

November 2024



# Conservation Plan

for the Haugh Family Preserve and Gray's Woods Preserve

*Cover photo:* The Barrens (or Eastern) Buckmoth (*Hemileuca maia*) is a Species of Greatest Conservation Concern in Pennsylvania. The buckmoth is associated with barrens where large stands of scrub oak provide the food the caterpillars need. The buckmoth is threatened by habitat loss and fragmentation from development and succession due to fire suppression. Buckmoth populations are also impacted by a fly parasitoid (*Compsilura concinnata*), which was introduced to North America to control the invasive spongy moth. Scotia Barrens supports one of the best populations of buckmoth in the state. The showy black and white adults can be found cruising their scrub oak habitats in the daytime in the fall during deer season.

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# Executive Summary

Patton Township established their Open Space Program in 2001 through ballot referendum. Since then, the Township has conserved 652 acres of land through the conservation of the Haugh Family Preserve, Gray's Woods Preserve, and the Marjorie D. Seward Preserve. These properties were conserved to protect natural resources and provide residents the opportunity to connect to nature through passive recreational activities. Both the Haugh Family Preserve and Gray's Woods Preserve are protected in perpetuity by conservation easements.

The *Conservation Plan for the Haugh Family Preserve and Gray's Woods Preserve* is a 10-year management strategy (2023 – 2033) based on the Township's Management Goals identified by the Open Space Stewardship Committee. This Conservation Plan provides guidance for all habitat management and agricultural activities occurring on these properties, a requirement of both conservation easements. It also provides the Township with recommendations to guide recreation, education, and research activities and the development of a long-term financial strategy. This Conservation Plan is based on the Forest Stewardship Plan and Wetland Stewardship Plans that were created as part of this larger Conservation Planning effort (Wolf 2023, Wilson 2023a, b).

The Haugh Family Preserve and Gray's Woods Preserve are publicly accessible open spaces immediately adjacent to SGL 176 and are part of an area, locally known as the Scotia Barrens. The Scotia Barrens includes one of the largest known Pitch Pine - Scrub Oak- Barrens Communities remaining in Pennsylvania. Together with SGL 176 and additional private properties, they are part of special designation areas including the Scotia Barrens Natural Heritage Area, The Barrens at Scotia Important Bird Area, and Central Mountains Important Mammal Area.

## *With Gratitude*

Patton Township is grateful for the financial support received from the Hamer Foundation to develop the *Conservation Plan for the Haugh Family Preserve and Gray's Woods Preserve* and high-priority habitat management implementation activities.

The Haugh Family Preserve and the Gray's Woods Preserve have inherent conservation values of their own that merited permanent protection. However, conservation of these Open Space properties was especially important to the larger Scotia region as their protection also buffers rare habitats found on SGL 176 from encroaching development and created critical connectivity between SGL 176 and the wetland complex located in Gray's Woods Park and Preserve.

Threats and stressors including climate change, lack of forest management, overbrowsing by white-tailed deer, invasive species, and stormwater all threaten the sustainability of the Open Space properties and create challenges as the Township strives to fulfill its Management Goals. This Conservation Plan provides prioritized recommendations that address these threats and stressors, which will increase resiliency and enhance habitats for many Species of Greatest Conservation Need.

Successful implementation of the Conservation Plan will take dedication, financial resources, and technical expertise. Development of annual Open Space Stewardship Committee workplans will maintain focus on priority activities. A long-term funding strategy will also ensure that the Township has adequate financial resources to steward the properties during the 10-year planning period (2023-2033) but also into perpetuity. Continuation of existing collaborative partnerships will enable the Township to maintain and expand unique habitats for several Species of Greatest Conservation Need. Growing new collaborative partnerships, especially with the Pennsylvania Game Commission and their 400 Areas Program, will enable cross boundary management and bring significant financial resources and technical expertise, increasing the Township's capacity to do impactful large-scale stewardship projects on the Open Space properties.

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# Acronym Definitions

CCVI	Climate Change Vulnerability Index
COA	Conservation Opportunity Area
DCNR	Pennsylvania Department of Conservation and Natural Resources
IBA	Important Bird Area
MU	Management Unit
NHA	Natural Heritage Area
OSSC	Open Space Stewardship Committee
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
SGL	State Game Lands
SGCN	Species of Greatest Conservation Need
SWAP	Pennsylvania State Wildlife Action Plan
USFWS	U.S. Fish and Wildlife Service

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# Background Information

## Patton Township Open Space Program

Patton Township residents voted by a ballot referendum in 2001 to establish the Centre Region's first Open Space Program (Appendix A). In 2007, the Patton Township Open Space and Recreation Areas ordinance was created, enabling the official designation of certain Township-owned lands as recreation areas distinct from active parkland (Ord. No. 2007 – 481, now Code 235 as of 2024) (Appendix A). The ordinance's intent was to protect the Township's

sensitive natural resources and scenic beauty that were quickly being lost to development and provide residents with the opportunity to connect to nature through passive, low-impact recreational activities. Through this program, the Township has protected 652 acres of Open Space from development with the conservation of the Haugh Family Preserve, Gray's Woods Preserve, and the Marjorie D. Seward Preserve. This Conservation Plan is only for the Haugh Family Preserve and Gray's Woods Preserve (Figure 1).

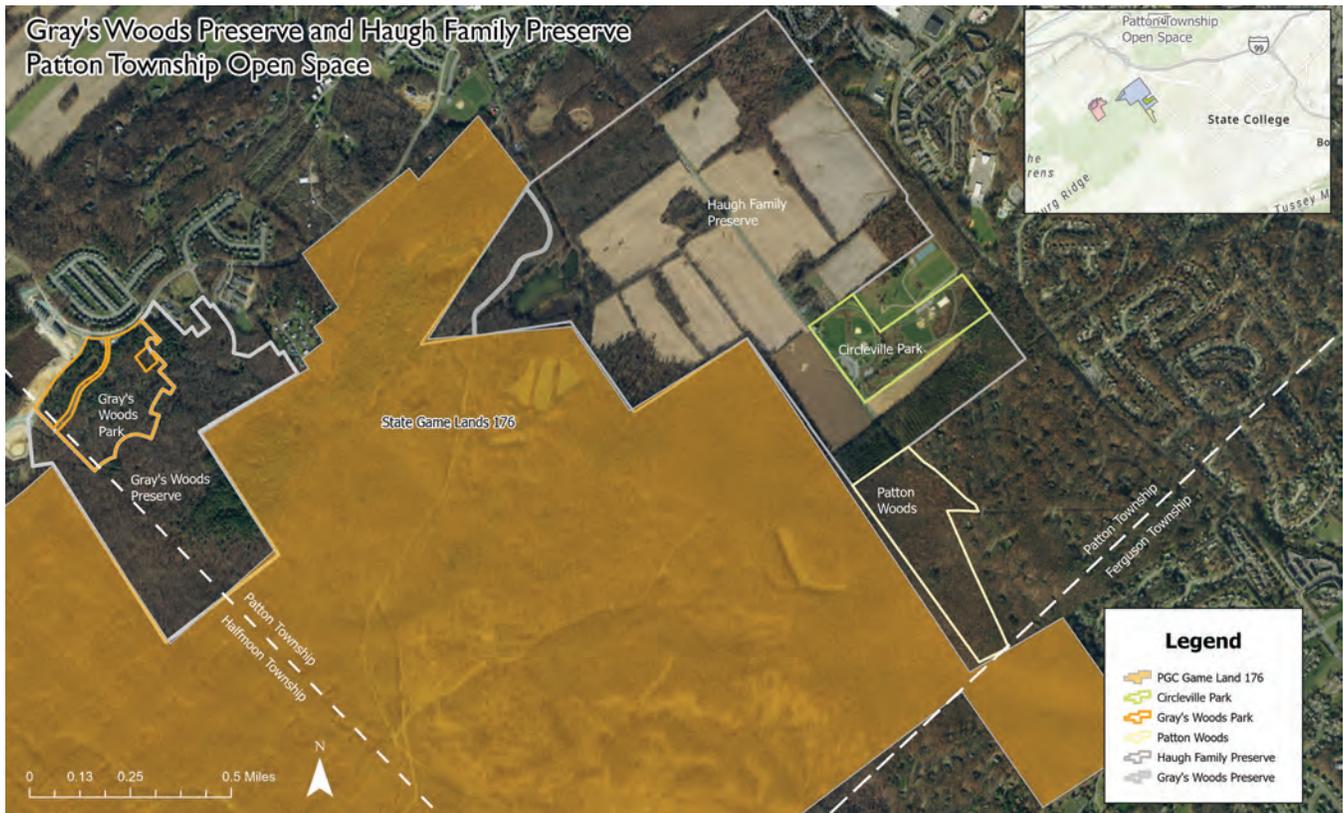


Figure 1. Location of the Haugh Family Preserve and Gray's Woods Preserve Open Space properties.

### **Haugh Family Preserve<sup>1</sup>**

In 2007, Helen and Hubert Haugh generously sold their 466-acre property that was valued at \$8 million at bargain sale for \$2,500,000 to Patton Township. Their gift, in conjunction with the 2001 \$2.5 million voter-supported bond issue, permanently protected this property, creating the Haugh Family Farm Open Space (officially changed to the “Haugh Family Preserve” in 2023). The Haugh’s also created a \$300,000 endowment at the Centre County Community Foundation (now the Centre Foundation) for future stewardship of the property.

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### **Gray’s Woods Preserve**

Patton Township residents again voted in support of a new \$3.5 million bond issue in 2014 to conserve additional open space within the Township (Appendix A). With additional support of a \$750,000 grant from the Hamer Foundation, the Township purchased 150 acres of the Gray’s Woods Planned Community in 2017 for \$4,250,000 creating the Gray’s Woods Preserve.

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### **Marjorie D. Seward Preserve**

Marjorie D. Seward bequeathed an approximate 36-acre parcel to Patton Township upon her passing in 2019, to establish and maintain a limited-development, passive-use public park. The property, located along North Atherton Street, at the top of Bald Eagle Mountain (locally known as Skytop Mountain), is entirely forested. In June 2024, the Township officially adopted the property into its Open Space Program.

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<sup>1</sup> Haugh Family Preserve is the official property name used by Patton Township. Other names that have been used to reference the property include Haugh Tract, Haugh Farm Preserve, and Haugh Family Farm Open Space.

## **Open Space Stewardship Committee**

The Open Space Stewardship Committee (OSSC) is an advisory committee to the Township that was formed in 2007 to provide community input to and oversight of the management of Township Open Space properties and to ensure that all management activities are consistent with the conservation easements. The Committee is comprised of seven community members that volunteer to serve six-year terms. One Township Supervisor participates with the OSSC as a liaison to the Board of Supervisors. Committee meetings are typically scheduled quarterly and often include a spring and/or fall site visit to one of the Open Space properties.

## **Open Space Conservation Easements and Planning Requirements**

Conservation easements were placed on the Haugh Family Preserve in 2005 and the Gray’s Woods Preserve in 2022 to protect these properties from development in perpetuity (Appendix B, Appendix C). The Haugh Family Preserve conservation easement was amended in 2007 to clarify that forest management for maintaining forest health and trails is an allowable activity on the property (Appendix D). Patton Township is the holder of this conservation easement and retains a third-party contractor to conduct annual easement monitoring. ClearWater Conservancy is the holder of the Gray’s Woods Preserve conservation easement.

The conservation easement for each property specifies the conservation values that these easements are intended to protect and management goals to further enhance these values. The easements also specify allowable and prohibitive activities and uses. Patton Township is legally bound to uphold these conservation easements, so it is essential that Township staff and OSSC members have a firm understanding of these documents.

### **What is a Conservation Easement?**

A conservation easement is a voluntary legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land in order to protect conservation values of the property. The landowner still owns the land but agrees to certain restrictions on its use. The conservation easement holder is responsible for annual monitoring, to ensure that its provisions are upheld.

Maintaining regularly updated Conservation and Forest Management Plans is a requirement of the Haugh Family Preserve and the Gray's Woods Preserve conservation easements. Unlike the conservation easements, these resource management plans are working documents that provide detailed multi-year management recommendations of prioritized and allowable disturbances and management activities (e.g., forest or other habitat management, invasive species management, maintenance, recreational development, etc.). These documents are meant to be updated every 10 years to reevaluate how the properties have changed and how goals have been advanced due to management activities, naturally occurring habitat succession, unanticipated changes, and emerging new threats. Through time, new opportunities may also present themselves that should be factored into each consecutive plan. As part of each update, another 10 years of management actions will be recommended that are consistent with the conservation easements and the Township's goals.

## **Property Descriptions**

The 466-acre Haugh Family Preserve is largely managed for agriculture. Patton Township leases 230 acres of agricultural fields to a local producer and 1.6 acres are managed as Community Gardens that are available to rent. The Haugh Family Preserve also has several forested stands totaling approximately 180.6 acres of mixed-age oak and hardwood forest. Tree rows, rights-of-way, parking lots, and Ten Acre pond comprise the remaining 53.8 acres. Many small, isolated wetlands are located in both the agricultural and forested areas and are included in those land cover classifications. The Haugh Family Preserve is divided by Circleville Road and is adjacent to Circleville Park and Patton Woods, also owned and managed by the Township. The Haugh Family Preserve is located entirely within Patton Township (Figure 2).

Sustainable agriculture is an allowable use on the Haugh Family Preserve and the conservation easement encourages continued cultivation of the property for as long as reasonably possible. Conversion of any woodlands to agricultural use is not permitted. If agriculture production stops for any reason, the conservation easement requires that these agricultural fields revert to nature according to a Conservation Stewardship Plan (Appendix B).



*Haugh Family Preserve farm field  
photo by K. Ombalski*



Figure 2. Haugh Family Preserve.

The 150-acre Gray's Woods Preserve is comprised mostly of 80-year-old oak and mixed hardwood forest (Wolf 2023). Notable ecologically important features include six isolated wetlands (Wilson 2023b), and a small remnant clay pit that creates a small canopy gap and exposed sandy soils. Two gated and unimproved roads traverse the property: Palustrine Lane services

a nearby State College Borough Water Authority wellfield and Heritage Trail Road that provides access to private property through State Game Lands (SGL) 176. There are also several unofficial trails on the property. The Gray's Woods Preserve is adjacent to both Gray's Woods Park and is in both Patton (105 acres) and Halfmoon (45 acres) Townships (Figure 3).

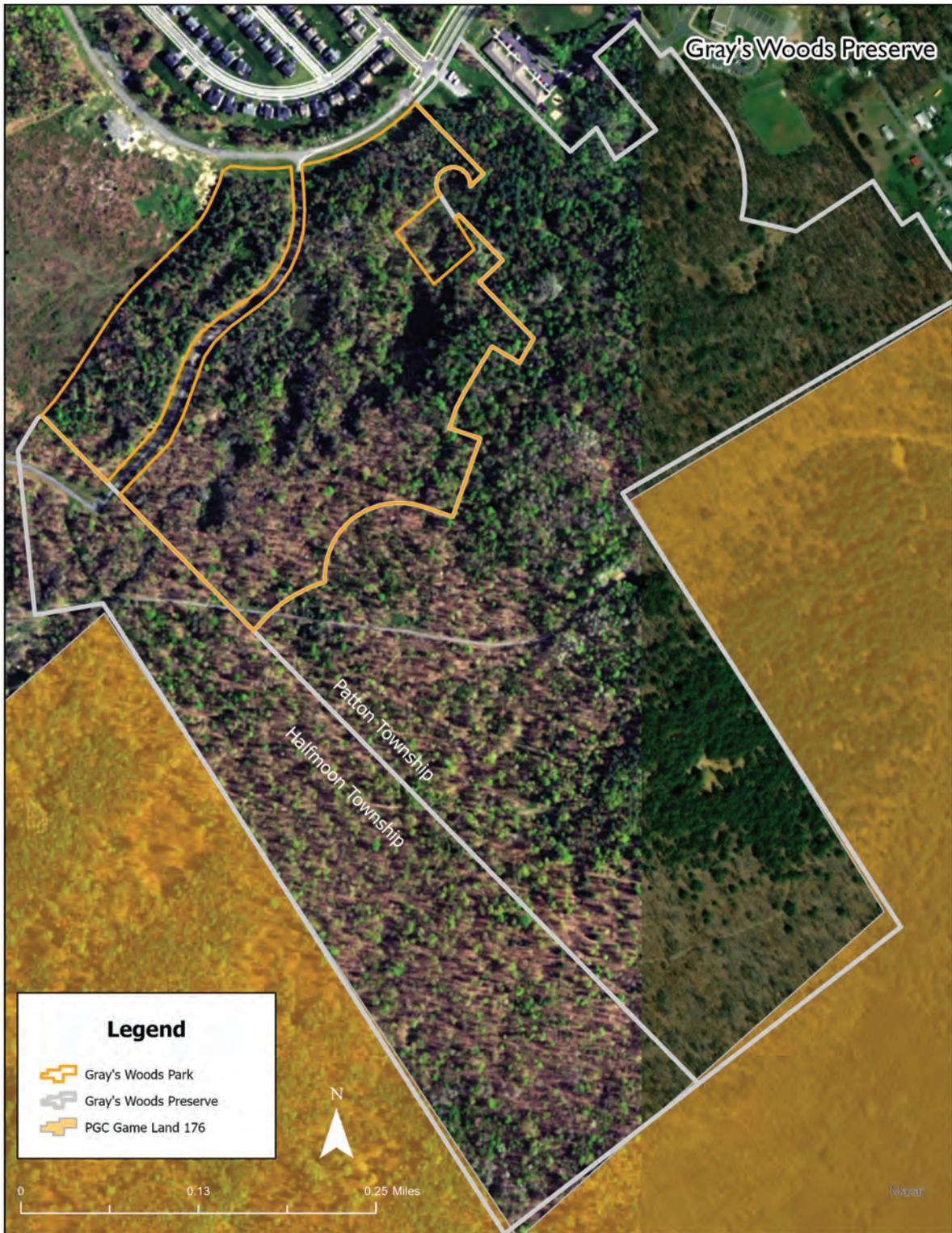


Figure 3. Gray's Woods Preserve.

## Landscape Context

The Haugh Family Preserve and Gray's Woods Preserve are publicly accessible open spaces immediately adjacent to SGL 176 and are part of an area, locally known as the Scotia Barrens (Figure 4). The Scotia Barrens includes one of the largest known Pitch Pine - Scrub Oak- Barrens Communities remaining in Pennsylvania. This exceptional ecosystem, located within the Ridge and Valley ecoregion, is believed to coincide with the Gatesburg Formation that extends

well past the boundaries of SGL 176 boundaries. Much of this habitat, however, has been lost to agriculture, development, or other types of habitat conversion. These protected natural lands, totaling 6,847 acres, are in the valley between Bald Eagle Ridge and Tussey Mountain and along the Spring and Spruce Creek watershed divide in Patton, Ferguson, and Halfmoon Townships of Centre County. Agriculture and residential development have isolated these protected lands from the surrounding forested ridges.

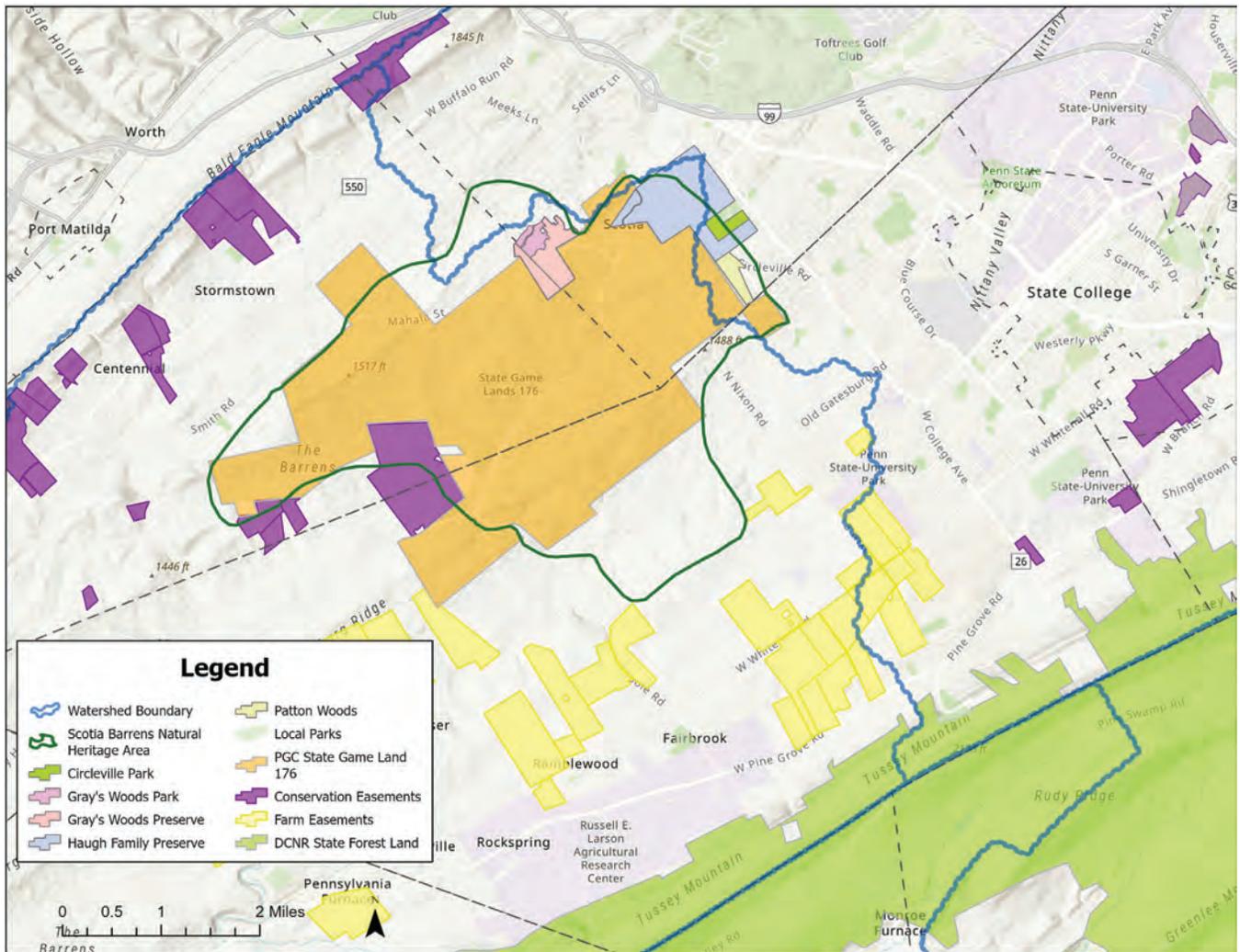


Figure 4. Landscape context of the Scotia Barrens.

Patton Township prioritized these properties for conservation through their Open Space Program because of the imminent threat of development from nearby State College and surrounding communities and their known importance to the conservation of biodiversity. In fact, the Haugh Family Preserve and Gray's Woods Preserve, are part of the "exceptionally significant" Scotia Barrens Natural Heritage Area (NHA), the Barrens at Scotia Important Bird Area, and the Central Mountains Important Mammal Area (Pennsylvania Natural Heritage Program 2002, Pennsylvania Audubon Society 1999, Pennsylvania Wildlife Federation, personal communication).

It is important to note that the Haugh Family Preserve and the Gray's Woods Preserve have inherent conservation values of their own that merit permanent protection. However, conservation of these open space properties was especially important as their protection conserved approximately 330 acres of forest, buffered rare habitats found on SGL 176 from encroaching residential development, and created critical connectivity between SGL 176 and the wetland complex located in Gray's Woods Park and Preserve. Strategic management of these Open Space properties also provides the opportunity to enhance and expand important habitats that support an incredible diversity of wildlife species, several of which are rare, threatened or endangered at state and federal levels.

### **Natural Heritage Areas**

Areas that support rare plants or animals, exemplary ecological communities, and Pennsylvania's native species biodiversity are designated as NHAs by the Pennsylvania Natural Heritage Program. The Scotia Barrens Natural Heritage Area was identified in the 2002 Centre County Natural Heritage Inventory report as being of Exceptional Significance and includes SGL 176 and several surrounding properties, including the Haugh Family Preserve and Gray's Woods Preserve (Pennsylvania Natural Heritage Program 2002) (Figure 4).

### **Scotia History**

The Scotia Barrens and its connection to the region's rich iron-mining history is well documented (<https://centrehistory.org/article/scotia/>, <https://www.clearwaterconservancy.org/article/scotia-an-area-rich-in-history>). In 1881, Centre Furnace ironmaster Moses Thompson sold 400 acres to Andrew Carnegie to establish a company town that included open-pit mines, ore-processing facilities, railroad service, and all the necessities of village life. Carnegie named this town Scotia after his homeland of Scotland. Today remnants of the town of Scotia and its ore-mining past are still visible within the Scotia Barrens. Other historic names familiar to current residents, including John Patton, Samuel Miles, and James Irvin were early settlers in the region and had strong ties to Scotia and numerous surrounding iron furnaces.



photo by K. Ombalski

## Conservation Targets

### Priority Habitats

The Scotia region is recognized as a high-value conservation area that has been a focus of conservation efforts for decades because of the number of rare plants and animals described below. Habitats that support these species include forests, barrens (an early successional forest type), and wetlands.

### *Forests*

Forests provide many services for people and wildlife. Not only do they provide wood and fiber products and offer numerous recreational opportunities, forests also store and sequester vast amounts of carbon, create oxygen, play a critical role in the global water cycle, build soil and protect it from erosion, and provide habitat for 80% of the world's terrestrial biodiversity.

Conservation of the Haugh Family Preserve and Gray's Woods Preserve protected nearly 330 acres of forest. The Haugh Family Preserve is 39% forested and is comprised of mixed-age oak and hardwood forest while the Gray's Woods Preserve is almost entirely forested and is comprised of 80-year-old oak and mixed hardwood forest. To evaluate overall forest health, forests assessments were conducted for both the Haugh Family Preserve and Gray's Woods Preserve as part of this conservation plan (Appendix E and Appendix F). Characteristics including tree regeneration, species composition, age class, and structural diversity, were evaluated. The assessments were then used to create a 10-year Forest Management Plan to maximize future forest health and resiliency (Wolf 2023). *The Haugh Family Preserve and Gray's Woods Preserve Forest Management Plan* is assessable on the Patton Township website: <https://twp.patton.pa.us/271/Forest-Management-Plan-PDF>.

## Barrens

There are five major types of barrens ecosystems in Pennsylvania. These include Ridge Top Acidic Barrens, Mesic Till Barrens, Serpentine Barrens, Limestone Glades/Barrens, and Shale Barrens (Pennsylvania Natural Heritage Program 2002, Orndorff 2008, Orndorff and Patten 2008). These ecosystems occur on various geologies but are unified by their shallow soils over bedrock and create growing conditions that limit tree growth, allowing for a number of plant species that require open canopies and can tolerate periods of drought, heat, and other extreme conditions. Barrens are often described as thickets or shrub/scrub habitats comprised of unique plant communities that support numerous plant species, some of which are rare. The differences in plant species composition of barrens ecosystems often reflect the chemical composition of the bedrock. Barrens are also known to support a variety of other vertebrate and invertebrate species that are in decline (e.g., frosted elfin (*Callophrys irus*), Appalachian cottontail (*Sylvilagus obscurus*), golden-winged warbler (*Vermivora chrysoptera*), ruffed grouse (*Bonasa umbellus*), eastern whip-poor-will (*Antrostomus vociferus*), etc.) as a result of habitat loss from land use change (i.e., mining, agriculture, development, etc.) and natural forest succession (i.e., early successional scrub-shrub habitat succeeding towards mid- to late seral forests).



Golden-winged Warbler  
(*Vermivora chrysoptera*)  
photo by J. Irms



Example of early successional barrens habitat at SGL 176  
photo by B. Leppo

The Pitch Pine – Scrub Oak Woodland Community, a component of the Ridge Top Acidic Barrens, is one of the more common barrens community types in Pennsylvania. It is often found on dry upper slopes in the Ridge and Valley Ecoregion of Pennsylvania and in places like the Scotia Barrens, despite its location in a valley between ridges, but where shallow soils over bedrock still limit the growth of trees. While this habitat is not rare, the Scotia Barrens is one of largest known remaining Pitch Pine – Scrub Oak Woodland Communities in the Ridge and Valley Ecoregion of Pennsylvania and supports several species of concern. Mining, forestry, and other extractive industrial activity further favored the barrens habitat. Because of the rare plant and animal species associated with this habitat, resource managers have worked to maintain this ecosystem through active forest management, including prescribed fire and timber harvesting. The Pennsylvania Game Commission (PGC) maintains over 2,000 acres within SGL 176 in a perpetual state of early succession to maintain this habitat type and associated wildlife species (PGC 2016).

Within the Patton Township Open Space properties, barrens habitat is found primarily along the powerline right-of-way and field edges of the Haugh Family Preserve. Regular maintenance of the powerline right-of-way on the Haugh Family Preserve has kept small patches open for barrens specialist species including frosted elfin and its host species, yellow wild indigo (*Baptisia tinctoria*). Historically, these management actions have been implemented for utility maintenance and not conservation purposes, but a stakeholder partnership was formed to further enhance and expand this important habitat (see section *Habitat Management for Rare Butterflies and Bees Project* under the Habitat Management Activities to Date section on page 49). A barrens management opportunity also exists within a disturbed area on the Gray's Wood Preserve known as the clay pit (see Tiger Beetle section on page 32) (Figure 13).

### *Wetlands*

Wetlands of the Haugh Family Preserve were delineated by Wilson (2008) and the Wetland Stewardship Plan was updated as part of the development of this conservation plan (Wilson 2023a). The 27 wetlands on the Haugh Family Preserve are primarily palustrine emergent and

scrub shrub wetlands, with some forested wetlands totaling 29.8 acres (Figure 5) (Wilson 2023a). There are a few wetlands with a component of open water habitat. Wetlands range from less than a tenth of an acre to 18 acres in size. The largest and most visible wetland of the Scotia Barrens is known locally as Ten Acre Pond, and its area varies annually depending on groundwater levels. It is as large as 18 acres in recent aerial imagery (see Ten Acre Pond description on page 37). All wetlands on this property were considered isolated depressional wetlands with no known connection to streams and include a mix of natural wetlands and wetlands that are remnants of historical iron ore mining activity.

A Wetland Stewardship Plan was also written for the Gray's Woods Preserve and Park as part of this Conservation Plan. Wilson delineated 18 palustrine wetlands as well as a stormwater management feature that is converting to a wetland. In total, there are 12.6 acres delineated wetlands on the Gray's Woods Preserve and Park (Wilson 2023b) (Figure 6).

The Wetland Stewardship Plans for the Haugh Family Preserve and the Gray's Woods Preserve can be accessed on the Township's website <https://twp.patton.pa.us/281/Wetland-Stewardship-Plans-PDFs>



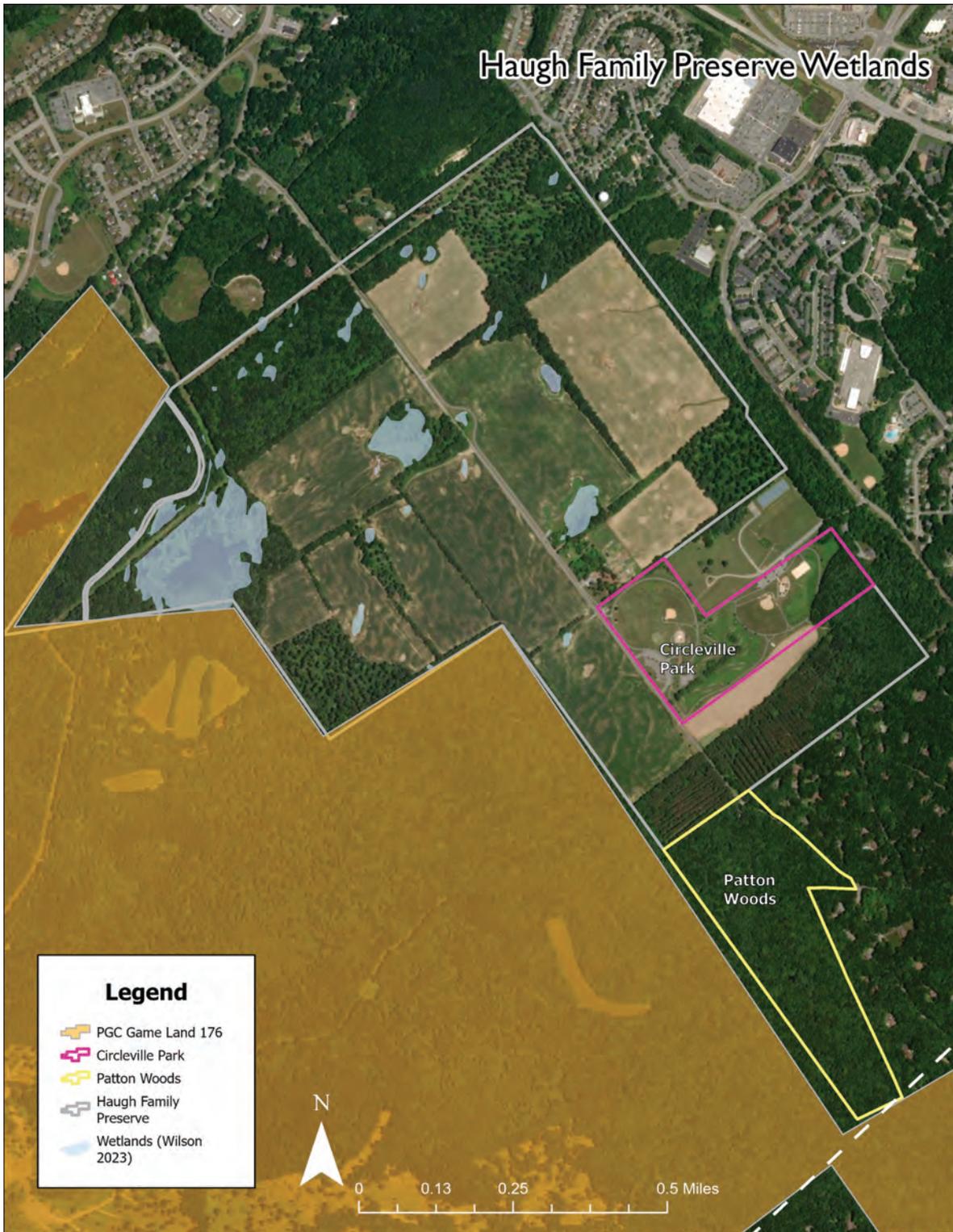


Figure 5. Wetlands of the Haugh Family Preserve, Patton Township, Centre County, Pennsylvania (Wilson 2023a).

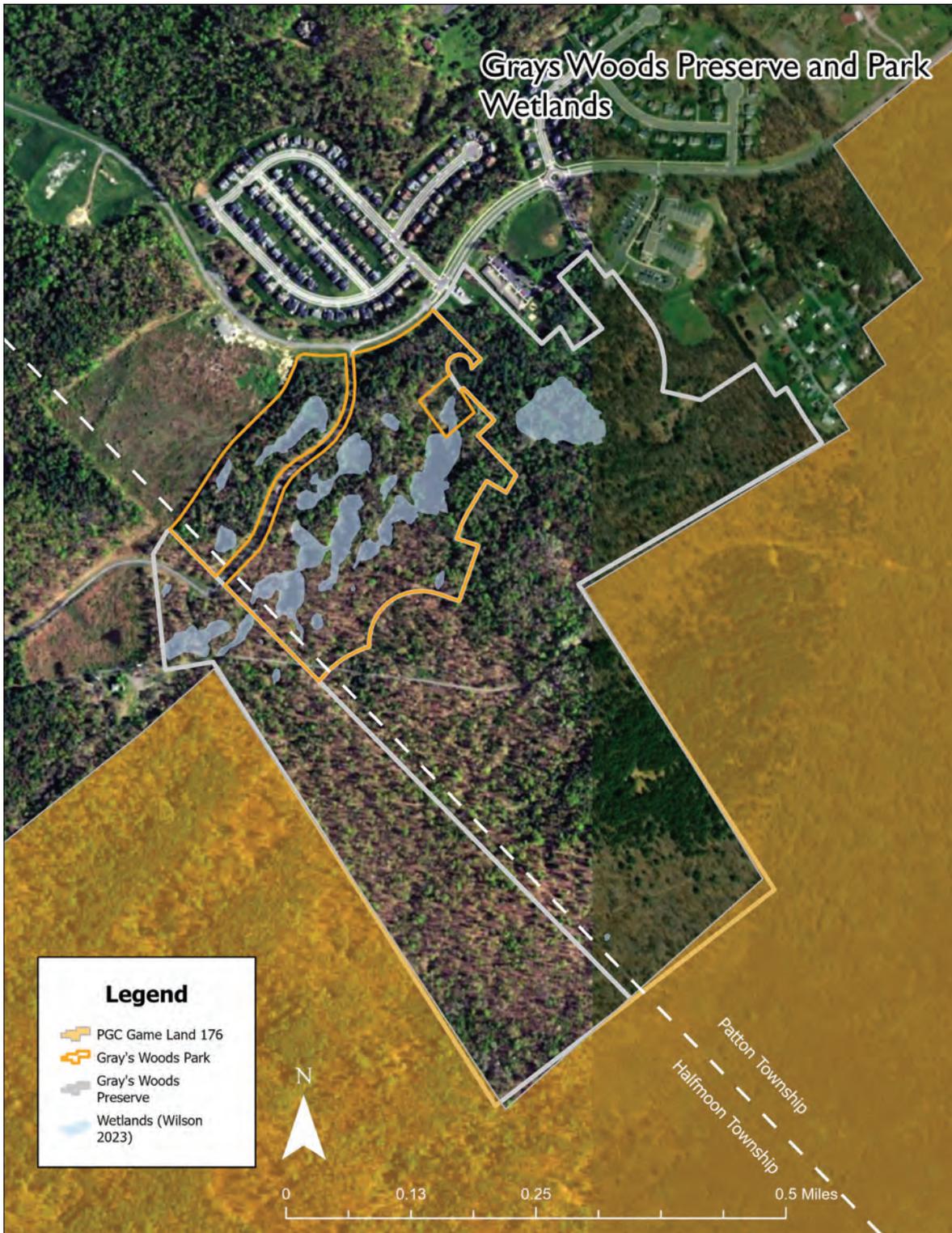
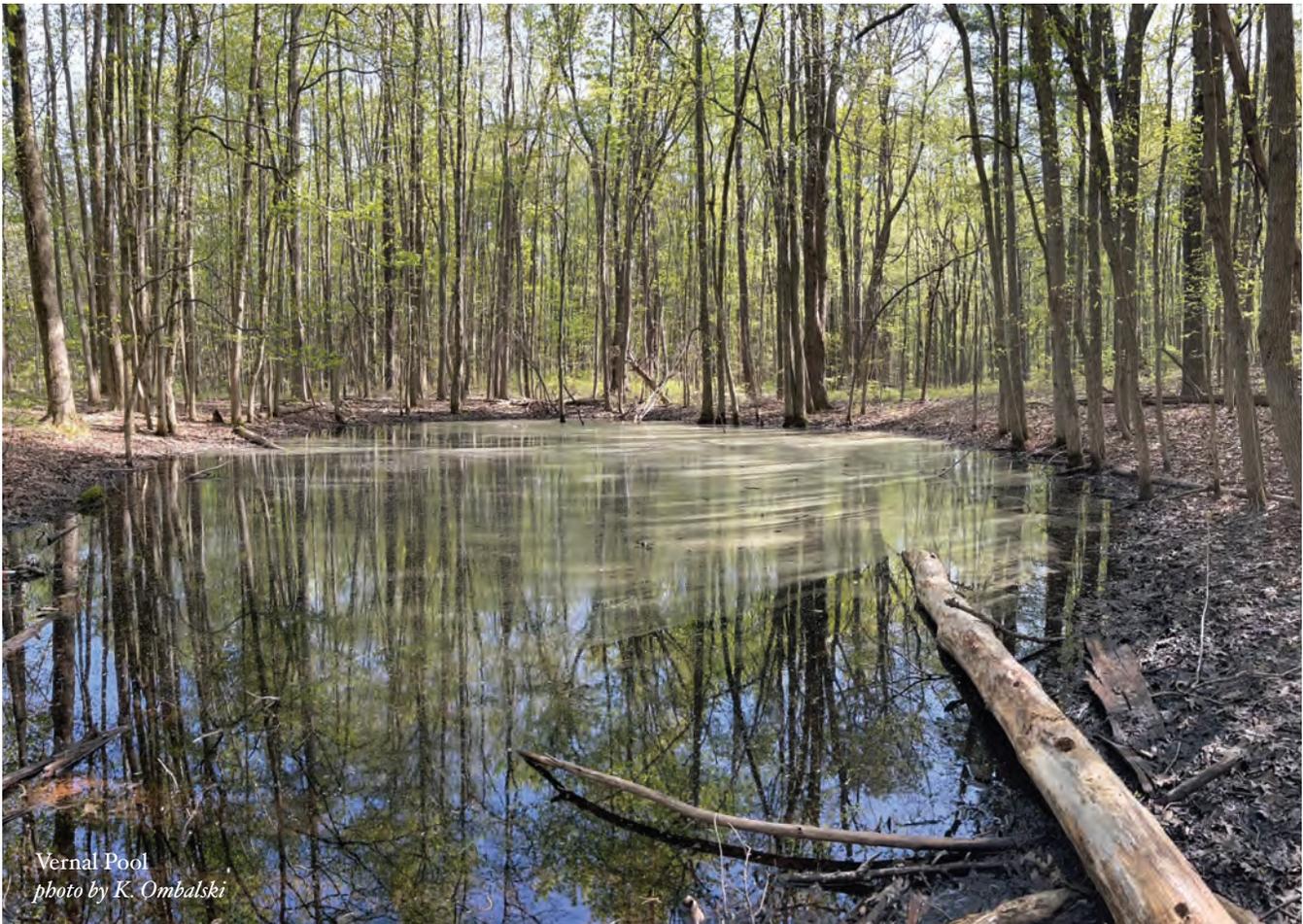


Figure 6. Wetlands of Gray's Woods Preserve, Patton and Halfmoon Townships, Centre County, Pennsylvania (Wilson 2023b).



Wetlands of the Haugh Family preserve range from low quality farm field depressions to extremely high-quality habitats. Most of the wetlands on the Haugh Family Preserve, Gray's Woods Preserve, and Gray's Woods Park are forested vernal pool habitats; however, the wetland types with the greatest acreage are emergent wetland and shrub habitat. There are open water emergent wetlands at both properties. The medium to high-quality wetlands are comprised of a diverse mix of primarily native plant species and provide a variety of ecological functions and human

use values. The wetland habitats of the Haugh Family preserve are protected from development because they are on public lands managed as public open space; however, stewardship actions are needed to improve their quality. While nine wetlands were found to have no invasive plants and were sparsely vegetated vernal pools, several wetlands were found to contain over 10 non-native plant species. These are wetlands surrounded by or close to agricultural fields (Wilson 2023a).

Wetland quality on the Gray's Woods Preserve and Park properties were rated higher overall than those on the Haugh Family Preserve, and most were described as community types most often associated with vernal pool ecosystems. One of these ephemeral wetlands at Gray's Woods supports the rare Northeastern bulrush (*Scirpus ancistrochaetus*), currently a Pennsylvania threatened species (Wilson 2023b). Additionally, the wetlands with open water at the Gray's Woods Preserve, Gray's Woods Park, and Haugh Family Preserve support a diverse assemblage of dragonflies and damselflies (Shiffer and White 1995, 2014, Wilson 2019).



Blue Corporal, male (*Ladona deplanata*)  
photo by Wikimedia Commons



Marbled Salamander (*Ambystoma opacum*)  
photo by Wikimedia Commons

Many of the forested wetlands are breeding habitat for amphibian species and invertebrates. Amphibians live most of the year underground in the moist soil of the surrounding upland forests (also called critical upland habitat) to survive the dry summers and freezing winters. When the snow begins to melt and spring rains begin, adult amphibians emerge from underground and embark in mass migrations to these wetlands to breed. These animals can travel over 1,000 feet through surrounding forested habitat to return each year to the vernal pool where they were born (Brown and Jung 2005). These wetlands are vital breeding habitat for many species because their fluctuating water levels prevent fish from living in these wetlands and eating amphibian larvae (Brown and Jung 2005).



## Species of Concern

The term “Species of Concern” is used by the Pennsylvania Natural Heritage Program to describe unique, rare, or important plant and wildlife species in the context of conservation planning, environmental review, and permitting activities. These include species that are threatened and endangered at the state or federal levels but also common species that are in decline. Jurisdictional agencies (Pennsylvania Department of Conservation and Natural Resources (DCNR), Pennsylvania Fish and Boat Commission (PFBC), and PGC) track declining Species of Concern because they believe that they may be at risk of becoming threatened or endangered without proper management or protection.

The Centre County Natural Heritage Inventory identified 26 Species of Concern within the Scotia Barrens NHA, including 12 plants, 11 invertebrates, and three vertebrates at the time of publishing (Pennsylvania Natural Heritage Program 2002). Information from this Conservation Plan will be used to inform future updates of the Scotia Barrens NHA.

In addition to Species of Concern tracked by the Pennsylvania Natural Heritage Program, there are a 75 (57 Known; 18 Likely) wildlife species that are recognized by state agencies as Species of Greatest Conservation Need (SGCN) and identified in the Pennsylvania State Wildlife Action Plan (SWAP). To be included in the Pennsylvania SWAP, a species must fall within one of these two categories: (1) Imperilment

and (2) Responsibility. Responsibility species are those that Pennsylvania is responsible for  $\geq 10\%$  of the North American population or  $\geq 25\%$  of the North American range (PGC-PFBC 2015). The list of SGCN occurring within the Scotia Barrens region, is found in the Conservation Opportunity Area (COA) Report (Appendix G).

The following is a summary of the Species of Concern and SGCN known to occur in the Scotia Barrens region. Habitat management recommendations provided in this Conservation Plan were informed by the needs of these species and are also consistent with Patton Township's Management Goals (Appendix H). Future recreational development of the Haugh Family and Gray's Woods Preserves should also take the habitat needs of Species of Concern and SGCN.



### **Conservation Status Designations from the Pennsylvania Natural Heritage Program**

**Global Rank:** Global Rank Conservation status ranks are based on a NatureServe standardized one to five scale, ranging from critically imperiled (G1) to demonstrably secure (G5).

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**State Rank:** State Rank Conservation status ranks are based on a NatureServe standardized one to five scale, ranging from critically imperiled (S1) to demonstrably secure (S5).

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**PA Legal Status:** State Status is defined by the following regulatory authorities: Plants: Title 17 Chapter 45, Conservation of Native Wild Plants, January 1, 1988; DCNR; Mammals and Birds: Title 34 Chapter 133, Game and Wildlife Code, revised Dec. 1, 1990, PGC; and Fish, Reptiles, Amphibians, And Aquatic Invertebrates: Title 30, Chapter 75, Fish and Boat Code, revised February 9, 1991; PFBC. Status classifications include Pennsylvania endangered, threatened, rare, extirpated, vulnerable, undetermined or No legal status.

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**Federal Legal Status:** Federal Status refers to species receiving, or deemed eligible to receive, federal protection under the Endangered Species Act of 1973. The two categories of federal status include Endangered for a species that is in danger of extinction throughout all or a significant portion of its range and Threatened for a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

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For a detailed explanation of rank and status codes and legal definitions, see the Pennsylvania Natural Heritage Rank and Status Definitions page: [naturalheritage.state.pa.us/rank.aspx](http://naturalheritage.state.pa.us/rank.aspx)

## Plants

In Pennsylvania, ownership and management of rare plants is the responsibility of the landowner. Thus, the entities that own properties within the Scotia Barrens region, including Patton Township, have the ability and responsibility to carry out management activities that benefit these species.

There are 12 species of plants listed by DCNR as plant Species of Concern within the Scotia Barrens NHA (Table 1), many of these require naturally open canopies characteristic of the Pitch Pine – Scrub Oak Barrens ecosystem, from which the conservation area gets its name. Additionally, the ephemeral wetlands, also known as vernal pools, along with Ten Acre Pond support rare wetland and aquatic plants, including the Northeastern bulrush, a plant that was until recently considered Threatened by U.S. Fish and Wildlife service (USFWS) because of its limited distribution in the eastern United States. Northeastern bulrush was delisted by USFWS in 2022 but is still considered a Pennsylvania Species of Concern.



**Table 1. Plant Species of Concern within the Scotia Barrens NHA (Pennsylvania Natural Heritage Program 2002).**

Species or Natural Community Name	Global Rank	State Rank	PA Legal Status
Roundleaf serviceberry ( <i>Amelanchier sanguinea</i> )	G5	S1	TU
Brome grass ( <i>Bromus kalmii</i> )	G5	S3	PT
Few-seeded sedge ( <i>Carex oligosperma</i> )	G4	S2	PT
Weak rush ( <i>Juncus debilis</i> )	G5	S3	PT
Round-head Gayfeather ( <i>Liatris scariosa</i> )	G5?	S2	PT
Hoary puccoon ( <i>Lithospermum canescens</i> )	G5	S2	PT
Lupine ( <i>Lupinus perennis</i> )	G5	S3	PR
Drooping bluegrass ( <i>Poa languida</i> )	G3G4	S2	TU
Oake's pondweed ( <i>Potamogeton oakesianus</i> )	G4	S1S2	TU
Allegheny plum ( <i>Prunus allegheniensis</i> )	G4	S2S3	PT
Sand cherry ( <i>Prunus pumila var susquehanae</i> )	G5T4	S2	PT
Northeastern bulrush ( <i>Scirpus ancistrochaetus</i> )	G3	S3	PE

## Birds

Gray's Woods and Haugh Family Preserves are within the Barrens at Scotia Important Bird Area (IBA). The IBA program, which is a global initiative of BirdLife International and Audubon, is an effort to identify and conserve areas that are vital to the conservation of birds and other biodiversity. Similar to the NHA, SGL 176 and adjacent properties, including portions of the Haugh Family and Gray's Woods Preserves, were designated as an IBA because of their significance to Neotropical migrants during spring and fall migration. At least 33 species of warblers alone have been observed during migratory and breeding seasons (Pennsylvania Audubon Society 1999). The Barrens at Scotia IBA is in close proximity and between two other local IBAs – the Rothrock State Forest/Greater Tussey Mountain IBA to the south and the Bald Eagle Ridge IBA to the north.



Scarlet Tanager (*Piranga olivacea*)  
photo by D. Whiteman



Lesser Scaup (*Aythya affinis*)  
photo by D. Whiteman



Wood Thrush (*Hylocichla mustelina*)  
photo by D. Whiteman

Among the 75 SGCN identified and reported as being “known” or “likely” to occur in the Scotia Barrens region by the COA (Appendix EG), there are 5 bird species considered to be globally or regionally significant. These include Cerulean Warbler (*Setophaga cerulea*) and Golden-winged Warbler, that are associated with mature and early successional forests, respectively, and American Bittern (*Botaurus lentiginosus*), Lesser Scaup (*Aythya affinis*), and Long-tailed Duck (*Clangula hyemalis*) that are associated with wetlands and have been documented at Ten Acre Pond. The additional 37 species of birds are also identified as SGCN for which conservation actions are needed so that their populations do not further decline (Table 2).

**Table 2. Bird Species of Greatest Conservation Need (SGCN) in the Scotia Barrens Region (PGC-PFBC 2015).**

Common Name	Scientific Name	SGCN Season	Global Rank	State Rank	PA Legal Status	Federal Status	SWAP Priority Category**
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Migration	G5	S3B,S4N,S5M	-	-	2
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	Breeding, Migration	G5	S3B,S4N,S3M	-	-	2,3
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Breeding	G5	S3B,S3M	-	-	2
American Black Duck	<i>Anas rubripes</i>	Migration	G5	S3B,S4N,S3M	-	-	2
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	Breeding	G5	S3B,S3M	-	-	2
Golden Eagle	<i>Aquila chrysaetos</i>	Migration	G5	S5N,S4M	-	-	2
Lesser Scaup	<i>Aythya affinis</i>	Migration	G5	S3N,S5M	-	-	1, 3
Ruffed Grouse	<i>Bonasa umbellus</i>	Breeding, Wintering	G5	S4B,S3N	-	-	2
American Bittern	<i>Botaurus lentiginosus</i>	Breeding	G5	S2B,S3M	PE	-	1,3
Broad-winged Hawk	<i>Buteo platypterus</i>	Breeding, Migration	G5	S4B,S5M	-	-	2
Canada Warbler	<i>Cardellina canadensis</i>	Breeding	G5	S4B,S4M	-	-	2
Brown Creeper	<i>Certhia americana</i>	Breeding	G5	S4	-	-	2
Chimney Swift	<i>Chaetura pelagica</i>	Breeding	G4G5	S3B,S5M	-	-	2
Long-tailed Duck	<i>Clangula hyemalis</i>	Migration	G5	S4N,S4M	-	-	1
Tundra Swan	<i>Cygnus columbianus</i>	Migration	G5	S4N,S3M	-	-	2
Bobolink	<i>Dolichonyx oryzivorus</i>	Breeding	G5	S4B,S3M	-	-	2
Gray Catbird	<i>Dumetella carolinensis</i>	Breeding	G5	S5B	-	-	2
Willow Flycatcher	<i>Empidonax traillii</i>	Breeding	G5	S4B,S5M	-	-	2
Rusty Blackbird	<i>Euphagus carolinus</i>	Migration	G4	S5N,S3M	-	-	2
American Kestrel	<i>Falco sparverius</i>	Breeding	G5	S4B,S4N,S4M	-	-	2
Common Gallinule	<i>Gallinula galeata</i>	Breeding	G5	S2B,S2M	-	-	3
Kentucky Warbler	<i>Geothlypis formosa</i>	Breeding	G5	S4B,S3M	-	-	2
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Wintering	G5	S4B,S5N,S4M	-	-	3
Wood Thrush	<i>Hylocichla mustelina</i>	Breeding, Migration	G4	S4B,S4M	-	-	2

**Table 2 continued. Bird Species of Greatest Conservation Need (SGCN) in the Scotia Barrens Region (PGC-PFBC 2015).**

Common Name	Scientific Name	SGCN Season	Global Rank	State Rank	PA Legal Status	Federal Status	SWAP Priority Category**
Yellow-breasted Chat	<i>Icteria virens</i>	Breeding	G5	S2B,S4M	-	-	3
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Breeding	G5	S4B,S4N	-	-	2
Black-and-white Warbler	<i>Mniotilta varia</i>	Breeding	G5	S4B,S4M	-	-	2
Louisiana Waterthrush	<i>Parkesia motacilla</i>	Breeding	G5	S4B,S3M	-	-	2
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Breeding	G5	S3B	-	-	2
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	Migration	G5	S5B,S4N,S4M	-	-	2
Scarlet Tanager	<i>Piranga olivacea</i>	Breeding	G5	S4B,S4M	-	-	2
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Breeding	G5	S2B,S4N,S4M	-	-	3
Sora	<i>Porzana carolina</i>	Breeding	G5	S3B,S3M	-	-	2
American Woodcock	<i>Scolopax minor</i>	Breeding	G5	S4B,S3N,S3M	-	-	2
Cerulean Warbler	<i>Setophaga cerulea</i>	Migration	G4	S3B,S4M	-	-	1
Hooded Warbler	<i>Setophaga citrina</i>	Migration	G5	S5B,S4M	-	-	2
Prairie Warbler	<i>Setophaga discolor</i>	Breeding	G5	S3B,S4M	-	-	2
Blackburnian Warbler	<i>Setophaga fusca</i>	Migration	G5	S4B,S4M	-	-	2
Black-throated Green Warbler	<i>Setophaga virens</i>	Breeding	G5	S3B,S4M	-	-	2
Field Sparrow	<i>Spizella pusilla</i>	Breeding	G5	S3B,S3N,S4M	-	-	2
Winter Wren	<i>Troglodytes hiemalis</i>	Breeding	G5	S4B,S4N,S4M	-	-	2
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Breeding	G4	S2B,S3M	-	-	1, 3
Blue-winged Warbler	<i>Vermivora cyanoptera</i>	Breeding	G5	S4B,S4M	-	-	2

\* B = Breeding, N = Non-breeding, M = Migrant

\*\* SWAP Priority Category

1 = Contribute to the conservation of globally or regionally important species.

Focused attention on these species will contribute to range-wide conservation of the species.

2 = Maintain rare native species.

Conservation actions benefiting these species will increase the likelihood of sustaining them in Pennsylvania.

3 = Reduce knowledge gaps to better assess conservation status of species.

More information on the distribution of these species is needed to evaluate their security in the state.

## Mammals

Two mammalian SGCN are included in the COA report for the Scotia Barrens region. These are the northern long-eared bat (*Myotis septentrionalis*) and the Appalachian cottontail. It is important to note that the COA (Appendix G) report is based on the 2015 SWAP that was published before several other bat species were added to the Pennsylvania endangered species list due to precipitous population declines caused by white nose syndrome that was introduced to North America in 2008.

### Bats

Several species of bats, including little brown bat (*Myotis lucifugus*), tricolored bat (*Perimyotis subflavus*), and northern long-eared bat were added to the Pennsylvania list of endangered species in 2019 by the PGC. USFWS is currently reviewing little brown bat for federal listing under the Endangered Species Act and has proposed to list the tricolored bat as endangered in September 2022. Northern long-eared bat was federally listed as endangered under the U.S. Endangered Species Act in 2022 (Table 3).

The forests and nearby limestone caves found in Centre and Huntingdon counties provide important foraging and roosting habitat for many local and

migrating bat populations. Of note is the SGL 176 forest management strategy that has resulted in a mosaic of early successional forest patches, which in combination with prescribed fire, creates preferred foraging and roosting habitat for many bats. These management strategies result in increased solar warming during important times of the year for bats. These strategies also create diverse herbaceous plant communities that support diverse insect communities for foraging bats (G. Turner, Pennsylvania Game Commission, personal communication).

While formal bat surveys have not been conducted on the Haugh Family Preserve, Gray's Woods Preserve, or SGL 176, it is likely that these Open Space properties provide important roosting and foraging habitat for local bat populations that will only be enhanced as forest health of these properties improves through time. Guidelines established by the USFWS should be followed during all forest management activities to minimize impacts to bats.

### Other Mammals

An inventory of the Haugh Family Preserve identified 16 small mammal species; however, none of them are considered rare or SGCN (Wilson 2010b). The Appalachian cottontail, not known to specifically

**Table 3. Conservation status of resident bat species of Pennsylvania. All of these species are known to occur in Centre County (G. Turner, Pennsylvania Game Commission, personal communication).**

Migratory Bats	Cave/Hibernating Bats	Global Rank	State Rank	PA Legal Status	Federal Status
Hoary bat		G3G4	S4	-	-
Red bat		G3G4	S4	-	-
Silver-Haired bat		G3G4	S1	-	-
	Little brown bat	G3G4	S1	Endangered	Under review
	Eastern Small-footed bat	G4	S2	Threatened	-
	Northern long-eared bat	G2G3	S1	Endangered	Endangered
	Indiana bat	G2	S1	Endangered	Endangered
	Tricolored bat	G3G4	S1	Endangered	Proposed endangered as of 9/2022
	Big brown bat	G5	S4	-	-

occur on either the Haugh Family Preserve or Gray's Woods Preserve, is identified as a SGCN mammal in the COA report for the Scotia region (Appendix G) and is one of the Species of Concern in the 2002 Centre County Natural Heritage Inventory (Pennsylvania Natural Heritage Program 2002). It is considered an S1/S2 species by the Pennsylvania Natural Heritage Program and closely associated with scrub/shrub habitats interspersed with grassy openings, such as the Pitch Pine – Scrub Oak early successional habitat found within the Scotia Barrens NHA. No known mammalian surveys have been conducted for Gray's Woods Preserve.

## *Invertebrates*

### **Butterflies and Moths**

Pennsylvania has a wide diversity of butterfly and moth species (Order Lepidoptera) including 155 species of butterflies and over 2,172 species of moths. As caterpillars, Lepidoptera are particularly important to songbirds that require an abundance of small, soft, protein-rich caterpillars to feed their young. An estimated 96% of songbirds in North America rear their young on invertebrates (Dickinson 1999). As adults, Lepidoptera contribute to pollination, while continuing to be an important food source for birds. Moths are especially popular with night-time hunters like Eastern whip-poor-will, common nighthawk (*Chordeiles minor*), and screech owl (*Megascops asio*).

The Lepidoptera of Scotia Barrens have proven to be exceptionally diverse. To date, 54 species of butterflies have been documented at Scotia Barrens, four of which are SGCN (PGC-PFBC 2015), including the Baltimore checkerspot butterfly (*Euphydryas phaeton* G4, S3) (Figure 7) and buck moth (*Hemileuca maia*, G5 S2) (Figure 8) (Table 4). Of note, a rare species of butterfly documented in the Scotia region is the frosted elfin, which was listed as a SGCN in Pennsylvania's SWAP (PGC-PFBC 2015) and is a Regional Species of Greatest Conservation Need according to the Northeast Regional Conservation Synthesis for 2025 State Wildlife Action Plans (Terwilliger Consulting, Inc. and the Northeast Fish and Wildlife Diversity Technical Committee 2023) (Figure 9). Additionally, the USFWS is currently assessing the conservation status of frosted elfin to determine if federal protection under the Endangered Species Act may be warranted (decision to be made in 2025).

An impressive 836 moth species have also been documented at Scotia Barrens to date (Wilson 2017a, 2019, Pennsylvania Natural Heritage Program 2023, Heilferty et al. 2023). Of these, 17 are currently considered SGCN in the 2015 SWAP (Table 4), and 51 more are slated for review for the 2025 SWAP update because they are potential Species of Concern (B. Leppo, Western Pennsylvania Conservancy Natural Heritage Program, personal communication).



Figure 7. The Baltimore checkerspot (*Euphydryas phaeton* G4, S3) is a butterfly of wetland habitats whose caterpillars feed primarily on white turtlehead (*Chelone glabra*).

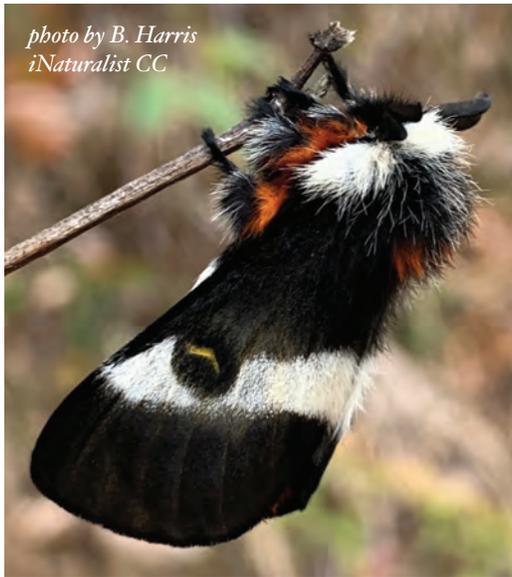


Figure 8. Adult buck moths (*Hemileuca maia*, G5 S2) fly during the daytime at Scotia barrens during the fall deer hunting season. Their spiny caterpillars can be found feeding on their host plant, scrub oak (*Quercus ilicifolia*) in the spring and summer.

Figure 9. Frosted elfin butterfly (*Callophrys irus*)

**Table 4. Pennsylvania rare and SGCN butterflies and moths of Scotia Barrens and their known host plants (PGC-PFBC 2015).**

BUTTERFLIES					
Family	Scientific Name	Common Name	Global Rank	State Rank	Host Plants
Lycaenidae	<i>Callophrys irus</i>	Frosted Elfin	G3	S1	Yellow wild indigo ( <i>Baptisia tinctoria</i> ) in PA
Hesperiidae	<i>Danaus plexippus</i>	Monarch	G4	S3	Milkweeds ( <i>Asclepias</i> )
Hesperiidae	<i>Erynnis persius persius</i>	Persius Duskywing	G5***	S1/S2	Yellow wild indigo ( <i>Baptisia tinctoria</i> ) in PA
Nymphalidae	<i>Euphydryas phaeton</i>	Baltimore Checkerspot	G4	S3	White turtlehead ( <i>Chelone glabra</i> ) is the primary food plant used by young caterpillars in PA. Older caterpillars may become polyphagous.
MOTHS					
Family	Scientific Name	Common Name	Global Rank	State Rank	Host Plants
Noctuidae	<i>Acronicta facula</i>	Corylus Dagger	G3	SNR*	Hazelnuts ( <i>Corylus americana</i> and <i>C. cornuta</i> )
Saturniidae	<i>Anisota stigma</i>	Spiny Oakworm	G5	S3?	Oaks, including scrub oak ( <i>Quercus ilicifolia</i> ); also reported from hazel ( <i>Corylus</i> ) and basswood ( <i>Tilia</i> ).

**Table 4 continued. Pennsylvania rare and SGCN butterflies and moths of Scotia Barrens and their known host plants (PGC-PFBC 2015).**

MOTHS					
Family	Scientific Name	Common Name	Global Rank	State Rank	Host Plants
Noctuidae	<i>Bagisara rectifascia</i>	Straight Lined Mallow	G4	S2	Hazelnuts ( <i>Corylus americana</i> and <i>C. cornuta</i> )
Mimallodidae	<i>Cicinnus melsheimeri</i>	Melsheimer's Sack Bearer	G4	S3	Oaks, especially scrub oak ( <i>Quercus ilicifolia</i> ) northward.
Erebidae	<i>Cisthene packardii</i>	Packard's Lichen Moth	G5	S3	Probably lichens, bark algae, and cyanobacteria
Geometridae	<i>Heliomata infulata</i>	Rare Spring Moth	G3	S3	Locusts ( <i>Robinia</i> ). Bristly locust ( <i>R. hispida</i> ) and clammy locust ( <i>R. viscosa</i> ) are cited as hosts. Both are adventive and not widespread in PA. Bristly locust has been reported from central PA. Black locust ( <i>R. pseudoacacia</i> ) is not thought to be the typical host plant.
Saturniidae	<i>Hemileuca maia</i>	Eastern Buckmoth	G5	S2	Oaks ( <i>Quercus</i> ), with a preference for scrub oak ( <i>Quercus ilicifolia</i> ).
Geometridae	<i>Hypagyrtis esther</i>	Esther Moth	G5	S3	Pines including white ( <i>Pinus strobus</i> ) and Virginia ( <i>Pinus virginiana</i> )
Geometridae	<i>Metarranthis sp. nr duaria</i>	Early Metarranthis	GNR	S3	Caterpillar host plant unknown
Noctuidae	<i>Neoligia semicana</i>	Northern Brocade	G3	S1	Native caterpillar host plant not known but expected to be a species of grass and/or sedge.
Crambidae	<i>Palpita magniferalis</i>	Splendid Palpita	GNR	S1?	Ash trees ( <i>Fraxinus</i> sp.).
Noctuidae	<i>Papaipema baptisiae</i>	Indigo Stem Borer	G4	S3	Yellow wild indigo ( <i>Baptisia tinctoria</i> ) or dogbane ( <i>Apocynum cannabinum</i> ).
Noctuidae	<i>Papaipema eupatorii</i>	Joe-Pye Weed Borer	G4	S3	Joe-pye weed ( <i>Eupatorium</i> sp.), particularly sweet joe-pye ( <i>Eupatorium purpureum</i> )
Noctuidae	<i>Papaipema nelita</i>	Coneflower Borer	G4	S3?	Native host plant is tall coneflower ( <i>Rudbeckia laciniata</i> ), but caterpillars also use common burdock ( <i>Arctium minus</i> ).
Erebidae	<i>Phoberia ingenua</i>	Uncommon Oak Moth	G3	S2	Scrub oak ( <i>Quercus ilicifolia</i> )
Geometridae	<i>Plagodis kuetzingi</i>	Purple Plagodis	G5	S1?	Ash trees ( <i>Fraxinus</i> sp.).
Noctuidae	<i>Xestia elimata</i>	Southern Variable Dart	G5	S3	Caterpillars feed on mature needles of pines, especially pitch pine ( <i>Pinus rigida</i> ) in PA
Erebidae	<i>Zale lunifera</i>	Pine Barrens Zale	G3	S2	Scrub oak ( <i>Quercus ilicifolia</i> )

\*SNR – State status is not ranked yet.

\*\*GNR – Not ranked at the global level.

\*\*\**Persius duskywing* subspecies is considered *vulnerable*

## Bees

Bees (Order Hymenoptera) are an especially important group of pollinators, because they are very efficient at pollination. Honey bees are the most familiar, but there are at least 437 species of bees found in Pennsylvania, and they contribute to pollinating all the plants in our natural areas, gardens, and agricultural crops (Kilpatrick et al. 2020).

The *Xeric Habitats Conservation Project* study conducted by the Pennsylvania Natural Heritage Program and funded by the Pennsylvania Department of Agriculture and the Northeast Regional Conservation Needs Grant Program, was completed

in 2023 (Heilferty et al. 2023). As part of this project, several survey sites were located on the Haugh Family Preserve and SGL 176. The study documented 100 bee species including five state records of bees that had not previously been known to occur in Pennsylvania, such as a miner bee (*Panurginus potentillae*) (Figure 10) and 11 county records of bees that had not previously been documented for Centre County (Table 5). Notable findings include two globally vulnerable bees, eleven specialist bees that require the pollen or oils provided by certain plant species, and six parasitic bees that require populations of their host bee (Table 5).



Figure 10. *Panurginus potentillae* is a solitary bee in the miner bee family (Andrenidae) that specializes on dwarf cinquefoil (*Potentilla canadensis*). It was newly documented for Pennsylvania during the *Xeric Habitats Conservation Project* (Heilferty et al. 2023). Andrenidae bees nest in the soil, digging their own burrows where they lay eggs and provision food for their offspring.

**Table 5. Notable bees of the Scotia Barrens.**

BEES					
Family	Scientific Name	Common Name	Global Rank	State Rank	Notes
Apidae	<i>Bombus terricola</i>	Yellow-banded Bumble Bee	G3G4	SNR	globally vulnerable
Apidae	<i>Bombus fervidus</i>	Great Northern Bumble Bee	G3G4	SNR	globally vulnerable
Apidae	<i>Epeolus scutellaris</i>	Red-chested Cuckoo Nomad Bee	GNR	SNR	A nest parasite of <i>Colletes</i>
Apidae	<i>Melissodes desponsus</i>	Thistle Long-horned Bee	GNR	SNR	specialist on flowers in the aster family (Asteraceae), including thistles ( <i>Cirsium</i> )
Apidae	<i>Melissodes subillatus</i>	Vigorous Long-horned Bee	GNR	SNR	specialist on flowers in the aster family (Asteraceae)
Andrenidae	<i>Andrena nubecula</i>	Cloudy-winged Miner Bee	GNR	SNR	specialist on goldenrods ( <i>Solidago</i> ) and asters ( <i>Symphyotrichum</i> )
Andrenidae	<i>Andrena ziziaeformis</i>	an andrenid bee	GNR	SNR	specialist on cinquefoils ( <i>Potentilla</i> ) and barrens strawberries ( <i>Waldstenia</i> )
Andrenidae	<i>Panurginus potentillae</i>	a miner bee	GNR	SNR	specialist on cinquefoils ( <i>Potentilla</i> ), and new state record (Figure X)
Colletidae	<i>Colletes solidaginis</i>	Goldenrod Plasterer Bee	GNR	SNR	specialist on goldenrods ( <i>Solidago</i> ), and new state record
Halictidae	<i>Lasioglossum nelumbonis</i>	Water-lily Sweat Bee	GNR	SNR	a wetland specialist, may be linked to water lilies (Nymphaeaceae)
Halictidae	<i>Lasioglossum wheeleri</i>	a metallic sweat bee	GNR	SNR	new state record
Halictidae	<i>Sphecodes fattigi</i>	a sweat bee	GNR	SNR	new state record, a nest parasite of <i>Halictus</i> and occasionally <i>Andrena</i>
Halictidae	<i>Sphecodes johnsonii</i>	Johnson's Cuckoo Sweat Bee	GNR	SNR	new state record, a nest parasite of <i>Halictus</i> and occasionally <i>Andrena</i>
Halictidae	<i>Sphecodes mandibularis</i>	Red-toothed Cuckoo Sweat Bee	GNR	SNR	a nest parasite, host(s) undocumented
Halictidae	<i>Sphecodes near minor</i>	A sweat bee	GNR	SNR	a nest parasite, host(s) undocumented
Megachilidae	<i>Megachile pugnata</i>	Pugnacious Leafcutter Bee	G5	SNR	specialist on flowers in the aster family (Asteraceae), including sunflowers ( <i>Helianthus</i> )
Megachilidae	<i>Osmia virga</i>	Twig Mason Bee	G5	SNR	specialist on blueberries ( <i>Vaccinium</i> )
Megachilidae	<i>Stelis louisae</i>	Louisiana Cuckoo Carder Bee	GNR	SNR	A nest parasite of the bellflower resin bee ( <i>Megachile campanulae</i> )
Melittidae	<i>Macropis ciliata</i>	Fringed Loosestrife Oil-collecting Bee	GNR	SNR	specialist on loosestrifes ( <i>Lysimachia</i> )

## Tiger Beetles

Tiger beetles (Order Coleoptera) are day-active ground beetles that often have attractive markings and iridescent colors on their wings. They prey on smaller insects and other invertebrates as adults and larvae. In the larval stage, tiger beetles dig pits to capture small invertebrates who fall into their traps and cannot climb out. Adult tiger beetles have big eyes to see their prey, and long legs that help them run rapidly across the ground to catch their prey with their formidable mandibles. To hunt successfully, they require open substrates at ground level with light to sparse vegetation. Many species are adapted to specific substrates (such as sand, clay, or cobblestones) exposed by natural disturbances.

Four species of tiger beetles are known to be currently present on Patton Township properties (Table 6) (Wilson 2019, 2020). These four species are all ranked as “globally secure”, and range from “secure” (S5) to “apparently secure” (S4) at the state level by the Pennsylvania Natural Heritage Program (2023).

These species include the eastern red-bellied tiger beetle, oblique-lined tiger beetle, punctured tiger beetle, and six-spotted tiger beetle, which are all ranked “secure” (S5) or “apparently secure” (S4). The eastern red-bellied and oblique-lined tiger beetles were once tracked by the Pennsylvania Natural Heritage Program as Species of Concern with state ranks that straddled the divide between ‘S3 - vulnerable’ and ‘S4 - apparently secure’. However, during the 2015 SWAP revision, these species were reassessed and newly verified populations across the state indicated that these species were more secure than previously thought.

A fifth species of tiger beetle, the eastern big sand tiger beetle (*Cicindela formosa generosa*) is known historically from the Gray’s Woods Preserve and is ranked as critically imperiled (S1) in Pennsylvania (Figure 11). It is also ranked vulnerable (S3) in Ohio, imperiled (S2) in Virginia, and critically imperiled (S1) in West Virginia (NatureServe 2023). Adult eastern big sand tiger beetles were seen in the fall of 1985 and 1988 in open sand at the edge of ATV trails near

**Table 6. Tiger beetles of the Scotia Barrens.**

TIGER BEETLES					
Family	Scientific Name	Common Name	Global Rank	State Rank	Notes
Carabidae	<i>Cicindela rufiventris</i>	Eastern Red-bellied Tiger Beetle	G5	S4S5	Extant
Carabidae	<i>Cicindela tranquebarica</i>	Oblique-lined Tiger Beetle	G5	S4	Extant
Carabidae	<i>Cicindela punctulata</i>	Punctured Tiger Beetle	G5	S5	Extant
Carabidae	<i>Cicindela sexguttata</i>	Six-spotted Tiger Beetle	G5	S5	Extant
Carabidae	<i>Cicindela formosa generosa</i>	Eastern Big Sand Tiger Beetle	G5	S1	Historical record from open sandy habitats on the Gray’s Woods property, last observed by Western Pennsylvania Conservancy staff between 1985 and 1988.



Figure 11. An adult eastern big sand tiger beetle (*Cicindela formosa generosa*)

Marysville (Pennsylvania Natural Heritage Program 2023). The surrounding habitat was described as a ‘five-acre sandy soil woodland’ with ‘herbaceous wild indigo openings among stunted trees and shrubs. The survey area was not precisely mapped, but the vegetation in this area has grown significantly since the 1980s. The eastern big sand tiger beetle has been searched for several times in recent years but without success (Wilson 2019, 2020b; B. Leppo, Western Pennsylvania Conservancy Natural Heritage Program, personal communication.). The clay pit on Gray’s Woods Preserve, and a sand pit on private property adjacent to the Haugh Family Preserve are two habitats in the vicinity that may still be able to support this species (Figure 12 and Figure 13).



Figure 12. Gray’s Woods Preserve clay pit near Marysville. This area is potential habitat for the eastern big sand tiger beetle (*Cicindela formosa generosa*) and other regional rarities like the northern barrens tiger beetle (*Cicindela patruela*).

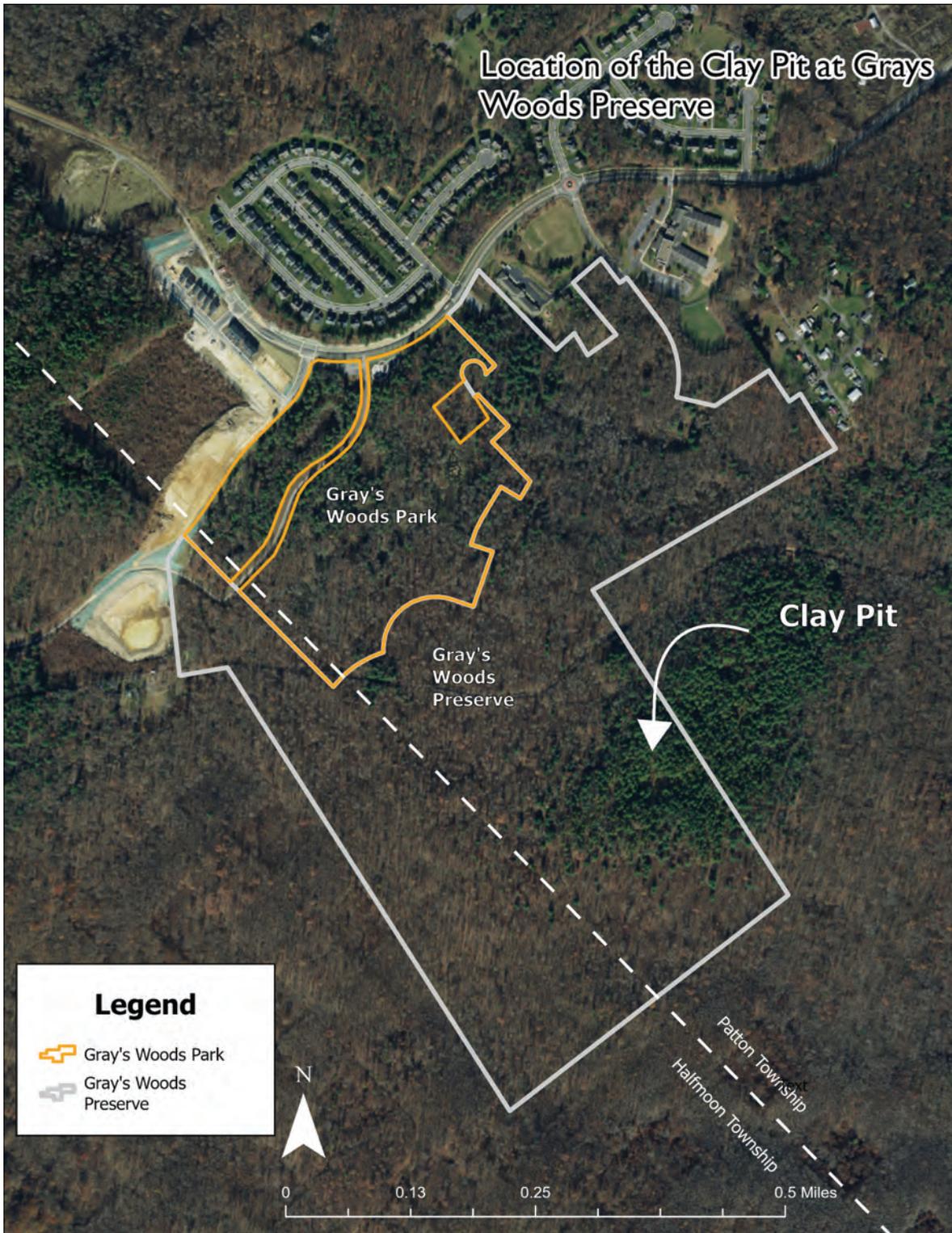


Figure 13. Location of Gray's Woods Preserve clay pit near Marysville.

### *Dragonflies and Damselflies*

There are 175 species of dragonflies and damselflies (Order Odonata) known to occur in Pennsylvania. Collectively called “odonates,” 127 species of dragonflies and damselflies have been documented for Centre County (Abbott 2023). Of these, 87 species are known to occur in wetlands located on the Haugh Family and Gray’s Woods Preserves. This list is primarily composed of the species documented in a remarkable 50+ year study of the odonates of

Ten Acre Pond and published in the Northeastern Naturalist (Shiffer and White 1995). A natural resource inventory of the wetlands in Gray’s Woods Preserve and Park documented 23 odonate species all of which also occur at Ten Acre Pond (Wilson 2019). These studies have documented 15 dragonfly and 4 damselfly Species of Concern including the Spatterdock Darner (Figure 14) (Table 7).

**Table 7. Pennsylvania SGCN dragonflies and damselflies of Ten Acre Pond (Haugh Family Preserve) and Gray’s Woods Preserve (Shiffer and White 1995, 2014, Wilson 2019).**

DRAGONFLIES						
Family	Scientific Name	Common Name	Global Rank	State Rank	Ten Acre Pond	Gray’s Woods Wetlands
Aeshnidae	<i>Aeshna constricta</i>	Lance-tipped Darner	G5	S3S4	Y	-
Aeshnidae	<i>Anax longipes</i>	Comet Darner	G5	S2S3	Y	-
Corduliidae	<i>Cordulia shurtleffii</i>	American Emerald	G5	S3S4	Y	-
Libellulidae	<i>Erythrodiplax minuscula</i>	Little Blue Dragonlet	G5	SH	Y	-
Libellulidae	<i>Ladona deplanata</i>	Blue Corporal	G5	S3S4	Y	-
Libellulidae	<i>Leucorrhinia glacialis</i>	Crimson-ringed Whiteface	G5	S3S4	Y	-
Libellulidae	<i>Leucorrhinia proxima</i>	Belted Whiteface	G5	S2S3	Y	-
Libellulidae	<i>Libellula auripennis</i>	Golden-winged Skimmer	G5	S2S3	Y	-
Libellulidae	<i>Libellula axilena</i>	Bar-winged Skimmer	G5	S1S2	Y	-
Gomphidae	<i>Phanogomphus borealis</i>	Beaverpond Clubtail	G5	S3	Y	-
Aeshnidae	<i>Rhionaeschna mutata</i>	Spatterdock Darner	G4	S3	Y	Y
Corduliidae	<i>Somatochlora elongata</i>	Ski-tailed Emerald	G5	S3S4	Y	-
Corduliidae	<i>Somatochlora linearis</i>	Mocha Emerald	G5	S2S3	Y	-
Libellulidae	<i>Sympetrum ambiguum</i>	Blue-faced Meadowhawk	G5	S1S2	Y	-
Libellulidae	<i>Sympetrum semicinctum</i>	Band-winged Meadowhawk	G5	S3S4	Y	-

**Table 7 continued. Pennsylvania SGCN dragonflies and damselflies of Ten Acre Pond (Shiffer and White 1995) and Gray’s Woods Preserve (Wilson 2019).**

DAMSELFLIES						
Family	Scientific Name	Common Name	Global Rank	State Rank	Ten Acre Pond	Gray’s Woods Wetlands
Coenagrionidae	<i>Coenagrion resolutum</i>	Taiga Bluet	G5	S1S2	Y	-
Coenagrionidae	<i>Enallagma boreale</i>	Boreal Bluet	G5	S2S3	Y	-
Lestidae	<i>Lestes dryas</i>	Emerald Spreadwing	G5	S3	Y	Y
Lestidae	<i>Lestes eurinus</i>	Amber-winged Spreadwing	G5	S3S4	Y	Y



Figure 14. Spatterdock Darner (*Rhionaeschna mutata*), Centre County, Ten Acre Pond.

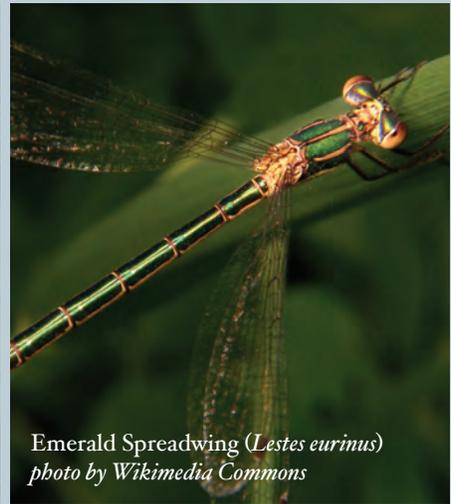
### Ten Acre Pond special habitat for Odonates

Ten Acre Pond is a large, diverse, dynamic wetland that is the heart of the Haugh Family Preserve. It is the largest wetland on both preserves. It is a large 18-acre pond when fully flooded but behaves just like a large vernal pool where water levels drop through the summer months. In a dry year, the pond may have no standing water at all by late summer or fall. This wetland is well known to local naturalists as a place to see unique birds, herptiles, and other wildlife. It is also a hot spot for dragonflies and damselfly diversity. Several local experts paid many visits to this wetland to document the odonate community that is as dynamic as the wetland itself. Between 1967 and 2011, Clark Shiffer visited Ten Acre Pond over 800 times, contributing to the nearly continuous annual records of dragonfly diversity that began in the 1950s by George and Alice Beatty. This is arguably the longest sustained study of dragonflies at single habitat in North America (Shiffer and White 1995, Shiffer and White 2014) and perhaps the world.

This research showed how important Ten Acre Pond is for invertebrate taxa, in particular odonates, with 87 of Pennsylvania's 175 known dragonfly and damselfly species documented at this site at one time or another.



Ten Acre Pond  
*photo by B. Leppo*



Emerald Spreadwing (*Lestes eurinus*)  
*photo by Wikimedia Commons*



Little Blue Dragonlet  
(*Erythrodiplox minuscula*)  
*photo by G. Hampshire, Flickr*



Ten Acre Pond  
*photo by B. Leppo*

### *Amphibians and Reptiles*

Amphibian and Reptile surveys at Haugh Family Preserve and Gray’s Woods Preserve and Park were conducted (Wilson 2008, 2009). Species of Concern include three amphibians and three reptiles that are identified in the SWAP and listed as rare species in the Centre County Natural Heritage Inventory (Pennsylvania Natural Heritage Program 2002) (Table 8).



**Table 8. Amphibian and Reptile Species of Concern from the Haugh Family Preserve and Gray’s Woods Preserve and Park (Pennsylvania Natural Heritage Program 2002, 2023; Wilson 2008, 2009).**

Common Name	Scientific Name	Occurrence	Global Rank	State Rank	PA Legal Status	Federal Status
Jefferson salamander	<i>Ambystoma jeffersonianum</i>	Gray’s Woods	G4	S3	-	-
Marbled salamander	<i>Ambystoma opacum</i>	Haugh Family Preserve Gray’s Woods	G5	S3	-	-
Eastern spadefoot	<i>Scaphiopus holbrookii</i>	Haugh Family Preserve Gray’s Woods	G5	S2S3	PT	-
Eastern hognose snake	<i>Heterodon playrhinos</i>	Haugh Family Preserve Gray’s Woods	G5	S3S4	-	-
Smooth green snake	<i>Liochlorophis vernalis</i>	Gray’s Woods	G5	S4	-	-
Eastern box turtle	<i>Terrapene carolina</i>	Gray’s Woods	G5T5	S3S4	-	-



Japanese barberry (*Berberis vulgaris*)  
photo by B. Leppo

## Threats

### Climate Change

Climate change may threaten the persistence of many rare species in Pennsylvania, especially those that are known to be restricted to cooler habitats or are at the southern edge of their respective ranges. Pennsylvania Natural Heritage Program completed Climate change vulnerability assessments for 85 species in Pennsylvania using the Climate Change Vulnerability Index (CCVI v2.0) developed by NatureServe (Young et al. 2011). The CCVI allows the user to examine the exposure and sensitivity of

a species to a series of risk factors associated with climate change. Presented below are the results of the vulnerability assessments along with the state and global ranks for select Species of Concern in the Scotia region assessed by the Pennsylvania Natural Heritage Program (Table 9). To read a more detailed summary of species' climate change related threats, see the Pennsylvania Natural Heritage Program climate change assessment fact sheets: <https://www.naturalheritage.state.pa.us/climate.aspx>.

**Table 9. Select Species of Concern within the Scotia Barrens NHA and their CCVI ratings.**

Species	Common Name	Conservation Rank	Vulnerability Rating
<i>Scirpus ancistrochaetus</i>	Northeastern bulrush	S3G3	Extreme Vulnerability
<i>Scaphiopus holbrookii</i>	Spadefoot toad	S2S3 G5	Extremely vulnerable
<i>Callophrys irus</i>	Frosted elfin	S1S2 G3	Presumed stable
<i>Prunus pumila var. depressa</i>	Eastern sand cherry	S1 G5T5	Presumed stable
<i>Ambystoma jeffersonianum</i>	Jefferson salamander	S3G	Highly vulnerable
<i>Cicindela patruela</i>	Northern barrens tiger beetle	S2S3	Presumed stable
<i>Sylvilagus obscurus</i>	Appalachian cottontail	S1S2	Presumed stable

### Habitat Loss

The area surrounding SGL 176 in Patton, Halfmoon, and Ferguson Townships is a highly desirable area for residential development because of its rural nature and proximity to Penn State University. Permanent conversion of habitat to housing (i.e., habitat loss) is a significant threat to the Scotia Barrens. Past conversion of habitat to agriculture also caused forest and wetland habitat loss in the Scotia region. Conservation of the Haugh Family Preserve and Gray’s Woods Preserve by Patton Township’s Open Space Program prevented the loss of nearly 349 acres of forest and wetland habitat and 267 acres of farmland as these properties most certainly would have been converted into residential developments. Other stakeholders have conserved lands within the Scotia region including Halfmoon and Ferguson Townships, PGC, Western Pennsylvania Conservancy, and ClearWater Conservancy. Opportunities to conserve more land and restore important habitats remain within the Scotia region.

### Habitat Fragmentation

The Haugh Family Preserve, Gray’s Woods Preserve, and SGL 176 together create a large, protected block of habitat, but many roads (e.g., Scotia Range Road, Circleville Road, Heritage Trail Road, etc.) and utility rights-of-way fragment the landscape. Habitat fragmentation caused by anthropogenic features (e.g., transportation corridors, utility rights-of-way, etc.) are a threat because they are conduits for the introduction

and spread of non-native invasive species and cause canopy openings in otherwise contiguous habitats. For example, roads and utility rights-of-way are considered fragmenting features that degrade habitat for interior forest dwelling birds and other species that require deep unbroken forest.

It is important to understand that while habitat fragmentation can be detrimental to some species, it may also create opportunities for other species with proper management. For example, to ensure safety and to prevent interruption of utility services, mid- and upper canopy vegetation is routinely removed within the right-of-way that crosses the Haugh Family Preserve and SGL 176. This clearing causes forest fragmentation. However, when managed thoughtfully, removal of this vegetation can create ideal conditions for rare species associated with barrens habitat that prefer sandy, sunny openings, such as wild blue lupine (*Lupinus perennis*) yellow wild indigo, and frosted elfin butterfly.



## Lack of Forest Management

Much of the Scotia Barrens region was heavily logged to support the iron ore industry starting in the 1800s. When large-scale logging ended in the early 1900's, the forest began to succeed into mostly homogenous, middle-aged forest on what is now the Haugh Family Preserve, Gray's Woods Preserve and SGL 176. The condition of today's forests reflects years with minimal natural disturbances, overbrowsing by white-tailed deer (*Odocoileus virginianus*), invasive species, and forest pests, and other factors that impede forest regeneration. The resulting and unnatural even-aged forests provide little age class or structural diversity that are needed by many wildlife species throughout different parts of their life cycles. Although the Scotia region is rich in biodiversity, many wildlife species populations found here are in decline, and it is believed that lack of a range of forest age-classes is a primary threat (Rosenberg et. al 2019).

## Loss of Barrens and Early Successional Habitats

Within the historic forest matrix of the Scotia region, there were natural shrub-and herbaceous openings maintained by natural disturbances or influenced by shallow soils and bedrock outcrops. These areas are "barrens". Barrens habitat is a priority habitat within this region because it supports many Species of Concern. Barrens habitat can be maintained by a combination of management, natural site conditions, or natural disturbances (e.g., tornados or wind events, forest fire, etc.) that prevent succession to older forest age classes. In absence of disturbance, barrens habitats can quickly be lost as young forests revert to older forest age classes, which are comprised of different and typically more common plant communities. Recognizing the importance of the Pitch Pine – Scrub Oak Barrens plant community (an example of a type of barrens in Pennsylvania) and the numerous rare species that it supports, the PGC began and has continued to actively manage over 2,000 acres of SGL 176 as early-successional barrens habitat to ensure that this rare habitat is represented in this landscape. Patton Township is collaborating with PGC and USFWS to



White-tailed Deer (*Odocoileus virginianus*)  
photo by B. Leppo

manage additional opportunity areas (e.g., utility right-of-way that crosses SGL 176 and the Haugh Family Preserve) as functional barrens habitat to meet habitat management goals for several Species of Concern and prevent further habitat loss (See *Habitat Management for Rare Butterflies and Bees Project* on page 49).

## White-Tailed Deer

An overabundant white-tailed deer population has detrimental impacts to forest health and degrades habitat for many wildlife species. Historically, deer populations were kept in balance by their habitat (i.e., food availability) and predators. However, in absence of predators, deer populations increased beyond the forests' carrying capacity resulting in overbrowsing.

Impacts from overbrowsing can be severe. When deer densities exceed available food resources, significant changes in tree regeneration, forest structure, and forest species composition occur. These changes to the forest habitat have cascading impacts on forest wildlife and decrease forest resiliency.

Hunting, which is currently permitted on Township Open Space properties, is the best management tool to maintain a sustainable deer population and reduce the threat of overbrowsing to forest health and forest-dependent wildlife.



## Invasive Plants

The introduction of non-native invasive species to Pennsylvania began with the initial settlement of Europeans in the 17th century and continues today (Thompson et al. 2013). Invasive plants threaten biodiversity by dominating habitat normally occupied by native plant species, disrupting food chains, impacting forest structure, forest regeneration, and overall resiliency of ecosystems.

The following are some of the non-native invasive plants found at the Haugh Family Preserve and Gray's Woods Preserve that are known to compete with native plants and impact wetland and forest health:

- Amur cork tree (*Phellodendron amurense*)
- Bradford or Callery pear (*Pyrus calleryana*)
- Japanese barberry (*Berberis thunbergii*)
- Autumn olive (*Elaeagnus umbellata*)
- Privet (*Ligustrum* spp.)
- Shrub honeysuckles (*Lonicera* spp.)
- Norway maple (*Acer platanoides*)
- Reed canary grass (*Phalaris arundinacea*)
- Common reed (*Phragmites australis*)
- Mile-a-minute (*Persicaria perfoliata*)
- Japanese stiltgrass (*Microstegium viminium*)

## Forest Pests

Tree species that were once a ubiquitous part of this region's forests, such as the American chestnut, American elm, white ash, and green ash, have been eliminated or greatly reduced in our forests by the introduction of exotic forest pests and diseases. More species may still be lost in the future including oak species, eastern hemlock, and American beech that are currently threatened by the spongy moth (*Lymantria dispar*), hemlock woolly adelgid (*Adelges tsugae*), and beech bark disease complex (the beech bark scale insect (*Cryptococcus fagisuga*) and several fungal species (*Neonectria* spp.), respectively. New exotic pests are certain to arrive that will have additional unknown impacts to forest health and diversity. Two recent introductions include an invasive nematode that is further threatening American beech (beech leaf disease) and spotted lanternfly (*Lycorma delicatula*) that may impact numerous native woody species.

Although landowners have limited ability to control many of these forest pests, actions can be taken to maximize forest resiliency by implementing forest management practices that reduce stressors (i.e., invasive species, overbrowsing by deer) and increase forest regeneration and native species diversity. It is possible that treatment of forest pests may have unintended consequences to non-target species so care must be taken. For example, spongy moth control programs using BT (*Bacillus Thuringiensis*) or the insect growth regulator "Mimic" (Tebufenozide) can significantly impact populations of native moths and butterflies. The frosted elfin butterfly, a rare barrens species targeted for conservation on the Haugh Family Preserve and SLG 176 is unfortunately particularly sensitive to these pesticides used to treat spongy moths. Care should be taken to avoid impacts to non-target species (see *Habitat Management for Rare Butterflies and Bees Project* on page 49).

## Chytrid Fungus

Chytrid fungus (*Batrachochytrium dendrobatidis*) has caused significant declines in amphibian populations. Care should be taken when facilitating any outreach activities associated with the wetlands located on the Haugh Family Preserve and Gray's Woods Preserve to reduce the potential spread of chytrid fungus. Best practices include not handling amphibians unless necessary, only handling amphibians with plastic gloves, and ensuring equipment and footwear is disinfected prior to visiting these wetlands (especially for event leaders who may routinely visit other wetlands).

## Recreational Overuse

The managers of public open spaces are challenged with maintaining open space quality while providing recreational opportunities. Due to the proximity of State College to the Patton Township Open Space properties, these natural areas are subject to recreational overuse. Recreation impacts include trampling of sensitive vegetation, soil erosion, soil compaction, and spread of invasive species. These impacts to sensitive habitats can be minimized by the creation and implementation of a recreational plan that identifies user needs, creates sustainable infrastructure, proper public outreach, and signage.

## Stormwater Runoff

Stormwater runoff can contain sediment, salt, fertilizers, pesticides and other chemicals from surrounding roads and suburban developments and negatively impact the wetlands located within the Haugh Family Preserve, Gray's Woods Preserve, and Gray's Woods Park. Stormwater also causes changes in hydrology, degrading the quality of wetland habitat for breeding amphibians and invertebrates.

Sedimentation caused by stormwater runoff from upslope land disturbance activities was identified several times in Wetland #1 of the Gray's Woods

Preserve during the preparation of this plan (K. Ombalski, Woods and Waters Consulting, E. Zimmerman and B. Leppo, Western Pennsylvania Conservancy Natural Heritage Program, M. Wolf, Appalachian Forest Consultants, personal communication, 2022, Wilson 2023b, ClearWater Conservancy 2022, 2023). Erosion and sedimentation caused by inadequate drainage from Palustrine Lane to several vernal pools on Gray's Woods Preserve was also identified several times during the preparation of this plan (K. Ombalski, E. Zimmerman, B. Leppo, M. Wolf, personal communication, 2022, Wilson 2023b, ClearWater Conservancy 2022 and 2023).

## Change in Agricultural Use on the Haugh Family Preserve

The agricultural fields of the Haugh Family Preserve have been under a long-term lease with a local farmer since the Township acquired the property. Continuation of agricultural use of the 230 leased acres is encouraged through the conservation easement as long as it is reasonably possible (Appendix B). If farming the property is no longer feasible or there is no longer interest from local producers, the conservation easement states that the agricultural fields should be "reforested or allowed to revert to nature according to a Conservation Stewardship Plan".

Although there is no indication that farming will be discontinued anytime soon, it is imperative that the Township is prepared for this transition to occur if any or all of the 230 acres of agricultural fields cease to be in production. If a transition from agriculture to forest habitat were to occur, allowing nature to take its course is not an option because of the prevalence of invasive species found on the Haugh Family Preserve and nearby properties. Alternatively, a restoration plan should be in place and with considerations including desired habitat type, methodology, budget, potential funding sources, and possible restoration partners.

Black-and-white Warbler (*Mniotilta varia*)  
photo by D. Whiteman



## Open Space Habitat Assessments, Inventories, and Reports

Since the acquisition of the Haugh Family and Gray's Woods Preserves, Patton Township retained Wilson Ecological Consulting to conduct the following habitat assessments and inventories to assess and study these Open Space properties to document current habitat condition and rare species, and to better understand how the Township could protect and further enhance these unique resources:

Haugh Family Preserve assessments and inventories

- *Wetlands Stewardship Plan: Haugh Family Farm Open Space* (Wilson 2008)
- *Botanical Survey and Habitat Characterization with Notes on Wildlife Assemblages: Haugh Family Farm Open Space* (Wilson 2009)
- *Small Mammal Survey with Notes on Other Wildlife and Botanical Species: Haugh Family Farm Open Space* (Wilson 2010b)
- *Avian Survey Report: Haugh Family Farm Open Space* (Wilson 2014a)
- *Botanical Survey Report: Haugh Family Farm Open Space* (Wilson 2014b)
- *Habitat Evaluation Report: HFFOS Stands 21 and 22* (Wilson 2015a)
- *Wetland Evaluation Report: HFFOS Stands 11 and 17* (Wilson 2015b)
- *Botanical Survey of the Haugh Family Preserve, with Special Emphasis on Wetland Habitats: 2016 Growing Season* (Wilson 2016)

- *Pollinator Inventory on the Haugh Family Preserve* (Wilson 2017a)
- *Wild Blue Lupine (Lupinus Perennis) Restoration on the Haugh Family Preserve* (Wilson 2017b)
- *Invasive Species Assessment at the Haugh Family Preserve* (Wilson 2018)
- *Haugh Family Preserve Floristic Quality Assessment* (Wilson 2020a)
- *Haugh Farm Preserve Tiger Beetle Survey* (Wilson 2020b)
- *U.S. Fish and Wildlife Service Habitat Improvements* (Wilson 2020c)
- *Wetland Stewardship Plan: Haugh Farm Preserve* (Wilson 2023a)

Gray's Woods Preserve/Gray's Woods Park assessments and inventories

- *Natural Resource Inventory of the Gray's Woods Preserve* (Wilson Ecological Consulting 2019)
- *Memorandum: Habitat Improvements, Gray's Woods Preserve* (Wilson Ecological Consulting 2020d)
- *Botanical Survey with Notes on Other Species of Interest: Proposed Gray's Woods Park Site* (Wilson Ecological Consulting 2010a)
- *Wetland Stewardship Plan: Gray's Woods Preserve* (Wilson Ecological Consulting 2023b)

Western Pennsylvania Conservancy Natural Heritage Program and other researchers have completed the following reports focused on rare species and pollinators of the Scotia Barrens and include:

- *Four Decades of Stability and Change in the Odonata Populations at Ten Acre Pond in Central Pennsylvania* (Shiffer and White 1995)
- *Centre County Natural Heritage Inventory* (Pennsylvania Natural Heritage Program 2002)
- *Dragonfly and Damselfly Colonization and Recolonization of a Large, Semi-Permanent Pennsylvania Pond* (Shiffer and White 2014)
- *Activities for Research and Conservation of Rare Insects at Scotia Barrens State Game Lands 176 and Patton Township, Centre County* (Leppo 2024)
- *Scotia Barrens habitat management for pollinators and rare insects- a summary and guide for Scotia Barrens land managers and project partners* (Leppo 2024)
- *Xeric Habitats Conservation Project study* (Heilferty et al. 2023)

The assessments, inventories, and research projects listed above informed the development of this Conservation Plan.



Rural Farm  
*photo by iStock.com/Bo Shen*

## Management of Open Space Properties

Management activities that occur on the Township's Open Space Properties can be broadly categorized as general property maintenance, agricultural management, and habitat management.

### Property Maintenance

General property maintenance activities, including deer exclusion fence repair, trail repair, trash clean-up, watering newly planted landscape trees, sign installation, etc., are managed by Patton Township's Open Space Property Manager and carried out by the Township Road Crew.

### Agricultural Management

Management of all leased agricultural fields is the responsibility of the lease holder. Patton Township Open Space Property Manager manages this lease

on behalf of the Township and is the main point of contact. The Haugh Family Preserve Community Gardens are also managed by the Township Open Space Manager.

### Habitat Management

Patton Township's Open Space Property Manager coordinates all habitat management projects with guidance from the OSSC. Habitat management projects include forest management and discrete habitat management projects. Because of the specialized technical nature of this work, conservation partnerships are developed, or private contractors are retained to plan projects, provide implementation oversight, and implement management activities. All management activities must be part of an approved Conservation Plan or Forest Management Plan.



## Habitat Management Activities to Date

### History of Forest Management on Open Space Properties (2007 – 2018)

#### *Haugh Family Preserve*

The first forest management plan was written by Brian Stibler, a consulting forester, as a requirement of the Haugh Family Preserve conservation easement. This Forest Stewardship Plan provided the Township with a 10-year implementation schedule (2007 – 2018) of forest management activities consistent with the goals and objectives articulated in the conservation easement (Stibler 2007).

Once the 2007 – 2018 planning period was completed, the Township initiated the development of a new forest management plan, which is part of this larger conservation planning effort. In 2020, Appalachian Forest Consultants, LLC conducted a field assessment of forest management activities completed under the *Haugh Family Farm Open Space (Haugh Tract) Forest Stewardship Plan*, and provided observations important for the development of the next 10-year Forest Stewardship Plan (Appendix E). The following is a summary of the field assessment findings:

- Most of the forest management recommendations conducted from 2007 – 2018 were successfully implemented and included multiple herbicide treatments to control invasive species and competitive plants, installation of deer-exclosure fencing, thinnings, shelterwood harvests and overstory removals.
- The Township was without a forest management plan for the Haugh Family Preserve from 2019 to 2023.
- Some forest management (overstory removal in MU L) was conducted in 2019 that was beyond the scope of the 2007 Forest Management Plan. When considering management activities that are not included in the current Forest Management Plan (i.e., unplanned activities), a thorough review of the activity should be conducted with the help of a professional forester, and a written site plan should be created. The site plan should be submitted to the OSSC for review, discussion, and authorization to maintain compliance with the conservation easement. The Forest Management Plan should also be updated to document the decision and justification for changing the plan.

### *Gray's Woods Preserve*

Patton Township has not conducted any forest management activities on the Gray's Woods Preserve since the property was conserved in 2022. Development of a Forest Management Plan is required by the Gray's Woods Preserve conservation easement to ensure that all forest management is consistent with the conservation easement and the Township's goals. The first Forest Management Plan was written for Gray's Woods as part of this Conservation Plan (Wolf 2023).

### *History of Habitat Management for Pollinators, Rare Butterflies, and Other Insects*

Barrens ecosystems are known to provide critical habitat for rare insect species. Management of early successional barrens habitat to increase populations of pollinators, rare butterflies and other insects has been an ongoing Township priority, and the focus of state and federal partners. Target species have included wild blue lupine, pink lady's slipper (*Cypripedium acaule*), frosted elfin butterfly (*Callophrys irus*), tiger beetles, and numerous additional species of butterflies and bees.

### *Wild Blue Lupine Management*

Wild Blue Lupine is a Pennsylvania Rare species (Pennsylvania Natural Heritage Program 2024) (Figure 15). This uncommon wildflower is cross pollinated by long tongued bees and is a potential host plant for frosted elfin and Persius duskywing butterflies. Management for wild blue lupine was initiated at two locations on the Haugh Family Preserve in 2017 by Wilson Ecological Consulting who coordinated the habitat mowing with USFWS Partners for Fish and Wildlife Program on behalf of the Township. Habitat Management services were donated by USFWS Partners for Fish and Wildlife (Appendix J and Appendix K) (Wilson 2017, 2020), Management for wild blue lupine has continued through 2024 (B. Leppo, Western Pennsylvania Conservancy Natural Heritage Program, personal communication and N. Ranalli, USFWS, personal communication).

*photo by WPC*



Figure 15. Wild Blue Lupine (*Lupinus perennis*).

### *Pink Lady's Slipper Management*

Pink lady's slipper is a showy orchid species common to Pennsylvania. Bees are required for pollination and bumblebees are the most frequently found pollinator on pink lady's slipper. Management for pink lady's slipper occurred in 2020 at one location on the Haugh Family Preserve. This project was initiated by Wilson Ecological Consulting who coordinated the habitat mowing with USFWS Partners for Fish and Wildlife Program on behalf of the Township. Habitat Management services were donated by USFWS Partners for Fish and Wildlife (Wilson 2020c) (Appendix K).

### *Tiger Beetle Habitat Management*

Tiger beetle management on the Gray's Woods Preserve was initiated in 2020 by Wilson Ecological Consulting who coordinated project implementation on behalf of the Township. Habitat mowing was conducted at three sites and totaled 0.22 acres. All habitat management services were donated by USFWS Partners for Fish and Wildlife Program (Appendix L) (Wilson 2020). See more about Tiger Beetles on page 32.

### *Habitat Management for Rare Butterflies and Bees Project*

In 2019, Western Pennsylvania Conservancy Natural Heritage Program began the *Habitat Management for Pollinators and Rare Butterflies Project* to gather data on several rare butterflies in Pennsylvania, with funding from the Pennsylvania Department of Agriculture. Their surveys and resulting habitat management on the Haugh Family Preserve and SGL 176 initially focused on the frosted elfin

Frosted elfin butterflies require early successional habitats with well-drained, often sandy soils, and an abundance of their caterpillar host plant, yellow wild indigo (Figure 16). Frosted elfin butterflies are found in the Scotia Barrens at a few localized spots, and habitat restoration activities have focused primarily on improving and maintaining the best patches of their host plant and core habitat. Pennsylvania’s SWAP describes the frosted elfin habitat as grassy openings with sandy or rocky soils, most commonly found now in anthropogenic habitats such as powerline and utility rights-of-way, like those found within the Haugh Family Farm Preserve (PGC-PFBC 2015).

Habitat management activities completed to date have been done in partnership with Western Pennsylvania Conservancy Natural Heritage Program, First Energy, PGC, USFWS, USFWS Partners for Fish and Wildlife, Wilson Ecological Consulting, and Patton Township. Management activities have included mowing, mulching, tree canopy thinning, invasive removal,

and planting small areas with yellow wild indigo seeds and seedlings. Focal areas for current habitat management are shown in Figure 17. Several reports providing details on the frosted elfin and habitat management at Scotia have been provided to Patton Township during the implementation of these activities (Leppo 2024a, b). All habitat management services completed to date were donated by USFWS Partners for Fish and Wildlife Program.

Numerous butterflies and bees found at Scotia, including those found through the Xeric Habitats Conservation Project described on page 30, will also benefit from the habitat management activities initiated by this work (Table 4 and Table 5) (Heilferty et al. 2023).

It should be stated that it is very uncertain whether we will be successful in this endeavor. The frosted elfin population is so small that it is extremely vulnerable to threats, some of which are out of our control (e.g., extreme weather or disease). It is possible that frosted elfin butterflies will be lost from this area before they have a chance to recover. While we provide cautious management in habitats that support the frosted elfin and yellow wild indigo (hostplant) on the Haugh Family Preserve, there are other opportunities on SGL 176 to use prescribed fire to create and maintain early successional habitats at large scale. These different but complimentary approaches on adjacent properties improve our chances of recovering this species at Scotia Barrens.



Figure 16. Yellow wild indigo at Scotia.

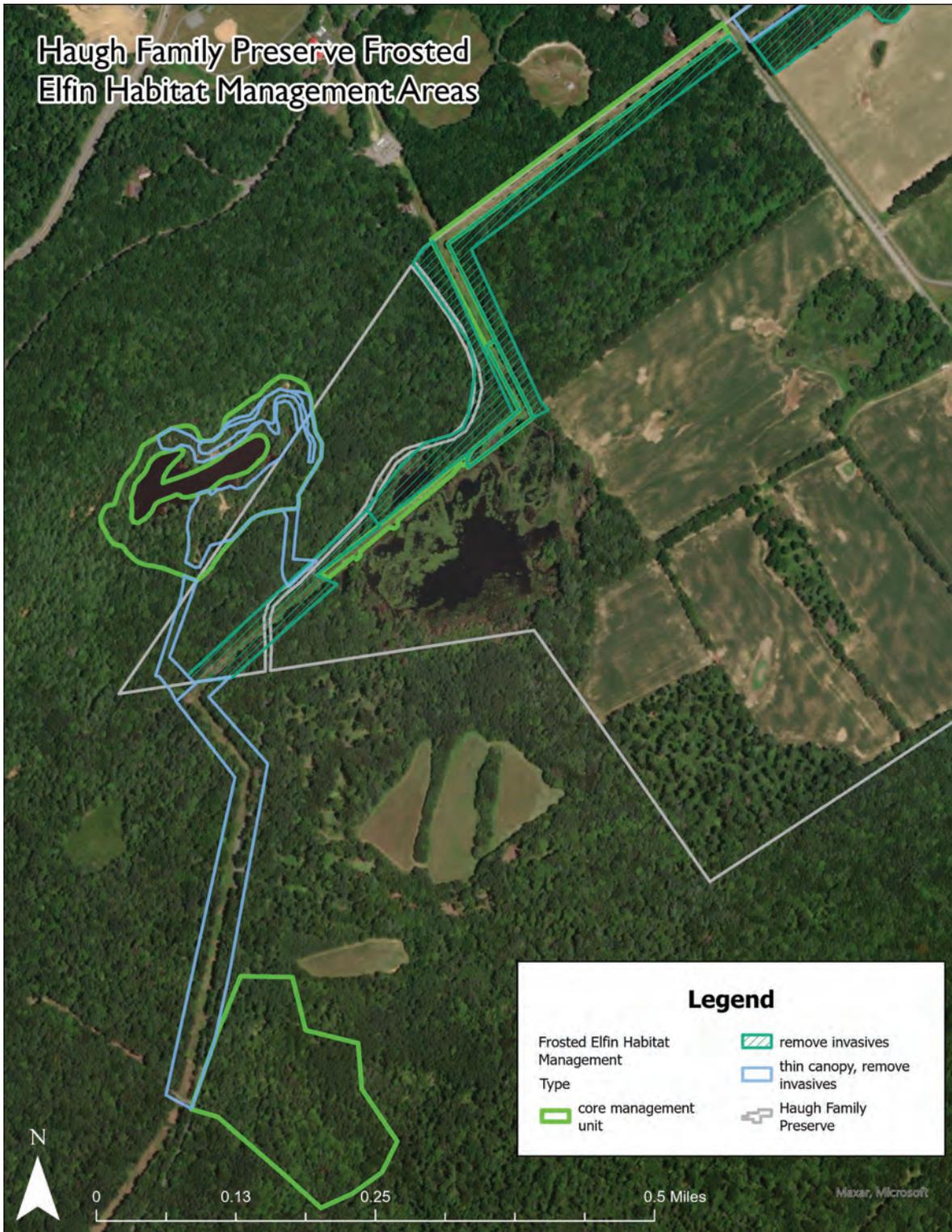


Figure 17. Frosted elfin habitat management focal areas, 2019-2023.



## The Importance of Collaborative Partnerships

Collaborative partnerships are commonly the foundation of successful conservation endeavors. To achieve the Township's goals for the Haugh Family Preserve and Gray's Woods Preserve, there is more work to be done than the Township can do alone. Fortunately, there are many conservation partners that are eager to support the Township's vision to conserve, restore and enhance the natural, recreational, and cultural resources of these Open Space properties. Some of those partners include Clearwater Conservancy, DCNR, Penn State researchers, Pennsylvania Natural Heritage Program, PFBC, PGC, USFWS, USFWS Partners for Fish and Wildlife, and Western Pennsylvania Conservancy just to name a few.

### PGC 400 Areas Program

PGC is a particularly important conservation partner as the Haugh Family Preserve, Gray's Woods Preserve, and PGC's SGL 176 share several common property

boundaries. The Township already partners with PGC through the *Habitat Management for Pollinators and Rare Butterflies Project* on the Haugh Family Preserve along with other conservation partners (see project description on page 49). However, significant opportunities exist to expand this partnership through enrollment in PGC's 400 Areas Program (Appendix I). Enrollment in this program would enable PGC to assist in the advancement of the Township's goals by contributing financial and technical assistance to the Township. For example, enrollment would allow PGC's professional habitat management staff to support cross-boundary management activities (e.g., invasive species control, targeted habitat management, etc.). All management activities implemented by PGC would be priority actions identified in the *Haugh Family Preserve and Gray's Woods Preserve Forest Management Plan* and/or this Conservation Plan (Table 10) (Wolf 2023).



## Open Space Revenues

The Township currently has several revenue streams available to fund its Open Space Program: dedicated property tax millage, Centre County Community Foundation Haugh Family endowment, Township endowment, 2021 Hamer Foundation grant, Haugh Family Preserve farm lease, and income from timbering guided by the current Forest Management Plan (Wolf 2023). These revenues are forecasted to be sufficient to fund anticipated maintenance, monitoring, and improvements through 2027.

### Dedicated Real Estate Tax

A referendum passed in November 2014 authorized the Board of Supervisors to spend up to \$3.5 million for the purpose of financing acquisition of development rights, conservation easements and land for the preservation of open space. The millage is set at 0.6 mills. The dedicated millage was implemented in 2016, and debt service payments began in 2018. In 2024, this millage brought in \$366,963. Of that, \$245,435 was spent on debt service in 2024.

## Centre Foundation Endowment Income

The Haugh Family established a \$300,000 endowment at the Centre Foundation to fund the perpetual maintenance of the property. The annual disbursement provided \$15,263 of revenue in 2024.

## Township Endowment

The Township also established an endowment for the Haugh Family Preserve. The current fund balance is \$195,027 and is invested by the Township in a dedicated account. The money is to be used to support activities at the Haugh Family Preserve.

## Hamer Foundation Grant

The Township was awarded a \$164,400 grant from the Hamer Foundation in 2021 to support the development of this Conservation Plan for the Haugh Family Preserve and the Gray's Woods Preserve. As part of this Conservation Plan, a Forestry

Stewardship Plan and Wetland Stewardship Plans were written for the Haugh Family Preserve and the Gray's Woods Preserve (Wilson 2023a, b; Wolf 2023). This grant is also providing funding to begin implementation of recommended forest management activities. All Hamer Foundation grant funds will be expended in early to mid-2025.

## Farm Rental Income

The Haugh Family Preserve conservation easement provides for the continuation of farming. The 2024 rent is based on 230 tillable acres at \$68 per acre. This rent accounted for \$15,640 in revenue in 2024.

## Timbering/Forestry

The Township allows for timbering and other forestry activities in accordance with its approved Forestry Management Plan. All revenue generated through forestry management practices will be reinvested into habitat management.



Farm Field  
*photo by iStock.com/ Gary Tognoni*



Ruffed Grouse (*Bonasa umbellus*)  
photo by Wikimedia Commons

## Creating a 10-Year Conservation Plan: Planning as One

This *Conservation Plan for the Haugh Family Preserve and Gray's Woods Preserve* is a 10-year management strategy (2024 – 2034) written by Woods and Waters Consulting, Appalachian Forest Consultants, LLC, and Western Pennsylvania Conservancy Natural Heritage Program with guidance from the Patton Township's OSSC and staff. Independently, the Haugh Family Preserve and the Gray's Woods Preserve were important land conservation projects that protected significant natural resources. However, considered together and in context with the larger landscape (i.e., adjacency to SGL 176), large-scale conservation benefits and cost efficiency can be maximized. Understanding this, the Patton Township OSSC decided early in the planning process that the conservation values and management of these properties should be evaluated together and coordinated under one Conservation Plan.

### Management Goals

The Township's management goals for both the Haugh Family Preserve and the Gray's Woods Preserve are the foundation of this Conservation Plan. The current management goals are based on the original 2005 goals established for the Haugh Family Preserve conservation easement and the 2007 Stibler Forest Stewardship Plan but were revisited in 2021 and formally modified by the OSSC in 2022 to eliminate redundancy and provide clarification when goals conflicted with each other (Appendix H). They were also used in the drafting of the 2022 Gray's Woods Conservation Easement (Appendix C). In addition to habitat management, the updated management goals also address outreach, education, research and long-term funding.

## Haugh Family Farm Preserve and Gray's Woods Park and Preserve Management Goals (Adopted July 14, 2022)

**GOAL 1:** Maximize forest health and resiliency

**GOAL 2:** Protect and enhance wetlands, vernal pools and critical upland habitat

**GOAL 3:** Enhance habitat for rare, threatened, and endangered species

**GOAL 4:** Encourage regenerative and sustainable agricultural practices that support farm productivity, increase soil health, protect local water quality, meet state requirements and support the Township's Chesapeake Bay watershed goals

**GOAL 5:** Conduct outreach to promote recreational use of the Open Space properties

**GOAL 6:** Promote educational and research opportunities

**GOAL 7:** Establish a long-term financial strategy for the Open Space Program management and operations

### Management Recommendations

The following narrative is a summary of the management recommendations developed for the Conservation Plan for the Haugh Family Preserve and Gray's Woods Preserve. Specific recommendations are outlined by Management Goal and prioritized in the accompanying Recommendations Table (Table 10).

#### *Goal 1: Maximize Forest Health and Resiliency*

Forest management recommendations for the Haugh Family Preserve and Gray's Woods Preserve, coupled with PGC management of SGL 176, will improve forest resiliency and diversify forest age class, structure, and species composition, thereby improving habitat for numerous forest-dependent wildlife species.

Patton Township's forest management goal is strongly aligned with the PGC's management goals for SGL 176, which provides tremendous partnership opportunities for cross-boundary habitat management. Cross-

boundary management is highly beneficial as it often creates opportunities for landowners that would otherwise be unachievable when working alone. It also increases management cost efficiencies, enhances conservation values, and helps to build strong partnerships with neighboring landowners (i.e., PGC).

#### **PGC's 400 Areas Program**

A priority recommendation of this Conservation Plan is to enroll the Gray's Woods Preserve into a 10-year agreement with the PGC's 400 Areas Program to implement forest management recommendations developed in this Conservation Plan (Appendix I). These recommendations include late seral stage forest management and invasive species management. In time, future management opportunities could be considered including spongy moth treatments and prescribed fire.

In 2024, the Township solicitor reviewed the Haugh Family Preserve conservation easement to determine if enrolling the Haugh Family Preserve in the 400 Areas Program is allowable. While the easement does allow for the Township to partner with the PGC on the Haugh Family Preserve, the Township decided only to enroll the Gray's Woods Preserve at this time and re-evaluate expanding this partnership to include the Haugh Family Preserve after a few years.

As part of this conservation planning effort, Appalachian Forest Consultants, LLC prepared a comprehensive 10-year Forest Management Plan for both the Haugh Family Preserve and the Gray's Woods Preserve to guide all forest management activities from 2023 - 2033 (<https://twp.patton.pa.us/DocumentCenter/View/723/Forest-Management-Plan-PDF>). *The Haugh Family Preserve and Gray's Woods Preserve Forest Management Plan* (Wolf 2023) is based on the original 2007 Haugh Forest Stewardship Plan (2007 – 2018) (Stiber 2007), a field assessment of the resulting forest management activities on the Haugh Family Preserve and the first Forest Resource Inventory of the Gray's Woods Preserve and Park (Appendix E and F).

The resulting long-term recommended forest management strategies for the Haugh Family Preserve and Gray's Woods Preserve, although complimentary, are different from each other. Forest management recommendations for the Haugh Family Preserve are a continuation of the 2007 Forest Management Plan strategy to maximize forest resiliency by encouraging regeneration, diversifying forest age classes, and improving forest structure. These actions improve forest conditions and enhance wildlife habitat on the Haugh Family Preserve but also the adjoining forested habitat of SGL 176.



The long-term management strategy for Gray's Woods Preserve is to develop a late seral stage forest. Late seral stage refers to older forests composed primarily of canopy/overstory trees. Other characteristics of late seral stage forests include a diversity of tree sizes, high volume of standing dead trees (snags) and downed logs, and wildlife species that prefer intact interior forest conditions. This recommendation was based on several factors including the current forest age class of Gray's Woods Preserve (largely mid-seral stage), the desire to protect the critical upland habitat for amphibians and wetland complex located on the Gray's Woods Preserve and Park, proximity of late seral management on SGL 176, and the overall lack of late seral stage forest in the larger Scotia Barrens region. Implementation of forest management activities on both properties cannot occur until invasive species are reasonably controlled (see below) and approved by a forester.

Forest Management Units (MUs) were established for both properties. MUs are delineated management areas that have similar species composition, age, structure, and/or stressors and therefore have similar management needs. The 2007 Forest Management Plan used forest stands to delineate management areas, but the new 2023 Forest Management Plan created 12 new MUs for the Haugh Family Preserve that reflect changes in vegetation and current management needs (Figure 18). Four new MUs were created for Gray's Woods Preserve (Figure 19).

Invasive species management is a high priority for both properties and will be an ongoing activity throughout the planning period (2023 - 2033). Invasive species treatments recommended for the Haugh Family Preserve were initiated in fall 2024 while this conservation plan was being finalized and are scheduled to continue through 2025. Invasive species management for the Gray's Woods Preserve

is recommended to be included in the PGC's 400 Areas Program partnership agreement and is not scheduled to begin until after the 400 Areas Program contract is finalized in 2025. Invasive species should be reassessed in fall 2025 or spring 2026 on both properties to evaluate the success of the 2024 – 2025 treatments and prioritize and budget annual invasive species management needs starting in 2026.

Deer exclusion fencing is recommended to be installed in early 2025 around the western portion of MUL on the Haugh Family Preserve to enable adequate tree regeneration. The eastern portion of MUL should be monitored for up to five years to determine if deer exclosure fencing is necessary to achieve Management Goals for this MU.

See Recommendations Table (Table 10) for specific forest management recommendations, prioritization, timeline, and budget considerations.



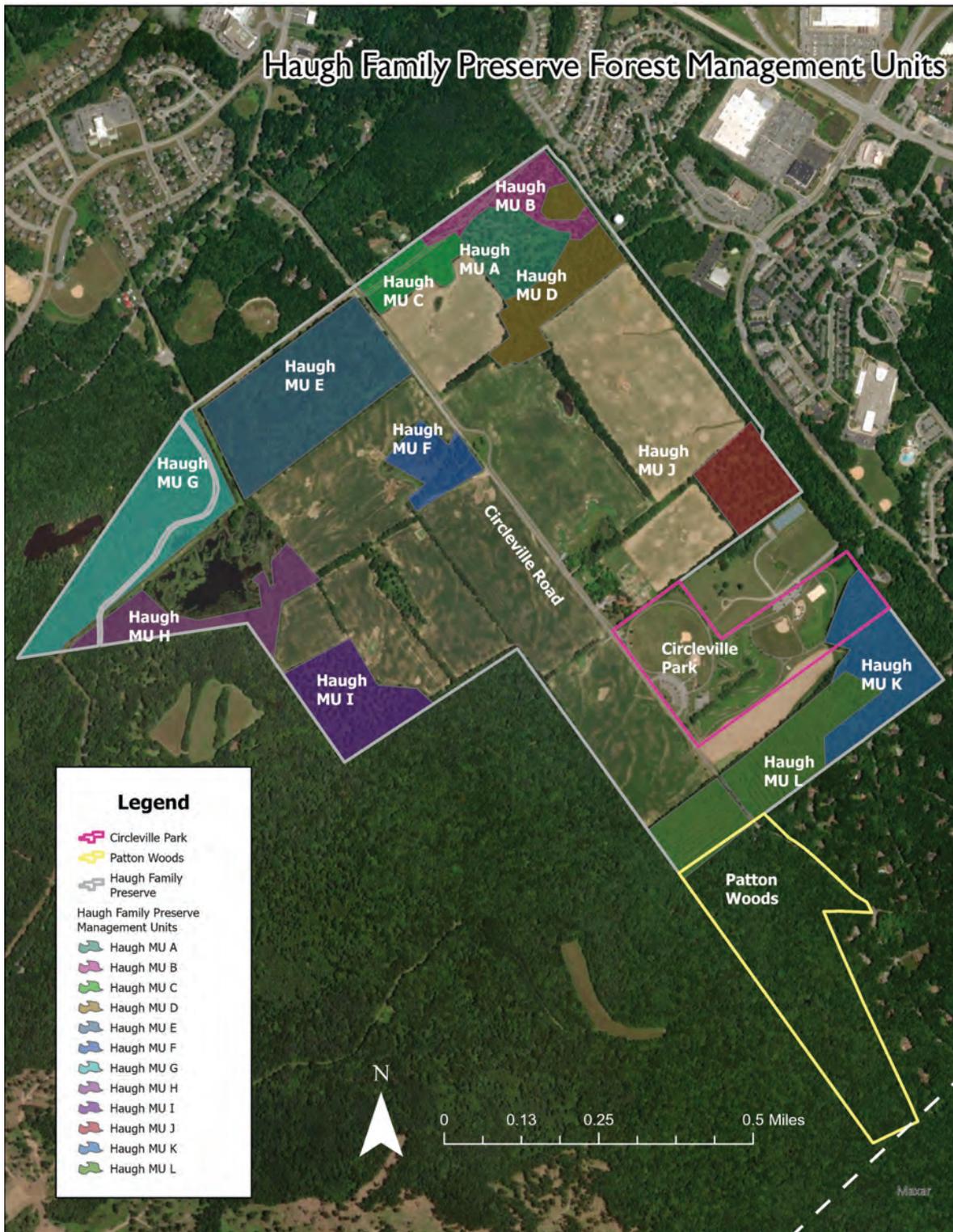


Figure 18. Forest Management Units of the Haugh Family Preserve, Patton Township, Centre County, Pennsylvania.

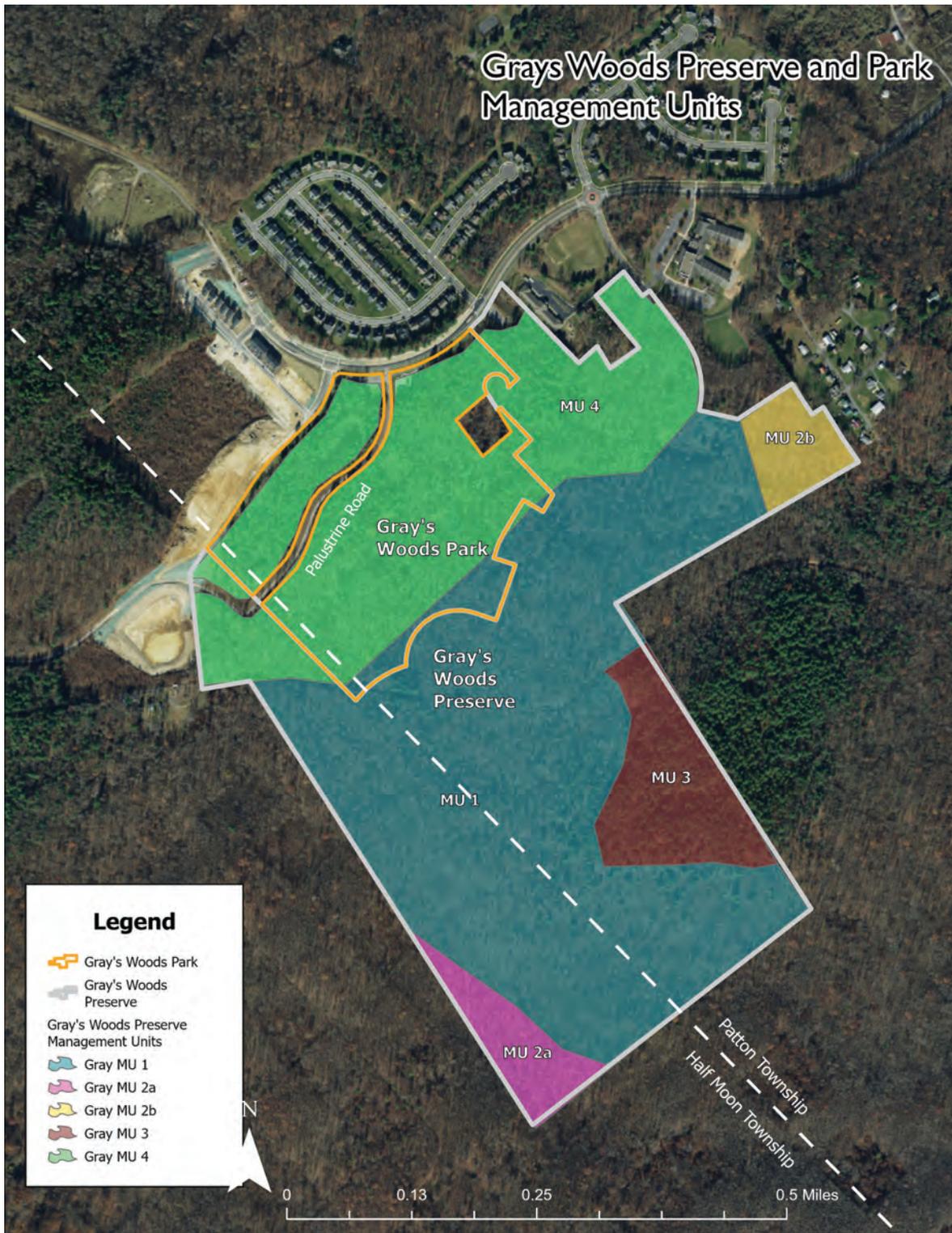


Figure 19. Forest Management Units of Gray's Woods Preserve, Patton and Halfmoon Townships, Centre County, Pennsylvania.

### *Goal 2: Protect And Enhance Wetlands, Vernal Pools and Critical Upland Habitat*

Wilson Ecological Consulting prepared Wetland Stewardship Plans for the Haugh Family Preserve and for the Gray's Woods Preserve and provided detailed recommendations to protect and enhance the wetlands found on these properties (Wilson 2023a, 2023b).

Management goals for wetlands and their supporting upland habitat are focused on meeting habitat needs for wildlife species and increasing resilience to human-caused ecological stressors, invasive plant species, stormwater runoff from roads and surrounding development, overbrowsing by white tailed deer, and climate change. Invasive species are present at varying levels around all wetlands on both the Haugh Family Preserve and Gray's Woods Preserve. While some invasive species can be reasonably managed, others such as Japanese stiltgrass will be an ongoing management challenge. Invasive species around wetlands and throughout the forest habitat will be a part of a comprehensive invasive species management effort on both properties.

The increase in impervious surface surrounding the Patton Township open space properties has created stormwater management concerns for several wetlands on the Gray's Woods Preserve and Gray's Woods Park. While wetlands provide significant ecosystem services including slowing the flow of runoff and trapping sediment and pollutants, excess flow, nutrients, salt, and chemicals from stormwater can drastically change the composition and structure of naturally occurring wetlands and impact wildlife. Observations of stormwater impacts to the Gray's Woods wetland complex should be communicated to PA Department of Environmental Protection and the Centre County Conservation District.

Addressing threats such as invasive species and stormwater impacts from Palustrine Lane should be done in partnership with Patton Township Parks Program.

See Recommendations Table (Table 10) for specific wetland management recommendations, prioritization, timeline, and budget considerations.

### *Goal 3: Enhance Habitat for Rare, Threatened, and Endangered Species*

Many forest and wetland management recommendations provided in this Conservation Plan will benefit rare, threatened, and endangered species by diversifying forest age classes, promoting diverse healthy native plant communities, and controlling invasive species. However, targeted and discrete habitat management recommendations are required to adequately enhance and maintain barrens-dependent plant communities (host plants) and the fulfill lifecycle needs of the insects that depend on them. Patton Township has recognized the need to support insect diversity and has been committed to support habitat management on both the Haugh Family Preserve and Gray's Woods Preserve (see History of Habitat Management for Pollinators, Rare Butterflies, and Other Insects section starting on page 48).

A priority recommendation is the continuation and expansion of the *Habitat Management for Rare Butterflies and Bees Project* in partnership with the Western Pennsylvania Conservancy Natural Heritage Program, First Energy, PGC, USFWS, and USFWS Partners for Fish and Wildlife. Currently, this project is located on SGL 176 and the Haugh Family Preserve. Management has occurred on the powerline right-of-way running along Ten Acre Pond to the west side of Circleville Road and also in the woodlands surrounding Ore Pit Pond (see *Habitat Management for Rare Butterflies and Bees Project* section on page 49) (Figure 17). Habitat management should be expanded along the right-of-way on the east side of Circleville Road (Figure 20). It is important to note that a State College Borough Water Authority waterline is also located within this section of right-of-way so it will be important that they are added to the partnership. Although frosted elfin and yellow wild indigo (hostplant) have been this project's primary plant target, numerous other barrens pollinator species and plants will also benefit.



Figure 20. Pollinator and barrens habitat management opportunity areas located on the Haugh Family Preserve.

Additional barrens pollinator habitat was located along the edges of MU K and MUL of the Haugh Family Preserve (Figure 20). During the preparation of the Conservation Plan, yellow wild indigo was noted growing here. Both MUs are adjacent to agricultural fields, so management activities must be coordinated with the producer that leases them. Finally, a field in Circleville Park that appears fallow and invaded by invasive species was identified as a pollinator habitat management opportunity area that could benefit both the OSSC and Circleville Park users. Coordination with Patton Township Parks Program would be necessary to advance this recommendation.

Opportunities to expand pollinator habitat management at Gray's Woods are along Palustrine Lane and the Gray's Woods powerline that parallels Heritage Trail Road. The clay pit at Gray's Woods also presents an opportunity to enhance habitat for the critically imperiled eastern big sand tiger beetle (Figure 21).

See Recommendations Table (Table 10) for specific pollinator habitat management recommendations, prioritization, timeline, and budget considerations. More detailed descriptions of habitat management activities that have occurred for frosted elfin and other rarer pollinators that are underway and recommended for future implementation can be found in these reports:

- Leppo, Betsy. 2024. Activities for research and conservation of rare insects at Scotia Barrens in SGL 176 and Patton Township, Centre County. Western Pennsylvania Conservancy, Pennsylvania Natural Heritage Program. 20 pp. Revised February 28, 2023.
- Leppo, Betsy. 2024. Scotia habitat management for pollinators and rare butterflies. Western Pennsylvania Conservancy, Pennsylvania Natural Heritage Program. 11 pp. Revised April 3, 2023

*Goal 4: Encourage regenerative and sustainable agricultural practices that support farm productivity, increase soil health, protect local water quality, meet state requirements and support the Township's Chesapeake Bay watershed goals*

The Haugh conservation easement allows for sustainable agriculture practices on 230 acres of the Haugh Family Preserve (Figure 2) (Appendix B). It is recommended that the OSSC open lines of communication with the producer to learn about the farm operation. Staff and the OSSC should also talk with the producer about recommendations from the *Conservation Plan for the Haugh Family Preserve and Gray's Woods Preserve* that are relevant to their operation and agricultural fields including:

- Updating the 2006 NRCS Conservation Plan (NRCS Conservation Plans provide a written record of a producer's objectives and assesses and analyzes the natural resources issues on that producer's land related to soil, water, animals, plants, air, energy, and human interaction and guides and documents the conservation practices implemented on the property).
- Invasive species treatments along field borders
- Increasing pollinator habitat between the agricultural fields and MUK and MUL
- Review wetland locations within agricultural fields or at the edge of forest MUs and explore possible buffering opportunities
- Create a buffer between a known wild blue lupin patch (LP1) and agricultural activities (Wilson 17b)
- Explore partnership to implement additional agricultural Best Management Practices and opportunities (e.g., soil health testing, soil health practices)



Figure 21. Pollinator and barrens habitat management opportunity areas located on the Gray's Woods Preserve.

It is also recommended that the OSSC develop a contingency plan to restore any or all of the agricultural fields if production were to stop for any reason. Continued cultivation of the property is allowed and encouraged on the property for as long as reasonably possible and it is likely that the current producer will continue farming the Haugh Family Farm agricultural lands for some time. However, if the producer were to stop farming all or a portion of the Haugh agricultural fields in the future, the Township is not prepared technically or financially to transition aquacultural fields to forest, which is required by the conservation easement.

See Recommendations Table (Table 10) for specific agricultural management recommendations, prioritization, timeline, and budget considerations.

### *Goal 5: Conduct outreach to promote recreational use of the Open Space properties*

A primary objective of Patton Township's Open Space Program is to provide residents with the opportunity to connect to nature through passive, low-impact recreational activities on Open Space properties. While there are several trails currently located on the Haugh Family Preserve and Gray's Woods Preserve, these trails were established before acquisition of these properties and without consideration of property boundaries (i.e., SGL 176 and private properties) or sensitive natural resources known to occur on the property (Figure 22). A few examples include the powerline right-of-way, wetlands, and Gray's Woods clay pit that are all known to, or have the potential to, support many SGCN. The development of an Open Space Recreation Plan should be created by an experienced recreational planner early in this management period to enhance sustainable recreational opportunities of open space properties, address conflicts with neighboring property owners, and protect sensitive natural resources. Considerations for trailheads, on-site directional and educational signage, digital and hardcopy maps, etc. should be included in this planning process.

It is recommended that a comprehensive Open Space Recreational Plan be completed for the Haugh Family Preserve, Gray's Woods Preserve, and the Marjorie D. Seward Preserve so that all planning and resulting outcomes are consistent across all open space properties, to enable the Township to prioritize implementation activities for all open space properties in context with each other, and to increase cost-efficiency.

See Recommendations Table (Table 10) for specific recreation recommendations, prioritization, timeline, and budget considerations.

### *Goal 6: Promote educational and research opportunities*

The OSSC has a strong desire to provide public engagement and educational opportunities associated with the Open Space properties and started an initial list of ideas during the 2021 Management Goal Review process (see Appendix H). During this process, several challenges and considerations were also identified including staff and volunteer capacity to coordinate and manage educational and outreach events, staff and volunteer capacity to develop educational materials, and budget impacts associated with proposed education and outreach activities.

The Scotia region has been a long-standing area of researchers interested in studying the diverse and unique natural resources of the area. It is recommended that the Township develop a research policy for all Open Space Properties to increase awareness of research activities and ensure that all data and findings from research projects are shared with the Township. When data gaps or research needs are identified by the OSSC or their consultants, researchers should be invited and encouraged to help fill these needs.

See Recommendations Table (Table 10) for specific education and research recommendations, prioritization, timeline, and budget considerations.

*Goal 7: Establish a long-term financial strategy for the Open Space Program management and operations*

Development of a long-term financial strategy for the Open Space Program is recommended to ensure that the Township is financially able to fulfill legal obligations created by the Haugh Family Preserve and Gray's Woods Preserve conservation easements, fulfill Management Goals identified by the OSSC,

and properly steward all Open Space properties through time. See Recommendations Table (Table 10) for specific recommendations to create a long-term financial strategy, prioritization, timeline, and budget considerations. In 2025, projects less than \$12,900 do not require a formal quote process. Projects between \$12,900 and \$23,800, require three quotes to be submitted and projects over \$23,800 must be bid.

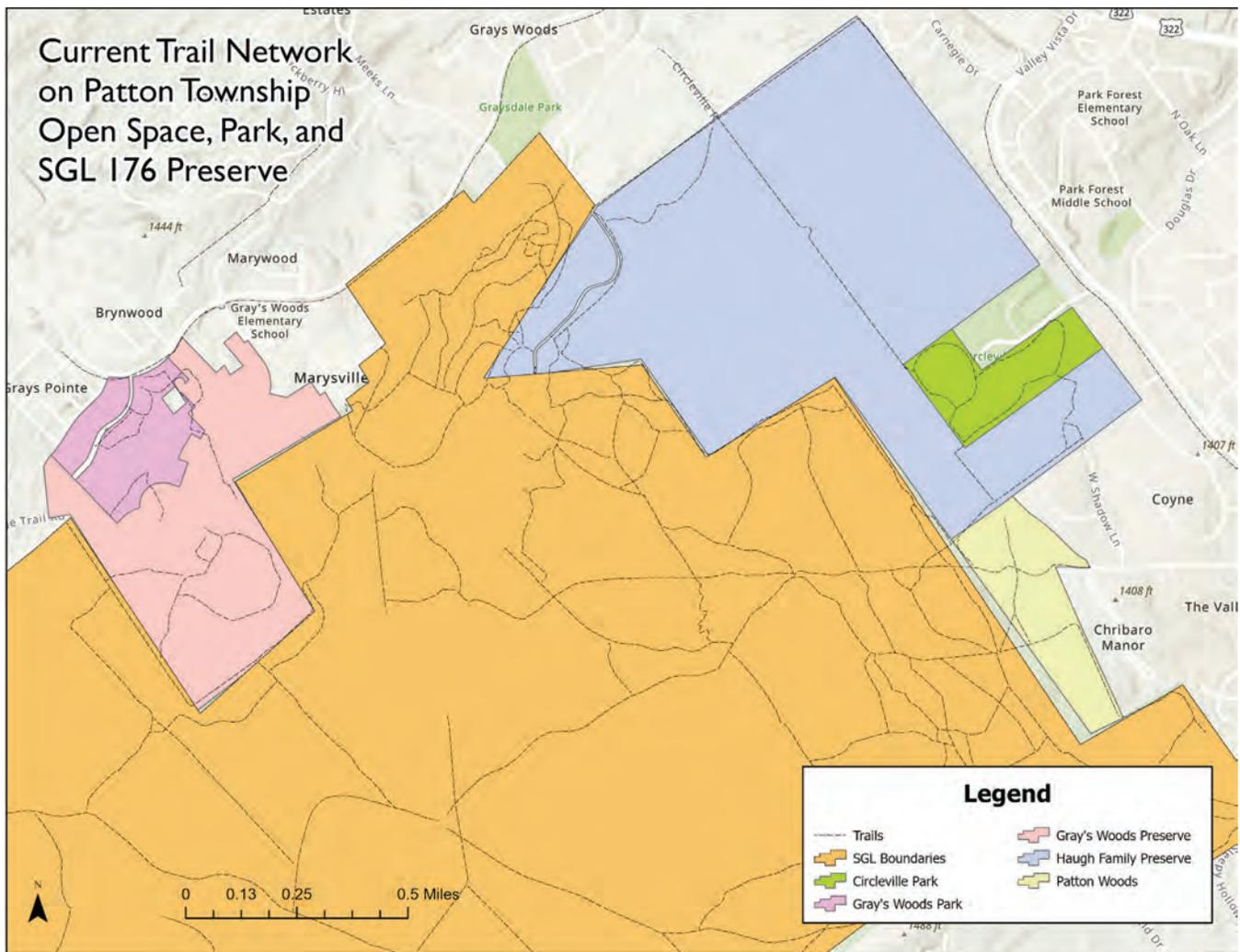


Figure 22. Current trail network on Patton Township Open Space and Park properties and SGL 176.

**Table 10: Recommendations Table**

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 1: Maximize Forest Health and Resiliency</b>				
Tier 1	Forested Habitat	<ul style="list-style-type: none"> <li>Improved forest structure</li> <li>Sufficient forest regeneration</li> <li>Diversified forest age classes to provide diverse habitats</li> <li>Improved native species diversity</li> </ul>	<ul style="list-style-type: none"> <li>Implement management recommendations in the Haugh Family Preserve and Gray's Woods Preserve Forest Management Plan to improve forest health and resiliency (Appalachian Forest Consultants, LLC 2023). Many of these recommendations are a continuation of the original management recommendations from the 2007 Forest Management Plan (Stibler 2007)**</li> </ul>	<ul style="list-style-type: none"> <li>Implement late successional forest management strategy recommendations in the Haugh Family Preserve and Gray's Woods Preserve Forest Management Plan (Appalachian Forest Consultants, LLC 2023) through partnership with the PA Game Commission's 400 Areas Program to increase representation of this forest habitat age class in the Scotia Barrens ecosystem, protect and improve critical upland habitat surrounding isolated wetlands, improve forest structure for late-successional wildlife, (e.g., canopy structure, woody debris, snags), store carbon, and enhance recreational and aesthetic values for users**</li> </ul>
Tier 1	Forested Habitat	<ul style="list-style-type: none"> <li>Minimize non-native invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>Treat non-native invasive species and competitive vegetation as recommended in the 2023 Forest Management Plan (Appalachian Forest Consultants, LLC 2023)**</li> </ul>	
Tier 1	Forested Habitat	<ul style="list-style-type: none"> <li>Sufficient forest regeneration</li> <li>Diversified forest age classes to provide diverse habitats</li> <li>Improved native species diversity</li> </ul>	<ul style="list-style-type: none"> <li>Install deer exclosure fencing around the western portion of MUL to enable regeneration of diverse native species.</li> </ul>	
Tier 1	Forested Habitat	<ul style="list-style-type: none"> <li>Sufficient forest regeneration</li> <li>Diversified forest age classes to provide diverse habitats</li> <li>Improved native species diversity</li> </ul>	<ul style="list-style-type: none"> <li>Monitor the eastern portion of MUL for up to five years to determine if deer exclosure fencing is necessary to achieve Township Management Goals</li> </ul>	
Tier 2	Forested Habitat	<ul style="list-style-type: none"> <li>Minimize non-native invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>Reassess invasive species load and create Invasive Species Work Plan and budget (2026 - 2033) after invasive species management supported by the Hamer Foundation Grant is completed in 2025</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2024-2027 2025-2027	High	<ul style="list-style-type: none"> <li>• PGC 400 Areas Program</li> <li>• Patton Township dedicated millage</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team and PGC	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2024-2025	High	<ul style="list-style-type: none"> <li>• Hamer Foundation</li> <li>• Patton Township dedicated millage</li> <li>• PGC 400 Areas Program</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team and PGC	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> </ul>	2025 2025-2030	High	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> </ul>	2025-2030	Low	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2025	Low	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 1: Maximize Forest Health and Resiliency <i>Continued</i></b>				
Tier 1	Forested Habitat	<ul style="list-style-type: none"> <li>Targeted invasive species are controlled</li> </ul>	<ul style="list-style-type: none"> <li>Implement targeted cork tree treatments in MU L and adjacent farm field (new pollinator management area). Partner with PGC to treat any cork trees on SGL 176, if present</li> </ul>	<ul style="list-style-type: none"> <li>Treat invasive species along trails (former skid trails) and the 1-acre opening as described in the 2023 Forest Management Plan (Appalachian Forest Consultants, LLC 2023)</li> <li>Plant native trees and shrubs to increase shade to achieve rapid canopy closure and reduce the long-term need to treat invasive species</li> </ul>
Tier 2	Forested Habitat	<ul style="list-style-type: none"> <li>Minimize non-native invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>Implement invasive species management annually based on 2025 reassessment and resulting Invasive Species Work Plan. Conduct annual invasive species monitoring to locate newly infested areas and treat new or high priority invasive species (e.g., cork tree, tree of heaven, others TBD)</li> </ul>	
Tier 1	Forested Habitat	<ul style="list-style-type: none"> <li>Minimize invasive forest pests</li> </ul>	<ul style="list-style-type: none"> <li>Survey for and manage forest pests including spongy moth outbreaks while avoiding impacts to non-target wildlife species) **</li> </ul>	
Tier 1	Forested Habitat	<ul style="list-style-type: none"> <li>Improved forest structure and native species diversity</li> <li>Sufficient forest regeneration</li> </ul>	<ul style="list-style-type: none"> <li>Continue to allow and promote deer hunting to reduce over browsing, promote allowable hunting on Open Space Properties on Township website</li> <li>Explore enrollment in PGC's Deer Management Assistance Program (DMAP)</li> </ul>	
Tier 2	Forested Habitat	<ul style="list-style-type: none"> <li>Non-native invasive plant species will no longer be planted on Patton Township Open Space Preserve or other Township-owned properties (Circleville Park, Gray's Woods Park, Patton Woods, Municipal building, along trails, street trees, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Discourage future planting and replace non-native and invasive species in cultural/ maintained areas on Township Open Space properties (e.g., amur cork tree (<i>Phellodendron amurense</i>), bradford/callery pear (<i>Pyrus calleryana</i>), Japanese barberry (<i>Berberis thunbergii</i>), Norway maple (<i>Acer platanoides</i>), burning bush (<i>Euonymus alatus</i>), butterfly bush (<i>Buddleja davidii</i>), etc.)</li> <li>Explore partnership with the Patton Township Parks Program to establish a Township Native Species Policy for Township Open Space, Parks, and possibly other Township-owned properties</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2024-2027	Low	<ul style="list-style-type: none"> <li>• Hamer Foundation</li> <li>• Patton Township dedicated millage</li> <li>• PGC 400 Areas Program</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	Annually starting in 2026	Moderate to High	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> </ul>	Staff	Woods and Waters Consulting Team	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2025 and then as needed as determined by Forester	Low for Survey Moderate to High for Implementation	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> </ul>	Staff	Woods and Waters Consulting Team	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	Annually starting in 2024	Low, Primarily Staff Time	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> </ul>	Staff	Staff, Open Space Stewardship Committee lead	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2025	Low, Primarily Staff Time	<ul style="list-style-type: none"> <li>• Patton Township</li> </ul>	Staff	Staff and Open Space Stewardship Committee lead	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 2: Protect And Enhance Wetlands, Vernal Pools And Critical Upland Habitat</b>				
Tier 2	Wetlands	<ul style="list-style-type: none"> <li>Impacts from stormwater runoff to the Gray's Woods Wetland Complex are minimized or eliminated</li> </ul>		<ul style="list-style-type: none"> <li>In conjunction with Patton Township Parks Program, establish a collaborative partnership with Gray's Woods Partnership (owner of Palustrine Lane), Penn State Center for Dirt and Gravel Road Studies, State College Borough Water Authority, and the Centre County Conservation District to address stormwater runoff and other road impacts to the Gray's Woods Wetland Complex located on the Gray's Woods Preserve and Park</li> <li>Explore Township Municipal Separate Storm Sewer System (MS4) crediting for stormwater improvements</li> <li>Develop a scope of work and possible funding sources</li> </ul>
Tier 1	Wetlands	<ul style="list-style-type: none"> <li>Impacts from stormwater runoff to the Gray's Woods Wetland Complex are minimized or eliminated</li> </ul>		<ul style="list-style-type: none"> <li>Request communication from PA DEP, Centre County Conservation District, and/or PA Fish and Boat Commission for the OSSC that would provide an overview of the Gray's Woods Planned Community stormwater permits, violations that have occurred to date and expectations moving forward</li> <li>Identify an Open Space Committee member(s) and/or Patton Township resident(s) to monitor the severity and impact of stormwater runoff to the Gray's Woods wetland complex located on the Gray's Woods Preserve and Park from 1) Palustrine Lane and 2) the Gray's Woods Planned Community stormwater facilities (see Wilson 2023). Report all stormwater impacts to the Centre County Conservation District, PA Department of Environmental Protection, and the PA Fish and Boat Commission</li> </ul>
Tier 1	Wetlands	<ul style="list-style-type: none"> <li>Stewardship of the Gray's Woods Wetland Complex is maximized</li> </ul>		<ul style="list-style-type: none"> <li>Collaborate with the Patton Township Parks Program to realign the property boundary between the Gray's Woods Preserve and Gray's Woods Park to reduce management challenges</li> <li>Collaborate with the Patton Township Parks Program to identify joint management goals and actions for Gray's Woods Vernal Pool Complex located on the Gray's Woods Park and Gray's Woods Preserve (cross boundary management)</li> </ul>
Tier 1	Wetlands	<ul style="list-style-type: none"> <li>Wetlands are protected by 100' forested buffers</li> </ul>	<ul style="list-style-type: none"> <li>Establish a wetland buffer policy to protect and maintain a 100' forested buffer around all forested wetlands* to protect critical upland habitat for migratory vernal pool and other wetland species. Considerations for the buffer policy should include: allowing non-commercial forest management (i.e., for forest health improvements and safety concerns), seasonal restrictions, minimal soil disturbance, prohibit heavy equipment use off trail or off road</li> </ul> <p>*The proposed wetland buffer policy would apply to wetlands that are currently in forested settings. Wetlands that are currently in agricultural fields are addressed under Goal 4.</p>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2025-2028	Low	• Patton Township	Staff	Staff and Open Space Stewardship Committee lead	
<ul style="list-style-type: none"> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2024 2025 2026 Ongoing	Low Staff and Volunteer Time	• Patton Township	Staff	Staff and Open Space Stewardship Committee lead	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2025	Moderate Staff and Volunteer Time	• Patton Township	Staff	Staff, Open Space Stewardship Committee lead, and ClearWater Conservancy	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2025	Low Staff Time	• Patton Township	Staff	Staff and Open Space Stewardship Committee lead	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 2: Protect And Enhance Wetlands, Vernal Pools And Critical Upland Habitat <i>Continued</i></b>				
Tier 2	Wetlands	<ul style="list-style-type: none"> <li>Wetlands are protected by 100' forested buffers</li> </ul>	<ul style="list-style-type: none"> <li>Assess wetlands located in agricultural fields to identify opportunities and priorities to establish protective forested riparian buffers and reconnect pools to forested areas to improve migration between habitats (Wilson 2023a)</li> <li>Work with tenant farmer to determine interest and willingness remove high-priority wetlands from the agriculture lease to establish protective buffers</li> </ul>	
Tier 2	Wetlands	<ul style="list-style-type: none"> <li>Trash is removed from Wetland 25 (Wilson 2023)</li> </ul>	<ul style="list-style-type: none"> <li>Partner with ClearWater Conservancy to include Wetland 25 in 2024 Watershed Cleanup Day</li> </ul>	
<b>Goal 3: Enhance habitat for rare, threatened, and endangered species</b>				
Tier 1	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>Habitat for rare, threatened, and endangered species is enhanced and expanded</li> </ul>	<ul style="list-style-type: none"> <li>Continue and expand Habitat Management for Rare Butterflies and Bees project to restore early successional habitat targeting host plants for specialist pollinators (i.e., butterflies, moths, and bees) in partnership with WPC PA Natural Heritage Program and USFWS (see Frosted Elfin Management Plan (Leppo 2023))</li> </ul>	
Tier 2	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>Habitat for rare, threatened, and endangered species is enhanced and expanded</li> </ul>	<ul style="list-style-type: none"> <li>Establish new pollinator management area near MU K and MUL after invasive species are treated and reasonably controlled. Re-assess this site two or three years after invasive control to determine if seeding is necessary. Coordinate with agricultural producer.</li> </ul>	
Tier 1	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>Existing wild blue lupine population is maintained</li> </ul>	<ul style="list-style-type: none"> <li>Continue wild blue lupine management in partnership with Wilson Ecological Consulting, USFWS Partners for Wildlife, and DCNR Bureau of Forestry, Ecological Services Section</li> </ul>	
Tier 2/3	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>Minimize invasive species seed sources and increase pollinator habitat on adjacent Patton Township Properties</li> </ul>	<ul style="list-style-type: none"> <li>Approach Patton Township Parks Program to establish a partnership to treat invasive species and establish pollinator habitat at Circleville Park and to treat invasive species at Gray's Woods Park</li> <li>Determine scope of work and estimated budget, identify funding sources, and write grant proposal(s) to support this work</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2026-2034	Low \$1,000	• Patton Township	Staff, Open Space and Stewardship Committee lead, and consultant	Staff, Open Space and Stewardship Committee lead, and consultant	
<ul style="list-style-type: none"> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2024	Low Staff and Volunteer Time	• Patton Township	Staff	Staff and Open Space Stewardship Committee lead	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2024-2033	Low to Moderate	<ul style="list-style-type: none"> <li>• USFWS in-kind contribution</li> <li>• Hamer Foundation</li> <li>• Patton Township dedicated millage</li> <li>• Outside funding sources</li> </ul>	Betsy Leppo, WPC PNHP and Nicole Ranalli, USFWS in partnership with Dan Lowenstein, West Penn/First Energy and Eric Erdman, PA Game Commission	USFWS Partners for Wildlife, WPC Natural Heritage Program, Appalachian Forest Consultants, Private Contractor	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2025-2026	Moderate	<ul style="list-style-type: none"> <li>• Hamer Foundation</li> <li>• Patton Township dedicated millage</li> <li>• Outside funding sources</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team	
<ul style="list-style-type: none"> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2024-2033	Low	<ul style="list-style-type: none"> <li>• USFWS in-kind contribution</li> <li>• Patton Township dedicated millage</li> </ul>	Wilson Ecological Consulting in consultation with DCNR Bureau of Forestry Ecological Services, WPC PA Natural Heritage Program	Contractor, USFWS Partners for Wildlife	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2025 Discussion 2025-2030 Implementation	Low to Moderate	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> <li>• Outside funding</li> </ul>	Staff, forester, and consultant	Forester, contractor(s), and Township Public Works	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 3: Enhance habitat for rare, threatened, and endangered species <i>Continued</i></b>				
Tier 3	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>Habitat for rare, threatened, and endangered species is enhanced and expanded</li> </ul>		<ul style="list-style-type: none"> <li>After stormwater management issues along Heritage Trail Road are addressed, assess site to identify proper vegetation management to minimize invasive species colonization and maximize pollinator opportunities</li> </ul>
Tier 2	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>Additional habitat for rare, threatened, and endangered species is conserved</li> </ul>		<ul style="list-style-type: none"> <li>Implement early successional habitat recommendations in the Haugh Family Preserve and Gray's Woods Preserve Forest Management Plan (Wolf 2023) to maintain and expand habitat for pollinator and tiger beetles around the clay pit**</li> <li>Re-assess site to evaluate success and future habitat management needs</li> </ul>
Tier 3	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>Additional habitat for rare, threatened, and endangered species is conserved</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate conservation options (i.e., new open space Acquisition or conservation easement) for adjoining parcels that may provide additional high-priority habitat for rare, threatened and endangered species and charismatic species such as tiger beetles</li> <li>Conservation partners including WPC Natural Heritage Program, USFWS Partners for Wildlife, and DCNR Bureau of Forestry Ecological Services Section may have interest in working with a neighboring landowner to expand pollinator management efforts</li> <li>It is possible that Open Space land acquisition of adjoining lands is not an option but partners such as ClearWater Conservancy or other partnering land trust could be encouraged to explore landowner interest to place conservation easements, on adjoining properties with high conservation values</li> </ul>	
Tier 3	Pollinator/ Barrens Habitat Management	<ul style="list-style-type: none"> <li>New wild blue lupine populations are established on the preserve</li> </ul>	<ul style="list-style-type: none"> <li>Consider introducing wild blue lupine into early successional habitats within the preserve</li> </ul>	<ul style="list-style-type: none"> <li>Considering introducing wild blue lupine into early successional habitats within the preserve (clay pit and ROW along Heritage Trail Road)</li> </ul>
Tier 3	Eastern big sand tiger Beetle	<ul style="list-style-type: none"> <li>Complete survey for eastern big sand tiger beetle</li> </ul>	<ul style="list-style-type: none"> <li>Survey for eastern big sand tiger beetle to determine if new/expanded/restored habitat (adjoining private property to Haugh Family Preserve and the clay pit on Gray's Woods) supports this critically imperiled species of tiger beetle</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2029	Moderate to High	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> <li>• Outside funding</li> </ul>	Staff, consultant	Contractor	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2025-2028 Implementation 2028 Re-assess	Moderate	<ul style="list-style-type: none"> <li>• Hamer Foundation</li> <li>• PA Game Commission 400 Areas Program</li> <li>• Patton Township dedicated millage</li> </ul>	Staff and Woods and Waters Consulting Team	Woods and Waters Consulting Team, contractor, PA Game Commission	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2030-2033	Moderate to High	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> <li>• Outside funding</li> </ul>	Staff and WPC Natural Heritage Program	TBD pending scope of work	
<ul style="list-style-type: none"> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2028-2033	Low	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> <li>• Outside funding</li> <li>• USFWS in-kind contribution</li> </ul>	Staff and WPC Natural Heritage Program in consultation with DCNR Bureau of Forestry Ecological Services Section	WPC Natural Heritage Program in consultation with DCNR Bureau of Forestry Ecological Services Section, USFWS Partners for Wildlife	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2026 2030-2033	Low	<ul style="list-style-type: none"> <li>• WPC Natural Heritage Program in-kind service</li> <li>• Patton Township dedicated millage</li> </ul>	Staff	WPC Natural Heritage Program	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 4: Encourage regenerative and sustainable agricultural practices that support farm productivity, increase soil health, protect local water quality, meet state requirements and support the Township's Chesapeake Bay watershed goals</b>				
Tier 1	Agricultural Management	<ul style="list-style-type: none"> <li>• Agricultural production on the Haugh Family Preserve is in compliance with state regulations</li> <li>• Water quality and quantity is protected</li> </ul>	<ul style="list-style-type: none"> <li>• Review current agricultural lease agreement and consider adding a requirement to have all required conservation plans in place and current</li> <li>• Review market rental rate and compare to current market rate</li> <li>• Review agricultural lease every 10 years as part of the Conservation Plan update process</li> </ul>	
Tier 1	Agricultural Management	<ul style="list-style-type: none"> <li>• Strong and friendly working relationship with the producer</li> </ul>	<ul style="list-style-type: none"> <li>• Contact tenant farmer to talk about mutual goals and long-term plans, learn about their operation, opportunities to maximize soil health, protect water quality and quantity and also provide an update on the Township's recent conservation planning efforts</li> </ul>	
Tier 1	Agricultural Management	<ul style="list-style-type: none"> <li>• Strong and friendly working relationship with the producer</li> <li>• Rare habitats are enhanced</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss farmer willingness to allow the Township to treat invasive species (e.g., cork tree, Japanese barberry, autumn olive, etc.) and create a pollinator habitat management area in the corner of the agricultural field at the northwest corner of MU L</li> </ul>	
Tier 1	Agricultural Management	<ul style="list-style-type: none"> <li>• Strong and friendly working relationship with the producer</li> <li>• Rare habitats are enhanced</li> </ul>	<ul style="list-style-type: none"> <li>• Review wetland locations in agricultural fields with Producer and discuss restoration opportunities</li> </ul>	
Tier 1	Agricultural Management	<ul style="list-style-type: none"> <li>• Strong and friendly working relationship with the producer</li> <li>• Agricultural production on the Haugh Family Preserve is in compliance with state regulations</li> <li>• Water quality and quantity is protected</li> </ul>	<ul style="list-style-type: none"> <li>• In partnership with the producer and the Centre County Conservation District or NRCS, review their existing conservation plan to determine if there are opportunities or needs to 1) update the conservation plan and 2) implement additional Best Management Practices (BMPs) to provide additional resource protection or enhancement (e.g., cover crops to reduce stormwater runoff and increase groundwater infiltration)</li> <li>• Explore opportunities for Patton Township to obtain MS4 credits by assisting the producer with BMP implementation</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
	2024/2025	Staff Time	• Patton Twp dedicated millage	Staff and Open Space Stewardship Committee lead	Staff	
	2025	Low	• Patton Twp dedicated millage	Staff and Open Space Stewardship Committee lead	Staff	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance Habitats for Rare Species</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2025	Low	• Patton Twp dedicated millage	Staff and Open Space Stewardship Committee lead	Staff and Consultant	
<ul style="list-style-type: none"> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance Habitats for Rare Species</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	2025	Low	• Patton Twp dedicated millage	Staff and Open Space Stewardship Committee lead	Staff and Consultant	
<ul style="list-style-type: none"> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2025/2026	Staff Time	• Patton Twp dedicated millage	Staff and Open Space Stewardship Committee lead	Staff and Consultant	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 4: Encourage regenerative and sustainable agricultural practices that support farm productivity, increase soil health, protect local water quality, meet state requirements and support the Township's Chesapeake Bay watershed goals <i>Continued</i></b>				
Tier 1	Agricultural Management	<ul style="list-style-type: none"> <li>• Strong and friendly working relationship with the producer</li> <li>• Agricultural production on the Haugh Family Preserve is in compliance with state regulations</li> <li>• Water quality and quantity is protected</li> <li>• Climate resiliency is improved</li> </ul>	<ul style="list-style-type: none"> <li>• In partnership with the producer, explore enrollment in PA Sustainable Agriculture's (PASA) Climate-Smart Farming and Marketing Program <a href="https://climatesmart.org/">https://climatesmart.org/</a> to improve soil health and climate resiliency</li> </ul>	
Tier 3	Agricultural Management	<ul style="list-style-type: none"> <li>• Agricultural production continues as long as there is an interested producer willing to lease the agricultural fields</li> <li>• Native plant communities are re-established if agricultural production stops</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a contingency plan to restore agricultural fields if agricultural production were to stop for any reason</li> </ul>	
<b>Goal 5: Conduct outreach and education to promote recreational use of the Open Space properties</b>				
Tier 1	Recreational Use and Public Engagement	<ul style="list-style-type: none"> <li>• A sustainable trail plan with improved trail media to encourage responsible public use of the Open Space properties</li> <li>• Increase public awareness, appreciation, and engagement with Open Space properties</li> </ul>	<ul style="list-style-type: none"> <li>• Retain a recreational specialist to develop a trail plan for the Haugh Family Farm Preserve, Gray's Woods Preserve, and Marjorie D. Seward Preserve that includes an assessment of the current trail systems (trails, trailheads, on-site signage), identification of recreational needs and opportunities, community engagement, and a sustainable budget</li> <li>• NOTE: Partnership with the PA Game Commission on the development of this plan will be important to ensure that current and proposed recreational uses do not create user conflicts for either Patton Township or the PA Game Commission (adjacent land landowner and partner)</li> <li>• Partner with Purple Lizard Maps to include updated trails and trailheads on future versions of Purple Lizard Map's Scotia (Pennsylvania State Game lands 176) Trail Map</li> <li>• Create trailhead/trail media (e.g., on site signage/maps, hardcopy Township Open Space Trail Map, website)</li> <li>• Identify opportunities to engage the public (e.g., participating in the development of a recreation plan, naming trails, etc.)</li> </ul>	
Tier 1	Public Engagement	<ul style="list-style-type: none"> <li>• Maximize use of the Community Gardens, support locally produced foods, and build a sense of community.</li> </ul>	<ul style="list-style-type: none"> <li>• Promote Community Gardens</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
	2024-2025	Low	• Patton Twp dedicated millage	Staff or Consultant	Consultant	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2026-2027	Low	• Patton Twp dedicated millage	Staff	Consultant	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Promote education and research opportunities</li> </ul>	2025-2026 for Planning 2026-2033 for Implementation	Moderate for planning Moderate to High for Implementation	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> <li>• Grants</li> </ul>	Staff and Open Space Stewardship Committee lead	Consultants	
<ul style="list-style-type: none"> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	Annually	Staff and Volunteer Time Low	• Patton Township dedicated millage	Staff and Volunteers	Staff and Volunteers	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 6: Promote education and research opportunities</b>				
Tier 1	Public Engagement	<ul style="list-style-type: none"> <li>To begin intentional outreach and educational actions that will engage the community and promote Patton Township's Open Space Program</li> <li>To determine what level of outreach and educational effort is feasible with existing capacity (i.e., staff, volunteers, and funding)</li> <li>To determine what level of additional funding would be necessary to implement priority activities</li> </ul>	<ul style="list-style-type: none"> <li>Hold a facilitated discussion of the Open Space and Stewardship Committee to develop an outreach and educational workplan including goals, objectives and priorities, recognizing that each activity will require some level of Township staff and budgetary support, funding, and an individual volunteer and/or partner organization champion</li> <li>See OSSC ideas generated during the 2021 Management Goal Review process (Appendix F)</li> </ul>	
Tier 2	Public Engagement	<ul style="list-style-type: none"> <li>Patton Township is aware of research interests of Open Space properties and receives electronic and hard copies of project outcomes (e.g., final reports, supporting data (e.g., shapefiles, species lists, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Adopt and promote a Township policy for research proposed on Open Space Properties</li> <li>Provide research policy on Township website, etc.</li> </ul>	
Tier 3	Research and Monitoring Needs	<ul style="list-style-type: none"> <li>Priority research is advanced</li> </ul>	<ul style="list-style-type: none"> <li>Identify research priorities, monitoring needs and data gaps to advance Conservation Plan goals in partnership with WPC Natural Heritage Program and DCNR Bureau of Forestry Ecological Services Section, and USFWS</li> <li>Identify and encourage academic and conservation partners to address research needs</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2026-2027	Low	<ul style="list-style-type: none"> <li>• Patton Twp dedicated millage</li> </ul>	Staff	Staff, Open Space Stewardship Committee lead and/or Consultant	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2026-2027	Primarily Staff Time Low	<ul style="list-style-type: none"> <li>• Patton Twp dedicated millage</li> </ul>	Staff and Open Space Stewardship Committee lead	Staff	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> </ul>	Ongoing	Low	<ul style="list-style-type: none"> <li>• Patton Twp dedicated millage</li> </ul>	Staff and Open Space Stewardship Committee lead	PA Natural Heritage Program, WPC Natural Heritage Program, DCNR Ecological Services, USFWS, Penn State and other universities	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 7: Establish a long-term financial strategy for the Open Space Program management and operations</b>				
Tier 1	Sustainable Program Budget	<ul style="list-style-type: none"> <li>Township staff and Open Space Stewardship Committee have a firm understanding of annual financial resources, expenses, and has developed prioritized work plans</li> </ul>	<ul style="list-style-type: none"> <li>Township Manager presents an annual budget to the Open Space Stewardship Committee that clearly communicates revenues and expenses</li> <li>Open Space Stewardship Committee identifies annual work plans supported by the Open Space budget to advance program priorities</li> </ul>	
Tier 1	Sustainable Program Budget	<ul style="list-style-type: none"> <li>Increased funding for forest management and technical assistance for Gray's Woods Preserve</li> <li>Improved partnership with PA Game Commission</li> <li>Increase efficiency and ecological impact through cross-boundary management</li> </ul>		<ul style="list-style-type: none"> <li>Enroll in the Pennsylvania Game Commission's 400 Areas Program in 2024 to obtain financial and technical support from the PA Game Commission to implement high-priority forest management activities (Wolf 2023)</li> <li>Reconsider enrolling the Haugh Family Preserve in the 400 Areas Program after working with the PGC's 400 Areas Program on the Gray's Woods Property for a few years and after the recreational/trail plan is completed</li> </ul>
Tier 2	Sustainable Program Budget	<ul style="list-style-type: none"> <li>Increased funding for Open Space management and public engagement</li> </ul>	<ul style="list-style-type: none"> <li>Identify new funding opportunities for priority management recommendations to advance and fulfill the Township's Open Space Goals</li> <li>Explore the possibility of creative funding streams (e.g., a "Friends of Patton Township Open Space", a new endowment at the Centre Foundation, etc.)</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> </ul>	Annually 2024-2033	Staff Time Low	<ul style="list-style-type: none"> <li>• Patton Township dedicated millage</li> </ul>	Staff	Staff and Open Space Stewardship Committee	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2024/2025	Low	<ul style="list-style-type: none"> <li>• Pennsylvania Game Commission's 400 Areas Program</li> </ul>	Staff and Woods and Waters Consulting Team	Pennsylvania Game Commission, Appalachian Forest Consultants	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2025-2033	Staff and Volunteer Time Low	<ul style="list-style-type: none"> <li>• Patton Twp dedicated millage</li> </ul>	Staff	Staff and Open Space Stewardship Committee lead	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

**Table 10: Recommendations Table *Continued***

Priority Level	Conservation Target	Desired Outcomes	Haugh Family Preserve	Gray's Woods Preserve
<b>Goal 7: Establish a long-term financial strategy for the Open Space Program management and operations <i>Continued</i></b>				
Tier 3	Program Sustainability and Impact	<ul style="list-style-type: none"> <li>• Increase staff capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Hire a dedicated Land Stewardship Specialist (long-term goal) or contract with a forester (short-term option) to provide management oversight of the natural areas of the Township's open space properties</li> <li>• The Township's Land Stewardship Specialist would be responsible for the day-to-day management of implementing the recommendations identified in this plan. At a minimum, the ideal candidate for this position would have a Bachelor's degree in natural resource management but a forestry degree is preferred.</li> </ul>	
Tier 1	Sustainable Program Budget	<ul style="list-style-type: none"> <li>• Patton Township is prepared financially and logistically to update the Conservation plan and Forest Management Plan for the Haugh Family Preserve and Gray's Woods Preserve in 2033</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a strategy and budget to update the Conservation Plan and Forest Management Plan so that both documents are in place and ready for implementation by December 2033</li> </ul>	

Other Goals Addressed	Schedule*	Estimated Budget Level	Funding Source	Manager / Coordinator	Likely Implementer	Mark Done
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2030-2033	Moderate to High	<ul style="list-style-type: none"> <li>• Patton Twp dedicated millage</li> </ul>	Staff	Staff	
<ul style="list-style-type: none"> <li>• Goal 1: Forest Health and Resiliency</li> <li>• Goal 2: Protect and enhance wetlands, vernal pools and critical upland habitat</li> <li>• Goal 3: Enhance habitat for rare, threatened, and endangered species</li> <li>• Goal 4: Encourage regenerative and sustainable agricultural practices</li> <li>• Goal 5: Conduct outreach to promote recreational use of Open Space Properties</li> <li>• Goal 6: Promote educational and research opportunities</li> <li>• Goal 7: Establish long-term financial strategy for the Open Space Program management and operations</li> </ul>	2031	Moderate to High	<ul style="list-style-type: none"> <li>• Patton Twp dedicated millage</li> </ul>	Staff	Staff	

\*The recommended implementation schedule should be discussed and prioritized annually with guidance from the WWC Consulting Team.

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# Appendices

- [Page 90: Appendix A: 2001 and 2014 Patton Township Open Space Referendum Language and Patton Township Code, Chapter 110: Open Space and Recreation Areas](#)
- [Page 93: Appendix B: Haugh Family Preserve Conservation Easement](#)
- [Page 113: Appendix C: Gray’s Woods Conservation Easement](#)
- [Page 135: Appendix D: Haugh Family Preserve Conservation Easement Amendment \(2007\)](#)
- [Page 139: Appendix E: Review of forest management activities conducted on the Haugh Family Preserve \(2007 – 2019\)](#)
- [Page 156: Appendix F: Gray’s Woods Forest Resources Inventory Report](#)
- [Page 173: Appendix G: Conservation Opportunities Area Tool Report \(2023\)](#)
- [Page 217: Appendix H: Management Goal Review and Summary for Patton Township’s Haugh Family Preserve and Gray’s Woods Park and Preserve, July 19, 2021](#)
- [Page 222: Appendix I: Pennsylvania Game Commission Administrative Chapter 10: “400 Areas” – Other Governmental Wildlife Habitat Areas Program](#)
- [Page 225: Appendix J: Wild Blue Lupine \(\*Lupinus perennis\*\) Restoration on the Haugh Family Preserve Report \(2017\)](#)
- [Page 234: Appendix K: U.S. Fish and Wildlife Service Habitat Improvements Report \(2020\)](#)
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# Appendix A

2001 and 2014 Patton Township Open Space Referendum Language and Patton Township Code,  
Chapter 110: Open Space and Recreation Areas



## **2014 ELECTION NOTICE**

### **PATTON TOWNSHIP REFERENDUM FOR OPEN SPACE ACQUISITION**

The Patton Township Board of Supervisors has placed a question on the November 4<sup>th</sup> ballot for the voters of the Township. The question will be:

“Shall debt in the sum of 3,500,000 dollars for the purpose of financing acquisition of development rights, conservation easements, and land for the preservation of open space be authorized to be incurred as debt approved by the electors?”

If approved by the voters, the Township would retire the debt by enacting a property tax increase of 0.6 mills beginning in 2016. For more information visit the Township website at <http://twp.patton.pa.us/> or call the Township office at 234-0271.

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### **2014 Open Space Survey**

Patton Township surveyed residents and property owners in March & April of 2014. We found 78.56% supported dedicating a portion of their property taxes to acquire and preserve additional Open Space lands in the Township. When asked about support for a specific increase in the tax rate, 67.56% of respondents indicated support for an increase of 0.6 mills or more.

### **The Proposal**

An increase of 0.6 mills of property tax would increase the property taxes on a home with a market value of \$250,000 by \$42.60.

The Township will only deal with willing sellers; no adverse actions will be taken to obtain Open Space property.

### **The 2001 Experience**

Following a similar survey, 63% of the voters approved a borrowing of \$2,500,000 for open space preservation. The final payments on that Bond issue will be made in 2014.

In January of 2006, through the great generosity of Hubie and Helen Haugh, the Township was able to purchase the Haugh Family Farm. While the property, 465 acres, was appraised at over \$8,000,000, the Haugh siblings accepted the available \$2,500,000. The Haughs then established an endowment of \$300,000 at the Centre Foundation to provide funds for the perpetual maintenance of the property. The Township also has set aside an endowment fund to maintain the property.

*Township of Patton, PA  
Friday, January 22, 2021*

## Chapter 110. Open Space and Recreation Areas

### § 110-1. Intent.

Patton Township has designated certain Township-owned properties as recreation areas, distinct from active parkland, and has acquired or is in possession of other certain open space properties specifically designated to be preserved from development as residential, commercial, industrial, or nonrecreational public uses. Recreation areas are intended to provide recreational opportunities, such as, but not limited to, hiking, nature enjoyment and cross-country skiing, that create minimal impacts on the natural landscape. Standards of conduct are provided to promote responsible use and enjoyment of these properties by residents and other users.

# Appendix B

Haugh Family Preserve Conservation Easement

Campbell  
14-6  
49.51

RECORD  
RECORDED ON THE INDICATED  
DATE & TIME IN THE ABOVE BOOK & PAGE  
INST #



001934

2005 DEC 30 P 1:27

**DECLARATION OF  
CONSERVATION EASEMENT**

*Joseph L. Davidson*

THIS CONSERVATION EASEMENT is dated as of December 29, 2005 (the "Easement Date") by Hubert H. Haugh and Helen Haugh, brother and sister, of 335 Arbor Way, State College, Pennsylvania, (hereinafter referred to a "Declarants").

**BACKGROUND**

The Declarants are the Owners of a tract of land consisting of 465.97 acres located in Patton Township, Centre County, Pennsylvania as more fully described on Exhibit "A" attached hereto and also being referred to as Centre County Tax Parcel 18-3-61.

The Declarants have entered into an agreement with Patton Township, Centre County, Pennsylvania (hereinafter referred to as "Holder"), whereby Declarants have agreed to convey the premises to Holder upon certain terms and conditions, one of which being the execution and recordation of a conservation easement prior to closing and delivery of the deed to the Holder.

The Declarants therefore execute this Declaration pursuant to the terms of the agreement which terms are incorporated herein by reference and made a part hereof.

Now therefore, Declarants declare that the real property described on Exhibit "A" attached hereto is and shall be held and occupied subject to all the covenants, conditions and restrictions set forth herein, which covenants, conditions and restrictions shall be construed as covenants running with the land and binding upon whosoever shall own or acquire the premises, as follows:

**ARTICLE I.**

**1.01 Property**

The undersigned Owners are the sole owners in fee simple of the Property described in Exhibit "A" (the "Property").

**1.02 Conservation Plan**

Attached as Exhibit "B" is a survey or other graphic depiction of the Property.

**1.03 Conservation Objectives**

This Conservation Easement provides protection of the property so as to achieve the goals and resources protection objectives for the Property set forth below:

**(a) Resource Protection Objectives**

**(i) Water Resources.** This Conservation Easement seeks to protect both the quality and quantity of water resources and watershed. These measures help to protect water resources from sediment and non-point pollution and

promote the infiltration, detention and natural filtration of storm water. The restrictions also preserve habitat for Native Species dependant on water resources.

- (ii) **Forest and Woodland Resources.** This Conservation Easement seeks to promote biological diversity and to perpetuate and foster the growth of a healthy and unfragmented forest or woodland. Features to be protected include Native Species; continuous canopy with multi-tiered under story of trees, shrubs, wildflower and grasses; natural habitat, breeding sites and corridors for the migration of birds and wildlife. Species other than Native Species often negatively affect the survival of Native Species and disrupt the functioning of ecosystems. Trees store carbon, offsetting the harmful by products of burning fossil fuels and trap air pollution particles, cleaning air.
- (iii) **Wildlife Resources.** This Conservation Easement seeks to protect large intact areas of wildlife habitat and connect patches of wildlife habitat. Large habitat patches typically support greater bio-diversity and can maintain more ecosystem processes than small patches. Large intact habitats over time. Fragmentation of large habitats often decreases the connectivity of systems, negatively affecting the movement of species necessary for fulfilling nutritional or reproductive requirements.
- (iv) **Scenic Resources.** This Conservation Easement seeks to preserve the relationship of scenic resources within the Property to natural and scenic resources in its surrounds and to protect scenic vistas visible from public rights-of-way and other public access points in the vicinity of the Property.

(b) **Goals**

- (i) This Conservation Easement seeks to protect natural resources so as to keep them in an undisturbed state except as required to promote and maintain a diverse community of predominantly Native Species, and to promote good stewardship so that its soil, forest and other resources will be available for a variety of Sustainable uses and activities.

1.04 **Charitable Contribution**

(a) **Qualified Conservation Contribution**

This Conservation Easement has been donated in whole or in part to Holder by the undersigned Declarants. This Conservation Easement is intended to qualify as a charitable donation of a partial interest in real estate (as defined under §170 (f)(3)(B)(iii) of the Code, a "Qualified Conservation Contribution") to a qualified organization (as defined in §1.70 (A-14)(c)(1) of the Regulations, a "Qualified Organization).

(b) **Public Benefit**

Public policy statements and other factual information support the significant public benefit of this Conservation Easement as defined in §1.170A-14(d)(4)(iv) of the Regulations.

(c) **Mineral Interests**

No Person has retained a qualified mineral interest in the Property of a nature that would disqualify the Conservation Easement for purposes of §1.170A-14(g)(4) of the Regulations

(d) **Property Right**

The undersigned Declarants agree that this Conservation Easement gives rise to a property right, which will vest in the Holder with a Market Value that is at least equal to the Proportionate Value of this Conservation Easement as of the Easement Date.

**1.05 Holder**

Patton Township, a second class Township located in Centre County, Pennsylvania, is intended to be the Holder of this Conservation Easement as outlined and required by an agreement between Declarants and Holder, which will be the subject of a deed of conveyance of the premises as described on Exhibit "A" which will be conveyed under and subject to this Conservation Easement.

**ARTICLE II.**

**SUBDIVISION**

**2.01 Prohibition**

No Subdivision of the Property is permitted except as set forth below.

**2.02 Permitted Subdivision**

The following Subdivision are permitted:

(a) **Lot Line Change**

Subdivision resulting in (i) no additional Lot; and (ii) no material decrease in the acreage of the Property.

(b) **Transfer to Qualified Organization**

Subdivision to permit the transfer of a portion of the Property to a Qualified Organization for use by the Qualified Organization for park, nature preserve, public trail or other conservation purposes consistent with and in furtherance of Conservation Objectives.

(c) **Agricultural Lease**

Transfer of possession (but not ownership) of land by lease for Sustainable Agriculture or Sustainable Forestry purpose in compliance with applicable requirements of this Conservation Easement.

**ARTICLE III.****IMPROVEMENTS****3.01 Prohibition**

Improvements within the Property are prohibited except as permitted below in this Article.

**3.02 Permitted**

The following Improvements are permitted:

**(a) Existing Improvements**

Any Existing Improvement may be maintained, repaired and replaced in its existing location. Existing Improvements may be expanded or relocated if the expanded or relocated Improvement complies with requirements applicable to Additional Improvements of the same type set forth in this Article.

**(b) Additional Improvements**

The following Additional Improvements are permitted:

- (i) Fences, walls and gates.
- (ii) Regulatory Signs.
- (iii) Habitat improvements devices such as birdhouses and bat houses.
- (iv) Trails covered (if at all) by wood chips, gravel, or other highly porous surface.
- (v) Subject to review, Access Drives, Farm Lanes and underground Utility Facilities to service existing Improvements within the Property.

**ARTICLE IV. ACTIVITIES; USES; DISTURBANCE OF RESOURCES****4.01 Prohibition**

Activities and uses are limited to those permitted below in this Article and provided in any case that the intensity or frequency of the activity or use does not materially and adversely affect maintenance or attainment of Conservation Objectives.

**4.02 Density Issues under Applicable Law****(a) Promoting Development outside the Property**

Neither the Property nor the grant of this Conservation Easement may be used under Applicable Law to increase density or intensity of use or otherwise promote the development of other lands outside the Property.

**(b) Transferable Development Rights**

Declarants may not transfer for use outside the Property (whether or not for compensation) any development rights allocated to the Property under Applicable Law.

**4.03 Permitted**

The following activities and uses are permitted:

- (a) **Existing Agreements**  
Activities, uses and Construction that Declarants are required to allow under Existing Agreements.
- (b) **Disturbance of Resources**
  - (i) Cutting trees, Construction or other disturbances of resources, including removal of Invasive Species, to the extent reasonably prudent to remove, mitigate or warn against an unreasonable risk of harm to Persons, property or health of Native Species on or about the Property in accordance with a Conservation Stewardship Plan.
  - (ii) Planting a diversity of Native Species of trees, shrubs and herbaceous plant materials in accordance with Best Management Practices.
  - (iii) Removal and disturbance of soil, rock and vegetative resources to the extent reasonable necessary to accommodate Construction of and maintain access to Improvements with restoration as soon as reasonably feasible by replanting with a diversity of Native Species of trees, shrubs and herbaceous plant materials in accordance with Best Management Practices.
  - (iv) Vehicular use (including motorized vehicular use) in connection with an activity permitted herein or otherwise in the case of emergency. However, motorized off road vehicles (ATV's, Snowmobiles, Dirt Bikes, etc.) are prohibited.
  - (v) Removal of vegetation to accommodate replanting with a diversity of Native Species of trees, shrubs and herbaceous plant materials.
  - (vi) Other resource management activities consistent with maintenance or attainment of Conservation Objectives and conducted in accordance with a Conservation Stewardship Plan approved for that activity by Holder.
  - (vii) Removal of timber shall not be permitted unless necessary for safety or maintenance of trails etc., as is consistent with terms of this agreement.
- (c) **Release and Disposal**
  - (i) Application of substances to promote health and growth of vegetation in accordance with manufacturer's recommendations and Applicable Law. Within Wet Areas only substances approved for aquatic use are permitted.
  - (ii) Piling of brush and other vegetation to the extent reasonably necessary to accommodate an activity under this Conservation Easement.
  - (iii) Subject to Review, other activities involving application of substances, piling of materials and similar activities in accordance with a Conservation Stewardship Plan approved for that activity.

- (d) **Nature Preserve and Trail Uses**  
Activities that do not require Improvements other than those permitted herein and do not materially and adversely affect natural resources herein such as the following:
- (i) Walking, horseback riding on trails, cross-country skiing on trails, nature study, bird watching, fishing and hunting, bicycling (no trail obstructions).
  - (ii) Other educational or scientific activities consistent with and in furtherance of Conservation Objectives.
- (e) **Agricultural and Forestry Uses; Disturbance of Resources**
- (i) Uses and activities that maintain continuous vegetative cover (other than Invasive Species) such as meadow, turf or lawn.
  - (ii) Sustainable Agricultural uses that do not maintain continuous vegetative cover (such as plowing, tilling, planting and harvesting field crops, equestrian, horticultural and nursery use). However, use of land for Agricultural purposes shall not be increased over lands not currently used for agriculture or forestry. Woodlands may not be converted to agricultural use.
- (f) **Release and Disposal**
- (i) Piling and composting of biodegradable materials originating from the Property in furtherance of Agricultural Uses within the Property permitted under this Article.
  - (ii) Disposal of sanitary sewage effluent from Improvements permitted under Article III.
- (g) **Recreational and Open-Space Uses**  
Non-commercial recreational and open-space uses that do not require Improvements; do not materially and adversely affect scenic views and other values described in the Conservation Objectives; and do not require vehicular use other than for resource management purposes.
- (h) **Residential and Other Uses**
- (i) Residential use is permitted but limited to not more than one Dwelling Units.
- (i) **Other Miscellaneous Permitted and Prohibited Uses**
- (i) Existing farmland shall stay primarily under cultivation as long as reasonably possible - then reforest or revert to nature according to a Conservation Stewardship Plan.
  - (ii) Existing ponds and wet lands shall remain as they are.
  - (iii) The relics of the Scotia mines should not be disturbed.

- (iv) All chestnut trees should not be disturbed or removed unless for safety or health reasons.
- (v) None of the land shall be conveyed to the Pennsylvania Game Commission.
- (vi) Activities of Nittany Bird Club and similar non-profit organizations in accordance with a Conservation Stewardship Plan.
- (vii) The lifetime use of Declarants and immediate family to cut bittersweet and alder, pick ground pine, pick berries and pursue similar activities.

**ARTICLE V. RIGHTS AND DUTIES OF HOLDER AND OTHER BENEFICIARIES**

**5.01 Grant to Holder**

By signing this Conservation Easement recording it in Office of Recorder of Deeds of Centre County, Pennsylvania and unconditionally delivering it to Holder, the undersigned Declarants, intending to be legally bound, grant and convey to Holder a conservation servitude over the Property in perpetuity for the purpose of administering and enforcing the restrictions and limitations set forth in Articles II, III, and IV in furtherance of the Conservation Objectives. The undersigned Declarants warrant to Holder that the Property is, as of the Easement Date, free and clear of all Liens.

**5.02 Rights and Duties of Holder**

The grant to Holder under the preceding section gives Holder the right and duty to perform the tasks set forth below.

**(a) Enforcement**

To enforce the terms of this Conservation Easement in accordance with the provisions of Article VI including, in addition to other remedies, the right to enter the Property to investigate a suspected, alleged or threatened violation.

**(b) Inspection**

To enter and inspect the Property for compliance with the requirements of this Conservation Easement upon reasonable notice, in a reasonable manner and at reasonable times.

**(c) Review**

To exercise rights of Review in accordance with the requirements of this Article as and when required under applicable provisions of this Conservation Easement.

**(d) Interpretation**

To interpret the terms of this Conservation Easement, apply the terms of this Conservation Easement to factual conditions on or about the Property, respond to requests for information from Persons having an interest in this Conservation Easement or the Property (such as requests for a certification of compliance), and apply the terms of this Conservation Easement to changes occurring or proposed within the Property.

**5.03 Other Rights of Holder**

The grant to Holder under this Article also permits Holder, without any obligation to do so, to exercise the following rights:

**(a) Amendment**

To enter into an Amendment with Declarants or the survivor thereof during their lifetime if Holder determines that (i) the Amendment is consistent with and in furtherance of the Conservation Objectives; (ii) the Amendment is not likely to result in any overall negative effect on natural resources intended to be protected under the Conservation Objectives; (iii) the Amendment will result overall in an increase in the conservation benefit of this Conservation Easement; and (iv) the Amendment will not result in any private benefit prohibited under the Code.

**(b) Signs**

To install one or more signs within the Property identifying the Declarants and interest of Holder of this Conservation Easement on the Property. Any signs installed by Holder do not reduce the number or size of signs permitted to Declarants under Article III. Signs are to be of the customary size installed by Holder or Beneficiary, as the case may be, and must be installed in locations readable from the public right-of-way and otherwise reasonably acceptable to Declarants. Acceptable signs include signs noting the Declarant family gift, trail and interpretive and directional signs relating to Scotia Village historical site.

**ARTICLE VI.****VIOLATION; REMEDIES****6.01 Breach of Duty****(a) Failure to Enforce**

If Holder fails to enforce this Conservation Easement, or ceases to qualify as a Qualified Organization, then the rights and duties of Holder under this Conservation may be transferred to another Qualified Organization by a court of competent jurisdiction.

**(b) Transferee**

The transferee must be a Qualified Organization and must commit to hold this Conservation Easement exclusively for conservation purposes as defined in the Code.

**6.02 Remedies Cumulative**

The enumeration of Holder's rights and remedies under this Conservation Easement is not intended to be exhaustive. The exercise by Holder of any right or remedy under this Conservation Easement does not preclude the exercise of any other rights or remedies, all of which are cumulative and are in addition to any other right or remedy under this Conservation Easement or which may now or subsequently exist under Applicable Law.

**6.03 No Waiver**

If Holder does not exercise any right or remedy when it is available to Holder, this is not to be interpreted as a waiver of any non-compliance with this Conservation Easement or a waiver of Holder's rights to exercise its rights or remedies at another time.

**ARTICLE VII.**

**MISCELLANEOUS**

**7.01 Governing Law**

The internal laws of the Commonwealth of Pennsylvania govern this Conservation Easement.

**7.02 Assignment and Transfer**

Holder may not assign or otherwise transfer any of their respective rights or duties under this Conservation Easement voluntarily or involuntarily, whether by merger, consolidation, dissolution, operation of law or any other manner except as permitted below. Any purported assignment or transfer in violation of this Section is void.

**(a) By Holder**

Holder may assign its rights and duties under this Conservation Easement, either in whole or in part, but only to a Qualified Organization that executes and records in the Public Records a written agreement assuming the obligations of Holder under this Conservation Easement.

**7.03 Binding Agreement**

Subject to the restrictions on assignment and transfer set forth in the preceding Section, this Conservation Easement binds and benefits Declarants and Holder and their respective personal representatives, successors and assigns.

**7.04 No Other Beneficiaries**

This Conservation Easement does not confer any Enforcement Rights or other remedies upon any Person other than Declarants, Holder and the Beneficiaries (if any) specifically named in this Conservation Easement. Declarants of Lots within or adjoining the Property are not beneficiaries of this Conservation Easement and, accordingly, have no right of approval or joinder in any Amendment other than an Amendment applicable to the Lot owned by such Declarants. This provision does not preclude Declarants or other Persons having an interest in this Conservation Easement from petitioning a court of competent jurisdiction to exercise remedies available under this Conservation Easement for breach of duty by Holder.

**7.05 Severability**

If any provision of this Conservation Easement is determined to be invalid, illegal or unenforceable, the remaining provisions of this Conservation Easement remain valid, binding and enforceable. To the extent permitted by Applicable Law, the parties waive any provision of Applicable Law that renders any provision of this Conservation Easement invalid, illegal or unenforceable in any respect.

**7.06 Entire Agreement**

This is the entire agreement of Declarants, Holder and Beneficiaries (if any) pertaining to the subject matter of this Conservation Easement. The terms of this Conservation Easement supersede in full all statements and writings between Declarants, Holder and other pertaining to the transaction set forth in this Conservation Easement.

**ARTICLE VIII.****GLOSSARY****8.01 Access Drive(s)**

Roads or drives providing access to and from Improvements and public rights-of-way.

**8.02 Agricultural Improvements**

Improvements used or usable in furtherance of Agricultural uses such as barn, stable, silo, green house, riding arena (whether indoor or outdoor), horse walker, manure storage pit, storage buildings, feeding and irrigation facilities.

**8.03 Agricultural**

Any one or more of the following and the leasing of land for any of these purposes:

**(a) Farming**

- (i) Production of vegetables, fruits, seeds, mushrooms, nuts and nursery crops for sale.
- (ii) Production of field crops.

**8.04 Applicable Law**

Any federal, state or local laws, statutes, codes, ordinances, standards and regulations applicable to the Property or this Conservation Easement as amended through the applicable date of reference.

**8.05 Best Management Practices**

A series of guidelines or minimum standards (sometimes referred to as BMP's) recommended by federal, state and/or country resource management agencies for proper application of farming and forestry operations, non-point pollution of water resources and other disturbances of soil, water and vegetative resources and to protect wildlife habitats. Examples of resource management agencies issuing pertinent BMP's as of the Easement Date are: the Natural Resource Conservation Service of the United States Department of Agriculture (with respect to soil resources); the Pennsylvania Department of Environmental Protection (with respect to soil erosion, sedimentation and water resources) and the following sources of BMP's with respect to forest and woodland management: the Forest Stewardship Council principles and criteria, Sustainable Forestry Initiative standards, Forest Stewardship Plan requirements, American Tree Farm standards and Best Management Practices for Pennsylvania Forests.

- 8.06 Code**  
The Internal Revenue Code of 1986, as amended through the applicable date of reference.
- 8.07 Conservation Easements Act**  
The Pennsylvania Conservation and Preservation Easements Act, Act 29 of 2001, Pub. L. 390 as amended through the applicable date of reference.
- 8.08 Construction**  
Any demolition, construction, reconstruction, expansion, exterior alteration, installation or erection of temporary or permanent Improvements; and, whether or not in connection with any of the foregoing, any excavation, dredging, mining, filling or removal of gravel, soil, rock, sand, coal, petroleum or other minerals.
- 8.9 Dwelling Unit**  
An Improvement or portion of an Improvement designed for human habitation by one or more Persons (whether or not related).
- 8.10 Invasive Species**  
A plant species that is (a) non-native (or alien) to the ecosystem under consideration; and (b) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. In cases of uncertainty, publications such as "Plant Invaders of the Mid-Atlantic Natural Areas," by the National Park Service National Capital Region, Center for Urban Ecology and the U.S. Fish and Wildlife Service, Chesapeake Bay Field Office are to be used to identify Invasive Species.
- 8.11 Lot**  
A unit, lot or parcel of real property separated or transferable for separate ownership or lease under Applicable Law.
- 8.12 Market Value**  
The fair value that a willing buyer, under no compulsion to buy, would pay to a willing seller, under no compulsion to sell as established by appraisal in accordance with the then-current edition of Uniform Standards of Professional Appraisal Practice issued by the Appraisal Foundation or, if applicable, a qualified appraisal in conformity with §1.170A-13 of the Regulations.
- 8.13 Native Species**  
A plant or animal indigenous to the locality under consideration. In cases of uncertainty, published atlases, particularly *The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas* by Rhoads and Klein and *Atlas of United States Trees, vols. 1 & 4* by Little are to be used to establish whether or not a species is native.

- 8.14 Declarants**  
The undersigned Declarants and all Persons after them who hold any interest in all or any part of the Property.
- 8.15 Person**  
An individual, organization, trust or other entity.
- 8.16 Proportionate Value**  
Expressed as a percentage, the Market Value of this Conservation Easement as of the Easement Date (determined in accordance with the Regulations) divided by the Market Value of the Property as a whole as of the Easement Date.
- 8.17 Public Records**  
The public records of the Office for the Recording of Deeds in Centre County in which the Property is located.
- 8.18 Qualified Organization**  
A government or non-profit entity that (a) has a perpetual existence; (b) is established as a public charity for the purpose of preserving and conserving natural resources, natural habitats, environmentally sensitive areas and other charitable, scientific and educational purposes; (c) meets the criteria of a Qualified Organization under the Regulations; and (d) is duly authorized to acquire and hold conservation easement under Applicable Law.
- 8.19 Regulations**  
The provisions of C.F.R. §1.170A-14 as amended through the applicable date of reference.
- 8.20 Regulatory Signs**  
Signs to control access to the Property or for informational, directional or interpretive purposes.
- 8.21 Residential Improvements**  
Habitable Improvements and Improvements accessory to residential uses such as garage and children's play facilities.
- 8.22 Site Improvements**  
Unenclosed Improvements such as driveways, walkways, boardwalks, storm water management facilities, parking areas and other pavements, lighting fixtures, signs, fences walls, gates, berms and landscaping treatments.
- 8.23 Soil Conservation Plan**  
A plan for soil conservation and/or sedimentation and erosion control that meets the requirements of Applicable Law.

**8.24 Sustainable**

Land management practices that provide goods and services from an ecosystem without degradation of bio-diversity and resource values at the site and without a decline in the yield of goods and services over time.

**8.25 Utility Improvements**

Improvements for the reception, storage or transmission of water, sewage, electricity, gas and telecommunications or other sources of power.

**8.26 Wet Areas**

Areas within 100-feet beyond the edge of watercourses, springs, wetlands and non-impounded standing water.

**8.27 Woodland Areas**

Hedgerows (if any) shown on the Conservation Plan and other wooded areas within the Property containing at least two acres of continuous canopy of trees primarily of Native Species.

INTENDING TO BE LEGALLY BOUNDED, the undersigned Declarants and Holder, by their respective duly authorized representatives, have signed and delivered this Conservation Easement as of the Easement Date.

Witness/Attest:

*RL Campbell*  
\_\_\_\_\_  
\_\_\_\_\_

*Hubert H. Haugh*  
\_\_\_\_\_  
Hubert H. Haugh

*Helen M. Haugh*  
\_\_\_\_\_  
Helen Haugh  
M

PATTON TOWNSHIP

By: *Thomas Kurtz*  
\_\_\_\_\_  
Thomas Kurtz, Manager

STATE OF PENNSYLVANIA

)

COUNTY OF CENTRE

)

SS:

)

On this, the 29<sup>th</sup> day of December, 2005, before me a Notary Public, the undersigned officer, personally appeared Hubert H. Haugh and Helen <sup>W</sup>Haugh, known to me (or satisfactorily proven) to be the persons whose names are subscribed to the within instrument, and acknowledged that they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

COMMONWEALTH OF PENNSYLVANIA  
Notarial Seal  
Shirley J. Gaines, Notary Public  
State College Boro, Centre County  
My Commission Expires Jan. 16, 2008  
Member, Pennsylvania Association Of Notaries

Shirley J. Gaines  
My Commission Expires

STATE OF PENNSYLVANIA

)

COUNTY OF CENTRE

)

SS:

)

On this, the 29<sup>th</sup> day of December, 2005, before me a Notary Public, the undersigned officer, personally appeared Thomas Kurtz, who acknowledged himself to be the Manager of Patton Township, known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument, and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

COMMONWEALTH OF PENNSYLVANIA  
Notarial Seal  
Shirley J. Gaines, Notary Public  
State College Boro, Centre County  
My Commission Expires Jan. 16, 2008  
Member, Pennsylvania Association Of Notaries

Shirley J. Gaines  
My Commission Expires

**PROPERTY DESCRIPTION**

**Haugh Property**  
**Tax Parcel 18-3-61**

**ALL** that certain message, tenement, and tract of land situate within the Township of Patton, County of Centre, Commonwealth of Pennsylvania, being bounded and described as follows:

**BEGINNING** at a iron pin found being Pennsylvania Game Commission Corner #3,

**THENCE** along lands of the Pennsylvania Game Commission, State Game Lands #176, N 31° 53' 40" E a distance of 2379.32 feet to an Oak Corner Tree, Pennsylvania Game Commission Corner #2,

**THENCE** along Sowelco Developers, Inc. Subdivision, recorded in Plat Book 36, Page 188, the following three (3) courses and distances:

- (1) N 53° 40' 24" E a distance of 1750.59 feet to an iron pin found,
- (2) N 53° 03' 05" E a distance of 53.30 feet to an iron pin found,
- (3) N 53° 35' 47" E a distance of 2064.50 feet to a concrete monument found,

**THENCE** along lands now or formerly of J. Alvin Hawbaker, et ux, S 35° 45' 00" E a distance of 85.16 feet to an iron pin found

**THENCE** along Valley Vista Park Subdivision, Phase I, recorded in Plat Book 31, Page 42, S 35° 45' 00" E a distance of 700.07 feet to an iron pin found,

**THENCE** along lands now or formerly of State College Water Authority and lands now or formerly of J. Alvin Hawbaker Subdivision, recorded in Plat Book 35, Page 91, S 35° 32' 49" E a distance of 1225.29 feet to an iron pin found,

**THENCE** continuing along the J. Alvin Hawbaker Subdivision, recorded in Plat Book 35, Page 91, S 36° 14' 08" E a distance of 1661.81 feet to a point located S 07° 50' 27" W a distance of 9.15 feet from a concrete monument found,

**THENCE** along lands now or formerly of State College Area School District, S 53° 27' 20" W a distance of 1335.46 feet to an iron pin found,

**THENCE** along lands now or formerly of Patton Township, S 53° 27' 20" W a distance of 692.67 feet to an iron pin found at the Eastern right of way line of Circleville Road, T-336, a 33-foot wide right of way,

**THENCE** along the Eastern right of way line of Circleville Road, T-336, a 33-foot wide right of way, S 36° 30' 58" E a distance of 1218.59 feet to an iron pin found,

**THENCE** along lands now or formerly of Patton Township, N 53° 29' 58" E a distance of 2022.21 feet to an iron pin found,

**THENCE** along the J. Alvin Hawbaker Subdivision, recorded in Plat Book 36, Page 176, S 36° 14' 24" E a distance of 832.15 feet to an iron pin found,

**THENCE** along the Homestead Farms Subdivision, recorded in Plat Book 16, Page 77, the following three (3) courses and distances:

- (1) S 51° 32' 07" W a distance of 20.58 feet to an iron pin found,
- (2) S 53° 05' 33" W a distance of 61.61 feet to an iron pin found,
- (3) S 53° 06' 12" W a distance of 702.16 feet to an iron pin found,

**THENCE** along the Coyne Subdivision, recorded in Plat Book 21, Page 90, the following four (4) courses and distances:

- (1) S 53° 04' 50" W a distance of 64.54 feet to an iron pin found,
- (2) S 53° 12' 09" W a distance of 337.69 feet to a concrete monument found,
- (3) S 52° 25' 48" W a distance of 402.92 feet to an iron pin found,
- (4) S 53° 10' 00" W a distance of 317.02 feet to a concrete monument found,

**THENCE** along lands now or formerly of Patton Township, S 53° 19' 19" W a distance of 994.92 feet to a ¼ inch rebar found in stones,

**THENCE** along lands of the Pennsylvania Game Commission, State Game Lands #176, the following four (4) courses and distances:

- (1) N 33° 35' 18" W a distance of 2443.83 feet to an iron pin found, State Game Lands Corner #53,
- (2) S 58° 30' 15" W a distance of 1750.24 feet to an axel found, State Game Lands Corner #54,
- (3) N 34° 33' 37" W a distance of 1440.24 feet to an iron pin found in stones, State Game Lands Corner #4,
- (4) S 81° 55' 16" W a distance of 1774.46 feet to the first mentioned point being the **POINT OF BEGINNING**.

**CONTAINING:** 465.97 Acres, according to a Retracement Survey by Henry Surveys, dated August 16, 1990, a revised and reduced draft thereof to be recorded herein.

**BEING** a portion of that tract of land granted unto Herbert H. Haugh & Helen M. Haugh within Centre County Deed Book: 377, Page: 314, dated March 29, 1978.

Dupuis  
BCE  
10/26/07



R 01999-0019 Oct 26, 2007  
HAUGH, HUBERT H  
HAUGH, HUBERT H  
10-26-2007  
15:59:57  
AMEN 3 pas  
RECORDER OF DEEDS

ELIZABETH A. DUPUIS  
BABST CALLAND CLEMENTS ZOMNIR, PC  
328 INNOVATION BOULEVARD, SUITE 200  
STATE COLLEGE, PA 16803

**AMENDMENT TO HAUGH FAMILY CONSERVATION EASEMENT**

THIS AMENDMENT TO THE CONSERVATION EASEMENT dated the 17  
day of October, 2007, by and between:

**HUBERT H. HAUGH and HELEN M. HAUGH**, brother and sister, of 335 Arbor  
Way, State College, Patton Township, Pennsylvania, (hereinafter "Declarants"), and

**PATTON TOWNSHIP**, of 100 Patton Plaza, Patton Township, State College,  
Pennsylvania, (hereinafter "Holder").

**BACKGROUND**

WHEREAS, Declarants executed a Declaration of Conservation Easement dated  
December 29, 2005, and recorded December 30, 2005, in Centre County Record Book 1912, at Page  
707;

WHEREAS, said Declaration of Conservation Easement related to the tract of land  
consisting of 465.97 acres, more fully described in Exhibit "A" attached to the Declaration, and  
being known as Centre County Tax parcel Number 18-3-61;

WHEREAS, the Declarants subsequently conveyed that parcel to Holder by Deed of  
Dedication dated January 18, 2006, and recorded January 20, 2006, in Centre County Record Book  
1918, at Page 0051;

WHEREAS, the parties desire to amend a section of the Conservation Easement as provided herein.

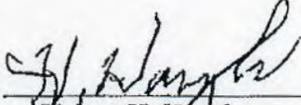
NOW, THEREFORE, in consideration the Declarant and the Holder hereby modify the Declaration of Conservation Easement as follows:

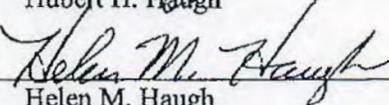
1. Section 4.03 (b) (vii) is amended to read as follows:

Removal of timber shall be permitted as necessary for the health of the forest and understory vegetation or maintenance of trails, etc., as is consistent with the terms of this Agreement.

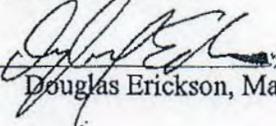
2. All other terms of the original Declaration of Conservation Easement shall remain in full force and effect, and the parties acknowledge the same by executing the amendment herein.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals the day and year first above written.

By:   
Hubert H. Haugh

By:   
Helen M. Haugh

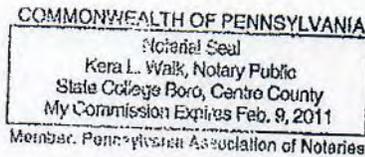
PATTON TOWNSHIP

By:   
Douglas Erickson, Manager

COMMONWEALTH OF PENNSYLVANIA )  
 ) SS:  
COUNTY OF CENTRE )

On this, the 17 day of October, 2007, before me, the undersigned officer, personally appeared HUBERT H. HAUGH and HELEN M. HAUGH, husband and wife, known to me (or satisfactorily proven) to be the persons whose names are subscribed to the within instrument, and acknowledged that they executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

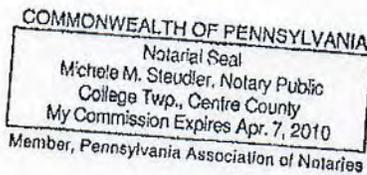


Kera L. Walk  
Notary Public

COMMONWEALTH OF PENNSYLVANIA )  
 ) SS:  
COUNTY OF CENTRE )

On this 26<sup>th</sup> day of October, 2007, before me, a Notary Public, personally appeared DOUGLAS ERICKSON, Manager of Patton Township, who acknowledged that he, being authorized to do so, executed the within document for the purposes therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand an notarial seal.



Michele M. Steudler  
Notary Public

# Appendix C

Gray's Woods Conservation Easement

Return to:  
Name: ClearWater Conservancy of  
Central Pennsylvania, Incorporated  
Address: 2555 North Atherton Street  
State College, PA 16803



R 02288-0446 Feb 22, 2022  
Patton Township  
ClearWater Conservancy of Central Pennsylvania  
02/22/2022  
11:46:03  
EASE 21pgs RECORDER OF DEEDS  
Electronically Recorded / Submitted by Simplifi.

Tax Parcel(s): 18-3/200A and 17-2/5A

**Declaration of Public Trust and Covenants  
and Grant of Conservation Easement**

THIS DECLARATION OF PUBLIC TRUST AND COVENANTS (the "Declaration") AND GRANT OF CONSERVATION EASEMENT (the "Grant" and, together with the Declaration, the "Declaration and Grant") dated as of February 22, 2022 (the "Easement Date") is made by Patton Township, of State College, Pennsylvania, a municipal corporation, (the "Owner"). ClearWater Conservancy of Central Pennsylvania, Inc., a Pennsylvania non-profit corporation (the "Holder") joins in this Declaration and Grant to evidence its acceptance of the rights granted to it hereunder (Owner and Holder are each a "Party" and collectively the "Parties").

**Article 1. Background; Declaration of Public Trust; Grant to Holder**

**1.01 Property**

The undersigned Owner is the sole owner in fee simple of the Property that is the subject of this Declaration and Grant , being 149.74 acres located in Patton Township and Halfmoon Township, Centre County, Pennsylvania as more fully described on Exhibit "A" attached hereto and also being referred to as Centre County Tax Parcels 18-003-,200A,0000- and 17-002-,005A,0000- (the "Land" or the "Property").

The Owner acquired the land following a referendum in 2014 wherein the voters of Patton Township approved a proposal to borrow \$3,500,000 for the acquisition of development rights, conservation easements, and land for the preservation of open space.

In addition to the referendum funding, the Owner received a grant in the amount of \$750,000 from the Hamer Foundation of State College, Pennsylvania, to aid in the acquisition of the Land.

The Owner purchased the Land on December 28, 2017, from Gray's Woods Partnership for \$4,250,000. The deed is recorded in Centre County Record Book 2209 at Pages 926 to 931. Additionally, the Land is subject to a Declaration of Restrictive Covenants and Easements recorded in Centre County Record Book 2211 at Pages 944 to 952.

## **1.02 Declaration of Public Trust**

The undersigned Owner makes this Declaration, pursuant to the Donated or Dedicated Property Act (53 P.S. §§3381-3386 ) to affirm the Property as a public natural resource. Owner makes this Declaration and Grant to assure public access to, and enjoyment of, the predominately undeveloped Property for passive outdoor recreation and open-space benefits, as well as to maintain and improve natural resources within the Property for the benefit of the public as described below (collectively, the "Public Purposes and Conservation Objectives").

## **1.03 Easement; Covenants**

- (a) Easement.** By this Grant, the Owner grants and conveys to Holder an unconditional and perpetual easement upon the Land for the purpose of advancing the Conservation Objectives described below (the "Conservation Easement"). The Conservation Easement empowers Holder to block activities, uses, and Improvements inconsistent with the Conservation Objectives. Article 6 more fully describes the rights this Grant vests in Holder.
- (b) Owner Covenants.** By this Grant, the Owner, in furtherance of the Conservation Objectives, establishes covenants binding upon Owner's interest in the Land, which are set forth in articles 2 through 5. Article 7 addresses potential violation of these covenants and remedies.
- (c) Holder Covenants.** By this Grant, Holder accepts the Conservation Easement and, in furtherance of the Conservation Objectives, establishes covenants binding upon Holder's easement interest in the Property, which are set forth in article 6.

## **1.04 Easement Plan**

Attached as exhibit B is a survey or other graphic depiction of the Land (the "Easement Plan").

## **1.05 Public Purposes and Conservation Objectives**

This Declaration and Grant provides protection of the Land so as to achieve the goals and resource protection objectives described in the Public Purposes and Conservation Objectives for the Land as more fully set forth below:

Established by the Patton Township Open Space Committee on November 9, 2021.

**OBJECTIVE 1:** Protect and improve forest health and resiliency by developing and implementing a Forest Stewardship Plan, and updating the Plan as needed/recommended.

**OBJECTIVE 2:** Protect and enhance sensitive habitats such as wetlands, vernal pools and critical upland areas by creating a Conservation Plan that will include mapping and classifying sensitive habitats, inventorying flora/fauna, and provide recommendations for activities that benefit or improve the habitat(s).

OBJECTIVE 3: Protect and enhance habitat for rare, threatened, and endangered species by locating, identifying and mapping these species, and by working with subject matter experts to preserve and improve these habitats.

OBJECTIVE 4: Conduct public outreach to promote appropriate recreational use of the properties, promote educational and research opportunities, and promote public knowledge by telling stories of our successes.

#### **1.06 Baseline Documentation**

As of the Easement Date, the Owner and Holder have signed an acknowledgment of the accuracy of the report (the "Baseline Documentation") to be kept on file at the principal offices of Owner and Holder. The Baseline Documentation contains an original, full-size version of the Easement Plan and includes, among other information, photographs depicting existing conditions of the Land as of the Easement Date.

#### **1.07 Defined Terms**

Initially capitalized terms not defined in this article 1 are defined in article 9.

#### **1.08 Federal Tax Items**

The provisions of this section supplement and, to the extent of an inconsistency, supersede provisions set forth elsewhere in this Grant.

**(a) Mineral Interests.** The Owner represents that no Person has retained a qualified mineral interest in the Land. From and after the Easement Date, the grant of such an interest is prohibited, and Holder has the right to prohibit the exercise of such a right or interest if granted in violation of this provision.

**(b) Acknowledgment of Donation.** Except for such monetary consideration (if any) as is set forth in this article, Holder acknowledges that no goods or services were delivered to the Owner in consideration of this Grant.

#### **1.09 Beneficiaries**

No Beneficiary is identified in this Grant.

#### **1.10 Consideration**

The Owner acknowledges receipt, as of the Easement Date, of the sum of \$1.00 in consideration of this Grant.

#### **1.11 Superior to all Liens**

The Owner warrants to Holder that the Land is, as of the Easement Date, free and clear of Liens or, if it is not, that Owner has obtained and recorded in the Public Records the legally binding subordination of the Liens affecting the Land as of the Easement Date.

### **Article 2. Transfer; Subdivision**

#### **2.01 Prohibitions**

All of the following are prohibited except as set forth in the next section:

**(a) Transfer of Portion of Land.** Transfer of ownership, possession, or use of a portion of the Land, including subsurface portions of the Land, independent of the remainder of the Land.

- (b) **Subdivision.** Change in the boundary of a Lot or other Subdivision of the Land except as noted in 2.02
- (c) **Transfer of Density.** Use of open space area protected under this Grant to increase (above limits otherwise permitted under Applicable Law) allowable density or intensity of development within other portions of the Land or outside the Land.
- (d) **Transfer of Rights.** Transfer of development rights or other rights granted or allocated to the Land in support of development outside the Land except as may already be provided in documents in the chain of title.

## 2.02 Permitted Changes

The following changes are permitted:

- (a) **Lots within Land.** If the Land contains more than one Lot, Subdivision to (1) merge two or more Lots into one; or (2) subject to Review, reconfigure one or more of the boundaries of such Lots except a boundary of the Land as described in exhibit A.
- (b) **Equal Transfers between Park and Open Space.** Subject to Review, creation and transfer of a Lot to a Qualified Organization (such as Patton Township) for a park, nature preserve, public trail, or other conservation purpose approved by Holder after review. Subject to Review, Owner may also add acreage to the Land under conservation easement. For example, the Owner may elect to 'smooth' the boundary line between the Gray's Woods Preserve (18-003-,200A,0000-) and Gray's Woods Park (18-003-,222-,0000-) by transferring essentially equal acreages, by deed, between the parcels. See appendix for illustration.
- (c) **Transfer of Rights of Possession or Use.** Subject to Review, transfer of possession or use (but not ownership) of one or more portions of the Land, including subsurface portions of the Land, for purposes permitted under, and subject to compliance with, the terms of this Grant. Leases of space within Improvements are not subject to Review.

## 2.03 Requirements

- (a) **Establishment of Lots; Allocations.** Prior to transfer of a Lot following a Subdivision, Owners must (1) furnish Holder with the plan of Subdivision approved under Applicable Law and legal description of each Lot created or reconfigured by the Subdivision; (2) mark the boundaries of each Lot with permanent markers; and (3) allocate in a document recorded in the Public Records those limitations applicable to more than one Lot under this Grant. This information will become part of the Baseline Documentation incorporated into this Declaration and Grant.
- (b) **Amendment.** Holder may require Owner to execute an Amendment of this Declaration and Grant to reflect a change to the description of the Land set forth in exhibit A or other changes and allocations resulting from Subdivision that are not established to the reasonable satisfaction of Holder by recordation in the Public Records of the plan of Subdivision approved under Applicable Law.

## Article 3. Improvements, Activities, and Uses

### 3.01 Public Access

Owner may regulate public access for consistency with the Public Purposes and Conservation Objectives, avoidance of nuisances, and other public safety reasons. Owner's administration of the Property, including leasing and licensing (if any), must not result in members of the public being effectively blocked from substantial access to and enjoyment of the Property due to the imposition of charges, barriers, restrictions, or requirements that are not broadly affordable and capable of satisfaction.

### 3.02 Improvements

Improvements are prohibited except as permitted below in this article.

**(a) Existing Improvements.** Existing Improvements may be maintained, repaired, and replaced in their existing locations. Existing Improvements may be expanded or relocated if the expanded or relocated Improvement complies with requirements applicable to Additional Improvements of the same type.

**(b) Existing Servitudes.** Improvements that Owner is required to allow because of an Existing Servitude are permitted.

**(c) Additional Improvements.** The following Additional Improvements are permitted:

- (1) Fences, walls, and gates, not to exceed eight (8) feet in height or such greater height as is approved by Holder after Review.
- (2) Signs; compliant with Owner's regulations
- (3) Habitat enhancement devices such as birdhouses and bat houses.
- (4) Trails covered (if at all) by wood chips, gravel, or other highly porous surface.
- (5) Footbridges, stream crossing structures, and stream access structures.
- (6) Tree stands and blinds for hunting or nature study. Tree stands and blinds to remain in place for more than a season are subject to Review (See Section 6.02).
- (7) Access Drives and Utility Improvements to service Improvements within the Land but only if there is no other reasonably feasible means to provide access and utility services to the Land.
- (8) Subject to Review, Extraction Improvements but only if located wholly beneath the surface at a depth at which there can be no impairment of water or other resources described in the Conservation Objectives. No Access Drives to construct or service such Improvements are permitted.

### 3.03 Activities and Uses

Activities and uses are prohibited except as permitted below in this article and provided in any case that:

- The intensity or frequency of the activity or use does not materially and adversely affect maintenance or attainment of Conservation Objectives.
- No Invasive Species are introduced.

**(a) Existing Servitudes.** Activities and uses that Owner is required to allow because of an Existing Servitude are permitted.

- (b) Resource Management and Disturbance.** The following activities and uses are permitted:
- (1) Forestry management activities in accordance with a Forestry Stewardship Plan or Updated Forestry Stewardship Plan which, so long as Patton Township is the Owner, is developed and adopted by the Owner upon the recommendation of the Patton Township Open Space Stewardship Committee (the "Open Space Committee").
  - (2) Cutting trees, Construction, or other disturbance of resources, including removal of Invasive Species, to the extent reasonably prudent to remove, mitigate, or warn against an unreasonable risk of harm to Persons, their belongings, or health of Native Species on or about the Land.
  - (3) Planting, replanting, and maintaining Native Species or, subject to Review, planting, replanting, and maintaining other vegetation.
  - (4) Removal of vegetation to accommodate replanting as permitted in this article.
  - (5) Construction of permitted Improvements with prompt restoration of soil and vegetation disturbed by such activity.
  - (6) Vehicular use in the case of emergency and in connection with activities or uses permitted under this subsection.
  - (7) Subject to Review (See Section 6.02), extraction of natural gas (regardless of source) or oil, and injection or release of water and other substances to facilitate such extraction, but only at subterranean depths at which there can be no impairment of water or other resources described in the Conservation Objectives. No surface activities or uses, including Construction activities, incident to such extraction, injection, or release are permitted.
  - (8) Application of manure and plant material, both well composted, and, subject to compliance with manufacturer's recommendations, other substances to promote the health and growth of vegetation. (These permitted substances do not include sludge, biosolids, septic system effluent, and related substances.)
  - (9) Piling of brush and other vegetation to the extent reasonably necessary to accommodate activities or uses permitted
  - (10) Other activities that Holder, without any obligation to do so, determines are consistent with maintenance or attainment of Conservation Objectives and are conducted in accordance with the Resource Management Plan or other plan approved for that activity after Review (See Section 6.02).
- (c) Recreation and Education.** Recreational, educational, and scientific research activities are permitted that do not require Improvements other than trails and do not materially and adversely affect maintenance or attainment of Conservation Objectives such as the following: (1) walking, horseback riding on trails, cross-country skiing, bird watching, nature study, fishing, and hunting; and (2) wildlife research consistent with and in furtherance of the Conservation Objectives. Off-road vehicular use is not permitted in connection with the activities permitted under this subsection unless approved after Review (See Section 6.02).

Article 4. (reserved)

Article 5. (reserved)

## Article 6. Rights and Duties of Holder and Beneficiaries

### 6.01 Holder Covenants

In support of the Conservation Objectives, Holder declares the following covenants binding upon its easement interest in the Land:

- (a) **Exercise of Powers.** Holder must exercise the powers granted to it by this Grant to block activities, uses, and Improvements of the Land inconsistent with the Conservation Objectives.
- (b) **Must be Qualified Organization.** Holder must be and remain at all times a Qualified Organization and must not transfer the Conservation Easement or otherwise assign its rights or responsibilities under this Grant to a Person other than a Qualified Organization committed to upholding the Conservation Objectives.
- (c) **Forfeiture Remedy.** If Holder fails to abide by the covenants of this section, a Beneficiary of the Conservation Easement or the Commonwealth of Pennsylvania may petition a court of competent jurisdiction to order the Conservation Easement transferred to a Qualified Organization ready, willing, and able to abide by such covenants.

### 6.02 Rights and Duties of Holder

The items set forth below are both rights and duties vested in Holder by this Grant:

- (a) **Enforcement.** To enter the Land to investigate a suspected, alleged, or threatened violation of the covenants and, if found, to enforce the terms of this Grant by exercising Holder's remedies in this Grant.
- (b) **Inspection.** To enter and inspect the Land for compliance with the requirements of this Grant upon reasonable notice, in a reasonable manner, and at reasonable times.
- (c) **Review.** To exercise rights of Review, as noted throughout this document in accordance with the requirements of this article (the "Review"). Also See Section 6.04.
- (d) **Interpretation.** To interpret the terms of this Grant, and, at the request of Owner, furnish Holder's explanation of the application of such terms to then-existing, proposed, or reasonably foreseeable conditions within the Land

### 6.03 Other Rights of Holder

The items set forth below are also rights vested in Holder by this Grant; however, Holder, in its discretion, may or may not exercise them:

- (a) **Amendment.** To enter into an Amendment with Owner if Holder determines that the Amendment: (1) will not impair Holder's power, enforceable in perpetuity, to block activities, uses, and Improvements of the Property inconsistent with the Conservation Objectives; (2) will not result in a private benefit prohibited under the Code; and (3) will be consistent with Holder's policy with respect to Amendment as of the applicable date of reference.

- (b) **Signs.** To install one or more signs within the Land identifying the interest of Holder in the Conservation Easement. Such signs do not reduce the number or size of signs permitted to Owner under this Grant. Signs are to be of the customary size installed by Holder, as the case may be, and must be installed in locations readable from the public right-of-way and otherwise reasonably acceptable to Owner.
- (c) **Proceedings.** To assert a claim, defend or intervene in, or appeal, any proceeding under Applicable Law that (1) pertains to the impairment of Conservation Objectives; or (2) may result in a transfer, Improvement, or use of the Land that violates the terms of this Declaration and Grant.

#### **6.04 Review**

The following provisions are incorporated into any provision of this Grant that is subject to Review:

- (a) **Notice to Holder.** Before Owner begins or allows a Subdivision, Improvement, activity, or use that is subject to Review, Owner must (1) notify Holder of the proposed change (if the undersigned Owner, such notice must include a written recommendation from the Patton Township Open Space Committee) with such information as is reasonably sufficient to comply with Review Requirements and otherwise describe the proposal and its potential impact on the Conservation Objectives and (2) receive Holder's approval.
- (b) **Notice to Owners.** Upon receipt of Owner's notice, Holder must review the proposed change and shall notify Owner of its determination to (1) accept Owners' proposal in whole or in part; (2) reject Owner's proposal in whole or in part; (3) accept Owner's proposal conditioned upon compliance with conditions imposed by Holder; or (4) reject Owner's proposal for insufficiency of information on which to base a determination. If Holder gives conditional acceptance under clause (3), commencement of the proposed Subdivision, Improvement, activity, or use constitutes acceptance by Owner of all conditions set forth in Holder's notice. Upon written request by Owner or the Township Open Space Committee, Holder shall meet with Owner or the Open Space Committee during Holder's Time for Review to discuss Owner's proposal.
- (c) **Time for Review.** If requested by Owner, Holder must furnish its estimate of the time required to review the proposed change and use its best efforts and due diligence to notify Owner of its determination within this time period. Otherwise, Holder must make its determination within a reasonable period of time, but not to exceed 90 days, following receipt of Owner's notice to Holder.
- (d) **Standard of Review**  
Holder's approval is not to be unreasonably withheld. It is not unreasonable for Holder to disapprove a proposal that may adversely affect resources described in the Public Purposes and Conservation Objectives or that is otherwise inconsistent with maintenance or attainment of Public Purposes and Conservation Objectives.

## **6.05 Costs and Expenses**

Owners must pay or reimburse, as the case may be, Holder's costs and expenses in connection with: (a) response to requests by Owners for Review, Waiver, or Amendment; and (b) compliance with requests for information, interpretation, or other action pertaining to the Grant if required by Applicable Law.

## **Article 7. Violation; Remedies**

### **7.01 Violation**

If Holder determines that the terms of this Declaration and Grant are being or have been violated or that a violation is threatened or imminent, then the provisions of this section will apply:

- (a) Notice.** Holder must notify Owner of the violation. Holder's notice may include its recommendations of measures to be taken by Owner to cure the violation and restore features of the Land damaged or altered as a result of the violation.
- (b) Opportunity to Cure.** Owner's cure period expires ninety (90) days after the date of Holder's notice to Owner subject to extension for the time reasonably necessary to cure but only if all of the following conditions are satisfied:

  - (1) Owner and Holder agree, within the initial **ninety (90)** -day period, upon the measures Owner will take to cure the violation;
  - (2) Owner commences to cure within the initial **ninety (90)** -day period; and
  - (3) Owner continues thereafter to use best efforts and due diligence to complete the agreed upon cure.
- (c) Imminent Harm.** No cure period is required if circumstances require prompt action to prevent or mitigate irreparable harm or alteration to a natural resource or other feature of the Property described in the Public Purposes and Conservation Objectives but in any case Holder shall make a good faith effort to provide immediate notice to Owner. In no case shall more than 36 hours elapse between the time Holder takes action and notice is provided to Owner. Once imminent harm is abated Owner shall be provided an opportunity to cure as above.

### **7.02 Remedies**

Upon expiration of the cure period (if any) described in the preceding section, Holder may do one or more of the following:

- (a) Injunctive Relief.** Seek injunctive relief to specifically enforce the terms of this Declaration and Grant, to restrain present or future violations of the terms of this Declaration and Grant, and/or to compel restoration of resources destroyed or altered as a result of the violation.

### **7.03 Remedies Cumulative**

The description of Holder's remedies in this article does not preclude Holder from exercising any other right or remedy that may at any time be available to Holder under this article or Applicable Law. If Holder chooses to exercise one remedy, Holder may nevertheless choose to exercise one or more of the other rights or remedies available to Holder at the same time or at any other time.

#### **7.04 Modification or Termination.**

If the Conservation Easement is or is about to be modified or terminated by exercise of the power of eminent domain (condemnation) or adjudication of a court of competent jurisdiction sought by a Person other than Holder, the following provisions apply:

- (a) **Compensatory Damages.** Holder is entitled to collect from the Person seeking the modification or termination, compensatory damages in an amount equal to the costs incurred by Holder in reviewing the modification or in the event of termination, all costs of Holder in reviewing and monitoring as required by the Declaration and Grant plus reimbursement of Litigation Expenses as if a violation had occurred. In the event of an extinguishment of the Conservation Easement, Holder is entitled to the greater of the compensation provided under this section or the compensation provided under any other provision of this Declaration and Grant.
- (b) **Restitution.** Holder is entitled to recover from the Person seeking the modification or termination: (1) restitution of amounts paid for this Declaration and Grant (if any) and any other sums invested in the Property for the benefit of the public as a result of rights vested by this Declaration and Grant, plus (2) reimbursement of Litigation Expenses as if a violation had occurred.
- (c) **Remedies Cumulative.** The description of Holder's remedies in this article does not preclude Holder from exercising any other right or remedy that may at any time be available to Holder under this article or Applicable Law. If Holder chooses to exercise one remedy, Holder may nevertheless choose to exercise one or more of the other rights or remedies available to Holder at the same time or at any other time.

#### **7.05 Further Restriction on Condemnation.**

Owner, if an entity with the power of eminent domain, agrees that it is prohibited from taking all or any part of the Property by exercise of eminent domain or acquiring by purchase in lieu of condemnation so as to terminate this Grant, in whole or in part. This prohibition operates independently of, and does not supersede, the obligations of such Owner to comply with the requirements of the Pennsylvania General Assembly Act 45 of 2018.

#### **7.06 Waivers**

- (a) **No Waiver.** If Holder does not exercise a right or remedy when it is available to Holder, that is not to be interpreted as a waiver of any non-compliance with the terms of this Grant or a waiver of Holder's rights to exercise its rights or remedies at another time.
- (b) **No Material Effect.** Holder in its discretion may provide a Waiver if Holder determines that the accommodation is for a limited time and limited purpose and will have no material effect on the Conservation Objectives.

### **Article 8. Miscellaneous**

#### **8.01 Notices**

- (a) **Requirements.** Each Person giving notice pursuant to this Grant must give the notice in writing and must use one of the following methods of delivery: (1)

personal delivery; (2) certified mail, return receipt requested and postage prepaid; or (3) nationally recognized overnight courier, with all fees prepaid.

**(b) Address for Notices.** Each Person giving a notice must address the notice to the appropriate Person at the receiving party at the address listed below or to another address designated by that Person by notice to the other Person:

If to Owners: Township Manager  
Patton Township  
100 Patton Plaza, State College, PA 16803

If to Holder: Clearwater Conservancy  
c/o Executive Director  
2555 North Atherton Street  
State College, PA 16803

### **8.02 Governing Law**

The laws of the Commonwealth of Pennsylvania govern this Declaration and Grant.

### **8.03 Transfer**

**(a) Notice Required.** Not less than thirty (30) days prior to transfer of the Land or a Lot, Owner must notify Holder of the name(s) and address for notices of the person(s) who will become owner following the transfer.

**(b) Prior to Transfer.** Owner authorizes Holder to (1) contact the person(s) to whom the Land or Lot will be transferred, and other person(s) representing Owner or the prospective transferees, to discuss the terms of this Grant and, if applicable, other pertinent documents; and (2) enter the Land to assess compliance with this Grant.

**(c) Ending Continuing Liability.** If Holder is not notified per this section's requirement, it is not the obligation of Holder to determine whether a violation first occurred before or after the date of the transfer. The Owner continues to be liable on a joint and several basis with the post-transfer owner(s) for the correction of violations under this Declaration and Grant until such time as Holder is given the opportunity to inspect and all violations noted in Holder's resulting inspection report are cured.

### **8.04 Burdens; Benefits**

This Declaration and Grant binds and benefits Owner and Holder and their respective successors, and assigns.

**(a) Binding on Owner.** This Declaration and Grant vests a servitude running with the land binding upon the Owner and, upon recordation in the Public Records, all subsequent owners of the Land or any portion of the Land are bound by its terms whether or not such owners had actual notice of this Grant and whether or not the deed of transfer specifically referred to the transfer being under and subject to this Grant.

**(b) Rights Exclusive to Holder.** Only Holder has the right to enforce the terms of this Declaration and Grant and exercise other rights of Holder. Subsequent owners of Lots within the Property do not have the right to enforce the terms of this Grant against Owner. Only an owner of the Lot that is the subject of a request for Review, Waiver, Amendment, interpretation, or other decision by Holder have a right to notice of, or other participation in, such decision.

#### **8.05 Documentation Requirements**

**(a) Between Holder and Owner.** No Amendment, Waiver, approval after Review, interpretation, or other decision by Holder is valid or effective unless it is in writing and signed by an authorized signatory for Holder. This requirement may not be changed by oral agreement. The grant of an Amendment or Waiver in any instance or with respect to any Lot does not imply that an Amendment or Waiver will be granted in any other instance.

**(b) Between Holder and Assignee.** Any assignment of Holder's rights under this Grant, if otherwise permitted under this Grant, must be in a document signed by both the assigning Holder and the assignee Holder. The assignment document must include a covenant by which the assignee Holder assumes the covenants and other obligations of Holder under this Grant. The assigning Holder must deliver the Baseline Documentation and such other documentation in Holder's possession reasonably needed to uphold the Conservation Objectives.

#### **8.06 Severability**

If any provision of this Grant is determined to be invalid, illegal, or unenforceable, the remaining provisions of this Grant remain valid, binding, and enforceable. To the extent permitted by Applicable Law, the parties waive application of any provision of Applicable Law that renders any provision of this Grant invalid, illegal, or unenforceable in any respect.

#### **8.07 Counterparts**

This Grant may be signed in multiple counterparts, each of which constitutes an original, and all of which, collectively, constitute only one document.

#### **8.08 Indemnity**

Owner must indemnify and defend the Indemnified Parties against all Losses and Litigation Expenses arising out of or relating to: (a) a breach or violation of this Grant or Applicable Law; and (b) personal injury (including death) and damage to personal belongings occurring on or about the Land if and to the extent not caused by the negligent or wrongful acts or omissions of an Indemnified Party.

#### **8.09 Guides to Interpretation**

**(a) Captions.** The descriptive headings of the articles, sections, and subsections of this Grant are for convenience only and do not constitute a part of this Grant.

**(b) Glossary.** If a term defined in the Glossary is not used in this Grant, the defined term is to be disregarded.

**(c) Other Terms**

(1) The word "including" means "including but not limited to."

(2) The word “must” is obligatory; the word “may” is permissive and does not imply an obligation.

**(d) Conservation and Preservation Easements Act.** This Declaration and Grant is intended to be interpreted so as to convey to Holder all of the rights and privileges of a holder of a conservation easement under the Conservation and Preservation Easements Act.

**(e) Restatement (Third) of the Law of Property: Servitudes.** This Declaration and Grant is intended to be interpreted so as to convey to Holder all of the rights and privileges of a holder of a conservation servitude under the Restatement (Third) of the Law of Property: Servitudes.

**(f) Interpret in Favor of Conservation Objectives.** If any provision of this Declaration and Grant or any writing submitted to or issued by or on behalf of Holder in connection with this Grant is vague, ambiguous, or may be interpreted or construed to favor an interest other than Holder’s, such provision is to be given the interpretation or construction most favorable to Holder’s interest in the Conservation Objectives.

#### **8.10 Entire Agreement**

This is the entire agreement of Owner and Holder pertaining to the subject matter of this Declaration and Grant. The terms of this Grant supersede in full all statements and writings between Owner and Holder pertaining to the transaction set forth in this Grant.

#### **8.11 Incorporation by Reference**

Each exhibit attached to this Declaration and Grant is incorporated into this Grant by this reference. The Baseline Documentation (whether or not attached to this Grant) is incorporated into this Grant by this reference.

#### **8.12 Coal Rights Notice**

The following notice is given to Owner solely for the purpose of compliance with the Conservation and Preservation Easements Act:

**NOTICE:** The Conservation Easement may impair the development of coal interests including workable coal seams or coal interests that have been severed from the Property.

#### **8.13 Jurisdiction; Venue**

Holder and Owner submit to the exclusive jurisdiction of the courts of the Commonwealth of Pennsylvania located in Centre County and agree that any legal action or proceeding relating to this Grant or the Conservation Easement may be brought only in those courts located in Centre County.

### **Article 9. Glossary**

“**Access Drive**” means a road, drive, or lane providing vehicular access.

“**Additional Improvement**” means an Improvement other than an Existing Improvement.

**“Amendment”** means an amendment, modification, or supplement to this Grant signed by Owners and Holder and recorded in the Public Records. The term “Amendment” includes an amendment and restatement of this Grant.

**“Applicable Law”** means federal, state, or local laws, statutes, codes, ordinances, standards, and regulations applicable to the Property, the Conservation Easement, or this Grant, as amended through the applicable date of reference. If this Grant is intended to meet the requirements of a qualified conservation contribution, then applicable provisions of the Code and the Regulations (including notices issued interpreting the Regulations) are also included in the defined term.

**“Beneficiary”** means a Person given rights under the terms of this Grant (other than Owners or Holder).

**“Best Management Practices”** mean a series of guidelines or minimum standards (sometimes referred to as BMP’s) recommended by federal, state, and/or county resource management agencies for farming and forestry operations; for preventing and reducing pollution of water resources and other disturbances of soil, water, and vegetative resources; and for protecting wildlife habitats.

**“Conservation and Preservation Easements Act”** means the Pennsylvania act of June 22, 2001 (P.L. 390, No. 29) (32 P.S. §§5051-5059) as amended through the applicable date of reference.

**“Construction”** means demolition, construction, reconstruction, maintenance, expansion, exterior alteration, installation, or erection of temporary or permanent Improvements; and, whether or not in connection with any of the foregoing, excavation, dredging, mining, filling, or removal of gravel, soil, rock, sand, coal, petroleum, or other minerals.

**“Existing Improvement”** means an Improvement existing as of the Easement Date as identified in the Baseline Documentation.

**“Existing Servitude”** means an easement or other matter affecting title to the Property (other than a Lien) accorded priority to the Conservation Easement by notice in the Public Records or other prior notice recognized under Applicable Law.

**“Extraction Improvements”** mean wells, casements, impoundments, and other Improvements for the exploration, extraction, collection, containment, transport, and removal (but not processing or refining) of oil or natural gas (regardless of source) from substrata beneath the surface of the Property. The term “Extraction Improvements” includes any Access Drive required for the Construction or operation of Extraction Improvements or the removal of oil or natural gas from the Property.

**“Forestry”** means planting, growing, nurturing, managing, and harvesting trees whether for timber and other useful products or for water quality, wildlife habitat, and other Conservation Objectives.

**“Height”** means the vertical elevation of an Improvement measured from the average exterior ground elevation of the Improvement to a point, if the Improvement is roofed, midway between the highest and lowest points of the roof excluding chimneys, cupolas, ventilation shafts, weathervanes, and similar protrusions or, if the Improvement is unroofed, the top of the Improvement.

**“Improvement”** means a building, structure, facility, or other improvement, whether temporary or permanent, located on, above, or under the Property.

**“Indemnified Parties”** mean Holder and its respective directors, officers, employees and agents, and its successors, and assigns.

**“Invasive Species”** means a plant species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. In cases of uncertainty, publications such as “Plant Invaders of Mid-Atlantic Natural Areas” by the National Park Service and U.S. Fish and Wildlife Service, are to be used to identify Invasive Species.

**“Lien”** means a mortgage, lien, or other encumbrance securing the payment of money.

**“Litigation Expense”** means any court filing fee, court cost, arbitration fee or cost, witness fee, and each other fee and cost of investigating and defending or asserting any claim of violation or claim for indemnification under this Grant including, in each case, attorneys’ fees, other professionals’ fees, and disbursements.

**“Losses”** mean any liability, loss, claim, settlement payment, cost, expense, interest, award, judgment, damages (including punitive damages), diminution in value, fines, fees, penalties, or other charge other than a Litigation Expense.

**“Lot”** means a unit, lot, or parcel of real estate separated or transferable for separate ownership or lease under Applicable Law.

**“Native Species”** mean a plant or animal indigenous to the locality under consideration. In cases of uncertainty, published atlases, particularly *The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas* by Rhoads and Klein and *Atlas of United States Trees, vols. 1 & 4* by Little are to be used to establish whether or not a species is native.

**“Owner”** means the undersigned Owner and all Persons after it who hold an interest in the Property.

**“Person”** means an individual, organization, trust, government, or other entity.

**“Public Records”** mean the public records of the office for the recording of deeds in and for the county in which the Property is located.

**“Qualified Organization”** means a governmental or charitable entity that (a) meets the criteria of a qualified organization under §1.170(A-14)(c)(1) of the Regulations and (b) is duly authorized to acquire and hold conservation easements under the Conservation and Preservation Easements Act.

**“Regulations”** mean the provisions of C.F.R. §1.170A-14, and any other regulations promulgated under the Code that pertain to qualified conservation contributions, as amended through the applicable date of reference.

**“Resource Management Plan”** means a record of the decisions and intentions of Owners prepared by a qualified resource management professional for the purpose of protecting natural resources that the Conservation Objectives aim to protect during certain operations potentially affecting those resources. It includes a

resource assessment, identifies appropriate performance standards (based upon Best Management Practices where available and appropriate), and projects a multi-year description of planned activities for operations to be conducted in accordance with the plan.

**“Review”** means review and approval by Holder under the procedure described in article 6.

**“Review Requirements”** mean, collectively, any plans, specifications, or other information required for approval of the Subdivision, activity, use, or Improvement under Applicable Law (if any) plus the information required under (a) an exhibit incorporated into this Grant or (b) the Baseline Documentation or (c) if the information described in items (a) and (b) is inapplicable, unavailable, or insufficient under the circumstances, the guidelines for Review of submissions set by Holder to provide sufficient information to conduct its Review.

**“Subdivision”** means any division of the Land or any Lot within the Land; and any creation of a unit, lot, or parcel of real estate, including subsurface portions of the Land, for separate use or ownership by any means including by lease or by implementing the condominium form of ownership. The term “Subdivision” includes any “subdivision” as defined in the Pennsylvania Municipalities Planning Code, Act of 1968, P.L. 805, No. 247, as reenacted and amended as of the applicable date of reference.

**“Utility Improvement”** means an Improvement for the reception, storage, or transmission of potable water, stormwater, sewage, electricity, gas, telecommunications, or other sources of power. The term does not include Extraction Improvements.

**“Waiver”** means a written commitment by which Holder, without any obligation to do so, agrees to refrain from exercising one or more of its rights and remedies for a specific period of time with respect to a specific set of circumstances.

[CONTINUED ON FOLLOWING PAGE]

INTENDING TO BE LEGALLY BOUND, the Owner and Holder, by their respective duly authorized representatives, have signed and delivered this Declaration and Grant as of the Easement Date.

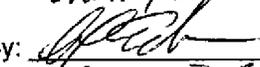
ON BEHALF OF OWNER

PATTON TOWNSHIP

By: 

Name: Pamela Robb

Title: chair, Board of Supervisors

Attest By:  (Seal)

Name: Douglas J. Erickson

Title: Town Secretary/Manager

ON BEHALF OF HOLDER

CLEARWATER CONSERVANCY OF CENTRAL PENNSYLVANIA, INC.

By:  (Seal)

Name: Deborah J. Mardone

Title: Executive Director

[ACKNOWLEDGMENTS ON FOLLOWING PAGE]

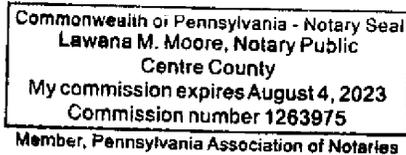
COMMONWEALTH OF PENNSYLVANIA :

COUNTY OF :

ON THIS DAY Feb 10, 2022 before me, the undersigned officer, personally appeared Pamela Roub, who acknowledged him/her/themself to be the Chair of Patton Township, a Pennsylvania Municipality of the second class of the Commonwealth of Pennsylvania, and that he/she/they as such officer, being authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by her/him/themselves as such officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Lawana M Moore, Notary Public  
Print Name: Lawana M Moore



COMMONWEALTH OF PENNSYLVANIA :

SS

COUNTY OF :

ON THIS DAY Feb 22, 22 before me, the undersigned officer, personally appeared Deborah J. Nardone, who acknowledged him/her/themselves to be the Executive Director of ClearWater Conservancy of Central Pennsylvania, Inc., a Pennsylvania non-profit corporation, and that he/she/they as such officer, being authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by him/her/themself as such officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Nadine V. Kerlin, Notary Public  
Print Name: Nadine V. Kerlin

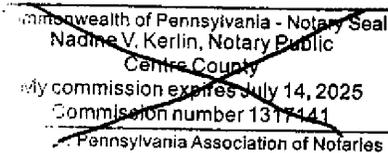
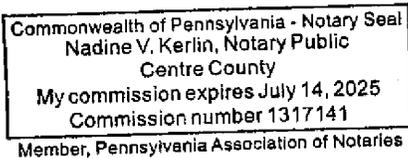


EXHIBIT A  
LEGAL DESCRIPTION OF PROPERTY

**ALL** that certain piece or parcel of land lying and being situate in Patton and Halfmoon Townships, Centre County, Pennsylvania, being more particularly bounded and described as follows:

**BEGINNING** at a point at the common corner of lands now or formerly of Thomas W. Newby and lands now or formerly of the Commonwealth of Pennsylvania, State Game Lands No. 176; thence along the State Game Lands, South 59° 53' 04" West, a distance of 1488.08 feet to a point; thence along the same, South 32° 38' 37" East, a distance of 1919.33 feet to a point; thence along the same, South 52° 10' 26" West, a distance of 1864.51 feet to a point; thence along the same and along lands now or formerly of Eight Point Buck Hunting Camp, LLC, North 32° 23' 49" West, a distance of 2783.04 feet to a point; thence continuing along the Eight Point Buck Hunting Camp lands, South 83° 30' 23" West, a distance of 250.53 feet to a point; thence through lands of which this is a part, North 06° 29' 37" West, a distance of 600.25 feet to a point; thence through the same, North 32° 21' 54" East, a distance of 140.90 feet to a point; thence through the same and with a curve turning to the right with a radius of 325.00 feet, an arc length of 17.84 feet, a chord bearing of North 47° 36' 38" East, and a chord length of 17.84 feet to a point at the common corner of lands now or formerly of Patton Township; thence along Patton Township lands, South 44° 26' 43" East, a distance of 1124.67 feet to a point; thence along the same and with a non-tangential curve turning to the right with a radius of 525.00 feet, an arc length of 326.88 feet, a chord bearing of North 55° 20' 01" East, and a chord length of 321.62 feet to a point; thence along the same with another non-tangential curve turning to the right with a radius of 275.00 feet, an arc length of 543.16 feet, a chord bearing of North 52° 25' 07" East, and a chord length of 459.08 feet to a point; thence along the same, South 70° 59' 53" East, a distance of 117.89 feet to a point; thence along the same, North 19° 00' 07" East, a distance of 308.17 feet to a point; thence along the same, North 70° 59' 53" West, a distance of 120.00 feet to a point; thence along the same, North 19° 00' 07" East, a distance of 58.07 feet to a point; thence along the same and with a curve turning to the right with a radius of 400.00 feet, an arc length of 81.55 feet, a chord bearing of North 24° 50' 32" East, and a chord length of 81.40 feet to a point; thence along the same, North 30° 40' 57" East, a distance of 204.84 feet to a point; thence along the same, South 59° 19' 03" East, a distance of 120.00 feet to a point; thence along the same, North 30° 40' 57" East, a distance of 104.00 feet to a point; thence along the same, North 43° 48' 28" West, a distance of 290.43 feet to a point; thence along the same, North 46° 11' 32" East, a distance of 120.00 feet to a point; thence along the same, North 43° 48' 28" West, a distance of 234.35 feet to a point; thence along the same, South 46° 11' 32" West a distance of 21.09 feet to a point on the common line of lands now or formerly of Betty Fields Howe; thence along the Howe lands, North 31° 37' 24" West, a distance of 104.26 feet to a point; thence along the same, South 49° 16' 38" West, a distance of 0.77 feet to a point on the common line of lands now or formerly of Patton Township; thence along Patton Township lands and with a non-tangential curve turning to the right with a radius of 63.00 feet, an arc length of 251.37 feet, a chord bearing of North 74° 24' 59" East, and a chord length of 114.83 feet to a point; thence along the same, North 46° 11' 32" East a distance of 68.73 feet to a point; thence along the same, North 43° 46' 24" West, a distance of 360.92 feet to a point on the easterly right-of-way line of

EXHIBIT A  
LEGAL DESCRIPTION OF PROPERTY

Gray' Woods Boulevard; thence along the easterly right-of-way line of Gray' Woods Boulevard and with a non-tangential curve turning to the left with a radius of 770.00 feet, an arc length of 175.14 feet, a chord bearing of North 36° 54' 22" East, and a chord length of 174.76 feet to a point; thence along the same, North 30° 23' 25" East, a distance of 121.86 feet to a point at the common corner of lands now or formerly of Troy E. & Amy J. Morgan; thence along the Morgan lands, South 43° 48' 28" East, a distance of 588.49 feet to a point; thence along the same, North 46° 11' 32" East, a distance of 134.52 feet to a point on the common line of lands now or formerly of Allen D. Shoemaker; thence along the Shoemaker lands, South 29° 50' 56" East, a distance of 137.59 feet to a point; thence along the same, North 54° 16' 25" East, a distance of 186.00 feet to a point; thence along the same, North 39° 53' 18" West, a distance of 357.00 feet to a point on the common line of lands now or formerly of Troy E. & Amy J. Morgan; thence along the Morgan lands, North 49° 16' 38" East, a distance of 197.99 feet to a point on the southerly right-of-way line of Brackenbourne Drive; thence along the right-of-way line of Brackenbourne Drive, South 36° 47' 08" East, a distance of 160.59 feet to a point; thence along the same, North 53° 12' 52" East a distance of 50.00 feet to a point on the common line of lands now or formerly of State College Area School District; thence along the School District lands, South 36° 47' 08" East, a distance of 296.38 feet to a point; thence along the same and with a curve turning to the right with a radius of 480.00 feet, an arc length of 419.09 feet, a chord bearing of South 11° 46' 23" East, and a chord length of 405.90 feet to a point; thence along the same, South 76° 45' 37" East, a distance of 207.49 feet to a point; thence along the same, North 56° 33' 43" East, a distance of 342.49 feet to a point on the common line of lands now or formerly of Julie L. Mikesell; thence along the Mikesell lands and along lots now or formerly owned by Harold W. & Mary Jo. Brown, South 33° 26' 17" East, a distance of 197.04 feet to a point; thence continuing along the Brown lands, North 56° 31' 59" East, a distance of 72.28 feet to a point at the common corner of lands now or formerly of Nickolas D. Doroschenko, Jr.; thence along the Doroschenko lands and along lands now or formerly of Scott E. Gibson and lands now or formerly of Thomas W. Newby, South 32° 47' 06" East, a distance of 346.56 feet to the point and place of beginning and having an area of 149.740 Acres.

**BEING KNOWN AS** Centre County Uniform Parcel Identifier Tax Parcel Number

\_\_\_\_\_ Parcel 18-3/200A and Parcel 17-2/5A

**BEING** a portion of the land title to which became vested in Gray's Woods Partnership by deeds recorded in Centre County Deed Book Volume 454 at page 890 and Record Book 557 at page 921.

**BEING** more fully shown on a plan titled "Subdivision Plan, Gray's Woods Planned Community, Open Space Lot #3" as prepared by Keller Engineers, Inc., dated October 31, 2017, last revised November 21, 2017 and indexed as Project Number 3711-2, and recorded on December 15, 2017, in Centre County Plat Book 92 at page 117.



**CLEARWATER**  
*Conservancy*

*Gray's Woods Preserve  
Easement Plan  
Exhibit B*

 Preserve Boundary

0 750 1,500

Feet  
1:6,000



ClearWater Conservancy  
January 2022 - JAB

Data Sources: Centre County Planning, USGS  
Background Image: USDA / NAIP - 2017

# Appendix D

Haugh Family Preserve Conservation Easement Amendment (2007)

Dupuis  
828



R 01999-0019 Oct 26, 2007  
HAUGH, HUBERT H  
HAUGH, HUBERT H  
10-26-2007  
15:59:57  
AMEN 3 pas . RECORDER OF DEEDS

ELIZABETH A. DUPUIS  
BABST CALLAND CLEMENTS ZOMNIR, PC  
328 INNOVATION BOULEVARD, SUITE 200  
STATE COLLEGE, PA 16803

**AMENDMENT TO HAUGH FAMILY CONSERVATION EASEMENT**

**THIS AMENDMENT TO THE CONSERVATION EASEMENT** dated the 17  
day of October, 2007, by and between:

**HUBERT H. HAUGH and HELEN M. HAUGH**, brother and sister, of 335 Arbor  
Way, State College, Patton Township, Pennsylvania, (hereinafter "Declarants"), and  
**PATTON TOWNSHIP**, of 100 Patton Plaza, Patton Township, State College,  
Pennsylvania, (hereinafter "Holder").

**BACKGROUND**

WHEREAS, Declarants executed a Declaration of Conservation Easement dated  
December 29, 2005, and recorded December 30, 2005, in Centre County Record Book 1912, at Page  
707;

WHEREAS, said Declaration of Conservation Easement related to the tract of land  
consisting of 465.97 acres, more fully described in Exhibit "A" attached to the Declaration, and  
being known as Centre County Tax parcel Number 18-3-61;

WHEREAS, the Declarants subsequently conveyed that parcel to Holder by Deed of  
Dedication dated January 18, 2006, and recorded January 20, 2006, in Centre County Record Book  
1918, at Page 0051;

WHEREAS, the parties desire to amend a section of the Conservation Easement as provided herein.

NOW, THEREFORE, in consideration the Declarant and the Holder hereby modify the Declaration of Conservation Easement as follows:

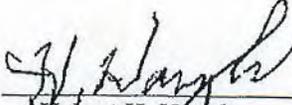
1. Section 4.03 (b) (vii) is amended to read as follows:

Removal of timber shall be permitted as necessary for the health of the forest and understory vegetation or maintenance of trails, etc., as is consistent with the terms of this Agreement.

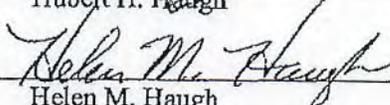
2. All other terms of the original Declaration of Conservation Easement shall remain in full force and effect, and the parties acknowledge the same by executing the amendment herein.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals the day and year first above written.

By: \_\_\_\_\_

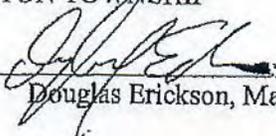
  
Hubert H. Haugh

By: \_\_\_\_\_

  
Helen M. Haugh

PATTON TOWNSHIP

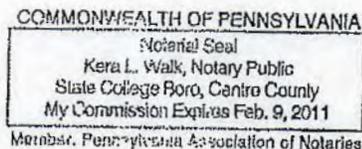
By: \_\_\_\_\_

  
Douglas Erickson, Manager

COMMONWEALTH OF PENNSYLVANIA )  
 ) SS:  
COUNTY OF CENTRE )

On this, the 17 day of October, 2007, before me, the undersigned officer, personally appeared HUBERT H. HAUGH and HELEN M. HAUGH, husband and wife, known to me (or satisfactorily proven) to be the persons whose names are subscribed to the within instrument, and acknowledged that they executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.



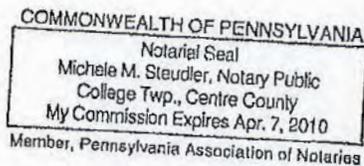
*Kera L. Walk*  
Notary Public

COMMONWEALTH OF PENNSYLVANIA )  
 ) SS:  
COUNTY OF CENTRE )

On this 21<sup>st</sup> day of October, 2007, before me, a Notary Public, personally appeared DOUGLAS ERICKSON, Manager of Patton Township, who acknowledged that he, being authorized to do so, executed the within document for the purposes therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand an notarial seal.

*Michele M. Steudler*  
Notary Public



# Appendix E

Review of forest management activities conducted on the Haugh Family Preserve (2017 – 2017)



Ken Soder  
Patton Township  
100 Patton Plaza  
State College, PA 16803

November 25, 2020

The purpose of this letter is to provide a review of the forest management activities to date at the Haugh Tract, proposed January 6, 2020 as follows:

- Review Haugh Forest Management Plan
  - Review document, activities completed to date, and conduct field assessment
    - 2007 Forest Management Plan (2007-2018)
    - Make recommendations for 2021 update

On October 20<sup>th</sup>, 2020, I met with Ken Soder and Katie Ombalski on site at the Haugh Tract. We spent most of the day looking at each “Stand,” or forest management unit. Prior to our meeting, I reviewed the Haugh Tract Forest Management Plan, dated 7/20/07, written by Brian C. Stiber – Stiber Forestry, and other appropriate documents. This report focused on the management units that are primarily forested. For each stand discussed in this report, you will see excerpts from the 2007 forest management plan, a listing of forest management activities since 2007, and my observations and notes.

### **Stand #10:**

#### **Stand 10**

**Land area:** 11.0 Acres

**Landuse history:**

This stand has been in forest cover for many generations in the past. Firewood cutting has been done in this stand in the recent past.

**Forest Type:** Dry oak – Mixed Hardwood Forest

**Description of vegetation:**

Stand 10 is predominantly white oak, red maple, scarlet oak, and black oak which represents 88% of the species composition. Chestnut oak, hickories, and bigtooth aspen are also present in the forest canopy. This is a medium sawtimber sized stand. Red maple saplings, black cherry saplings, hayscented ferns, and bracken ferns are present in the understory.

**Management recommendations:**

I would recommend conducting a regeneration harvest to establish more desirable oak seedlings in this stand. A shelterwood harvest should be conducted. This is where good seed producing trees are left and all other trees down to two inches in diameter are harvested. Approximately 50 to 60 percent of the canopy cover is removed in the initial harvest. This will provide both more sunlight and an available seed source to establish seedlings. A second harvest could be conducted to remove all or some of the remaining canopy trees after adequate seedlings have established or the canopy could be left as it is after the initial removal creating a two aged stand of mature overstory trees and dense understory seedlings.

There is an abundance of competing vegetation (red maple saplings and hayscented ferns) and heavy deer browsing pressure in this stand. Herbicide application and deer fencing to control competing vegetation and deer browsing would be required to establish a new stand of desirable seedlings (oak). The deer fence would be removed after an adequate amount of desirable seedlings are above the browse height of the deer. This would be temporary, about 5 or more years. This will provide early successional habitat for wildlife which would benefit species such as whitetail deer, turkey, and grouse. After the fence is removed, this would provide woody browse for whitetail deer.

- Forest Management Activities:
  - 2009-2010
    - Presumed herbicide work accomplished
    - Shelterwood harvest
    - Deer fence built after harvest
  - 2015
    - Deer fence removed
    - “Final” harvest conducted – removal of approximately 40% of seed trees

- Observations:

The stand has regenerated well. There is an abundance of desirable seedlings in the stand, including oak species. Additionally, there is an abundance of blackberry and black raspberry, which is desirable wildlife food and cover as well as good ground-level plants that help promote regeneration of desirable tree seedlings. A small amount of invasive species were found, but do not seem to be an issue currently. Final density and spacing of residual overstory trees is adequate and is conducive to growing a new forest. Overall, the forest management activities in this stand, including the regeneration harvest sequence, has resulted in a successful young forest.

Three items to note:

- If the deer fence would have been left in place longer, the oak regeneration would have a better chance for increased survivability. Oak seedlings spend at least a few years growing strong roots. This causes oak seedlings to lag behind other species in height. While the other understory tree species are, on average, taller than the deer can reach, the oak seedlings are still in the deer damage zone. Deer damage is evident on the oak seedlings.
- While the 2007 forest management plan briefly mentions a second/final harvest (“a second harvest could be conducted to remove all or some of the remaining canopy trees after adequate seedlings have established...”), the Activity Summary Table (the “to do” list for activities) on page 68 does not

list a second harvest specifically. It must be assumed that there was plenty of observation and discussion with a professional forester (Brent Harding?) to make the decision to move forward. It is always best to amend the forest management plan in a case like this to keep things clear. Amending the plan shows how the activity was consistent with stated goals and documents the activity for future managers.

- Deer fencing is typically necessary in Pennsylvania when trying to regenerate a forest. Installing a deer fence after a harvest is logistically easiest, but installing a deer fence a few years prior to a harvest is preferred and typically produces improved results for regrowing oak. In a “pre-fence” scenario, invasive and competing plants are controlled and a fence is installed in year 1. This will ensure “advanced regeneration,” or desirable seedlings that are present in abundance prior to a harvest. Harvesting can begin after adequate desirable seedling numbers are observed – typically after 3 or 4 years. For best results, deer fence should remain for 10+ years.

### **Stands #11, #17, and #18:**

#### **Stand 11**

**Land area:** 2.29 Acres

**Landuse history:**

This stand has been in forest cover for many generations in the past. No recent forest management activities were observed.

**Forest Type:** Dry Oak – Mixed Hardwood Forest

**Description of vegetation:**

This stand is predominantly white oak, scarlet oak, and red maple which represent 85% of the species composition of the growing stock. Black oak and black cherry are also present in the canopy. This is a large sawtimber stand. Desirable seedlings are very scarce. The understory is mostly open. Red maple and black cherry saplings are present in the understory.

#### **Stand 17**

**Land area:** 4.06 Acres

**Landuse history:**

This stand has been in forest cover for many generations in the past. No recent forest management activities were observed.

**Forest Type:** Dry Oak – Mixed Hardwood Forest

**Description of vegetation:**

Stand 17 is predominately white oak, black oak, and scarlet oak which compose 89 % of the species composition of the growing stock. Chestnut oak and red maple are also present in the canopy. This is a large sawtimber sized stand. Seedlings of desirable species are scarce in the understory which includes small black cherry seedlings. The understory vegetation includes red maple saplings, hayscented ferns, and lowbush blueberry.

## **Stand 18**

**Land area:** 2.64 Acres

### **Landuse history:**

This stand has been in forest cover for many generations in the past. No recent forest management activities were observed..

**Forest Type:** Dry White Pine -- Oak Forest

### **Description of vegetation:**

Stand 18 is predominately chestnut oak and white pine which compose 85 % of the species composition of the growing stock. Black and scarlet oak is also present in the canopy. This is a medium sawtimber sized stand. There is an abundance of white pine saplings in the understory. There is also red maple saplings, lowbush blueberry, sassafras, and small chestnut oak seedlings present in the understory.

(2007 forest management plan provided the same recommendations for all 3 stands)...

### **Management recommendations:**

I would recommend conducting a regeneration harvest to establish more desirable oak seedlings in this stand. A shelterwood harvest should be conducted. This is where good seed producing trees are left and all other trees down to two inches in diameter are harvested. Approximately 50 to 60 percent of the canopy cover is removed in the initial harvest. This will provide both more sunlight and an available seed source to establish seedlings. A second harvest could be conducted to remove all or some of the remaining canopy trees after adequate seedlings have established or the canopy could be left as it is after the initial removal creating a two aged stand of mature overstory trees and dense understory seedlings.

There is an abundance of competing vegetation (red maple saplings and hayscented ferns) and heavy deer browsing pressure in this stand. Herbicide application and deer fencing to control competing vegetation and deer browsing would be required to establish a new stand of desirable seedlings (oak). The deer fence would be removed after an adequate amount of desirable seedlings are above the browse height of the deer. This would be temporary, about 5 or more years. This will provide early successional habitat for wildlife which would benefit species such as whitetail deer, turkey, and grouse. After the fence is removed, this would provide woody browse for whitetail deer.

- Forest Management Activities:
  - 2012
    - Presumed herbicide work accomplished
    - Lighter harvest than recommended – more like a thinning, overall
    - Riparian areas well-protected with little harvesting along natural drainage
- Observations:

The harvesting was appropriate for these stands. While the forest management plan called for a regeneration harvest sequence to create a new/young forest, the actual harvesting was more like a thinning and actually fits better in these narrow stands that contain a corridor of natural drainages. Because this thinning harvest did not remove as many trees as proposed in the forest management plan, a deer fence was not necessary. A deer fence works to protect a new forest – the goal of a regeneration harvest – but a thinning focuses

on the continued growth of the overstory trees and is not intended to grow a new/young forest.

One item to note:

1. While the decision to conduct a lighter harvest in these stands was wise, it is always best to amend the forest management plan in a case like this to keep things clear. Amending the plan shows how the activity was consistent with stated goals and documents the activity for future managers.

## **Stand #16:**

### **Stand 16**

**Land area:** 20.89 Acres

**Landuse history:**

This stand has been in forest cover for many generations in the past. Firewood cutting has been done in this stand in the recent past.

**Forest Type:** Dry Oak - Heath Forest

**Description of vegetation:**

Stand 16 is predominately chestnut oak, black oak, and scarlet oak which compose 85 % of the species composition of the growing stock. White oak, red maple, and pitch pine are also present in the canopy. This is a small sawtimber sized stand. Seedlings of desirable species are scarce in the understory which includes small chestnut oak, white oak, and black oak seedlings. The understory vegetation includes lowbush blueberry, bracken ferns, sassafras, black gum, and American chestnut sprouts.

**Management recommendations:**

Maintain this stand in its current condition. The white, chestnut, black, and scarlet oak in the canopy and lowbush blueberry and sassafras in the understory are good food sources for wildlife. Protect the chestnut sprouts from damage. Protect vernal ponds.

- Forest Management Activities:
  - 2017
    - Presumed herbicide work accomplished
    - Shelterwood harvest
    - Deer fence built after harvest (only 66% of total area due to trail/access purposes)
- Observations:

The stand has regenerated well. There is an abundance of desirable seedlings in the stand, including oak species. Additionally, there is an abundance of blackberry and black raspberry, which is desirable wildlife food and cover as well as good ground-level plants that help promote regeneration of desirable tree seedlings. Current density and spacing of residual overstory trees is adequate and is conducive to growing a new forest. Overall, the forest management activities in this stand, including the regeneration harvest sequence, has resulted in a successful young forest, especially inside the deer enclosure (2/3<sup>rd</sup> of

total area). The unprotected 1/3<sup>rd</sup> should be observed closely for deer damage, especially to oak regeneration. Deer impacts are already evident and we discussed some options while on-site to add some protection from hungry deer (dropping less valuable trees and leaving large tops on the ground, building a number of small deer exclosures, etc).

Three items to note:

1. Because this stand was all treated the same, but only 2/3<sup>rd</sup> of it was fenced, there will be ample opportunity to observe regeneration differences in coming years. It will be a good opportunity to see the value of your deer fence investments.
2. The 2007 forest management plan did not call for a harvest in this stand. While the success of the regeneration harvest is obvious, it is always best to amend the forest management plan in a case like this to keep things clear. Amending the plan shows how the activity was consistent with stated goals and documents the activity for future managers.
3. Deer fencing is typically necessary in PA when trying to regenerate a forest. Installing a deer fence after a harvest is logistically easiest, but installing a deer fence a few years prior to a harvest is preferred and typically produces improved results for regrowing oak. In a “pre-fence” scenario, invasive and competing plants are controlled and a fence is installed in year 1. This will ensure “advanced regeneration,” or desirable seedlings that are present in abundance prior to a harvest. Harvesting can begin after adequate desirable seedling numbers are observed – typically after 3 or 4 years. For best results, deer fence should remain for 10+ years.

### **Stand #23 and #24:**

#### **Stand 23**

**Land area:** 12.03 Acres

**Landuse history:**

This area was an orchard in the past.

**Forest Type:** Early successional habitat, overgrown orchard

**Description of vegetation:**

The overstory of stand 23 is predominately red maple, black cherry, bigtooth aspen, and scarlet oak. These trees are scattered and patchy. Most of this area is covered by shrub vegetation. Bush honeysuckle, multiflora rose, blackberry, privet, autumn olive, and highbush blueberry are some of the shrubs present in this stand. Scrub oak, hawthorn, and scattered old apple trees are also present in this stand. There is an abundance of invasive species in this stand which include bush honeysuckle, multiflora rose, autumn olive, and privet.

**Management recommendations:**

Maintain this stand in its current condition. The blackberry, grapevines, hawthorn, apple trees, highbush blueberry and black cherry are good food sources for wildlife. Treat invasive species with herbicide to prevent them from spreading further.

## Stand 24

**Land area:** 21.08 Acres

**Landuse history:**

Part of this stand was a Chinese chestnut orchard in the past. The Chinese chestnut are still present in the overstory of this stand.

**Forest Type:** Aspen Forest

**Description of vegetation:**

The overstory of stand 24 is predominately bigtooth aspen and red maple. Black cherry, pitch pine, black oak, white oak, scarlet oak, and Chinese chestnut are also present in the canopy. This is a small sawtimber sized stand. Lycopodium, mayapple, hayscented ferns, lowbush blueberry, sassafras, black gum, bush honeysuckle, barberry, and multiflora rose are also present in the understory of this stand. Red maple saplings and black oak and black cherry seedlings are also present in this stand. Chinese chestnut sprouts are scattered throughout the stand. Invasive species of concern include bush honeysuckle, barberry, and multiflora rose.

(same recommendations for both stands)...

**Management recommendations:**

Maintain this stand in its current condition. The Chinese chestnut, scarlet oak, white oak, black oak, lowbush blueberry, mayapple, sassafras, black gum, and black cherry are good food sources for wildlife. Protect Chinese chestnut trees from disturbance. Protect the vernal ponds. Treat invasive species with herbicide to prevent them from spreading further.

- Forest Management Activities:
  - None were observed or communicated
- Observations:

Since no forest management activity has taken place in these stands, there has not been much change, except for a likely increase in tree size as well as a likely increase in invasive plant abundance. Original recommendations to control competing plants in these stands still applies. The highest priority in this stand would be to control the most aggressive invasive species.

## Stand #21 and #22:

### **Stand 21**

**Land area:** 6.74 Acre

**Landuse history:**

This stand was farmed in the past. This is evidenced by the field stone piles and stone rows present in this area.

**Forest Type:** White Pine – Northern Hardwood Forest

**Description of vegetation:**

Stand 21 is predominately white pine, red maple, and black cherry which compose 96 % of the species composition of the growing stock. White oak is also present in the canopy. This is a medium sawtimber sized stand. Lycopodium, barberry, hayscented ferns, multiflora rose, and huckleberry are present in the understory of this stand. Small black cherry, red maple, and white oak seedlings are also present in this stand. Invasive species of concern include multiflora rose and barberry.

**Management Recommendations:**

I would recommend conducting a regeneration harvest to establish more desirable seedlings (black cherry and white pine) in this stand. A shelterwood harvest should be conducted. This is where good seed producing trees are left and all other trees down to two inches in diameter are harvested. Approximately 50 to 60 percent of the canopy cover is removed in the initial harvest. This will provide both more sunlight and an available seed source to establish seedlings. A second harvest could be conducted to remove all or some of the remaining canopy trees after adequate seedlings have established or the canopy could be left as it is after the initial removal creating a two aged stand of mature overstory trees and dense understory seedlings.

There is an abundance of competing vegetation (red maple saplings, hayscented ferns, and barberry) and heavy deer browsing pressure in this stand. Herbicide application and deer fencing to control competing vegetation and deer browsing would be required to establish a new stand of desirable seedlings (black cherry and white pine). The deer fence would be removed after an adequate amount of desirable seedlings are above the browse height of the deer. This would be temporary, about 5 or more years. This will provide early successional habitat for wildlife which would benefit species such as whitetail deer, turkey, and grouse. White Pine seedlings and saplings would provide good winter thermal cover for wildlife.

### **Stand 22**

**Land area:** 7.81 Acres

**Landuse history:**

This stand has been in forest cover for many generations in the past. No recent forest management activities were observed.

**Forest Type:** Dry Oak – Mixed Hardwood Forest

**Description of vegetation:**

Stand 22 is predominately red maple, white oak, and bigtooth aspen which compose 88 % of the species composition of the growing stock. Scarlet oak, black oak, hickories, and black cherry are also present in the canopy. This is a medium sawtimber sized stand. Lycopodium,

hayscented ferns, herbaceous grasses, and red maple saplings are present in the understory of this stand. Black cherry, red maple, white oak, and black oak seedlings are also present in this stand.

**Management recommendations:**

Maintain this stand in its current condition. The white, black, and scarlet oak and black cherry in the canopy are good food sources for wildlife.

- Forest Management Activities:

- 2013
  - Presumed herbicide work accomplished
  - Shelterwood harvest
  - Deer fence built after harvest
  - Deer fence removed 2018

- Observations:

The stands seem to be regenerating pretty well. There are desirable seedlings in the stand, including some oak species. Current density and spacing of residual overstory trees is adequate and is conducive to growing a new forest. Overall, the forest management activities in this stand, including the regeneration harvest sequence, has resulted in a successful young forest. Timing of next steps (final harvest?) – should be discussed in detail.

Three items to note:

1. The 2007 forest management plan did not call for a harvest in Stand 22, however, it is understandable why the decision was made to combine these two stands for this regeneration harvest. While the success of the regeneration harvest in both stands is obvious, it is always best to amend the forest management plan in a case like this to keep things clear. Amending the plan shows how the activity was consistent with stated goals and documents the activity for future managers.
2. Deer fencing is typically necessary in PA when trying to regenerate a forest. Installing a deer fence after a harvest is logistically easiest, but installing a deer fence a few years prior to a harvest is preferred and typically produces improved results for regrowing oak. In a “pre-fence” scenario, invasive and competing plants are controlled and a fence is installed in year 1. This will ensure “advanced regeneration,” or desirable seedlings that are present in abundance prior to a harvest. Harvesting can begin after adequate desirable seedling numbers are observed – typically after 3 or 4 years. For best results, deer fence should remain for 10+ years.
3. A descriptive sign was noted on the west side of these stands, along a well-used trail. The sign described the forest management activities and included a nice map of the harvest area. This is a great mechanism for public education and understanding of forest management activities. The sign noted that a forest management plan is in place and being followed and even provided contact information for questions/comments. I would make only one small suggestion for future signage and that is to be sure to properly identify and name the specific silvicultural practice as well as the intent of the activity. For example, if the activity is a regeneration

harvest, the sign could say, "This shelterwood harvest is designed to regrow a new/young forest." If the activity is a thinning, the sign could say, "This thinning harvest is designed to improve the growth (crown size, mast production, carbon storage capacity, etc) of the unharvested, most productive trees by removing less productive trees."

## **Stands #1 and #5:**

### **Stand 1**

**Land area:** 14.85 Acres

**Landuse history:**

This stand was farmed in the past. This is evidenced by the field stone piles and stone rows present in this area.

**Forest Type:** Red Pine Plantation

**Description of vegetation:**

The overstory of stand 1 is dominated by red pine which represents 95 % of the species composition of the growing stock. Very scattered white pine, red maple, black cherry, and Scotch pine are also present in the forest canopy. The trees that make up the overstory of this stand are overcrowded. This is a small sawtimber sized stand. Desirable seedlings are scarce in the understory. There are some very small red maple, black cherry, white oak, and black oak seedlings, less than 1 foot in height, present. Red maple saplings dominate the understory. White oak and black oak saplings are also present. There is also sassafras, false sarsaparilla, Virginia creeper, lowbush blueberry, bush honeysuckle, and some bryophytes present in the understory. Invasive species of concern in this area includes bush honeysuckle that is present on the margins of this stand near the field. However, it is not abundant throughout the entire stand.

**Management Recommendations:**

Due to the overcrowded conditions of the overstory, I would recommend conducting a thinning harvest in this stand. I would recommend conducting a thin from below harvest which would remove mainly trees in the lower canopy positions that are less productive, smaller in diameter, and have smaller crowns. This may also involve completely removing a few of the planted rows of red pine. Several small openings could also be created where there are abundant oak, cherry, and maple seedlings and saplings present.

Treat bush honeysuckle with herbicide to keep it from spreading further. Protect intermittent drainage

## Stand 5

**Land area:** 8.04 Acres

### **Landuse history:**

This stand was farmed in the past. This is evidenced by the field stone piles and stone rows present in this area.

**Forest Type:** Red Pine Plantation

### **Description of vegetation:**

The overstory of stand 5 is dominated by red pine which represents 98 % of the species composition of the growing stock. Very scattered white pine, red maple, and black cherry are also present in the forest canopy. The trees that make up the overstory of this stand are overcrowded. This is a large poletimber sized stand. Desirable seedlings are scarce in the understory. There are some very small red maple, black cherry, white oak, and black oak seedlings, less than 1 foot in height, present. Red maple, white oak, and black oak saplings are present in the understory. There is also sassafras, false sarsaparilla, Virginia creeper, lowbush blueberry, bush honeysuckle, and some bryophytes present in the understory. Invasive species of concern in this area includes bush honeysuckle that is present on the margins of this stand near the field. However, it is not abundant throughout the entire stand.

### **Management Recommendations:**

Due to the overcrowded conditions of the overstory, I would recommend conducting a thinning harvest in this stand. I would recommend conducting a thin from below harvest which would remove mainly trees in the lower canopy positions that are less productive, smaller in diameter, and have smaller crowns. This may also involve completely removing a few of the planted rows of red pine. Several small openings could also be created where there are abundant oak, cherry, and maple seedlings and saplings present.

Treat bush honeysuckle with herbicide to keep it from spreading further.

- Forest Management Activities:

- 2011
  - Presumed herbicide work accomplished
  - Presumed thinning from below or row thinning
  - Planted 2,500 white pine seedlings
- 2019
  - Overstory removal of pine

- Observations:

As stated in the forest management plan, the purpose of the 2011 thinning was to reduce overcrowding, to remove less productive trees, and to release small patches of hardwood seedlings, where present. Because of the recent 2019 harvesting in these stands, all evidence of the 2011 thinning activity is gone. I can only assume it was done well and lead to a successful outcome. Only the results of the 2019 harvest are evident now. Because the 2019 activity was not part of a plan and not matched to written goals, I have to make an assumption about the purpose of the work. I assume the purpose of the overstory removal of 2019 was to convert the stands from plantation/softwood stands to (future) hardwood stands. While there are some pine seedlings present in the understory, there are not nearly enough to repopulate the site. It seems there was a desire to reduce

pine cover and to refocus growth on what is more natural for the site – primarily hardwoods with a small mix of softwoods. When prescribing and implementing an overstory removal, the ground layer vegetation has to be the focus, as the goal of an overstory removal is to release the **present** understory. However, the present understory, in stands 1 and 5, does not include enough desirable seedlings (hardwood or softwood) to successfully regenerate these two stands. In order to regenerate the next forest, these stands will likely need significant management effort including planting, managing invasive and competitive plants, and protection from deer.

Five items to note:

1. The prerequisite to the prescription and implementation of an overstory removal has to be abundant, desirable, and protected advanced regeneration (seedlings present prior to any harvest). Prior to the overstory removal in these stands, apparently there was not enough desirable advanced regeneration and what may have been present was unprotected. The result is a fairly vacant understory – at least vacant of desirable hardwood and softwood seedlings in the numbers necessary to become a new forest. Old plantations are a challenge, for sure. A landowner who has old plantations is faced with some tough decisions. For the purpose of this review, it is certainly not pertinent to second-guess the work, rather, it is important to help to overcome the challenges now at hand.
2. On the positive side, going from a (likely) stagnant old plantation to a fresh overstory removal will create incredible increases in species diversity and wildlife usage. If you can manage the inflow of invasive species and overbrowsing by deer, you should see abundant native wildflowers, forbs, grasses, and other herbaceous plants thrive. Additionally, habitat has improved greatly for insects, birds, and small mammals. If the goal of the overstory removal of pine was to create all this, then I say it's a success. However, if the goal was to (someday) grow a new forest in these stands, it will be an uphill battle.
3. The 2019 harvesting was not called for in the 2007 forest management plan, so the goals are not clear. An advantage to having a forest management plan is to have a goal (a target). When you aim at a target, it's easy to judge your result. Did you hit your mark? Did you miss your mark? Then, after judgement comes learning and adaptation, if necessary.
4. If new forest cover (someday) is the goal, I suggest immediate deer protection as well as a routine treatment of invasive plants. Planting may also be necessary.
5. If a wildlife meadow is the goal, you will be on your way with some routine invasive treatments and probably some well-spaced, well-protected planting of small fruit producing trees and shrubs.

## Stands #2, #3, and #4:

### **Stand 2**

**Land area:** 3.9 Acres

**Landuse history:**

This stand was farmed in the past. This is evidenced by the field stone piles and stone rows present in this area.

**Forest Type:** Dry White Pine - Oak Forest

**Description of vegetation:**

The forest canopy of stand 2 is dominated by red maple, scarlet oak, and white oak which represents 87% of the species composition of the growing stock. White pine and bigtooth aspen are also present in the forest canopy. This is a large poletimber stand. Desirable seedlings and saplings present in the understory include white pine, black cherry, black oak, and red maple. Other vegetation present in the understory includes lowbush blueberry and sassafras

**Management recommendations:**

Maintain this stand in its current condition. The white and scarlet oak in the canopy and lowbush blueberry and sassafras in the understory are good food sources for wildlife. Protect the intermittent drainage.

### **Stand 3**

**Land area:** 6.46 Acres

**Landuse history:**

This stand has been in forest cover for many generations in the past. No recent forest management activities were observed.

**Forest Type:** Dry White Pine -- Oak Forest

**Description of vegetation:**

The overstory of stand 3 is dominated by white oak, scarlet oak, black oak, and red maple which represents 93% of the species composition of the growing stock. White pine and red oak is also present in the forest canopy. This is a small sawtimber stand. Red maple and white pine saplings dominate the understory. There are also some small white oak and black oak seedlings that are below the browse height of the deer. American chestnut sprouts are present throughout the understory. Most have cankers from the chestnut blight. Other vegetation present in the understory includes lowbush blueberry, bracken ferns, and sassafras.

**Management recommendations:**

Maintain this stand in its current condition. The white, black, and scarlet oak in the canopy and lowbush blueberry and sassafras in the understory are good food sources for wildlife. Protect the American chestnut sprouts from damage.

## **Stand 4**

**Land area:** 2.77 Acres

### **Landuse history:**

This stand has been in forest cover for many generations in the past. No recent forest management activities were observed.

**Forest Type:** Dry Oak – Heath Forest

### **Description of vegetation:**

Stand 4 is predominantly white oak, scarlet oak, and black oak which represents 90% of the species composition of the growing stock. Red maple and chestnut oak is also present in the canopy. This is a large poletimber stand. Desirable seedlings are scarce and are predominately small white and black oak seedlings. Lowbush blueberry, sassafras, bracken ferns, white pine saplings, and American chestnut sprouts are also present in the understory.

### **Management recommendations:**

Maintain this stand in its current condition. The white, chestnut, black, and scarlet oak in the canopy and lowbush blueberry and sassafras in the understory are good food sources for wildlife. Protect the chestnut sprouts from damage.

- Forest Management Activities
  - None noted
- Observation:

Combined, these stands include 13.13 acres of forest. These stands are fairly similar, with only slight differences in species, and size and age of trees – primarily due to past land use. The 2007 forest management plan included similar recommendations for each – “maintain stand in its current condition.” No management has occurred, as prescribed. Invasive plants were not mentioned in the 2007 plan, but it is likely that there are some to consider treating.

## Stand #26:

### **Stand 26**

**Land area:** 19 Acres

**Landuse history:**

This stand has been in forest cover for many generations in the past. No recent forest management activities were observed.

**Forest Type:** Dry Oak – Mixed Hardwood Forest

**Description of vegetation:**

The overstory of stand 26 is predominately white oak, scarlet oak, bigtooth aspen, and red maple which compose 91 % of the species composition of the growing stock. Red oak, black oak, black cherry, black locust, and hickories are also present in the canopy. This is a small sawtimber sized stand. Hayscented ferns, bracken ferns, false sarsaparilla, lowbush and highbush blueberry, blackberry, Virginia creeper, sassafras, mayapple, bush honeysuckle, winged euonymus, and multiflora rose are present in the understory of this stand. Red maple saplings and white oak, black oak, and red maple seedlings are also present in the understory. A few American chestnut sprouts were observed in this stand. Invasive species of concern include bush honeysuckle, winged euonymus, and multiflora rose.

**Management recommendations:**

Maintain this stand in its current condition. The blackberry, blueberry, mayapple, sassafras, oaks, hickories, and black cherry are good food sources for wildlife. Protect the relics of the Scotia mines. Protect American chestnut sprouts from damage. Protect the vernal ponds. Treat invasive species with herbicide to prevent them from spreading further.

- Forest Management Activities:
  - 2010
    - Presumed herbicide work accomplished
- Observation:

This stand is quite beautiful with a large population of white oak. Much of the stand is visible from Scotia Range Road. While herbicide work called for in the 2007 forest management plan may have been accomplished in 2010, invasive species are quite obvious and abundant. The largest populations of invasive species are on the road side of the stand, but are also present throughout. It would be wise to begin controlling the understory vegetation in this stand immediately. Overstory growth and development has been good in this stand. There are abundant mast producing trees that, according to the forest management plan, are approaching 100 years old. The stand contains high valued historic elements related to iron ore mining and the town of Scotia.

## **Final Thoughts:**

Overall, the Haugh Tract is an incredible property and well-deserving of all the care and attention it receives from its stewards – the Patton Township Board of Supervisors, the Patton Township Open Space Stewardship Committee, and the people of Patton Township. Fortunately, the Haugh Tract has been under the care and management of Patton Township officials and professional Foresters for over a decade. The love of the property by all involved definitely shows.

The 2007 forest management plan was well-written and has put the property on a sustainable trajectory. Most of the forest management activities on the property have been well documented and precisely implemented to date. Thanks to all the great work and investment over the years, the Haugh Tract forests have a great potential to be sustained for many generations to come.

The definition of forest health, is to have a forest in strong enough condition that it can sustain itself – no matter what challenges it may face through time. Forest challenges typically come in the way of unadvisable forestry practices, invasive plant establishment, storm damage, insect damage, and disease outbreaks. The forests of the Haugh Tract contain multiple age classes and enough species diversity to weather many “storms.” Overall, the Haugh Tract forests are not perfect – there are some challenges. However, I have faith that the diligence of the aforementioned stewards will take the necessary steps and make the necessary improvements that will ensure sustainability and improved forest health.

There is great evidence of good stewardship over much of the Haugh Tract’s forestland. Since the forest management plan was written in 2007, most of the forest management recommendations have been followed and most of the activities have been successfully implemented. This is rare. Additionally, it is rare for a landowner to go through a thorough review process like this report presents. You all can be proud. The Haugh Tract is in good hands.

As stewards of the Haugh Tract, after essentially completing the recommendations of the 2007-2018 forest management plan, it is time to enter a new era. From this point forward you will be working on forest management activities that are beyond your original written plan – meaning, your “to do” list created in 2007 is practically complete. Forest management plans are written to encompass approximately 10 years for a reason – things can change, learning has taken place, adaptations may be necessary, new goals are developed, and some successes may need to be maintained. In the coming decade, there will still be work to do, so the time has come for a new plan to be your guide through 2031.

Your next forest management plan will create a new “to do” list and will guide you through the coming decade of forest management improvement activities. Ask yourself, where would you be today if it weren’t for the plan that was written and accepted in 2007? Similarly, where will you be 10 years from now without a new plan in place?

Anyone can feel free to contact me anytime by phone (814) 659-1280 or email [mike.wolf.afc@gmail.com](mailto:mike.wolf.afc@gmail.com). Thank you all for the opportunity to present this review.

# Appendix F

Gray's Woods Forest Resources Inventory Report

# Gray's Woods Forest Resources Inventory (Summary)

Gray's Woods Preserve

192 acres

Patton Township, Centre County, Pennsylvania

November 2020



Prepared by:

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### Goals for Gray's Woods:

- Protect quality and quantity of all water resources on the property, including wetlands/vernal ponds, springs/seeps, and streams/riparian areas
- Maintain and improve hydrologic function
- Preserve habitat for native species dependent on water resources
- Promote biological diversity
- Maintain and improve forest health and productivity
- Protect native species and natural habitat, control invasive species that are infringing on natives
- Prevent any further fragmentation of the forest on the property
- Protect and maintain large intact areas of wildlife habitat, maintain and improve wildlife travel corridors to connect patches of wildlife habitat on the property
- Maintain forest with a continuous canopy and a multi-tiered understory of trees, shrubs, wildflowers, and grasses
- Create diversity of habitat types to benefit all wildlife species and protect special sites that are important to wildlife habitat such as snags, den trees, and breeding sites
- Protect scenic vistas visible from public access points and right-of-ways
- Promote recreational and educational opportunities
- Protect natural resources to keep them in an undisturbed state except as required to promote and maintain a diverse community of predominantly native species, and to promote stewardship
- Protect the relics of Scotia mines
- Protect all chestnut trees from disturbance unless for safety or health reasons

### Inventory Method:

Appalachian Forest Consultants, LLC conducted a SILVAH cruise in July 2020. The cruise consisted of 191 well-spaced, sample plots – collecting both understory (6-foot radius) and overstory (non-radial 10 BAF) forest data. Note: SILVAH prescriptions are just a guide and all final prescriptions will be created by your Forester. Also, SILVAH “effective age” and “timber value” estimates are just estimates.

From “SILVAH – Decision support for managers of Allegheny hardwood and mixed oak ecosystems” (<https://www.nrs.fs.fed.us/tools/silvah/#:~:text=SILVAH%20is%20the%20computerized%20implementation,inventory%20of%20overstory%20and%20understory>):

**SILVAH** (short for **Sil**viculture of **Allegheny Hard**woods) is a computer tool for making silvicultural decisions in hardwood stands of the mid-Atlantic and upper Appalachian region. It is an "expert system" in that it recommends appropriate treatments based upon user objectives and overstory, understory, and site data provided by the user. SILVAH also contains a wildlife attributes report, forest stand growth simulator, provides the ability to test alternative cuts, enables development of a forest-wide inventory database, and facilitates other forest management planning functions.

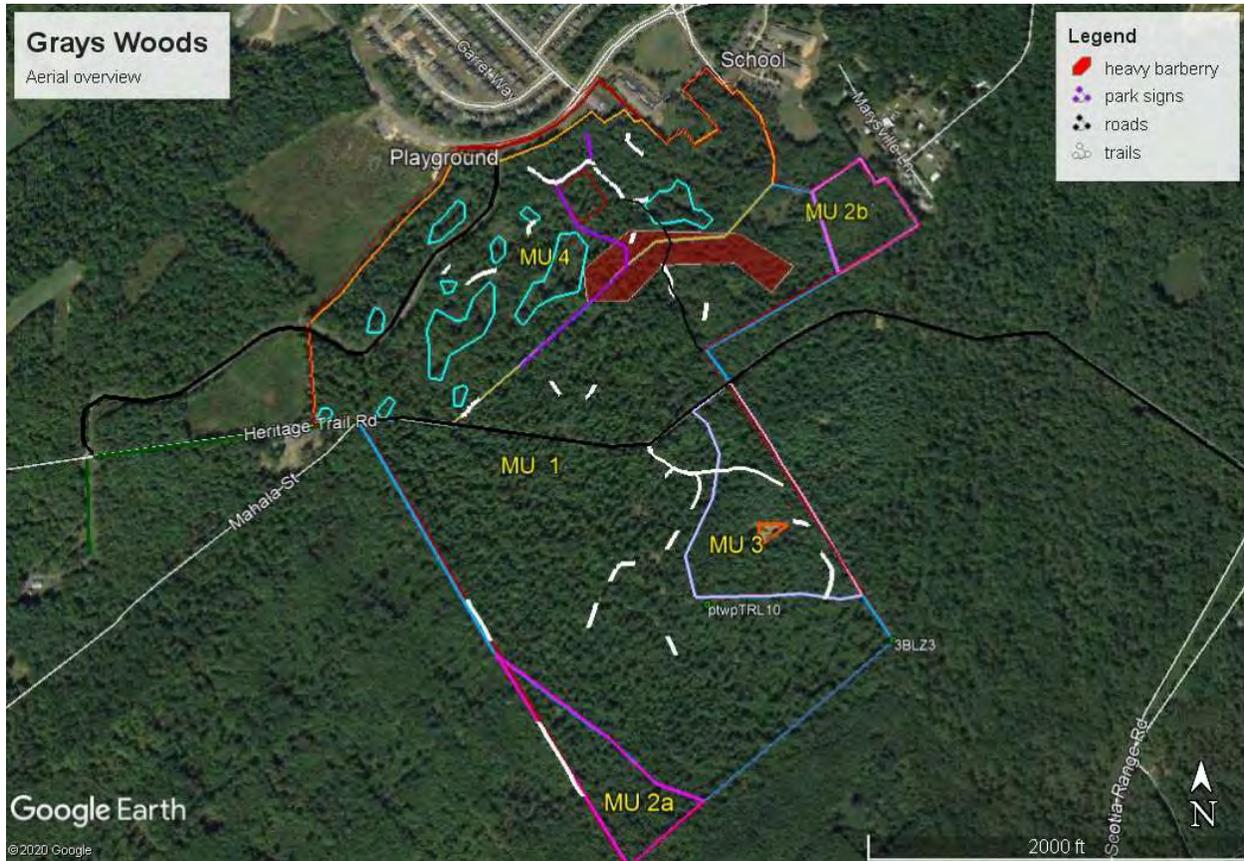
SILVAH is the computerized implementation of a systematic approach to silviculture, in which current conditions are identified through a systematic inventory of overstory and understory. These conditions are evaluated using an objective set of research-based standards and the constraints and objectives of the land-manager. Then a prescription is recommended to move the stand closer to the manager's objectives. The silviculture behind the SILVAH system in Allegheny, northern hardwood, and mixed-oak forests is described in two publications titled [Prescribing silvicultural treatments in hardwood stands of the Alleghenies](#) and [Prescribing regeneration treatments for mixed-oak forests in the Mid-Atlantic region](#)

### Forest Management Units:

Consistent with previous forest inventory work, this report breaks down the whole property into four forest management units (MU) as shown in Figure 1.

- MU 1, 103 acres
- MU 2, 12.3 acres
- MU 3, 14 acres
- MU 4, 62.9 acres

Figure 1: Forest Management Unit Map:



### Gray's Woods MU Descriptions and Notes:

- General notes - All trails managed by the operating agency are marked with yellow paint, making it difficult to distinguish separate trails and connect segments. A clear deer browse line exists south of Heritage Trail Road, however, most deer observed north of Heritage Trail. Perhaps the availability of water outweighed the proximity to human activity. Another large housing development is under construction along the northwest border and is not indicated on the 2015 aerial photo. Heritage trail road is accessed off the Scotia Range Road. The west end is apparently considered a private road with no trespassing signs and a truck usually parked in the middle of the road. Heritage trail is in rough shape. A single American chestnut was found in each of MU1 and MU4. Several folks were hiking/biking each day throughout the area.

- MU 1, 103 acres, by far the largest unit on the property. It appears to have had a seedtree regeneration harvest around 2005-2008. Much of the area is in saplings between 12 and 25 ft tall with a few larger residual seed trees. Surprisingly, relatively few non-native invasive species (NNIS) were found. A 4-wheeler trail runs southward along the west side boundary south of Heritage trail road for about  $\frac{3}{4}$  of the way. A footpath continues around the remainder of the boundary. A single Ailanthus (sapling) was located along the Heritage trail road under the powerline. Crown vetch was noted along Heritage Trail.
- MU 2, 12.3 acres, consists of MU 2a in the southwest corner and 2b in the north east corner near Marysville Lane. This area is relatively undisturbed when compared to MU 1 with larger trees and few saplings/poles. Oriental bittersweet was located in MU 2b. A small shed in a state of disrepair was found in the extreme eastern corner of MU 2b.
- MU 3, 14 acres, appears to be the site of the iron mine referred to in the previous biological study. The terrain is obviously disturbed by human activity (steep slopes, deep trenches, spoil piles of iron ore rock). This could be a historically significant site and may need to be checked with the SHPO (state historical preservation office) due to the large number of historical smelting furnaces in the region. The tree canopy is mostly conifer (white pine and pitch pine). A large sand hill exists for some reason (orange area on map).
- MU 4, 62.9 acres, has been designated as a park with a small parking area, a playground, and small signs posted through the wooded area (purple line thru middle of area on map) prohibiting hunting. Heavy barberry (indicated in red area on map) exists along the edge with MU 1. Several USFWS wetlands in this MU (light blue on map) – varying sizes. Most were wet, but some were currently dry with trees and herbaceous vegetation growing. The dry wetlands have mud stains on the bottom 18 inches of trees and the presence of sedges. Many of the wetlands appear to have been delineated with flagging (a pink/blue combination for actual wet area and orange flags for buffer). Gray’s Woods Elementary School is very close to the eastern corner of this MU. Most of the invasive species seemed to occur in this MU. One oriental bittersweet encountered in transect, not on plot. A 1.2 ac exclusion appears to be privately owned (according to onXmaps) though I could find no evidence of boundary delineation other than the paths seemed to avoid the area. A single woodcock was noted.

SILVAH Output Summary and Analysis for each MU:

**MU 1 - Narrative Summary and Analysis (2020 inventory data)**

Nonnative invasive species have the potential to displace native vegetation, including desirable timber species. There were no invasives in the overstory, seven invasives in the understory (Japanese barberry, Tatarian honeysuckle, multiflora rose, unspecified non-native shrub, garlic mustard, Japanese stiltgrass and autumn olive), and nine that were found outside the plots (Japanese barberry, Tatarian honeysuckle, multiflora rose, unspecified non-native shrub, garlic mustard, Japanese stiltgrass, autumn olive, ailanthus and oriental bittersweet).

This mixed oak stand is dominated by Red Maple, Chestnut Oak, White Oak, Black Oak, Aspen, non-commercial species, White Pine and Scarlet Oak which together comprise 89 percent of the basal area.

This is a small sawtimber stand, with average medial diameter of 10.9 inches. Sapling trees too small to be merchantable represent a significant proportion of stand stocking and should be included in any thinnings.

If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 25 years. Effective stand age is about 85 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species would make it difficult to apply selection cutting.

Relative stand density is 74 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is in the optimum range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Thinning to provide more growing space for the better stems is not necessary at this time.

Total growing stock amounts to 85 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 14.5 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 9.9 cords of pulp wood and 2531.8 board feet of sawtimber (Scribner log rule). The total stand value is estimated to be about \$887 per acre.

Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Large competitive regeneration in the sapling and small pole sizes is abundant, probably as a result of heavy cutting in the past. This understory will respond to form the next stand if the overstory is removed.

Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover.

## **MU 2 - Narrative Summary and Analysis (2020 inventory data)**

Nonnative invasive species have the potential to displace native vegetation, including desirable timber species. There were no invasives in the overstory, five invasives in the understory (Japanese barberry, Tatarian honeysuckle, garlic mustard, privet, and oriental bittersweet), and nine that were found outside the plots (Japanese barberry, Tatarian honeysuckle, garlic mustard, privet, oriental bittersweet, Japanese stiltgrass, multiflora rose, autumn olive and ailanthus).

This mixed oak stand is dominated by Red Maple, Aspen, Black Oak, Scarlet Oak, White Oak and Black Cherry which together comprise 86 percent of the basal area.

This is a small sawtimber stand, with average medial diameter of 12.0 inches.

If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 27 years. Effective stand age is about 79 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species would make it difficult to apply selection cutting.

Relative stand density is 77 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is in the optimum range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Thinning to provide more growing space for the better stems is not necessary at this time.

Total growing stock amounts to 98 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 19.6 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 15.2 cords of pulp wood and 2447.4 board feet of sawtimber (Scribner log rule). The total stand value is estimated to be about \$831 per acre.

Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand.

Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover.

### **MU 3 - Narrative Summary and Analysis (2020 inventory data)**

Nonnative invasive species have the potential to displace native vegetation, including desirable timber species. There were no invasives in the overstory, two invasives in the understory (Japanese stiltgrass and Tatarian honeysuckle), and nine that were found outside the plots (Japanese stiltgrass, Tatarian honeysuckle, Japanese barberry, multiflora rose, garlic mustard, autumn olive, unspecified non-native shrub, ailanthus and oriental bittersweet).

This unknown type stand is dominated by White Pine, Pine, Black Oak, Chestnut Oak and Red Maple which together comprise 89 percent of the basal area.

This is a small sawtimber stand, with average medial diameter of 13.0 inches.

If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 24 years. Effective stand age is about 94 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 89 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is higher than optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably moderate, while growth rate of the medium and smaller-sized trees is probably fair and mortality due to crowding moderate.

Thinning to provide more growing space for the better stems is desirable if it will at least pay the cost of harvesting.

Total growing stock amounts to 124 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 25.5 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 15.7 cords of pulp wood and 5498.3 board feet of sawtimber (Scribner log rule). The total stand value is estimated to be about \$992 per acre.

Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves. Non-commercial saplings and poles represent 6 sq. ft. of basal area and may need to be treated prior to final harvest cutting.

Competitive seedlings are not abundant; they will provide adequate natural regeneration only if supplemented with residual stems retained from the present overstory and protected from deer browsing.

Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover.

#### **MU 4 - Narrative Summary and Analysis (2020 inventory data)**

Nonnative invasive species have the potential to displace native vegetation, including desirable timber species. There were no invasives in the overstory, seven invasives in the overstory (multiflora rose, Tatarian honeysuckle, autumn olive, Japanese barberry, unspecified non-native shrub, garlic mustard and Japanese stiltgrass), and nine that were found outside the plots (multiflora rose, Tatarian honeysuckle, autumn olive, Japanese barberry, unspecified non-native shrub, garlic mustard, Japanese stiltgrass, oriental bittersweet and ailanthus).

This unknown type stand is dominated by Red Maple, White Pine, White Oak, Misc Comm. Species, Black Cherry, Aspen and Red Oak which together comprise 89 percent of the basal area.

This is a medium sawtimber stand, with average medial diameter of 13.8 inches.

If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 19 years. Effective stand age is about 90 years.

If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 77 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is in the optimum range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Thinning to provide more growing space for the better stems is not necessary at this time.

Total growing stock amounts to 107 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 23.6 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 16.7 cords of pulp wood and 3928.9 board feet of sawtimber (Scribner log rule). The total stand value is estimated to be about \$1,420 per acre.

Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand.

A combination of undesirable understory plants and site limitations are likely to interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover. The limitations on this stand include excessively wet soils.

Gray's Woods Forest Metrics:

Cruise data for all MU's is summarized in Figure 2 (below – next page). This summary does not replace the complete SILVAH analysis and output that is on file with Appalachian Forest Consultants and is available upon request.

Figure 2: Forest Metrics summarized for each MU:

Stand analysis		54%	6%	7%	33%	
Grays woods		MU 1	MU 2	MU 3	MU 4	forest total
overstory plots		101	12	16	62	191
understory plots		101	12	16	62	191
forested area		103.0	12.3	14.0	62.9	192.2
selection adapt		no	no	yes	yes	no
yrs to maturity		25	27	24	19	21
eff age		85	79	94	90	89
Med dbh		10.9	12.0	13.0	13.8	12.4
stem size		small saw	small saw	small saw	med saw	small saw
stand type		mixed oak	mixed oak	white pine	oak hdwd	mxd oak
net bd fr/acre	silvah	2532	2447	5498	3929	3226
pulpwood cds/ac	silvah	9.9	15.2	15.7	16.7	13
trees/ac		806	448	572	394	657
basal area	sq ft/ac	85	98	124	107	96
ags basal area		57	65	99.4	69.8	
ba of undesirable saplings/poles		5	1	6	3	4
<b>species % of BA (2% or more)</b>						
red maple	rm domin	25%	41%	8%	28%	27%
black cherry	ahw>40%	2%	6%		5%	4%
black oak		10%	10%	10%	3%	8%
red oak			2%		4%	2%
sugar maple						
Other non comm						
hickory			6%			
chestnut oak		13%	2%	8%		8%
birch		2%		6%	2%	2%
honey locust						
sassafras		3%		2%		2%
white pine		4%		51%	23%	16%
aspen		6%	14%	2%	4%	6%
Black locust	predom				2%	
black gum					6%	3%
White oak		12%	7%		18%	14%
scarlet oak		3%	9%		3%	3%
pitch pine				13%		2%
ash						
black walnut			3%			
pin oak						
<b>rel density</b>		<b>74%</b>	<b>77%</b>	<b>89%</b>	<b>77%</b>	<b>76</b>
<b>ags rel den</b>		<b>50%</b>	<b>51%</b>	<b>69%</b>	<b>52%</b>	<b>53</b>
<b>Q-factor</b>		<b>1.20</b>	<b>1.58</b>	<b>1.56</b>	<b>1.58</b>	<b>1.19</b>
interference tall		52%	17%	88%	65%	57%
interference low		35%	25%	69%	55%	43%
ferns		24%	50%	13%	31%	27%
grass		5%	33%	6%	24%	13%
invasive		31%	33%	19%	56%	73%
grapevines		32%	50%	6%	19%	27%
% plots w/regen		7%	0%	6%	8%	7%
% plots w/interference		77%	100%	94%	98%	87%
% rocky		0%	0%	25%	0%	2%
% poor drainage		0%	0%	0%	40%	13%
<b>slope %</b>						
seed supply		low	low	very low	moderate	low
acorn supply		some	inadequate	inadequate	some	some
Deer impact		high	high	high	high	high

Important Gray's Woods Factors for Forest Management:

Figure 3: Gray's Woods Wetland Mapping - USFWS

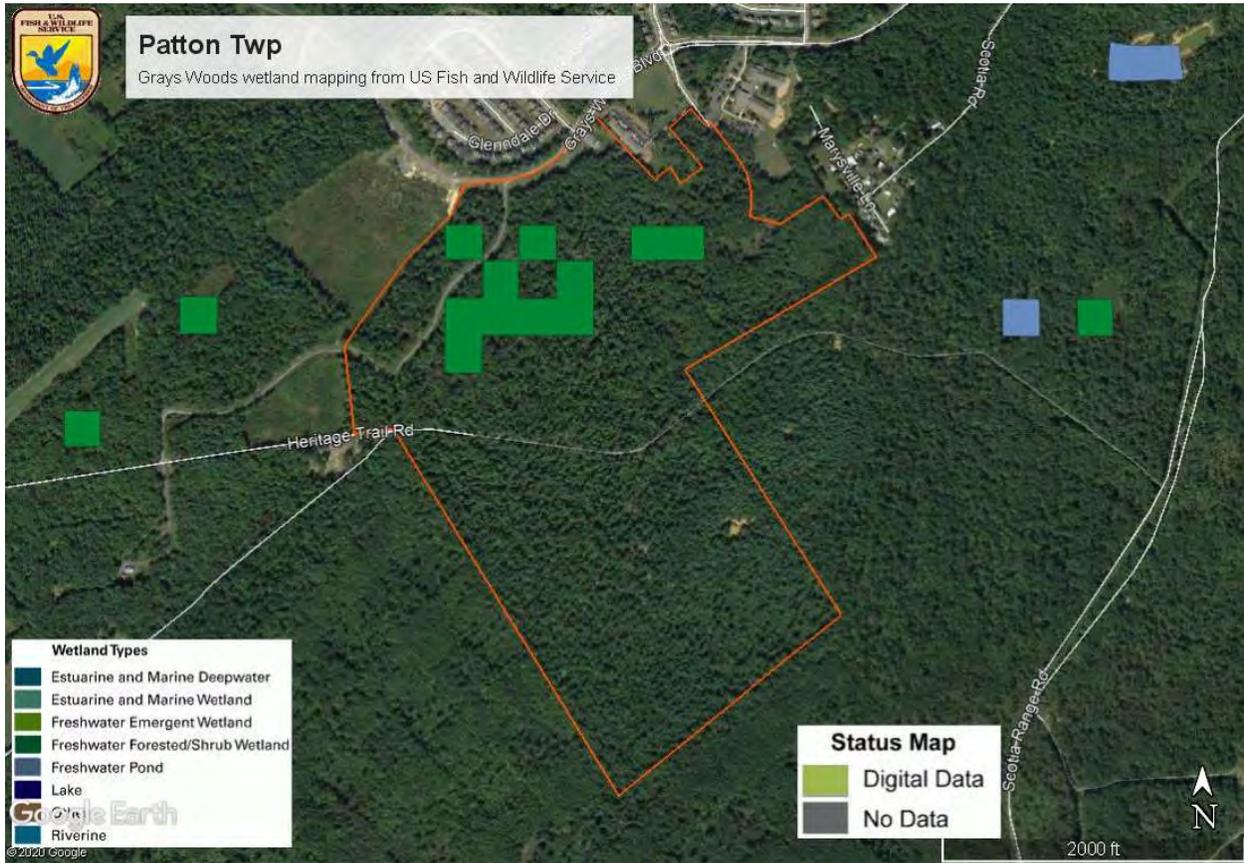
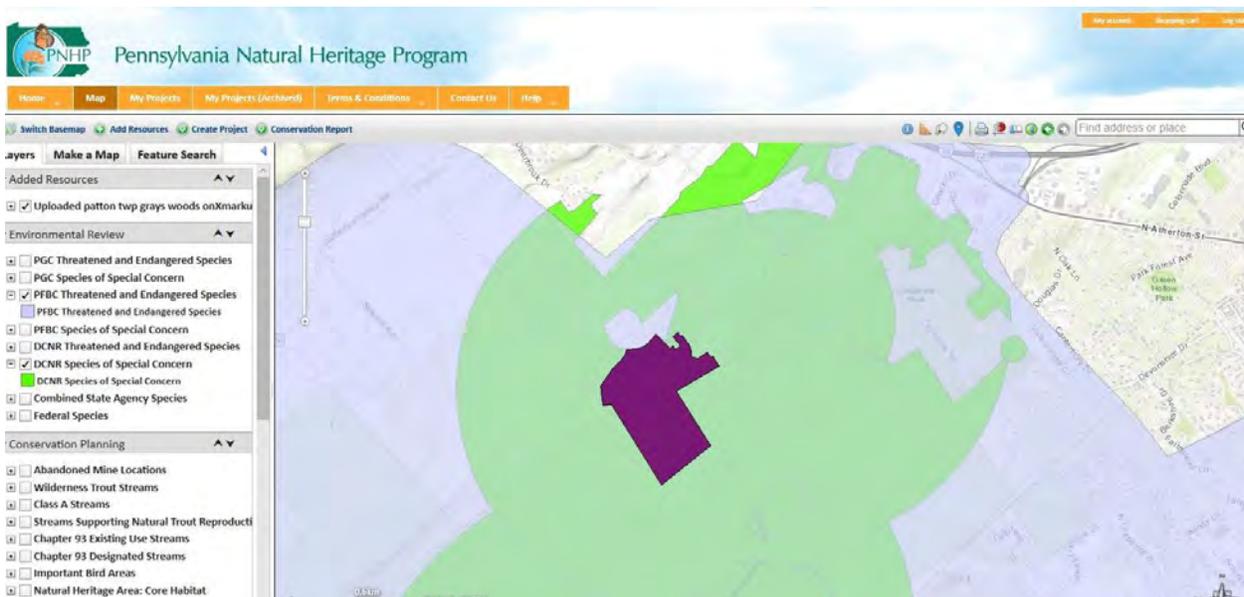


Figure 4: PA Natural Diversity Index (PNDI) mapping for potential presence of Rare, Threatened, or Endangered Species (full PNDI report is available upon request):



## SILVAH Information on Wildlife Habitat – all MU's combined:

Note: Also available for each MU, by request.

### **Information on Wildlife Habitat**

#### **Mast, Forage and Browse resources**

Hard mast such as hickory nuts, acorns and beech nuts are foods that can be consumed immediately or stored for use during the winter season. They are required by many wildlife species, including bears, squirrels and mice. The stand has 36.8 sq.ft. of trees that produce high-quality hard mast (white oak, chestnut oak, black oak, scarlet oak, northern red oak, pitch pine, black walnut, honeylocust, pin oak, blackjack oak and bur oak), and 53.7 sq.ft. of other hard mast producers (red maple, white pine, aspen, black cherry, blackgum, black locust, pin cherry and sugar maple). The understory data has nine species that produce high-quality hard mast (American chestnut, black oak, blackjack oak, chestnut oak, honeylocust, northern red oak, pitch pine, scarlet oak and white oak) and eight of other hard mast producers (aspen, black cherry, black locust, blackgum, pin cherry, red maple, white pine and witchhazel).

Soft mast (fruits), such as cherries and berries are high energy foods required by many wildlife species including bears and many species of migrating songbirds where high energy sources are of key importance during fall migration. The stand has five species that produce high-quality soft mast totaling a basal area of 8.0 sq.ft. (black cherry, blackgum, sassafras, pin cherry and serviceberry) and no other soft mast producing trees. The understory data has twelve species that produce high-quality soft mast (black cherry, blackgum, blueberry, devil's walkingstick, flowering dogwood, grape, pin cherry, rubus, sassafras, serviceberry, silky dogwood and smilax) and one of other soft mast producers (witchhazel).

Browse is a critical food resource for herbivores such as deer, rabbits, and cottontails. Because most herbivores of concern are ground foragers, only understory vegetation is considered in this report. This stand contains ten species that produce high-quality browse (black oak, blackgum, blackjack oak, chestnut oak, grape, northern red oak, pin cherry, rubus, smilax and white oak) and fourteen species that produce lesser quality browse (birch, black cherry, black locust, blueberry, devil's walkingstick, flowering dogwood, hickory, honeylocust, red maple, sassafras, scarlet oak, serviceberry, white pine and witchhazel). The distribution of browse across the stand is good, 89.0 percent of plots have at least one browse species.

This stand has five species that provide exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 17.7 sq.ft. (white oak, black cherry, black locust, pin cherry and bur oak). Another thirteen species totaling 41.0 sq.ft. provide some additional food value (white pine, chestnut oak, black oak, scarlet oak, blackgum, northern red oak, sassafras, black walnut, honeylocust, pin oak, blackjack oak, serviceberry and sugar maple). The understory has six species that provide exceptional additional wildlife food in the form of insects and nectar (American chestnut, black cherry, black locust, pin cherry, rubus and white oak). Another seventeen species provide some additional food value (black oak, blackgum, blackjack oak, blueberry, chestnut oak, devil's walkingstick, flowering dogwood, grape, honeylocust, northern red oak, sassafras, scarlet oak, serviceberry, silky dogwood, smilax, white pine and witchhazel). These additional food resources support many songbirds and pollinators.

#### **Snags Cavities and Dens**

Snags and den trees provide shelter for a wide variety of wildlife including owls, ducks, woodpeckers, songbirds, squirrels, fishers, and other mammals. They are also used for foraging by various birds,

mammals and amphibians. There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 22.9 sq.ft. of sawtimber size trees that have exceptional value as snags (white pine, white oak, aspen, sassafras, black locust and sugar maple).

### **Stand Structure and Composition**

Structurally diverse forests support a greater diversity of wildlife. Understory structure provides foraging and nesting substrate, and escape and roosting cover for birds and mammals. Evergreen and ericaceous species provide thermal cover, structural complexity, nesting and foraging substrate, and compositional (or habitat) diversity for deer, grouse, turkey, black-throated green and -blue warblers, and other species. The stand has two evergreen trees with a basal area of 16.8 sq.ft. (white pine and pitch pine) and no ericaceous trees. The understory has two evergreen species (pitch pine and white pine) and one ericaceous species (blueberry).

Structure is contributed both by the attributes of individual trees and species (branching habit, foliage type) and by the distribution of trees horizontally and vertically in a stand. So-called "wolf trees" with large trunks and large, low, horizontal branches are selected by several canopy-nesting bird species. Horizontal diversity can be promoted with reserve islands and variable-retention harvests. While most users of SILVAH do not collect height data, height and diameter are closely related, so we can infer the vertical structure of a stand by the proportion of trees in each diameter class.

### SILVAH Recommendations for each MU:

Note: The final Conservation Plan of 2021 may or may not follow SILVAH's recommendations. The final recommendations in the Conservation Plan of 2021 will re-filter all the forest data through multiple input layers.

### **MU 1 - Treatment Description with Marking Instructions (2020)**

SILVAH has recommended a **Defer Cutting (low relative density)**.

The stand is not yet mature (25 years to maturity) and the user does not wish to begin regeneration now. The relative density is 74.1% which is below the 80% threshold considered necessary for a partial cut. Immature or all-aged stands that are within or below the optimum range of stand density do not need any sort of partial cutting. In such a stand, the best prescription is to leave the stand alone for 10 or 15 years, and then re-examine it to see what treatment is appropriate at that time.

### **Additional treatment**

- This stand has 31.7 percent of the understory plots stocked with grapevines. Grapevines that grow into the crowns of trees can cause extensive damage by interfering with growth and seed production, and by breaking out the tops of the trees. Damage can be especially severe in young, even-aged stands. In stands with more than 30 percent of the understory plots stocked with grapevines, it is usually advisable to treat the vines. This can be done by cutting the vines close to the ground. Canopy shade will usually prevent the sprouts from surviving. Where canopy density is low, or where harvest cutting will occur within a few years, cut the vines and treat the cut stumps with an herbicide.

These prescriptions generally produce the desired results, requires an investment, and usually will yield an economic return at the same time. If such investment meets your organization's economic criteria, we recommend it. If not, we recommend no treatment. In the case of regeneration prescriptions, stands generally will not reproduce without the recommended treatment.

## **MU 2 - Treatment Description with Marking Instructions (2020)**

SILVAH has recommended a **Defer Cutting (low relative density)**.

The stand is not yet mature (27 years to maturity) and the user does not wish to begin regeneration now. The relative density is 77.2% which is below the 80% threshold considered necessary for a partial cut. Immature or all-aged stands that are within or below the optimum range of stand density do not need any sort of partial cutting. In such a stand, the best prescription is to leave the stand alone for 10 or 15 years, and then re-examine it to see what treatment is appropriate at that time.

### **Warnings**

- The relative density (77.2) is just below the 80% decision point in Chart C; A Thinning Prescription may be appropriate.

### **Additional treatment**

- This stand has 50.0 percent of the understory plots stocked with grapevines. Grapevines that grow into the crowns of trees can cause extensive damage by interfering with growth and seed production, and by breaking out the tops of the trees. Damage can be especially severe in young, even-aged stands. In stands with more than 30 percent of the understory plots stocked with grapevines, it is usually advisable to treat the vines. This can be done by cutting the vines close to the ground. Canopy shade will usually prevent the sprouts from surviving. Where canopy density is low, or where harvest cutting will occur within a few years, cut the vines and treat the cut stumps with an herbicide.

These prescriptions generally produce the desired results, requires an investment, and usually will yield an economic return at the same time. If such investment meets your organization's economic criteria, we recommend it. If not, we recommend no treatment. In the case of regeneration prescriptions, stands generally will not reproduce without the recommended treatment.

## **MU 3 - Treatment Description with Marking Instructions (2020)**

SILVAH has recommended a **Commercial Thinning**.

The stand is not yet mature (24 years to maturity) and the user does not wish to begin regeneration now. The stand will not be fully mature for another 24 years, but there is enough volume for a Commercial Thinning. Stands at or above 80 percent relative density should generally receive a commercial thinning at this time. In calculating the cut and residual stands, attempt to reduce relative stand density to 60 percent, but do not remove more than 35 percent of the stocking in any one cut. The cutting should be concentrated in the smaller, merchantable-size trees. Some larger trees should also be cut to open the canopy, improve spacing, and remove unacceptable growing stock. No non-merchantable saplings need to be cut. This type of thinning should tend to narrow the range of diameters and mold the stand structure (of

the merchantable-size trees) into a more pronounced bell-shaped distribution. A commercial thinning should increase stand diameter and reduce the time required for the larger and better quality trees to reach maturity. They should also increase the proportion of the most valuable species, and improve the average stand quality by removing the poorer stems. Include some high-wildlife value species (white pine, black oak, chestnut oak, aspen, sassafras, northern red oak, scarlet oak and blackgum) for retention in the thinning and TSI. Begin to identify islands of vertical structure for final overstory removal. A pulpwood only sale will yield 8 cords.

**Yields**

- The yield only passes the breakpoint for a pulpwood-only sale.
- A combined sawlog/pulpwood sale will yield 848 bd.ft. (Scribner) and 7 cords.
- A sawlog-only sale will yield 848 bd.ft. (Scribner)
- **A pulpwood-only sale will yield 8 cords.**

About 47% of the basal area harvested (39 sq.ft.) will be unacceptable growing stock (UGS). This will result in removal of about 74% of the UGS in this stand, and 100% of the merchantable-size UGS.

**Cut Guides**

Reduce relative stand density to 60%. Within the size and quality constraints below, favor the best trees wherever possible. Try to preserve seed sources of scarce species if they are desired in the regeneration, and strive for uniform spacing among residuals whenever possible.

- Cut **2** out of **3** trees in the **pole** size class.
- Cut **1** out of **5** trees in the **small sawtimber** size class.
- Cut **1** out of **10** trees in the **medium sawtimber** size class.
- Cut **1** out of **3** trees in the **large sawtimber** size class.

**Leave Guides**

Leave 85 sq.ft. of basal area per acre using the basal area distribution below.

Basal area distribution	
Size class	Basal Area (sq.ft./ac.)
Saplings	14
Pole	12
Small sawtimber	31
Medium sawtimber	21
Large sawtimber	6

#### **MU 4 - Treatment Description with Marking Instructions (2020)**

SILVAH has recommended a **Defer Cutting (low relative density)**.

The stand is not yet mature (19 years to maturity) and the user does not wish to begin regeneration now. The relative density is 77.2% which is below the 80% threshold considered necessary for a partial cut. Immature or all-aged stands that are within or below the optimum range of stand density do not need any sort of partial cutting. In such a stand, the best prescription is to leave the stand alone for 10 or 15 years, and then re-examine it to see what treatment is appropriate at that time.

#### **Warnings**

- The relative density (77.2) is just below the 80% decision point in Chart C; A Thinning Prescription may be appropriate.

# Appendix G

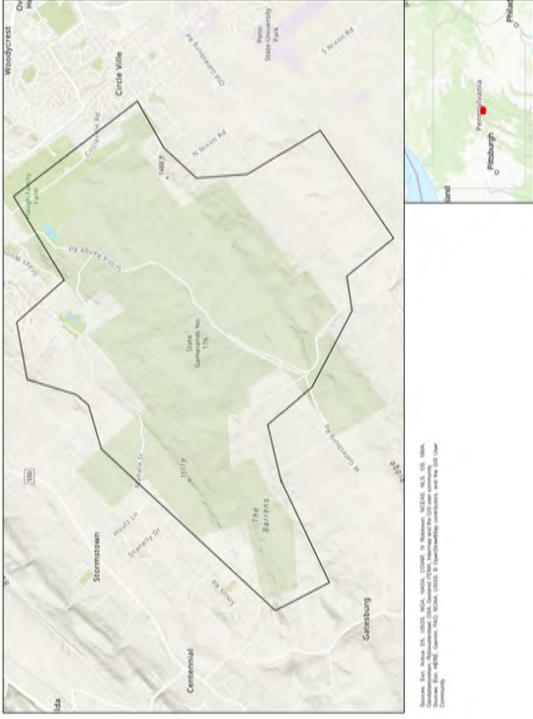
Conservation Opportunities Area Tool Report (2023)



# P E N N S Y L V A N I A WILDLIFE ACTION PLAN

## Conservation Opportunity Area Tool Results

**Project Name:** Patton Township Open Space  
**Project Date:** 15 December 2023  
**Project Area:** 9,526.84 acres (998 planning units)  
**Project Coordinates:** 40.775916 / -77.963867 (centroid)



**Counties:** Centre County  
**Municipalities:** Ferguson Township, Halfmoon Township, Patton Township  
**Physiographic Provinces:** Ridge and Valley  
**Ecoregions:** Central Appalachian Forest  
**Major Drainage Basin (HUC8):** Bald Eagle, Upper Juniata  
**Watershed (HUC12):** Beaver Branch, Big Hollow, Buffalo Run, Halfmoon Creek  
**Natural Heritage Areas:** [Scotia Barrens](#)  
**Protected Land\*:** Patton Township Woodlands Park, State Game Land 176

\*Note: At least one of the 10-acre planning units overlaps the above protected conservation land.

## Species of Greatest Conservation Need

*Species of Greatest Conservation Need are at-risk, threatened, or endangered species as well as common species of conservation concern for which Pennsylvania has stewardship responsibility.*

**Number of SGCN:** 71 (57 Known; 18 Likely\*)

**Number of Sensitive Species:** 7 (5 PFBC; 1 PGC; 1 Invertebrates)

\*"Known" and "Likely" SGCN counts may include multiple seasons for the same species (e.g., breeding and migration). Therefore, the total of these counts may exceed the number of unique SGCN in the area.

The sensitive species count is included in the total number of SGCN. Sensitive species may or may not be displayed in the table, subject to permissions.

**THIS REPORT DISPLAYS SENSITIVE SPECIES (\*); not for public distribution.**

All projects should be entered into the [Pennsylvania Conservation Explorer Environmental Review Tool](#) to avoid and minimize sensitive species conflicts.

Results are organized by:

- **Prioritization Category** (e.g., Contribute to the conservation of globally or regionally important species), then within each category by:
  - **Priority Score** with highest priority SGCN (i.e., score 1, 2, or 3; 1 = highest) for each category noted first, followed by additional SGCN found in the Area of Interest that are not as high of a priority (i.e., score 4, 5, or 6; 6 = lowest). For more information about SGCN and prioritization categories, see the [2015 Pennsylvania Wildlife Action Plan, Chapter 1](#).

## Contribute to the conservation of globally or regionally important species.

*Focused attention on these species will contribute to range-wide conservation of the species.*

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<b>Bird</b>					
<a href="#">Cerulean Warbler</a> ( <i>Setophaga cerulea</i> )	Migration	3	Known	Central Oak-Pine	Poorly known. Assumed to be similar to breeding habitat
<a href="#">Golden-winged Warbler</a> ( <i>Vermivora chrysoptera</i> )	Breeding	3	Known	Central Oak-Pine	Mosaic of herbaceous patches and shrubby thickets located along a forest edge, often at higher elevations; increasingly found in higher elevation bogs and forested wetlands
<a href="#">American Bittern</a> <sup>b</sup> ( <i>Botaurus lentiginosus</i> )	Breeding	3	Known	Emergent Marsh	Extensive freshwater wetlands with dense stands of cattails, spatterdock, bulrushes, sedges interspersed with open water
<a href="#">Long-tailed Duck</a> ( <i>Clangula hyemalis</i> )	Migration	4	Known	Lake and Pond	Large, deep waterbodies (both freshwater and marine) providing diverse and abundant invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although migrating and wintering Long-Tailed Ducks also occasionally occur at other locations (on lakes and large rivers) throughout the state
<a href="#">Lesser Scaup</a> ( <i>Aythya affinis</i> )	Migration	6	Known	Lake and Pond	Large, deep waterbodies providing diverse submerged aquatic vegetation and abundant aquatic invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although scaup also occasionally occur at other locations (on lakes and large rivers) throughout the state
<b>Mammal</b>					
<a href="#">Northern Long-eared Bat</a> <sup>b†</sup> ( <i>Myotis septentrionalis</i> )	Year-round	1	Known	Central Oak-Pine	Summer: Deciduous/mixed forested areas containing mature trees with exfoliating bark/snags, also human structures; Winter: Caves and mines

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<b>Invertebrate - Butterflies</b>					
Frosted Elfin <sup>†</sup> ( <i>Callophrys irus</i> )	Year-round	2	Known	Central Oak-Pine	Grassy openings with sandy or rocky soils, most commonly now in anthropogenic habitats such as powerline and railroad right-of-ways. Host plant is Baptisia ( <i>Baptisia tinctoria</i> ), sometimes lupine ( <i>Lupinus perennis</i> )
Persius Duskywing ( <i>Erynnis persius</i> )	Year-round	1	Likely	Central Oak-Pine	Specific habitat requirements are currently not available
<b>Invertebrate - Moths</b>					
Melsheimer's Sack Bearer Moth ( <i>Cicinnus melsheimeri</i> )	Year-round	3	Likely	Central Oak-Pine	Primarily found in sandy oak barrens. Preferred host plant is scrub oak ( <i>Quercus ilicifolia</i> )

### Prevent common species from becoming at-risk.

Proactive measures to enhance these populations could prevent further decline toward critical imperilment.

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<b>Bird</b>					
<a href="#">Blue-winged Warbler</a> ( <i>Vermivora cyanoptera</i> )	Breeding	1	Known	Agricultural	Early-mid successional forests and thickets with openings; areas marked by patches of herbs, shrubs, and trees and often located near a forest edge
<a href="#">Bobolink</a> ( <i>Dolichonyx oryzivorus</i> )	Breeding	1	Known	Agricultural	Moist meadows and fields of hay, clover, alfalfa and other herbaceous vegetation
<a href="#">Field Sparrow</a> ( <i>Spizella pusilla</i> )	Breeding	1	Known	Agricultural	Mixture of grasses and shrub
<a href="#">Rusty Blackbird</a> ( <i>Euphagus carolinus</i> )	Migration	1	Known	Agricultural	Generally forages in shallow waters such as streamsides, wet woods, lake and pond-edge, swamps and other wetlands including adjacent fields. Roosts in tree groves and orchards, crop stubble
<a href="#">Tundra Swan</a> ( <i>Cygnus columbianus</i> )	Migration	1	Known	Agricultural	Combination of open water areas (lakes and slow-moving portions of large rivers) for secure roosting with substantial amounts of large agricultural fields (especially harvested corn, harvested soybeans, and winter wheat) for feeding within 5-10 miles (8-16 kilometers) of roost sites
<a href="#">Eastern Whip-poor-will</a> ( <i>Antrostomus vociferus</i> )	Breeding	1	Known	Central Oak-Pine	Early to mid successional and open, forested habitats near clearings

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<a href="#">Kentucky Warbler</a> ( <i>Geothlypis formosa</i> )	Breeding	1	Known	Central Oak-Pine	Lowland deciduous forests with well-developed ground cover and a dense brushy or vine-filled understory, often near streams
<a href="#">Sora</a> ( <i>Porzana carolina</i> )	Breeding	1	Known	Emergent Marsh	Large shallow-intermediate depth emergent wetlands with a mosaic of open water, dense emergent vegetation, and mudflats
<a href="#">Black-and-white Warbler</a> ( <i>Mniotilta varia</i> )	Breeding	1	Known	Northern Hardwood & Conifer	Reported by some as an area-sensitive forest breeder, although apparently accepts early-successional forest; most abundant in forest with dense understory, including scrubby barrens
<a href="#">Broad-winged Hawk</a> ( <i>Buteo platypterus</i> )	Breeding	1	Known	Northern Hardwood & Conifer	Continuous deciduous or mixed deciduous forests with openings and water source nearby
<a href="#">Brown Creeper</a> ( <i>Certhia americana</i> )	Breeding	1	Known	Northern Hardwood & Conifer	Requires dead trees with loose bark for nesting in late-successional forest
<a href="#">Canada Warbler</a> ( <i>Cardellina canadensis</i> )	Breeding	1	Known	Northern Hardwood & Conifer	Hemlock-dominated ravines and wet sites in northern hardwood and mixed forest with a dense understory of shrubs such as rhododendron or hobblebush; higher elevations > 1499 feet (>457 meters)
<a href="#">Louisiana Waterthrush</a> ( <i>Parkesia motacilla</i> )	Breeding	1	Known	Northern Hardwood & Conifer	Mature, forested watersheds with med-high gradient headwater (1st-3rd order) streams, with well developed banks (ravines) and/or plentiful overturned trees with exposed root masses. High-quality stream indicator
<a href="#">Ruffed Grouse</a> ( <i>Bonasa umbellus</i> )	Breeding	1	Known	Northern Hardwood & Conifer	Mosaic of age classes within a forested landscape, with early succession forest as 12-15 percent of total. Peak use by drummers occurs at years 6-18 of regrowth. Low moist bottomlands with herbaceous cover, as well as coarse woody debris, important as brood habitat
<a href="#">Scarlet Tanager</a> ( <i>Piranga olivacea</i> )	Breeding	1	Known	Northern Hardwood & Conifer	A wide variety of mature deciduous and mixed-deciduous forest types
<a href="#">Winter Wren</a> ( <i>Troglodytes hiemalis</i> )	Breeding	1	Known	Northern Hardwood & Conifer	High elevation, coniferous/mixed forests, with a substantial hemlock component. Nests often near water, particularly streams in hemlock ravines but sometimes near bogs or swamps; require substantial downed woody debris, standing dead trees, or large-diameter logs

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<a href="#">Wood Thrush</a> ( <i>Hylocichla mustelina</i> )	Breeding	1	Known	Northern Hardwood & Conifer	Second-growth deciduous forest and forest-edge habitats; often with available fruit
<a href="#">American Woodcock</a> ( <i>Scolopax minor</i> )	Breeding	1	Known	Ruderal Shrubland & Grassland	Habitat mosaics that include small, scattered openings and dense stands of shrubs and young trees on moist soils
<a href="#">Prairie Warbler</a> ( <i>Setophaga discolor</i> )	Breeding	1	Known	Ruderal Shrubland & Grassland	Brushy second growth, dry scrub, low pine-juniper, pine barrens, burned-over areas, and sproutlands
<a href="#">Chimney Swift</a> ( <i>Chaetura pelagica</i> )	Breeding	1	Known	Urban/Suburban Built	Dark vertical hollow shafts, chimneys, hollow logs, silos and old barns
<a href="#">Willow Flycatcher</a> ( <i>Empidonax traillii</i> )	Breeding	1	Known	Wet Meadow / Shrub Marsh	Low-elevation shrub swamp, wet meadow, and brushy habitats along streams and the edges of ponds and marshes; sometimes dry upland sites
<a href="#">Golden Eagle</a> ( <i>Aquila chrysaetos</i> )	Migration	2	Known	Central Oak-Pine	Inhabit rugged, mostly wooded terrain throughout the Allegheny Plateau and Valley and Ridge regions (Ombalski and Brandes 2010)
<a href="#">Hooded Warbler</a> ( <i>Setophaga citrina</i> )	Migration	2	Known	Central Oak-Pine	Most frequent during migration in edges and early-successional deciduous forest (Rodewald and Matthews 2005)
<a href="#">Northern Saw-whet Owl</a> ( <i>Aegolius acadicus</i> )	Breeding	2	Known	Central Oak-Pine	Dense shrubby understory, including ericaceous shrubs, young conifers
<a href="#">American Black Duck</a> ( <i>Anas rubripes</i> )	Migration	2	Known	Lake and Pond	Palustrine and lacustrine wetlands
<a href="#">Blackburnian Warbler</a> ( <i>Setophaga fusca</i> )	Migration	3	Known	Central Oak-Pine	Not very specific during migration. Any habitat with at least some woody vegetation may be used
<a href="#">Cerulean Warbler</a> ( <i>Setophaga cerulea</i> )	Migration	3	Known	Central Oak-Pine	Poorly known. Assumed to be similar to breeding habitat
<a href="#">Ruffed Grouse</a> ( <i>Bonasa umbellus</i> )	Wintering	3	Known	Central Oak-Pine	Mosaic of age classes within a forested landscape, with early succession forest as 12-15 percent of total. High quality, native food and cover species within close proximity to one another. Conifers may provide important thermal cover from winter rain and ice. Diverse and complex native forest structure is preferred over heavily managed or thinned parcels
<a href="#">Wood Thrush</a> ( <i>Hylocichla mustelina</i> )	Migration	3	Known	Central Oak-Pine	Second-growth, closed-canopy deciduous and mixed forest often near water
<a href="#">Eastern Towhee</a> ( <i>Pipilo erythrophthalmus</i> )	Migration	3	Known	Ruderal Shrubland & Grassland	Edges, shrubland
<a href="#">Red-headed Woodpecker</a> ( <i>Melanerpes erythrocephalus</i> )	Breeding	3	Known	Urban/Suburban Built	Woodlots at least 4 acres (2 hectares) in size with snags near open pasture. Savannah-like forests, parks, swamps

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<a href="#"><u>Long-tailed Duck</u></a> ( <i>Clangula hyemalis</i> )	Migration	4	Known	Lake and Pond	Large, deep waterbodies (both freshwater and marine) providing diverse and abundant invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although migrating and wintering Long-Tailed Ducks also occasionally occur at other locations (on lakes and large rivers) throughout the state
<a href="#"><u>Northern Saw-whet Owl</u></a> ( <i>Aegolius acadicus</i> )	Migration	4	Known	Northern Hardwood & Conifer	Any forested habitat, including edges and ruderal forests, presumably
<a href="#"><u>Gray Catbird</u></a> ( <i>Dumetella carolinensis</i> )	Breeding	4	Known	Urban/Suburban Built	Dense, shrubby vegetation, including thickets, hedgerows, woodland edges, and regenerating clearcuts
<a href="#"><u>Bald Eagle</u></a> <sup>b</sup> ( <i>Haliaeetus leucocephalus</i> )	Wintering	5	Known	Agricultural	Protected perch and roost site trees near open water for foraging
<a href="#"><u>Broad-winged Hawk</u></a> ( <i>Buteo platypterus</i> )	Migration	5	Known	Central Oak-Pine	Continuous deciduous or mixed deciduous forests with openings and water source nearby
<a href="#"><u>Sharp-shinned Hawk</u></a> ( <i>Accipiter striatus</i> )	Migration	5	Known	Northern Hardwood & Conifer	Large, contiguous coniferous or mixed conifer/deciduous forests, away from suburban areas or areas of human consistent human activity. Migrants select large or contiguous forests >494 acres (>200 hectares) (Goodrich 2010) often near streams, rivers or wet thickets
<a href="#"><u>Lesser Scaup</u></a> ( <i>Aythya affinis</i> )	Migration	6	Known	Lake and Pond	Large, deep waterbodies providing diverse submerged aquatic vegetation and abundant aquatic invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although scaup also occasionally occur at other locations (on lakes and large rivers) throughout the state
<a href="#"><u>American Kestrel</u></a> ( <i>Falco sparverius</i> )	Breeding	1	Likely	Agricultural	Uses variety of grassland habitats with short herbaceous vegetation and sparse woody vegetation preferred; use meadows, agricultural fields, pastures, large lawn areas. Requires nest tree with cavity or nest box on tree, barn, or pole. Prime habitat includes > 61 acres (> 25 hectares) of contiguous grassland. Areas used consistently include greater than 65 percent open habitat in 2.5 acres (1 hectare) around nest site and distances from woodland > 1148 feet (>350 meters) (Smallwood and Bird 2002)

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<a href="#">Grasshopper Sparrow</a> ( <i>Ammodramus savannarum</i> )	Breeding	1	Likely	Agricultural	Indicator for large-scale grasslands; grassland obligate species
<a href="#">Black-throated Green Warbler</a> ( <i>Setophaga virens</i> )	Breeding	1	Likely	Northern Hardwood & Conifer	Large tracks of coniferous, deciduous, and mixed forests >984 feet (>300 meters) elevation
<a href="#">Savannah Sparrow</a> ( <i>Passerculus sandwichensis</i> )	Breeding	2	Likely	Agricultural	Arable fields, pasture, and reclaimed surface mines (Wilson in Wilson et al. 2012)
<b>Snake</b>					
<a href="#">Eastern Hognose Snake</a> <sup>†</sup> ( <i>Heterodon platirhinos</i> )	Year-round	3	Known	Central Oak-Pine	Sandy clearings in forests and grasslands. Often associated with sandy floodplains along waterways
<b>Turtle</b>					
<a href="#">Eastern Box Turtle</a> <sup>†</sup> ( <i>Terrapene carolina carolina</i> )	Year-round	1	Known	Central Oak-Pine	Deciduous forests, old fields, ecotonal areas, and marshy areas
<b>Salamander</b>					
<a href="#">Marbled Salamander</a> <sup>†</sup> ( <i>Ambystoma opacum</i> )	Year-round	3	Known	Central Oak-Pine	Vernal pools in mixed deciduous forests; both upland and floodplain sites
<a href="#">Jefferson Salamander</a> <sup>†</sup> ( <i>Ambystoma jeffersonianum</i> )	Year-round	3	Known	Northern Hardwood & Conifer	Vernal pools in mixed deciduous forests; primarily upland sites
<b>Invertebrate - Butterflies</b>					
Northern Hairstreak ( <i>Satyrrium favonius</i> )	Year-round	2	Known	Central Oak-Pine	Specific habitat requirements are currently not available
<b>Invertebrate - Moths</b>					
Loosestrife Borer Moth ( <i>Papaipema lysimachiae</i> )	Year-round	4	Known	Wet Meadow / Shrub Marsh	Feeds on swamp loosestrife ( <i>Lysimachia terrestris</i> ), a wetland species, and whorled yellow loosestrife ( <i>Lysimachia quadrifolia</i> ), which primarily grows in dry, open, sandy or rocky forests
Broad Sallow Moth ( <i>Xylotype capax</i> )	Year-round	4	Likely	Central Oak-Pine	Acid soil pine barrens, swamps, bogs, and dry oak woodlands. Host plants are most often highbush blueberry ( <i>Vaccinium corymbosum</i> ) and wild cherry ( <i>Prunus</i> )
Spiny Oakworm Moth ( <i>Arisota stigma</i> )	Year-round	4	Likely	Central Oak-Pine	Dry oak woodlands and barrens. Host plants are oaks ( <i>Quercus</i> ), but also known to feed on hazelnut ( <i>Corylus</i> ), and basswood ( <i>Tilia</i> )
<b>Invertebrate - Dragonflies and Damselflies</b>					
Crimson-ringed Whiteface ( <i>Leucorrhinia glacialis</i> )	Year-round	4	Likely	Lake and Pond	Lakes and ponds, usually with boggy or marshy areas
Emerald Spreadingwing ( <i>Lestes dryas</i> )	Year-round	4	Likely	Lake and Pond	Vegetated ponds, temporary pools, and slower streams

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
Spatterdock Darner ( <i>Rhionaeschna mutata</i> )	Year-round	4	Likely	Lake and Pond	Vegetated, fishless ponds or pools, often in open marshes and bogs
<b>Invertebrate - Terrestrial Snails</b>					
Toothed Globe ( <i>Mesodon zaletus</i> )	Year-round	4	Likely	Northern Hardwood & Conifer	Terrestrial habitats

## Maintain rare native species.

Conservation actions benefiting these species will increase the likelihood of sustaining them in Pennsylvania.

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<b>Bird</b>					
<u><a href="#">Pied-billed Grebe</a></u> ( <i>Podilymbus podiceps</i> )	Breeding	2	Known	Lake and Pond	Emergent wetlands with abundant vegetation (70 percent cover, 27-52 inches; 69-133 centimeters) in height and shallow water (9-22 inches; 24-56 centimeters) depth
<u><a href="#">Golden-winged Warbler</a></u> ( <i>Vermivora chrysoptera</i> )	Breeding	3	Known	Central Oak-Pine	Mosaic of herbaceous patches and shrubby thickets located along a forest edge, often at higher elevations; increasingly found in higher elevation bogs and forested wetlands
<u><a href="#">American Bittern</a></u> <sup>b</sup> ( <i>Botaurus lentiginosus</i> )	Breeding	3	Known	Emergent Marsh	Extensive freshwater wetlands with dense stands of cattails, spatterdock, bulrushes, sedges interspersed with open water
<u><a href="#">Common Gallinule</a></u> ( <i>Gallinula galeata</i> )	Breeding	3	Known	Lake and Pond	Large shallow-intermediate depth wetlands with a 1:1 ratio of open water and emergent vegetation and vegetated fringes
<u><a href="#">Yellow-breasted Chat</a></u> ( <i>Icteria virens</i> )	Breeding	3	Known	Northern Hardwood & Conifer	Low, dense shrub habitats with an open or partially open tree canopy in regenerating clearcuts, forest edges, abandoned farmland, burned forest, and shrubby margins
<u><a href="#">Northern Saw-whet Owl</a></u> ( <i>Aegolius acadicus</i> )	Migration	4	Known	Northern Hardwood & Conifer	Any forested habitat, including edges and ruderal forests, presumably
<u><a href="#">Bald Eagle</a></u> <sup>b</sup> ( <i>Haliaeetus leucocephalus</i> )	Wintering	5	Known	Agricultural	Protected perch and roost site trees near open water for foraging

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<u>Lesser Scaup</u> ( <i>Aythya affinis</i> )	Migration	6	Known	Lake and Pond	Large, deep waterbodies providing diverse submerged aquatic vegetation and abundant aquatic invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although scaup also occasionally occur at other locations (on lakes and large rivers) throughout the state
<b>Mammal</b>					
<u>Appalachian Cottontail</u> ( <i>Sylvilagus obscurus</i> )	Year-round	2	Known	Central Oak-Pine	High elevation flat ridgetops dominated by mountain laurel with interspersed grassy openings; small, recently planted pine plantations with significant grass and forb cover; young clearcuts; also high elevation beaver meadows with thickets
<b>Frog</b>					
<u>Eastern Spadefoot</u> <sup>b†</sup> ( <i>Scaphiopus holbrookii</i> )	Year-round	3	Known	Agricultural	Temporary, ephemeral pools in depression areas in agricultural or wooded settings, upland habitat friable-loamy to sandy soils
<b>Invertebrate - Butterflies</b>					
Frosted Elfin <sup>†</sup> ( <i>Callophrys irus</i> )	Year-round	2	Known	Central Oak-Pine	Grassy openings with sandy or rocky soils, most commonly now in anthropogenic habitats such as powerline and railroad right-of-ways. Host plant is Baptisia ( <i>Baptisia tinctoria</i> ), sometimes lupine ( <i>Lupinus perennis</i> )
Monarch ( <i>Danaus plexippus</i> )	Year-round	3	Known	Ruderal Shrubland & Grassland	Open fields, meadows, or marshes where milkweeds ( <i>Asclepias</i> ) grow
<b>Invertebrate - Moths</b>					
Northern Brocade Moth ( <i>Neoligia semicana</i> )	Year-round	2	Known	Central Oak-Pine	Found primarily in wet bogs, salt marshes, and other brackish places
Loosestrife Borer Moth ( <i>Papaipema lysimachiae</i> )	Year-round	4	Known	Wet Meadow / Shrub Marsh	Feeds on swamp loosestrife ( <i>Lysimachia terrestris</i> ), a wetland species, and whorled yellow loosestrife ( <i>Lysimachia quadrifolia</i> ), which primarily grows in dry, open, sandy or rocky forests
Doll's Merolonche ( <i>Acronicta doli</i> )	Year-round	2	Likely	Central Oak-Pine	Found primarily in acidic oak-heath forests and wetlands. Host plants are likely a variety of scrubby oaks (e.g., <i>Quercus ilicifolia</i> ) and blueberries ( <i>Vaccinium</i> )
An Oak Moth ( <i>Phoberia ingenua</i> )	Year-round	3	Likely	Central Oak-Pine	Dry, sandy habitats with host plant, scrub oak ( <i>Quercus ilicifolia</i> )
Barrens Buckmoth ( <i>Hemileuca maia</i> )	Year-round	3	Likely	Central Oak-Pine	Oak woodlands, forests, and barrens. Host plants are oaks ( <i>Quercus</i> ), preference for scrub oak ( <i>Quercus ilicifolia</i> )

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
Gray Spring Zale ( <i>Zale submediana</i> )	Year-round	3	Likely	Northern Swamp	Dry, sandy conifer forests. Host plants are a variety of pines
Broad Sallow Moth ( <i>Xylotype capax</i> )	Year-round	4	Likely	Central Oak-Pine	Acid soil pine barrens, swamps, bogs, and dry oak woodlands. Host plants are most often highbush blueberry ( <i>Vaccinium corymbosum</i> ) and wild cherry ( <i>Prunus</i> )
Spiny Oakworm Moth ( <i>Anisota stigma</i> )	Year-round	4	Likely	Central Oak-Pine	Dry oak woodlands and barrens. Host plants are oaks ( <i>Quercus</i> ), but also known to feed on hazelnut ( <i>Corylus</i> ), and basswood ( <i>Tilia</i> )
<b>Invertebrate - Dragonflies and Damselflies</b>					
Blue-faced Meadowhawk ( <i>Sympetrum ambiguum</i> )	Year-round	2	Known	Lake and Pond	Woodland ponds or floodplains
Comet Darner ( <i>Anax longipes</i> )	Year-round	3	Known	Lake and Pond	Shallow ponds and lakes with few or no fish, such as abandoned quarry ponds
Taiga Bluet ( <i>Coenagrion resolutum</i> )	Year-round	2	Likely	Northern Swamp	Wetlands and slow-moving streams
Crimson-ringed Whiteface ( <i>Leucorrhinia glacialis</i> )	Year-round	4	Likely	Lake and Pond	Lakes and ponds, usually with boggy or marshy areas
Emerald Spreadwing ( <i>Lestes dryas</i> )	Year-round	4	Likely	Lake and Pond	Vegetated ponds, temporary pools, and slower streams
Spatterdock Darner ( <i>Rhionaeschna mutata</i> )	Year-round	4	Likely	Lake and Pond	Vegetated, fishless ponds or pools, often in open marshes and bogs
<b>Invertebrate - Terrestrial Snails</b>					
Toothed Globe ( <i>Mesodon zaletus</i> )	Year-round	4	Likely	Northern Hardwood & Conifer	Terrestrial habitats
<b>Invertebrate - Beetles</b>					
Big Sand Tiger Beetle ( <i>Cicindela formosa</i> )	Year-round	2	Likely	Northern Hardwood & Conifer	Specific habitat requirements are currently not available

## Reduce knowledge gaps to better assess conservation status of species.

More information on the distribution of these species is needed to evaluate their securement in the state.

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<b>Bird</b>					

SGCN Name	SGCN Season	Priority Score	Occurrence <sup>a</sup>	Habitat Macrogroup(s)	Specific Habitat Requirements
<a href="#">Bald Eagle<sup>b</sup></a> ( <i>Haliaeetus leucocephalus</i> )	Wintering	5	Known	Agricultural	Protected perch and roost site trees near open water for foraging
<a href="#">Lesser Scaup</a> ( <i>Aythya affinis</i> )	Migration	6	Known	Lake and Pond	Large, deep waterbodies providing diverse submerged aquatic vegetation and abundant aquatic invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population, although scaup also occasionally occur at other locations (on lakes and large rivers) throughout the state
<b>Invertebrate - Butterflies</b>					
Frosted Elfin <sup>†</sup> ( <i>Callophrys irus</i> )	Year-round	2	Known	Central Oak-Pine	Grassy openings with sandy or rocky soils, most commonly now in anthropogenic habitats such as powerline and railroad right-of-ways. Host plant is Baptisia (Baptisia tinctoria), sometimes lupine (Lupinus perennis)
Monarch ( <i>Danaus plexippus</i> )	Year-round	3	Known	Ruderal Shrubland & Grassland	Open fields, meadows, or marshes where milkweeds (Asclepias) grow
<b>Invertebrate - Moths</b>					
Northern Brocade Moth ( <i>Neoligia semicana</i> )	Year-round	2	Known	Central Oak-Pine	Found primarily in wet bogs, salt marshes, and other brackish places
Doll's Merolonche ( <i>Acrionicta dollii</i> )	Year-round	2	Likely	Central Oak-Pine	Found primarily in acidic oak-heath forests and wetlands. Host plants are likely a variety of scrubby oaks (e.g., Quercus ilicifolia) and blueberries (Vaccinium)

<sup>a</sup> Occurrence values are defined as follows: **Known** - The species has been documented within the area of interest; **Likely** - The species has not been documented within the area of interest, but species distribution models or other data sources indicate strong potential for its occurrence.

<sup>b</sup> This species is protected as candidate, threatened or endangered at the federal or state level in Pennsylvania: Game Commission [Chapter 58](#); Fish and Boat Commission [Chapter 73](#); US Fish and Wildlife Service [Endangered Species Act](#). Bald and golden eagles are federally protected by the [Bald and Golden Eagle Protection Act](#).

Habitat may also be present for the following SGCN, though surveys are needed to confirm their presence or absence: Virginia Rail (*Rallus limicola*), Cerulean Warbler (*Setophaga cerulea*), Long Dash (*Polites mystic*), Dion Skipper (*Euphyes conspiciua*), Black Dash (*Euphyes conspiciua*), West Virginia White (*Pieris virginianensis*), Baltimore Checkerspot (*Euphydryas phaeton*), Purple Martin (*Progne subis*), Vesper Sparrow (*Pooecetes gramineus*), Black-throated Blue Warbler (*Setophaga caerulescens*), Bronze Copper (*Lycaena hyllus*), Copperhead (*Agkistrodon contortrix*), Eastern Small-footed Bat (*Myotis leibii*), Northern Goshawk (*Accipiter gentilis*), American Black Duck (*Anas rubripes*), Harris' Checkerspot (*Chlosyne harrisii*).

## Habitats

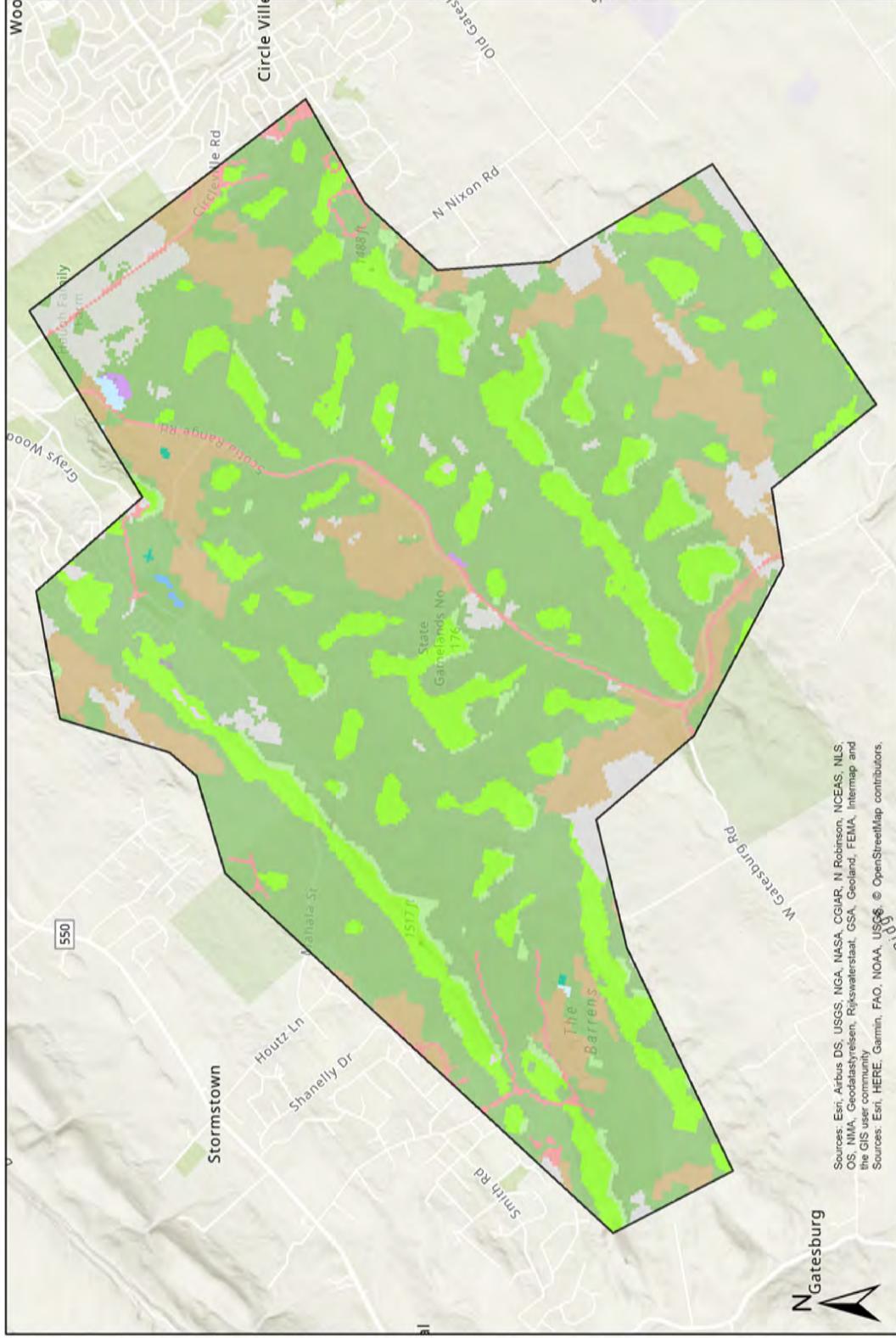
Habitats intersecting planning units within your area of interest are noted in the table below. Terrestrial and wetland habitats (i.e., ecological systems) are grouped by similarities (i.e., macrogroup). More information about habitats is available in the [2015 Pennsylvania Wildlife Action Plan, Chapter 2](#) and [Appendices](#).

Terrestrial and Wetland Habitat <sup>c</sup>		Area(ac)	Percentage
<b>Lake and Pond</b>			
	Warm to Cool, Eutrophic, Alkaline	9.6	0.1%
<b>Water</b>			
	Open water	3.8	0.0%
<b>Central Hardwood Swamp</b>			
	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	4.2	0.0%
<b>Urban/Suburban Built</b>			
	Developed	207.8	2.1%
<b>Wet Meadow / Shrub Marsh</b>			
	Laurentian-Acadian Wet Meadow-Shrub Swamp	1.8	0.0%
<b>Central Oak-Pine</b>			
	Dry Oak-Pine Forest, Central Apps and Southern Piedmont	248.7	2.5%
	Northeastern Interior Dry-Mesic Oak Forest	5,873.3	58.9%
<b>Northern Hardwood &amp; Conifer</b>			
	Appalachian (Hemlock)-Northern Hardwood Forest	1,374.4	13.8%
<b>Emergent Marsh</b>			
	Laurentian-Acadian Freshwater Marsh	8.5	0.1%
<b>Glade, Barren and Savanna</b>			
	Central Appalachian Alkaline Glade and Woodland	1,612.1	16.2%
<b>Northern Swamp</b>			
	North-Central Interior and Appalachian Rich Swamp	4.2	0.0%
<b>Agricultural</b>			
	Agriculture	631.5	6.3%

Note that due to data source and scale, not all features (eg. streams, wetlands, etc) observed on the ground will be documented in tables.

Stream and River Habitat	Length(mi)
Moderate Gradient, Cool, Headwaters and Creeks	6.2

# Habitats Map



## Conservation Opportunities

Primary and secondary actions for Species of Greatest Conservation Need (SGCN) identified within your area of interest are prioritized below according to **occurrence** (known > likely), **species priority** (1, 2, or 3 > 4, 5, 6 in any SGCN category; refer to SGCN section above), and species **action priority** (1 > 2 > 3).

Additionally, results are organized by standardized conservation action types (e.g., land use planning, invasive species control, etc.). Note that multiple SGCN may be associated with a common specific action and it is possible that an action for one species may have unintended consequences for another. You are encouraged to contact a wildlife professional before planning your project.

Additional information regarding conservation actions for SGCN can be found in the Wildlife Action Plan species accounts (Appendix 1.4 - [birds](#), [mammals](#), [amphibians](#), [reptiles](#), [fishes](#), federal or state listed [mussels](#)).

**Important:** These results DO NOT satisfy or supplant regulatory review requirements and are NOT for Pennsylvania Natural Diversity Inventory (PNDI) project screening, protocols, and procedures. All projects should be entered into the [Pennsylvania Conservation Explorer Environmental Review Tool](#) to avoid and minimize sensitive species conflicts. ([Conservation Opportunity Area Tool Terms and Conditions](#)).

**THIS REPORT DISPLAYS SENSITIVE SPECIES (†); not for public distribution.**

## Primary Actions

Recommended Conservation Actions

SGCN Benefiting (*Italics* = Likely Occurrence)

Conservation area designation

- Conserve boreal conifer wetlands by avoiding activities that would cause flooding (e.g., dams).
- Develop best management practices for conserving large core areas of mature forest, including a 328 foot (100 meter) buffer.[\[11\]](#)
- Identify and conserve priority forested wetlands.[\[11\]](#)
- Identify and conserve unprotected large >247 acres (>100 hectares) forest blocks.[\[11\]](#)
- Monitor rabbit hunting in areas identified to have ideal Appalachian cottontail habitat and/or confirmed Appalachian cottontail populations until more is know about their distribution, abundance, and the effect of hunting on their populations.

Rusty Blackbird  
Brown Creeper, Winter Wren

American Black Duck  
Eastern Whip-poor-will, Scarlet Tanager  
Appalachian Cottontail

Coordination and Administration

- Coordinate planning of new roads, pipelines, and powerlines to avoid large forest blocks, or use existing corridors.
- Develop landscape-scale (e.g., multi-state) plans to accommodate occurring or likely shifts in distribution.[\[67\]](#)
- Restore native vegetation to disturbed areas, such as pipelines and powerlines.[\[68\]](#)

Black-and-white Warbler, Cerulean Warbler, Hooded Warbler  
Eastern Whip-poor-will

Canada Warbler

Create new habitat or natural processes

## Primary Actions

Recommended Conservation Actions	SGCN Benefiting ( <i>Italics</i> = Likely Occurrence)
<ul style="list-style-type: none"><li>· Actively manage habitat (e.g., controlled burns) to promote presence of the species.<a href="#">[24]</a>, <a href="#">[67]</a></li><li>· Collaborate with local utilities to manage vegetation appropriately.<a href="#">[68]</a>, <a href="#">[49]</a>, <a href="#">[64]</a></li><li>· Create patches of forest openings and young forest habitat (i.e., multiple age stands) through best management practices (e.g., controlled burns or timber harvest).<a href="#">[24]</a>, <a href="#">[37]</a>, <a href="#">[38]</a>, <a href="#">[43]</a>, <a href="#">[58]</a>, <a href="#">[67]</a>, <a href="#">[49]</a>, <a href="#">[64]</a></li><li>· Identify areas of unnaturally acidified soils and restore using terrestrial lime application.<a href="#">[29]</a></li></ul>	Appalachian Cottontail, Black-and-white Warbler Golden-winged Warbler Blue-winged Warbler, Golden-winged Warbler Kentucky Warbler, Ruffed Grouse, Wood Thrush
<b>Environmental review</b>	
<ul style="list-style-type: none"><li>· Avoid, minimize, or mitigate wetland losses, even those &lt; 5 acres (&lt; 2 hectares).<a href="#">[12]</a></li><li>· Conserve trees along streams and rivers, and around wetlands.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a></li><li>· Consider migratory routes in project design and evaluation.<a href="#">[52]</a></li><li>· Coordinate with developers, permitting agencies, counties, and municipalities to avoid, minimize, or mitigate impacts to this species and its habitats, and provide proactive land protection in habitat management plans.<a href="#">[66]</a></li><li>· Encourage utility companies to develop and implement an avian protection plan to minimize avian mortality risks.<a href="#">[68]</a></li><li>· Work with jurisdictional wildlife agency/agencies to site projects appropriately to reduce impacts to species and habitats.</li></ul>	American Bittern <sup>b</sup> Rusty Blackbird Tundra Swan Eastern Spadefoot <sup>b†</sup>  Golden Eagle  Golden Eagle
<b>Fire management</b>	
<ul style="list-style-type: none"><li>· Create patches of forest openings and young forest habitat (i.e., multiple age stands) through best management practices (e.g., controlled burns or timber harvest).<a href="#">[24]</a>, <a href="#">[37]</a>, <a href="#">[38]</a>, <a href="#">[43]</a>, <a href="#">[58]</a>, <a href="#">[67]</a>, <a href="#">[49]</a>, <a href="#">[64]</a></li><li>· Maintain or create habitat mosaics, including shrubs, with fire.<a href="#">[24]</a></li></ul>	Eastern Whip-poor-will Field Sparrow, Prairie Warbler, Yellow-breasted Chat
<b>Grazing/farm management</b>	
<ul style="list-style-type: none"><li>· Implement land use best management practices (e.g., riparian buffers) and erosion and sedimentation plans to protect water quality.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a>, <a href="#">[48]</a>, <a href="#">[30]</a></li></ul>	Blue-faced Meadowhawk, Comet Darter, <i>Crimson-ringed Whiteface</i> , <i>Emerald Spreadwing</i> , <i>Spatterdock Darter</i> , <i>Taiga Bluet</i>
<b>Incentives</b>	
<ul style="list-style-type: none"><li>· Create incentive programs for private landowners to encourage beneficial habitat management.</li><li>· Create or maintain at least 150 feet (46 meters) of native vegetation uphill from wetlands.</li></ul>	Appalachian Cottontail Canada Warbler
<b>Invasive species control</b>	
<ul style="list-style-type: none"><li>· Assess potential loss of hemlock due to woolly adelgid aphid and proactively remediate impacts (e.g., replace dead stands with red spruce).</li><li>· Conserve wetlands and manage water levels to provide optimal conditions for Species of Greatest Conservation Need.<a href="#">[44]</a></li><li>· Educate private property owners and the public about what they can reduce disturbance to the species.<a href="#">[56]</a>, <a href="#">[12]</a></li></ul>	Broad-winged Hawk, Brown Creeper, Northern Saw-whet Owl, Winter Wren Common Gallinule  Kentucky Warbler, Wood Thrush

## Primary Actions

Recommended Conservation Actions	SGCN Benefiting <i>(Italics = Likely Occurrence)</i>
<ul style="list-style-type: none"><li>· Implement integrated pest management (IPM) strategies as an alternative to broad-scale pesticide use in agricultural and forestry operations.<a href="#">[2]</a></li><li>· Manage deer for healthy and sustainable forest habitat.<a href="#">[50]</a>, <a href="#">[51]</a></li><li>· Remove non-native or invasive vegetation.<a href="#">[7]</a>, <a href="#">[9]</a>, <a href="#">[34]</a>, <a href="#">[55]</a>, <a href="#">[65]</a>, <a href="#">[6]</a>, <a href="#">[10]</a>, <a href="#">[12]</a>, <a href="#">[17]</a>, <a href="#">[35]</a></li></ul>	Chimney Swift  Broad-winged Hawk, Brown Creeper, Kentucky Warbler, Winter Wren, Wood Thrush American Bittern <sup>b</sup> , American Woodcock, Kentucky Warbler, Pied-billed Grebe, Ruffed Grouse, Sora, Wood Thrush
<b>Land acquisition</b>	
<ul style="list-style-type: none"><li>· Conserve small blocks of mixed deciduous-coniferous forest through easements.<a href="#">[11]</a>, <a href="#">[40]</a></li><li>· Incentivize conservation of privately-owned large forest blocks, such as free technical assistance and tax relief.<a href="#">[11]</a>, <a href="#">[40]</a></li></ul>	Broad-winged Hawk Broad-winged Hawk
<b>Land use planning</b>	
<ul style="list-style-type: none"><li>· Cluster development, utilities, and associated infrastructure to reduce impacts to species.<a href="#">[54]</a>, <a href="#">[57]</a></li><li>· Conserve trees along streams and rivers, and around wetlands.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a></li><li>· Conserve, large, contiguous forest blocks throughout migration corridor.<a href="#">[52]</a>, <a href="#">[54]</a>, <a href="#">[11]</a>, <a href="#">[57]</a>, <a href="#">[67]</a>, <a href="#">[40]</a></li><li>· Create or maintain at least 150 feet (46 meters) of native vegetation uphill from wetlands.</li><li>· Develop landscape-level planning agreements across ownerships in areas where species occurs.<a href="#">[11]</a>, <a href="#">[67]</a></li><li>· Discourage pond creation in shrubby wetlands.</li><li>· Implement land use best management practices (e.g., riparian buffers) and erosion and sedimentation plans to protect water quality.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a>, <a href="#">[48]</a>, <a href="#">[30]</a></li><li>· Proactive land conservation at the municipal level to prevent conversion to habitat that does not meet the species' habitat requirements.<a href="#">[66]</a></li><li>· Proactively conserve migratory stop-over sites to prevent conversion to habitat that does not meet the species' habitat requirements.<a href="#">[52]</a></li><li>· Promote low density, low impact land use at the municipal level where Species of Greatest Conservation Need occur.<a href="#">[11]</a>, <a href="#">[66]</a>, <a href="#">[54]</a>, <a href="#">[57]</a></li></ul>	Blackburnian Warbler, Field Sparrow, Kentucky Warbler, Prairie Warbler, Wood Thrush, Yellow-breasted Chat, <i>Black-throated Green Warbler</i> , <i>Grasshopper Sparrow</i> Rusty Blackbird Golden Eagle Canada Warbler Black-and-white Warbler, Brown Creeper, Cerulean Warbler, Hooded Warbler, Winter Wren Willow Flycatcher Louisiana Waterthrush, Rusty Blackbird  American Black Duck  American Black Duck  Willow Flycatcher
<b>Law enforcement</b>	
<ul style="list-style-type: none"><li>· Enforce existing wildlife or water pollution regulations.</li><li>· Implement land use best management practices (e.g., riparian buffers) and erosion and sedimentation plans to protect water quality.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a>, <a href="#">[48]</a>, <a href="#">[30]</a></li><li>· Install bat gates at hibernacula to limit intrusions.</li></ul>	Red-headed Woodpecker Rusty Blackbird  Northern Long-eared Bat <sup>b†</sup>

## Primary Actions

### Recommended Conservation Actions

- Prevent illegal harvest through enforcement by Waterways Conservation Officers.
- Protect hibernacula from human disturbance.

### Legislation

- Develop landscape-scale (e.g., multi-state) plans to accommodate occurring or likely shifts in distribution.[\[67\]](#)
- Develop more stringent federal air quality standards to reduce acid precipitation in eastern U.S.
- Monitor climate change indicators, such as water temperature and prey populations.

### Partner/stakeholder engagement

- Coordinate with conservation partners to properly manage habitat for this species, inform the public, and reduce access to sensitive areas.[\[66\]](#)
- Create patches of forest openings and young forest habitat (i.e., multiple age stands) through best management practices (e.g., controlled burns or timber harvest).[\[24\]](#), [\[37\]](#), [\[38\]](#), [\[43\]](#), [\[58\]](#), [\[67\]](#), [\[49\]](#), [\[64\]](#)
- Develop and implement window collision mitigation solutions.[\[59\]](#)
- Evaluate relationship between pesticide use, flying insect abundance, and impact to aerial insectivorous species.
- Increase awareness of bird-window collision threat and mitigating solutions.[\[59\]](#)
- Increase awareness regarding impacts to ground-nesting birds from unleashed dogs and free-roaming cats.[\[53\]](#)
- Increase law enforcement oversight.
- Increase public awareness of frog and toad conservation.[\[36\]](#)
- Monitor window collisions on residential and commercial buildings.[\[59\]](#)
- Reduce public access to sensitive areas for this species.
- Retain non-hazardous standing dead trees.[\[67\]](#), [\[32\]](#), [\[43\]](#)
- Work with partners to increase knowledge of this species importance and management needs.

### Private Sector Standards and Codes

- Enforce regulations and codes prohibiting energy development in or adjacent to known occupied habitat.
- Increase awareness of bird-window collision threat and mitigating solutions.[\[59\]](#)

### SGCN Benefiting

 (*Italics* = Likely Occurrence)

Eastern Box Turtle<sup>†</sup>, Eastern Hognose Snake<sup>†</sup>, Jefferson Salamander<sup>†</sup>, Marbled Salamander<sup>†</sup>, Northern Long-eared Bat<sup>b†</sup>

Chimney Swift

Black-and-white Warbler, Brown Creeper, Scarlet Tanager, Winter Wren  
Louisiana Waterthrush

Eastern Spadefoot<sup>b†</sup>

American Woodcock

Wood Thrush

Chimney Swift

Wood Thrush

American Woodcock, Ruffed Grouse

Eastern Spadefoot<sup>b†</sup>

Eastern Spadefoot<sup>b†</sup>

Wood Thrush

Eastern Spadefoot<sup>b†</sup>

Red-headed Woodpecker

Loosestrife Borer Moth, Monarch, Northern Brocade

Moth, *An Oak Moth*, *Barrens Buckmoth*, *Broad Sallow*

*Moth*, *Doll's Merolonche*, *Gray Spring Zale*, *Melsheimer's*

*Sack Bearer Moth*, *Persius Duskywing*, *Spiny Oakworm*  
*Moth*

Black-and-white Warbler, Brown Creeper, Winter Wren

Blackburnian Warbler

## Primary Actions

Recommended Conservation Actions	SGCN Benefiting ( <i>Italics</i> = Likely Occurrence)
<ul style="list-style-type: none"><li>·Promote "lights out" programs in cities during migration.<a href="#">[61]</a></li><li>·Reduce straight, 'hard edges' between field and forest by creating a young forest transition between the habitats.<a href="#">[55]</a>, <a href="#">[65]</a>, <a href="#">[67]</a>, <a href="#">[58]</a></li><li>·Restore or enhance natural habitat in areas that are heavily used during migration.<a href="#">[52]</a></li></ul>	Blackburnian Warbler Willow Flycatcher  Blackburnian Warbler
<b>Private lands agreements</b>	
<ul style="list-style-type: none"><li>·Conserve agricultural land used as wildlife feeding areas.<a href="#">[20]</a></li><li>·Proactive land conservation to prevent conversion to habitat that does not meet the species' habitat requirements.<a href="#">[11]</a>, <a href="#">[66]</a></li></ul>	Tundra Swan Sora
<b>Species Management</b>	
<ul style="list-style-type: none"><li>·Do not relocate species from original sites.</li></ul>	Appalachian Cottontail
<b>Species and habitat management planning</b>	
<ul style="list-style-type: none"><li>·Cluster development, utilities, and associated infrastructure to reduce impacts to species.<a href="#">[54]</a>, <a href="#">[57]</a></li><li>·Conserve old-growth forest areas and manage areas where forests can develop old-growth characteristics (e.g., large, hollow trees and snags).<a href="#">[11]</a>, <a href="#">[40]</a>, <a href="#">[67]</a></li><li>·Conserve, large, contiguous forest blocks throughout migration corridor.<a href="#">[52]</a>, <a href="#">[54]</a>, <a href="#">[11]</a>, <a href="#">[57]</a>, <a href="#">[67]</a>, <a href="#">[40]</a></li><li>·Create patches of forest openings and young forest habitat (i.e., multiple age stands) through best management practices (e.g., controlled burns or timber harvest).<a href="#">[24]</a>, <a href="#">[37]</a>, <a href="#">[38]</a>, <a href="#">[43]</a>, <a href="#">[58]</a>, <a href="#">[67]</a>, <a href="#">[49]</a>, <a href="#">[64]</a></li><li>·Design and construct wildlife crossings in travel corridors.</li><li>·Develop a statewide climate change mitigation strategy that minimizes impacts to vulnerable species and habitats (e.g., wetlands).</li><li>·Maintain contiguous forest.<a href="#">[11]</a>, <a href="#">[67]</a></li><li>·Manage deer for healthy and sustainable forest habitat.<a href="#">[50]</a>, <a href="#">[51]</a></li><li>·Minimize disturbance to the species through seasonal activity restrictions.</li></ul>	Broad-winged Hawk Chimney Swift  Wood Thrush Eastern Whip-poor-will, Golden-winged Warbler  Eastern Spadefoot <sup>b†</sup> American Bittern <sup>b</sup> , American Black Duck, Pied-billed Grebe Northern Saw-whet Owl Golden-winged Warbler, Scarlet Tanager Broad-winged Hawk
<b>State Regulations</b>	
<ul style="list-style-type: none"><li>·Cluster development, utilities, and associated infrastructure to reduce impacts to species.<a href="#">[54]</a>, <a href="#">[57]</a></li><li>·Conserve large, contiguous forest blocks.<a href="#">[11]</a>, <a href="#">[40]</a></li></ul>	Louisiana Waterthrush, Scarlet Tanager Scarlet Tanager
<b>Technical assistance</b>	
<ul style="list-style-type: none"><li>·Conduct outreach to private property owners and the public regarding habitat management practices for this species.<a href="#">[67]</a></li><li>·Create patches of forest openings and young forest habitat (i.e., multiple age stands) through best management practices (e.g., controlled burns or timber harvest).<a href="#">[24]</a>, <a href="#">[37]</a>, <a href="#">[38]</a>, <a href="#">[43]</a>, <a href="#">[58]</a>, <a href="#">[67]</a>, <a href="#">[49]</a>, <a href="#">[64]</a></li><li>·Promote dynamic forest management on private and public lands to provide the appropriate habitat condition needed for the species.<a href="#">[12]</a>, <a href="#">[43]</a>, <a href="#">[45]</a>, <a href="#">[55]</a>, <a href="#">[65]</a>, <a href="#">[67]</a></li></ul>	Chimney Swift  American Woodcock  Ruffed Grouse

## Primary Actions

### Recommended Conservation Actions

- Provide educational and technical assistance programs related to species conservation status and best conservation practices to promote the species and appropriate habitat.[\[65\]](#), [\[67\]](#)

SGCN Benefiting (*Italics* = Likely Occurrence)

Ruffed Grouse

### Techniques development

- Identify areas of unnaturally acidified soils and restore using terrestrial lime application.[\[29\]](#)

Golden-winged Warbler

### Vegetation management

- Allow shrubs in rights-of-way.[\[68\]](#)
- Allow succession of old fields to support the species.
- Cluster development, utilities, and associated infrastructure to reduce impacts to species.[\[54\]](#), [\[57\]](#)
- Conserve boreal conifer forests and swamps through land protection and developing and implementing best management practices.[\[11\]](#), [\[40\]](#), [\[66\]](#)
- Conserve, create, or restore habitat for this species.
- Create or maintain grassland habitat, particularly warm season grasses.[\[12\]](#), [\[15\]](#), [\[44\]](#), [\[27\]](#), [\[68\]](#), [\[24\]](#)
- Create patches of forest openings and young forest habitat (i.e., multiple age stands) through best management practices (e.g., controlled burns or timber harvest).[\[24\]](#), [\[37\]](#), [\[38\]](#), [\[43\]](#), [\[58\]](#), [\[67\]](#), [\[49\]](#), [\[64\]](#)
- Encourage utility companies to create shrubby edges along edges of rights-of-way.[\[68\]](#)
- Implement Cerulean Management Guidelines (Wood et al. 2013) in appropriate areas; follow sustainable oak forestry guidelines generally (Brose et al 2008).[\[41\]](#), [\[42\]](#), [\[67\]](#)
- Implement forestry best management practices.[\[43\]](#), [\[45\]](#), [\[67\]](#)
- Maintain or create habitat mosaics, including shrubs, with fire.[\[24\]](#)
- Manage deer for healthy and sustainable forest habitat.[\[50\]](#), [\[51\]](#)
- Reduce straight, 'hard edges' between field and forest by creating a young forest transition between the habitats.[\[55\]](#), [\[65\]](#), [\[67\]](#), [\[58\]](#)
- Remove non-native or invasive vegetation.[\[7\]](#), [\[9\]](#), [\[34\]](#), [\[55\]](#), [\[65\]](#), [\[6\]](#), [\[10\]](#), [\[12\]](#), [\[17\]](#), [\[35\]](#)
- Restrict mowing during peak breeding season.[\[27\]](#)

American Woodcock

Prairie Warbler

Eastern Towhee, Ruffed Grouse

Canada Warbler

Blue-faced Meadowhawk, Comet Darter, Loosestrife  
Borer Moth, Monarch, Northern Brocade Moth, Willow  
Flycatcher, *An Oak Moth*, *Barrens Buckmoth*, *Broad  
Sallow Moth*, *Crimson-ringed Whiteface*, *Doll's  
Merlonche*, *Emerald Spreadwing*, *Gray Spring Zale*,  
*Melzheimer's Sack Bearer Moth*, *Persius Duskywing*,  
*Spatterdock Darter*, *Spiny Oakworm Moth*, *Taiga Bluet*  
Bobolink, Field Sparrow, *Grasshopper Sparrow*  
Blackburnian Warbler, Gray Catbird, Northern Saw-whet  
Owl

Blue-winged Warbler

Cerulean Warbler

Northern Long-eared Bat<sup>†</sup>

Eastern Towhee, Yellow-breasted Chat

Prairie Warbler

American Woodcock, Ruffed Grouse

American Black Duck, Bobolink, *Savannah Sparrow*

Bobolink

### Water management

- Conserve wetlands and manage water levels to provide optimal conditions for Species of Greatest Conservation Need.[\[44\]](#)

Pied-billed Grebe, Sora

## Primary Actions

Recommended Conservation Actions	SGCN Benefiting ( <i>Italics</i> = Likely Occurrence)
<ul style="list-style-type: none"><li>·Develop best management practices for conserving large core areas of mature forest, including a 328 foot (100 meter) buffer.<a href="#">[11]</a></li><li>·Maintain wetlands and manage water levels to provide optimal migration habitat conditions.</li></ul>	Louisiana Waterthrush American Black Duck
<b>Wildlife Management Areas</b>	
<ul style="list-style-type: none"><li>·Conserve wetlands and manage water levels to provide optimal conditions for Species of Greatest Conservation Need.<a href="#">[44]</a></li><li>·Protect large, privately owned marshes through voluntary agreements.<a href="#">[11]</a>, <a href="#">[44]</a></li></ul>	Common Gallinule Common Gallinule
<b>Wildlife damage management</b>	
<ul style="list-style-type: none"><li>·Manage deer for healthy and sustainable forest habitat.<a href="#">[50]</a>, <a href="#">[51]</a></li></ul>	Black-and-white Warbler, Willow Flycatcher, <i>Black-throated Green Warbler</i>
<b>Wildlife disease management</b>	
<ul style="list-style-type: none"><li>·Assess species vulnerability to West Nile Virus.</li><li>·Protect hibernacula from human disturbance.</li><li>·Remove non-native or invasive vegetation.<a href="#">[7]</a>, <a href="#">[9]</a>, <a href="#">[34]</a>, <a href="#">[55]</a>, <a href="#">[6]</a>, <a href="#">[10]</a>, <a href="#">[12]</a>, <a href="#">[17]</a>, <a href="#">[35]</a></li></ul>	Ruffed Grouse Northern Long-eared Bat <sup>b†</sup> Ruffed Grouse

## Secondary Actions

Recommended Conservation Actions	SGCN Benefiting ( <i>Italics</i> = Likely Occurrence)
<b>Conservation area designation</b>	
<ul style="list-style-type: none"><li>·Conserve trees along streams and rivers, and around wetlands.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a></li><li>·Designate large blocks of mature conifer forest, including a 328 foot (100 meter) buffer, as a conservation area.<a href="#">[11]</a></li><li>·Evaluate risk to species from wind turbine placement along migration routes.</li><li>·Identify regularly used large forest blocks within the migration corridor; designate these areas as important migratory stopover sites; use sustainable forestry practices; and limit development and human disturbance in these areas.<a href="#">[52]</a>, <a href="#">[54]</a>, <a href="#">[57]</a></li><li>·Limit high-volume roadways within migration corridor.</li><li>·On public land, designate remaining large forest blocks as High Conservation Value Forests.</li></ul>	Bald Eagle <sup>b</sup> , Louisiana Waterthrush Brown Creeper, Winter Wren Lesser Scaup Broad-winged Hawk Broad-winged Hawk <i>Black-throated Green Warbler</i>
<b>Coordination and Administration</b>	
<ul style="list-style-type: none"><li>·Promote low density, low impact land use at the municipal level where Species of Greatest Conservation Need occur.<a href="#">[11]</a>, <a href="#">[66]</a>, <a href="#">[54]</a>, <a href="#">[57]</a></li></ul>	Sharp-shinned Hawk
Create new habitat or natural processes	

## Secondary Actions

Recommended Conservation Actions	SGCN Benefiting ( <i>Italics</i> = Likely Occurrence)
<ul style="list-style-type: none"><li>·Conserve habitat and supporting landscapes within the core of the species' range to prevent conversion to non-suitable habitat.<a href="#">[111]</a>, <a href="#">[140]</a></li><li>·Encourage complex forest structure, including conifers.<a href="#">[67]</a></li><li>·Focus habitat restoration on sites with adequate calcium and/or buffering capacity.</li></ul>	Canada Warbler  Northern Saw-whet Owl Ruffed Grouse
<b>Database development and management</b>	Long-tailed Duck
<b>Environmental review</b>	Blue-faced Meadowhawk, Comet Darter, <i>Crimson-ringed Whiteface</i> , <i>Emerald Spatterwing</i> , <i>Spatterdock Darter</i> , <i>Taiga Bluet</i>
<b>Fire management</b>	<i>Grasshopper Sparrow</i>
<ul style="list-style-type: none"><li>·Conserve grassland habitat using best management practices (e.g., controlled burns) to prevent conversion to non-grassland habitat.<a href="#">[24]</a></li><li>·Create or maintain grassland habitat, particularly warm season grasses.<a href="#">[12]</a>, <a href="#">[15]</a>, <a href="#">[44]</a>, <a href="#">[27]</a>, <a href="#">[68]</a>, <a href="#">[24]</a></li></ul>	Field Sparrow
<b>Grazing/farm management</b>	<i>American Kestrel</i>
<ul style="list-style-type: none"><li>·Develop and encourage best management practices for reduced pesticide and herbicide use on farmland.</li><li>·Implement land use best management practices (e.g., riparian buffers) and erosion and sedimentation plans to protect water quality.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a>, <a href="#">[48]</a>, <a href="#">[30]</a></li></ul>	<i>Crimson-ringed Whiteface</i> , <i>Emerald Spatterwing</i> , <i>Spatterdock Darter</i> , <i>Taiga Bluet</i>
<b>Incentives</b>	
<ul style="list-style-type: none"><li>·Create or promote economic incentives to encourage conservation of large forest blocks.<a href="#">[11]</a>, <a href="#">[40]</a></li><li>·Create or promote economic incentives to minimize high volume roads.</li><li>·Provide financial incentives to agricultural producers to encourage crop rotations and harvest techniques that provide stable to increased levels of food resources.<a href="#">[15]</a>, <a href="#">[20]</a></li><li>·Support and expand economic incentives to encourage establishment and maintenance of grassland habitats (e.g., hayfield, pastureland).<a href="#">[44]</a></li></ul>	Sharp-shinned Hawk Sharp-shinned Hawk Tundra Swan  <i>American Kestrel</i>
<b>Invasive species control</b>	
<ul style="list-style-type: none"><li>·Exercise caution with any plant species potentially used for biomass production; dense, quick-growing species can become invasive.<a href="#">[6]</a>, <a href="#">[9]</a>, <a href="#">[10]</a>, <a href="#">[12]</a>, <a href="#">[17]</a>, <a href="#">[35]</a></li></ul>	Ruffed Grouse

## Secondary Actions

### Recommended Conservation Actions

- Remove or manage invasive and non-native species.

### SGCN Benefiting *(Italics = Likely Occurrence)*

Loosestrife Borer Moth, Monarch, Northern Brocade Moth, *An Oak Moth*, *Barrens Buckmoth*, *Broad Sallow Moth*, *Doll's Merolonche*, *Gray Spring Zale*, *Melsheimer's Sack Bearer Moth*, *Persius Duskywing*, *Spiny Oakworm Moth*

### Land acquisition

- Proactive land conservation to prevent conversion to habitat that does not meet the species' habitat requirements.[\[11\]](#), [\[66\]](#)

*Savannah Sparrow*

### Land use planning

- Cluster development, utilities, and associated infrastructure to reduce impacts to species.[\[54\]](#), [\[57\]](#)
- Develop landscape-level planning agreements across ownerships in areas where species occurs.[\[11\]](#), [\[67\]](#)

Blackburnian Warbler, *Black-throated Green Warbler*, *Grasshopper Sparrow*

Black-and-white Warbler, Cerulean Warbler, Hooded Warbler

### Partner/stakeholder engagement

- Cluster development, utilities, and associated infrastructure to reduce impacts to species.[\[54\]](#), [\[57\]](#)
- Implement forestry best management practices.[\[43\]](#), [\[45\]](#), [\[67\]](#)
- Work with partners to increase knowledge of this species importance and management needs.

*American Kestrel*

Hooded Warbler

Loosestrife Borer Moth, *An Oak Moth*, *Barrens Buckmoth*, *Broad Sallow Moth*, *Doll's Merolonche*, *Gray Spring Zale*, *Melsheimer's Sack Bearer Moth*, *Persius Duskywing*, *Spiny Oakworm Moth*

### Private Sector Standards and Codes

- Enforce regulations and codes prohibiting energy development in large forest tracts.

Cerulean Warbler, Hooded Warbler

### Private lands agreements

- Conserve, large, contiguous forest blocks throughout migration corridor.[\[52\]](#), [\[54\]](#), [\[11\]](#), [\[57\]](#), [\[67\]](#), [\[40\]](#)
- Create or maintain grassland habitat, particularly warm season grasses.[\[12\]](#), [\[15\]](#), [\[44\]](#), [\[27\]](#), [\[68\]](#), [\[24\]](#)
- Restrict mowing during peak breeding season.[\[27\]](#)

Broad-winged Hawk

*American Kestrel*

*Savannah Sparrow*

### Species Management

- Collaboratively assess bioaccumulation of pollutants and subsequent impacts to species.
- Complete calculations of harvest potential of long-tailed ducks and adjust harvest regulations as necessary to maintain realized harvest at or below the harvest potential.
- Determine the impact of pesticide use and contaminant bioaccumulation.
- Educate private property owners and the public about what they can reduce disturbance to the species.[\[56\]](#), [\[12\]](#)

Lesser Scaup

Long-tailed Duck

Pied-billed Grebe

Bald Eagle<sup>b</sup>

## Secondary Actions

Recommended Conservation Actions	SGCN Benefiting ( <i>Italics</i> = Likely Occurrence)
<ul style="list-style-type: none"><li>·Examine population impacts of bioaccumulated toxins (pesticides, lead, etc.)</li><li>·Monitor invasive species impacts to population.</li></ul>	American Black Duck Lesser Scaup
<b>Species and habitat management planning</b>	
<ul style="list-style-type: none"><li>·Conduct species distribution and population surveys to support management decisions and conservation strategies.<a href="#">[1]</a>, <a href="#">[36]</a></li><li>·Implement land use best management practices (e.g., riparian buffers) and erosion and sedimentation plans to protect water quality.<a href="#">[18]</a>, <a href="#">[19]</a>, <a href="#">[21]</a>, <a href="#">[23]</a>, <a href="#">[39]</a>, <a href="#">[48]</a>, <a href="#">[30]</a></li><li>·Include land use best management practices (e.g., vernal pool conservation strategies) during planning.<a href="#">[1]</a></li><li>·Maintain contiguous forest.<a href="#">[11]</a>, <a href="#">[67]</a></li><li>·Protect and enhance resilient landscapes.<a href="#">[11]</a>, <a href="#">[43]</a></li></ul>	Eastern Box Turtle <sup>†</sup> , Eastern Hognose Snake <sup>†</sup> , Jefferson Salamander <sup>†</sup> , Marbled Salamander <sup>†</sup> Rusty Blackbird Jefferson Salamander <sup>†</sup> , Marbled Salamander <sup>†</sup> Northern Saw-whet Owl <i>Black-throated Green Warbler</i>
<b>State Regulations</b>	
<ul style="list-style-type: none"><li>·Continue wind-wildlife monitoring program.</li><li>·Develop and implement best management practices related to lights, flares, and habitat restoration following disturbance.</li></ul>	Blackburnian Warbler Blackburnian Warbler
<b>Technical assistance</b>	
<ul style="list-style-type: none"><li>·Encourage utility companies to create shrubby edges along edges of rights-of-way.<a href="#">[68]</a></li><li>·Promote forestry practices that provide adequate nesting substrate and regenerate conifers.<a href="#">[67]</a></li></ul>	Gray Catbird <i>Black-throated Green Warbler</i>
<b>Techniques development</b>	
<ul style="list-style-type: none"><li>·Report species encounters to the Game Commission, including road kill.</li></ul>	Northern Saw-whet Owl
<b>Vegetation management</b>	
<ul style="list-style-type: none"><li>·Conserve, large, contiguous forest blocks throughout migration corridor.<a href="#">[52]</a>, <a href="#">[54]</a>, <a href="#">[11]</a>, <a href="#">[57]</a>, <a href="#">[67]</a>, <a href="#">[40]</a></li><li>·Create or maintain grassland habitat, particularly warm season grasses.<a href="#">[12]</a>, <a href="#">[15]</a>, <a href="#">[44]</a>, <a href="#">[27]</a>, <a href="#">[68]</a>, <a href="#">[24]</a></li><li>·Encourage complex forest structure, including conifers.<a href="#">[67]</a></li><li>·Remove non-native or invasive vegetation.<a href="#">[7]</a>, <a href="#">[9]</a>, <a href="#">[34]</a>, <a href="#">[55]</a>, <a href="#">[65]</a>, <a href="#">[6]</a>, <a href="#">[10]</a>, <a href="#">[12]</a>, <a href="#">[17]</a>, <a href="#">[35]</a></li></ul>	Sharp-shinned Hawk Bobolink, <i>Grasshopper Sparrow</i> Northern Saw-whet Owl Bobolink, <i>Savannah Sparrow</i>
<b>Water management</b>	
<ul style="list-style-type: none"><li>·Identify hibernacula with the greatest flooding potential and proactively mitigate the threat.</li></ul>	Northern Long-eared Bat <sup>†</sup>
<b>Wildlife damage management</b>	
<ul style="list-style-type: none"><li>·Submit roadkill observations to jurisdictional agency.</li></ul>	Red-headed Woodpecker
<b>Wildlife disease management</b>	
<ul style="list-style-type: none"><li>·Exclude European Starlings from nest boxes.<a href="#">[60]</a></li><li>·Prompt removal of fish and bird carcasses during botulism outbreaks.</li><li>·Reduce West Nile Virus exposure by limiting mosquito breeding locations (e.g., stagnant water).</li></ul>	<i>American Kestrel</i> Long-tailed Duck <i>American Kestrel</i>

<sup>b</sup> This species is protected as candidate, threatened or endangered at the federal or state level in Pennsylvania: Game Commission [Chapter 58](#); Fish and Boat Commission [Chapter 75](#); US Fish and Wildlife Service [Endangered Species Act](#). Bald and golden eagles are federally protected by the [Bald and Golden Eagle Protection Act](#).

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## Research and Survey Needs

Research and survey needs identified for the KNOWN vertebrate Species of Greatest Conservation Need (SGCN) within your area of interest are provided below. For 'likely' SGCN, research and survey needs can be found through links associated with individual species listed above in this report or in the comprehensive Wildlife Action Plan species accounts for each taxonomic group (Appendix 1.4 - [birds](#), [mammals](#), [amphibians](#), [reptiles](#), [fishes](#), federal or state listed [mussels](#)). Surveys are encouraged to confirm species suspected as 'likely' to occur within your area of interest. To submit occurrence data, visit the [Data Info tab](#) - How to Submit Data Section. NOTE: Not all research and survey needs may be applicable to your project. Consult the Game Commission or Fish & Boat Commission prior to initiating a research or survey project.

SGCN	Research Needs	Survey Needs
American Bittern - Breeding	<ul style="list-style-type: none"> <li>Habitat suitability of occupied sites including an assessment of management techniques to enhance manipulated wetlands or restore degraded habitats.</li> <li>Factors affecting nesting success and mortality in adults, juveniles, nestlings, and eggs.</li> <li>Basic biology, mating system, sources and rates of mortality including contaminants, philopatry of individuals, migration routes and stopovers.</li> </ul>	<ul style="list-style-type: none"> <li>Regular surveys in large wetlands where this species and its cohorts have history of breeding (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).</li> <li>Total territories and nesting success in wetlands across state; extend wetland surveys to smaller wetlands especially with history of bitterns or newly created wetlands, continuing to pursue unknown populations.</li> <li>Persistence and nesting success at key nesting areas in state.</li> </ul>
American Black Duck - Migration	<ul style="list-style-type: none"> <li>No research currently needed for migratory American black duck.</li> </ul>	<ul style="list-style-type: none"> <li>Establish a procedure to extract and analyze data from available datasets (e.g., eBird) on the number and locations of migrating black ducks.</li> </ul>
American Woodcock - Breeding	<ul style="list-style-type: none"> <li>Investigate impact of changing spring weather conditions on migratory chronology, peak display period, and juvenile production.</li> <li>Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Expand annual Singing Ground Surveys at targeted habitat management sites to determine population response to active habitat management.</li> <li>Conduct USFWS Singing Ground Survey annually</li> </ul>
Bald Eagle - Wintering	<ul style="list-style-type: none"> <li>Identify all communal winter roost site locations and collect data on size, habitat, and extent of use.</li> </ul>	<ul style="list-style-type: none"> <li>Continuation of annual mid-winter bald eagle survey.</li> <li>Communal winter roost site monitoring.</li> </ul>

### Black-and-white Warbler - Breeding

- Determine habitat correlates of nest success, abundance, and site fidelity to identify optimal habitat of black-and-white warblers in PA.
- Evaluate population response to habitat management prescriptions, including silviculture, used to create, maintain or enhance breeding habitat of forest birds.
- Determine the adequacy of USGS breeding bird surveys to monitor populations compared to off-road surveys

- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.

### Blackburnian Warbler - Migration

- What stopover habitats do migrant blackburnians use?
- Where are the breeding grounds of blackburnian warblers that pass through Pennsylvania during migration?
- Does the loss of hemlock have a negative effect on blackburnian warbler as a stopover passage migrant?

- Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.
- Conduct mist netting and banding at heavily used migration sites to monitor frequency of this species and others.

### Blue-winged Warbler - Breeding

- Population, range, and distribution through annual statewide monitoring of Golden-winged and Blue-winged Warblers and hybrids, with emphasis on northwestern and southeastern regions or anywhere within agricultural landscapes or below 1500 feet.
- An intensive demographic study of multiple breeding populations of blue-winged warblers to identify the most productive breeding areas and habitat types (Kubel in Steele et al. 2010).
- What habitat conditions, if any, favor blue-winged warblers to the exclusion of golden-winged warblers and hybrids? (Kubel in Steele et al. 2010); also, an international research collaboration that identifies wintering grounds for Pennsylvania blue-winged warblers as well as habitat associations and conditions on wintering grounds.

- Long-term monitoring of Blue-winged Warbler and hybrids as part of the Golden-winged Warbler Cornell Lab of Ornithology Conservation Initiative Monitoring to collect abundance and distribution data.
- Conduct additional surveys in the northwest and southeast regions (outside of Golden-winged Warbler focal areas) and encourage the Pennsylvania birding community to concentrate search efforts in these regions.
- Post-treatment monitoring of locations in the northwest and southeast regions that are managed for Blue-winged Warblers or managed for early successional species.

	Research Needs	Survey Needs
Bobolink - Breeding	<ul style="list-style-type: none"> <li>• Do Conservation Grasslands provide substantial refuges for this species in northern and western Pennsylvania?</li> <li>• Is climate change likely to result in changes to agricultural practices (specifically earlier mowing) that could impact this species over coming decades?</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring through USGS Breeding Bird Survey.</li> <li>• Assessment of use of Conservation Grasslands in north and western areas of the state.</li> </ul>
Broad-winged Hawk - Breeding	<ul style="list-style-type: none"> <li>• Determine population densities by region or forest type and develop a long-term monitoring system or breeding forest raptors in Pennsylvania.</li> <li>• Year-round habitat use and movement patterns of Pennsylvania nesting birds. Determine if sex or age classes use different habitats and winter in different locations.</li> <li>• Broad-winged hawk prey selection during the breeding season across forest types in Pennsylvania.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop effective monitoring technique for nesting population stratified by forest type, and an appropriate frequency (every 3-5 years?) that might track population trends effectively. Implement survey within next five years, and include other forest-raptors not well surveyed by other methods.</li> <li>• Monitor productivity at Broad-winged Hawk nests across the state periodically; have birders and land managers report on nests they locate and number of young produced.</li> </ul>

## SGCN

### Research Needs

#### Broad-winged Hawk - Migration

- Define nesting and wintering range of Pennsylvania migrants. Identify key stopover sites and their characteristics to inform conservation planning.
- Evaluate Pennsylvania migrant population trends and improve our knowledge of migration corridors in the ridge and valley region, Appalachians, and near Lake Erie.
- How far from migration routes do migrant broad-winged hawks travel to find stopover sites?

### Survey Needs

- Conduct 1-2 year counts of birds using key ridges in the Appalachian chain, besides Blue Mountain, and along Lake Erie shoreline or other potential concentration areas in spring and fall season.
- Additional banding station on western Appalachians or Allegheny Front region to monitor migrants using those areas for health and to provide additional information on nesting and wintering population extent. Request banders in eastern and western ridges collect and report weight, sex/age ratios, fat levels on migrants to provide index to migrant health annually.
- Partner with other conservation groups and state or federal agencies to implement trail or road surveys for Broadwings on the wintering grounds in South America.
- Encourage consistent migration counts at hawk count sites immediately south of Pennsylvania and during spring in Pennsylvania. Partner with HMANA to identify sites, possibly provide small grants to sustain operation and get each site's historical hourly data entered and part of the current long-term migration monitoring program particularly for PA spring migration sites (e.g. RPI).

#### Brown Creeper - Breeding

- Evaluate brown creeper response to varying levels of habitat damage by hemlock woolly adelgid.
- Assess suitability of hemlock surrogates (e.g., Norway and red spruce, fir, larch) as brown creeper habitat to inform restoration efforts in areas hit hard by hemlock woolly adelgid.
- Assess response of brown creeper to various timber management practices.

- Establish a simple state network of off-road point counts in large forest blocks.

- Establish off-road point counts for boreal conifer forest guild species, similar to Mountain Birdwatch project.

SGCN	Research Needs	Survey Needs
Canada Warbler - Breeding	<ul style="list-style-type: none"> <li>• What are effects of energy and residential development on area-sensitive forest birds in the large forest blocks of the state?</li> <li>• What is the species sensitivity to disturbance along the fringe of the habitat? How close can disturbance be to their breeding habitat without affecting breeding activities?</li> <li>• Following disturbance, what is the timeline for the return of a viable breeding population?</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.</li> <li>• Establish off-road point counts for boreal conifer forest guild species, similar to Mountain Birdwatch project.</li> <li>• MAPS program for selected locations.</li> </ul>
Cerulean Warbler - Migration	<ul style="list-style-type: none"> <li>• What stopover habitats do migrant ceruleans use?</li> <li>• Determine migratory routes and stop-over areas for cerulean warblers breeding in Pennsylvania, using light-detecting geolocators.</li> <li>• What habitats do cerulean warblers use post-breeding before migration?</li> </ul>	<ul style="list-style-type: none"> <li>• No survey needs at this time.</li> </ul>
Chimney Swift - Breeding	<ul style="list-style-type: none"> <li>• What is the relationship between pesticide use, flying insect abundance, and aerial insectivore populations?</li> <li>• How effective are chimney swift towers at attracting swifts?</li> <li>• Do chimney swifts nest in large trees and old growth forests in Pennsylvania?</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring of urban areas that harbor large populations of chimney swifts. A volunteer survey network could be developed to perform these surveys.</li> <li>• Identify communal roosts that contain large concentrations of Chimney Swifts prior to migration. This survey could be based on the "Swift Night Out" program conducted by the Chimney Swift Conservation Association.</li> </ul>
Common Gallinule - Breeding	<ul style="list-style-type: none"> <li>• Best Management Practices for maintaining mosaic of emergent vegetation and open water, including response to wetland management.</li> <li>• Determine relationships between habitat factors (both site- and landscape-level) and breeding site occupancy and demographic rates.</li> <li>• Retrospective analysis of changes in overall percentages and amount of interspersions of emergent vegetation and open water to inform selection of target values for these parameters through habitat management activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Statewide surveys of wetlands using the Pennsylvania Game Commission Marsh Bird Survey protocol.</li> <li>• Use PA eBird as an efficient way to gather information on common gallinule distribution, breeding locales, migratory stopover sites, and timing of migration.</li> <li>• Improve methods to track hunter participation and harvest during the migratory period (e.g., human dimensions surveys, in collaboration with USFWS Harvest Information Program.)</li> </ul>

SGCN	Research Needs	Survey Needs
Eastern Towhee - Migration	<ul style="list-style-type: none"> <li>Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat of young forest birds.</li> <li>What are the effects of right-of-way management and pipelines on populations?</li> <li>How does towhee and other forest understory species react to deer browse effect on forest vegetation structure and diversity?</li> </ul>	<ul style="list-style-type: none"> <li>Annual monitoring through USGS Breeding Bird Survey.</li> <li>Continued monitoring through USGS Breeding Bird Survey and Breeding Bird Atlas efforts.</li> </ul>
Eastern Whip-poor-will - Breeding	<ul style="list-style-type: none"> <li>What site characteristics constitute high quality whip-poor-will habitat in Pennsylvania?</li> <li>Identify key factors influencing whip-poor-will calling rates to maximize the effectiveness of population surveys.</li> <li>Determine response of this species and others to silvicultural treatments, especially for young forest / early succession habitats.</li> </ul>	<ul style="list-style-type: none"> <li>Long-term, statewide, nocturnal bird surveys are required in Pennsylvania to better document whip-poor-will abundance, distribution, and population trends.</li> <li>Conduct post-treatment surveys of silvicultural treatments to determine reaction of young forest and shrub species.</li> <li>Conduct Northern Saw-whet Owl breeding surveys in forested areas which includes quiet period when all species are recorded including this species.</li> </ul>
Field Sparrow - Breeding	<ul style="list-style-type: none"> <li>Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat of early succession species?</li> <li>What are the effects of right-of-way management and pipelines on populations?</li> <li>What are the effects of controlled burns (fire) on populations?</li> </ul>	<ul style="list-style-type: none"> <li>Annual monitoring through USGS Breeding Bird Survey.</li> <li>Continued monitoring through USGS Breeding Bird Survey and Breeding Bird Atlas efforts.</li> </ul>
Golden Eagle - Migration	<ul style="list-style-type: none"> <li>No research is currently needed on migratory golden eagles in Pennsylvania.</li> </ul>	<ul style="list-style-type: none"> <li>Encourage consistent migration monitoring effort, especially during the spring migration.</li> <li>Continue trail camera surveys especially in remote forested regions.</li> <li>Pre- and post-construction monitoring at potential and existing wind energy facilities.</li> </ul>

SGCN	Research Needs	Survey Needs
Golden-winged Warbler - Breeding	<ul style="list-style-type: none"> <li>• Supplemental to continued breeding population monitoring within PA focal areas, identify and monitor specific populations that occur in areas devoid of blue-winged warbler and areas that have lower rates of hybridization.</li> <li>• Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat.</li> <li>• What are the linkages between Pennsylvania golden-winged warbler populations and wintering grounds in Central and northwest South America?</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term monitoring of Golden-winged Warbler, Blue-winged Warbler and hybrids as part of the Golden-winged Warbler Cornell Lab of Ornithology Conservation Initiative Monitoring to collect focal area abundance and distribution data.</li> <li>• Post-treatment monitoring of locations managed for Golden-winged Warblers.</li> <li>• Monitor high priority populations within GWWA focal areas, searching for new populations that have responded to disturbances.</li> </ul>
Gray Catbird - Breeding	<ul style="list-style-type: none"> <li>• What is Gray Catbird response to silviculture / young forest management in Pennsylvania?</li> <li>• What is Gray Catbird response to scrub barrens management in Pennsylvania?</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct post-treatment surveys of silvicultural treatments to determine reaction of young forest and shrub species.</li> <li>• MAPS program for selected locations.</li> <li>• No survey needs at this time.</li> </ul>
Hooded Warbler - Migration	<ul style="list-style-type: none"> <li>• Determine what stopover habitats migrant hooded warblers use.</li> <li>• What is the linkage of Pennsylvania's nesting hooded warbler population on wintering ground?</li> <li>• Evaluate population response to habitat management prescriptions including silviculture used to create, maintain or enhance breeding habitat of forest species.</li> </ul>	
Kentucky Warbler - Breeding	<ul style="list-style-type: none"> <li>• Assess the effects of forest fragmentation on forest interior birds, including predation/parasitism rates, minimum area requirements, as well as minimum viable population sizes.</li> <li>• Conduct landscape level analysis of areas with forest interior bird species (e.g., Kentucky Warbler) using 2nd Breeding Bird Atlas data in areas of range change to investigate land use factors influencing that change.</li> <li>• Evaluate population response to habitat management prescriptions used to create, maintain or enhance breeding habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices focused in the Allegheny Plateaus and Ridge and Valley provinces.</li> <li>• Design and conduct off-road point count surveys to estimate Kentucky Warbler (and other forest interior bird) populations to enable evaluation of roadside point counts and associated population estimates from the 2nd Breeding Bird Atlas.</li> </ul>

SGCN	Research Needs	Survey Needs
Lesser Scaup - Migration	<ul style="list-style-type: none"> <li>• Examine existing data sources (e.g., Lake Erie migration surveys, Christmas Bird Count, eBird) to determine if they provide adequate data quantity / quality to monitor population trends of migratory scaup in Pennsylvania.</li> <li>• Monitor wind-energy development planning and implementation in relation to established scaup habitats on Lake Erie.</li> <li>• Evaluate invasive aquatic species composition in Lake Erie (vegetation, invertebrates, and fish) and potential impacts on migration food availability for lesser scaup.</li> </ul>	<ul style="list-style-type: none"> <li>• Compile historical fall scaup migration abundance records to determine abundance patterns and if future coordination of efforts are warranted or possible.</li> <li>• Participate in coordinated Great Lakes waterbird surveys (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).</li> </ul>
Long-tailed Duck - Migration	<ul style="list-style-type: none"> <li>• Examine existing data sources (e.g., eBird) to determine if they provide adequate data quantity / quality to monitor population trends of migratory long-tailed ducks in Pennsylvania.</li> <li>• Examine habitat use and selection of migratory long-tailed ducks in Pennsylvania.</li> <li>• Determine breeding ground affiliations of long-tailed ducks migrating through Pennsylvania.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a procedure to extract and analyze data from available datasets (e.g., eBird) on the number and locations of migrating long-tailed ducks.</li> <li>• Support the implementation of an operational Atlantic Flyway Sea Duck Survey, building on the experimental U.S. Fish and Wildlife Service surveys conducted from 2008-2011.</li> </ul>
Louisiana Waterthrush - Breeding	<ul style="list-style-type: none"> <li>• Effects of shale gas drilling activity.</li> <li>• Effects of disappearance of riparian hemlock stands.</li> <li>• Post-breeding habitat use.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring of breeding densities, productivity and chemical residues in tissues in areas of high Marcellus Shale drilling activity.</li> <li>• Monitoring of breeding densities and productivity in hemlock dominated riparian areas with differing hemlock woolly adelgid infestation levels.</li> <li>• Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.</li> </ul>

SGCN	Research Needs	Survey Needs
Northern Saw-whet Owl - Breeding	<ul style="list-style-type: none"> <li>• Project OwlNet expanded and including breeding population.</li> <li>• What is the annual population and distribution of nesting saw-whet owls?</li> <li>• Are northern saw-whet owls philopatric in Pennsylvania or in certain areas of the state?</li> <li>• How do breeding saw-whet owls respond to loss of hemlocks and understory where those changes occur?</li> </ul>	<ul style="list-style-type: none"> <li>• Determine extent of breeding population through volunteer surveys.</li> <li>• Implement Project OwlNet at more locations.</li> <li>• Conduct nest-box surveys to determine saw-whet owl occupancy and persistence at known breeding grounds.</li> <li>• Banding of breeding birds to make Project OwlNet more effective at studying PA breeding population migration pattern.</li> </ul>
Northern Saw-whet Owl - Migration		<ul style="list-style-type: none"> <li>• Conduct banding studies to determine where PA nesting saw-whet owls migrate in the winter.</li> </ul>
Pied-billed Grebe - Breeding	<ul style="list-style-type: none"> <li>• Habitat requirements: nest site selection, minimum wetland size, factors affecting nesting success and density, and importance of water quality and disturbance.</li> <li>• Effects of biocide bioaccumulations.</li> <li>• Effects of waterfowl/waterbird management on nesting pied-billed grebes.</li> </ul>	<ul style="list-style-type: none"> <li>• Statewide surveys of wetlands using the Pennsylvania Game Commission Marsh Bird Survey protocol.</li> <li>• Implement annual, standardized surveys of Crawford, Mercer, Lawrence, and Butler Counties, the historic stronghold for breeding pied-billed grebes (e.g., Great Lakes Marsh Monitoring Survey, Bird Studies Canada).</li> <li>• Select 5 breeding locations as long-term (&gt;3 years) monitoring sites to understand population stability across varying habitats.</li> </ul>
Prairie Warbler - Breeding	<ul style="list-style-type: none"> <li>• What are the effects of controlled burns (fire) on populations?</li> <li>• What are the effects of right-of-way management and pipelines on populations?</li> <li>• What are the winter linkage areas for the Pennsylvania breeding population of this long-distance migrant and what are the conditions of those habitats that may effect breeding condition and success?</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring through USGS Breeding Bird Survey.</li> <li>• Continued monitoring through USGS Breeding Bird Survey and Breeding Bird Atlas efforts.</li> </ul>
Red-headed Woodpecker - Breeding	<ul style="list-style-type: none"> <li>• Statewide nest success and habitat condition.</li> <li>• Response of red-headed woodpecker to silviculture treatments including salvage cuttings of diseased trees.</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring through USGS Breeding Bird Survey.</li> <li>• Track changes of wetland acreage throughout PA using the National Wetlands Inventory.</li> </ul>

SGCN	Research Needs	Survey Needs
Ruffed Grouse - Breeding	<ul style="list-style-type: none"> <li>• Determine vulnerability and mortality rates of breeding ruffed grouse exposed to West Nile Virus.</li> <li>• Determine impact of changing spring weather conditions on juvenile production, obtain current survival rate estimates of juvenile grouse, and determine relative contributions of various mortality factors (disease, weather, predation) to juvenile mortality.</li> </ul>	<ul style="list-style-type: none"> <li>• Refine PGC Grouse Summer Sighting Survey to provide more reliable data on annual recruitment.</li> </ul>
Ruffed Grouse - Wintering	<ul style="list-style-type: none"> <li>• Comparative study of sex and age ratios in fall population, from 1970-80s (Mgmt. Plan's population baseline years) to present via a Parts Collection Survey.</li> <li>• Analyze expected range contraction of grouse in Pennsylvania and other Northeastern / Appalachian states following Porter and Jarzyna (2013) methods to inform priority areas for intensive habitat management.</li> <li>• Extent of West Nile Virus exposure in Pennsylvania ruffed grouse, as indexed by antibodies in hunter harvested samples.</li> <li>• Suitability of grouse season structure and current harvest levels on Pennsylvania ruffed grouse, with particular emphasis on north/south population dynamics.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a targeted hunter survey of grouse habitat with detailed characterization of vegetation and cover types, and repeat visits to determine species presence as a way to identify factors involved in habitat occupancy.</li> <li>• Expand spring and fall flush counts at priority sites to detect a population response where specific management actions have targeted grouse.</li> </ul>
Rusty Blackbird - Migration	<ul style="list-style-type: none"> <li>• What are the limiting factors for this species across its range leading to its long-term decline?</li> <li>• What locations are important for this species in Pennsylvania? Where are the larger migration stopover locations and roosts?</li> <li>• What role does Pennsylvania play in the life cycle of this species and how can the state maintain or increase its role in recovery?</li> </ul>	

## Scarlet Tanager - Breeding

- Determine key features of high quality breeding habitat (i.e., source habitat) for the Scarlet Tanager in Pennsylvania, particularly within fragmented landscapes.
- Determine how forest management practices (e.g. timber harvest), natural forest maturation, and effects of deer over-browsing affect breeding habitat quality for tanagers.
- Post-nesting dispersal and migration pattern to the wintering ground little known but may be consequential.

## Sharp-shinned Hawk - Migration

- Define nesting and wintering range of Pennsylvania migrants. Similarly, map wintering and migration areas for Pennsylvania nesting birds.
  - Evaluate health and contaminant load of Pennsylvania migrants by partnering with banding stations to conduct blood and fat analyses for heavy metals and contaminants.
  - Evaluate Pennsylvania migrant population trends and improve our knowledge of migration corridors in the ridge and valley region, Appalachians, and near Lake Erie.
- Conduct 1-2 year counts of birds using key ridges in the Appalachian chain, besides Blue Mountain, and along Lake Erie shoreline or other potential concentration areas in spring and fall season.
  - Additional banding station on western Appalachians or Allegheny Front region to monitor migrants using those areas for health and to provide additional information on nesting and wintering population extent. Request banders in eastern and western ridges collect and report weight, sex/age ratios, fat levels on migrants to provide index to migrant health annually.
  - Encourage consistent migration counts at hawk count sites immediately south of Pennsylvania and during spring in Pennsylvania. Partner with HMANA to identify sites, possibly provide small grants to sustain operation and get each site's historical hourly data entered and part of the current long-term migration monitoring program particularly for PA spring migration sites (e.g. RPI).

## SGCN

### Research Needs

- Sora - Breeding
- Best Management Practices for maintaining mosaic of emergent vegetation and open water, including response to wetland management.
  - Determine relationships between habitat factors (both site- and landscape-level) and breeding site occupancy and demographic rates.
  - Retrospective analysis of changes in overall percentages and amount of interspersed emergent vegetation and open water to inform selection of target values for these parameters through habitat management activities.
- Tundra Swan - Migration
- Compare quantitative site- and landscape-level habitat data between sites swan use and non-use sites to clarify important habitat components for migrating swans.
  - Examine predicted effects of various climate change scenarios on wetland and agricultural habitats in the Lebanon / Lancaster County area to identify potential long-range concerns and appropriate mitigation approaches.
  - Develop methods / models to estimate metabolizable energy available to tundra swans in the Lebanon / Lancaster County area and measure effects of changes in land use or agricultural practices on swan food resources and bioenergetics.

### Survey Needs

- Statewide surveys of wetlands using the Pennsylvania Game Commission Marsh Bird Survey protocol.
  - Use PA eBird as an efficient way to gather information on sora distribution, breeding locales, migratory stopover sites, and timing of migration.
  - Improve methods to track hunter participation and harvest during the migratory period (e.g., human dimensions surveys, in collaboration with USFWS Harvest Information Program.)
- Tundra Swan
- Monitor tundra swan population around Middle Creek Management Area, including roosting and feeding locations, to track progress toward conservation goal.
  - Establish a procedure to extract and analyze data from available datasets (e.g., eBird) on the number and locations of migrating swans.
  - Development of a standardized survey of roosting and feeding habitat quantity and characteristics in the southern Lebanon / northern Lancaster County area.
- Willow Flycatcher - Breeding
- Riparian shrubland monitoring especially in Important Bird Areas.
  - Conduct post-treatment surveys of silvicultural treatments to determine reaction of young forest and shrub species.
  - Watershed quality monitoring of riparian bird species.

SGCN	Research Needs	Survey Needs
Winter Wren - Breeding	<ul style="list-style-type: none"> <li>• Assess suitability of hemlock surrogates (e.g., Norway and red spruce, fir, larch) as winter wren habitat to inform restoration efforts in areas hit hard by hemlock woolly adelgid.</li> <li>• What are effects of energy and residential development on area-sensitive forest birds in the large forest blocks of the state?</li> <li>• Determine winter wren responses to silvicultural practices.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a simple state network of off-road point counts in large forest blocks.</li> <li>• Establish off-road point counts for boreal conifer forest guild species, similar to Mountain Birdwatch project.</li> </ul>
Wood Thrush - Breeding	<ul style="list-style-type: none"> <li>• use Breeding Bird Atlas and LiDAR data to conduct analyses that improve our understanding of the relationship between forest structure and forest interior bird breeding densities.</li> <li>• Long-term studies of seasonal fecundity to identify source/sink populations throughout the state and investigate effects of forest age on nest success, adult survival, and return rates.</li> <li>• Investigate links between breeding demographics and non-breeding activities/migratory connectivity.</li> <li>• Long-term point count surveys and territory mapping of forest interior birds should be established to identify population change at a range of sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct off-road point count surveys and spot-mapping for forest interior birds to determine habitat requirements and association with current forest management practices.</li> <li>• Surveys to assess response of forest species to silviculture treatments and other management.</li> </ul>
Wood Thrush - Migration	<ul style="list-style-type: none"> <li>• Identify key components of important stopover habitats during migration and determine priority areas.</li> <li>• Quantify effects of Wood Thrush, and other Neotropical migrants, with glass and buildings in Pennsylvania. Research solutions to mitigate bird mortalities with glass.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue statewide migration counts and integrate eBird data to better understand migratory patterns of Wood Thrush through Pennsylvania and to help identify stopover priority areas and habitats.</li> </ul>

SGCN	Research Needs	Survey Needs
Yellow-breasted Chat - Breeding	<ul style="list-style-type: none"> <li>• What are the effects of controlled burns (fire) on populations?</li> <li>• What are the effects of right-of-way management and pipelines on populations?</li> <li>• What are the winter linkage areas for the Pennsylvania breeding population of this long-distance migrant and what are the conditions of those habitats that may effect breeding condition and success?</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring through USGS Breeding Bird Survey.</li> <li>• Continued monitoring through USGS Breeding Bird Survey and Breeding Bird Atlas efforts.</li> </ul>
Eastern Spadefoot <sup>†</sup> - Year-round	<ul style="list-style-type: none"> <li>• Determine population size structure of key Spadefoot Toad populations.</li> <li>• Determine habitat use and travel distance to breeding pools from burrows.</li> <li>• Evaluate population genetics at isolated sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue Eastern Spadefoot surveys for undocumented populations within the historically-occupied range.</li> <li>• Estimate population size through focused studies on newly documented populations.</li> </ul>
Appalachian Cottontail - Year-round	<ul style="list-style-type: none"> <li>• What is the abundance and distribution of Appalachian cottontails in Pennsylvania?</li> <li>• What habitat management practices are most beneficial to Appalachian cottontails?</li> <li>• What are the influences of the eastern cottontail on Appalachian cottontails?</li> </ul>	<ul style="list-style-type: none"> <li>• Survey high elevation areas (&gt;800 ft.) for Appalachian cottontails using DNA collection (pellets), rabbit harvest, and/or trap and release.</li> <li>• Identify the acreage of suitable habitat conditions at appropriate elevations for Appalachian cottontail in Pennsylvania and what percent of areas with suitable habitat are occupied by Appalachian cottontails, both eastern and Appalachian cottontails, eastern cottontails, or no cottontails.</li> <li>• Survey and compare the distribution of Appalachian cottontails and eastern cottontails in high elevation areas of Pennsylvania.</li> </ul>

SGCN	Research Needs	Survey Needs
Northern Long-eared Bat <sup>†</sup> - Year-round	<ul style="list-style-type: none"> <li>Determine post-WNS population trends, over-winter strategies that permit avoidance and survival of WNS, and current distribution in Pennsylvania to identify areas with the highest local abundance of this species to prioritize conservation efforts.</li> <li>Determine what impact various types of forest management (including prescribed fire) have on spring, summer, and autumn populations. What types of forest management are beneficial? What mitigation techniques might reduce/minimize impacts?</li> <li>Identify specific characteristics of preferred summer roost trees, especially trees used by reproductive females.</li> <li>No research currently required.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct targeted, range-wide surveys.</li> </ul>
Jefferson Salamander <sup>†</sup> - Year-round	<ul style="list-style-type: none"> <li>No research currently required.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct targeted, range-wide surveys.</li> </ul>
Marbled Salamander <sup>†</sup> - Year-round	<ul style="list-style-type: none"> <li>No research currently required.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct targeted, range-wide surveys.</li> </ul>
Eastern Hognose Snake <sup>†</sup> - Year-round	<ul style="list-style-type: none"> <li>Conduct a radio telemetry study focused on habitat delineation and use.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct targeted, range-wide surveys.</li> </ul>
Eastern Box Turtle <sup>†</sup> - Year-round	<ul style="list-style-type: none"> <li>No research currently required.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct targeted, range-wide surveys.</li> </ul>

## Want more information or have questions?

Your area of interest is in the following agency regions:

**Pennsylvania Game Commission:** Northcentral

**Pennsylvania Fish and Boat Commission:** Northcentral

Additional information about the Species of Greatest Conservation Need and Conservation Actions in this report is available by contacting:

- Birds, Mammals, Terrestrial Invertebrates: Pennsylvania Game Commission Regional Wildlife Diversity Biologist

**Northcentral Regional Office,** Mario Giazzone [mgiazzone@pa.gov](mailto:mgiazzone@pa.gov); 570-398-4744

*Cameron, Centre, Clearfield, Clinton, Elk, Lycoming, McKean, Potter, Tioga, Union counties*

- Fish, Reptiles and Amphibians, Freshwater Mussels, Terrestrial Invertebrates: Pennsylvania Fish and Boat Commission Conservation Coordinator; RA-FBSWAP@pa.gov

- Federally Threatened or Endangered Species: U.S. Fish and Wildlife Service State College Field Office; 814.234.4090

For other inquiries about this tool or the Pennsylvania Wildlife Action Plan, contact:



Game Commission  
Wildlife Diversity Conservation  
Planning Coordinator  
[PGCSWAP@pa.gov](mailto:PGCSWAP@pa.gov)



Fish and Boat Commission  
Conservation Coordinator  
[RA-FBSWAP@pa.gov](mailto:RA-FBSWAP@pa.gov)

Thank you for your interest in the Pennsylvania Wildlife Action Plan! If you would like to receive an email notification when a section of the Plan has been updated, please provide your contact information through this form: [Registration Form](#)

# Appendix H

Management Goal Review and Summary for Patton Township's Haugh Family Preserve and Gray's Woods Park and Preserve, July 19, 2021

## **Management Goal Review and Summary for Patton Township's Haugh Family Farm Preserve and Gray's Woods Park and Preserve July 19, 2021**

The following is a final draft of the goals developed by the Patton Township Open Space Stewardship Committee Meeting for the Haugh Family Farm Preserve and Gray's Woods Park and Preserve at their April 15, 2021 and May 20, 2021 committee meetings. These goals will be the foundation for the future Forest Management Plan and overall Conservation Plan that are to be developed for these properties. Funding for these plans is pending a grant from the Hamer Foundation.

### **Haugh Family Farm Preserve and Gray's Woods Park and Preserve Management Goals**

- GOAL 1: Maximize forest health and resiliency
- GOAL 2: Protect and enhance wetlands, vernal pools and critical upland habitat
- GOAL 3: Enhance habitat for rare, threatened, and endangered species
- GOAL 4: Encourage regenerative and sustainable agricultural practices that support farm productivity, increase soil health, protect local water quality, meet state requirements and support the Township's Chesapeake Bay watershed goals
- GOAL 5: Conduct outreach to promote recreational use of the Open Space properties
- GOAL 6: Promote educational and research opportunities
- GOAL 7: Establish a long-term financial strategy for the Open Space Program management and operations

The following information was presented and discussed with the Committee at their May 20, 2021 meeting and was used to finalize the goals listed above:

### Goals

- Foundation of the forest management and conservation plans
- General guidelines that explain what you want to achieve or protect on these properties
- Long-term vision for the properties
  - Must be consistent with the conservation easement

### Objectives

- Defined strategies or implementation steps to achieve your goals
  - Part of plan writing
- Specific, measurable, and have a defined completion date

\*Data collected at the 4/15/2021 Open Space Stewardship Committee Meeting on Jamboard

\*Notes shown in **blue** were recorded under “Conservation Values – Other?”

### **DRAFT GOAL 1: Maximize forest health and resiliency**

- Promote forest health
- Maximize forest resiliency
- Maintain/augment forest footprint
- Improve forest structure
- Protect native species/identify and treat noxious weeds/detrimental invasive species
- Improve/maintain migratory bird habitat
- Provide a diverse forest along with open spaces
- American chestnut?

### **DRAFT GOAL 2: Protect and enhance wetlands, vernal pools and critical upland habitat**

- Preserve and protect wetlands
- Augment buffers around vernal ponds near ag fields
- Protect critical upland habitat surrounding vernal pools
- Use water-safe herbicide

### **DRAFT GOAL 3: Enhance habitat for rare, threatened, and endangered species**

- Partner with other organizations (USFWS) to leverage resources
- Create/Maintain unique habitat

- Enhance habitat for rare, threatened, and endangered species

**DRAFT GOAL 4:** Encourage regenerative and sustainable agricultural practices that support farm productivity, increase soil health, protect local water quality, meet state requirements and support the Township’s Chesapeake Bay watershed goals

- Agricultural BMPs, monitor what they are spraying and where, pesticides logs for ag and forest area, fertilizer use logs, cover crops, not farming through vernal/ephemeral water

**DRAFT GOAL 5: Conduct outreach to promote recreational use of the Open Space properties**

- Create and maintain trails
- Provide designated parking areas
- Provide appropriate parking areas and trail heads
- Geo-referenced map with property boundaries and QR code of signage
- Promote the community gardens
- Trail maps

**DRAFT GOAL 6: Promote educational and research opportunities**

- Promote research opportunities to Penn State, SCASD, NGO’s, PGC, NHP
- Signage listing endangered species
- Don’t duplicate Millbrook Mash or other educational assets in the Region
- Share the story of the Scotia Iron ore history
- Annual interpretive walk, host a “Walk in Penn’s Woods” walk
- Materials for elementary school field trips
- Increase knowledge of habitat, its flora/fauna, its management and conservation
- Learning to love and appreciate and protect the land where you live
- Target-audience – Patton Township residence about open space program, Centre Region, and/or Centre County. Could encourage other townships to do their own open space programs
- Is there an outreach goal?
- Is there an education goal?
- Guided walks, plants, trees, animals, history
- Outreach to increase appreciation for the natural resources that were protected
- Why the Township created the open space program – Twp is balancing new development and preservation
- Joe Wilson hosts a tiger beetle identification crawl

**DRAFT GOAL 7: Establish a long-term financial strategy for the Open Space Program management and operations**

- Committee makes a financial recommendation to the BOS
- Grants and gifts as a supplemental source of funding
- Establish “friends of” group?

**Comments from the May 20, 2021 meeting**

- Do we keep doing what we have been doing or do we want to change anything/direction?
- All activities to date have been self-sustaining to date. Don’t want to use tax dollars for management. Look for outside sources.

Schedule moving forward

- June – field tour
- July – finalize goals?

# Appendix I

Pennsylvania Game Commission Administrative Chapter 10: “400 Areas” – Other Governmental Wildlife Habitat Areas Program

# Administrative Chapter 10

## “400 Areas” - Other Governmental Wildlife Habitat Areas

By Scott Bearer, Habitat Division Chief and Timothy Haydt, Public Lands Section Chief

### Introduction

The Pennsylvania Game Commission’s (PGC) Bureau of Wildlife Habitat Management along with our six regions are directly responsible for managing wildlife habitats across over 1.5 million acres of Pennsylvania’s state game lands. In addition, the PGC cooperates with two other important groups to manage habitat and provide hunting/trapping opportunities, 1) private landowners, and 2) other governmental entities. To work with private landowners and create hunting/trapping opportunities, the PGC coordinates with over 11,000 private landowners who have enrolled over 2.1 million acres into the Hunter Access Program. The PGC also coordinates with other governmental entities and quasi-governmental organizations to permit PGC to manage some of their lands for healthy wildlife habitats. Lands owned by other governmental entities but managed through a partnership management agreement with PGC are known as “400 Areas”. The term “400 Areas” comes from the fact that historically, state game lands were numbered up to the mid-300s (332 as of Feb. 2021). In an effort to maintain that numbering paradigm while providing a distinction due to their unique nature, they were given numbers beginning with 400\*. Currently, the PGC assists with managing over twenty 400 Areas across all six regions, totaling over 86,000 acres.

**\*400 Area Numbering in GIS:** As the state game lands system has expanded, new game lands have been established, and our GIS capabilities have developed, “400 Areas” are now categorized with a state game land ID beginning with 2xxx (the “x” representing the original 400 Area number). For example, the 400 Area of Raystown Lake was originally numbered **420**, but is now given the Game Land ID = **2420**.

### What is a 400 Area?

400 Areas are lands owned by governmental entities (e.g., local, county, state, and federal ) or quasi-governmental organizations (e.g., water authorities, lands administered by state or land grant universities) where that entity has signed an agreement with the PGC allowing the PGC to assist in the planning and

\*\* 400-Areas may be considered in populated areas (> approx. 600 people/mile<sup>2</sup>) where hunting/trapping restrictions are necessary for public safety, as long as all *reasonable* hunting/trapping access is still available.

### What is a 400 Area?

1. Lands owned by other government or quasi-governmental entities and are treated like state game lands through an established agreement.
2. 400 areas must:
  - Provide open access\*\* to hunting/trapping activities like a state game land.
  - Have documented, long term (>25 years) commitment to PGC habitat management activities.
  - Balance other outdoor recreational activities to ensure hunting and trapping access and minimize user conflicts.

implementation of management practices on the enrolled lands for the long-term health of wildlife habitats while simultaneously providing reasonable access to hunting/trapping opportunities to the public.

### How are 400 Areas Established?

400 Areas are established through a variety of legal mechanisms, including a long-term (25-year) lease or license agreement, or via a Memorandum of Understanding.

The agreement must align with the missions, long-term goals, and strategic plans of each entity, it must permit the PGC to conduct some degree of habitat management activities, and it must allow for public access\*\* for hunting/trapping. Agreements can take months (or longer) to become established, and it is important to note that even if an agreement is in development, no PGC funded management shall occur on these lands until the agreement is signed by both parties and coordinated through Regional and Bureau of Wildlife Habitat Management leadership.

## Who Maintains the 400 Area Agreements?

After being signed by the other entity's authorized personnel and PGC's Chief Council and Executive Director, the 400 Area agreements are housed, tracked, and maintained by the Public Lands Section Chief, Division of Habitat Planning and Development, Bureau of Wildlife Habitat Management. Questions regarding 400 Areas should be directed to the Public Lands Section Chief.

## What are the Benefits of a 400 Area?

400 Areas provide the PGC the opportunity to enhance and manage wildlife habitats in areas that are not

directly owned by the PGC, thereby increasing the health and resilience of habitats and wildlife across a larger portion of the landscape. Also, by entering into a 400 Area agreement, the PGC can manage these lands similar to state game lands, ensuring public access to these areas so that hunting/trapping activities can continue. Likewise, the PGC may enforce rules and regulations promulgated under Titles 34 and 58 of the Game and Wildlife Code. The Game Fund and/or Pittman-Robertson funding may be used to support the habitat management activities on these lands when available and coordinated through Regional and Bureau of Wildlife Habitat Management leadership.

### LANDS MANAGED BY THE PENNSYLVANIA GAME COMMISSION THROUGH A LICENSE, LEASE AGREEMENT OR A MEMORANDUM OF UNDERSTANDING (Referenced As "400 Areas")

<u>400 Area #</u>	<u>Site</u>	<u>Acreage</u>	<u>County</u>	<u>Region</u>
401	Allegheny National Forest	1,500	Warren, McKean, Forest, Elk	NW/NC
402	PA State Forest Lands		Various	All
403	PA Fish and Boat Commission		Various	All
406	PA State Park Lands		Various	All
411	Conemaugh - ACOE	6,913	Indiana, Westmoreland	SW
414	Beltzville - ACOE		Carbon	NE
415	Shenango - ACOE	3,140	Mercer	NW
416	Indian Rock - ACOE	1,539	York	SC
417	Foster Joseph Sayers - ACOE	1,014	Centre	NC
418	Curwensville - ACOE	1,476	Clearfield	NC
419	Loyalhanna - ACOE	3,201	Westmoreland	SW
420	Raystown - ACOE	3,018	Huntingdon	SC
422	Ontelaunee Lake	2,050	Berks - City of Reading	SE
423	Muddy Run	500	Lancaster	SE
424	City of DuBois		Clearfield	NC
425	Blue Marsh - ACOE	2,732	Berks	SE
427	Mahoning Creek Lake - ACOE	1,240	Armstrong	SW
429	Nescopeck State Park	1,666	Luzerne	NE
432	Hillman State Park	3,747	Washington	SW
433	Lehigh County Commissioners	407	Lehigh	SE
434	Deleware Water Gap - NPS	34,000	Monroe, Pike and Northampton	NE/SE
435	Woodcock Creek - ACOE	582	Crawford	NW
437	Martic Township	361	Lancaster	SE
438	Tioga-Hammond - ACOE	8,100	Tioga	NC
439	Conwanesque Lake - ACOE	2,619	Tioga	NC
440	Crooked Creek Lake - ACOE	2,564	Armstrong	SW
441	Tionesta Lake - ACOE	2,619	Forest	NW

# Appendix J

Wild Blue Lupine (*Lupinus perennis*) Restoration on the Haugh Family Preserve Report (2017)

# ***WILD BLUE LUPINE (LUPINUS PERENNIS) RESTORATION***

## ***ON THE HAUGH FAMILY PRESERVE***

*Prepared for:  
Open Space Stewardship Committee*



*Prepared by: Joseph J. Wilson*



October 2017

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### ***INTRODUCTION***

The Haugh Family Preserve (HFP) is an approximately 466-acre parcel that is accessible off Circleville Road and Scotia Range Road in Patton Township, Centre County, Pennsylvania (see Location Map). A *Conservation Easement* was placed on the HFP property when the parcel ownership was transferred to Patton Township (Township) in 2005. The principal components of the *Conservation Easement* are to protect water, forest, wildlife, and scenic resources. Thus, the overall goal of the *Conservation Easement* is to protect the natural resources of the property by leaving them in an undisturbed state except as required to promote and maintain native species and promote good stewardship that allows sustainable uses of the property.

The Open Space Stewardship Committee (Committee) is an advisory group that provides comment to the Township on activities at the HFP. The Committee approves all land disturbance activities and ensures that the activities are consistent with the goals and objectives of the *Conservation Easement*. In

addition the Committee reviews, comments upon, and incorporates scientific studies evaluating the site into their decision-making process. This study was conducted through oversight from the Committee.



Wild blue lupine (WBL, *Lupinus perennis*) is a perennial herb of the pea family (Fabaceae). The stems are usually a reddish-green color and hairy. The leaves are alternate, palmately compound, hairy, and comprised of 7-11

oblanceolate leaflets with a green upper surface and pale green lower surface. In flowering specimens, the upper stem extends into a long raceme with irregular, 5-part, blue-violet (rarely white) flowers that are about ¾ inches long and attached to the stem by an approximately ½ inch long petiole. The flowering period typically lasts a few weeks from late spring through early summer. After flowering, hairy seedpods that are up to 2 inches long and contain about 7 seeds, replace the flowers. Reproduction can be from seed (which are ejected when seedpod dries) or as clones from rhizomes that emerge off the taproot.

WBL is listed as rare in Pennsylvania (PNHP 2017) but it is recognized as globally secure (NatureServe 2017). In addition to the rare listing in Pennsylvania, the species has special protections in Iowa, Maine, Maryland, New Hampshire, Rhode Island, and Vermont (USDA NRCS 2017). WBL decline is generally attributed to fire suppression and habitat destruction (USDA 2003).

WBL is an important food source for many larval butterflies (Wagner et al. 2003); in particular the federally-listed endangered species the Karner blue butterfly (*Lycaeides melissa samuelis*). WBL is also a host for larvae of the frosted elfin (*Callophrys irus*) and Persius duskywing (*Erynnis persius*) butterflies, both species considered critically imperiled in Pennsylvania (PNHP 2017).

In 2009, botanical surveys at the HFP identified two populations of WBL (WEC 2009, see Wild Blue Lupine Populations Map). Subsequent studies at the site have failed to document one of the populations (Population WBL2) and have noted a steady decline in the health of the other population (Population WBL1, Table 1).

Table 1 – Population WBL1 at HFP

Year	Total Stems	Flowering Stems
2009	+100	64
2010	+100	64
2014	???	12
2016	9	0

The tremendous decrease in WBL at the site is likely attributable to natural succession. Both population locations are along an edge habitat ecotone between upland forest habitat/open field (agricultural) habitat and over the past few years, native woody species have become established. These woody species likely out-compete the WBL for required resources (i.e. sunlight and nutrients).

Restoration of WBL populations through woody vegetation removal has been practiced in other locations with great success (Forrester et al. 2005, Pfitsch and Williams 2008). For example, a New York site experienced a significant increase in flowering stems of WBL after removal of nine mature white pine trees that were shading the population (Pfitsch and Williams 2008). The removal of competing plants and litter (detritus) from a WBL site in Indiana was shown to increase WBL survival (Pavlovic and Grundel 2009). Other studies have documented WBL restoration success using controlled burns (Kwiloszcz and Knutson 1999); however, fire is not practical for all areas, in particular public open spaces.

Restoration activities appear necessary to maintain WBL at the HFP. The purpose of this study is to attempt to restore the WBL populations at the HFP through the removal of invading immature woody vegetation, competing herbs, and leaf litter at the two previously identified population locations (Populations WBL1 and WBL2).

### METHODS

The two WBL population locations at HFP were visited in mid-April, 2017 to begin restoration activities. At each location, the boundaries of the former populations were temporarily delineated with pin flags using data from previous site assessments, and a reel tape was used to measure the dimensions of each population location. All vegetation within the delineated boundary at each location was documented. Color photographs were taken to document site conditions prior to performing site restoration activities.



Population WBL1 location was found to be approximately 35' x 35' (1,225 ft<sup>2</sup>) and to be dominated by sweetfern (*Comptonia peregrina*) shrubs and oak (*Quercus* spp.) and maple (*Acer* spp.) saplings. The most abundant herbaceous species at WBL1 was common cinquefoil (*Potentilla simplex*). Twelve woody species totaling 392 stems (0.32 stems/ft<sup>2</sup>) and five herbaceous plant species were noted within the boundaries of WBL1 immediately prior to restoration activities. Among the herbaceous species found at the location were 14 emerging stems of wild blue lupine. A machete, pruning shears, and a rake were used to clear the location of all of vegetation and litter except for the 14 stems of wild blue lupine.



Population LP2 location was found to be approximately 25' x 10' (250 ft<sup>2</sup>) and to be dominated by oak saplings and blackberry (*Rubus* spp.) shoots. The most abundant herbaceous species at WBL2 was common cinquefoil. Seven woody species totaling 49 stems (0.20 stems/ft<sup>2</sup>) and seven herbaceous plant species were noted within the boundaries of WBL2 prior to restoration activities. No emerging stems of wild blue lupine were noted at WBL2. Loppers, pruning shears, and a rake were used to clear the location of all of vegetation and litter.



The two locations were monitored every two to three weeks from mid-April through mid-July to determine the effectiveness of the restoration

activities. During each monitoring event the number (if any) and condition (in-flower, in-fruit, etc.) of WBL were documented at each location. In addition, notes were taken on the overall botanical condition of the location (i.e. other species present, deer browse activity, etc.).

**RESULTS**

Population WBL1 exhibited an immediate positive response to the restoration activities (Table 2). The total number of WBL stems increased by 86% from the previous growing season and the number of flowering stems increased from 0 to 14.

Table 2 – Restoration Response of WBL1

Date	Total Stems	Flowering Stems
April 12	14	0
April 28	44	0
May 10	56	12
June 2	64	13
June 22	64	14
July 19	51	Fruiting



Competing vegetation was at a minimum throughout April and May but was noted as becoming prevalent during the June 2 monitoring event. Population WBL1 habitat was dominated by rough-stem goldenrod

(*Solidago rugosa*) and northern dewberry (*Rubus hispidus*) by mid-July. The large abundance of these and other species, plus some obvious deer browse, made counting WBL stems difficult in July.



No stems of WBL were recorded from population WBL2. Removal of the woody vegetation did appear to increase the abundance of herbaceous species at this location as by mid-July there were 11 herbaceous species present with common cinquefoil and early goldenrod (*Solidago juncea*) dominant.

**DISCUSSION**

Consistent with other studies in Pennsylvania (Sitch *personal communication*), this study documents successful restoration of WBL with limited effort and cost through the removal of woody shrubs, competing herbs, and light disturbance of surface litter. Other studies have shown that WBL population density is greatest when litter cover is low and canopy and competing ground cover are moderate (Pavlovic and Grundel 2009). Hence, maintenance of population WBL1 may simply require raking away the litter layer each spring and selective pruning of some nearby woody species.

It is likely that the WBL2 population is extinct at the HFP. This population was probably on its way out when first observed in 2009. Future efforts to restore this population are not recommended. However, it may be a worthwhile effort to attempt to establish another population of WBL at the HFP. The Pennsylvania Department of Conservation and Natural Resources (PADCNR) is currently attempting to establish new populations of WBL on State Forest lands by collecting seeds from healthy plants, growing them in a controlled setting until healthy seedlings, and then planting them in suitable habitats (Sitch, *personal communication*). This approach could be attempted at HFP with minimal cost.

Prior to attempting to establish new populations of WBL at the HFP, a few important things should be considered. New WBL populations should be located beyond the limits of routine disturbances associated with farming, powerline maintenance, and mowing. Buffering new populations of WBL a safe distance from hiking trails is also recommended to prevent unwanted collection. Finally, new WBL locations should be located in areas with suitable soils, appropriate solar exposure, and few competing species, in particular few or no exotic and invasive species. There are a few places at the HFP where new WBL population establishment are recommended (see Wild Blue Lupine Populations Map).

In conclusion, routine maintenance (raking away detritus in early spring and pruning back woody vegetation that is blocking solar exposure) of the WBL1 population is recommended. Also, establishing one or more new populations of WBL at the HFP through the collection and propagation of seed from WBL1 may be a worthwhile endeavor.

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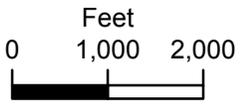
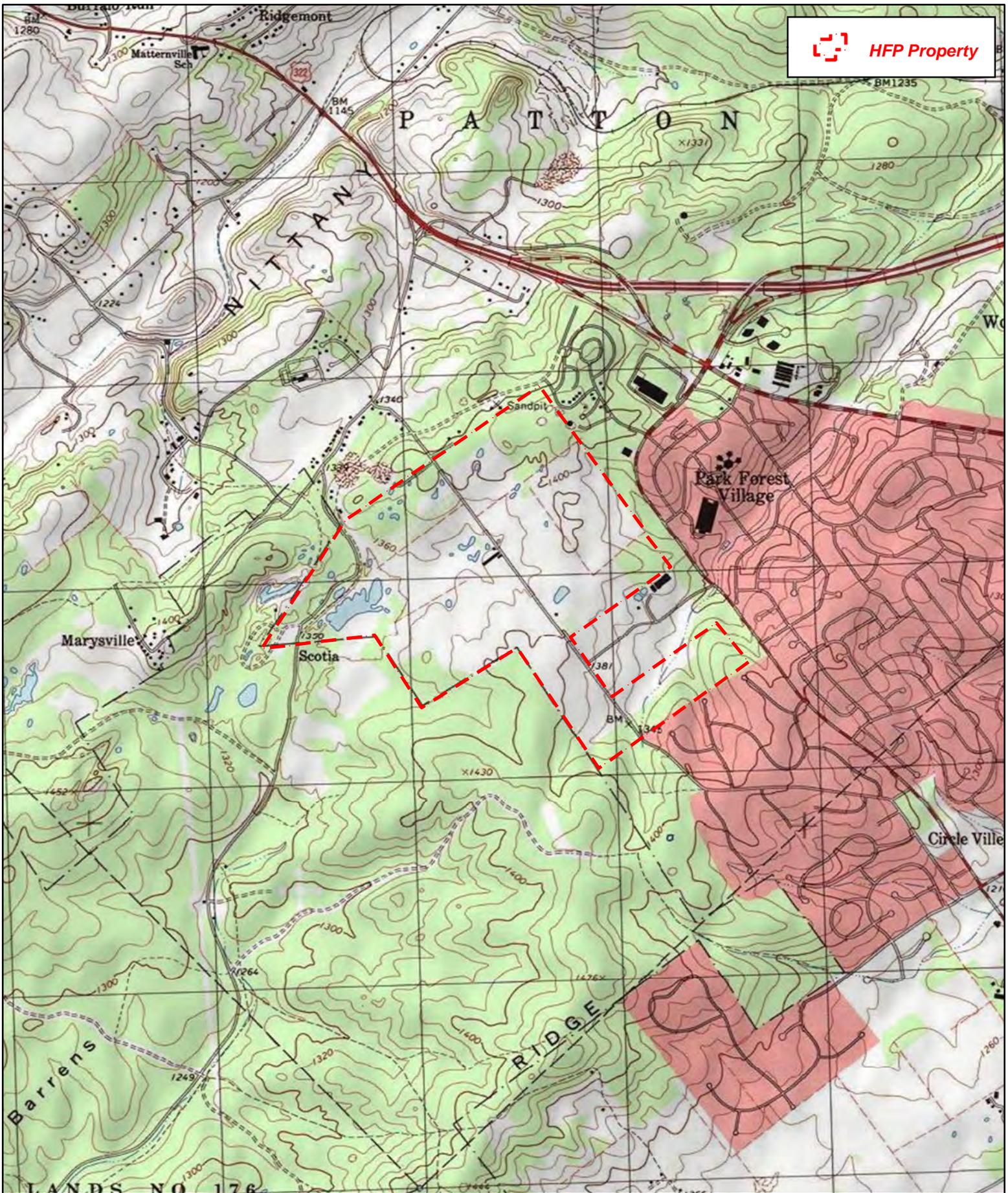
814-933-2488, jjw@wilsonecological.com

PADCNR Wild Plant Management Permit No. 16-041

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*Senior Certified Ecologist*, Ecological Society of America

*Professional Wetland Scientist*, Society of Wetland Scientists



**LOCATION MAP: HAUGH FAMILY PRESERVE**  
Patton Township, Centre County, PA

**Patton Township Open Space Stewardship Committee**



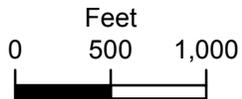
Map created October 12, 2017  
Julian USGS Quadrangle



 **HFP Property**  
 **Wild Blue Lupine**



**WILD BLUE LUPINE POPULATIONS MAP: HAUGH FAMILY PRESERVE**  
**Patton Township, Centre County, PA**



**Patton Township Open Space Stewardship Committee**



Map created October 12, 2017  
Julian USGS Quadrangle

# Appendix K

U.S. Fish and Wildlife Service Habitat Improvements Report (2020)

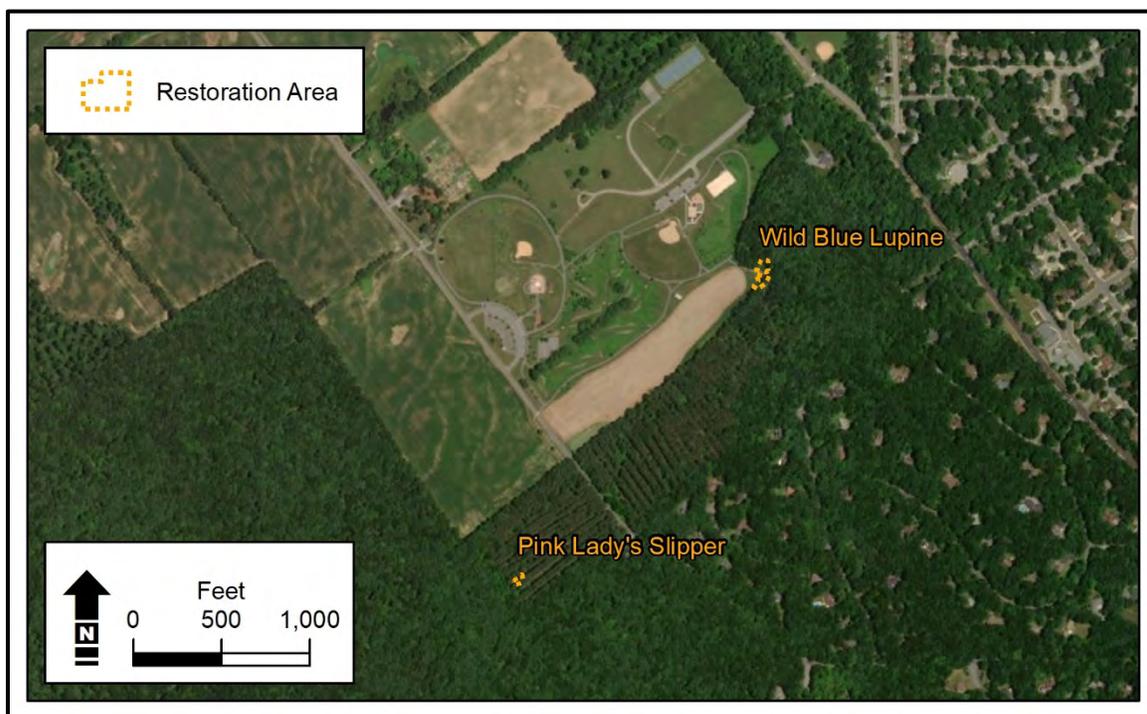
# U.S. Fish and Wildlife Service Habitat Improvements

Prepared by:

Wilson Ecological Consulting, LLC

October 2020

In February 2020, Wilson Ecological Consulting (WEC) and the U.S. Fish and Wildlife Service (USFWS), in collaboration with Patton Township officials, performed habitat improvement services at two locations on the Haugh Farm Preserve (see map below).



**Habitat Improvement Areas on the Haugh Farm Preserve**

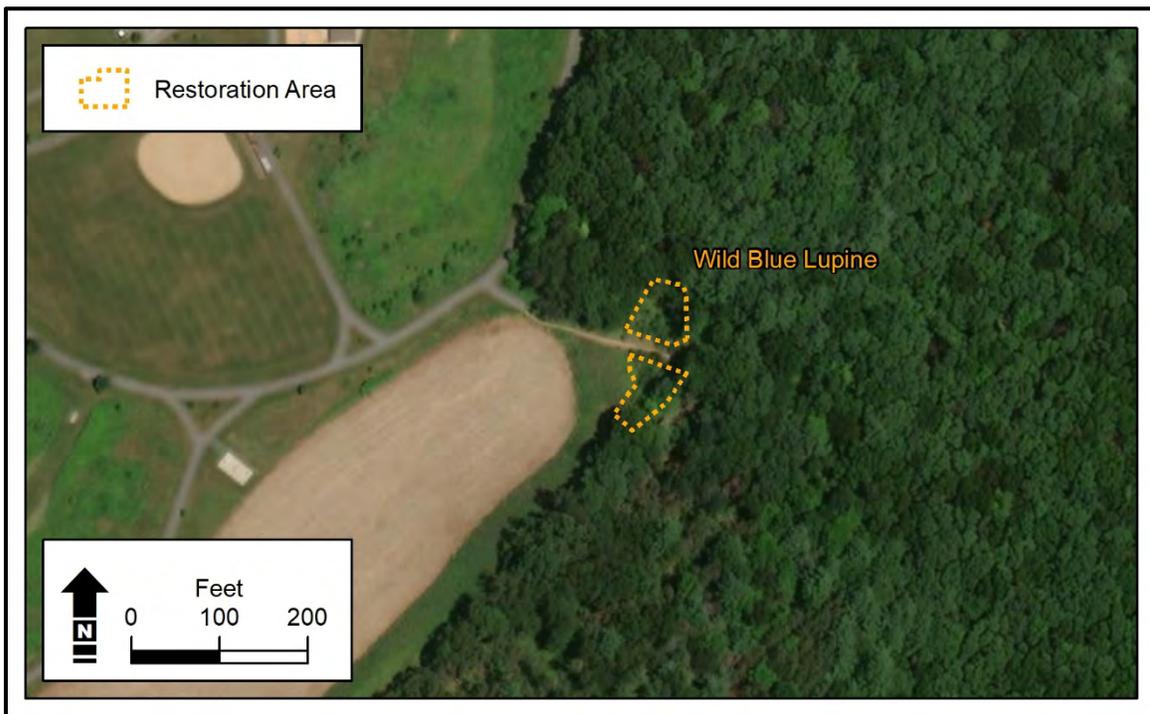
These two locations were selected because each contains populations of a unique flower. Wild blue lupine (*Lupinus perennis*) is a state-listed rare flowering herb that is one of only two plant species that are hosts of the critically imperiled frosted elfin (*Callophrys irus*) butterfly, which currently is known from only two locations in Pennsylvania, including the Haugh Farm Preserve. This population of wild blue lupine contained more than 100 stems with more than 60 flowering specimens as recently as 2010 and has had recent years where fewer than 10 stems and no flowering specimens were noted.

Pink lady's slipper (*Cypripedium acaule*) has no special protection status and is actually rather widespread in dry upland forest habitats of Pennsylvania. However, it is a very attractive, showy orchid that is an important source of pollen for bees and also offers human aesthetic values (i.e. nature photography). This particular population is huge, with more than 100 individuals in a small area and in recent years it has been threatened by the invasion of woody species that are shading it out. Additionally, recent timbering operations in Stand 5

of the site have promoted additional woody invasion, thus some habitat improvement operations were warranted to protect this population.

Habitat restoration at each site was done using a skid steer with a commercial grade, drum-type mulcher attachment. Two areas, totaling about 7,000 square-feet were cleared at the wild blue lupine location and one area totaling about 1,700 square-feet was cleared at the pink lady's slipper location. Mulched woody material was left in place on the ground to return nutrients to the soil and to help maintain soil moisture.

The northern cleared area (see map below) is where the population of wild blue lupine exists. The southern cleared area was determined to be of similar habitat and somewhat better suitable for the species in terms of solar exposure, so it was cleared in hopes of triggering a re-emergence of any historic population of the species.



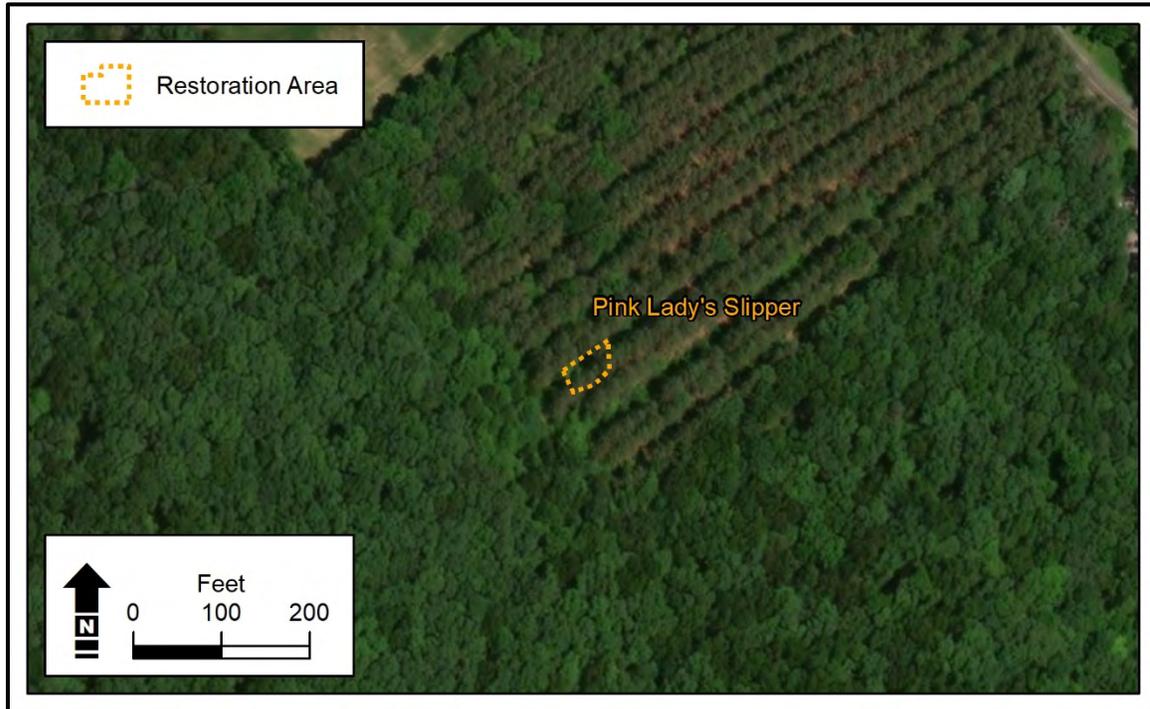
**Wild Blue Lupine Habitat Improvement Area on the Haugh Farm Preserve**

Surveys were conducted from late April through mid-July. Twelve clumps of wild blue lupine were noted in the northern cleared area with 48 stems and 24 flowering specimens. One of the flowering specimens produced white flowers, a rare occurrence for this species that has been noted in some other wild populations. Some deer browse on the wild blue lupine stems was evident throughout the survey period and by mid-July, the specimens were difficult to locate as other forbs, principally goldenrods (*Solidago* spp.) were extremely abundant.

In mid-July, 50% of the remaining seed pods (n=14) were removed from the stems that had flowered and a 5-gallon bucket of soil from the site was collected. The seed pods and soil were then given to the USFWS. The USFWS plans to attempt to grow wild blue lupine from these seeds in a local greenhouse in an effort to create a new population of wild blue lupine

at the site. Presently, planting any successfully germinated wild blue lupine seeds at a historic site near the union of Stands 14 and 16 in the spring of 2021 is being considered. Any input on this matter from the Township and/or Open Space Committee would be appreciated.

Restoration of the pink lady's slipper population also appeared to be successful. In late May, more than 100 flowering specimens were counted at the site and it was estimated that as many as 200 specimens may have been present.



**Pink Lady's Slipper Habitat Improvement Area on the Haugh Farm Preserve**

The above described habitat improvements will likely have to be repeated in the future to maintain these populations. Wild blue lupine is a species of successional habitats so maintaining successional habitat is of paramount importance to the long-term survival of that population. Pink lady's slipper is actually a species of mature forests so removal of invading woody species in these next few years will be important as the former red pine plantation is converted to a more natural forest comprised of white pine and mixed oak. It is worth noting, a red pine within the center of the pink lady's slipper population was left standing during the timber harvesting operations.

WEC plans to continue monitoring these sites in 2021 and to hopefully continue working on habitat improvements with the USFWS. Plans to improve tiger beetle and pollinator habitat on the Grays Woods Preserve property were put on hold due to the Corona virus crisis. The USFWS was not permitted to work in March while the ground was still frozen but have indicated they would be happy to do those improvements in the late winter of 2021.

The following pages include color photographs documenting the habitat restoration activities and monitoring events.



Typical view of wild blue lupine habitat improvement area prior to restoration activities



Typical view of skid steer performing habitat improvements



Typical view of wild blue lupine habitat after habitat improvements



Typical view of emerging wild blue lupine in late April



Typical view of flowering wild blue lupine in early June



Typical view of fruiting wild blue lupine in late June



Typical view of restoration activities in the pink lady's slipper area



Typical view of flowering pink lady's slipper in late May

# Appendix L

Memorandum: Habitat Improvements, Gray's Woods Preserve (2020)

## MEMORANDUM

**To:** Nicole Ranalli (USFWS)

**Date:** December 15, 2020

**RE:** Habitat Improvements, Gray's Woods Preserve

**From:** Joe Wilson (Wilson Ecological Consulting, LLC)

**CC:** Ken Soder (Patton Township)  
Mark Roberts (USFWS)  
Brandon Bleiler (USFWS)

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This *Memorandum* is to document the work performed earlier today by Mr. Brandon Bleiler of the U.S. Fish and Wildlife Service (USFWS), Partners for Fish and Wildlife Program at the Gray's Woods Preserve in Patton Township, Centre County, PA. Mr. Bleiler brought a commercial mulcher to the site and accompanied me and Mr. Ken Soder to a location along the south side of Heritage Trail Road where habitats for sensitive invertebrate wildlife species are known to exist (see attached map).

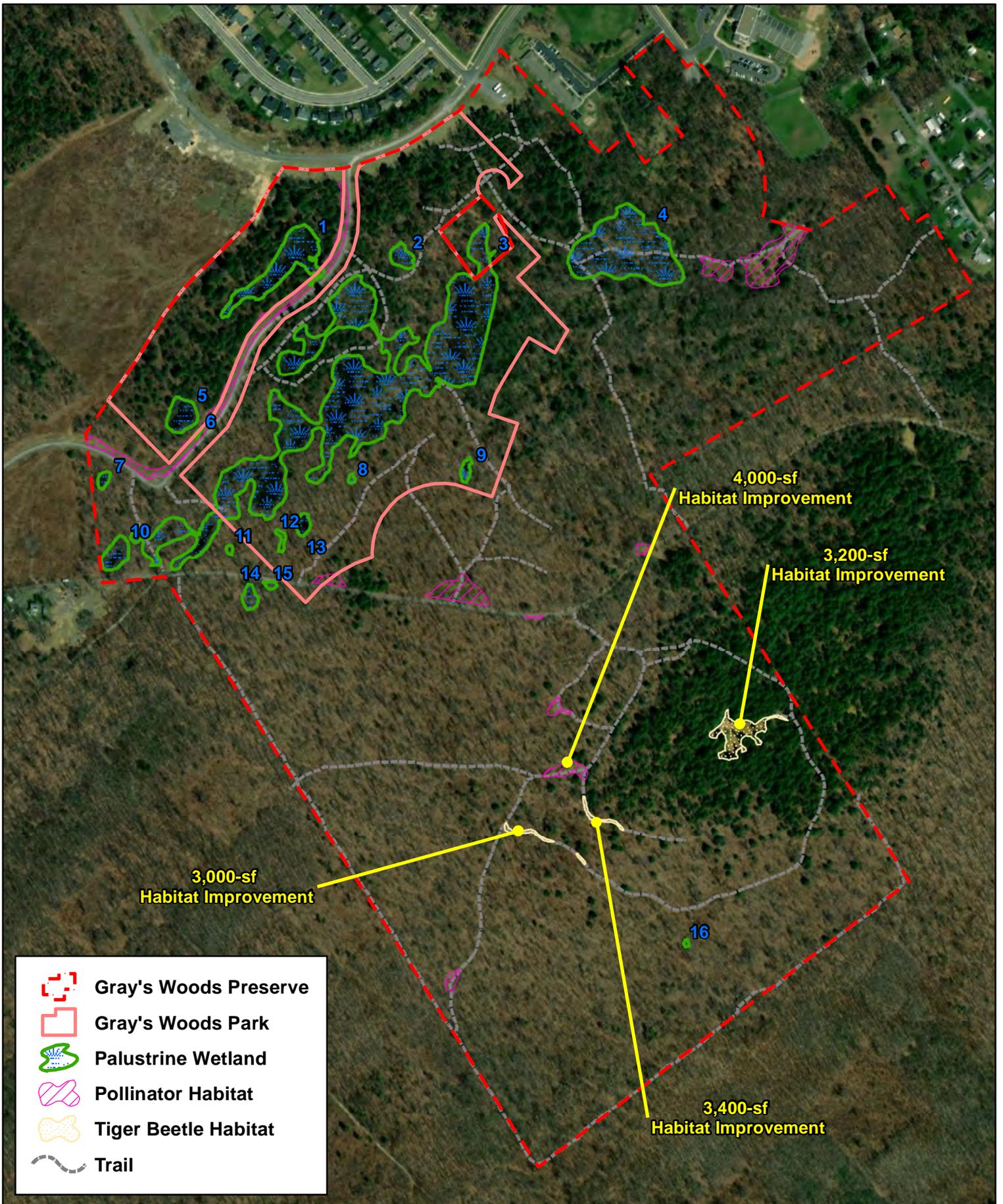
Three of these habitats are openings in sandy upland woodlands where four species of tiger beetles have been recently documented. Two of these tiger beetle species are considered rare in the Commonwealth of Pennsylvania and are tracked by the Pennsylvania Heritage Program. These three tiger beetle habitats are succumbing to natural succession and reducing in size annually. In an effort to improve habitat for tiger beetles, Mr. Bleiler removed woody vegetation and surface debris from a total area of approximately 0.22 acres of tiger beetle habitat. These efforts will allow for increased solar radiation to the sandy soils and provide a larger area of suitable habitat at each site. Furthermore, these actions should retard the rate of natural succession and reset the habitats to an early successional stage where woody shrubs and saplings are absent. Thus, it is expected these efforts should be recognizable for the next several growing seasons. Monitoring is planned to document the success of these efforts.

In addition to the tiger beetle habitat improvements, Mr. Bleiler removed woody vegetation in an approximately 0.09-acre pollinator habitat area. This pollinator habitat area is dominated by milkweed and goldenrods and is an important habitat for monarch butterflies, other lepidopterans, bees, and other flying insects. Over the past few years, the western edge of this habitat has become invaded by woody saplings and shrubs and the middle of the habitat is becoming overrun with blackberry canes. Removal of the competing woody vegetation will enhance herbaceous cover through increased solar radiation, soil moisture, and nutrients. Enhancing the herbaceous species in this woodland opening will be a tremendous benefit to the invertebrate wildlife that depend upon the flowers of these herbaceous species for their survival.

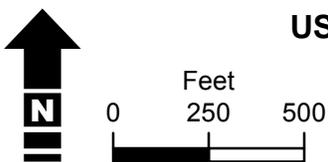
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On behalf of Patton Township and the Open Space Stewardship Committee, I would like to thank the USFWS for their efforts in organizing and conducting these activities. We look forward to working with you in the future on other projects.

Attached to this memorandum is the previously mentioned map and couple of color photographs of each site.



**USFWS HABITAT IMPROVEMENTS: GRAY'S WOODS PRESERVE**  
 Patton Township, Centre County, PA



**PATTON TOWNSHIP**

Map created December 15, 2020  
 Julian USGS Quadrangle



View of the 3,000-sf tiger beetle habitat improvement area



View of the 3,000-sf tiger beetle habitat improvement area

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View of the 3,400-sf tiger beetle habitat improvement area



View of the 3,400-sf tiger beetle habitat improvement area

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View of the 3,200-sf tiger beetle habitat improvement area



View of the 3,200-sf tiger beetle habitat improvement area

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View of the 4,000-sf pollinator habitat improvement area



View of the 4,000-sf pollinator habitat improvement area

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WOODS  
AND WATERS

CONSULTING

Conservation with Vision