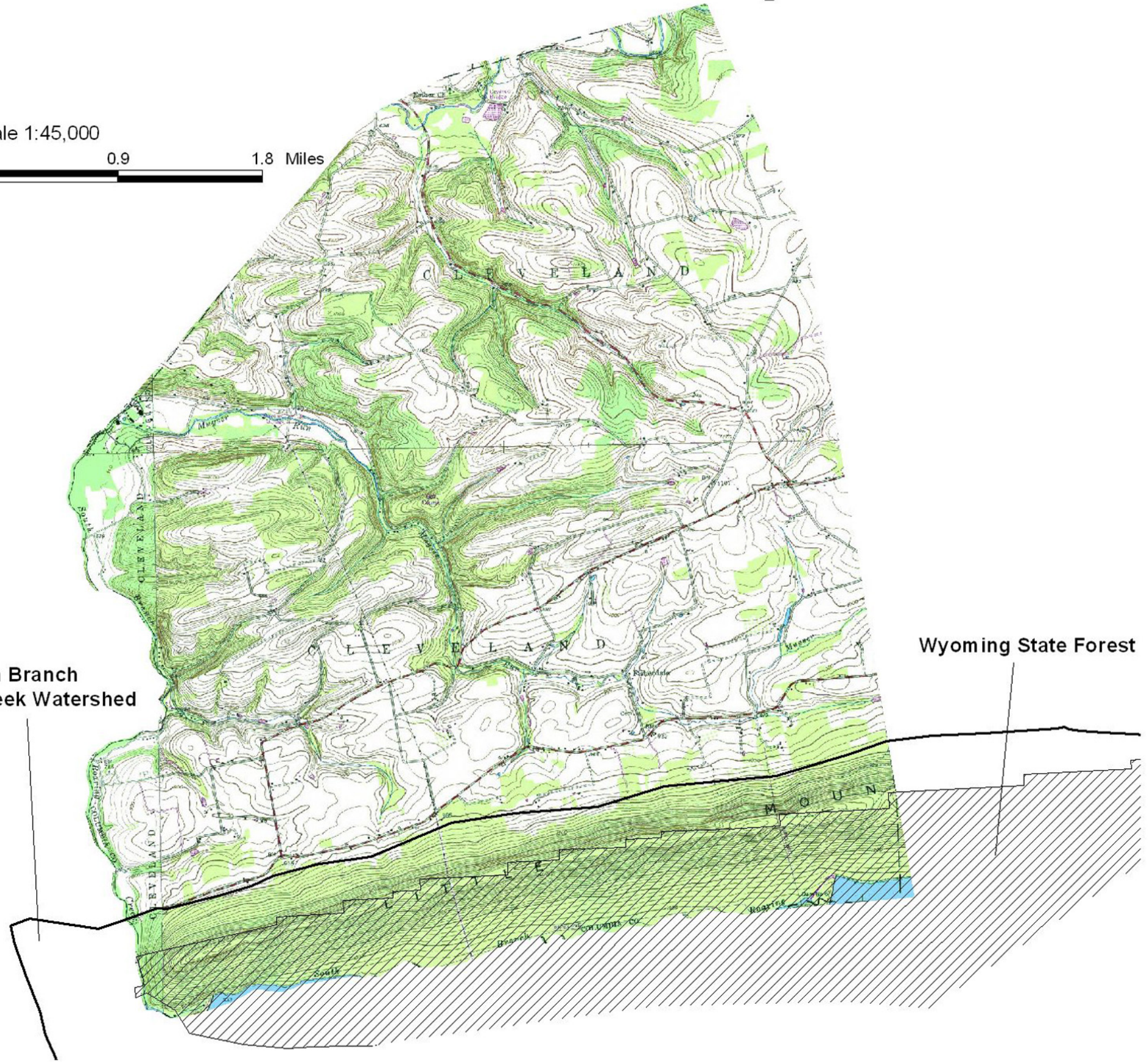
Cleveland Township is in the southwest corner of the county, bordered by Northumberland County in the west. The township is largely agriculture, with a portion of Little Mountain falling in the very southern part of the county. Some of the most important natural features in this township include forested slopes along **Mugser Run** and other small creeks in the township. Removal of vegetation on the steep slopes along creeks increases soil erosion and agricultural runoff, decreasing water quality in the creek (Master et.al 1998). Restoration of forested buffers along streams is an excellent way to help increase water quality in the watershed, and connect these important forested patches to the much larger Little Mountain. With minimal restoration efforts these forested areas could form a corridor between Little Mountain and other important forested areas such as Catawissa Mountain and portions of Roaring Creek. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [CLEVELAND TOWNSHIP](#)

Cleveland Township



Scale 1:45,000



Cleveland Township

Columbia County Natural Areas Inventory

Natural Areas:

South Branch Roaring Creek Watershed

Managed Areas:



Wyoming State Forest

South Branch
Roaring Creek Watershed

Wyoming State Forest



Legend

-  Managed Area
-  Natural Area or Locally Significant Site

(Cleveland Twp. continued)

SOUTH BRANCH ROARING CREEK WATERSHED (Cleveland, Conyngham and Locust Townships & Northumberland County) – A significant portion of Columbia County has been disturbed either by agriculture, mining or development. In the context of the modified nature of the surrounding lands, the extensive forests of the South Branch Roaring Creek Watershed and the adjacent Trout Run Watershed are clearly important for their ecoregional significance. This watershed is part of a continuously forested ridge and valley complex connecting Moosic Mountain in Lackawanna County, through Luzerne County to Nescopeck and Catawissa Mountains, finally connecting with the Susquehanna River. It is the continuously forested nature of this mountainous system that is its biggest attribute. South Branch Roaring Creek and Trout Run Watersheds provide an essential link in the chain of forested habitats from the Pocono Mountains to the Susquehanna River. This green corridor provides habitat and an avenue of migration for many species of animals and plants. If the continuity of this forested corridor is broken by additional roadways and development, the protected portions could become more isolated from the supporting landscape, reducing their viability as a functioning ecosystem. This area also provides great opportunities for outdoor recreation for local residents, including hunting, hiking, birdwatching, and many other outdoor activities. It is the contiguous and relatively undisturbed nature of these watersheds that make this area one of the top sites in the county for preservation.

The valley and adjacent lands to the east have gone relatively undisturbed (with the exception of logging) for nearly one hundred years. Seep wetlands and wet meadows border the stream; the sandy-bottomed seeps bubble up like little pots of watery porridge. Hemlock groves add to the diversity of the mostly deciduous forest. The south side of Little Mountain is dominated by an oak forest with a heath understory. The South Branch Roaring Creek and Trout Run watersheds have not been mined. Consequently, the water in these streams is of such high quality that the Water Company was able to provide unfiltered drinking water to their customers until recent state regulations required the water to be filtered. A brief electroshocking survey of a section of the South Branch of Roaring Creek yielded eleven species of fish including native trout populations and a diverse array of aquatic life (e.g., aquatic insects and stream salamanders). Other fish species documented during this survey include brown bullhead catfish (*Ameiurus nebulosus*), white sucker (*Catostomus commerson*), chain pickerel (*Esox niger*), cutlips minnow (*Exoglossum maxillingua*), bluegill (*Lepomis macrochirus*), rainbow trout (*Oncorhynchus mykiss*), longnose dace (*Rhichthys cataractae*), blacknose dace (*Rhinichthys atratulus*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*) and creek chub (*Semotilus atromaculatus*).

There are many vernal pools and wetlands in the watersheds that provide important breeding habitat for several species of amphibians including wood frogs (*Rana sylvatica*), northern spring peepers (*Pseudacris crucifer*), eastern American toad (*Bufo americanus*), red-spotted newts (*Notophthalmus viridescens*), and mole salamanders (Ambystomids). Many of the wetlands are spring fed and provide hydrology not only to the wetlands themselves, but also to South Branch Roaring Creek.

Mammal surveys conducted in the South Branch Roaring Creek Area in 2001 yielded a diverse number of species including beaver (*Castor canadensis*), gray squirrel (*Sciurus carolinensis*), groundhog (*Marmota monax*), masked shrew (*Sorex cinereus*), meadow jumping mouse (*Zapus hudsonius*), woodland jumping mouse (*Napaeozapus insignis*), northern short-tailed shrew

(Cleveland Twp. continued)

(*Blarina brevicauda*), pygmy shrew (*Sorex hoyi*), redback vole (*Microtus chrotorrhinus*), smoky shrew (*Sorex fumeus*), white-footed mouse (*Peromyscus leucopus*), and white-tailed deer (*Odocoileus virginianus*). Two animal species of concern were identified during brief surveys near Trout Run. The **northern long-eared bat** (*Myotis septentrionalis*), a G4, S3 species of concern, is known to occur on mined lands to the south of Trout Run. This species was captured during a survey along the Trout Run and South Branch Roaring Creek, and is using the stream corridors for feeding and the trees for raising their young. Another G4, S3 animal species of concern the, **long-tailed shrew** (*Sorex dispar*), was also documented from this site during a small mammal survey in 2001. Additional surveys in other parts of both watersheds are recommended.

Threats and Disturbances

There has been some recent logging in the watershed. These disturbed sites often harbor exotic-invasive species that may spread in the more natural areas of the watershed. Over-browsing by deer is also a problem in some areas of the watershed. The greatest potential disturbance to the South Branch Roaring Creek area is commercial and residential development.

Conservation Recommendations

To maintain good water quality in the stream, selective logging of the site is preferred to clearcutting with the appropriate erosion and sedimentation control measures. However, the practice of throwing slash in wetlands and vernal pools should be avoided. Undisturbed forested buffers should be maintained around streams, wetlands, and vernal pools. The invasion of exotic species should be monitored and control measures enacted where possible. Any development in the watershed should be discouraged. The pristine conditions and scenic beauty of the area make it vulnerable to development. Allowing more extensive deer hunting will help the native understory plant species to become re-established. An increase in residential and commercial development would quickly decrease the quality of the natural habitats within the watershed.

Invasive Plant Species

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



Japanese Knotweed (*Polygonum cuspidatum*)



Tree of Heaven (*Ailanthus altissima*)



Purple loosestrife (*Lythrum salicaria*)



Multiflora rose (*Rosa multiflora*)

CONYNGHAM TOWNSHIP; Ashland & Centralia Boroughs

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Aristes Vernal Pond Community	Ephemeral/Fluctuating Natural Pool Community	G?	S3	N	2003-07-24	E
South Branch Roaring Creek Headwaters	Animal	G4	S3S4	PC	2003-06-13	E
	Animal	G5	S3S4	N	2003-08-13	E
	Animal	G5	S3S4	N	2003-08-13	E
	Hemlock Palustrine Forest Natural Community	G?	S3	N	2003-06-13	E
South Branch Roaring Creek Watershed	Long-tailed Shrew (<i>Sorex dispar</i>)	G4	S3	N	2001-06-20	E
	Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	G4	S3B,S3N	N	2001-06-20	E

Locally Significant Areas: Shenandoah Municipal Authority Watershed

Managed Areas: Wyoming State Forest

Conyngham Township is the southernmost township in Columbia County. Much of the landscape in this township has been altered by mining activity. Strip mining has severely degraded the natural habitats in the township. The Roaring Creek Watershed remains the most valuable feature of the landscape in southern Columbia County. However, with extensive reclamation efforts, some valuable habitat can be created for wildlife in the township. Some **reclaimed mining sites** can produce habitat for declining grassland bird species. Uncommon to rare birds such as Short-eared Owl (*Asio flammeus*), Eastern Meadowlark (*Sturnella magna*), Bobolink (*Dolichonyx oryzivorus*), Upland Sandpiper (*Bartramia longicauda*), Henslow's Sparrow (*Ammodramus henslowii*), and Vesper Sparrow (*Pooechetes gramineus*) have benefited from human managed and created early successional areas. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [CONYNGHAM TOWNSHIP](#)

Conygham Township Ashland and Centralia Boro



Conygham Township and Ashland Boro and Centralia Boro

Columbia County Natural Areas Inventory

Natural Areas:

- Aristes Vernal Pond Comm.
- South Branch Roaring
Creek Watershed
- South Branch Roaring Creek
Headwaters

Locally Significant Sites:

- Shenandoah Municipal Authority Watershed

Natural Areas:

- Wyoming State Forest



Legend

- Managed Area
- Natural Area or Locally Significant Site

(Conyngham Twp. continued)

ARISTES VERNAL POND COMMUNITY (Conyngham Township) - An **Ephemeral/Fluctuating Natural Pool Community** was documented in this area during surveys in 2003. Several ponds were located among other open wetlands and forested habitat. These ponds provide important habitat for breeding amphibians and a variety of other species. They serve as important habitat for a diverse array of plant species and an important resource to conserve. Many vernal ponds are destroyed or filled during dry months because they can be easily overlooked. It is important to identify and protect these areas to ensure this valuable habitat will remain intact into the future.

Threats and Disturbances

This site is fairly close to a well-traveled road and there is some disturbance from the roadway. There has been some logging in the area, however so far the ponds remain intact.

Conservation Recommendations

It is recommended that a forested buffer be left around vernal ponds if logging continues in the area.

SOUTH BRANCH ROARING CREEK HEADWATERS (Conyngham, Locust and Roaring Creek Townships) – The South Branch Roaring Creek Headwaters is the portion of the watershed east of Route-42. This may seem an arbitrary dividing line severing this portion of the watershed from the adjacent western portion, but there are significant habitat differences between the two areas to regard them independently. While the western portion of the watershed has several artificially created reservoirs, the headwaters have never been significantly modified. The headwaters have a good quality **Hemlock Palustrine Forest Natural Community**, a type of forested wetland. Seep wetlands and wet meadows border the stream in many places, with many sandy-bottomed, sphagnum moss-ringed seeps. This habitat is exceptionally scenic as well as fragile, and would be easily degraded by roads or other alterations of the topography. The springs in this area are the source for much of the clean water supplying the Consumers PA Water Company reservoirs.

A **G5, S3S4 Pennsylvania animal species of concern** was documented in this area in the summer of 2003. One individual was observed using an open sedge dominated area in a beaver meadow. This species requires rocky outcrops as primary habitat. The animals commonly forage in lower elevation sites during the summer months. The associated plant species include sphagnum moss (*Sphagnum* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), red maple (*Acer rubrum*) and highbush blueberry (*Vaccinium corymbosum*). Surrounding forest composition is a mixed hardwood/conifer woodland, which includes species such as eastern hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*) and yellow birch (*Betula alleghaniensis*).

Two other animal species of concern were documented at this site in 2003. Both species were found using habitat along Roaring Creek. Other species observed at the site include Spotted turtle (*Clemmys guttata*), Red-spotted newt (*Notophthalmus viridescens*), Wood frog (*Rana sylvatica*), Green frog (*Rana clamitans melanota*), Leopard Frog (*Rana palustris*), lancet clubtail (*Gomphus exilis*), a darter (*Sympetrum* sp.), bluet (*Enallagma* sp.), fragile forktail (*Ischnura posita*) and swamp spreadwing (*Lestes vigilax*).

(Conyngham Twp. continued)

South Branch Roaring Creek Headwaters also provides habitat for a number of species of birds including Song Sparrow (*Melospiza melodia*), Acadian Flycatcher (*Empidonax virescens*), Louisiana Waterthrush (*Seiurus motacilla*), Black-throated Green Warbler (*Dendroica virens*), Dark-eyed Junco (*Junco hyemalis*), Veery (*Catharus fuscescens*), Wood Thrush (*Hylocichla mustelina*), Hermit Thrush (*Catharus guttatus*), Common Yellowthroat (*Geothlypis trachias*), Yellow-rumped Warbler (*Dendroica coronata coronata*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Brown Creeper (*Certhia americana*), Blue-headed Vireo (*Vireo solitarius*), Ovenbird (*Seiurus aurocapillus*), Scarlet Tanager (*Piranga olivaceus*), American Redstart (*Setophaga ruticilla*), Black-and-white Warbler (*Mniotilta varia*), Eastern Towhee (*Pipilo erythrophthalmus*), Black-capped Chickadee (*Poecile atricapilla*), Great Crested Flycatcher (*Myiarchus crinitus*), Northern Flicker (*Colaptes auratus*), and Blackburnian Warbler (*Dendroica fusca*).

Threats and Disturbances

There are no direct threats to this site; however, future land use changes could affect these species and the Hemlock Palustrine Forest Natural Community. Disturbances include the hemlock woolly adelgid, logging, planted exotic conifers (Norway spruce, red pine plantations), invasion of exotic species and jeep trails. Changes in water quality could be detrimental to the species of concern at the site.

Conservation Recommendations

More surveys are necessary to determine the primary habitat for these species and relative health of the population. Logging should be avoided in this portion of the watershed due to the numerous wetlands in the flat bottomland. Upcoming resource plans should consider this area as a potential future old growth area. Recreation plans for this portion of the newly acquired Wyoming State Forest lands should be limited to low density, non-motorized outdoor recreational activities.

SOUTH BRANCH ROARING CREEK WATERSHED (Cleveland, Conyngham and Locust Townships & Northumberland County) – A significant portion of Columbia County has been disturbed either by agriculture, mining or development. In the context of the modified nature of the surrounding lands, the extensive forests of the South Branch Roaring Creek Watershed and the adjacent Trout Run Watershed are clearly important for their ecoregional significance. This watershed is part of a continuously forested ridge and valley complex connecting Moosic Mountain in Lackawanna County, through Luzerne County to Nescopeck and Catawissa Mountains, finally connecting with the Susquehanna River. It is the continuously forested nature of this mountainous system that is its biggest attribute. South Branch Roaring Creek and Trout Run Watersheds provide an essential link in the chain of forested habitats from the Pocono Mountains to the Susquehanna River. This green corridor provides habitat and an avenue of migration for many species of animals and plants. If the continuity of this forested corridor is broken by additional roadways and development, the protected portions could become more isolated from the supporting landscape, reducing their viability as a functioning ecosystem. This area also provides great opportunities for outdoor recreation for local residents, including hunting, hiking, birdwatching, and many other outdoor activities. It is the contiguous and relatively undisturbed nature of these watersheds that make this area one of the top sites in the county for preservation.

(Conyngham Twp. continued)

The valley and adjacent lands to the east have gone relatively undisturbed (with the exception of logging) for nearly one hundred years. Seep wetlands and wet meadows border the stream; the sandy-bottomed seeps bubble up like little pots of watery porridge. Hemlock groves add to the diversity of the mostly deciduous forest. The south side of Little Mountain is dominated by an oak forest with a heath understory. The South Branch Roaring Creek and Trout Run watersheds have not been mined. Consequently, the water in these streams is of such high quality that the Water Company was able to provide unfiltered drinking water to their customers until recent state regulations required the water to be filtered. A brief electroshocking survey of a section of the South Branch of Roaring Creek yielded eleven species of fish including native trout populations and a diverse array of aquatic life (e.g., aquatic insects and stream salamanders). Other fish species documented during this survey include brown bullhead catfish (*Ameiurus nebulosus*), white sucker (*Catostomus commerson*), chain pickerel (*Esox niger*), cutlips minnow (*Exoglossum maxillingua*), bluegill (*Lepomis macrochirus*), rainbow trout (*Oncorhynchus mykiss*), longnose dace (*Rhinichthys cataractae*), blacknose dace (*Rhinichthys atratulus*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*) and creek chub (*Semotilus atromaculatus*).

There are many vernal pools and wetlands in the watersheds that provide important breeding habitat for several species of amphibians including wood frogs (*Rana sylvatica*), northern spring peepers (*Pseudacris crucifer*), eastern American toad (*Bufo americanus*), red-spotted newts (*Notophthalmus viridescens*), and mole salamanders (Ambystomids). Many of the wetlands are spring fed and provide hydrology not only to the wetlands themselves, but also to South Branch Roaring Creek.

Mammal surveys conducted in the South Branch Roaring Creek Area in 2001 yielded a diverse number of species including beaver (*Castor canadensis*), gray squirrel (*Sciurus carolinensis*), groundhog (*Marmota monax*), masked shrew (*Sorex cinereus*), meadow jumping mouse (*Zapus hudsonius*), woodland jumping mouse (*Napaeozapus insignis*), northern short-tailed shrew (*Blarina brevicauda*), pygmy shrew (*Sorex hoyi*), redback vole (*Microtus chrotorrhinus*), smoky shrew (*Sorex fumeus*), white-footed mouse (*Peromyscus leucopus*), and white-tailed deer (*Odocoileus virginianus*). Two animal species of concern were identified during brief surveys near Trout Run. The **northern long-eared bat (*Myotis septentrionalis*)**, a G4, S3 species of concern, is known to occur on mined lands to the south of Trout Run. This species was captured during a survey along the Trout Run and South Branch Roaring Creek, and is using the stream corridors for feeding and the trees for raising their young. Another G4, S3 animal species of concern the, **long-tailed shrew (*Sorex dispar*)**, was also documented from this site during a small mammal survey in 2001. Additional surveys in other parts of both watersheds are recommended.

Threats and Disturbances

There has been some recent logging in the watershed. These disturbed sites often harbor exotic-invasive species that may spread in the more natural areas of the watershed. Over-browsing by deer is also a problem in some areas of the watershed. The greatest potential disturbance to the South Branch Roaring Creek area is commercial and residential development.

Conservation Recommendations

To maintain good water quality in the stream, selective logging of the site is preferred to clearcutting with the appropriate erosion and sedimentation control measures. However, the

(Conyngham Twp. continued)

practice of throwing slash in wetlands and vernal pools should be avoided. Undisturbed forested buffers should be maintained around streams, wetlands, and vernal pools. The invasion of exotic species should be monitored and control measures enacted where possible. Any development in the watershed should be discouraged. The pristine conditions and scenic beauty of the area make it vulnerable to development. Allowing more extensive deer hunting will help the native understory plant species to become re-established. An increase in residential and commercial development would quickly decrease the quality of the natural habitats within the watershed.

LOCALLY SIGNIFICANT SITE:

Shenandoah Municipal Authority Watershed (Conyngham Township & Schuylkill County) – This **locally significant site** contains the forested seeps, streams and creeks leading into Shenandoah Reservoir #6. The hemlock forest in Schuylkill County at the head of the reservoir resembles old growth, with large hemlocks (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), tulip poplar (*Liriodendron tulipifera*) and chestnut oak (*Quercus montana*). A tree ring core from one of the hemlocks revealed a conservative estimate of 150 years. The hemlocks in this older-growth forest are currently infested with the hemlock wooly adelgid (*Adelges tsugae*) to an extent that the branches appear ashen and skeletonized.

A hemlock pest accidentally introduced from Asia, the hemlock wooly adelgid, has detrimentally impacted hemlock stands throughout the mid-Atlantic states and New England. These small, aphid-like insects are covered with a cottony mass giving them a wooly appearance. They suck sap from the young twigs of hemlock trees resulting in the loss of needles and new growth. Without new shoot growth to support photosynthesis, tree health is seriously impaired, leading to defoliation and tree death within several years. This pest has the potential to severely alter hemlock-dominated habitats. As mature hemlock stands are defoliated, the cool, moist microclimate created by their deep shade ceases to exist. Plant and animal species that are adapted to this environment will, in effect, be homeless. Work is ongoing to identify and distribute natural predators of the wooly adelgid. This approach, known as biological control, is the only likely way to control this widespread pest. A small lady beetle (*Pseudoscymnus tsugae*) has been the focus of the biological control effort so far. This species, a natural predator of wooly adelgid in Japan, has proven effective in controlling this pest in its native setting. This wooly adelgid predator has been released at various sites in infested areas since 1995. Though initial results from these field releases have been encouraging, it will likely take many years to determine if this predator can be an effective control of the hemlock wooly adelgid in North America. In the meantime, hemlock dominated habitats are in serious danger from this pest.

Threats and Disturbances

The hemlock wooly adelgid (*Adelges tsugae*) is a major threat to the eastern hemlock trees throughout the watershed. Another major threat is streamside logging. In some areas, recent logging operations cut trees to the edge of the stream, leaving no buffer at all. This can be extremely detrimental to the quality of the stream by increasing water temperatures and siltation from erosion.

Conservation Recommendations

The associated tree species at this site, yellow birch, tulip poplar and chestnut oak are unaffected by the wooly adelgid. These large and old trees at the western end of the reservoir should be protected from future logging operations, and a wide undisturbed buffer created around them to

(Conyngham Twp. continued)

expand this potential future old growth site. This site should be considered for release of biological control agents for the hemlock wooly adelgid. More surveys to the headwaters of the reservoir are encouraged to determine the extent of this older-growth site. A significant buffer zone should also be left along streams to reduce effects of logging on the water quality and species inhabiting the stream.

[South Branch Roaring Creek Watershed](#)



Viewing portions of the South Branch Roaring Creek Watershed from the air helps put this extensive forested valley in context. Several reservoirs as well as areas that have seen no recent disturbances are within this continuous corridor of relatively unfragmented habitat across southern Columbia County.



Photos: PA Science Office of The Nature Conservancy

FISHING CREEK TOWNSHIP

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

Locally Significant Areas: Huntington Creek Floodplain
Maple Grove Slopes and Floodplain
Wenner Swamp

Managed Areas: State Game Lands #55

Fishing Creek Township is located in the northeast portion of the county. **Knob Mountain** and **Huntington Mountain** are important forested habitats in the township. Private lands connected to State Game Lands provide a larger portion of continuous forest and increase the value of these ridges in the landscape. Another important feature that deserves protection and restoration are **floodplain** habitats along **Fishing Creek** and **Huntington Creek**. Many of these floodplain habitats have been converted to agriculture or subjected to invasion by exotic species. One major to floodplain habitats is the spread of invasive species along rivers and stream. Many floodplain forests and river islands are being overtaken by invasive plant species. Two of the worst offenders in Columbia County are Japanese knotweed (*Polygonum cuspidatum*) and purple loosestrife (*Lythrum salicaria*). Where possible, control efforts should be initiated to restore native species to the floodplains in the township and county. Finally, the forested slopes along these creeks and their tributaries should be preserved to protect water quality, landscape connectivity and recreational opportunities in the township. Additional surveys of forested slopes, ravines and streams in this township are encouraged.



Though appearing as dry land, these vegetation mats on Wenner Swamp actually float on top of the water, buoyed by a thick layer of sphagnum moss.

Insert map [FISHING CREEK TOWNSHIP](#)



Fishing Creek Township Stillwater Boro

Fishing Creek Township and Stillwater Boro

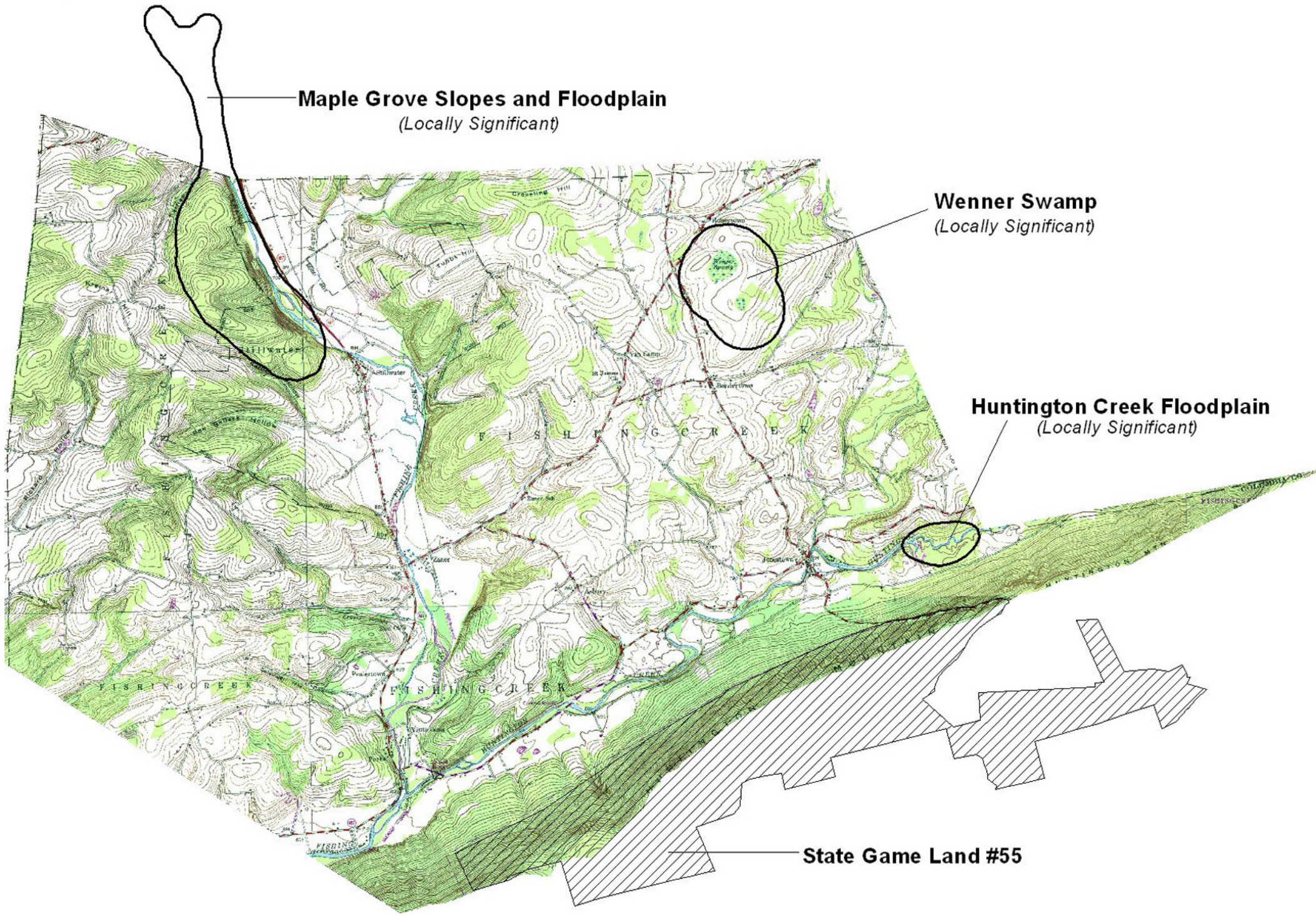
Columbia County Natural Areas Inventory

Locally Significant Sites:

- Huntington Creek Floodplain
- Maple Grove Slopes and Floodplain
- Wenner Swamp

Managed Areas:

- State Game Land #55



Scale 1:55,000



Legend

- Managed Area
- Natural Area or Locally Significant Site

(Fishing Creek Twp. continued)

LOCALLY SIGNIFICANT SITES:

Huntington Creek Floodplain (Fishing Creek Township) – This locally significant site consists of the floodplain, meanders and oxbows formed in this slow moving portion of Huntington Creek. This area was identified from aerial photography, and a ground survey is necessary to determine the quality of this habitat. Forested buffers should remain intact for the length of the creek with logging operations refraining from cutting within 50 to 100 feet of the creek bank. Stream bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential and roadway settings. In addition, the stream bank floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Much of the area's important biodiversity can be preserved by maintaining an intact, forested floodplain along the creek. The effectiveness of the forested creek as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses and additional roadways along the creek. Local planning should discourage construction of new residences and roadways along the creek, adjacent slopes and floodplain.

Maple Grove Slopes and Floodplain – (Benton and Fishing Creek Townships) – This **locally significant site** is composed of the Fishing Creek floodplain and forested slopes between Benton and Stillwater. The floodplain broadens in areas to create islands within the meandering confines of the creek bed. These floodplain areas typically harbor a rich herbaceous flora and higher biodiversity than the surrounding uplands. Herbaceous vegetation along the floodplain of Fishing Creek in this area included twisted sedge (*Carex torta*), long sedge (*Carex folliculata*), large water-starwort (*Callitriche heterophylla*), blue cohosh (*Caulophyllum thalictroides*), white turtlehead (*Chelone glabra*), horse-balm (*Collinsonia canadensis*), sweet joe-pye weed (*Eupatorium purpureum*), flat-top goldenrod (*Euthamia graminifolia*), spotted jewel-weed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*), arrow-leaved tearthumb (*Polygonum sagittatum*), cut-leaved coneflower (*Rudbeckia laciniata*), jack-in-the-pulpit (*Arisaema triphyllum*), stinging nettle (*Urtica dioica*), true forget-me-not (*Myosotis scorpioides*), lady's thumb (*Polygonum persicaria*) and the invasive introduced species Japanese knotweed (*Polygonum cuspidatum*).

The slopes of the adjacent hillsides have a mixed coniferous-deciduous canopy dominated by hemlock (*Tsuga canadensis*) but include sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), beech (*Fagus grandifolia*), basswood (*Tilia americana*), tulip poplar (*Liriodendron tulipifera*) and black cherry (*Prunus serotina*). The shrub layer is composed of the aforementioned tree seedlings as well as hop-hornbeam (*Ostrya virginiana*), striped maple (*Acer pensylvanicum*), mountain maple (*Acer spicatum*), wild hydrangea (*Hydrangea arborescens*), maple-leaf viburnum (*Viburnum acerifolium*), elderberry (*Sambucus canadensis*), black raspberry (*Rubus occidentalis*), purple flowering raspberry (*Rubus odoratus*) and two native bush honeysuckle species northern bush-honeysuckle (*Diervilla lonicera*) and fly-honeysuckle (*Lonicera canadensis*). The shrub layer along the hillside also includes an excellent quality population of the relatively uncommon shrub species American yew (*Taxus canadensis*). This species was recently removed from the plant species of concern list based on updated statewide population estimates. Yew has been in decline over much of its range in the state due to habitat loss and over-browsing by deer (Rhoads and Block 2000). Recent documentation of several excellent quality populations of yew in Columbia County may suggest this species is truly on the rebound.

(Fishing Creek Twp. continued)

The herbaceous layer on the forested slopes has a rich mixture of woodland wildflower including climbing fumitory (*Adlumia fungosa*), Canada mayflower (*Maianthemum canadense*), partridgeberry (*Mitchella repens*), heart-leaved foam-flower (*Tiarella cordifolia*) and downy Solomon's-seal (*Polygonatum pubescens*). Along with these herbaceous species is a diverse fern flora including maidenhair spleenwort (*Asplenium trichomanes*), lady-fern (*Athyrium filix-femina*), rattlesnake fern (*Botrychium virginianum*), three varieties of wood ferns (*Dryopteris carthusiana*, *D. intermedia*, *D. marginalis*), northern oak fern (*Gymnocarpium dryopteris*), rock polypody (*Polypodium virginianum*) and Christmas fern (*Polystichum acrostichoides*). A historic population of the fern species of concern, Braun's holly fern (*Polystichum braunii*), had been reported from near Benton. This species was not located during a survey of the area, but the excellent population of yew at this location suggests a relatively undisturbed high quality habitat remains along these slopes. Additional surveys for Braun's holly fern and other species of concern are encouraged along the forested slopes in this area.

Threats and Disturbances

The floodplain of Fishing Creek appears to be in good condition though encroaching development and agricultural fields have removed the forest buffer in some areas. A high deer population could severely impact the regrowth of tree seedlings and herbaceous species. Indiscriminate logging could severely diminish the quality of this habitat by allowing invasive species of plants a foothold in the otherwise unfragmented forest canopy.

Conservation Recommendations

Forested buffers should be maintained along the creek and adjacent to floodplains of Fishing Creek. Development in the floodplain should be strongly discouraged. Where buffers are absent, property owners could be encouraged to enroll in streamside erosion reduction programs like the Conservation Reserve Program (CRP and CREP). Clear cut lumbering operations should be discouraged in favor of selectively managed forestry practices which may include the harvesting of lower quality trees while allowing the higher quality trees to continue to act as a seed source for the area.

Wenner Swamp – (Fishing Creek Township) – This **locally significant site** represents a remnant of a bog-like natural community that has seen past disturbances. The extensive accumulation of sphagnum moss, which typifies a bog environment, was removed in the past by a peat mining operation. Most of the natural character and function of the bog natural community has been modified by these activities. From the air, the evidence of peat mining is apparent from the strips of shrub vegetation separated by channels of open water. From the water level, the strips of vegetation are primarily composed of floating bog mat remnants. These are the result of centuries, of colonization of the water surface by sphagnum moss and other aquatic vegetation. As the sphagnum moss accumulates around the edges and on top of open water, it builds up into a thick floating layer that provides a habitat suitable for the growth of other characteristic bog plants. Over time, sedges, ferns and species of shrubs, trees and other plants that can tolerate wet conditions colonize the sphagnum mats until the area appears to be dry land. These vegetation mats are floating, however, and usually exhibit a quaking aspect. At this site, the disturbed vegetation mats are slowly mending, and have been colonized by the small trees gray birch (*Betula populifolia*) and red maple (*Acer rubrum*), and by shrubs such as high-bush blueberry (*Vaccinium corymbosum*), red chokeberry (*Aronia arbutifolia*), winterberry holly (*Ilex verticillata*), and meadow-sweet (*Spiraea alba*). The herbaceous vegetation consists primarily of cinnamon fern (*Osmunda cinnamomea*), Canada mayflower (*Maianthemum canadense*), three-

(Fishing Creek Twp. continued)

way sedge (*Dulichium arundinaceum*), soft rush (*Juncus effusus*), marsh St.-Johns-wort (*Triadenum virginianum*) and bog sedge (*Carex atlantica* ssp. *atlantica*).

The site hosts common wetland animal species including numerous dragonflies and damselflies, wood frogs (*Rana sylvatica*), green frogs (*Rana clamitans*), spotted turtles (*Clemmys guttata*), Red-winged Blackbirds (*Agelaius phoeniceus*), Eastern Kingbirds (*Tyrannus tyrannus*), and Wood Ducks (*Aix sponsa*).

Threats and Disturbances

The natural community at this site has already received a harsh disturbance by the past peat mining operation. Additional and ongoing disturbances include the alteration of the pond hydrology by the construction of a dam, clearing of mat forming floating aquatic vegetation, and the spread of introduced invasive species of plants, particularly multiflora rose (*Rosa multiflora*) and autumn olive (*Elaeagnus umbellata*).

Conservation Recommendations

As long as the natural hydrology of the wetlands is not significantly modified, the natural bog system has the potential to return to pre-disturbance conditions. The hydrology has likely fluctuated in the past from higher to lower water levels due to cyclic beaver activity. The construction of more permanent dams, and the clearing of floating vegetation will likely impede the natural processes of bog-mat accumulation. The site should be monitored for the spread of invasive species of plants, and control measures take before the plants become a threat to the native vegetation.



Sundew, an insectivorous plant considered secure in Pennsylvania, can occasionally be found in acidic wetlands in Columbia County.

Photo: PA Science Office of The Nature Conservancy

FRANKLIN TOWNSHIP and Stillwater Borough

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Catawissa Bluffs	Jeweled Shooting-star (<i>Dodecatheon radicum</i>)	G?	S2	PT	2003-05-16	B
Roaring Creek Bluffs	Jeweled Shooting-star (<i>Dodecatheon radicum</i>)	G?	S2	PT	1997-05-13	BC
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: None

Managed Areas: None

Franklin Township is located in the southwest corner of the county. The **South Branch of Roaring Creek** and the forested areas to the west are very important attributes in the township along with the natural areas. Forested slopes and floodplains buffer the South Branch of Roaring Creek. Some of the smaller intermittent streams that feed the south branch area also surrounded by intact forest. These remaining forest patches provide important habitat for many species, including species dependant on streams and riparian habitats. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [FRANKLIN TOWNSHIP](#)

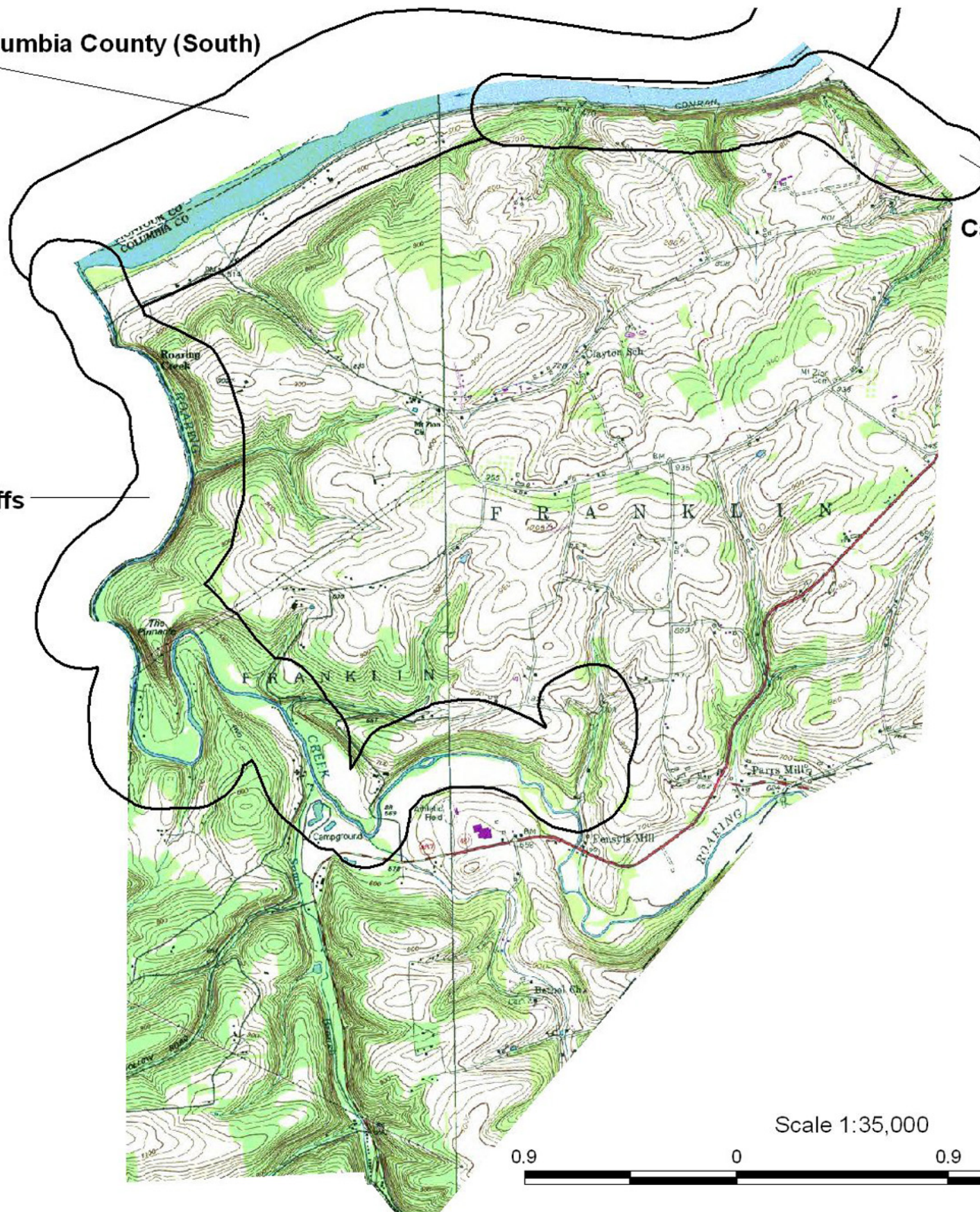


Franklin Township

Susquehanna River in Columbia County (South)

Roaring Creek Bluffs

Catawissa Bluffs



Scale 1:35,000



Franklin Township


Columbia County Natural Areas Inventory

Natural Areas:

- Catawissa Bluffs
- Roaring Creek Bluffs
- Susquehanna River (South)



Legend

 Natural Area or Locally Significant Site

(Franklin Twp. continued)

CATAWISSA BLUFFS (Catawissa and Franklin Townships, and Catawissa Borough) – Several populations of **jeweled shooting-star** (*Dodecatheon radicans*), an S2 PA-Threatened plant species of concern, are found on wet, extremely steep limestone cliffs dominating the Susquehanna River and Catawissa Creek in this area. The moist, north-facing cliffs provide an excellent quality habitat for the jeweled shooting-star. Most of the plants of these populations are in cracks and crevices high on the sheer rock face and only accessible by rock climbing equipment. This aspect of the site will help protect these populations from potential collection by garden enthusiasts. The Columbia County populations of the jeweled shooting-star represent the northernmost occurrences of this species in the state (Rhoads and Klein 1993). The hemlock (*Tsuga canadensis*) and yellow birch (*Betula allegheniensis*) forested slopes adjacent to and at the top of the bluffs overlooking the river act as a buffer to degradation of the cliffside community. The cliff face is mostly unvegetated, but the few associated species at this site include mosses (bryophytes), poison-ivy (*Toxicodendron radicans*), wild hydrangea (*Hydrangea arborescens*), lyrate rockcress (*Arabis lyrata*), coral bells (*Heuchera* spp.), fragile fern (*Cystopteris fragilis*), wild columbine (*Aquilegia canadensis*), early saxifrage (*Saxifraga virginensis*) and asters (*Aster* spp.).

Threats and Disturbances

Disturbances to this site include the adjacent railroad tracks, potential expansion of the lane at the bottom of the slope, potential development of the bluff top, and invasion of exotic species. Exotic species spread rapidly along routes of disturbance including railroad tracks. Another threat to this species is the use of herbicides for weed control. Removal or fragmentation of the forested buffers by additional roads or structures would decrease the quality of the habitat.

Conservation Recommendations

The site should be monitored to assure these plants are not replaced with non-native invasive species of plants. Weed control along the cliffs should not include the use of herbicides. Local planning should guide development away from this sensitive natural feature. A wider forested buffer may need to be established in some areas at the top of the bluffs to protect the cliff community from the effects of introduced species of plants.

ROARING CREEK BLUFFS (Franklin Township and Montour County) - These wet, limestone ledges along roaring creek provide habitat for several populations of a G?, S2 PA - Threatened plant species, **jeweled shooting-star** (*Dodecatheon radicans*). Associated plant species at this site include hydrangea (*Hydrangea arborescens*), fragile fern (*Cystopteris fragilis*), maidenhair spleenwort (*Asplenium trichomanes*) and golden saxifrage (*Chrysosplenium americanum*).

Threats and Disturbances

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

Conservation Recommendations

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

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Catawissa, Main, Mifflin, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these

(Franklin Twp. continued)

animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site: http://midwest.fws.gov/mussel/life_history.html.

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands” natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp (*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

Threats and Disturbances

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

Conservation Recommendations

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

Jeweled Shooting Star



Several populations of the jeweled-shooting star (*Dodecatheon radicans*), a PA-Threatened species of concern, occur on rocky outcrops in Columbia.

Photo: PA Science Office of The Nature Conservancy

GREENWOOD TOWNSHIP and Millville Borough

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

Locally Significant Areas: None

Managed Areas: None

Other: Little Fishing Creek – Exceptional Value Stream

Greenwood Township is located in the northwest portion of the county. During this study, no species of special concern, exemplary natural communities or locally significant sites were identified in Greenwood Township. However, environmentally sensitive areas likely exist in the township. It is very possible that additional field studies would identify sensitive features along **Green Creek, Little Green Creek and Little Fishing Creek**. Little Fishing Creek is considered an Exceptional Value Stream from its source to the confluence with Lick Run at Sereno by the PA Department of Environmental Protection as expressed in the Pennsylvania Code section § 93.9k. None of these areas were subject to intensive surveys during our field studies. Soil erosion is a concern along Green Creek drainage, especially in the more heavily agricultural Greenwood Valley. The riparian forest cover is quite narrow along some parts of Green Creek and restoration efforts to widen these buffers would be beneficial. Exotic species are a threat in riparian habitats and purple loosestrife (*Lythrum salicaria*) colonies are expanding along Green Creek. Some bird species identified in these areas during the study include Great Blue Heron (*Ardea herodias*), Yellow-billed Cuckoo (*Coccyzus americanus*), Red-bellied Woodpecker (*Melanerpes carolinus*), Hairy Woodpecker (*Picoides villosus*), Willow Flycatcher (*Empidonax traillii*), Louisiana Waterthrush (*Seiurus motacilla*) and many others (Doug Gross, 2003).

Bunker Hill and the area east of **Bald Hill** are also important tracts in Greenwood Township. These forested hills and slopes still remain somewhat intact and are important components in a very fragmented habitat. Forest fragmentation is a major threat to preservation of biodiversity in Pennsylvania. The negative effects of forest fragmentation are numerous, and recovery of our forested habitats does not happen quickly. In 1997, Pennsylvania was losing 300 acres every day to development (NRCS 1997). This trend continues today and as pressure from urban sprawl continues, our forests become more fragmented. Forest fragmentation can have negative and irreversible effects on local environments, especially when the fragmentation is a result of development. Fragmentation results in a loss of aesthetic values, recreation, forest-based employment, and forestry products, and leads to increased pressure on infrastructure such as roads and utilities (Forest Fragmentation in the Chesapeake Bay Watershed, 1998)._Additional surveys of forested slopes, ravines and streams in this township are encouraged.

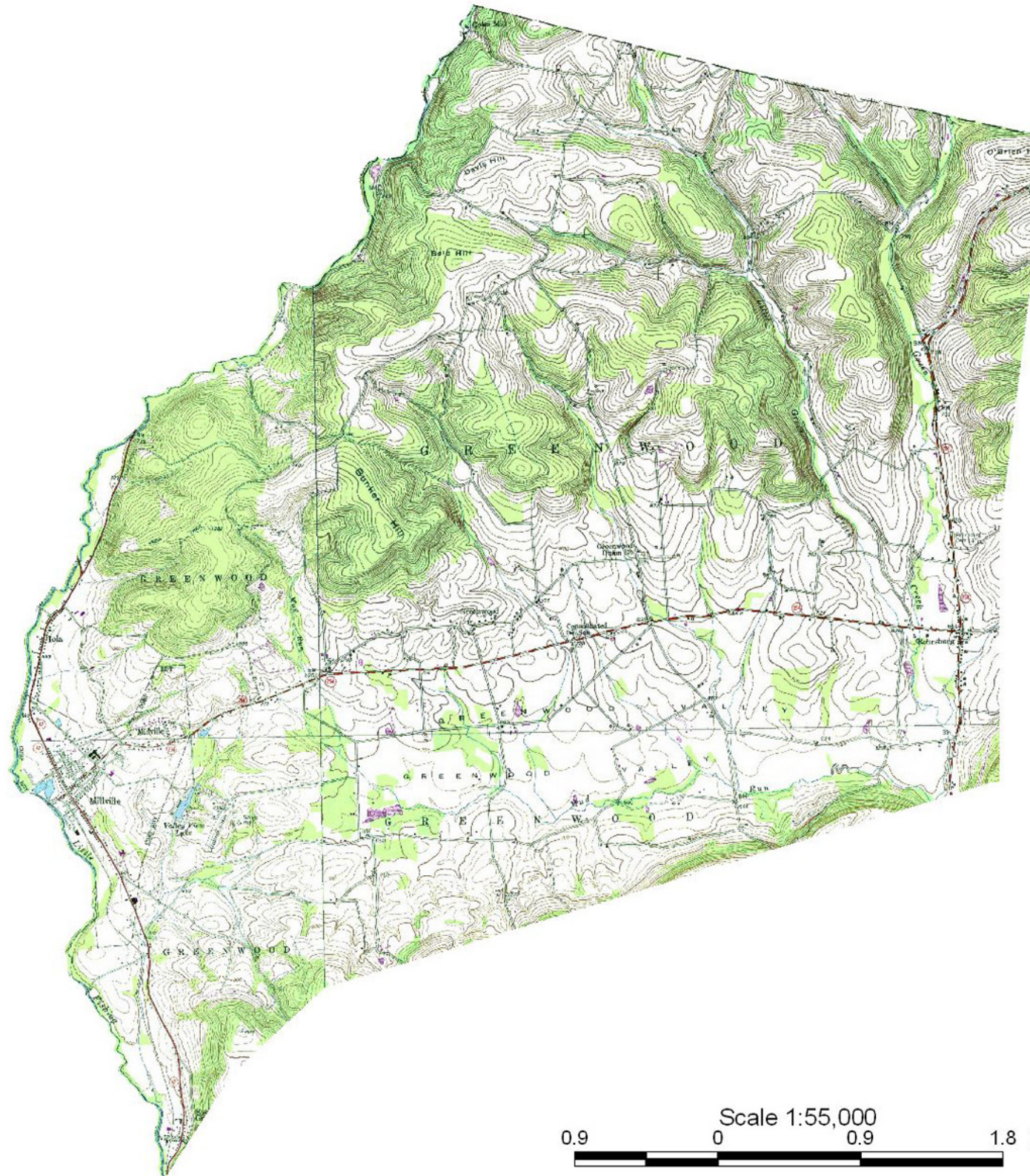
Insert map [GREENWOOD TOWNSHIP](#)



Greenwood Township Millville Boro

Greenwood Township and Millville Boro

Columbia County Natural Areas Inventory





Natural Areas:

Locally Significant Sites:

Managed Areas:



Legend

-  Managed Area
-  Natural Area or Locally Significant Site



This black phase timber rattlesnake (*Crotalus horridus*), a PA–Candidate species of concern, was documented as part of several populations occurring in Columbia County. These misunderstood snakes are relatively mild-mannered, and will seek escape before defending themselves. This species is endangered in Pennsylvania primarily due to exploitation by snake hunters (Hulse 2001).

(Photo: PA Science Office of The Nature Conservancy)

HEMLOCK TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Jakey Hollow Natural Area	Northern Conifer Forest Natural Community	G5	S3S4	N	2003	BC

Locally Significant Areas: None

Managed Areas: None

Hemlock Township is located in the western portion of Columbia County. The township is composed of agricultural and residential areas with a significant amount of fairly intact, forested tracts. The area south of West Hemlock Creek and north of I-80 is an important forested component in the township. The slopes along **West Hemlock Creek** provide an important buffer and the slopes composed mainly of eastern hemlock (*Tsuga canadensis*). Using aerial photography interpretation, ecologists at The Nature Conservancy identified forested seeps that could have sensitive ecological features along West Hemlock Creek and at the headwaters of **Frozen Run**. These areas were not included in our survey however future field studies may be successful in identifying important ecological features in these habitats. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

JAKEY HOLLOW NATURAL AREA - (Hemlock and Mt. Pleasant Townships) - Jakey Hollow is a **Northern Conifer Forest Natural Community** adjacent to Fishing Creek. The 60-acre tract was purchased by DCNR in 1990 and is designated as a Natural Area. The site is home to an excellent mixed stand of second growth eastern hemlock (*Tsuga canadensis*) and hardwoods, with a small area of virgin hemlock. This forest is a small remnant of the grand woodlands that used to cloak Pennsylvania.

Some of the other tree species at this site include sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), white pine (*Pinus strobus*), chestnut oak (*Quercus montana*), white oak (*Quercus alba*), white ash (*Fraxinus americana*), American beech (*Fagus grandifolia*), black birch (*Betula lenta*) and black cherry (*Prunus serotina*).

The shrub and herbaceous layer includes mountain laurel (*Kalmia latifolia*), Virginia creeper (*Parthenocissus quinquefolia*), New York fern (*Thelypteris noveboracensis*), sensitive fern (*Osmunda sensibilis*), Christmas fern (*Polystichium acrostichoides*), Solomon's seal (*Polygonatum pubescens*), intermediate shield fern (*Dryopteris intermedia*), purple trillium (*Trillium erectum*), Indian cucumber (*Medeola virginiana*), goldenrod (*Solidago* spp.), partridge

Insert map [HEMLOCK TOWNSHIP](#)

Hemlock Township

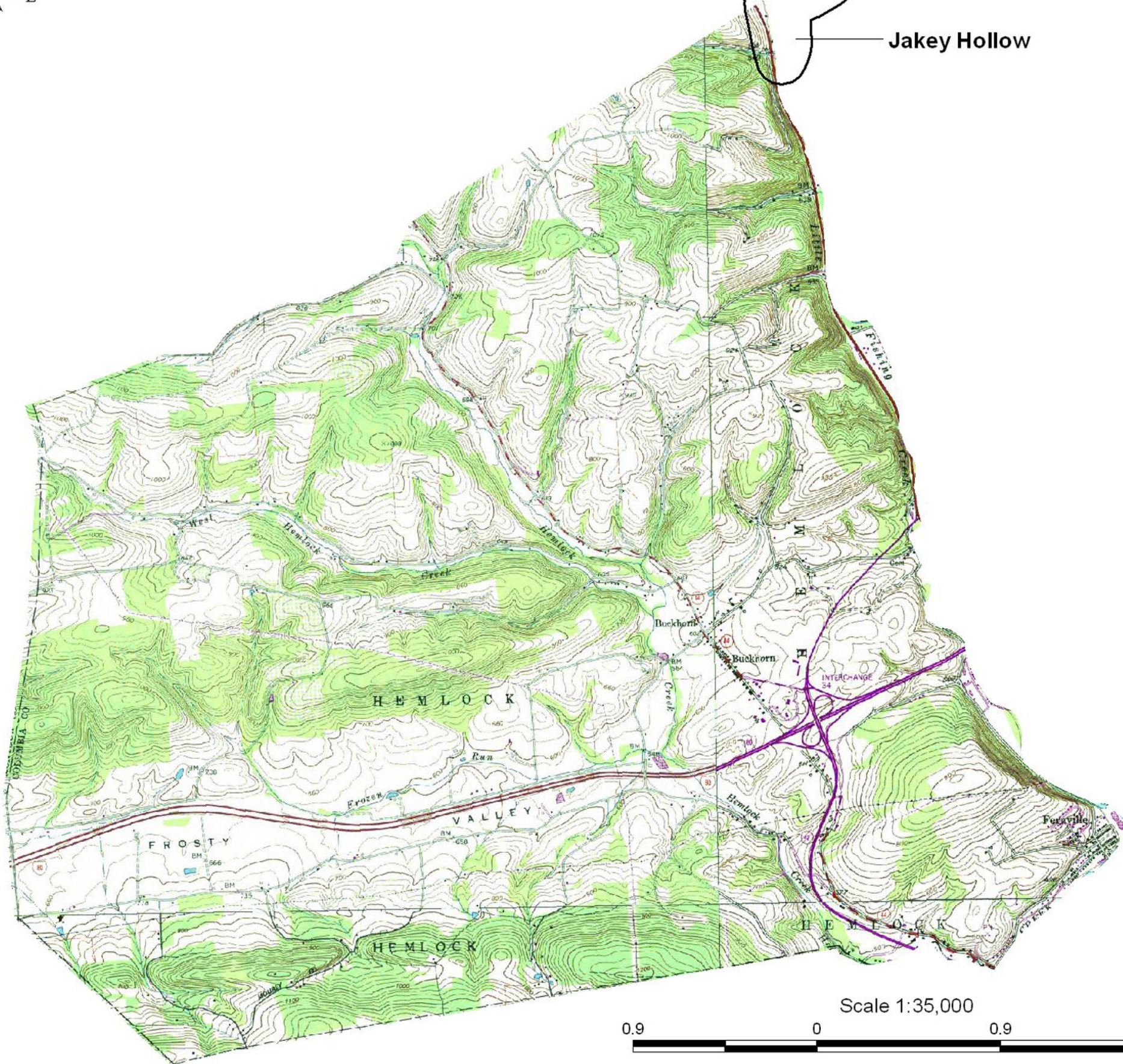


Jakey Hollow

Hemlock Township

Columbia County
Natural Areas Inventory


Natural Areas:
Jakey Hollow



Scale 1:35,000



Legend

 Natural Area or Locally Significant Site

(Hemlock Twp. continued)

berry (*Mitchella repens*) jewelweed (*Impatiens* spp.), white wood aster (*Aster divaricatus*), mayapple (*Maianthemum canadense*), foamflower (*Tiarella cordifolia*), dwarf ginseng (*Panax trifolius*), skunk cabbage (*Symplocarpus foetidus*) and garlic mustard (*Alliaria petiolata*).

Jakey Hollow is also home to a variety of bird species. This site is important to birds and other animal species because it is an intact, though small, old growth area. Some of the bird species observed at this site include Barred Owl (*Strix varia*), Blue-headed Vireo (*Vireo solitarius*), Veery (*Catharus fuscescens*), Wood Thrush (*Hylocichla mustelina*), Black-throated Green Warbler (*Dendroica virens*), Blackburnian Warbler (*Dendroica fusca*), Louisiana Waterthrush (*Seiurus motacilla*), Scarlet Tanager (*Piranga olivacea*), Pileated Woodpecker (*Dryocopus pileatus*), White-breasted Nuthatch (*Sitta carolinensis*), Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), Ovenbird (*Seiurus aurocapillus*), Cedar Waxwing (*Bombycilla cedrorum*) and Worm-eating Warbler (*Helmitheros vermivorus*).

Threats and Disturbances

Though this site is now protected, the surrounding areas are changing quickly. Many new homes have been built near the hollow and the remaining land surrounding this old growth remnant may soon be developed. It is possible that in the future, most of the natural area will be surrounded by housing developments. This will have a negative effect on the area by decreasing the scenic beauty and natural quality of the site. Evidence of runoff from agricultural fields was noted at the site along with introduction of exotic species. Invasive species such as garlic mustard (*Alliaria petiolata*) are quickly becoming established along the edges and could have devastating effects on the diversity in the understory. Over-browsing by deer is also a threat to this site. Hunting is allowed in the natural area but deer populations remain high. Another threat to this site is the invasion of the hemlock wooly adelgid (*Adelges tsugae*). This pest was present in the area and a large number of hemlocks could die from the infestation. This may change the composition of the forest, with other species replacing hemlocks in the canopy.

Conservation Recommendations

The old growth hemlock stand is threatened by the hemlock wooly adelgid. The area should be monitored to determine the damage from the infestation. Possible options for control of the adelgid should be investigated and implemented at this site. Additional development adjacent to the natural area should be discouraged. Forested buffers should be established and expanded by conservation easements, or outright purchase if the opportunity becomes available. Control of exotic species is also recommended to prevent further spread into the interior of the natural area.

JACKSON TOWNSHIP

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

Locally Significant Areas: Green Creek Floodplain

Managed Areas: State Game Land #13

Other: Little Fishing Creek - Exceptional Value Stream

Jackson Township is located in the upper northwest corner of the county. This northern part of the township is largely forested and partially covered by State Game Lands #13. It borders Sullivan County, a large portion of which also remains forested. Two important features in the township include **Little Fishing Creek** and the **West Branch of Fishing Creek**. Little Fishing Creek is considered an Exceptional Value Stream from its source to the confluence with Lick Run at Sereno by the PA Department of Environmental Protection as expressed in the Pennsylvania Code section § 93.9k. Both creeks have forested buffers across most of their reaches in this township. Forested buffers along the creeks are especially important to protect the stream from agricultural runoff and other non-point sources of pollution. Buffers also help to reduce erosion, provide groundwater discharge and prevent flooding. Preserving these forested corridors will provide important ecological services along with a more attractive environment in which to live and work. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

LOCALLY SIGNIFICANT AREAS:

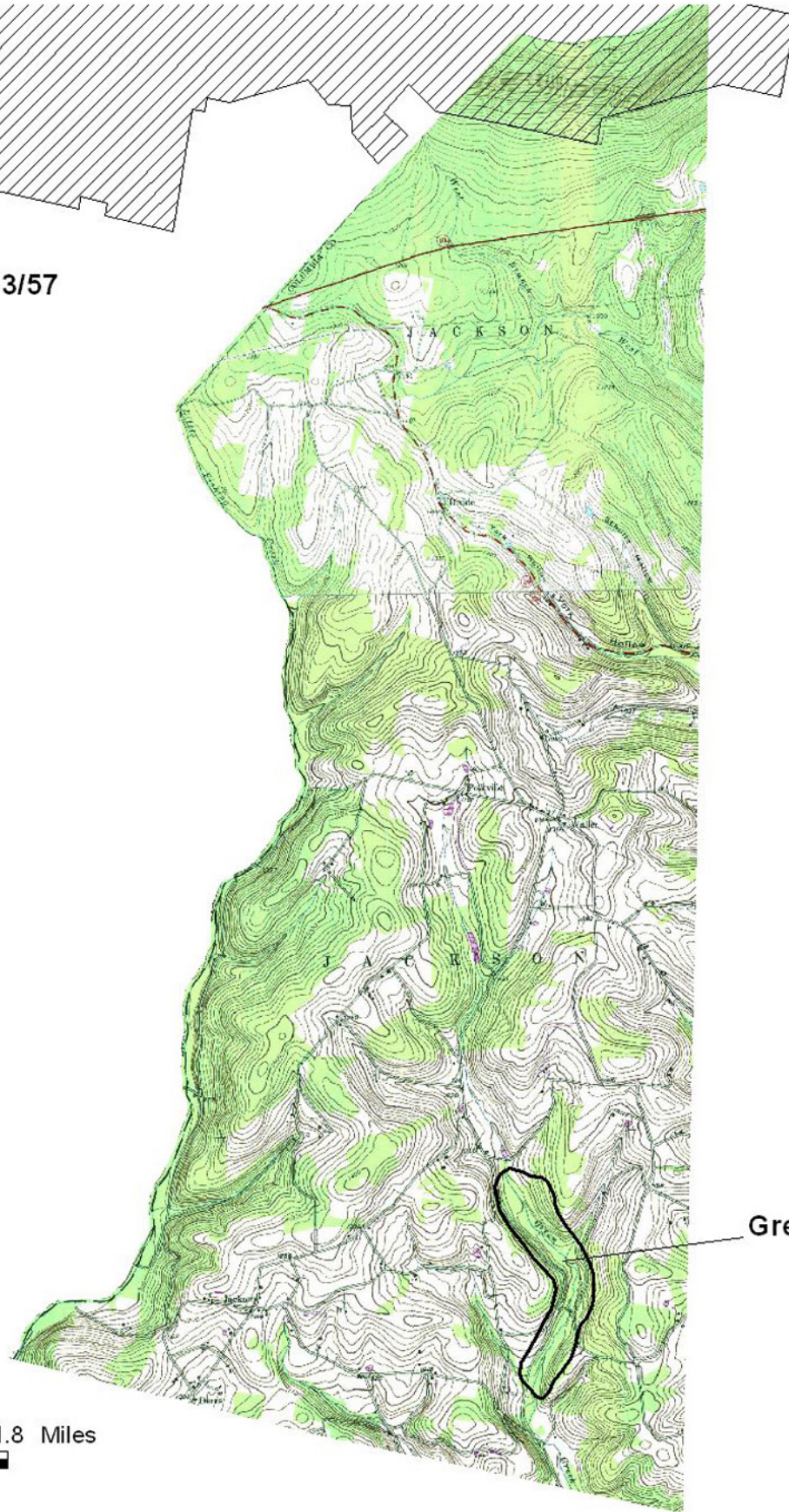
Green Creek Floodplain (Jackson Township) – This locally significant site is made up of the hemlock forested floodplain along short stretch of Green Creek. This area was delineated from aerial photography, and a ground survey is recommended to determine the quality and type of natural community at this location. The floodplain forest in this location appears to be intact despite being paralleled on either side by roadways. Forested buffers should remain intact for the length of the creek with logging operations refraining from cutting within 50 to 100 feet of the creek bank. Stream bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential and roadway settings. In addition, the stream bank floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Much of the area’s important biodiversity can be preserved by maintaining an intact, forested floodplain along the creek. The effectiveness of the forested creek as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses and additional roadways along the creek. Local planning should discourage construction of new residences and roadways along the creek, adjacent slopes and floodplain.

Insert map [JACKSON TOWNSHIP](#)

Jackson Township



State Game Land #13/57



Green Creek Floodplain
(Locally Significant)

Scale 1:55,000



Jackson Township

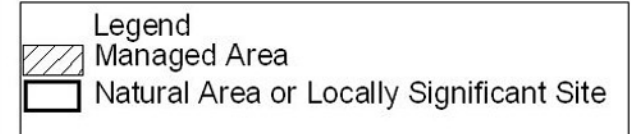
Columbia County Natural Areas Inventory

Locally Significant Sites:

Green Creek Floodplain

Managed Areas:

State Game Land #13/57



River Island Grassland Communities



The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created distinctive natural tall grassland communities as the result of these natural disturbances.

LOCUST TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
South Branch Roaring Creek Headwaters	Animal	G4	S3S4	PC	2003-06-13	E
	Animal	G5	S?	N	2003-08-13	E
	Animal	G5	S?	N	2003-08-13	E
	Hemlock Palustrine Forest Natural Community	G?	S3	N	2003-06-13	E
South Branch Roaring Creek Watershed	Long-tailed Shrew (<i>Sorex dispar</i>)	G4	S3	N	2001-06-20	E
	Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	G4	S3B,S3N	N	2001-06-20	E

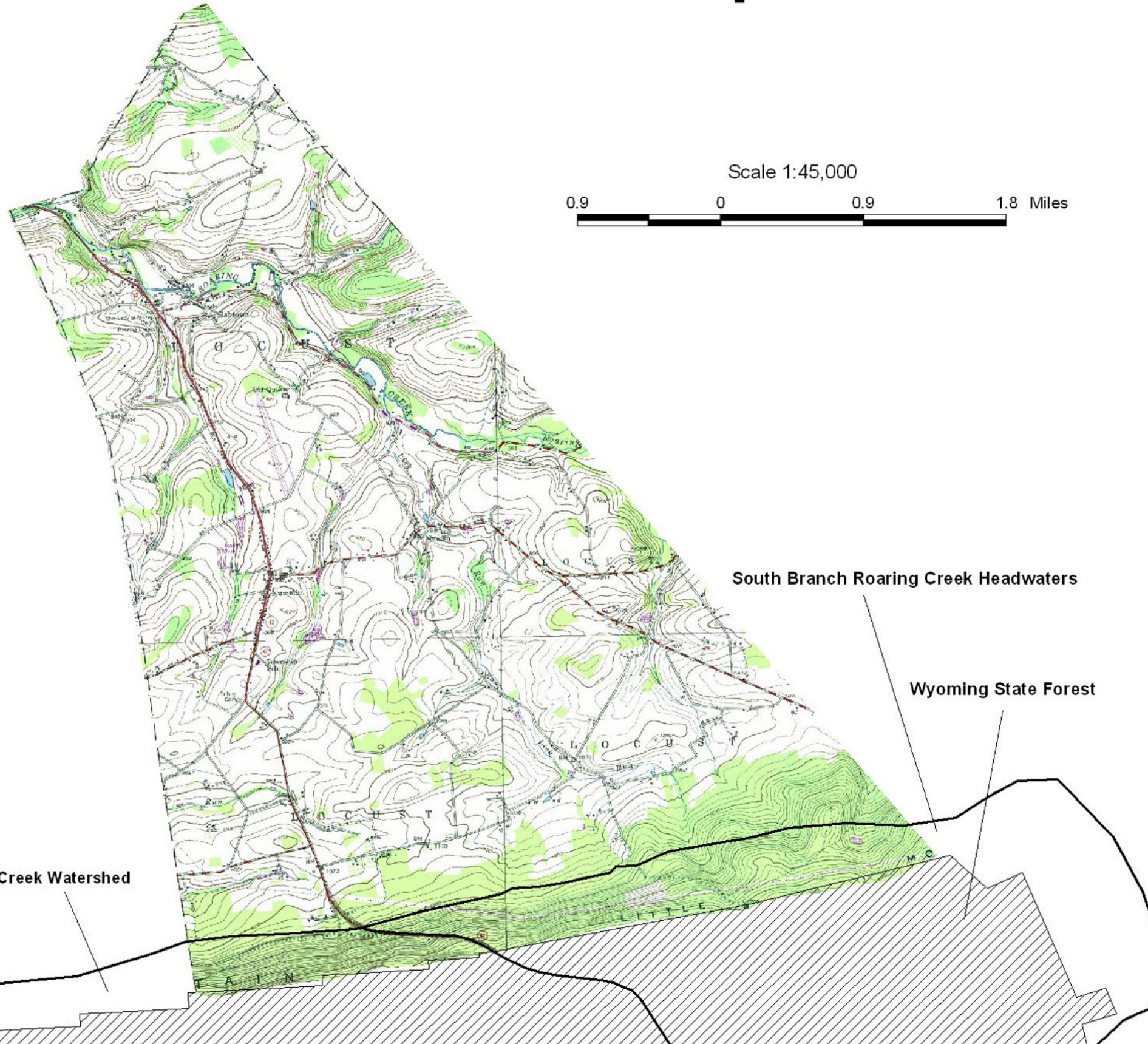
Locally Significant Areas: None

Managed Areas: Wyoming State Forest

Locust Township is located in the southern portion of Columbia County. The northern portion of the township is largely agricultural, with very little intact buffers along **Roaring Creek**. This important landscape feature is not well protected from agricultural runoff and erosion, which can decrease water quality in the creek. Restoration of forested buffers along the banks of Roaring Creek could help restore the watershed to a more natural state. Clean water is necessary for the health of both aquatic and terrestrial animal populations as well as township residents. Clean water is also a major step in conservation of biological resources. Locust Township would benefit greatly from restoration efforts in the roaring creek watershed. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [LOCUST TOWNSHIP](#)

Locust Township



Scale 1:45,000



Locust Township

Columbia County Natural Areas Inventory

Natural Areas:

- South Branch Roaring Creek Headwaters
- South Branch Roaring Creek Watershed

Managed Areas:

- Wyoming State Forest

South Branch Roaring Creek Headwaters

Wyoming State Forest

South Branch Roaring Creek Watershed



Legend

- Managed Area
- Natural Area or Locally Significant Site

(Locust Twp. continued)

SOUTH BRANCH ROARING CREEK HEADWATERS (Conyngham, Locust and Roaring Creek Townships) – The South Branch Roaring Creek Headwaters is the portion of the watershed east of Route-42. This may seem an arbitrary dividing line severing this portion of the watershed from the adjacent western portion, but there are significant habitat differences between the two areas to regard them independently. While the western portion of the watershed has several artificially created reservoirs, the headwaters have never been significantly modified. The headwaters have a good quality **Hemlock Palustrine Forest Natural Community**, a type of forested wetland. Seep wetlands and wet meadows border the stream in many places, with many sandy-bottomed, sphagnum moss-ringed seeps. This habitat is exceptionally scenic as well as fragile, and would be easily degraded by roads or other alterations of the topography. The springs in this area are the source for much of the clean water supplying the Consumers PA Water Company reservoirs.

A **G5, S3S4 Pennsylvania animal species of concern** was documented in this area in the summer of 2003. One individual was observed using an open sedge dominated area in a beaver meadow. This species requires rocky outcrops as primary habitat. The animals commonly forage in lower elevation sites during the summer months. The associated plant species include sphagnum moss (*Sphagnum* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), red maple (*Acer rubrum*) and highbush blueberry (*Vaccinium corymbosum*). Surrounding forest composition is a mixed hardwood/conifer woodland, which includes species such as eastern hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*) and yellow birch (*Betula alleghaniensis*).

Two other animal species of concern were documented at this site in 2003. Both species were found using habitat along Roaring Creek. Other species observed at the site include Spotted turtle (*Clemmys guttata*), Red-spotted newt (*Notophthalmus viridescens*), Wood frog (*Rana sylvatica*), Green frog (*Rana clamitans melanota*), Leopard Frog (*Rana palustris*), lancet clubtail (*Gomphus exilis*), a darter (*Sympetrum* sp.), bluet (*Enallagma* sp.), fragile forktail (*Ischnura posita*) and swamp spreadwing (*Lestes vigilax*).

South Branch Roaring Creek Headwaters also provides habitat for a number of species of birds including Song Sparrow (*Melospiza melodia*), Acadian Flycatcher (*Empidonax virens*), Louisiana Waterthrush (*Seiurus motacilla*), Black-throated Green Warbler (*Dendroica virens*), Dark-eyed Junco (*Junco hyemalis*), Veery (*Catharus fuscescens*), Wood Thrush (*Hylocichla mustelina*), Hermit Thrush (*Catharus guttatus*), Common Yellowthroat (*Geothlypis trachias*), Yellow-rumped Warbler (*Dendroica coronata coronata*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Brown Creeper (*Certhia americana*), Blue-headed Vireo (*Vireo solitarius*), Ovenbird (*Seiurus aurocapillus*), Scarlet Tanager (*Piranga olivaceus*), American Redstart (*Setophaga ruticilla*), Black-and-white Warbler (*Mniotilta varia*), Eastern Towhee (*Pipilo erythrophthalmus*), Black-capped Chickadee (*Poecile atricapilla*), Great Crested Flycatcher (*Myiarchus crinitus*), Northern Flicker (*Colaptes auratus*), and Blackburnian Warbler (*Dendroica fusca*).

Threats and Disturbances

There are no direct threats to this site; however, future land use changes could affect these species and the Hemlock Palustrine Forest Natural Community. Disturbances include the hemlock woolly adelgid, logging, planted exotic conifers (Norway spruce, red pine plantations),

(Locust Twp. continued)

invasion of exotic species and jeep trails. Changes in water quality could be detrimental to the species of concern at the site.

Conservation Recommendations

More surveys are necessary to determine the primary habitat for these species and relative health of the population. Logging should be avoided in this portion of the watershed due to the numerous wetlands in the flat bottomland. Upcoming resource plans should consider this area as a potential future old growth area. Recreation plans for this portion of the newly acquired Wyoming State Forest lands should be limited to low density, non-motorized outdoor recreational activities.

SOUTH BRANCH ROARING CREEK WATERSHED (Cleveland, Conyngham and Locust Townships & Northumberland County) – A significant portion of Columbia County has been disturbed either by agriculture, mining or development. In the context of the modified nature of the surrounding lands, the extensive forests of the South Branch Roaring Creek Watershed and the adjacent Trout Run Watershed are clearly important for their ecoregional significance. This watershed is part of a continuously forested ridge and valley complex connecting Moosic Mountain in Lackawanna County, through Luzerne County to Nescopeck and Catawissa Mountains, finally connecting with the Susquehanna River. It is the continuously forested nature of this mountainous system that is its biggest attribute. South Branch Roaring Creek and Trout Run Watersheds provide an essential link in the chain of forested habitats from the Pocono Mountains to the Susquehanna River. This green corridor provides habitat and an avenue of migration for many species of animals and plants. If the continuity of this forested corridor is broken by additional roadways and development, the protected portions could become more isolated from the supporting landscape, reducing their viability as a functioning ecosystem. This area also provides great opportunities for outdoor recreation for local residents, including hunting, hiking, birdwatching, and many other outdoor activities. It is the contiguous and relatively undisturbed nature of these watersheds that make this area one of the top sites in the county for preservation.

The valley and adjacent lands to the east have gone relatively undisturbed (with the exception of logging) for nearly one hundred years. Seep wetlands and wet meadows border the stream; the sandy-bottomed seeps bubble up like little pots of watery porridge. Hemlock groves add to the diversity of the mostly deciduous forest. The south side of Little Mountain is dominated by an oak forest with a heath understory. The South Branch Roaring Creek and Trout Run watersheds have not been mined. Consequently, the water in these streams is of such high quality that the Water Company was able to provide unfiltered drinking water to their customers until recent state regulations required the water to be filtered. A brief electroshocking survey of a section of the South Branch of Roaring Creek yielded eleven species of fish including native trout populations and a diverse array of aquatic life (e.g., aquatic insects and stream salamanders). Other fish species documented during this survey include brown bullhead catfish (*Ameiurus nebulosus*), white sucker (*Catostomus commerson*), chain pickerel (*Esox niger*), cutlips minnow (*Exoglossum maxillingua*), bluegill (*Lepomis macrochirus*), rainbow trout (*Oncorhynchus mykiss*), longnose dace (*Rhinichthys cataractae*), blacknose dace (*Rhinichthys atratulus*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*) and creek chub (*Semotilus atromaculatus*).

(Locust Twp. continued)

There are many vernal pools and wetlands in the watersheds that provide important breeding habitat for several species of amphibians including wood frogs (*Rana sylvatica*), northern spring peepers (*Pseudacris crucifer*), eastern American toad (*Bufo americanus*), red-spotted newts (*Notophthalmus viridescens*), and mole salamanders (Ambystomids). Many of the wetlands are spring fed and provide hydrology not only to the wetlands themselves, but also to South Branch Roaring Creek.

Mammal surveys conducted in the South Branch Roaring Creek Area in 2001 yielded a diverse number of species including beaver (*Castor canadensis*), gray squirrel (*Sciurus carolinensis*), groundhog (*Marmota monax*), masked shrew (*Sorex cinereus*), meadow jumping mouse (*Zapus hudsonius*), woodland jumping mouse (*Napaeozapus insignis*), northern short-tailed shrew (*Blarina brevicauda*), pygmy shrew (*Sorex hoyi*), redback vole (*Microtus chrotorrhinus*), smoky shrew (*Sorex fumeus*), white-footed mouse (*Peromyscus leucopus*), and white-tailed deer (*Odocoileus virginianus*). Two animal species of concern were identified during brief surveys near Trout Run. The **northern long-eared bat (*Myotis septentrionalis*)**, a G4, S3 species of concern, is known to occur on mined lands to the south of Trout Run. This species was captured during a survey along the Trout Run and South Branch Roaring Creek, and is using the stream corridors for feeding and the trees for raising their young. Another G4, S3 animal species of concern the, **long-tailed shrew (*Sorex dispar*)**, was also documented from this site during a small mammal survey in 2001. Additional surveys in other parts of both watersheds are recommended.

Threats and Disturbances

There has been some recent logging in the watershed. These disturbed sites often harbor exotic-invasive species that may spread in the more natural areas of the watershed. Over-browsing by deer is also a problem in some areas of the watershed. The greatest potential disturbance to the South Branch Roaring Creek area is commercial and residential development.

Conservation Recommendations

To maintain good water quality in the stream, selective logging of the site is preferred to clearcutting with the appropriate erosion and sedimentation control measures. However, the practice of throwing slash in wetlands and vernal pools should be avoided. Undisturbed forested buffers should be maintained around streams, wetlands, and vernal pools. The invasion of exotic species should be monitored and control measures enacted where possible. Any development in the watershed should be discouraged. The pristine conditions and scenic beauty of the area make it vulnerable to development. Allowing more extensive deer hunting will help the native understory plant species to become re-established. An increase in residential and commercial development would quickly decrease the quality of the natural habitats within the watershed.

MADISON TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Iola Woods	Puttyroot (<i>Aplectrum hyemale</i>)	G5	S3	PR	2003-05-27	B
Jakey Hollow Natural Area	Northern Conifer Forest Natural Community	G5	S3S4	N	2003	BC

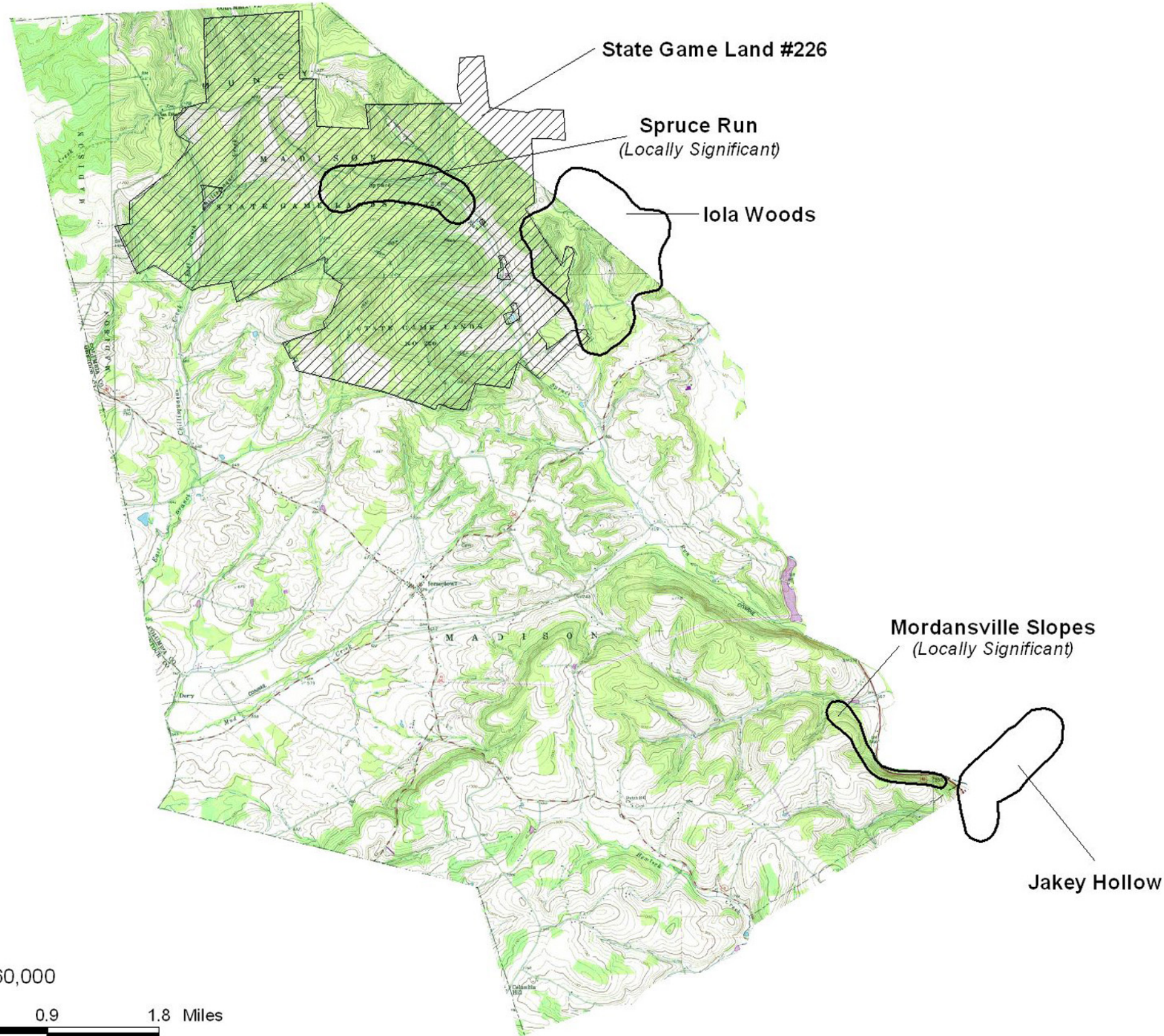
Locally Significant Areas: Mordansville Slopes
Spruce Run

Managed Areas: State Game Lands #226

Madison Township is located in the western part of Columbia County. A large portion of the northern part of the township is State Game Lands #226. One important feature in this township is the **Spruce Run Hemlock Slopes** west of Eyers Grove. Biologists did not visit this site during our field surveys. The wet hemlock slopes and floodplain area could contain environmentally sensitive features. This site should be protected from intensive logging and development. The site serves to protect water quality in Spruce Run and provides habitat for many species of wildlife. This may include species such as Black-throated Green Warblers (*Dendroica virens*) and red salamanders (*Pseudotriton ruber*). Madison Township should work to protect this valuable resource. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [MADISON TOWNSHIP](#)

Madison Township



Madison Township

Columbia County Natural Areas Inventory

Natural Areas:
Iola Woods
Jakey Hollow

Locally Significant Sites:
Mordansville Slopes
Spruce Run

Managed Areas:
State Game Land #226



Legend	
	Managed Area
	Natural Area or Locally Significant Site

Scale 1:60,000



(Madison Twp. continued)

IOLA WOODS (Madison and Pine Townships) - An unnamed tributary of Spruce Run, located in a portion of State Game Lands #226, has a good quality occurrence of a G5, S3 PA-Rare plant species of special concern, **puttyroot** (*Aplectrum hyemale*). It was found here in 1992 and again located during a site visit in 2003. This orchid is generally found on moist, rich wooded slopes and in bottomlands. The habitat supporting these plants is a hemlock / mixed hardwood forest, with shale derived soils. This occurrence is also noteworthy for being one of the very few known populations of puttyroot in the more northern part of the state.

Threats and Disturbances

There do not appear to be any threats for this species of concern, given the rather inconspicuous habit of this species and the public ownership. Disturbances to the surrounding area include past logging, old field habitats, use of ATV's, invasion of exotic species and erosion.

Conservation Recommendations

Control of exotic species is highly recommended before they become established along the portions of the stream that still have high quality habitats. Monitoring of the hemlock woolly adelgid (*Tsugae adelges*) is recommended and control efforts should be implemented where possible.

JAKEY HOLLOW NATURAL AREA - (Hemlock, Madison and Mt. Pleasant Townships)
Only a small portion of this natural area occurs in Madison Township. **Please refer to the Mt. Pleasant Township section for a complete description of this site.**

LOCALLY SIGNIFICANT SITES:

Mordansville Slopes (Madison and Mount Pleasant Townships) – This **locally significant site** contains a population of the recently delisted shrub species American yew (*Taxus canadensis*). This species was recently removed from the plant species of concern list based on updated statewide population estimates. Yew has been in decline over much of its range in the state due to habitat loss and over-browsing by deer (Rhoads and Block 2000). Recent documentation of several excellent quality populations of yew in Columbia County may suggest this species is truly on the rebound. This shrub species was observed along slopes directly adjacent to the Rt-42 roadway.

Threats and Disturbances

Use of herbicides or other indiscriminate roadside vegetation maintenance could detrimentally impact this population of yew.

Conservation Recommendations

Road maintenance activities or potential road widening efforts should try to avoid this evergreen shrub species, which is very conspicuous along this stretch of roadway. Additional surveys in the adjoining upland forest for this and other species of interest is recommended.

Spruce Run (Madison Township) – This **locally significant site** includes the upper sections of Spruce Run in State Game Lands # 226. This area contains fine local examples of hemlock (*Tsuga canadensis*) and mixed hardwood forest. Among the hardwood species present are sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), black birch (*Betula lenta*), yellow

(Madison Twp. continued)

birch (*Betula alleghaniensis*), black cherry (*Prunus serotina*), beech (*Fagus grandifolia*), and basswood (*Tilia americana*). A brief inventory of portions of these forests revealed a diversity of herbs, including at least fifteen species of ferns, twelve species of sedges (*Carex* spp.), and over sixty other species of woodland herbs. Unfortunately, some sections of Spruce Run in the State Game Lands, as well as many of the openings in the adjacent uplands, have become infested with exotic species, particularly multiflora rose (*Rosa multiflora*) and autumn olive (*Elaeagnus umbellata*).

State Game Lands #226 also supports a fairly diverse group of wildlife species. Game animals found at this site include Wild Turkey (*Meleagris gallopavo*), Ring-necked Pheasant (*Phasianus colchicus*), cottontail rabbit (*Sylvilagus floridanus*), squirrels (*Sciurus* spp.), black bear (*Ursus americana*) and white-tailed deer (*Odocoileus virginiana*). Other species found in this State Game Lands includes Acadian Flycatcher (*Empidonax virescens*), Wood Thrush (*Hylocichla mustelina*) Worm-eating Warbler (*Helmitheros vermivorus*), Whip-poor-will (*Caprimulgus vociferus*), Black-throated Green Warbler (*Dendroica virens*), Ovenbird (*Seiurus aurocapillus*), Blue-headed Vireo (*Vireo solitarius*), Blackburnian Warbler (*Dendroica fusca*), Magnolia Warbler (*Dendroica magnolia*), Louisiana Waterthrush (*Seiurus motacilla*), Blue-winged Warbler (*Vermivora pinus*), and Eastern Bluebird (*Sialia sialis*). Some of the bird species such as Blue-headed Vireo, Blackburnian Warbler, Magnolia Warbler and Louisiana Waterthrush, Acadian Flycatcher and Dark-eyed Juncos are associated with hemlocks and could be negatively affected by the introduced insect pest, hemlock woolly adelgid (*Tsugae adelges*).

Threats and Disturbances

The spread of the introduced invasive shrubs multiflora rose and autumn olive, as well as others invasive plants, presents a very real threat to this highly diverse, quality habitat. Removal of the forest canopy by logging operations would likely lead to the colonization of the creekbed by invasive species of plants. Though no All Terrain Vehicle (ATV) trails are currently present along the streambed, ATVs can seriously damage high quality riparian habitats such as this. The spread of the introduced insect pest, hemlock woolly adelgid, poses a serious threat to the health of the hemlocks throughout the state.

Conservation Recommendations

The Spruce Run area should be monitored for the spread of invasive species of plants, and eradicated when encountered. Populations of multiflora rose and autumn olive in the adjacent uplands and along the roadway should be eradicated to help prevent the spread of these invasive species of plants in the Spruce Run. Logging should be avoided along Spruce Run and its tributaries to provide a nucleus of undisturbed habitat for the future renewal of the adjacent forested area. ATV trails should be blocked as they appear in the Spruce Run area to discourage the destruction of this fragile riparian habitat. Monitoring of the hemlock woolly adelgid (*Tsugae adelges*) is recommended and control efforts should be implemented where possible.



Jakey Hollow Natural Area in Mt. Pleasant Township

MAIN TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Nescopeck Mountain State Game Lands #58	Animal	G4	S3S4	PC	2003-07-29	E
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: Catawissa Creek Outcrops
Catawissa Shrub Swamp

Managed Areas: State Game Lands #58

Main Township is located in the center of Columbia County. The southern part of the township is covered by State Game Lands #58. This township benefits greatly from the recreational opportunities and scenic beauty of this expansive gamelands. The northern part of the township is bordered by the Susquehanna River. The **Susquehanna River** is one of Pennsylvania's greatest resources. The protection of this water source is critical to the survival of the many aquatic and terrestrial species that depend on this river system. Freshwater mussels have the highest current and future rate of extinction of any animal group in North America (Stein and Flack 1997). Some populations are found almost entirely within the Susquehanna River drainage. Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site: http://midwest.fws.gov/mussel/life_history.html. The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species. Protecting the quality of the Susquehanna River in Columbia County is a top priority.

Past mining activities throughout the Catawissa Creek watershed (Luzerne, Schuylkill and Columbia Counties) have severely impacted the Catawissa Creek watershed. Aquatic life is absent in the highly acidic creek because of runoff from past mining practices in the watershed. Efforts are being made to restore the watershed and with increased Acid Mine Drainage (AMD) remediation, return the stream to a more natural state. This scenic creek could be a magnet for trout fishing enthusiasts across the state if the effects of AMD can be reversed and life restored to this aquatic system. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [MAIN TOWNSHIP](#)



Main Township

Main Township

Columbia County Natural Areas Inventory

Susquehanna River in Columbia County (North)

Nescopeck Mountain

Catawissa Shrub Swamp
(Locally Significant)

State Game Land #58

State Game Land #58

Catawissa Creek Outcrops
(Locally Significant)

Natural Areas:

- Nescopeck Mountain
- Susquehanna River (North)

Locally Significant Sites:

- Catawissa Creek Outcrops
- Catawissa Shrub Swamp

Managed Areas:

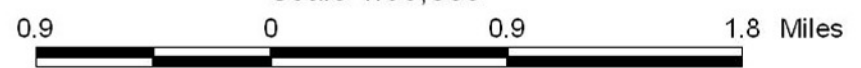
- State Game Land #58



Legend

- Managed Area
- Natural Area or Locally Significant Site

Scale 1:55,000



(Main Twp. continued)

NESCOPECK MOUNTAIN STATE GAME LANDS #58 (Beaver, Main and Mifflin Townships) - Nescopeck Mountain is home to a **G4, S3S4 Pennsylvania animal species of concern** that was documented there in the summer of 2003. Two individuals were found in rocky outcrop habitat along the slopes of the mountain. Forest composition is a dry oak/heath community which includes species such as red oak (*Quercus rubra*), chestnut oak (*Quercus montana*), scarlet oak (*Quercus coccinea*), black birch (*Betula lenta*), red maple (*Acer rubrum*), pitch pine (*Pinus rigida*), American chestnut (*Castanea dentata*), serviceberry (*Amelanchier spp.*), lowbush blueberry (*Vaccinium pallidum*), mountain laurel (*Kalmia latifolia*), sheep's laurel (*Kalmia angustifolia*), black huckleberry (*Gaylussacia baccata*), bracken fern (*Pteridium aquilinum*), Virginia creeper (*Parthenocissus quinquefolia*), and wild sarsaparilla (*Aralia nudicaulis*).

Threats and Disturbances

There are no direct threats to this site, however it has some recent disturbance from logging.

Conservation Recommendations

More surveys are necessary to determine the extent of this population. Any future logging should occur only during the winter months and a forested buffer should surround the primary habitat of this species of concern.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Briar Creek, Catawissa, Main, Mifflin, Montour, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site:

http://midwest.fws.gov/mussel/life_history.html.

The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species.

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands” natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp (*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases, providing drier habitat. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

(Main Twp. continued)

Threats and Disturbances

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

Conservation Recommendations

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

LOCALLY SIGNIFICANT SITES:

Catawissa Creek Outcrops – (Beaver and Main Townships) - This **locally significant site** includes the forested slopes along the Catawissa Creek from where it enters the county at the Schuylkill County border to the mountain gap at Mainville. Along the banks of the creek, which are exceptionally scenic, the hemlock and hardwood forests are underlain with thick stands of rhododendron. Stony outcrops flank the water at the many sharp bends in the creek. The clear waters, at first appearing sparkingly clean, at closer inspection reveal an aquatic ecosystem nearly devoid of life. One would expect to find numerous stonefly and mayfly nymphs, snails and other aquatic invertebrates attached to the underside of rocks within the creek. Fish, crayfish and submerged aquatic vegetation should be easily observed while turning over stones in the creek. None of these simple signs of life are easily found in this nearly sterile aquatic ecosystem. As a result, many other common animals further up the food chain are absent as well. Birds and mammals that feed on the fish, aquatic insects and other aquatic invertebrates are also lacking from this environment. Acid mine drainage (AMD) from coal mines long since abandoned, has greatly impacted this otherwise beautiful stretch of creek.

Despite this unfortunate and difficult-to-remedy aquatic impairment, the forested slopes along the creek act as a buffer to the waterway, filtering runoff, providing shade to the creek and acting as an essential corridor of habitat to terrestrial animal life. Several interesting plant species were noted along the banks of the creek. A large population of the relatively uncommon evergreen

(Main Twp. continued)

shrub American yew (*Taxus canadensis*) was observed hanging onto rock outcrops shaded by overarching hemlocks. This species was recently removed from the plant species of concern list based on updated statewide population estimates. Yew has been in decline over much of its range in the state due to habitat loss and over-browsing by deer (Rhoads and Block 2000). Recent documentation of several excellent quality populations of yew in Columbia County may suggest this species is truly on the rebound. The golden club (*Orontium aquaticum*) is another plant species that was recently removed from the species of concern list that was observed along the Catawissa Creek. This emergent aquatic plant species is spectacular when in bloom with its foot-long yellow club-like flower. A fair-quality population of this plant was found growing out of cracks in the creek bank bedrock.

Several massive rock outcrops occur at bends in the creek. These outcrops provide unique habitat conditions depending on the degree of moisture, solar exposure and bedrock substrate of which the outcrops are composed. Southerly-facing outcrops tend to be dry, with a very different plant community than typically cooler, moister northerly-facing cliffs. Most of the smaller outcrops along the creek have a similar plant community with early spring wildflowers such as columbine (*Aquilegia canadensis*), alum-root (*Heuchera americana*), early saxifrage (*Saxifraga virginensis*), miterwort (*Mitella diphylla*), moss pink (*Phlox subulata*), and a good variety of ferns including marginal wood fern (*Dryopteris marginalis*), spinulose wood fern (*D. carthusiana*), evergreen wood fern (*D. intermedia*), rock polypody (*Polypody virginianum*), Christmas fern (*Polystichum acrostichoides*), maidenhair spleenwort (*Asplenium trichomanes*), fragile fern (*Cystopteris tenuis*), New York fern (*Thelypteris noveboracensis*) and silvery glade fern (*Deparia acrostichoides*). Shrubs on these outcrops typically include wild hydrangea (*Hydrangea arborescens*), purple-flowering raspberry (*Rubus odoratus*), wild gooseberry (*Ribes rotundifolium*), pinxter-flower (*Rhododendron periclymenoides*), rosebay (*Rhododendron maximum*), elderberry (*Sambucus canadensis*) and two native bush honeysuckles (*Diervilla lonicera* & *Lonicera canadensis*). The tree canopy overarching these smaller outcrops consists primarily of Hemlock and mixed hardwoods including black birch (*Betula lenta*), river birch (*B. nigra*), basswood (*Tilia americana*), ash (*Fraxinus* sp.), red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), American elm (*Ulmus americana*), black cherry (*Prunus serotina*), choke cherry (*P. virginiana*), hackberry (*Celtis occidentalis*) and hop-hornbeam (*Ostrya virginiana*).

A very large and steep, dry outcrop along the creek has an interesting plant composition. Walking fern (*Asplenium rhizophyllum*), which is typically found on limestone, red cedar (*Juniperus virginiana*) and dwarf hackberry (*Celtis tenuifolia*) are typically found on dry sites, and American yew, which is usually found beneath the cool shade of hemlock are all growing on the same outcrop. This large, dry, loose-shale outcrop near the confluence with Mine Run was not adequately surveyed at the time of the creek survey and merits future investigations.

Another very steep and high outcrop occurs further downstream at the confluence with Scotch Run. This cliff has a northerly exposure, and is very wet. The cool, shaded conditions at this location provide habitat for a different plant community. Herbaceous species found at the site include swamp saxifrage (*Saxifraga pennsylvanica*), early saxifrage (*Saxifraga virginensis*), Virginia waterleaf (*Hydrophyllum virginianum*), golden saxifrage (*Chrysosplenium americanum*), Pennsylvania bittercress (*Cardamine pennsylvanica*), zigzag goldenrod (*Solidago flexicaulis*) and a variety of liverworts and moss species, which cover much of the dripping wet rock surface.

(Main Twp. continued)

Threats and Disturbances:

The degraded condition of the watershed due to acid mine drainage is the main disturbance to this otherwise quality habitat. Logging to the creek edge was observed in some areas. New houses built on the banks of the creek fragment the continuity of the habitat, interrupting its effect as a wildlife corridor, and potentially introduce invasive species of plants into the habitat.

Conservation Recommendations:

The Catawissa Creek Restoration Association (CCRA) has been very active in implementing measures designed to diminish the effects of acid mine drainage on this aquatic system. A method employed by the CCRA, along with a contingent of volunteer organizations and individuals, has been to buffer the acidity of the water with the addition of many hundreds of tons of limestone sand to the creek bed. Plans for AMD pond filtration systems are being developed for some of the major AMD sources. Forested buffers should remain intact for the length of the creek with logging operations refraining from cutting within 50 to 100 feet of the creek bank. Stream bank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential and roadway settings. In addition, the stream bank floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Much of the area's important biodiversity can be preserved by maintaining an intact, forested floodplain along the creek. The effectiveness of the forested creek as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses and additional roadways along the creek. Local planning should discourage construction of new residences and roadways along the creek, adjacent slopes and floodplain.

Catawissa Shrub Swamp – (Catawissa and Main Townships) –This **locally significant site** is a shrub swamp floodplain area along the Catawissa Creek. This area was identified from aerial photography. The area appears to be an open graminoid-dominated wetland ringed by tall and short shrubs, likely including highbush blueberry and winterberry holly. Future ground surveys are recommended to describe the quality and type of natural community found along the creek in this area. Forested buffers should be maintained along the creek and adjacent to floodplains of Catawissa Creek. Development in the floodplain should be strongly discouraged. Where buffers are absent, property could be encouraged to enroll in streamside erosion reduction programs like the Conservation Reserve Program (CRP and CREP).

River Island Grassland Communities



The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created distinctive natural tall grassland communities as the result of these natural disturbances.

MIFFLIN TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Nescopeck Mountain State Game Lands #58	Animal	G4	S3S4	PC	2003-07-29	E
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: Ten Mile Run

Managed Areas: State Game Lands #58

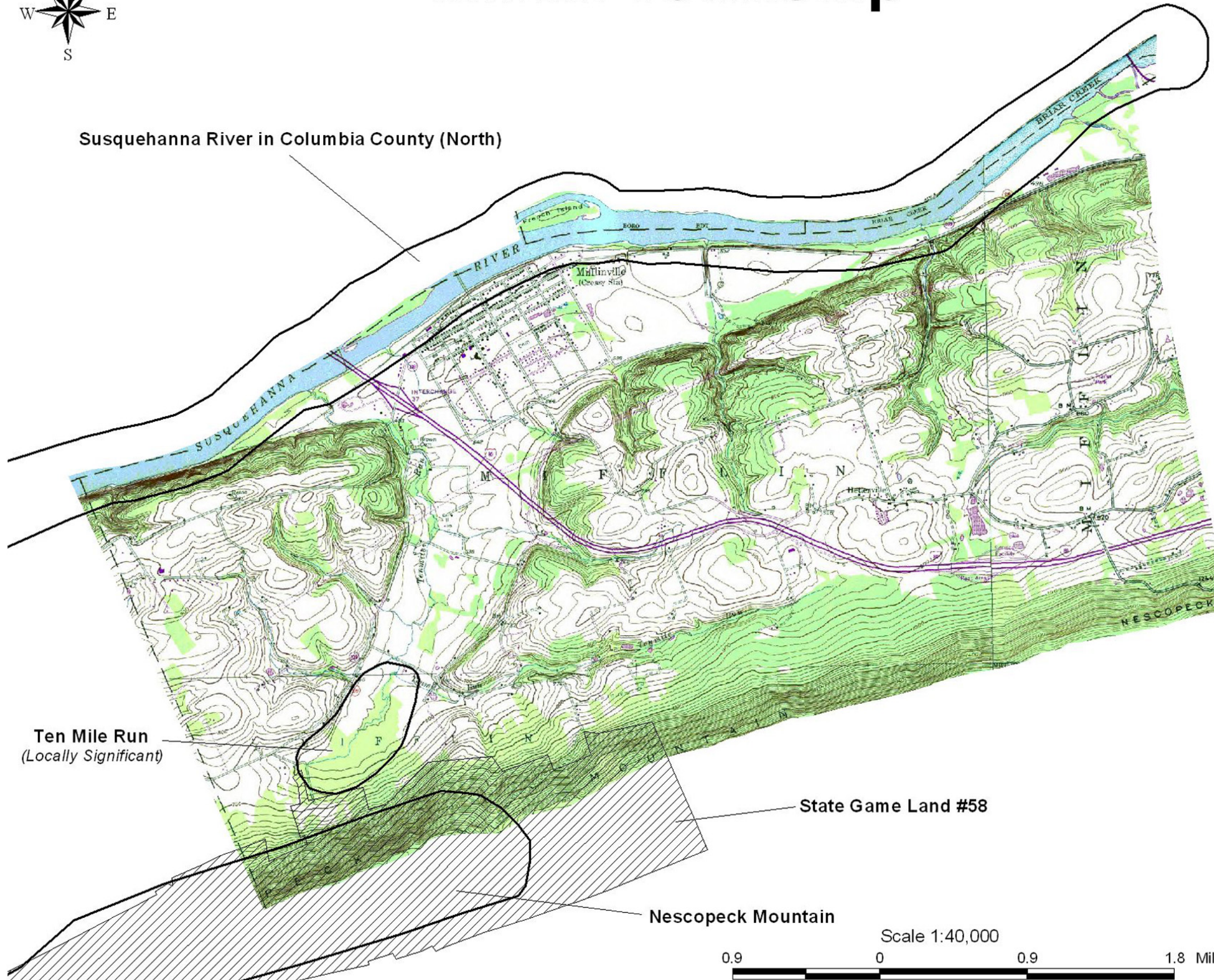
Mifflin Township is located in the eastern portion of Columbia County. One important feature in this township is **Nescopeck Mountain** east of State Game Lands #58. These forest ridges are many times the only large areas of forest remaining in the state. Proper management of these important resources is key to preserving the connectivity of the landscape. Another important area for conservation in the township is the forested ravines south of the Susquehanna. These steep ravines and ridges have likely remained forested because of their topography. Forestry practices on these steep slopes should be evaluated to minimize negative effects such as erosion. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [MIFFLIN TOWNSHIP](#)

Mifflin Township



Susquehanna River in Columbia County (North)



Mifflin Township

Columbia County Natural Areas Inventory

Natural Areas:

- Nescopeck Mountain
- Susquehanna River (North)

Locally Significant Sites:

- Ten Mile Run

Managed Areas:

- State Game Land #58



Legend

- Managed Area
- Natural Area or Locally Significant Site



(Mifflin Twp. continued)

NESCOPECK MOUNTAIN STATE GAME LANDS #58 (Beaver, Main and Mifflin Townships) - Nescopeck Mountain is home to an unknown quality population of an **S3S4 animal species of concern** that was documented there in the summer of 2003. Two individuals were found in rocky outcrop habitat along the slopes of the mountain. Forest composition is a “dry oak/heath community” which includes species such as red oak (*Quercus rubra*), chestnut oak (*Quercus montana*), scarlet oak (*Quercus coccinea*), black birch (*Betula lenta*), red maple (*Acer rubrum*), pitch pine (*Pinus rigida*), American chestnut (*Castanea dentata*), serviceberry (*Amelanchier spp.*), lowbush blueberry (*Vaccinium pallidum*), mountain laurel (*Kalmia latifolia*), sheep's laurel (*Kalmia angustifolia*), black huckleberry (*Gaylussacia baccata*), bracken fern (*Pteridium aquilinum*), Virginia creeper (*Parthenocissus quinquefolia*), and wild sarsaparilla (*Aralia nudicaulis*).

Threats and Disturbances

There were no observed direct threats to this site; however, it has had some recent disturbance from logging. There is increasing pressure on these habitats to be used as communication tower sites. Additionally, other utility right-of-ways (ROWs) fragment the continuity of the generally undisturbed habitat. These activities detrimentally impact the quality of this natural habitat.

Conservation Recommendations

More surveys are necessary to determine the extent of the population of the animal species of concern found in this area. Any future ridgetop logging should occur only during the winter months and undisturbed forested buffers should surround rock outcrops and rock scree fields, the primary habitat of this species of concern. Future placement of any communication towers, utility ROWs and access roadways should avoid these same habitats. Access roadways should be kept to a minimum to avoid unnecessary fragmentation of the habitat. New access roads typically inject numerous introduced invasive species into previously undisturbed habitats, potentially upsetting ecological processes.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Briar Creek, Catawissa, Main, Mifflin, Montour, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site:

http://midwest.fws.gov/mussel/life_history.html.

The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species.

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands” which are natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the

(Mifflin Twp. continued)

community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp (*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases, providing drier habitat. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

Threats and Disturbances

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

Conservation Recommendations

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

LOCALLY SIGNIFICANT SITE:

Ten Mile Run (Mifflin Township) - This **locally significant** area contains a “Mixed Hemlock-Hardwood palustrine forest”, which grades into an open smooth alder (*Alnus serrulata*) swamp and cattail (*Typha latifolia*) marsh. The upland forest consists of mixed hardwoods such as red maple (*Acer rubrum*), red oak (*Quercus rubra*), white ash (*Fraxinus americana*), and chestnut oak (*Quercus montana*). The understory consists of witch hazel (*Hamamelis virginiana*), white baneberry (*Actaea pachypoda*), Virginia creeper (*Parthenocissus quinquefolia*), maple-leaved viburnum (*Viburnum acerifolium*), may-apple (*Podophyllum peltatum*), striped maple (*Acer pennsylvanicum*), lowbush blueberry (*Vaccinium pallidum*), Japanese barberry (*Berberis thunbergii*), partridgeberry (*Mitchella repens*), flowering dogwood (*Cornus florida*), and spotted wintergreen (*Chimaphila maculata*). Ten-mile Run is a high-quality cold-water fishery stream as noted by the Department of Environmental Protection. This stream runs through a hemlock-

(Mifflin Twp. continued)

mixed hardwood palustrine forest. Associated species within this swamp include Eastern hemlock (*Tsuga canadensis*), skunk cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), spicebush (*Lindera benzoin*), interrupted fern (*Osmunda claytoniana*), highbush blueberry (*Vaccinium corymbosum*), mountain laurel (*Kalmia latifolia*), rosebay (*Rhododendron maximum*), mountain-holly (*Nemopanthus mucronatus*), royal fern (*Osmunda regalis*), sedge (*Carex intumescens*), prickly sedge (*Carex echinata*), Jack-in-the-pulpit (*Arisaema triphyllum*), and sphagnum moss (*Sphagnum* spp.). This forested swamp opens into a marsh/alder swamp. Species found in this area in addition to the ones already mentioned include poison sumac (*Toxicodendron vernix*), soft rush (*Juncus effusus*), winterberry holly (*Ilex verticillata*), American elderberry (*Sambucus canadensis*), rice cutgrass (*Leersia oryzoides*), blue vervain (*Verbena hastata*), silky dogwood (*Cornus amomum*), and multiflora rose (*Rosa multiflora*).

Bird species heard and/or seen include Wood Thrush (*Hylocichla mustelina*), American Redstart (*Setophaga ruticilla*), Eastern Tufted Titmouse (*Baeolophus bicolor*), Worm-eating Warbler (*Helmitheros vermivorus*), Eastern Towhee (*Pipilo erythrophthalmus*), Ovenbird (*Seiurus aurocapillus*), Veery (*Catharus fuscescens*), Pileated Woodpecker (*Dryocopus pileatus*), Nuthatch (*Sitta carolinensis*), Common Yellowthroat (*Geothlypis trichas*), Scarlet Tanager (*Piranga olivacea*), Black-capped Chickadee (*Poecile rufescens*), and Black-throated Green Warbler (*Dendroica virens*). In summary, this area is deemed locally significant for good plant diversity, and because of the significance of the wetland.

Threats and Disturbances

A forested buffer remains along the edges of Ten-mile Run; however, there is some evidence of logging within the swamp. The exotic invasive multiflora rose (*Rosa multiflora*) is becoming abundant in the shrub swamp. This species could eventually out compete all native species and significantly decrease the quality of the shrub swamp. Any additional development or any disturbance that changes the hydrology could alter the natural state of the swamp.

Conservation Recommendations

It is recommended that a forested buffer with limited timber harvesting be left around the stream and the wetland. A monitoring and management program for multiflora rose should be established to track the invasion and enact control measures where necessary. Eastern hemlock (*Tsuga canadensis*) is the dominant streamside tree. Damage from the hemlock wooly adelgid should also be monitored and efforts to protect these streamside buffer trees should be implemented where possible.

MONTOUR TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Rupert Bluffs	Northern Appalachian Shale Cliff Community	G?	S2	N	1997-05-13	BC
	Jeweled Shooting-star (<i>Dodecatheon radicum</i>)	G?	S2	PT	2003-05-07	B
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: None

Managed Areas: None

Montour Township is located on the western edge of the county. Two **large forested patches** north of Clarks Island and west of Rupert Bluffs are important features in this township, but were not included in our field surveys. Though these patches are relatively small on a regional scale, they are important natural features in this township. These forests may be very important in a largely agricultural landscape and serve as habitat for birds, squirrels, foxes as well as other species of animals and plants. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [MONTOUR TOWNSHIP](#)

Montour Township



Montour Township

Columbia County Natural Areas Inventory

Natural Areas:

- Catawissa Bluffs
- Rupert Bluffs
- Susquehanna River (South)



Legend

- Natural Area or Locally Significant Site

Scale 1:28,000

0.9 0 0.9 1.8 Miles

(Montour Twp. continued)

RUPERT BLUFFS (Catawissa and Montour Townships) – Portions of these steeply sloping areas along the Susquehanna River have been described as a **Northern Appalachian Shale Cliff Natural Community** (Smith, 1991). These communities are composed of vertical exposures of resistant shale bedrock, associated ledges and open talus. The small ledges and crevices formed in this rock substrate provide microhabitats for a restricted range of plant species. This community type is typically restricted to the major river valleys in Pennsylvania where extensive cliffs have formed (Smith, 1991). Several good quality populations of the **jeweled shooting star** (*Dodecatheon radicum*), a PA-Threatened species, can be found along wet portions of these cliffs and rocky outcrops on both sides of the Susquehanna River and near the Indian Head rock outcrop overhanging Rt. 42 north of Catawissa. The Columbia County populations of this PA-Threatened plant species of concern represent the northernmost occurrences in the state (Rhoads and Klein 1993) This plant species is part of a Sugar Maple-Basswood Forest Natural Community (Fike 1999), which includes the steep shale and sandstone cliffs. Associated species at this site include columbine (*Aquilegia canadensis*), lyre-leaved rock-cress (*Arabis lyrata*), alum-root (*Heuchera americana*), maidenhair spleenwort (*Asplenium trichomanes*) and the invasive species garlic mustard (*Alliaria petiolata*). The canopy tree and shrub species at this site include sugar maple (*Acer saccharum*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), hemlock (*Tsuga canadensis*), table-mountain pine (*Pinus pungens*) and Virginia pine (*Pinus virginiana*).

Threats and Stresses

Road maintenance along the adjacent roadway (Rt. 42) may impact this species occurrence. Salt applied to the roadway in winter as a deicing agent likely impacts the lower reaches of the cliff face. Any attempts to widen this busy road might impact the plant population along with its landmark Indian Head outcrop. Introduced invasive plant species such as garlic mustard are increasing in the area along the roadway at this site.

Conservation Recommendations

An alternative to rock salt as a deicing agent, such as Calcium Magnesium Acetate, sand and cinders, or grooved pavement applied along Rt. 42 in the vicinity of Indian Head would help provide a level of protection to the plant species of concern from the threat of salt spray. Any future road widening projects considered for this area should explore expanding towards the adjacent railroad bed, leaving the rock outcrop intact. Non-chemical means of weed control along the roadside can help control the spread of invasive plant species.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Briar Creek, Catawissa, Main, Mifflin, Montour, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site:

http://midwest.fws.gov/mussel/life_history.html.

The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species.

(Montour Twp. continued)

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands”, which are natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp (*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases, providing drier habitat. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

Threats and Disturbances

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

Conservation Recommendations

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

Ovenbird Nest



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

Photos: PA Science Office of The Nature Conservancy



MT. PLEASANT TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Jakey Hollow Natural Area	Northern Conifer Forest Natural Community	G5	S3S4	N	2003	BC

Locally Significant Areas: Mordansville Slopes
Turkey Hill Oxbow

Managed Areas: Jakey Hollow Natural Area

Mount Pleasant Township is located in the central part of the county. One important feature in this county is **Little Fishing Creek**. Little Fishing Creek feeds into Fishing Creek, which leads into the Susquehanna. The linkage between freshwater systems shows the importance of protecting freshwater on every scale. The negative impacts of human disturbance along even the smallest stream effects a wide array of people, plants and animals dependant on those systems for fresh water and suitable habitat. Many organizations have evolved around the world to help gather information and provide protection for these important river systems. The Fishing Creek Watershed Association (<http://www.columbiapa.org/fcwa/>) is an active organization in the county and township working to preserve the integrity of this watershed. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [MT. PLEASANT TOWNSHIP](#)



Mount Pleasant Township

Mt Pleasant Township

Columbia County Natural Areas Inventory

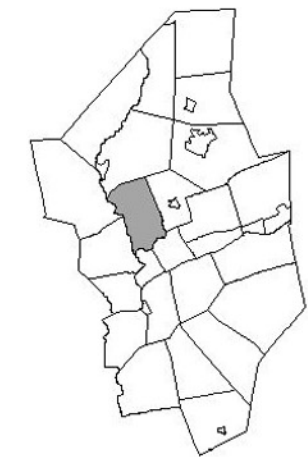


Natural Areas:
Jakey Hollow

Locally Significant Sites:
Turkey Hill Oxbow

Managed Area:
Jakey Hollow State Forest
Natural Area

Scale 1:45,000



Legend
□ Natural Area or Locally Significant Site

(Mt. Pleasant Twp. continued)

JAKEY HOLLOW NATURAL AREA - (Hemlock and Mt. Pleasant Townships) - Jakey Hollow is a **Northern Conifer Forest Natural Community** adjacent to Fishing Creek. The 60-acre tract was purchased by DCNR in 1990 and is designated as a Natural Area. The site is home to an excellent mixed stand of second growth eastern hemlock (*Tsuga canadensis*) and hardwoods, with a small area of virgin hemlock. This forest is a small remnant of the grand woodlands that used to cloak Pennsylvania.

Some of the other tree species at this site include sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), white pine (*Pinus strobus*), chestnut oak (*Quercus montana*), white oak (*Quercus alba*), white ash (*Fraxinus americana*), American beech (*Fagus grandifolia*), black birch (*Betula lenta*) and black cherry (*Prunus serotina*).

The shrub and herbaceous layer includes mountain laurel (*Kalmia latifolia*), Virginia creeper (*Parthenocissus quinquefolia*), New York fern (*Thelypteris noveboracensis*), sensitive fern (*Osmunda sensibilis*), Christmas fern (*Polystichium acrostichoides*), Solomon's seal (*Polygonatum pubescens*), intermediate shield fern (*Dryopteris intermedia*), purple trillium (*Trillium erectum*), Indian cucumber (*Medeola virginiana*), goldenrod (*Solidago* spp.), partridge berry (*Mitchella repens*) jewelweed (*Impatiens* spp.), white wood aster (*Aster divaricatus*), mayapple (*Maianthemum canadense*), foamflower (*Tiarella cordifolia*), dwarf ginseng (*Panax trifolius*), twinflower (*Linnaea borealis*), skunk cabbage (*Symplocarpus foetidus*) and garlic mustard (*Alliaria petiolata*).

Jakey Hollow is also home to a variety of bird species. This site is important to birds and other animal species because it is an intact, though small, old growth area. These forests are rare in the state and they may be important to species that depend on this habitat. Some of the bird species observed at this site include Barred Owl (*Strix varia*), Blue-headed Vireo (*Vireo solitarius*), Veery (*Catharus fuscescens*), Wood Thrush (*Hylocichla mustelina*), Black-throated Green Warbler (*Dendroica virens*), Blackburnian Warbler (*Dendroica fusca*), Louisiana Waterthrush (*Seiurus motacilla*), Scarlet Tanager (*Piranga olivacea*), Pileated Woodpecker (*Dryocopus pileatus*), White-breasted Nuthatch (*Sitta carolinensis*), Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), Ovenbird (*Seiurus aurocapillus*), Cedar Waxwing (*Bombycilla cedrorum*) and Worm-eating Warbler (*Helmitheros vermivorus*).

Threats and Disturbances

Though this site is now protected, the surrounding areas are changing quickly. Many new homes have been built near the hollow and the remaining land surrounding this old growth remnant may soon be developed. It is possible that in the future, most of the natural area will be surrounded by housing developments. This will have a negative effect on the area by decreasing the scenic beauty and natural quality of the site. Evidence of runoff from agricultural fields was noted at the site along with introduction of exotic species. Invasive species such as garlic mustard (*Alliaria petiolata*) are quickly becoming established along the edges and could have devastating effects on the diversity in the understory. Over-browsing by deer is also a threat to this site. Hunting is allowed in the natural area but deer populations remain high. Another threat to this site is the invasion of the hemlock wooly adelgid (*Adelges tsugae*). This pest was present in the area and a large number of hemlocks could die from the infestation. This may change the composition of the forest, with other species replacing hemlocks in the canopy.

(Mt. Pleasant Twp. continued)

Conservation Recommendations

The old growth hemlock stand is threatened by the hemlock wooly adelgid. The area should be monitored to determine the damage from the infestation. Possible options for control of the adelgid should be investigated and implemented at this site. Additional development adjacent to the natural area should be discouraged. Forested buffers should be established and expanded by conservation easements, or outright purchase if the opportunity becomes available. Control of exotic species is also recommended to prevent further spread into the interior of the natural area.

LOCALLY SIGNIFICANT SITE:

Turkey Hill Oxbow – (Bloomsburg Borough, Mt. Pleasant and Scott Townships) – This **locally significant site** is an oxbow of Fishing Creek that occurs between the forested slopes of Turkey Hill and I-80. The hemlock – hardwood slopes have several skunk cabbage seeps that feed the floodplain wetlands below. The extensive wetlands are forested wetlands, shrub swamps, graminoid openings and areas of open water, as well as the floodplain of the former creek bed. During high water events, the oxbow serves as an overflow channel of Fishing Creek, becoming flooded with water. During dry spells, the oxbow will dry down to the isolated deeper open-water areas. This fluctuating water level provides the conditions for an interesting type of habitat for a variety of plants and animals.

The surrounding forested slopes contain a mix of hemlock and hardwoods dominated by hemlock (*Tsuga canadensis*), but also containing black birch and yellow birch (*Betula lenta*, *B. alleghaniensis*), white oak and red oak (*Quercus alba*, *Q. rubra*), sugar maple, red maple, and Norway maple (*Acer saccharinum*, *A. rubrum*, *A. platanoides*), and tulip poplar (*Liriodendron tulipifera*). The understory is well developed, indicating an active renewal of the forest canopy, with seedling regeneration of many of the previously mentioned tree species, but also containing the understory trees slippery elm (*Ulmus rubra*) and ironwood (*Carpinus caroliniana*), and the shrubs witch-hazel (*Hamamelis virginiana*), wild hydrangea (*Hydrangea arborescens*), mountain-laurel (*Kalmia latifolia*), American elderberry (*Sambucus canadensis*), and the invasive species Japanese barberry (*Berberis thunbergii*) and European privet (*Ligustrum vulgare*). The upland shrub layer also includes the uncommon species American yew (*Taxus canadensis*). This species was recently removed from the plant species of concern list based on updated statewide population estimates. Yew has been in decline over much of its range in the state due to habitat loss and over-browsing by deer (Rhoads and Block 2000). The herbaceous layer in the uplands and the adjacent rock outcrops contains several rich woodland wildflower species including white baneberry (*Actaea pachypoda*), northern maidenhair fern (*Adiantum pedatum*), wild columbine (*Aquilegia canadensis*), spikenard (*Aralia racemosa*), blue cohosh (*Caulophyllum thalictroides*), Virginia waterleaf (*Hydrophyllum virginianum*), foamflower (*Tiarella cordifolia*), purple trillium (*Trillium erectum*) and false Solomon's-seal (*Smilacina racemosa*).

The floodplain is forested with deciduous trees common to such environments in central PA including river birch (*Betula nigra*), silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*) and slippery elm (*Ulmus rubra*). The shrub layer is also typical of wet or temporarily saturated habitats. Shrubs noted during the site visit include spicebush (*Lindera benzoin*), buttonbush (*Cephalanthus occidentalis*), silky dogwood (*Cornus amomum*), narrow-leaved meadow-sweet (*Spiraea alba*), and willow (*Salix* sp.). The herbaceous layer in the wet floodplain contains wild ginger (*Asarum canadense*), Jack-in-the-pulpit (*Arisaema triphyllum*),

(Mt. Pleasant Twp. continued)

white turtlehead (*Chelone glabra*), bulb-bearing water-hemlock (*Cicuta bulbifera*), white avens (*Geum canadense*), swamp milkweed (*Asclepias incarnata*), spotted jewel-weed (*Impatiens capensis*), cinnamon fern (*Osmunda cinnamomea*), skunk cabbage (*Symplocarpus foetidus*), true forget-me-not (*Myosotis scorpioides*), may apple (*Podophyllum peltatum*), stinging nettle (*Urtica dioica*), false-hellebore (*Veratrum viride*), blue vervain (*Verbena hastata*) and rattlesnake fern (*Botrychium virginianum*).

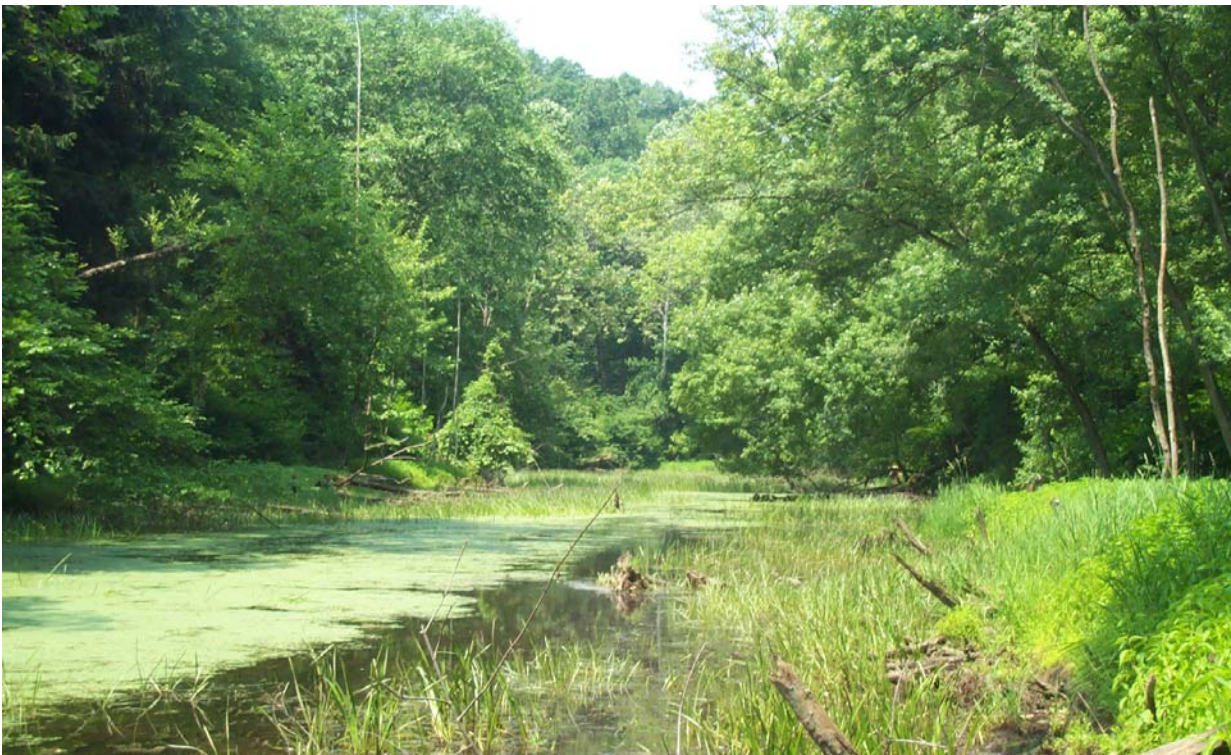
Pickerel frogs (*Rana palustris*), green frogs (*Rana clamitans*), snapping turtles (*Chelydra serpentina*) and Wood Ducks (*Aix spinosa*) were seen in the open-water wetlands. The pools are lined with grasses and sedges and other wetland species that indicate the degree of wetness of the soil conditions, including large water-starwort (*Callitriche heterophylla*), three-way sedge (*Dulichium arundinaceum*), other sedges (*Carex crinita*, *C. grayi*, *C. gynandra*, *C. lupulina*), manna-grasses (*Glyceria melicaria*, *G. striata*), soft rush (*Juncus effusus*), broadleaf arrowhead (*Sagittaria latifolia*) and northern blueflag (*Iris versicolor*).

Threats and Disturbances

Besides the presence of invasive introduced plant species, and its proximity to I-80, this site appears to have little disturbance. The invasive plant species Japanese knotweed (*Polygonum cuspidatum*) is colonizing the borders of the wetland adjacent to I-80, and poses a potentially significant threat to the diversity of the habitat.

Conservation Recommendations

Aggressive invasive species of plants should be controlled where practical. Concentration should be placed on the removal of Japanese knotweed and multiflora rose, but could expand to remove the introduced tree species Norway maple and Norway spruce, which may readily naturalize from landscape plantings. The establishment and protection of forested buffers around and within the site will help protect the habitat from the effects of introduced species, which thrive in disturbed environments.



Turkey Hill Oxbow
106

NORTH CENTRE TOWNSHIP

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

Locally Significant Areas: Stony Brook Watershed

Managed Areas: State Game Lands #55

North Centre Township is located in the central portion of Columbia County. Some significant features in this township include the areas around **Summer Hill** and **Fester Hollow**. These partially forested ravines and hilltops provide some important habitat and ecological diversity in the township. Some of the forested ravines along stream form continuous forested corridors connecting to Knob Mountain. Maintaining this landscape connectivity is critical in preserving biodiversity in the township. These forested corridors form a functional linkage between habitats and allow for movement of organisms between blocks of forest. Habitat fragmentation has left many organisms stranded in tiny forest patches surrounded by agriculture. These situations many times lead to a reduced fitness for forest patch inhabitants and eventually the possibility of localized extinctions (Soulé 1986). Maintaining landscape connectivity in the township will help increase the health of organisms and the ecosystem as a whole. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Stony Brook Watershed (North Centre and Orange Townships) - This **locally significant site** is a steep, narrow, forested ravine that has seen little recent disturbance. The entire watershed of Stony Brook from its source to the confluence with Fishing Creek is considered an Exceptional Value Stream by the PA Department of Environmental Protection (Pa.Code § 93.9k). A stream gains an Exceptional Value designation by meeting specific measurable water chemistry standards, and the surface water is of exceptional ecological significance. Once the stream has been classified as Exceptional Value, it receives a certain degree of legal protection by the Pennsylvania Code, which calls for, "...water quality of Exceptional Value Waters shall be maintained and protected" (Pa.Code § 93.4b).

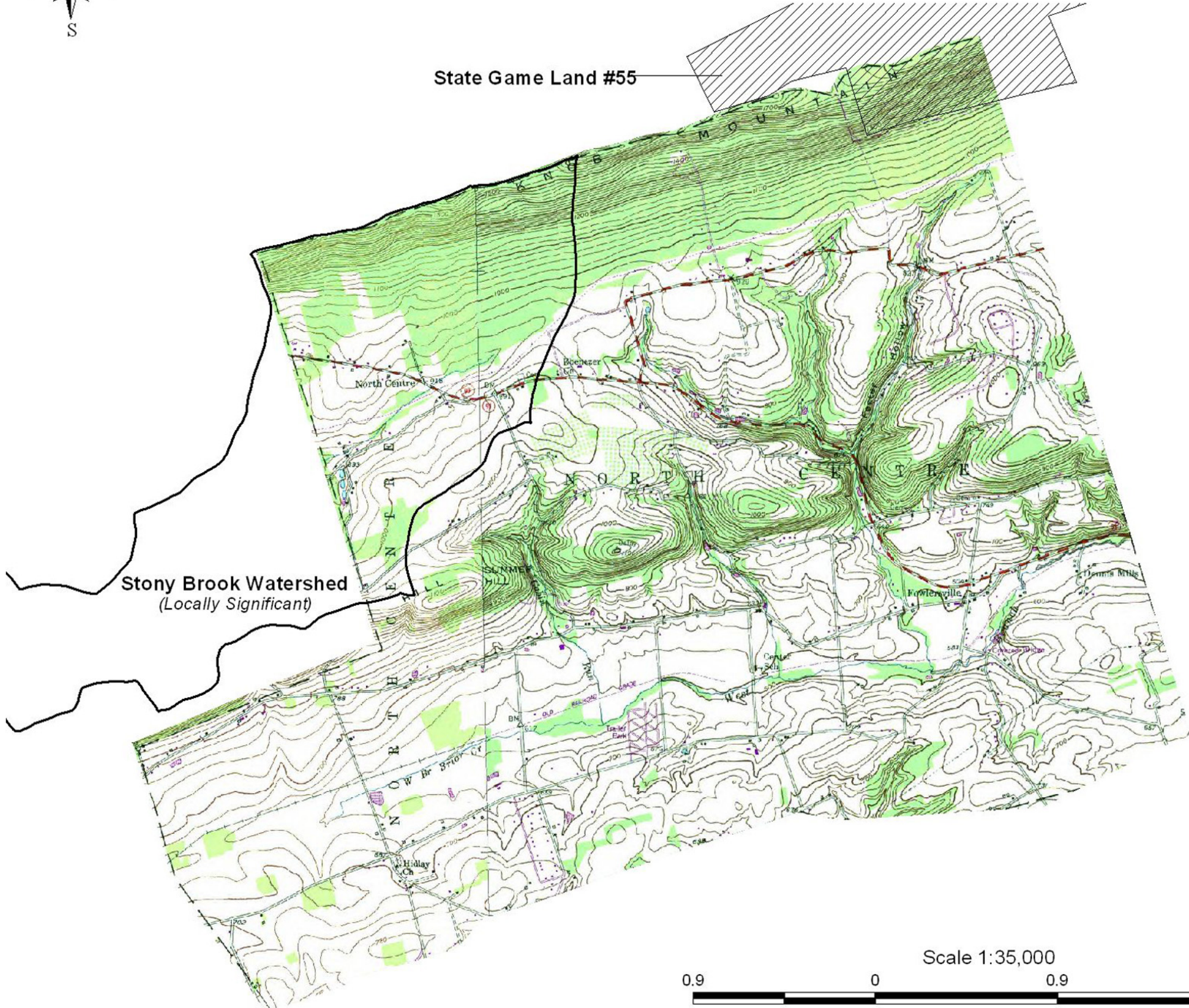
The quality of the surrounding habitat within this narrow ravine certainly offers a good degree of protection to the integrity of the water quality. The steep slopes are primarily covered in mixed-aged hemlock, but also include sugar maple, beech, white pine, yellow birch, chestnut oak, red oak, basswood, tulip poplar, black cherry, pignut hickory and white ash. The bottom of the ravine is mostly narrow with a clear, cobble-strewn creek, which broadens occasionally to allow for a rich herbaceous layer. Among the plant species at this site are many ferns including marginal shield fern (*Dryopteris marginalis*), common wood fern (*Dryopteris intermedia*),

Insert map [NORTH CENTRE TOWNSHIP](#)

North Centre Township



State Game Land #55



Stony Brook Watershed
(Locally Significant)

Scale 1:35,000



North Centre Township

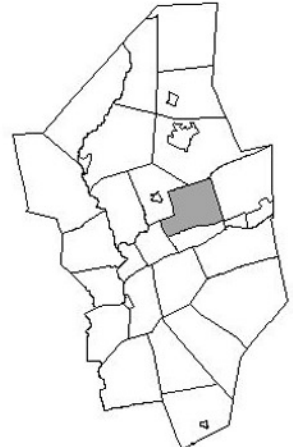
Columbia County
Natural Areas Inventory

Locally Significant Sites:



Stony Brook Watershed

Managed Areas:

State Game Land #55



Legend

-  Managed Area
-  Natural Area or Locally Significant Site

(North Centre Twp. continued)

rattlesnake fern (*Botrychium virginianum*), fragile fern (*Cystopteris tenuis*), ebony spleenwort (*Asplenium platyneuron*), maidenhair fern (*Adiantum pedatum*), Christmas fern (*Polystichum acrostichoides*), rock polypody (*Polypody virginianum*), sensitive fern (*Onoclea sensibilis*), interrupted fern (*Osmunda claytoniana*) and hayscented fern (*Dennstaedtia punctilobula*). The streamside vegetation includes a rich collection of native woodland wildflowers. Among those observed include Canada mayflower (*Maianthemum canadense*), white baneberry (*Actaea pachypoda*), purple trillium (*Trillium erectum*), blue cohosh (*Caulophyllum thalictroides*), trout lily (*Erythronium americanum*), wild stonecrop (*Sedum ternatum*), dwarf ginseng (*Panax trifolius*), false hellebore (*Veratrum viride*), Canada violet (*Viola canadensis*), twisted stalk (*Streptopus roseus*), golden saxifrage (*Chrysosplenium americanum*), Solomon's seal (*Polygonatum pubescens*), false Solomon's seal (*Smilacina racemosa*), miterwort (*Mitella diphylla*) and barren strawberry (*Waldsteinia fragarioides*).

Threats and Disturbances

The high quality habitat of the ravine is flanked on both sides and upstream by agriculture, and along one edge by a new housing development. A powerline, which is choked with invasive species such as multiflora rose, crosses the ravine in one location. The spread of invasive plant species into the ravine could displace much of the native diversity within this habitat. Runoff from residences, streets and agricultural fields could impair the water quality of the stream. The hemlock wooly adelgid (*Adelges tsugae*) is present in low levels at this site. A heavy infestation of this introduced pest can kill most of the hemlocks in the area.

Conservation Recommendations

Some areas along the ravine require additional forested buffers to minimize the impact of non-point sources of pollution. Many upstream portions are in an agricultural context and are in need of additional streamside forested buffers. Forested buffers provide critical protection to streams by reducing nutrient, sediment and toxic runoff from roads, residences and agricultural fields. This site has the potential to become a fair quality future old growth area if allowed to mature naturally. The present agricultural use of land within the watershed is considerably less threatening to this high quality habitat than additional development, which should be discouraged near the slopes and upstream from the ravine. Logging should be discouraged within the ravine at this location. The construction of a road through the ravine would be the most destructive action against this Exceptional Value Waters stream. This site should be considered for the release of biological control agents for the control of the hemlock wooly adelgid.

ORANGE TOWNSHIP & Orangeville Borough

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

Locally Significant Areas: Stony Brook Watershed

Managed Areas: None

Other: Stony Brook – Exceptional Value Stream

Orange Township is located in the center of Columbia County. **Knob Mountain** and **Knob Mountain Floodplain** are important features in this township. Though Knob Mountain remains forested, timber harvesting has degraded the quality of the communities present and the steep, rocky slopes do not promote quick regeneration. Species of trees now present at this site include young (Liriodendron tulipifera), American beech (Fagus grandifolia), black birch (Betula lenta), hickories (Carya spp.), and striped maple (Acer pensylvanica). The understory has a "weedy" appearance and is dominated by species such as hay-scented fern (*Dennstaedtia punctilobula*), Christmas fern (*Polystichum acrostichoides*), wood nettle (*Laportea canadensis*), and maple-leaved viburnum (*Viburnum acerifolium*). The Knob Mountain Floodplain has some remaining forested floodplain habitat dominated by sugar maple (*Acer saccharum*) in the canopy. However, the floodplain is being invaded by Japanese knotweed (*Polygonum cuspidatum*). This species forms a monoculture along scoured streamside habitats and floodplains, and out-compete native species. Though it grows best in open light, biologists at the site observed spread of the invasion into the understory. Japanese knotweed poses a serious threat to floodplains across the county and is difficult to eradicate. However, where possible, control measures should be enacted to prevent continued spread of this species throughout the county. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

LOCALLY SIGNIFICANT SITE:

Stony Brook Watershed (North Centre and Orange Townships) - This **locally significant site** is a steep, narrow, forested ravine that has seen little recent disturbance. The entire watershed of Stony Brook from its source to the confluence with Fishing Creek is considered an Exceptional Value Stream by the PA Department of Environmental Protection (Pa.Code § 93.9k). A stream gains an Exceptional Value designation by meeting specific measurable water chemistry standards, and the surface water is of exceptional ecological significance. Once the stream has been classified as Exceptional Value, it receives a certain degree of legal protection by the Pennsylvania Code, which calls for, "...water quality of Exceptional Value Waters shall be maintained and protected" (Pa.Code § 93.4b).

Insert map [ORANGE TOWNSHIP](#)



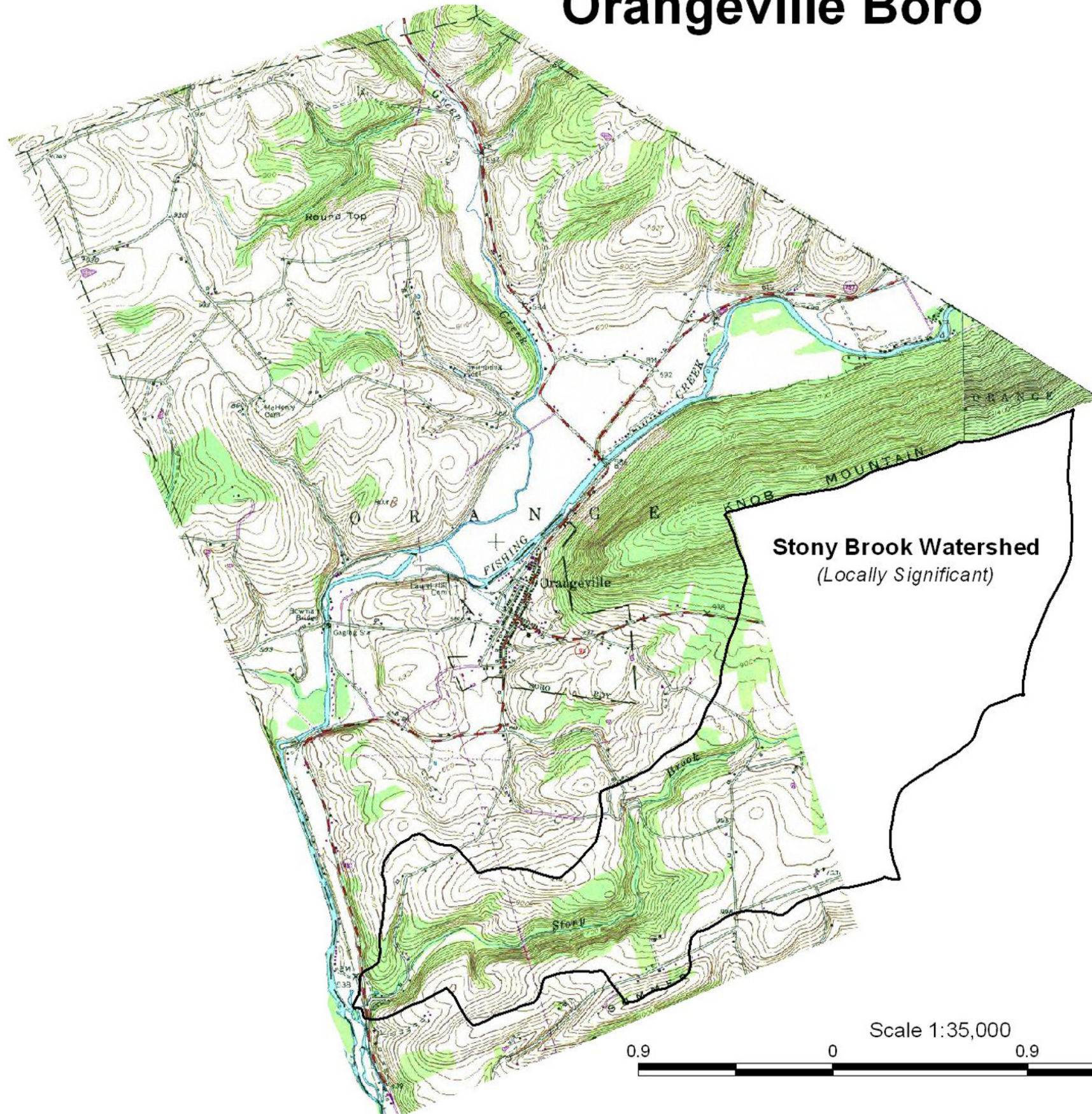
Orange Township Orangeville Boro

Orange Township and Orangeville Boro

Columbia County Natural Areas Inventory

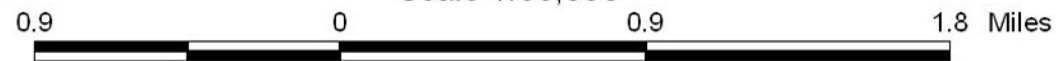
Locally Significant Sites:

Stony Brook Watershed



Stony Brook Watershed
(Locally Significant)

Scale 1:35,000



Legend

 Natural Area or Locally Significant Site

(Orange Twp. continued)

The quality of the surrounding habitat within this narrow ravine certainly offers a good degree of protection to the integrity of the water quality. The steep slopes are primarily covered in mixed-aged hemlock, but also include sugar maple, beech, white pine, yellow birch, chestnut oak, red oak, basswood, tulip poplar, black cherry, pignut hickory and white ash. The bottom of the ravine is mostly narrow with a clear, cobble-strewn creek, which broadens occasionally to allow for a rich herbaceous layer. Among the plant species at this site are many ferns including marginal shield fern (*Dryopteris marginalis*), common wood fern (*Dryopteris intermedia*), rattlesnake fern (*Botrychium virginianum*), fragile fern (*Cystopteris tenuis*), ebony spleenwort (*Asplenium platyneuron*), maidenhair fern (*Adiantum pedatum*), Christmas fern (*Polystichum acrostichoides*), rock polypody (*Polypody virginianum*), sensitive fern (*Onoclea sensibilis*), interrupted fern (*Osmunda claytoniana*) and hayscented fern (*Dennstaedtia punctilobula*). The streamside vegetation includes a rich collection of native woodland wildflowers. Among those observed include Canada mayflower (*Maianthemum canadense*), white baneberry (*Actaea pachypoda*), purple trillium (*Trillium erectum*), blue cohosh (*Caulophyllum thalictroides*), trout lily (*Erythronium americanum*), wild stonecrop (*Sedum ternatum*), dwarf ginseng (*Panax trifolius*), false hellebore (*Veratrum viride*), Canada violet (*Viola canadensis*), twisted stalk (*Streptopus roseus*), golden saxifrage (*Chrysosplenium americanum*), Solomon's seal (*Polygonatum pubescens*), false Solomon's seal (*Smilacina racemosa*), miterwort (*Mitella diphylla*) and barren strawberry (*Waldsteinia fragarioides*).

Threats and Disturbances

The high quality habitat of the ravine is flanked on both sides and upstream by agriculture, and along one edge by a new housing development. A powerline, which is choked with invasive species such as multiflora rose, crosses the ravine in one location. The spread of invasive plant species into the ravine could displace much of the native diversity within this habitat. Runoff from residences, streets and agricultural fields could impair the water quality of the stream. The hemlock wooly adelgid (*Adelges tsugae*) is present in low levels at this site. A heavy infestation of this introduced pest can kill most of the hemlocks in the area.

Conservation Recommendations

Some areas along the ravine require additional forested buffers to minimize the impact of non-point sources of pollution. Many upstream portions are in an agricultural context and are in need of additional streamside forested buffers. Forested buffers provide critical protection to streams by reducing nutrient, sediment and toxic runoff from roads, residences and agricultural fields. This site has the potential to become a fair quality future old growth area if allowed to mature naturally. The present agricultural use of land within the watershed is considerably less threatening to this high quality habitat than additional development, which should be discouraged near the slopes and upstream from the ravine. Logging should be discouraged within the ravine at this location. The construction of a road through the ravine would be the most destructive action against this Exceptional Value Waters stream. This site should be considered for the release of biological control agents for the control of the hemlock wooly adelgid.

PINE TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Iola Woods	Puttyroot (<i>Aplectrum hyemale</i>)	G5	S3	PR	2003-05-27	B

Locally Significant Areas: California Hollow
Kline Hollow Run

Managed Areas: State Game Lands #226

Other: Little Fishing Creek – Exceptional Value Stream

Pine Township is in the upper northwest portion of the county and borders Lycoming County. Pine Township is largely forested and the eastern edge borders Little Fishing Creek. Little Fishing Creek is considered an Exceptional Value Stream from its source to the confluence with Lick Run at Sereno by the PA Department of Environmental Protection as expressed in the Pennsylvania Code section § 93.9k. Some of the most important features in this township are the ravines containing **small streams and creeks** that flow into Little Fishing Creek. Many of these creeks remain moderately well buffered and should continue to be protected from development or intensive logging. One of the most important considerations in stream conservation and rehabilitation is protection of the headwaters. Headwaters is the term used to describe the origins of a stream. What happens at the origin of the stream effects every system as the water flows downstream. Protecting the source of the water can help to increase water quality throughout the watershed. Forested buffers should remain around headwaters and human activity should be minimized where possible. This will help to ensure a better quality water source for residents of the township, both human and wildlife. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [PINE TOWNSHIP](#)



Pine Township

Pine Township Columbia County Natural Areas Inventory

Natural Areas:

Iola Woods

Locally Significant Sites:

California Hollow
Kline Hollow Run

Managed Areas:

State Game Land #226

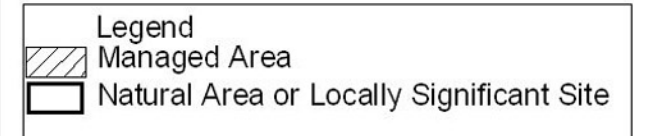
State Game Land #226

California Hollow
(Locally Significant)

Kline Hollow Run
(Locally Significant)

Iola Woods

Scale 1:65,000



(Pine Twp. continued)

IOLA WOODS (Madison and Pine Townships) - An unnamed tributary of Spruce Run, located in a portion of State Game Lands #226, has a good quality occurrence of a G5, S3 PA-Rare plant species of special concern, **puttyroot** (*Aplectrum hyemale*). It was found here in 1992 and again located during a site visit in 2003. This orchid is generally found on moist, rich wooded slopes and in bottomlands. The habitat supporting these plants is a hemlock / mixed hardwood forest, with shale derived soils. This occurrence is also noteworthy for being one of the very few known populations of puttyroot in the more northern part of the state.

Threats and Disturbances

There do not appear to be any threats for this species of concern, given the rather inconspicuous habit of this species and the public ownership. Disturbances to the surrounding area include past logging, old field habitats, use of ATV's, invasion of exotic species and erosion.

Conservation Recommendations

Control of exotic species is highly recommended before they become established along the portions of the stream that still have high quality habitats. Monitoring of the hemlock wooly adelgid (*Tsugae adelges*) is recommended and control efforts should be implemented where possible.

California Hollow (Pine Township) – This **locally significant site** was delineated from aerial photography. This narrow valley has a hemlock and white pine canopy along the slopes of the West Branch Little Fishing Creek. This relatively undisturbed narrow creek valley is one of the few in Columbia County that does not have a road adjacent to the creek. With this relative isolation, this habitat is likely to have a good diversity of native vegetation, and few introduced invasive species of plants. The shade provided by the heavy coniferous canopy cools the creek's water, allowing for high dissolved oxygen levels, a prerequisite for healthy reproducing populations of native brook trout and other important aquatic organisms in the food chain (Steiner 2002).

Threats and Stresses

The construction of a roadway along this creek would most jeopardize the quality of the habitat at this site. A road would open the forested habitat to invasive species of plants. Removal of the forested canopy by extensive timbering, development, or by the introduced insect pest of hemlocks, the hemlock wooly adelgid, could result in stream sedimentation and higher water temperatures.

Conservation Recommendations

Forested buffers should remain intact for the length of the creek with logging operations refraining from cutting within 50 to 100 feet of the creek bank. Streambank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential and roadway settings. In addition, the streambank floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Much of the area's important biodiversity can be preserved by maintaining an intact, forested floodplain along the creek. The effectiveness of the forested creek as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses and additional roadways along the creek. Ground surveys of this area are recommended to determine the quality of the habitat, and to inventory for species of concern.

(Pine Twp. continued)

Kline Hollow Run (Pine Township) - This **locally significant site** was delineated from aerial photography. The two stream systems at this site include Kline Hollow Run and Devil Hole Run. Both of these hemlock-dominated streams show a relatively small amount of disturbance, suggesting a high quality natural habitat. Both of these streams have only narrow private lanes adjacent to the creeks, providing relative isolation from disturbances such as introduced species of plants and other habitat degradations. There appear to be several small herbaceous openings along the creekbeds, likely wet meadows with assorted sedges, wetland plants and associated shrubs. The shade provided by the heavy coniferous canopy cools the creek's water, allowing for high dissolved oxygen levels, a prerequisite for healthy reproducing populations of native brook trout and other important aquatic organisms in the food chain (Steiner 2002).

Threats and Stresses

Removal of the forested canopy along the slopes and creeks would detrimentally impact the quality of the immediate habitat and watershed in general. Residential development built on the banks of the creek fragment the continuity of the habitat, interrupting its effect as a wildlife corridor, and potentially introduce invasive species of plants into the habitat.

Conservation Recommendations

Clear-cut logging operations should be avoided. Forested buffers should remain intact for the length of the creeks with logging operations refraining from cutting within 100 feet of the creek bank. Streambank forests help buffer the watershed from the effects of non-point sources of pollution including runoff from agricultural, residential and roadway settings. In addition, the streambank floodplain and corridor is usually an area of significantly higher biodiversity than the adjoining uplands. Much of the area's important biodiversity can be preserved by maintaining an intact, forested floodplain along the creeks. The effectiveness of the forested creek as a habitat corridor would be diminished by fragmentation of the forest continuity by the construction of houses and additional roadways along the creek. Local planning should discourage construction of new residences and roadways along the creek and floodplain.

South Branch Roaring Creek Headwaters



The sphagnum moss-ringed seeps bubble up through the sandy substrate in the headwaters of the South Branch of Roaring Creek within this Hemlock Palustrine Forest Natural Community..

Photos: PA Science Office of The Nature Conservancy

ROARING CREEK TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Catawissa Mountain State Game Lands #58	Animal	G4	S3S4	PC	2003-07-29	E
	Ephemeral/Fluctuating Pool Natural Community	G?	S3	N	2003-04-24	E
Roaring Creek Barrens	Scrub Oak Shrubland Natural Community	G?	S3	N	2003-07-31	E
South Branch Roaring Creek Headwaters	Animal	G4	S3S4	PC	2003-06-13	E
	Animal	G5	S3S4	N	2003-08-13	E
	Animal	G5	S3S4	N	2003-08-13	E
	Hemlock Palustrine Forest Natural Community	G?	S3	N	2003-06-13	E

Locally Significant Areas: None

Managed Areas: State Game Lands #58

Roaring Creek Township is located in the southern portion of the county, bordering Schuylkill County. State Game Lands #58 covers a portion of the township and provides important habitat for wildlife and exceptional recreational opportunities. Maintaining **connectivity of forests** in the township is a major concern. Though the ridges remain mostly forested, habitat fragmentation has had a major effect on the valleys in the township. Some forested patches remain but are not well connected to the larger forested ridges and are generally not large habitat blocks. One negative impact of fragmentation is spread of invasive species. Invasive species spread through a variety of vectors including wind, water, animals, and most efficiently through humans. Invasive species spread more quickly and easily now than ever before because of the increased mobility of human populations. Habitat fragmentation allows for large proportions of edge habitat or habitat bordering other land-use types (Soulé 1986). This edge habitat is often where exotic species begin to take hold. In fragmented landscapes they can spread quickly through small patches, sometimes dominating the habitat. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [ROARING CREEK TOWNSHIP](#)



Roaring Creek Township

Roaring Creek Township

Columbia County
Natural Areas Inventory

State Game Land #58

Catawissa Mountain

Scale 1:60,000
0.9 0 0.9 1.8 Miles

South Branch Roaring Creek Headwaters

Wyoming State Forest

Roaring Creek Barrens

Natural Areas:

- Catawissa Mountain
- Roaring Creek Barrens
- South Branch Roaring Creek Headwaters

Managed Areas:

- State Game Land #58
- Wyoming State Forest



Legend

- Managed Area
- Natural Area or Locally Significant Site

CATAWISSA MOUNTAIN – STATE GAME LANDS #58 (Beaver and Roaring Creek Townships) – This portion of Catawissa Mountain is home to an unknown quality population of an **S3S4 Pennsylvania animal species of concern** that was documented here in the summer of 2003. This species requires rocky outcrops as its primary habitat. These animals commonly move through lower elevation habitats during the summer months. Forest composition is a mixed hardwood/heath community, which includes species such as chestnut oak (*Quercus montana*), scarlet oak (*Quercus coccinea*), red maple (*Acer rubrum*), lowbush blueberry (*Vaccinium pallidum*), mountain laurel (*Kalmia latifolia*), and black huckleberry (*Gaylussacia baccata*).

An **Ephemeral/Fluctuating Pool Natural Community** was also documented at this site during surveys in 2003. These ponds serve as important breeding areas for amphibians such as wood frogs (*Rana sylvatica*), spotted salamanders (*Ambystoma maculatum*) and American toad (*Bufo americanus*). Plant species associated with the ponds include cranberry (*Vaccinium macrocarpon*), greenbriar (*Smilax* spp.), royal fern (*Osmunda regalis*), tussock sedge (*Carex stricta*), cinnamon fern (*Osmunda cinnamomea*), woolgrass (*Scirpus cyperinus*), and sphagnum moss (*Sphagnum* spp.). Canopy trees and shrubs ringing the ponds include blackgum (*Nyssa sylvatica*), white oak (*Quercus alba*), red maple (*Acer rubrum*), pitch pine (*Pinus rigida*), sassafras (*Sassafras albidum*), witch-hazel (*Hamamelis virginiana*), highbush blueberry (*Vaccinium corymbosum*), sheep's laurel (*Kalmia angustifolia*) and low sweet blueberry (*Vaccinium angustifolium*).

Threats and Disturbances

There are no direct threats to this site; however, future land use changes could affect the species of concern and the natural community. The increased use of All Terrain Vehicles (ATVs) in public forest property poses a potential threat to the site.

Conservation Recommendations

More surveys are necessary to determine the primary habitat for the species of concern and relative health of the population. Any future logging along the ridgetops should occur only during the winter months, and undisturbed forested buffers should surround rock outcrops and rock scree areas, the primary habitat of this species of concern. If logging should occur near the ephemeral pool natural community, undisturbed forested buffers around the ponds are also necessary to protect the integrity of this community. The site should be monitored for ATV traffic, and trails near the disturbance-sensitive ponds and rock outcrops blocked as they appear.

ROARING CREEK BARRENS – (Roaring Creek Township, Schuylkill County)

A small **Scrub Oak Shrubland natural community** was identified at this site in 2003. Many areas lacking tall overstory trees are dominated by scrub oak (*Quercus ilicifolia*) with other understory species scattered throughout including sheep's laurel (*Kalmia angustifolia*), black huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium pallidum*), low sweet blueberry (*Vaccinium angustifolium*), and teaberry (*Gaultheria procumbens*). Some areas are nearly impenetrable with young regeneration from somewhat recent fires. The fires have created a mosaic of habitat types, and in areas that didn't burn, canopy species remain including chestnut oak (*Quercus montana*), red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), and sassafras (*Sassafras albidum*). These specialized habitats are frequently home to rare species of moths and butterflies.

(Roaring Creek Twp. continued)

Threats or Disturbances

This site is disturbed by the presence of a housing community on the mountain. Relatively few houses have been built thus far, but more are likely to be constructed in the future. This community depends on fire to persist, however suppression is likely due to the human presence.

Conservation Recommendations

If possible, controlled burns are recommended to maintain this community type. It is possible that if controlled burns are not used as a management tool, natural fire would pose a greater threat to the homes in this fire dependant community. Local planning should discourage the construction of additional residences and roads in this fire-prone habitat. Additional surveys for barren- dependent species of concern are recommended.

SOUTH BRANCH ROARING CREEK HEADWATERS (Conyngham, Locust and Roaring Creek Townships) – The South Branch Roaring Creek Headwaters is the portion of the watershed east of Route-42. This may seem an arbitrary dividing line severing this portion of the watershed from the adjacent western portion, but there are significant habitat differences between the two areas to regard them independently. While the western portion of the watershed has several artificially created reservoirs, the headwaters have never been significantly modified. The headwaters have a good quality **Hemlock Palustrine Forest Natural Community**, a type of forested wetland. Seep wetlands and wet meadows border the stream in many places, with many sandy-bottomed, sphagnum moss-ringed seeps. This habitat is exceptionally scenic as well as fragile, and would be easily degraded by roads or other alterations of the topography. The springs in this area are the source for much of the clean water supplying the Consumers PA Water Company reservoirs.

A **G5, S3S4 Pennsylvania animal species of concern** was documented in this area in the summer of 2003. One individual was observed using an open sedge dominated area in a beaver meadow. This species requires rocky outcrops as primary habitat. The animals commonly forage in lower elevation sites during the summer months. The associated plant species include sphagnum moss (*Sphagnum* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), red maple (*Acer rubrum*) and highbush blueberry (*Vaccinium corymbosum*). Surrounding forest composition is a mixed hardwood/conifer woodland, which includes species such as eastern hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*) and yellow birch (*Betula alleghaniensis*).

Two other animal species of concern were documented at this site in 2003. Both species were found using habitat along Roaring Creek. Other species observed at the site include Spotted turtle (*Clemmys guttata*), Red-spotted newt (*Notophthalmus viridescens*), Wood frog (*Rana sylvatica*), Green frog (*Rana clamitans melanota*), Leopard Frog (*Rana palustris*), lancet clubtail (*Gomphus exilis*), a darter (*Sympetrum* sp.), bluet (*Enallagma* sp.), fragile forktail (*Ischnura posita*) and swamp spreadwing (*Lestes vigilax*).

South Branch Roaring Creek Headwaters also provides habitat for a number of species of birds including Song Sparrow (*Melospiza melodia*), Acadian Flycatcher (*Empidonax virens*), Louisiana Waterthrush (*Seiurus motacilla*), Black-throated Green Warbler (*Dendroica virens*), Dark-eyed Junco (*Junco hyemalis*), Veery (*Catharus fuscescens*), Wood Thrush (*Hylocichla mustelina*), Hermit Thrush (*Catharus guttatus*), Common Yellowthroat (*Geothlypis trachias*), Yellow-rumped Warbler (*Dendroica coronata coronata*), Blue-gray Gnatcatcher (*Polioptila*

(Roaring Creek Twp. continued)

caerulea), Brown Creeper (*Certhia americana*), Blue-headed Vireo (*Vireo solitarius*), Ovenbird (*Seiurus aurocapillus*), Scarlet Tanager (*Piranga olivaceus*), American Redstart (*Setophaga ruticilla*), Black-and-white Warbler (*Mniotilta varia*), Eastern Towhee (*Pipilo erythrophthalmus*), Black-capped Chickadee (*Poecile atricapilla*), Great Crested Flycatcher (*Myiarchus crinitus*), Northern Flicker (*Colaptes auratus*), and Blackburnian Warbler (*Dendroica fusca*).

Threats and Disturbances

There are no direct threats to this site; however, future land use changes could affect these species and the Hemlock Palustrine Forest Natural Community. Disturbances include the hemlock woolly adelgid, logging, planted exotic conifers (Norway spruce, red pine plantations), invasion of exotic species and jeep trails. Changes in water quality could be detrimental to the species of concern at the site.

Conservation Recommendations

More surveys are necessary to determine the primary habitat for these species and relative health of the population. Logging should be avoided in this portion of the watershed due to the numerous wetlands in the flat bottomland. Upcoming resource plans should consider this area as a potential future old growth area. Recreation plans for this portion of the newly acquired Wyoming State Forest lands should be limited to low density, non-motorized outdoor recreational activities.

[Dragonfly emerging](#)



A dragonfly, newly emerged from its nymph stage exoskeleton in South Branch Roaring Creek headwaters.

Photo: PA Science Office of The Nature Conservancy

SCOTT TOWNSHIP and Bloomsburg Borough

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Rupert Bluffs	Northern Appalachian Shale Cliff Community	G?	S2	N	1997-05-13	BC
	Jeweled Shooting-star (<i>Dodecatheon radicans</i>)	G?	S2	PT	2003-05-07	B
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: Espy Bog
Turkey Hill Oxbow

Managed Areas: None

Scott Township is located in the center of Columbia County and contains the borough of Bloomsburg. The **Susquehanna River** is a very important feature in the township. Bloomsburg's earliest development is associated with Native Americans, followed by a boom in the iron ore industry (<http://www.bloomsburgpa.com/>). Bloomsburg's location along the Susquehanna River made it an attractive place to settle and provided a valuable resource. Many cities are situated along the river throughout Pennsylvania. Unfortunately, with settlement came pollution and degradation of this valuable aquatic resource. Toxins, excess nutrients and sediments from erosion are a few of the problems facing water quality in the Susquehanna and the Chesapeake Bay (<http://www.acb-online.org/pubs/projects/deliverables-153-3-2003.pdf>). Township residents should be conscious of their effects on the river and work to improve water quality and prevent future degradation of the watershed. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

Insert map [SCOTT TOWNSHIP](#)

Scott Township Bloomsburg



Scott Township and Bloomsburg

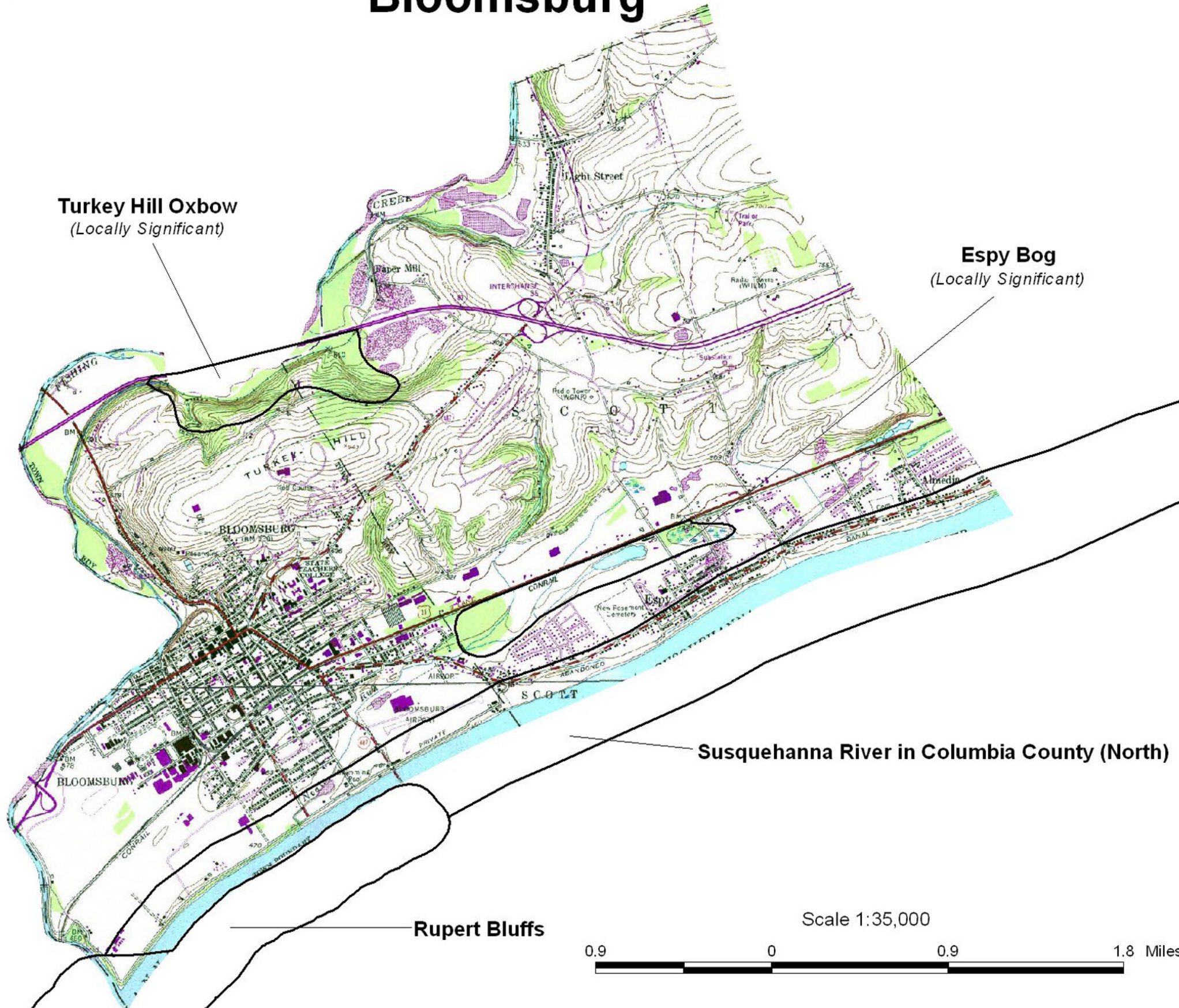
Columbia County Natural Areas Inventory

Natural Areas:

- Rupert Bluffs
- Susquehanna River (North)

Locally Significant Sites:

- Espy Bog
- Turkey Hill Oxbow



Turkey Hill Oxbow
(Locally Significant)

Espy Bog
(Locally Significant)

Susquehanna River in Columbia County (North)

Rupert Bluffs

Scale 1:35,000



Legend

Natural Area or Locally Significant Site

(Scott Twp. continued)

RUPERT BLUFFS (Catawissa and Montour Townships) – Portions of these steeply sloping areas along the Susquehanna River have been described as a **Northern Appalachian Shale Cliff Natural Community** (Smith, 1991). These communities are composed of vertical exposures of resistant shale bedrock, associated ledges and open talus. The small ledges and crevices formed in this rock substrate provide microhabitats for a restricted range of plant species. This community type is typically restricted to the major river valleys in Pennsylvania where extensive cliffs have formed (Smith, 1991). Several good quality populations of the **jeweled shooting star (*Dodecatheon radicans*)**, a PA-Threatened species, can be found along wet portions of these cliffs and rocky outcrops on both sides of the Susquehanna River and near the Indian Head rock outcrop overhanging Rt. 42 north of Catawissa. The Columbia County populations of this PA-Threatened plant species of concern represent the northernmost occurrences in the state (Rhoads and Klein 1993) This plant species is part of a Sugar Maple-Basswood Forest Natural Community (Fike 1999), which includes the steep shale and sandstone cliffs. Associated species at this site include columbine (*Aquilegia canadensis*), lyre-leaved rock-cress (*Arabis lyrata*), alum-root (*Heuchera americana*), maidenhair spleenwort (*Asplenium trichomanes*) and the invasive species garlic mustard (*Alliaria petiolata*). The canopy tree and shrub species at this site include sugar maple (*Acer saccharum*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), hemlock (*Tsuga canadensis*), table-mountain pine (*Pinus pungens*) and Virginia pine (*Pinus virginiana*).

Threats and Stresses

Road maintenance along the adjacent roadway (Rt. 42) may impact this species occurrence. Salt applied to the roadway in winter as a deicing agent likely impacts the lower reaches of the cliff face. Any attempts to widen this busy road might impact the plant population along with its landmark Indian Head outcrop. Introduced invasive plant species such as garlic mustard are increasing in the area along the roadway at this site.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Briar Creek, Catawissa, Main, Mifflin, Montour, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site:

http://midwest.fws.gov/mussel/life_history.html.

The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species.

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands”, which are natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp

(Scott Twp. continued)

(*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases, providing drier habitat. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

Threats and Disturbances

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

Conservation Recommendations

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

LOCALLY SIGNIFICANT SITES:

Espy Bog (Scott Township) – This **locally significant site** is composed of the lake and adjacent wetlands sandwiched between the borough of Espy and Rt.-11. The open water lake may be manmade, or possibly impounded as the result of the construction of the adjacent railroad and roadway. This wetland complex has good plant and animal diversity. The lake itself hosts the freshwater mussel, eastern floater (*Pyganodon cataracta*), painted turtles (*Chrysemys picta*), and many species of dragonflies and damselflies including unicorn clubtail (*Arigomphus villosipes*), ebony jewelwing (*Calopteryx maculata*), familiar bluet (*Enallagma civile*), western slender bluet (*Enallagma traviatum*), common baskettail (*Epithea cynosura*), blue dasher (*Pachydiplax longipennis*), and Jane’s meadowhawk (*Sympetrum janae*). Evidence of beaver activity in the wetlands was also observed. Among the birds observed at this location include Red-eyed Vireo (*Vireo olivaceus*), Song Sparrow (*Melospiza melodia*), Wood Thrush (*Hylocichla mustelina*), Northern Cardinal (*Cardinalis cardinalis*), Great Blue Heron (*Ardea herodias*), Fish Crow

(Scott Twp. continued)

(*Corvus ossifragus*), Cedar Waxwing (*Bombycilla cedrorum*), Common Yellowthroat (*Geothlypis trichas*), Downy Woodpecker (*Picoides pubescens*), and American Goldfinch (*Carduelis tristis*).

West of the lake is a diverse wetland with forested swamps, shrub swamps, and graminoid openings. The wetland supports a good population of poison sumac (*Toxicodendron vernix*), which suggests a circumneutral habitat favorable for many interesting plant species.

The forest canopy is dominated by pin oak (*Quercus palustris*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), American elm (*Ulmus americana*), ash (*Fraxinus* sp.) and white pine (*Pinus strobus*). The shrub layer is composed of common wetland species including the previously mentioned poison sumac, smooth alder (*Alnus serrulata*), buttonbush (*Cephalanthus occidentalis*), silky dogwood (*Cornus amomum*), spicebush (*Lindera benzoin*), winterberry holly (*Ilex verticillata*), willow (*Salix* sp.), and meadow-sweet (*Spiraea alba*). Several aggressive introduced species of shrubs were also noted in the habitat including multiflora rose (*Rosa multiflora*), common privet (*Ligustrum vulgare*), Morrow's honeysuckle (*Lonicera morrowii*), and buckthorn (*Rhamnus cathartica*).

The herbaceous layer is diverse, hosting a good mix of species. Common wetland herbaceous species noted include monkey flower (*Mimulus ringens*), northern blue flag (*Iris versicolor*), marsh purslane (*Ludwigia palustris*), marsh St.-John's-wort (*Triadenum fraseri*), swamp milkweed (*Asclepias incarnata*), bulbiferous water hemlock (*Cicuta bulbifera*), arrow-leaved & halberd-leaved tearthumbs (*Polygonum sagittatum* & *P. arifolium*), skunk-cabbage (*Symplocarpus foetidus*) and wetland ferns including cinnamon fern (*Osmunda cinnamomea*), marsh fern (*Thelypteris palustris*) and sensitive fern (*Onoclea sensibilis*). Meadow-like openings are dominated by various sedges and grasses including (*Carex stricta*), and soft rush (*Juncus effusus*).

Threats and Disturbances

Runoff from the adjacent railroad and Rt-11 represent a continued influence of non-point source pollution on the habitat. Residential and commercial developments currently surround the wetlands. Changes in the hydrology of the site, such as dams or draining, would severely reduce the quality of this habitat.

Conservation Recommendations

There is little opportunity to provide an additional forested buffer to the railroad bordering the wetland, but the southern and eastern edges of the wetlands would benefit from protection from further residential and commercial development.

Turkey Hill Oxbow (Bloomsburg Borough, Mt. Pleasant and Scott Townships) – This **locally significant site** is an oxbow of Fishing Creek that occurs between the forested slopes of Turkey Hill and I-80. The hemlock – hardwood slopes have several skunk cabbage seeps that feed the floodplain wetlands below. The extensive wetlands are forested wetlands, shrub swamps, graminoid openings and areas of open water, as well as the floodplain of the former creek bed. During high water events, the oxbow serves as an overflow channel of Fishing Creek, becoming flooded with water. During dry spells, the oxbow will dry down to the isolated deeper open-water areas. This fluctuating water level provides the conditions for an interesting type of habitat for a variety of plants and animals.

(Scott Twp. continued)

The surrounding forested slopes contain a mix of hemlock and hardwoods dominated by hemlock (*Tsuga canadensis*), but also containing black birch and yellow birch (*Betula lenta*, *B. alleghaniensis*), white oak and red oak (*Quercus alba*, *Q. rubra*), sugar maple, red maple, and Norway maple (*Acer saccharinum*, *A. rubrum*, *A. platanoides*), and tulip poplar (*Liriodendron tulipifera*). The understory is well developed, indicating an active renewal of the forest canopy, with seedling regeneration of many of the previously mentioned tree species, but also containing the understory trees slippery elm (*Ulmus rubra*) and ironwood (*Carpinus caroliniana*), and the shrubs witch-hazel (*Hamamelis virginiana*), wild hydrangea (*Hydrangea arborescens*), mountain-laurel (*Kalmia latifolia*), American elderberry (*Sambucus canadensis*), and the invasive species Japanese barberry (*Berberis thunbergii*) and European privet (*Ligustrum vulgare*). The upland shrub layer also includes the uncommon species American yew (*Taxus canadensis*). This species was recently removed from the plant species of concern list based on updated statewide population estimates. Yew has been in decline over much of its range in the state due to habitat loss and over-browsing by deer (Rhoads and Block 2000). The herbaceous layer in the uplands and the adjacent rock outcrops contains several rich woodland wildflower species including white baneberry (*Actaea pachypoda*), northern maidenhair fern (*Adiantum pedatum*), wild columbine (*Aquilegia canadensis*), spikenard (*Aralia racemosa*), blue cohosh (*Caulophyllum thalictroides*), Virginia waterleaf (*Hydrophyllum virginianum*), foamflower (*Tiarella cordifolia*), purple trillium (*Trillium erectum*) and false Solomon's-seal (*Smilacina racemosa*).

The floodplain is forested with deciduous trees common to such environments in central PA including river birch (*Betula nigra*), silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*) and slippery elm (*Ulmus rubra*). The shrub layer is also typical of wet or temporarily saturated habitats. Shrubs noted during the site visit include spicebush (*Lindera benzoin*), buttonbush (*Cephalanthus occidentalis*), silky dogwood (*Cornus amomum*), narrow-leaved meadow-sweet (*Spiraea alba*), and willow (*Salix* sp.). The herbaceous layer in the wet floodplain contains wild ginger (*Asarum canadense*), Jack-in-the-pulpit (*Arisaema triphyllum*), white turtlehead (*Chelone glabra*), bulb-bearing water-hemlock (*Cicuta bulbifera*), white avens (*Geum canadense*), swamp milkweed (*Asclepias incarnata*), spotted jewel-weed (*Impatiens capensis*), cinnamon fern (*Osmunda cinnamomea*), skunk cabbage (*Symplocarpus foetidus*), true forget-me-not (*Myosotis scorpioides*), may apple (*Podophyllum peltatum*), stinging nettle (*Urtica dioica*), false-hellebore (*Veratrum viride*), blue vervain (*Verbena hastata*) and rattlesnake fern (*Botrychium virginianum*).

Pickerel frogs (*Rana palustris*), green frogs (*Rana clamitans*), snapping turtles (*Chelydra serpentina*) and Wood Ducks (*Aix spinosa*) were seen in the open-water wetlands. The pools are lined with grasses and sedges and other wetland species that indicate the degree of wetness of the soil conditions, including large water-starwort (*Callitriche heterophylla*), three-way sedge (*Dulichium arundinaceum*), other sedges (*Carex crinita*, *C. grayi*, *C. gynandra*, *C. lupulina*), manna-grasses (*Glyceria melicaria*, *G. striata*), soft rush (*Juncus effusus*), broadleaf arrowhead (*Sagittaria latifolia*) and northern blueflag (*Iris versicolor*).

Threats and Disturbances

Besides the presence of invasive introduced plant species, and its proximity to I-80, this site appears to have had little recent disturbance. The invasive plant species Japanese knotweed

(Scott Twp. continued)

(*Polygonum cuspidatum*), is colonizing the borders of the wetland adjacent to I-80, and poses a potentially significant threat to the diversity of the habitat.

Conservation Recommendations

Aggressive invasive species of plants should be controlled where practical. Concentration should be placed on the removal of Japanese knotweed and multiflora rose, but could expand to remove the introduced tree species Norway maple and Norway spruce, which may readily naturalize from landscape plantings. The establishment and protection of forested buffers around and within the site will help protect the habitat from the effects of introduced species, which thrive in disturbed environments.

Freshwater Mussel Surveys



Surveying for freshwater mussels in the Susquehanna River using clear-bottomed buckets.



Green floater (*Lasmigona subviridis*)



Yellow lamp mussel (*Lampsilis cariosa*)



Eastern floater (*Pyanodon cataracta*)

SOUTH CENTRE TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Susquehanna River in Columbia County	Animal	G3	S2	N	2003-08-26	C
	Animal	G3G4	S3S4	N	2003-08-26	D

Locally Significant Areas: None

Managed Areas: None

South Centre Township is a small township along the Susquehanna River in the central portion of the county. The **Susquehanna River** is the biggest conservation concern in South Centre Township. Activities of industries and landowners along the river can have great impacts on water quality in the river down to the Chesapeake Bay. Erosion and chemical runoff into the water systems is a serious concern throughout the state. Below is a list of a few things businesses and landowners can do to improve water quality and prevent runoff into the river and its tributaries (<http://www.acb-online.org/pubs/projects/deliverables-153-3-2003.pdf>):

- Instead of impervious materials such as concrete or asphalt, use flagstones, brick and interlocking paving stones for walks and driveways.
- Use fertilizers, pesticides and herbicides sparingly and follow manufacturers instructions.
- Establish buffer zones along waterways by planting native trees, shrubs and grasses.
- Inspect septic systems every 3-5 years and check for failures.
- Use detergents that are phosphate-free.

SUSQUEHANNA RIVER - (Bloomsburg and Berwick Boroughs; Briar Creek, Catawissa, Main, Mifflin, Montour, Scott, and South Centre Townships) - Two different **animal species of concern** were identified at this site in 1995. Biologists revisited the site in the fall of 2003 and again located these animals of concern. Individuals were found at several sites along the Susquehanna River between Berwick and Bloomsburg. Additional surveys are recommended to better estimate populations of these animal species of concern in the river. Associated species include the freshwater mussels eastern floater (*Pyganodon cataracta*) and creeper (*Strophitus undulatus*). Additional information on the life history of freshwater mussels can be viewed online at the US Fish and Wildlife Service web site:

http://midwest.fws.gov/mussel/life_history.html.

The river also provides a valuable migration corridor for many bird species, especially aquatic dependent species, but also many Neo-tropical passerine migratory species.

Insert map [SOUTH CENTRE TOWNSHIP](#)



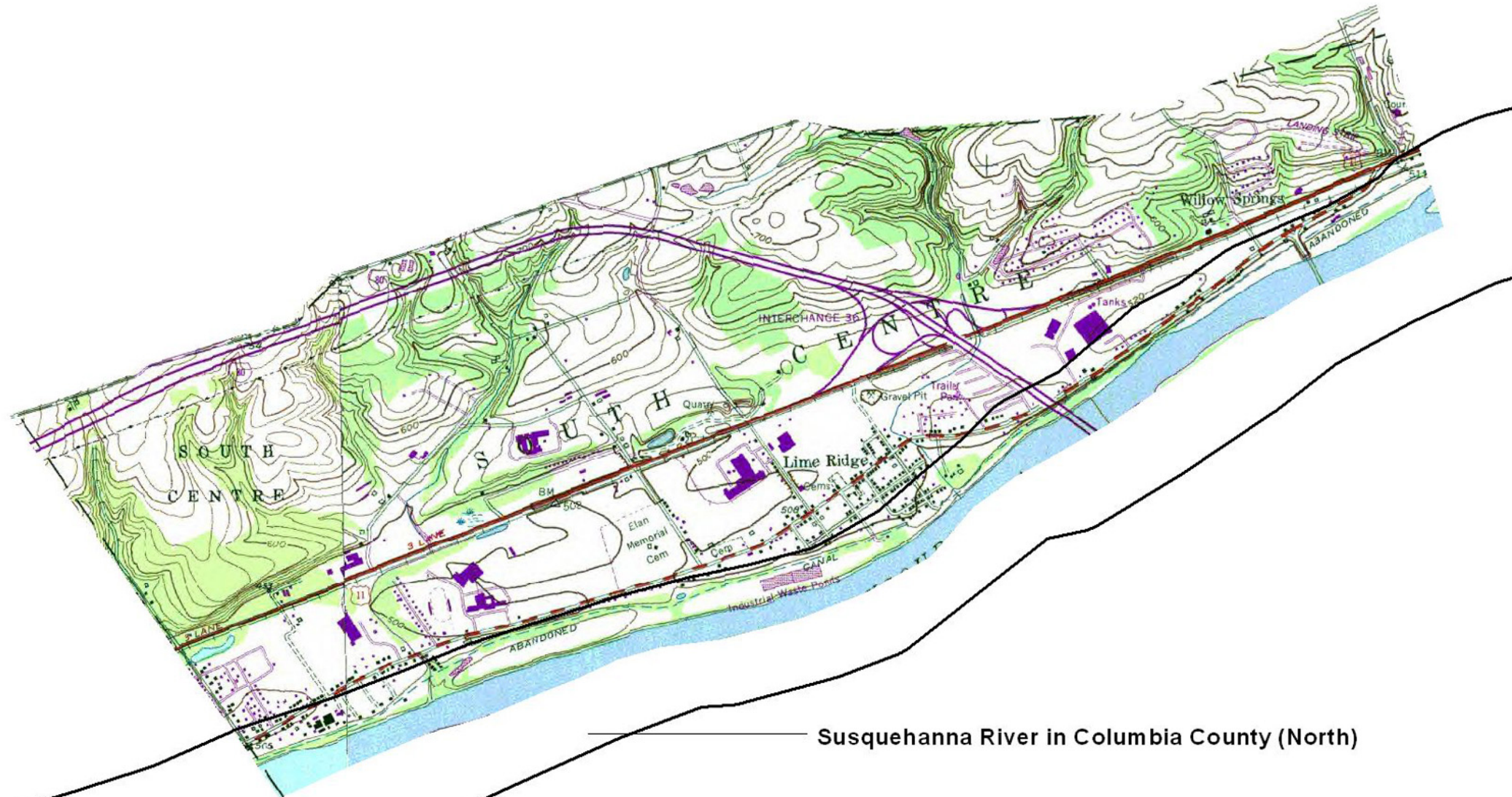
South Centre Township

South Centre Township

Columbia County Natural Areas Inventory

Natural Areas:

Susquehanna River (North)




Susquehanna River in Columbia County (North)

Scale 1:29,000



Legend

 Natural Area or Locally Significant Site

(South Centre Twp. continued)

The Susquehanna River is subject to frequent flooding and seasonal low water levels. Scouring of the banks and islands by flood events and ice have created specialized habitats along the river floodplain. Several islands have distinctive “Big bluestem (*Andropogon gerardii*)-Indian grass (*Sorghastrum nutans*) river grasslands”, which are natural tall grassland communities created as the result of these natural disturbances. These areas are dominated by the two species the community type is named for and also include switch grass (*Panicum virgatum*) and Indian hemp (*Apocynum cannabinum*). The habitat grades into a “water willow (*Justicia americana*) – smartweed riverbed community” on the lowest island elevations, and into a “black willow scrub/shrub wetland”, and “River birch – sycamore floodplain scrub” as the elevation increases, providing drier habitat. These natural communities are part of the “Riverbed – Bank – Floodplain Community Complex”, a broadly defined mosaic of community types that typify the natural vegetation along the Susquehanna River in Columbia County.

Threats and Disturbances

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

Conservation Recommendations

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

SUGARLOAF TOWNSHIP

Site Name	Special Species/ Community Type	PNHP Ranks*		State Status	Last Seen	Quality**
		Global	State			
Central Mountain	Northeastern Bulrush (<i>Scirpus ancistrochaetus</i>)	G3	S3	PE	2003-07-22	BC
	Ephemeral/Fluctuating Natural Pool Community	G?	S3	N	2003-07-22	E
	Hemlock Palustrine Forest Natural Community	G?	S3	N	2003-07-22	E

Locally Significant Areas: Fallow Hollow
Five Points Swamp
Grassmere Park Wetlands
Hess Hollow

Managed Areas: Ricketts Glen State Park
State Game Land #13

Sugarloaf Township is the very northern township in the county and borders Sullivan and Luzerne Counties. The township is largely forested and is a very attractive and relatively intact landscape. There are many important features in this landscape not included in the natural areas of Columbia County. **Camp Lavigne Boy Scout Camp** west of Coles Creek is an important part of the communities of northern Columbia County. Camp Lavigne provides important an important recreation opportunity for youth. Also, the area serves to preserve some of the natural landscape in the township. Large canopy species such as yellow birch (*Betula allegheniensis*), sugar maple (*Acer saccharum*), sycamore (*Platanus occidentalis*) and hemlock (*Tsuga canadensis*) are present in the overstory with a variety of species in the understory including wildflowers such as Solomon's seal (*Polygonatum pubescens*), false miterwort (*Tiarella cordifolia*), purple trillium (*Trillium erectum*) and many others. The camp also serves as a forested buffer for protection of water quality along Fishing Creek. As in many townships, maintaining and restoring forested buffers along streams and rivers is a very important conservation concern. For more information about streamside buffer assistance programs in Columbia County, contact the local Conservation District. Additional surveys of forested slopes, ravines and streams in this township are encouraged.

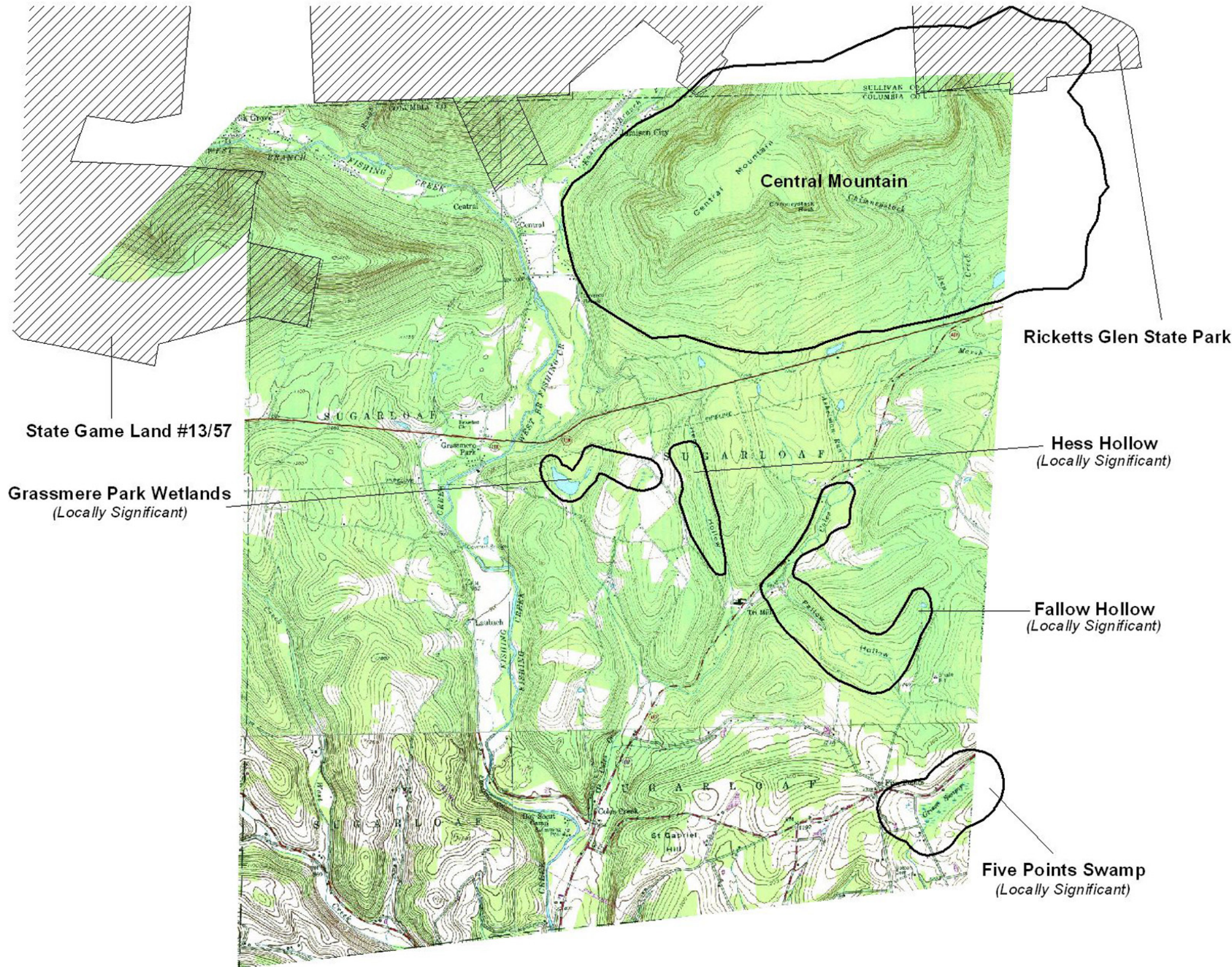
Insert map [SUGARLOAF TOWNSHIP](#)



Sugarloaf Township

Sugarloaf Township

Columbia County Natural Areas Inventory



Natural Areas:

Central Mountain

Locally Significant Sites:

- Fallow Hollow
- Five Points Swamp
- Grassmere Park Wetlands
- Hess Hollow

Managed Areas:

- Ricketts Glen State Park
- State Game Land #13/57



Legend

- Managed Area
- Natural Area or Locally Significant Site



(Sugarloaf Twp. continued)

CENTRAL MOUNTAIN (Sugarloaf Township, and Sullivan and Luzerne Counties) – Central Mountain is located in the northern portion of Columbia County. This extensive forested area at the edge of the Allegheny Plateau physiographic province rises dramatically from the adjacent southern lowlands and is considered one of the most important areas for conservation in the county. This area contains an **Ephemeral/Fluctuating Pool Natural Community, a Hemlock Palustrine Forest Natural Community** and **northeastern bulrush (*Scirpus ancistrochaetus*)**, a G3, S3 Federally–Endangered plant species of concern. The Federally endangered status of this plant indicates that the species may be in danger of extinction throughout all or a significant portion of its range. The northeastern bulrush is primarily found in temporary ponds and other pools with fluctuating water levels. These ponds also typically provide important breeding habitat for forest dwelling amphibians such as the wood frog (*Rana sylvatica*), and the spotted salamander (*Ambystoma maculatum*). The Hemlock Palustrine Forest Natural Community contains forested wetlands dominated by a hemlock canopy. The forested wetlands give way to open sedge meadows in several locations. The water-saturated deep-muck soils are covered in layers of sphagnum moss and mounds of sedges and other herbaceous species. This large forested area provides habitat for a variety of species and is an important natural habitat in Columbia County. Much of this forest has a visible browse-line, indicating a higher than desirable deer population. Regeneration of trees, shrubs and herbaceous species appears sparse in many areas of this forest.

The tree canopy in this forest includes hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), black birch (*Betula lenta*), blackgum (*Nyssa sylvatica*), ash (*Fraxinus* sp.), pignut hickory (*Carya glabra*), mockernut hickory (*Carya tomentosa*), shagbark hickory (*Carya ovata*), sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), white oak (*Quercus alba*), chestnut oak (*Quercus montana*), red oak (*Quercus rubra*), basswood (*Tilia americana*), white pine (*Pinus strobus*), tulip poplar (*Liriodendron tulipifera*) and sassafras (*Sassafras albidum*).

Shrubs include mountain laurel (*Kalmia latifolia*), striped maple (*Acer pensylvanicum*), highbush blueberry (*Vaccinium corymbosum*), black huckleberry (*Gaylussacia baccata*), low sweet blueberry (*Vaccinium angustifolium*), witch-hazel (*Hamamelis virginiana*), greenbriar (*Smilax rotundifolia*), swamp dewberry (*Rubus hispidus*) and gooseberry (*Ribes* sp.).

Among the herbaceous species of plants observed at this site include Christmas fern (*Polystichum acrostichoides*), black bulrush (*Scirpus atrovirens*), false hellebore (*Veratrum viride*), hay-scented fern (*Dennstaedtia punctilobula*), interrupted fern (*Osmunda claytoniana*), jewelweed (*Impatiens* sp.), partridgeberry (*Mitchella repens*), sedges (*Carex* spp.), smartweeds (*Polygonum* spp.), soft rush (*Juncus effusus*), false Solomon's seal (*Smilacina racemosa*), sphagnum moss (*Sphagnum* spp.), stinging nettle (*Urtica dioica*), swamp milkweed (*Asclepias incarnata*), sweet fern (*Comptonia peregrina*), sweet vernal grass (*Anthoxanthum odoratum*), teaberry (*Gaultheria procumbens*), three-way sedge (*Dulichium arundinaceum*), trailing arbutus (*Epigaea repens*), violets (*Viola* spp.), whorled loosestrife (*Lysimachia quadrifolia*), and woolgrass (*Scirpus cyperinus*).

Some of the animal species observed at the site include red-spotted newts (*Notophthalmus viridescens*), wood frog (*Rana sylvatica*), dusky salamander (*Desmognathus ochrophaeus*), pickerel frogs (*Rana palustris*), spotted salamanders (*Ambystoma maculatum*), white-tailed deer (*Odocoileus virginianus*) and black bear (*Ursus americana*).

(Sugarloaf Twp. continued)

Bird species observed included Ovenbird (*Seiurus aurocapillus*), Yellow-throated Vireo (*Vireo flavifrons*), Hermit Thrush (*Catharus guttatus*), Red-eyed Vireo (*Vireo olivaceus*), Black-throated Green Warbler (*Dendroica virens*), Dark-eyed Junco (*Junco hyemalis*), Black-throated Blue Warbler (*Dendroica caerulescens*), Black-and-white Warbler (*Mniotilta varia*), Blackburnian Warbler (*Dendroica fusca*), Blue-headed Vireo (*Vireo solitarius*), Veery (*Catharus fuscescens*), Black-capped Chickadee (*Poecile atricapilla*), Common Yellowthroat (*Geothlypis trichata*), Scarlet Tanager (*Piranga olivaceus*), Eastern Towhee (*Pipilo erythrophthalmus*), Eastern Wood-Pewee (*Contopus virens*), and Gray Catbird (*Dumetella carolinensis*).

Threats and Disturbances

Logging and other changes in the habitat adjacent to the ponds could endanger the quality of the habitat for the population of Northeastern Bulrush at this location. Herbivory by a large deer population decreases the potential for forest regeneration throughout the area. The increased use of All Terrain Vehicles (ATVs) on forested property poses a potential threat to the site.

Conservation Recommendations

Logging should be avoided adjacent to the ponds and other wetland habitats including forested wetlands, creeks, seeps and sedge openings. Undisturbed forested buffers surrounding all wetland habitats will best protect these habitats from detrimental influences. Increased deer hunting pressure should be encouraged to reduce the herd population to ecologically sustainable levels. The site should be monitored for ATV traffic, and trails near the ponds and wetlands blocked as they appear.



The Northeastern Bulrush (*Scirpus ancistrochaetus*) is a Federally Endangered plant species that has been documented in Columbia County

(Sugarloaf Twp. continued)

LOCALLY SIGNIFICANT SITES:

Fallow Hallow (Sugarloaf Township) - This **locally significant site** contains a diverse wetland with a good variety of birds and plants. The diverse habitats at this site include a graminoid/forb opening, a wooded ravine, a shrub swamp, a pond, and deciduous, seepy woods with a dense fern understory.

The canopy in the upland areas consists of species such as sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), serviceberry (*Amelanchier sp.*), sassafras (*Sassafras albidum*), big-tooth aspen (*Populus grandidentata*), red oak (*Quercus rubra*), black birch (*Betula lenta*), Eastern hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), and white oak (*Quercus alba*).

Shrubs and herbaceous plants included swamp dewberry (*Rubus hispidus*), hay-scented fern (*Dennstaedtia punctilobula*), northern lady fern (*Athyrium filix-femina*), common wood fern (*Dryopteris intermedia*), starflower (*Trientalis borealis*), and New York fern (*Thelypteris noveboracensis*). The open wetland consisted of plants such as maleberry (*Lyonia ligustrina*), sensitive fern (*Onoclea sensibilis*), highbush blueberry (*Vaccinium corymbosum*), meadow-sweet (*Spiraea alba*), northern arrow-wood (*Viburnum recognitum*), cinnamon fern (*Osmunda cinnamomea*), prickly sedge (*Carex echinata*), field wood-rush (*Luzula multiflora*), winterberry holly (*Ilex verticillata*), low sweet blueberry (*Vaccinium angustifolium*), nannyberry (*Viburnum lentago*), soft rush (*Juncus effusus*), blue vervain (*Verbena hastata*), sedge (*Carex folliculata*), sedge (*Carex gynandra*), sedge (*Carex intumescens*), sedge (*Carex bromoides*), three-way sedge (*Dulichium arundinaceum*), mad-dog skullcap (*Scutellaria lateriflora*), sweet vernal grass (*Anthoxanthum odoratum*), bog chickweed (*Stellaria alsine*), and robin-run-away (*Dalibarda repens*). The red maple and sugar maple seepy woods consisted of plant species such as Japanese barberry (*Berberis thunbergii*), pignut hickory (*Carya ovalis*), lowbush blueberry (*Vaccinium pallidum*), partridgeberry (*Mitchella repens*), Eastern hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), white pine (*Pinus strobus*), red trillium (*Trillium erectum*), Indian cucumber (*Medeola virginiana*), and witch hazel (*Hamamelis virginiana*).

Fallow Hollow has good bird diversity; however, because it was early in the season it was difficult to determine the breeding status of these species. Birds seen and/or heard include Black-throated Green Warbler (*Dendroica virens*), Yellow-rumped Warbler (*Dendroica coronata coronata*), Eastern Wood-Pewee (*Contopus virens*), Blue-headed Vireo (*Vireo solitarius*), Black-and-white Warbler (*Mniotilta varia*), Worm-eating Warbler (*Helminthos vermivorus*), American Redstart (*Setophaga ruticilla*), Yellow-throated Vireo (*Vireo flavifrons*), Ovenbird (*Seiurus aurocapillus*), Indigo Bunting (*Passerina cyanea*), Gray Catbird (*Dumetella carolinensis*), Song Sparrow (*Melospiza melodia*), Common Yellowthroat (*Geothlypis trichas*), Eastern Towhee (*Pipilo erythrophthalmus*), Eastern Tufted Titmouse (*Baeolophus bicolor*), Swamp Sparrow (*Melospiza georgiana*), Red-eyed Vireo (*Vireo olivaceus*), Pileated Woodpecker (*Dryocopus pileatus*), Scarlet Tanager (*Piranga olivaceus*), Blue-gray Gnatcatcher (*Poliophtila caerulea*) and Black-capped Chickadee (*Poecile atricapilla*).

Threats and Disturbances

Over-browsing by deer is has had a significant impact on the upland forests of Fallow Hollow. In parts of these areas, the understory is blanketed by hay-scented fern (*Dennstaedtia punctilobula*), which prefers, open, filtered light and acidic soils. Areas with high deer densities

(Sugarloaf Twp. continued)

often have general loss of plant cover in the understory, lower plant diversity and high densities of hay-scented fern.

Conservation Recommendations

A forested buffer should be left around wetlands to limit disturbances such as changes in hydrology. Beaver (*Castor canadensis*) have impacted the wetlands in the past and will likely return in the future. It is recommended that no beaver be introduced, but are allowed to return to the area in their natural cycle. Changes in species composition should be monitored throughout this area and deer hunting pressure should be increased.

Five Points Swamp (Sugarloaf Township and Luzerne County) – This **locally significant site** was identified from aerial photography. This area appears to have a conifer-dominated palustrine forest and an adjacent shrub wetland. Changes in the hydrology (damming or draining) and logging operations within the wetland should be avoided. Creation of an undisturbed buffer around this wetland will help protect the water quality from non-point sources of pollution. Ground surveys are needed to verify the natural community type and condition of this forested wetland.

Grassmere Park Wetlands (Sugarloaf Township) – This **locally significant site** contains a large, open-water lake that was created by beaver and human activities. The lake is ringed with standing snag trees drowned by rising water levels. The upper portion of the lake is an extensive sedge and herbaceous wetland that is also likely the result of past beaver activity. The adjacent forest canopy includes hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*), tulip poplar (*Liriodendron tulipifera*), red oak (*Quercus rubra*), yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*) and shagbark hickory (*Carya ovata*). Shrub species include meadow-sweet (*Spiraea alba*), buttonbush (*Cephalanthus occidentalis*), winterberry holly (*Ilex verticillata*), striped maple (*Acer pensylvanicum*), witch hazel (*Hamamelis virginiana*), dewberry (*Rubus hispidus*), poison ivy (*Toxicodendron radicans*) and the invasive introduced species multiflora rose (*Rosa multiflora*) and Japanese barberry (*Berberis thunbergii*). Herbaceous vegetation within the sedge wetland as well as the shallow margins of the lake included sedges and rushes (*Carex gynandra*, *C. stricta*, *C. stipata*, *C. lurida*, *C. intumescens*, *C. crinita*, *C. canescens*, and *C. trisperma*), three-way sedge (*Dulichium arundinaceum*), soft rush (*Juncus effusus*), woolgrass (*Scirpus cyperinus*) and fowl mannagrass (*Glyceria striata*). This layer included various ferns including cinnamon fern (*Osmunda cinnamomea*), interrupted fern (*Osmunda claytoniana*), sensitive fern (*Onoclea sensibilis*), New York fern (*Thelypteris noveboracensis*), and crested shield fern (*Dryopteris cristata*). Other characteristic herbaceous species included arrow-leaved tearthumb (*Polygonum sagittatum*), halberd-leaved tearthumb (*P. arifolium*), turtlehead (*Chelone glabra*), jewelweed (*Impatiens* sp.), marsh marigold (*Caltha palustris*), Canada mayflower (*Maianthemum canadense*), and gold thread (*Coptis trifolia*).

Animals observed at this site include Great Blue Heron (*Ardea herodias*), Pileated Woodpecker (*Dryocopus pileatus*), northern water snake (*Nerodia sipedon*), and wood frog (*Rana sylvatica*).

Threats and Disturbances

This is a relatively undisturbed environment with good quality forested buffers. Further impoundment to raise the water level would drown more of the adjacent forest, and flood the sedge wetland. Fragmentation of this habitat by the construction of roadways, powerline right-of-ways and other developmental pressures could detrimentally impact this wetland habitat by

(Sugarloaf Twp. continued)

the creation of additional edge effect, providing avenues for invasive species. All Terrain Vehicles (ATVs) can easily disrupt this fragile semi-aquatic habitat.

Conservation Recommendations

The sedge wetland has potential for species of concern and additional surveys are recommended. The hydrology of the sedge wetland may fluctuate due to temporary beaver impoundment, but the impulse to create a permanent impoundment or lake in this upper section should be resisted. The site should be monitored for ATV traffic, and trails entering the wetlands blocked as they appear.

Hess Hollow (Sugarloaf Township) - This **locally significant site** contains a small meandering stream, with pockets of forested wetlands and small open graminoid marshes. Though some selective cutting was observed, the overstory remains intact and contains a variety of canopy species including black birch (*Betula lenta*), blackgum (*Nyssa sylvatica*), Eastern hemlock (*Tsuga canadensis*), red maple (*Acer rubrum*), red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), white pine (*Pinus strobus*), and yellow birch (*Betula allegheniensis*). Though no species of special concern were identified at this site, wetlands are one of our most valuable resources.

The wetlands contained within Hess Hollow provide habitat for a variety of plant and animal species. The stream remains fairly well buffered, though the site is partially surrounded by agriculture. Other plant species identified at this site include bladder sedge (*Carex intumescens*), blue bead lily (*Clintonia borealis*), buttercup (*Ranunculus* spp.), Canada mayflower (*Maianthemum canadense*), Christmas fern (*Polystichum acrostichoides*), cinnamon fern (*Osmunda cinnamomea*), club moss (*Huperzia* spp.), false hellebore (*Veratrum viride*), greenbriar (*Smilax rotundifolia*), hay-scented fern (*Dennstaedtia punctilobula*), huckleberry (*Gaylussacia baccata*), Indian cucumber (*Medeola virginiana*), interrupted fern (*Osmunda claytoniana*), Jack-in-the-pulpit (*Arisaema triphyllum*), jewelweed (*Impatiens capensis*), lowbush blueberry (*Vaccinium palladium*), marsh blue violet (*Viola cucullata*), may apple (*Podophyllum peltatum*), miterwort (*Mitella diphylla*), mountain laurel (*Kalmia latifolia*), New York fern (*Thelypteris noveboracensis*), partridgeberry (*Mitchella repens*), raspberry (*Rubus* spp.), rushes (*Juncus* spp.), sassafras (*Sassafras albidum*), sedges (*Carex* spp.), sensitive fern (*Osmunda sensibilis*), Solomon's seal (*Polygonatum pubescens*), sphagnum moss (*Sphagnum* spp.), striped maple (*Acer pensylvanicum*), trillium (*Trillium* sp.), witch-hazel (*Hamamelis virginiana*), wood anemone (*Anemone quinquefolia*), wood nettle (*Laportea canadensis*) and wood sorrel (*Oxalis* sp.).

Hess Hollow also provides habitat for many animals including Black-capped Chickadee (*Parus atricapillus*), Black-throated Blue Warbler (*Dendroica caerulescens*), Black-throated Green Warbler (*Dendroica virens*), Blue-headed Vireo (*Vireo solitarius*), Common Yellowthroat (*Geothlypis trichas*), Dark-eyed Junco (*Junco hyemalis*), Eastern chipmunk (*Tamias striatus*), Ovenbird (*Seiurus aurocapillus*), Red-spotted Newt (*Notophthalmus viridescens*), Veery (*Catharus fuscescens*) and Wood Thrush (*Hylocichla mustelina*).

Threats and Disturbances

There are no immediate threats to this site. Disturbances include some selective cutting and nearby agricultural practices. Heavy deer browse and the abundance of hay-scented fern in some areas indicate deer densities may be too high.

Recommendations

(Sugarloaf Twp. continued)

Forested buffers should remain around streams and wetlands. Selective cutting may be beneficial if impacts from heavy machinery are kept at a minimum. Increasing hunting pressure in Hess Hollow would benefit the community and allow more regeneration and an increase in species diversity in the understory.



Deep sphagnum moss covers the roots of the trees in this Hemlock Palustrine Forest Natural Community on Central Mountain, Sugarloaf Twp.

Photo: PA Science Office of The Nature Conservancy

GLOSSARY

Acid Mine Drainage (AMD) – drainage flowing from or caused by surface mining, deep mining, or coal refuse piles that are typically highly acidic with elevated levels of dissolved metals (DEP).

Acidophilic – a plant that requires or prefers acidic soil conditions.

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

Anthracite- Dense, shiny coal that has a high carbon content and little volatile matter and burns with a clean flame. Also called *hard coal*.

Anthropogenic – human caused.

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

ATV – all-terrain-vehicle.

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

Bt (*Bacillus thuringiensis*) – an insecticide, which is produced by the fermentation of a bacterium (Bt), used to control many caterpillar-type pests (e.g., gypsy moth).

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

Calcareous- composed of, containing, or characteristic of calcium carbonate, calcium, or limestone; chalky.

Canopy – the layer formed by the tallest vegetation.

Circumneutral – pH between 5.5 and 7.

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

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

DBH – the diameter of a tree at breast height.

DCNR – Pennsylvania Department of Conservation and Natural Resources.

DEP – Pennsylvania Department of Environmental Protection.

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

Dimilin – a commercially produced, restricted-use insecticide containing diflubenzuron as the active ingredient. Diflubenzuron, which has been used as a method to control gypsy moth, interferes with chitin production during the early stages of certain insects (DCNR, Division of Pest Management).

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

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

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

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

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

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

Extant – currently in existence.

Fen- open-canopy peatland that has developed under the influence of basic-rich waters

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

Forb – non-grass herbaceous plant such as goldenrod.

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

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

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

Hemic – an organic soil in which the plant remains show a good degree of decomposition (between 1/3 and 2/3 of the fibers are still visible after rubbing the material between the fingers).

Hibernacula – a location where animals hibernate.

Hibernation –the period of winter inactivity during which time normal physiological processes are reduced and a significant decrease in body temperature occurs. In Pennsylvania, true hibernation is shown by woodchucks, jumping mice, and bats.

High-Quality Coldwater Fisheries (HQ-CWF)– DEP designation (PA Code, Chapter 93) for a stream or watershed that has excellent quality waters and environmental or other features that require special water quality protection.

Hydrology – water system of an area including both surface water and ground water.

Igneous-formed by solidification from a molten state. Used of rocks.

Kame – a short ridge or mound of sand and gravel deposited during the melting of glacial ice.

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

Lepidoptera – moths and butterflies.

Listed species – species that is monitored and considered to be of concern by PNDI.

Littoral – the area where water meets land, the shoreline.

Mesic – moist, not saturated.

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

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

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

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

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

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

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

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

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

PNHP – Pennsylvania Natural Heritage Program

POSCIP – Plant of Special Concern in Pennsylvania.

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

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

Riparian – streamside.

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

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

Sapric – organic soils (muck) in which most of the plant material is decomposed and the original constituents cannot be recognized.

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

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

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

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

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

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

Swamp - a wooded wetland, intermittently or permanently flooded

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

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

TNC – The Nature Conservancy

Trilobite- any of numerous extinct marine arthropods of the class Trilobita, of the Paleozoic Era, having a segmented body divided by grooves into three vertical lobes and found as fossils throughout the world.

Understory – layer of shrubs and small trees between the herbaceous layer and the canopy.

Upland- sites with well-drained dry to mesic soils.

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

Vernal – occurring in the spring.

Xeric – extremely dry or droughty.

REFERENCES AND LITERATURE CITED

- Alliance for the Chesapeake Bay: The Voice of the Bay. The Susquehanna and the Chesapeake Bay. Website: www.acb-online.org
- Anonymous. 1985. A Preliminary Inventory of Natural Areas on the Hoosier National Forest. Indiana Dept. of Natural Resources, Indianapolis, Indiana. Unpublished Report. 197 pp.
- Berg, T.M., J.H. Barnes, W.D. Sevon, V.W. Skema, J.P. Wilshusen and D.S. Yannacci. 1989. Physiographic Map of Pennsylvania. Map #13. PA Dept. Environ. Resources, Bureau of Topo. and Geol. Survey, Harrisburg, PA.
- Berg, T.M., W.E. Edwards, A.R. Geyer, A.D. Glover, D.M. Hoskins, D.B. Maclachlan, S.I. Root, W.D. Savon and A.A. Socolow. 1980. Geologic Map of Pennsylvania. PA Dept. Environ. Resources, Bureau of Topo. and Geol. Survey, Harrisburg, PA.
- Bloomsburg Area Chamber of Commerce Website: <http://www.bloomsburg.org/>
- Bowen, D. E, Jr. and C. S. Houston. 2001. Upland Sandpiper (*Bartramia longicauda*), The Birds of North America, No. 580.
- Braun, E.L. 1950. Deciduous Forests of Eastern North America. The Free Press, MacMillan Publ. Co., New York. 596 pp.
- Brauning, D.W. (ed.). 1992. Atlas of Breeding Birds in Pennsylvania Univ. of Pittsburgh Press, Pittsburgh, PA. 484 pp.
- Catawissa Creek Restoration Association Website: www.columbiapa.org/ccra/home.htm
- Columbia County Historical and Geneological Society Website: <http://www.colcohist-gensoc.org/>
- Covell, C.V. 1984. A Field Guide to the Moths. Houghton Mifflin Co., Boston. 496 pp.
- Crossley, G.J. 1999. A Guide to Critical Bird Habitat in Pennsylvania. Pennsylvania Important Bird Areas. Pennsylvania Audubon Society, Harrisburg, PA. 219 pp.
- Cuff, D.J., W.J. Young, E.K. Muller, W. Zelinsk, R.F. Abler, (eds.) 1989. The Atlas of Pennsylvania. Temple Univ. Press, Philadelphia, PA. 288 pp.
- DeGraaf, R.M. and D.D. Rudis. 1981. Forest Habitat for Reptiles and Amphibians of the Northeast. U.S. Dept. of Agric., Forest Service, Northeastern Forest Exper. Sta. 239 pp.
- Department of Conservation and Natural Resources. Hemlock woolly adelgid web site. <http://www.dcnr.state.pa.us/forestry/woollyadelgid/index.htm>.
- Department of Conservation and Natural Resources. Invasive Plants in Pennsylvania. Commonwealth of Pennsylvania.
- Department of Conservation and Natural Resources. Landscaping with Native Plants in Pennsylvania. Commonwealth of Pennsylvania.

Department of Conservation and Natural Resources. 1982. Geologic map of Pennsylvania. DCNR, Bureau of Topographic and Geologic Survey, Map 7.

Department of Conservation and Natural Resources, Scenic Rivers Program, 2000
<http://www.dcnr.state.pa.us/brc/rivers/scenicrivers/index.htm>

Department of Environmental Protection. 1999. Commonwealth of Pennsylvania, Pennsylvania Code, Title 25. Environmental Resources, Chapter 93. Water Quality Standards. Bureau of Water Quality Management.

Dunkle, S.W. 2000. *Dragonflies Through Binoculars*. Oxford University Press, New York, New York. 266 pp.

Fernald, M.L. 1970. *Gray's Manual of Botany*. D. Van Nostrand Co., New York. 1632 pp.

Fike, J. 1999. *Terrestrial & Palustrine Plant Communities of Pennsylvania*. PA Dept. of Conservation and Natural Resources, The Nature Conservancy, Western PA Conservancy. 87 pp.

Fishing Creek Watershed Association Website: www.columbiapa.org/fcwa/

Geyer, A.R. and W.H. Bolles. 1979. Outstanding Scenic Geological Features of Pennsylvania. Environ. Geol. Rept. 7, PA Dept. Environ. Resour. Bur. Topo. Surv. 508 pp.

Geyer, A.R. and W.H. Bolles. 1987. Outstanding Scenic Geological Features of Pennsylvania, Vol 2. Environ. Geol. Rept. 7, PA Dept. Environ. Resour. Bur. Topo. Surv. 270 pp.

Glassberg, J. 1993. *Butterflies Through Binoculars*. Oxford University Press, New York, New York. 160pp. plus color plates.

Gleason, H.A. 1952. *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada*. Hafner Press, New York. 3 volumes.

Gleason, H.A. and A. Cronquist. 1991. *Manual of Vascular Plants of Northeastern United States and Canada, 2nd Edition*. The New York Botanical Garden, Bronx, New York. 910 pp.

Gross, Douglas. 2003. *Bird Census of Columbia County*.

Haney, C. J. and C. P. Schaadt. 1996. Functional roles of eastern old growth in promoting forest bird diversity, Chapter 6, pages 76-88 *In Eastern Old Growth, Prospects for Rediscovery and Recovery* (M. B. Davis, editor), Island Press, Washington D.C.

Harlow, W.H. 1957. *Trees of the Eastern and Central United States and Canada*. Dover Publications, Inc., New York. 288 pp.

Holmgren, N.H. 1998. *The Illustrated Companion to Gleason and Cronquist's Manual*. The New York Botanical Garden, Bronx, New York. 937 pp.

Hulse, A.C., C.J. McCoy, and E.J. Censky. 2001. *Amphibians and Reptiles of Pennsylvania and the Northeast*. Cornell University Press, Ithaca, NY. 419 pp.

- Jacobson, M. and C. Seyler. 1997. How Important is Forestry in Columbia County. Penn State Timber Market Report. Penn State, School of Forest Resources, State College, PA. Website: <http://rnrext.cas.psu.edu/counties/columbia.pdf>
- Kenney, L.P. and M.R. Burne. 2000. A Field Guide to Vernal Pools. Massachusetts Division of Fisheries & Wildlife, Natural Heritage & Endangered Species Program., Westborough, Massachusetts. 73 pp.
- Lash, G.G. 1986. Sedimentologic and Geochemical Evidence for Middle Ordovician Near-trench Volcanism in the Central Appalachian Region. *Journal of Geology* vol.94, p.91-107. University of Chicago.
- Lohman, S.W. 1957. Groundwater in northeastern Pennsylvania. DCNR, Bureau of Topographic and Geologic Survey, Bulletin W 4.
- Master, L.L., S.R. Flack and B.A. Stein, eds. 1998. Rivers of Life: Critical Watersheds for Protecting Freshwater Biodiversity. The Nature Conservancy, Arlington, Virginia.
- Merritt, J.F. 1987. Guide to the Mammals of Pennsylvania. University of Pittsburgh Press for the Carnegie Museum of Natural History. 408 pp.
- Myer, G.H. 1989. Geology. pp 12-17 in D.J. Cuff, W.J. Young, E.K. Muller, W. Zelinsk, R.F. Abler, (eds.), *The Atlas of Pennsylvania*. Temple Univ. Press, Philadelphia, PA. 288 pp.
- The Nature Conservancy. 1988. Natural Heritage Operations Manual. The Nature Conservancy, Arlington, VA.
- Natural Resources Conservation Service. 1997. NRCS Report, NRCS Pennsylvania.
- Newcomb, L. 1977. Newcomb's Wildflower Guide. Little, Brown, & Company, Toronto, Canada. 490 pp.
- Opler, P.A. and G.O. Krizek. 1984. Butterflies East of the Great Plains. The Johns Hopkins Univ. Press, Baltimore, MD. 294 pp.
- Opler, P.A. and V. Malikul. 1992. A Field Guide to Eastern Butterflies. The Peterson Field Guide Series, Houghton-Mifflin Co., Boston, MA. 396 pp.
- Pennsylvania Geological Survey and Pittsburgh Geological Survey. 1999. *The Geology of Pennsylvania*. Charles H. Shultz (ed.). Boyer Printing, Lebanon, PA. 888 pp.
- Peterson, R.T. 1980. Eastern Birds. Peterson Field Guides. Houghton Mifflin Company, New York, New York. 384 pp.
- Peterson, R.T. and McKenny. 1968. Wildflowers of Northeastern and Northcentral North America. Peterson Field Guides. Houghton Mifflin Company, New York, New York. 420 pp.
- Plant Conservation Alliance, Alien Plant Fact Sheets Website: www.nps.gov/plants/alien/
- Podniesinski, G. and J. Wagner. 2002. Classification, Assessment and Protection of Forested Floodplain Wetlands of the Susquehanna Drainage. Report to the US EPA and the PA DCNR Bureau of Forestry , Forestry Advisory Services. 160 pp.
- Press Enterprise Newspaper, Bloomsburg, PA Website: www.bloomsburgpa.com/

- Rhoads, A.F and T.A.Block. 2000. The Plants of Pennsylvania, an Illustrated Manual. University of Pennsylvania Press, Philadelphia, PA. 1061 pp.
- Rhoads, A.F. and W.M. Klein, Jr. 1993. The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas. American Philosophical Society, Philadelphia, PA. 636 pp.
- Schweitzer, D.F. 1981. Species Accounts for Species of Special Concern Book (unpubl. draft).
- Sevan, W.D. 2000. Physiographic provinces of Pennsylvania. DCNR, Bureau of Topographic and Geologic Survey, Map 13.
- Shaffer, L.L. 1991. Pennsylvania Amphibians & Reptiles. The Pennsylvania Fish & Boat Commission, Harrisburg, PA. 161 pp.
- Shertzer, R.H., ed. 1992. Special Protection Waters Implementation Handbook. PA. Dept. Environ Resources, Harrisburg, PA.
- Snyder, Craig and Robert Ross et. al. 2004. Stream ecology linked to eastern hemlock decline in Delaware Water Gap National Recreation Area. U.S. Dept. of the Interior.
<http://www.lsc.usgs.gov/aeb/2048-03/dewa.asp>
- Society of American Foresters. 1998. Forest Fragmentation in the Chesapeake Bay Watershed: Ecological, Economic, Policy and Law Impacts. Bethesda, Maryland. Website:
<http://www.safnet.org/policyandpress/frag6.pdf>
- Soulé, M.E. 1986. Conservation Biology: The Science of Scarcity and Diversity. Sinauer Assoc., Inc., MA. 584 pp.
- Stein, B.A. and S.R. Flack. 1997. 1997 Species Report Card: The State of U.S. Plants and Animals. The Nature Conservancy, Arlington, Virginia.
- Strausbaugh, P.D. and E.L. Core. 1964. Flora of West Virginia, 2nd Edition. Seneca Books, Morgantown, West Virginia. 1079 pp.
- Treadwell, J.C. 1996. American chestnut. <http://ncnatural.com/NCNatural/trees/chestnut.html>
- United States Census Bureau. Pennsylvania MapStats. Website: <http://www.fedstats.gov/>
- United States Department of Agriculture, Soil Conservation Service. 1967. Soil Survey of Columbia County, Pennsylvania. 139 pp plus figures.
- White, J. 1978. Illinois Natural Areas Inventory Technical Report. Volume I: Survey Methods and Results. Illinois Natural Areas Inventory, Urbana, Illinois. 426 pp.

APPENDIX I: Natural Area Survey Form

Surveyor:

Address & Phone:

Date of Observation _____ Site Name:

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

Owner:

Owners Attitude Toward Conservation:

Site Elevation: _____ Size of Site (acres):

Source of Lead:

Current Land Use:

Type of Area: Old Growth Forest; Marsh; Shrub Swamp;
 Forested Swamp; Bog; Natural Pond.

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

Evidence of Disturbance:

Site Condition Compared to Your Last Visit:

Please attach any additional information, species list, etc.

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

APPENDIX II: Community Classification

CLASSIFICATION OF NATURAL COMMUNITIES IN PENNSYLVANIA

COMMUNITY NAME STATE RANK*	MAP CODE	GLOBAL RANK*
<u>ESTUARINE COMMUNITIES</u>		
DEEPWATER SUBTIDAL COMMUNITY	EAA	G? S1
SHALLOW-WATER SUBTIDAL COMMUNITY	EAB	G? S1
FRESHWATER INTERTIDAL MUDFLAT		EBA G3G4 S1
FRESHWATER INTERTIDAL MARSH	ECA	G3G4 S1
<u>RIVERINE COMMUNITIES</u>		
LOW-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RAA	G? S5
LOW-GRADIENT CLEARWATER CREEK	RAB	G? S3S4
LOW-GRADIENT CLEARWATER RIVER	RAC	G? S2S3
LOW-GRADIENT BROWNWATER CREEK	RAD	G? S2S3
MEDIUM-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RBA	G? S5
MEDIUM-GRADIENT CLEARWATER CREEK	RBB	G? S3
MEDIUM-GRADIENT CLEARWATER RIVER	RBC	G? S?
MEDIUM-GRADIENT BROWNWATER CREEK	RBD	G? S3
HIGH-GRADIENT EPHEMERAL/INTERMITTENT CREEK	RCA	G? S5
HIGH-GRADIENT CLEARWATER CREEK	RCB	G? S3
HIGH-GRADIENT CLEARWATER RIVER	RCC	G? S?
HIGH-GRADIENT BROWNWATER CREEK	RCD	G? S?
WATERFALL AND PLUNGEPOOL	RDA	G? S3S4
SPRING COMMUNITY	REA	G? S1S2
SPRING RUN COMMUNITY	REB	G? S1S2
<u>LACUSTRINE</u>		
ACIDIC GLACIAL LAKE	LAAA	G? S2S3
CALCAREOUS GLACIAL LAKE	LAAB	G? S1
NONGLACIAL LAKE	LAB	G? S2
ARTIFICIAL LAKE	LAC	* *
NATURAL POND	LBA	G? S2S3
ARTIFICIAL POND	LBB	* *
STABLE NATURAL POOL	LCA	G? S?
EPHEMERAL/FLUCTUATING NATURAL POOL	LCB	G? S2
ARTIFICIAL POOL	LCC	* *

EPHEMERAL/FLUCTUATING LIMESTONE
SINKHOLE

LCD G? S1

PALUSTRINE COMMUNITIES

ACIDIC BROADLEAF SWAMP	PAA	G5	S2S3
CIRCUMNEUTRAL BROADLEAF SWAMP	PAB	G?	S2S3
BOREAL CONIFER SWAMP	PAC	G?	S3
NORTHERN CONIFER SWAMP	PAD	G?	S3S4
BROADLEAF-CONIFER SWAMP	PAE	G?	S3S4
FLOODPLAIN SWAMP	PAF	G?	S1
EASTERN CALCAREOUS SEEPAGE SWAMP	PAG	G?	S1
ACIDIC SHRUB SWAMP	PAH	G5	S3
CIRCUMNEUTRAL SHRUB SWAMP	PAJ	G?	S3
GRAMINOID MARSH	PBA	G?	S3
ROBUST EMERGENT MARSH	PBB	G?	S2
MIXED GRAMINOID-ROBUST EMERGENT MARSH	PBC	G?	S2S3
CALCAREOUS MARSH	PBD	G?	S1
OLIGOTROPHIC GLACIAL KETTLEHOLE BOG	PCAA	G?	S3
WEAKLY MINEROTROPHIC LAKESIDE BOG	PCAB	G?	S2
NONGLACIAL BOG	PCB	G?	S3
RECONSTITUTED BOG	PCC	*	*
POOR (GRAMINOID) FEN	PCD	G?	S1
SHRUB (CALCAREOUS) FEN	PDA	G2G3	S1
BASIN GRAMINOID-FORB (CALCAREOUS) FEN	PDB	G?	S1
HILLSIDE GRAMINOID-FORB (CALCAREOUS) FEN	PDC	G?	S1
NORTHERN APPALACHIAN CIRCUMNEUTRAL SEEP	PEA	G?	S3?
NORTHERN APPALACHIAN CALCAREOUS SEEP	PEB	G?	S1
NORTHERN APPALACHIAN ACIDIC SEEP	PEC	G?	S3?
RIVERSIDE SEEP	PED	G?	S2?

TERRESTRIAL COMMUNITIES

NORTHERN CONIFER FOREST	TBA	G5	S3S4
NORTHERN HARDWOOD (DECIDUOUS) FOREST	TBB	G?	S3S4
NORTHERN HARDWOOD-CONIFER FOREST	TBC	G?	S3
XERIC CENTRAL HARDWOOD (DECIDUOUS) FOREST	TCA	G?	S5
XERIC CENTRAL CONIFER FOREST	TCB	G?	S3S4
XERIC CENTRAL HARDWOOD-CONIFER FOREST	TCC	G?	S3
RIDGETOP DWARF-TREE FOREST	TCD	G4	S2S3
DRY-MESIC ACIDIC CENTRAL FOREST	TCE	G?	S5
DRY-MESIC CALCAREOUS CENTRAL FOREST	TCF	G?	S2S3
MESIC CENTRAL FOREST	TCG	G?	S2
TALUS SLOPE FOREST	TCH	G?	S2?
COASTAL PLAIN FOREST	TEA	G?	S1
FLOODPLAIN FOREST	TFA	G?	S2
RIVER GRAVEL COMMUNITY	TGA	G?	S4S5
MESIC SCRUB OAK-HEATH-PITCH PINE BARRENS	TCDA	G1	S1

EASTERN SERPENTINE BARRENS	THA	G2	S1	
CENTRAL APPALACHIAN SHALE BARREN	THBA	G?	S1	
NORTHERN APPALACHIAN SHALE BARREN	THBB	G?	S2	
NORTHERN APPALACHIAN SAND BARREN	THC	G?	S?	
NORTHERN APPALACHIAN BOULDER FIELD	THD	G?	S5	
NORTHERN APPALACHIAN CALCAREOUS CLIFF	THE	G?	S2	
NORTHERN APPALACHIAN ACIDIC CLIFF	THF	G?	S5	
NORTHERN APPALACHIAN SHALE CLIFF	THG	G?	S2	
RIVERSIDE OUTCROP/CLIFF	THJ	G?	S1S2	
NORTHERN APPALACHIAN TALUS WOODLAND	TCHA	G?	S?	
NORTHERN APPALACHIAN ACIDIC ROCKY SUMMIT	THK	G?	S2	
NORTHERN APPALACHIAN CALCAREOUS ROCKY SUMMIT	THM	G?	S1	
CALCAREOUS ROCKY SLOPE	TFG	G?	S?	
CALCAREOUS RIVERSIDE OUTCROP	THH	G?	S1	
LAKE SEDIMENT SLUMP	TGB	G?	S1	
EASTERN GREAT LAKES BEACH COMMUNITY		TJA	G?	S?
EASTERN GREAT LAKES DUNE COMMUNITY	TJB	G?	S?	
EASTERN GREAT LAKES SAND PLAINS COMMUNITY		TJC	G?	S?
EASTERN GREAT LAKES BLUFF/CLIFF COMMUNITY	TJD	G?	S?	

SUBTERRANEAN COMMUNITIES

SOLUTION CAVE TERRESTRIAL COMMUNITY		SAA	G?	S3
SOLUTION CAVE AQUATIC COMMUNITY	SAB	G?	S3	
TECTONIC CAVE COMMUNITY	SAC	G?	S3S4	
TALUS CAVE COMMUNITY	SAD	G?	S2S4	

DISTURBED COMMUNITIES

BARE SOIL	DAA	---		
MEADOW/PASTURELAND	DAB	---		
CULTIVATED LAND	DAC	---		
SUCCESSIONAL FIELD	DAD	---		
YOUNG MISCELLANEOUS FOREST	DAE	---		
CONIFER PLANTATION	DAF	--		

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

APPENDIX III: Field Survey Form

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

SNAME: EOCODE:
SITENAME: SURVEYDATE:
SURVEYSITE: SOURCECODE
SURVEYOR:
SPECIMEN REPOSITORY:

Locational Information *QUADCODE* *DOTNUM*
TEN,TEN COUNTYCODE TOWNSHIP

LAT:
LONG:
DIRECTIONS:

Global PA EORANK:
EORANK
COMMENTS:

DATA:

HABITAT
DESCRIPTION:

MISCELLANEOUS:

DATA SENSITIVITY: OWNERCODE
REASON FOR DATA OWNER
SENSITIVITY:

HABITAT SKETCH:

APPENDIX IV: PNHP Ranks, Federal and State Status

FEDERAL STATUS

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

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

- LE** - Listed Endangered - Taxa in danger of extinction throughout all or a significant portion of their ranges.
- LT** - Listed Threatened - Taxa that are likely to become endangered within the foreseeable future through all or a significant portion of their ranges.
- PE** - Proposed Endangered - Taxa proposed to be formally listed as endangered.
- PT** - Proposed Threatened - Taxa proposed to be formally listed as threatened.
- C1** - Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.
- C2** - Taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threats are not currently known or on file to support the immediate preparation of rules.
- C3** - Taxa that are no longer being considered for listing as threatened or endangered species. Such taxa are further coded to indicate three categories, depending on the reason(s) for removal from consideration.
 - 3A--Taxa for which the Service has persuasive evidence of extinction.
 - 3B--Names that, on the basis of current taxonomic understanding, usually as represented in published revisions and monographs, do not represent taxa meeting the Act's definition of "species".
 - 3C--Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.
- N** - Taxa not currently listed by the U.S. Fish and Wildlife Service

APPENDIX IV (continued)

STATE STATUS-NATIVE PLANT SPECIES

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

- PE** - Pennsylvania Endangered - Plant species which are in danger of extinction throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained or if the species is greatly exploited by man. This classification shall also include any populations of plant species that have been classified as Pennsylvania Extirpated, but which subsequently are found to exist in this Commonwealth.
- PT** - Pennsylvania Threatened - Plant species which may become endangered throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained to prevent further decline in this Commonwealth, or if the species is greatly exploited by man.
- PR** - Pennsylvania Rare - Plant species which are uncommon within this Commonwealth. All species of native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification.
- PX** - Pennsylvania Extirpated - Plant species believed by the Department to be extinct within this Commonwealth. These plant species may or may not be in existence outside this Commonwealth. If plant species classified as Pennsylvania Extirpated are found to exist, the species automatically will be considered to be classified as Pennsylvania Endangered.
- PV** - Pennsylvania Vulnerable - Plant species which are in danger of population decline within Pennsylvania because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.
- TU** - Tentatively Undetermined - Plant species which are believed to be in danger of population decline, but which cannot presently be included within another classification due to taxonomic uncertainties, limited evidence within historical records, or insufficient data.
- N** - None - Plant species which are believed to be endangered, rare, or threatened, but which are being considered by the required regulatory review processes for future listing

APPENDIX IV (continued)

STATE STATUS-ANIMALS

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

PE - Pennsylvania Endangered

Game Commission - Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania if the deleterious factors affecting them continue to operate. These are: 1) species whose numbers have already been reduced to a critically low level or whose habitat has been so drastically reduced or degraded that immediate action is required to prevent their extirpation from the Commonwealth; or 2) species whose extreme rarity or peripherality places them in potential danger of precipitous declines or sudden extirpation throughout their range in Pennsylvania; or 3) species that have been classified as "Pennsylvania Extirpated", but which are subsequently found to exist in Pennsylvania as long as the above conditions 1 or 2 are met; or 4) species determined to be "Endangered" pursuant to the Endangered Species Act of 1973, Public law 93-205 (87 Stat. 884), as amended.

Fish and Boat Commission - Endangered Species are all species and subspecies: (1) declared by the Secretary of the United States Department of the Interior to be threatened with extinction and appear on the Endangered Species List or the Native Endangered Species list published in the Federal Register; or, (2) declared by the Executive Director (PaFC) to be threatened with extinction and appear on the Pennsylvania Endangered Species List published in the Pennsylvania Bulletin.

PT - Pennsylvania Threatened

Game Commission - Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the causal factors affecting the organism are abated. These are: 1) species whose populations within the Commonwealth are decreasing or have been heavily depleted by adverse factors and while not actually endangered, are still in critical condition; or 2) species whose populations may be relatively abundant in the Commonwealth but are under severe threat from serious adverse factors that have been identified and documented; or 3) species whose populations are rare or peripheral and in possible danger of severe decline throughout their range in Pennsylvania; or 4) species determined to be "Threatened" pursuant to the Endangered Species Act of 1973, Public law 93-205 (87-Stat. 884), as amended, that are not listed as "Pennsylvania Endangered".

Fish and Boat Commission - Threatened Species are all species and subspecies: (1) declared by the Secretary of the United States Department of the Interior to be in such small numbers throughout their range that they may become endangered if their environment worsens and appear on a Threatened Species List published in the Federal Register; or, (2) have been declared by the Executive Director (PaFC) to be in such small numbers throughout their range that they may become endangered if their environment worsens and appear on the Pennsylvania Threatened Species List published in the Pennsylvania Bulletin.

APPENDIX IV (continued)

PNHP GLOBAL ELEMENT RANKS

- G1** = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
- G2** = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
- G3** = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
- G4** = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- G5** = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- GH** = Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered (e.g., Bachman's Warbler).
- GU** = Possibly in peril range wide but status uncertain; need more information.
- GX** = Believed to be extinct throughout its range (e.g., Passenger Pigeon) with virtually no likelihood that it will be rediscovered.

PNHP STATE ELEMENT RANKS

- S1** = Critically imperiled in state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.
- S2** = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
- S3** = Rare or uncommon in state (on the order of 21 to 100 occurrences).
- S4** = Apparently secure in state, with many occurrences.
- S5** = Demonstrably secure in state and essentially ineradicable under present conditions.
- SA** = Accidental in state, including species which only sporadically breed in the state.

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

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

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

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

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

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

SX = Apparently extirpated from the state.

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

APPENDIX V: PNHP Element Occurrence Quality Ranks

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

-
- Intermediate ranks may also be assigned.

APPENDIX VI: Special Plants, Animals and Natural Communities of Columbia County

Animals of Special Concern

<u>Scientific Name</u>	<u>Common Name</u>
<i>Aeshna verticalis</i>	Green Striped Darner Dragonfly
<i>Crotalus horridus</i>	Timber Rattlesnake
<i>Lampsilis cariosa</i>	Yellow Lamp Mussel
<i>Lasmigona subviridis</i>	Green Floater Mussel
<i>Libellula incesta</i>	Slaty Skimmer Dragonfly
<i>Myotis septentrionalis</i>	Northern Long-eared Bat
<i>Sorex dispar</i>	Long-tailed Shrew

Plants of Special Concern

<u>Scientific Name</u>	<u>Common Name</u>
<i>Aplectrum hyemale</i>	Puttyroot
<i>Dodecatheon radicans</i>	Jeweled Shooting-star
<i>Scirpus ancistrochaetus</i>	Northeastern Bulrush

Natural Communities of Special Concern

- Natural Community Name
- Ephemeral/Fluctuating Pool Natural Community
- Hemlock Palustrine Forest Natural Community
- Northern Appalachian Shale Cliff Community
- Northern Conifer Forest Natural Community
- Scrub Oak Shrubland Natural Community

