

Preservation & Conservation of White's Woods Nature Center

**A Stewardship Plan
for White's Woods**

**First Public Draft
December 21, 2023**



Preservation & Conservation of White's Woods Nature Center

Adopted: _____

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Preservation & Conservation of White's Woods Nature Center



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Thank you to the subject matter experts who educated us during research and fact-finding to better understand the woods, managing a woodland, biodiversity, forest ecology, deer, ticks, insects, woodland composition, and invasive plants in White's Woods. They generously shared their knowledge and answered our questions. Knowledge gained from these experts was used in preparing this Stewardship Plan.

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A. Introduction

1. Executive Summary

In December 2021 the White Township Supervisors signed a resolution to create the White Township Stewardship Committee. This five-member committee was given the mission to develop a Stewardship Plan for White's Woods. Over the last 24 months, the Stewardship Committee has worked in good faith and transparently to develop this stewardship plan. White's Woods Nature Center is recognized as a special place in our community and the desire of this committee and the public is to see this woodland develop into an old growth forest. Our committee reviewed plans which support the recommendations on how to achieve this vision. The committee acknowledges that this is 'a living document' that will need to be reviewed, updated, and vetted with the public as new information, best practices, and up-to-date science becomes available.

The committee members are not professional foresters, biologists, or ecologist, but they all have the woodlands' and the community's best interests in mind in developing this plan. The information contained in this document is the result of hours of building rapport, having difficult discussions, recognizing shared common ground, learning from subject matter experts, engaging with the public, and conducting stewardship plan reviews. The committee is grateful for many contributions from the public, including the conveyance of relevant research and professionally-conducted WWNC inventories as well as assisting with building common ground.

The primary lessons learned from these documents echo those offered by committee consultants:

(1) protect the forest canopy; (2) focus on conservation, preservation, and protection; (3) control invasive plants; (4) relying on extensive collaboration with local environmental groups; (5) rely on extensive public engagement during implementation and any plan updates; and (6) establish routine monitoring of the forest. (See Appendix)

'Preservation' in this document is defined by this committee as protecting the nature center so that it will remain to a large degree in its natural state.

Many topics not covered in this document are worth exploring such as accessibility and outdoor equity, transit links and bicycle access to the entrance. Trail maintenance can be addressed with the conservation experts, Nature Center volunteers, and with the knowledgeable White Township maintenance staff. Future ways to fund the goals and objectives could be to establish a Foundation with a board to seek funds or partner with organizations for fundraising, seeking grants and/or recruiting volunteers.

It is through the efforts of this committee that we provide this Stewardship Plan for the protection, conservation, and preservation of White's Woods Nature Center.

2. History

a. Cultural History

Native American History

Many diverse tribes, while they disappeared from the area before European settlement, occupied the Indiana area, and specifically White's Woods. Although they developed agricultural products that remain in our diet today, the permanent alterations they made to the land were minimal.¹ While White's Woods looks very different than in prehistoric times, it remains more similar to that time than most other parts of Indiana.

Arrival of the colonists

Land ownership valued by Europeans drastically changed how land was treated. Colonists' domination over Native Americans often resulted from land disputes, and changed the nature of many natural areas, with timbering and land cultivation resulting in much more impact on the land

Ownership

Thomas White (1799-1866), for whom White Township was named, acquired over 1,000 acres of land, including that which is now WWNC. On it he built a home, a lodge intended for hired help, and a family burial vault. Among his many accomplishments, he was founder and first president of the Indiana County agricultural society, judge for Armstrong County, and a supporter of abolitionists and the underground railroad. His youngest son, Harry (1834-1920) became one of the largest land owners in the county. Upon his death, the land was split and sold to tenant farmers, corporations, and residents, with the largest purchase by R & P Coal; this piece eventually became most of WWNC.²

Original structures on the property included the Old Stone House, the White Family burial plot, various tenant buildings, and until the early 1900s a sandstone quarry. During that period, fields and pastures were used by tenant farmers. Soil quality deteriorated due to erosion, lack of crop rotation, and overgrazing, which destroyed many native plants. Eventually the land became better suited for forest than for farming.

An aerial photo from 1938 shows: a central upland comprised of young forest; the eastern slope that was mostly open with individual trees; the northeastern corner comprised of shrubland or young forest; the north-facing slope which was the area with the oldest trees. Most of White's Woods was cleared around 1800 or later, and had regrown by 1938.

In 1970, White Township finalized the paperwork for a state appropriation of \$50,000 to acquire land at a total cost of \$72,600, with the intention of using it as an open green space for a public park. In 1975, the park was designated as a nature center.³ In 1977, the township used 2½ acres cut off by a right of way from North 12th Street to establish the Fourth Ward Park. Indiana Recreation & Parks Department was given operational control.⁴

Cultural Significance

It is assumed that prehistoric peoples used the White's Woods land for foraging and hunting and possibly burning and farming too. As more European-type civilization developed in the area, the land offered several opportunities for employment. The White Family employed tenant farmers to work the land, which led to the building of a slaughter house. Eventually, stone was mined from quarries in White's Woods and used for many stone houses in the area. It is likely that timber was also harvested for use in the community.

As settlements developed in the area, White's Woods became Indiana's "near woods." It became the de facto community event center, and the venue for picnics, concerts, religious revivals, and dances. It became a learning laboratory for schools to teach students about nature, a refuge for solitude, and offered a diverse terrain for passive exercise and other activities. The cultural significance of WWNC is best captured a paragraph from the Community Interest Study conducted by Dr. Susan Boser's doctoral students:

"However, interviewees also spoke about the social connections fostered by these walks in the Nature Center. For example, one said that 'a lot of the people I now know as colleagues I actually met first in White's Woods.' The peace and quiet of the woods lends itself to developing these connections. One interviewee described it this way: 'There's something about walking along in the woods, not being able to hear anything because you are so isolated yet so in the center of a town in a busy part of the county, that it's just easy to become engaged in those conversations.' In essence, the nature of the woods and its presence where the township meets the borough supports development of social connections and community."⁵

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Supervisors' Actions

There have been several attempts by the supervisors to introduce significant changes in WWNC, most met with strong resistance from the public.

- In 1974, developer Richard Rinkus proposed an extension of 12th Street to access a housing development. The project was eventually completed, despite public protest. (Pennsylvania Department of Community Affairs' Bureau of Recreation and Conservation found that the use of White's Woods land for the road extension violated the provisions of Project 70 grant that funded the township's purchase of the land. Pa. DCA required the township to provide 2.5 acres of other land for recreation purposes to replace the land used for the road, and to reimburse \$143.50 of federal Project 70 funds used to originally acquire the land that became the right-of-way.) (Staff report, "Acreage Donated to Park: To Replace Severed Land," *The Indiana Gazette*, Oct. 24, 1974, page 1)

- In 1995, Jerry Kozusko, director of Indiana Area Recreation & Parks, proposed extensive development of WWNC, including a "Timber Cruise and Appraisal and Timber Sale Recommendations" by forester David Beale, in addition to major renovations to the park. After considerable public protest, the Supervisors conducted a mail ballot of the Township; with 62% opposing the plan, it was withdrawn.

- In 2006, the supervisors directed the township manager to contact foresters regarding selective timbering. In April 2007, forester David Babyak submitted a "Forest Stewardship Management Plan," which recommended removing "damaged, suppressed and over mature" trees. In 2008, Pennsylvania Department of Conservation and Natural Resources (DCNR) ruled that the plan did not comply with Project 70 requirements.

- In May 2019, the supervisors contracted for Millstone Land Management to develop a "woodlot management program for all White Township owned properties." In September, the supervisors instructed Millstone to prepare bid specifications of management of invasive species and timber on all Township woodlots. In March 2020, Millstone was authorized to begin work on a 50-acre tract in WWNC. After the public became aware of the plan, FWW submitted the plan to DCNR, which instructed the township to develop a comprehensive stewardship plan for WWNC.

- In December 2021, the supervisors appointed a 5-member White Township Stewardship Committee to conduct research, community engagement and write a stewardship plan for all White Township properties. The committee has been working for 24 months and has completed this Stewardship Plan for White's Woods.

- Over this same time frame, the supervisors discussed hunting on township properties. Most recently, they began to discuss a controlled archery hunt in WWNC in June 2021. A hunt was announced for 2022-23. Initially, it was planned for the "second season," beginning in late December 2022; however, in September 2022, hunting was announced to begin in October. In response to public confusion, the plan was withdrawn.

b. Project 70

The Pennsylvania Department of Forests and Waters (predecessor agency to DCNR) provided a grant for the permanent protection of White's Woods under the Project 70 Act in 1970. The objective of this program was to preserve Pennsylvania's scenic and recreation areas before they were permanently lost to competing land uses. Project 70 funds were particularly targeted toward urban areas with a population of at least 25,000 people and counties that had little public land available for recreational use. The land that became White's Woods Nature Center qualified on both counts.

Most of the parks in Indiana County were funded by Project 70, including Yellow Creek State Park, parts of Blue Spruce Park, and Hemlock Lake (with Project 70 as well as federal funding).

The original Project 70 grant application was filed by the since-dissolved Indiana County Recreation Board that included representation from the Indiana Borough, the Indiana regional school district, and White Township. This recreation board laid out a master recreation plan for the Indiana region that includes neighborhood parks, areas for organized sports, and the 248.52-acre WWNC that was designated as a regional park that is to remain as a forest, largely in its natural state, would be ideal for passive recreation.⁶

The entrance of White's Woods still displays the plaque acknowledging that this community forest, dedicated to serve the Indiana region, was made possible by the support of DCNR and the federal Land and Water Conservation fund.

The Indiana Recreation Board managed White's Woods until the board was dissolved. White Township then took over management. White Township is listed on the various White's Woods deeds.

The text of the Pennsylvania Land Acquisition and Borrowing Act of 1964 is shown in [Appendix \(A\)\(2\)\(b\)\(i\)](#).

Documents related to White Township's application for a Project 70 grant in 1965 are shown in [Appendix \(A\)\(2\)\(b\)\(ii\)](#).

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3. Stewardship Committee Mission

At the direction of the White Township Board of Supervisors, the White Township Stewardship Committee was provided this updated mission:

The panel is being asked to first complete the three phases of the project and produce a stewardship plan that will oversee and protect White's Woods using best practices and expert recommendations. The panel then would study and complete a stewardship plan for White Township Recreation Complex, Kennedy-King Park, Getty Heights Park, Fourth Ward Park and the White Township Municipal Center in what remains of the 18-month timeline for the committee. (The board of supervisors has extended the committee's mission to Dec. 31, 2023.)

The three phases refer to an original mission that included these phases:

- 6 months of research and factfinding
- 6 months of community engagement
- 6 months of writing the stewardship plan

a. Subject Matter Expert Review

The committee spoke with 10 experts with diverse areas of expertise to learn about best practices for managing a natural area such as WWNC, and reviewed various stewardship plans for possible relevant content.

There is a universal agreement among the experts that the greatest priority over the next decade is the need to establish an understory canopy that will allow forest succession to carry out its natural process while being monitored. Management strategies identified include increasing biodiversity by promoting native plant regeneration, controlling deer browse with means such as enclosure fencing, and manual removal of invasive plants. These are expected to allow the understory to develop more naturally and be resilient to events in the woods. In addition, their overall consensus is that the heterogenous, diverse and healthy canopy (overstory) needs to be protected.

This minimally disruptive management strategy may allow this second growth forest to mature to old growth. Registration of White's Woods in the Old Growth Forest Network would provide an additional layer of protection and bring multiple benefits to the Township. Future management should be grounded in collecting ecosystem data, including extensive inventories, to monitor the biodiversity, health of the forest and protect its habitat. Finally, the experts agree that WWNC affords numerous benefits to the community's environment, specifically it: absorbs 200,000 gallons of stormwater run-off annually; removes over 17,000 of pollutants annually; mediates regional temperatures; currently stores 27,688 tons of carbon, helping to mitigate climate change.⁷ WWNC has also been recognized by these experts as being an important resource to Indiana County residents and beyond by providing a natural space for exercise, mental health benefits, and educational opportunities.

In summary, the key points from committee consultants were to:

- Protect the canopy;
- Establish a resilient understory that will help succession to proceed;
- Evaluate the resiliency of the woods;
- Address invasive plants by least intrusive means;
- Address deer browse;
- Consider joining the Old Growth Forest Network; and
- Protect the ecosystem services provided by WWNC.

b. Public Input

Public interest in the management of WWNC has been robust since its acquisition in 1970. On every occasion that there appeared to be a threat to WWNC and/or the public was asked to give their opinion, the response was enthusiastic and the opinion consistent: leave WWNC alone; don't timber (either clear cut or selectively); don't build pavilions or amphitheaters. Keep it as a natural refuge for the users to enjoy in peace and solitude.

When it was discovered that trees were marked for timbering in April 2020, the public signed petitions, completed at least two surveys, sent emails and letters to the supervisors and to DCNR, and published letters to the editor. Dr. Susan Boser, whose doctoral students conducted a public opinion survey, informed the committee that everyone who has wanted to voice an opinion has had ample opportunity to do so.

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Survey Results Discussion: Review Key Takeaways

Since 1974, public input about White's Woods has included numerous surveys, which were reviewed and discussed by the Stewardship Committee during their meetings. Surveys were conducted by Friends of White's Woods (3), Dr. Susan Boser's graduate sociology class, and the Indiana Gazette. (Additionally, numerous letters to the township, letters to the editor, and petitions document the public's position on White's Woods.)

The summary of the findings of the most recent surveys, as statements of consensus/majority or as numerical/percentage, follow:

June 23, 2022

White's Woods Community Interest Study- conducted by Dr. Boser's IUP graduate sociology course in partnership with FWW.

Jones, Fetzer, Patterson, Agbere, Alqahtani, Boser

Woods use: exercise, social meetings

Mean age 53 – 60%F, 40%M ratio, n=289, 185 to 289 individual question responses and 8 personal interviews

Mean distance to WW, 7 miles

Respondents were sourced via FWW mailing lists and community partner organizations

30% use woods less than once per year, 39% monthly or less, 26% weekly

67% opposed timbering

68-70% project negative ecosystem impacts from timbering 70% believe Woods plays a role in stormwater mgmt.

82% to 89% say important for wildlife, air quality

51% concerned about hunting safety, 57% oppose hunting Anecdotal claim that deer are a problem; no percentage given

70% were not concerned about e-bike use

73% like trail system as-is

Majority feel it has positive impact to local economy and is historically important

Jun 3-Jul 16, 2020

White's Woods Use Survey – conducted by FWW using Survey monkey

n=229 respondents, 52% lived in White Twp, 32% in Indiana Boro

0% have never been there

58% used woods 2+ times/mon.; 42% monthly or less Woods uses: hiking, social, health, dog walking, exercise 52% want better trail signage

98% want natural area / preserve 90%+ happy with trails

59% want more trail maintenance 61% want restroom facilities 68% want better parking

78% say don't add more structures

70% would pick up litter, 51% would help clear trails

Possible enhancements to White's Woods Better signage/Trail maps

Vegetation signage and wildlife info signs Historical markers

Beautify gas well with wildflowers and other plantings Benches

Remove obstacles in trails (roots, logs, bushes) Picnic tables

Reduce deer grazing

Select Comments pertinent to the development of Stewardship Plan Remove invasives

Create a science-based management plan with the community and experts involved (conservation biologists and ecologists)

Citizen involvement and committee to make management decisions Mental, spiritual, physical well-being

No Timbering

Minor Maintenance – cut opening in felled tree, remove trees that may hurt others Remove Litter

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Public Input Data Regarding White's Woods 1974-2022

The public has been actively interested in all aspects of WWNC management throughout its history. A compilation of early public input is shown in [Appendix \(A\)\(3\)\(b\)\(i\)](#)

The survey questions appear in [Appendix \(A\)\(3\)\(b\)\(ii\)](#)

References:

⁵ Jones, A.; Fetzer, J.; Patterson, R.; Agbere, N.; and Alqahtani, A. "White's Woods Community Interest Study: Final Report," June 2022

Patrick, Kevin, "Near Woods: A Year in an Allegheny Forest," 2023.

^{1, 2, 4} Stephenson, Richard S. "An Introduction to the Human History of White's Woods Nature Center," 1977.

^{3, 6} White Township, Project 70 Land Acquisition Assistance Grant Application. August 1965. [[See Appendix \(A\)\(2\)\(b\)\(ii\).](#)]

⁷ Davey Tree Expert Company, "Estimates of Your Tree Benefits: White's Woods Nature Center." 2020 [[See Appendix \(A\)\(3\)\(a\).](#)]

B. Mission Statement

The committee adopted the phrase "Preservation & Conservation of the White's Woods Nature Center" as the mission of the stewardship plan.

From the [minutes of the committee's meeting of May 18, 2023](#): On a motion by Mr. Geesey seconded by Mr. Dahlheimer, and following brief discussion, the committee voted (4-0) to adopt the phrase as the committee's mission statement.



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C. Goals and Objectives

Goals and Objectives for WWNC stewardship are outlined below. Goals should reflect overarching and community-based priorities, while objectives are more specific, measurable, achievable, relevant, and time-bound (“SMART”) actions that contribute to achieving those goals.

In the text below, goals are outlined in bold with objectives identified as sub-points for each goal.

1. Uphold Project 70 Commitments and Goals

- a) Ensure that the WWNC Stewardship Plan recommendations support and promote recreation, conservation, and historical preservation of WWNC;
- b) Ensure that the WWNC Stewardship Plan recommendations protect the natural state of the land for the “health, prosperity, and general welfare of the people of Pennsylvania;”

2. Foster Collaboration and Community Engagement

- a) Management should be rooted in public input;
- b) Management decisions should be supported by ecology subject matter experts as well as those familiar with Project 70 (DCNR) to ensure transparency and foster trust with the public;
- c) Engage in and continue partnerships with local communities, conservation organizations, and relevant agencies to ensure collaborative decision-making and effective implementation of the stewardship plan;
- d) Include community members through workshops, public forums, volunteering, and outreach events to gather input, share progress, and promote a sense of ownership and pride in the community forested park;

3. Maintain and Enhance Ecosystem Health and Biodiversity

- a) Identify, monitor, and protect critical habitats and at-risk species;
- b) Identify, manage, and monitor invasive species;
- c) Support existing natural forest processes;
- d) Do not cut or remove trees from WWNC¹;
- e) Protect the canopy;
- f) Seek opportunities to diversify forest understory;
- g) Prioritize passive management activities above active management;
- h) Only engage in management practices that are compatible with preservation goals and limit negative impacts to ecosystem health;
- i) Develop partnerships with conservation organizations and/or programs to ensure the protection and preservation of WWNC as well as to stay informed regarding best management practices, developing research, and funding opportunities; and
- j) Develop and maintain relationships with Subject Matter Experts, particularly forest ecologists, to ensure the protection and preservation of WWNC as well as to stay informed regarding best management practices, developing research, and funding opportunities.

Footnote:

¹. There may be extremely rare cases when a tree may need to be disturbed, cut, or removed from WWNC if it poses imminent danger to park visitors or ecological surroundings. No downed wood should leave the WWNC, but rather be moved away from a trail to support habitat and provide other ecological benefits. Trees should not be removed from WWNC for any economic gain. If there is concern about the spread of insects or diseases in trees, WT should work with recommended forest ecologists prior to any proposed management. Similarly, if trees may need to be removed due to trail maintenance, the township should work with forest ecologists, and soil and erosion experts. Any proposed management of trees in WWNC should be discussed in advance with the public, including a recommended Nature Center Stewards Committee, and performed in consultation with forest ecologists and other subject matter experts (SMEs).

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4. Prioritize Watershed Protection and Quality

- a) Implement measures to protect water quality by minimizing soil erosion, maintaining riparian buffers (stream buffers), and ensuring sustainable water management practices within the forest; and
- b) Collaborate with local stakeholders and agencies (such as the Indiana County Conservation District, Indiana Borough, Department of Environmental Protection, Indiana County Stormwater Education Partnership (SEP), Evergreen Conservancy) to ensure that forest management practices align with watershed protection goals and support the health of aquatic ecosystems as well as those that rely on this resource.

5. Promote Recreation and Education

- a) Support diverse recreation activities that are compatible with preservation goals and limit negative impacts to ecosystem health;
- b) Maintain and improve trail systems while minimizing adverse impacts to the forest;
- c) Develop educational programs to promote environmental awareness, foster a deeper connection to nature, and provide opportunities for the community to learn about the woods; and
- d) Increase outdoor equality in the community by exploring opportunities for ADA accessibility.

6. Improve WWNC's Climate Resiliency

- a) Keep the 248.52-acre WWNC forest intact to maximize: stormwater management, temperature mitigation, and carbon sequestration;
- b) Enhance the forest's capacity to sequester carbon by supporting the growth of diverse tree species, maximizing forest density, and protecting against disturbances that release stored carbon;
- c) Establish monitoring of native, at-risk, endangered, and invasive species to determine impacts and trends that may result from climate change;
- d) Improve pedestrian, mass transit, and bicycle access to WWNC; and
- e) Engage in carbon sequestration programs as appropriate.



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D. White's Woods Nature Center (WWNC) Documentation

Included in this Stewardship Plan are Park Map, Habitat Map, Soils Map, a Wildflower Map, Pennsylvania Natural Diversity Inventory (PNDI), Indiana County Natural Heritage Inventory (NHI) and Invasive Species Mapping and Management Report. This section features descriptions of the maps that are available for WWNC. The maps and inventories are located in Appendix D.

1. The park map shows the extent of the property. Other maps can be used for determining areas of special interest because of the abundance of diverse species located in these areas of WWNC.

a. Park Maps show special features of WWNC including topography, streams, trails, utility line location and park boundary. A large version of this map is posted at the 12th Street entrance of the park and within the park to help visitors orient themselves in the space and to navigate to the next place to visit. A similar map shows the park boundaries drawn by Botsford Surveying Inc. [See Appendices [\(D\)\(1\)\(a\)\(i\)](#) and [\(D\)\(1\)\(a\)\(ii\)](#).]

b. Habitat Map was commissioned by FWW for Marion Holmes, Ph.D. to create this map showing the five different habitat areas within WWNC. This map was created by mapping the intersection of the soils, solar orientation and observed plant life in each area. The map and its accompanying description of the habitat areas can be used for researching the health of the woods based on plant communities, searching for at-risk species that are likely to be found in each habitat area, and if replanting is desired, knowledge of plants native to that each habitat community. [See Appendices [\(D\)\(1\)\(b\)\(i\)](#) and [\(D\)\(1\)\(b\)\(ii\)](#).]

c. A wildflower map was created by Cindy Rogers in 2000. This map shows the locations of wildflower she observed and identified while walking the trails that year. More recently wildflowers have not been found in these locations. Possibly some of the plants have been browsed by deer and are no longer in these areas. The wildflowers are identified both by common names and scientific names. [See Appendices [\(D\)\(1\)\(c\)\(i\)](#) and [\(D\)\(1\)\(c\)\(ii\)](#).]

d. Soils Map was compiled using the Web Soil Survey. The entire report identifies the types of soils found in White's Woods. These maps are used by landowners and conservation groups to help understand, protect and enhance the site using this information for how plants and animals may grow on the various soils. It is recommended that on site observations verify the information in this map. [See Appendix [\(D\)\(1\)\(d\)](#).]

e. Soils and Slopes Map and accompanying legend were created by rendering the Soils maps to show areas of similar slopes. The areas with the gentlest slopes are colored the lightest colors (yellow and light green). Areas that have the steepest slopes are colored in the darkest shades (dark green and blue). Having this visual distinction allows the observer to see slope patterns more easily within the woods. As with the Soils map it is recommended that site observations verify the information on this map. [See Appendices [\(D\)\(1\)\(e\)\(i\)](#) and [\(D\)\(1\)\(e\)\(ii\)](#).]

f. Native Plants List, an inventory prepared for WWNC by Sara Kuebbing and Marion Holmes in October 2021. [See Appendix [\(D\)\(1\)\(f\)](#).]

2. PNDI Environmental Review tool is accessed online (https://www.gis.dcnr.state.pa.us/PNDI/PNDI_HowTo.pdf) through the Pennsylvania Natural Heritage Program in partnership with DCNR, the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission and the Western Pennsylvania Conservancy in cooperation with the US Fish and Wildlife Service. There is a fee for generating this inventory of conservation information for planning purposes and identifies threatened, endangered and species of special concern located on properties. This draft PNDI was gathered by the stewardship committee chair conducted at the behest of White Township in May 2023. Both DCNR and the U.S. Fish and Wildlife Service provided information about protected, vulnerable, and at-risk species in WWNC. Information from the 2023 PNDI is cited in the plan section addressing at-risk species. [See Appendix [\(D\)\(2\)](#).]

3. Indiana County NHI 2021 updated was prepared for the Southwestern Pennsylvania Commission by the Pennsylvania Natural Heritage Program. This inventory is for the 43-acre Natural Heritage Area in WWNC. The White's Woods section is included in the [Appendix \(D\)\(3\), Page 12](#), and is accurate as of the time of this printing. To review the most current version of this NHI, please visit https://www.naturalheritage.state.pa.us/CNAI_PDFs/Indiana_NHI_2021.pdf. Information from the Indiana County Natural Heritage Inventory is cited in the plan section addressing at-risk species. [See [Appendix \(D\)\(3\)](#).]

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4. Invasive Species Mapping and Management Report for WWNC 2021 was conducted by Sara Kuebbing, Ph.D. and Marion Holmes, Ph.D. for FWW in cooperation with White Township. The map shows the current locations and approximate quantities of the invasives species they found in White's Woods. Dr. Holmes has been in WWNC since then to collect additional data and offer additional observations. This is the most comprehensive accounting of the invasive species there is for WWNC and is an excellent resource to preparing to manage the invasive species located here. [\[See Appendix \(D\)\(4\).\]](#)



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E. Management Philosophy

1. Natural Areas

WWNC is a mostly forested land, interrupted only by a few power lines including utility right of way (ROW), shallow gas production, and utility vehicle access dirt paths. This land is nestled between residential property land and is contiguous with the Indiana University of Pennsylvania's 280-acre CO-OP Recreation Park, which is composed of more woodland and fields. In 1970, WWNC was designated to serve as a natural area park for the citizens of the Indiana Region under Project 70. As a result, WWNC has since been used primarily for "passive recreation" and has remained "largely in its natural state". The conservation and preservation of WWNC requires the acknowledgement that it is both a community park and forest – with interlocking ecosystems, important flora and fauna, and vulnerabilities to climate, environmental, and human-induced impacts. The true value of a preserved and protected natural forested area is evident within the Indiana Region; the park is visited by passive recreationalists year-round and local community organizations (such as FWW) have been active for decades, promoting the conservation of WWNC.

As such, management and stewardship strategies proposed for WWNC should implement natural area best practices recommended by Subject Matter Experts, adhere to Project 70 guidelines, engage public input, and be reviewed and approved by DCNR. All management strategies should support the goals and objectives for WWNC, established through public input and outlined in this document.

2. Management Types/Challenges in White's Woods

WWNC faces complex challenges and emerging risks that make a completely "hands off" approach ill-suited for its long-term preservation and conservation. Some of these challenges and emerging risks include: invasive species, climate change, severe wind/weather/drought events, herbivory (deer browse), diseases and pests, and even fire risk. Aerial imagery from 1938 (reviewed and reported on by Dr. Holmes) indicate that trees on the North-facing slope of WWNC were old and established at that time and have remained in place. However, all other sections of the forest have been timbered within the last 150 years. Overall, WWNC is considered a primarily even-aged forest due to its history of timber harvesting in the early 1900's and again in the 1940s or '50s. While the resulting overstory has been identified as healthy, deer over-browse in the understory is reducing some native plants and increasing the ability for invasive species to grow. There are additional factors that are known to be transforming forests in Pennsylvania (such as climate change, suppression of wildfires, light, and more). Supporting the biodiversity in WWNC where possible is recommended to increase forest resiliency and adaptability.

Forest management is often described in two different categories: passive and active management.

- o Strictly passive management is a hands-off approach that assumes natural processes will drive the development of forest ecosystems without human intervention.
- o Active management is the deliberate human intervention and application of practices to achieve desired outcomes or products in a forest system.

For WWNC, choosing aspects of each of these management strategies that best support natural forest processes is necessary to optimize the conservation, ecological, and societal values while also mitigating potential risks to the forest's long-term health. Implementing engaged passive management strategies is recommended for WWNC. This management prioritizes minimal, non-invasive human intervention when appropriate to promote forest health and emphasizes the importance of natural processes in shaping and maintaining forest ecosystems.

Supported activities could include:

1. establishing protected areas
2. installing deer exclusion fencing
3. monitoring and research
4. protection of at-risk species
5. low-impact invasive species removal
6. education and outreach
7. trail maintenance and improvements
8. and other related activities.

An adaptive decision-making approach will allow for flexibility and adjustment in response to changing conditions and new information.

Note: Management strategies should: have limited impacts to existing passive recreation, protect the overstory canopy, leave the land "largely in its natural state", and support the goals and objectives for WWNC, previously established

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through public input and outlined in this document.

3. Engagement

Engagement has been a cornerstone of the Stewardship Committee's process to create this plan. This process is supported by Goal 1. Subject matter experts (SMEs) were engaged to understand the woods, the processes that take place, and how to best manage for them. Meetings that were open and well attended by the public. The committee participated in engagement events like the Northern Appalachian Folk Festival and presented to various community groups about the Stewardship Committee's Work and the development of this plan.

The committee's diverse engagement helped to garner trust and input from various experts and a variety of stakeholders. This process has been valuable providing a safe platform for all parties to share their thoughts and viewpoints and in developing a rapport with all parties in the community and with the supervisors.

Engagement, this committee believes, needs to be a continuing part of the implementation of this management plan for the township. Engagement with both experts and the community revealed steps for implementing this management plan into the future.

Through public engagement it was learned how those who frequent the woods use it, that climate change is an important consideration, that many people find solace walking and being in the woods and that it is an important place for recreation, including walking, hiking, running, and mountain biking. Overall engagement has taught us that there is a strong desire from many engaged that the woods should be managed towards becoming an old growth forest.

As the woods, our region, the climate, and community needs change, engagement should be part of a two-way process of ongoing education on what it means to care for and manage a community woodland.

White's Woods is a beloved community asset for many while others in the community have yet to experience it. Any management of this space will need to engage a wide range of stakeholders. In the past there was a lack of transparency on the management of the woodland. To retain the trust of the public, having community discussions about the woodland is necessary. The management of the woodland and engaging the public with a facilitator is not a no-cost endeavor but an important one. Funds for such may come from the township or an interested group may be willing to fundraise for these experiences.

Recommendations:

1. In addition to the open township supervisor meetings, management of White's Woods should be part of a community discussion with the public including interested folks like FWW, neighbors, stakeholders, and other residents of the township. Perhaps this could take place with the establishment of an oversight committee, which would include conservation groups. Additional meetings to discuss topics could be included quarterly during the Recreation Board meetings.
2. It may be advantageous for the township to have a community discussion with a facilitator present to lead the discussion of the implementation of this Stewardship Plan. Possibly Penn State Extension or other facilitation organization could assist.
3. The township has a contact list of residents interested in keeping abreast of township communications. Information about White's Woods could be included in this.
4. Keeping open communication and the community informed should take place continuously.

F. Forest Stewardship Plan

A healthy woods has young trees that replace the overstory when an opening in the canopy happens. The canopy layer has been identified as typical for this area by Holmes with a mix of tulip poplar, northern red oak, and red maple as the dominant species. There is no recommendation to change the canopy as canopy gaps happen naturally over time.

It is important to understand the number of seedlings that are present versus the number that should be. As noted by Drs. Kuebbing and Holmes, the composition of the saplings is less diverse and dominated by red maple with sweet birch and black cherry, a sapling layer composition that is now common in Pennsylvania forests. They noted that forest diversity at the sapling level would likely improve except for the deer browse and the lack of regeneration. SME's who have walked in the woods all mentioned the deer over browse.

It was noted by Forester Mike Wolf that the biggest problem in White's Woods is the lack understory vegetation so the questions he recommended to ask are "what is creating shade and what is feeding the deer." It is recommended that controlling CDL (Competing plants, Deer and Light) is the best approach to achieve the stewardship goals. The understory has invasive species which have been identified, mapped and need to be controlled, the deer management section has good recommendations, and the Canopy Gap section which addresses light that is a concern for invasive species growth but also for the regrowth of the understory layer within the canopy gaps.

WWNC has many utility rights of way and access routes within the woods which creates an abundance of edges providing good woodland habitat.

The woodland ground layer has been identified as healthy and uncompacted with the ability to absorb stormwater that reaches the ground.

Insects and diseases are present in the WWNC, but no need for management has been identified at this time. Beech Leaf Disease is a possible future concern, but no specific control measures have been identified at this time. Keeping in touch with forest ecologists as well as the DCNR service foresters is the best practice to be aware of possible issues.

Source:

Abrams, M., Sharp, B. & San Julian, G. (2003). Pennsylvania Forests Changing from Red Oak to Red Maple Dominated. Pennsylvania State University News. (Online at <https://www.psu.edu/news/agricultural-sciences/story/pennsylvania-forests-changing-red-oak-red-maple-dominated/>) [See Appendix (F).]

1. Canopy Protection

a. Maintaining and protecting current stand of trees

All committee consultants have confirmed that the White's Woods overstory is healthy.

Consultants have also explained that the canopy is diverse and is comparable to similar forests in our region. Fortunately, natural forest maturation processes will allow the overall canopy in White's Woods to thrive for another 200-400 years.

b. Canopy Openings and trees at risk of falling

In maturing forests such as White's Woods, most of the trees will continue to age, provide a tight canopy, and sequester large quantities of carbon. Even so, naturally-occurring canopy gaps, which are normal features of forest maturation, will occur.

A canopy gap occurs when a large tree, whose crown forms part of the forest's overstory, falls. A canopy tree's mortality is likely caused by wind, root damage, or disease. Wind has caused the loss of a handful of canopy trees in White's Woods this year.

Downed trees are a key component to a healthy forest: coarse woody debris is essential to the forest's ongoing maturation. Trees are as important to habitat when they are dead as when they are living, and their roles in forest health evolve as they undergo decay and deterioration. Standing dead wood, or snags, provide essential habitat for dozens of birds, mammals, reptile, and amphibians. Decaying trees host and nourish fungi, lichen, and insects, which themselves nourish birds and mammals. Insectivores drawn to downed wood help keep forest pests in check. Downed wood provides space for forest seedlings. Decaying wood is a principal source of forest nutrients for ongoing forest regeneration.

In ideal circumstances, the canopy gap creates increased light and moisture on the forest floor that allows for normal forest regeneration of both forbs and trees.

Consultants have indicated that the presence of both invasive plants and excessive deer- browse are likely to interfere with the normal forest regeneration processes made possible by the extra light provided to the forest floor by canopy gaps.

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Consultants have also reported the number of naturally-occurring canopy gaps in White's Woods are sufficient for normal forest maturation processes; however, they also stress that adequate management of invasive plants and deer-browse is critical in the event of a canopy opening.

Forest ecologist Dr. Mike Tyree assessed White's Woods canopy gaps and provided management recommendations. [\[See Appendix \(F\)\(1\)\(b\).\]](#)

Recommendations:

1. Leave all dead wood in the forest.
2. Clear fallen trees within four feet of a major trail.
3. Avoid use of heavy equipment to protect the forest floor and litter layer.
4. Cut large logs into manageable sections (e.g., 4-6 feet in length) so that they can be rolled away from the trail and into the immediate area
5. Leave the exposed root system and soil as is. It would be too difficult to move, it creates microhabitat, and eventually leads to a pit-and-mound topography (a characteristic of an aging forest).
6. Disperse smaller limbs in the same manner, preventing them from exceeding 3-4 feet in height, if possible, for aesthetic reasons. They will break down quickly and represent the source of most of the stored nutrients in trees. Again, only limbs within the 4-foot zone of a path need to be moved.
7. The part of the fallen tree that remains standing should be retained as habitat so long as it doesn't pose a safety risk. Dead standing trees are a natural part of the forest composition and should be saved when possible and can be reduced in height to reduce the risk.
8. Remove invasive plants in the newly-opened canopy gap. Again, no machinery is necessary for this. Volunteers who hand-pull or certified applicators can spot-spray herbicide to handle this. Evaluate the need to plant woody seedlings to influence the future plant composition. These plantings will need to be protected either by putting a single deer exclusion fence around the newly formed gap or protecting the planted trees individually until they are tall enough to be out of reach of deer browse (approximately 4' tall).
9. Modify the species composition in canopy gaps by carefully selecting the replacement plant species in these small forest gaps with assistance from knowledgeable experts.
10. Take advantage of the opportunity for outreach and education regarding forest ecosystems and the role of disturbance that is presented with a canopy gap. Research plots can be set up in these areas that can be used to inform future decisions about plant selection, fences, and invasive plant control. Examples of the types of treatments that could be positioned in these gaps are: (1) deer exclusion fencing; (2) invasive plant control; (3) fencing and invasive control, and (4) a do-nothing reference plot.

Dr. Tyree's full writeup of recommendations, sent to White Township on May 11, 2023, can be found in [Appendix \(F\)\(1\)\(b\).](#)

Goals: 1; 2 (a, b); 3 (a, b, c, d, e, f, g, j); 4 (a); 5 (c); 6 (a, b)

Risk Trees

As noted in detail in this plan's report concerning Canopy Gaps, dead trees are as important as living trees to forest ecosystems. In a forest, almost all dead trees are an advantage, rather than a risk. One of the greatest opportunities afforded by public access to a natural area is that human visitors can observe natural forest processes.

To this point, trees that have fallen in White's Woods have done so during heavy storms when hikers and walkers are not in the forest. Forest ecologist Dr. Tyree underscored that there was no way to predict the toppling of the last two big trees that fell in White's Woods and blocked trails. Big, old trees have a larger percentages of heartwood which makes them more durable, even as snags.

In the past, limbs or trees that have fallen across trails in White's Woods have been removed by park users who often alert White Township that they will be volunteering this service. When an exceptionally large tree has fallen across a trail, park users have contacted White Township staff who have removed the tree from the trail.

Many recommendations for addressing Risk Trees are consistent with those regarding Canopy Gaps.

Recommendations:

1. Leave all dead wood in the forest.
2. Clear fallen trees within four feet of a major trail.

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3. Avoid use of heavy equipment to protect the forest floor and litter layer.
4. Cut large logs into manageable sections (e.g., 4-6 feet in length) so that they can be rolled away from the trail and into the immediate area.
5. Urge Nature Center users to use common sense and stay out of the Nature Center when there are high winds or heavy storms.

Goals: 1; 2 (a, b,); 3 (a, c, d, f, g, j); 4 (a); 5 (a, b)

c. Insect/Disease

Insects provide vital ecosystem services to WWNC including: pollination, nutrient cycling, seed dispersal, as well as providing food sources for birds, bats, amphibians, and other wildlife.

The importance of insects in WWNC was highlighted by Dr. Ellen Yerger during her presentation to the Stewardship Committee when she stated that, "If you understand the insects, you can understand the ecosystem." The committee learned that insects are good indicators of forest health and ecological balance, because insects are often host specific (i.e., they rely on a specific and limited range of plant species for food). For example, spicebush swallowtail caterpillars will only eat spicebush plants, while the spicebush swallowtail adult butterfly will get nectar from almost any flower. This example highlights the importance of forest biodiversity in supporting the ecosystem. Changes in insect populations and diversity can offer insights into the following aspects of forest health:

- Biodiversity – a decline in insect diversity can be indicative of disturbances or imbalances within the ecosystem
- Pollution and Habitat Quality – some species of insects (caterpillars, bees, aquatic insects) are sensitive to environmental changes and pollutants
- Climate Change – shifts in insect distribution or seasonal activity can indicate impacts of climate change (warmer winters, extended growing seasons, changes in precipitation, and increased stress on native trees/plants, and more) on forest ecosystem
- Invasive Species – invasive insect species can disrupt native ecosystems (for example, the emerald ash borer causes death to ash trees – and warmer winters allow for these populations to expand and increased destructive impacts);

In WWNC, some native plant species that are critical to supporting insect life (such as the spicebush plant) are being severely browsed by deer. Additionally, when invasive plants take the place of native plant and wildflower species, this puts insects, and the animals that rely on those insect populations, at risk. Effects of climate change are already evident within White's Woods.

Impacts

Invasive insect species can have impacts on both forest and human health, in some cases exacerbating the spread of diseases in both contexts. Here are some of those impacts:

- Forest Health:
 - Tree mortality – infesting and killing trees (example: emerald ash borer);
 - Changes in forest composition – a loss of native plant/tree species may encourage non-natives to grow in their place;
 - Loss of ecosystem services – reduced carbon sequestration, wildlife habitat and water regulation;
- Human Health:
 - Transmission of vector-borne diseases – such as Lyme disease from blacklegged ticks or dengue fever/Zika virus from Asian tiger mosquitos; and
 - Changes in disease distribution and disease exposure – invasive insects can alter the geographic distribution of vector-borne disease, potentially causing increased disease exposure.

Insects – Ticks

Ticks species continue to be a growing concern in Pennsylvania. Dr. Thomas Simmons shared that the American Dog Tick, Lone Star Tick, and Blacklegged Tick are most prominent ticks that may be encountered in our region. Blacklegged Ticks are the vector for Lyme disease. Dr. Simmons emphasized the importance of the Blacklegged Tick's lifecycle in how they transmit Lyme disease. They have four life stages (egg, larva, nymph, and adult), two- year life cycles, and two overwintering periods. It is interesting to note that ticks only transmit Lyme disease after they have previously fed on an

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infected host (nymph stage and beyond).

However, hosts can be a broad range of mammals (mice, birds, deer, as well as humans and pets) and the risk of infection in our region is quite high.

Insects – Recommendations

The current native biodiversity already present in WWNC should be maintained.

Additionally, opportunities to improve native species biodiversity should be explored (protection from deer browse, removal of invasive plant species and possibly planting native species);

White Township should continue to urge park visitors to take personal measures to protect themselves from ticks including: avoidance of tick habitat (such as high grasses or shrubbery), physically protective clothing, regular tick checks and removal, applying natural and synthetic chemical repellents, and/or wearing permethrin-treated clothing.

Invasive shrubs, such as Japanese Barberry, are ideal habitat for ticks. It is recommended that White Township continue to take measures to remove Japanese Barberry with volunteer work sessions and other invasive species that also function as tick habitat.

With deer being a primary host for ticks, it may be appropriate to manage deer travel through WWNC through measures such as fencing.

White Township is encouraged to seek opportunities for monitoring insects, insect-dependent species, and host species in WWNC. Not only will this help monitor forest health and ecosystem balance and help to prevent invasive pest outbreaks, it could help inform community health practices. Monitoring could be accomplished by partnering with the IUP Biology Department on student projects and/or seeking grant opportunities to fund research in WWNC. Some organizations to explore for grant opportunities include, but are not limited to:

- U.S. Department of Agriculture (USDA), Forest Service – have various programs to support forest management and conservation efforts, including those related to monitoring;
- Environmental Protection Agency, Community Action for a Renewed Environment (CARE) Program – provides funding opportunities to address environmental concerns including those related to air and water quality, which can directly impact insect populations;
- National Fish and Wildlife Foundation (NFWF) – offers grant opportunities related to conservation, habitat restoration, and species monitoring;
- DCNR and other local/state agencies; and
- Nonprofit Organizations and Foundations – National Audubon Society, the Nature Conservancy.

Summary of Recommendations:

- Preserve native plant diversity already present in WWNC to protect insects and their habitat;
 - Avoid timbering and heavy machinery use to protect native species;
 - Reduce deer browse of insect-dependent species through the use of deer fencing and other methods;
- Reduce invasive species known to be ideal tick habitat;
- Work with community organizations, volunteers, as well as SMEs to remove and reduce invasive species;
- Monitor insects, insect-dependent species, and host species in WWNC to understand forest health, impacts of climate change, and prevention of invasive pest outbreaks; and
- Seek funding and grant opportunities that focus on ecosystem monitoring.

2. Promote Understory and Mid-Layer Growth and Biodiversity

a. Invasive Species Management

Invasive plants are defined by executive order as plants that are non-native to an ecosystem under consideration and causes or is likely to cause economic or environmental harm or harm to human health.

Invasive plants, if allowed to spread, present a threat to the health of any forest. Invasive plants, if left unchecked, may create a reduction in biodiversity, change ecosystem processes, and cause loss of habitat for both plant and wildlife species.

Numerous experts have provided input regarding invasive plants in White's Woods. Most notable among these are invasive-plant specialists Dr. Kuebbing and Dr. Holmes who completed an inventory of native and invasive plants in White's Woods in October 2021 [[See Appendix \(F\)\(2\)\(a\)\(i\)](#)]. Dr. Holmes has inventoried all of White's Woods additional times since and has walked the woods with township staff and citizens to point out her observations and to answer questions.

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IUP geology graduate student Joece Lynn has also been working on a project to inventory patches of Japanese barberry during the last year and has produced a map assessing the density of Japanese barberry in White's Woods. [\[See Appendix \(F\)\(2\)\(a\)\(ii\).\]](#)

Invasive Plants

Japanese barberry, Japanese stiltgrass, and tree of heaven are the three invasive plants in White's Woods identified by Kuebbing & Holmes as presenting the greatest threat to White's Woods at this time. These plants pose serious risk due to their capacity for densification and impact on nutrient cycling.

Nine additional invasive plants that have limited spread and/or limited potential for spread were identified in White's Woods in the 2021 Kuebbing and Holmes inventory and follow-up observation. [\[See Appendix \(F\)\(2\)\(a\)\(i\).\]](#) These species should be monitored for potential expansion and control while they are manageable.

In July 2023, FWW, working in concert with White Township Manager, Chris Anderson, began removing Japanese barberry from White's Woods. As of Dec. 1, 2023, eleven FWW volunteer workdays for this project have been completed. FWW has also submitted a detailed plan for invasive plant removal to White Township, including numerous Spring 2024 volunteer work days.

Invasive Plant Removal Plan

This plan emphasizes the importance of using least-intrusive means for forest management and that no management activity should interfere with conservation

An invasive species management plan requires a long-term commitment to ongoing stewardship. Forest ecology expertise is needed to identify invasive threats and identify native plants that require extra protection. Ecologist expertise is also needed to prioritize an invasive plant removal plan by threat, by geographic site or resource being threatened, and by individual plants. In White's Woods, for instance, the densest patch of Japanese barberry is identified as the patch that should be tackled last due to multiple complex concerns. [\[See Appendix \(F\)\(2\)\(a\).\]](#)

Allocation of resources is another concern. There are far more invasive plants than can ever be controlled. Extensive work by volunteers is important to the success of an invasive plant initiative.

The large, tree-less utility right-of-way that runs through White's Woods provides, by far, the largest entry-point for invasive plants. This area receives full sun and occasional traffic from utility vehicles. Invasive plants that become established in this right-of-way can be observed to be moving into the forest on every edge. Birds and animals are also a possible source of invasive plants through their droppings and carrying the seeds on the fur of animals.

Invasive plant control can be carried out using various methods: cultural, mechanical, biological and chemical. Numerous factors affect the selection of the best method.

1. Cultural control – makes the environment unsuitable to pests by using methods to enhance the growth of desirable plants and prevent the spread of undesirable plants. In White's Woods these control methods include Protection of the tree canopy which is the single most important action for reducing the growth of undesirable plants. Invasive plants thrive in high light. Methods to reduce the spread of undesirable plants include educating the neighbors, cleaning equipment and boots, minimizing disturbance and continuous monitoring. It is also critical to develop an invasive plant preventative plan to intercept new invasive species before they enter the forest. Prevention is much easier than removing an established invasive species.
2. Mechanical control – uses hand-pulling, mowing or machine removal
Minimal disturbance of WWNC is of utmost importance. No method of management should interfere with conservation. Hand-pulling of invasive plants is the least-intrusive option though it does cause some ground disturbance.
Kuebbing and Holmes indicate that the invasive plant problem in White's Woods is average or, perhaps, a little less than that now faced in other regional forests. But it is clear that the best time for action is now.
3. Biological control – uses natural pest controls (like the Mile-A-Minute Vine Weevil that eats the mile-a-minute vine). Release of pests that feed on certain invasives is done at the state level.
4. Chemical control – uses herbicides

There are risks of herbicide use (1) targeted invasives can develop resistance to it; and (2) There are risks to native plants, groundwater, animals, and humans if not handled properly. If herbicide use is decided, the label must be followed, it is the law. Herbicide use is required to be performed by certified professionals or with volunteers

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under the supervision of those certified. The DCNR-partner organization, weconserve.org, also observes that the exclusive use of herbicides alone is not likely to be an effective long-term solution for controlling invasives, in part because of timing since it can be difficult to apply the herbicide at the correct time in the plant lifecycle.

In their March 2021, letter to White Township, DCNR noted that the Bureau of Forestry recommended the use of herbicide only for spot treatment or cut-stump methods.

Invasive Plant Control Recommendations:

General:

1. Prioritize invasive plant removal, methods for removal, projected timeline, and future monitoring.
2. Seek further input from an experienced native and invasive plant specialist before proceeding with any removal of dense barberry along the Stephenson Trail because especially valuable native plants are abundant in this area of the forest. (See map.)
3. Removal and control/containment of invasive plants is a long-term, on-going task. FWW has developed a preliminary timeline to guide this work in their plan submission.

Cultural:

1. Protect the tree canopy.
2. Minimize Disturbance.
3. Work with experts to develop a Preventive Invasive Plant Plan that includes bi-annual monitoring of the WWNC's perimeter and by installing boot-brushes at major trail entries.
4. Investigate options for minimizing invasive plant entry via the utility right-of-way.
5. Monitor germination in this area and if needed consider doing follow-up planting of native shrubs and trees in those areas where dense patches of barberry are removed.
6. Monitor invasive plant containment/removal projects bi-annually by a trained forest ecologist. Identification of invasive plants known to be in White's Woods should be assessed annually. New invasive plants identified via the newly implemented preventative plan should be eliminated or contained as soon as possible.
7. Protect and encourage establishment of the native understory. Excessive deer browse can eliminate native plants that allows for the growth and spreading of invasives. Consider use of deer exclosure fencing, tree tubes and other means to encourage growth.

Mechanical:

1. Rely on least-intrusive methods of management.
2. Work collaboratively with the public on hand-pulling and other mechanical methods. Volunteer collaboration will be essential to the control of invasive plants in White's Woods.
3. Japanese barberry:
 - i. Prioritize the hand-removal of Japanese barberry as recommended by committee consultants in (1) the Natural Heritage Area and (2) the currently least-invaded areas (see map).
4. Japanese Stiltgrass:
 - i. Work with volunteers to hand-pull stiltgrass along the Spring Trail in the Natural Heritage Area (and other trails where the stiltgrass is spreading too rapidly) with the goal of preventing movement of this invasive into the forest interior.
 - ii. Control large patches along both exterior entry trails, Fleming and Fulton Run, and near gas wells. Follow expert recommendations regarding the timing of any mowing.

Biological:

1. Consult with DCNR Service Foresters and other professionals about possible Biological Controls that may be used.

Chemical:

1. Consider the "cut stump" method of treatment of Japanese Barberry in the dense patches of barberry at the southwest end of the Spring Trail and near the ridge-top near the gas well (see map).
2. Tree of heaven control should continue to rely on certified professionals to use the "hack and squirt" method to remove the remaining stems of Tree of heaven that are located mostly or entirely along the utility right of way and around the gas well with the largest "pad." Forester Wolf is already working on removing about a hundred mostly small stems of Tree of heaven in these areas.
3. Avoid herbicide use in recognized areas of ecological significance.

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4. Only certified professionals can administer herbicide on public lands or volunteers under the direct supervision of a certified professional.

Goals: 1; 2 (a, b, c, d); 3 (a, b, c, f, g, h, j); 5 (a, c)

Sources:

- Penn State Extension Webinar “Woods in Your Backyard” Invasive Species Section
- Duff Park public land management plans
- Okehocking Preserve public land management plans
- We Conserve Pa website. https://library.weconservepa.org/library_items/1403-Invasive-Species-Management-Program See also <https://library.weconservepa.org/guides/31-invasive-species-management-program>. [See Appendix (F)(2)(a)(iii), found online at https://conservationtools-production.s3.amazonaws.com/library_item_files/1403/1352/CT_InvasiveSpecies_151119.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIQFJLILYGVDR4AMQ%2F20231219%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20231219T133708Z&X-Amz-Expires=3600&X-Amz-SignedHeaders=host&X-Amz-Signature=be89fa24029609e4c6563d580bb037f67d213fb8613ec55d074bba08be214346]

b. Deer Management and Enclosures

As a part of the overall stewardship plan, the committee believes that White's Woods is similar to many other Pennsylvania wooded areas. Presently, there are several overarching concerns related to Whites Woods and its long-term longevity and vitality. The committee recognizes the purpose of any proposed deer management in WWNC should aim:

- 1). To reduce the effects of deer browsing on natural habitats.
- 2). To protect the health and safety of White Township residents and visitors by minimizing deer-related accidents and the risk of tickborne diseases (including Lyme disease).

These initiatives support both Goal 3 and Goal 4 outlined in the Goals and Objectives Section of this plan.

Specifically addressed in this section is the impact of the deer population on the Woods that is resulting in over browsing of seedlings, thereby prohibiting the seedlings growth to maturity. The white-tailed deer and vehicle collisions account for numerous accidents within the township as well as damaging homeowners' landscaping and gardens resulting in nuisance reports from neighboring landowners.

To be clear, the deer population competes for herbivorous foods that are also necessary for other native species such as rabbits, insects, mice, squirrels, and bird species. Smaller species (such as insects, mice, birds) in turn provide a food source for raptor species and small carnivores. These species include owls, hawks, bobcats, foxes, coyotes, and weasels, which, when in balance, increase overall wildlife diversity.

A brief historical perspective will establish several key concepts providing context to move forward with deer management as a part of the Stewardship Plan. Before the implementation of regulated hunting over a century ago, American settlers harvested deer in very high numbers while at the same time systematically exterminated their natural predators like wolves and mountain lions. These predators are having a resurgence now in our western states and are seen keeping deer numbers more controlled. To that point, in the absence of significant natural predators here in Pennsylvania, deer numbers have climbed to over 1.5 million despite hunters harvesting hundreds of thousands of deer per year in the state. Specifically, in the Wildlife Management Units that encompass Indiana County, over 60,000 deer have been taken annually.

In order to break this overpopulation cycle, interventions will need to be impactful in their design and implementation. That stated, the committee members have listened intently to testimony from local biologists that report a direct correlation between high white-tail deer populations and the significant increase in ticks. These high tick populations in White's Woods are certainly notable, as they are feeding on their mammalian hosts including the deer. The tick infestation, through their blood-sucking bites, can lead to subsequent negative health effects on people who are recreationally utilizing the Woods through the transmission of Lyme and other diseases (see Insects section).

The damage to the woods and its understory is continuing to deteriorate resulting in extensive understory blight and nonexistent regenerative growth. Without such growth opportunities, the understory will never be able to evolve into the midstory to keep the life cycle of the woods prospering.

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Recommendations:

As it stands, the stewardship committee recommends a transparent, long-term deer management plan led by the township, in cooperation with the Pennsylvania Game Commission as the premier authority and regulating body for wildlife in Pennsylvania. Distinctly under the Game Commissions jurisdiction is deer management and thereby the associated hunting regulations.

As of the time of writing this plan, the Game Commission has expanded Chronic Wasting Disease (CWD) Management Area (DMA) number 3, to include much of Indiana County and all of White Township. In concert with this expansion, the Game Commission has also, due to the finding of a CWD-positive deer along Fulton Run Road, adjacent to WWNC, along with evidence of over-abundant deer populations in White Township, established a new Deer Management Assistance Program (DMAP) area encompassing a large part of White Township and therein Whites Woods, in this new DMAP area [[See Appendix \(F\)\(2\)\(b\)\(i\)](#) for map of Unit # 6367] where an allocation of antlerless deer tags for the 2023-24 season is 402 permits.

It is the committee's determination that to maintain diverse and healthy natural habitats and wildlife in White's Woods, a multi-pronged approach could be developed.

However, there are factors specific to WWNC that must be considered when developing this approach. There is strong evidence to suggest that a recreational hunting program in WWNC would not aid in reaching the aforementioned desired goals. WWNC is a small and irregularly shaped area bounded on all sides by private, no-hunting properties. We have heard from many experts that deer would simply seek refuge in these surrounding areas in the event of a recreational hunt. A study comparing deer management methods completed by Cornell University over 10 years (2007-2017) concluded that "Neither sterilization nor recreational hunting reduced deer browse rates and neither appears able to achieve reductions in deer populations or their impacts." ¹

Additionally, deer management strategies should be rooted in public input – and there is strong and evident opposition to recreational hunting in WWNC, particularly as a means to improve forest health. We believe that working with adjacent property owners to cull additional deer on their properties would reduce the numbers of deer in White's Woods.

As such, the committee recommends the Township first pursue deer exclosures (fencing) to reduce deer browse in ecologically sensitive regions within WWNC. This method is widely accepted by members of the public invested in WWNC, can be implemented in targeted areas, and has evidence-based proof of regeneration (SMEs including Dr. Yerger, Mike Wolf, Mike Tyree, and others have all recommended deer exclosure fencing).

The subcommittee has been made aware of other deer management methodologies including non-lethal/passive strategies such as: fertility control, repellents and/or deterrent measures, and local bans on deer feeders in the nearby local community of Whites Woods. However, the success of these strategies is less certain.

Should the township feel the need to try to reduce deer populations for the benefit of forest and human health, the Stewardship Committee would suggest systematic deer culling (professional deer removal) within WWNC instead of recreational hunting methods. These specialized methods often require the least amount of time compared to other methods to reach reduced population goals. Prior to ANY action by White Township, these proposed methods must be socialized with the public. The committee believes that both baseline and post-culling population studies should be completed to measure success, however, we defer to the Pa. Game Commission and others for their recommendations.

Summary of Recommendations:

1. Establish a budget for and begin installation of a high-fence deer exclosure surrounding some of White's Woods, at least one full forested acre to start.
2. Continuously increase the area of the White's Woods deer exclosure as budgets allow.
3. Apply for grants and other aid to help support and properly maintain the deer exclosure.
4. Promote and post educational materials and signage for the public showcasing biodiversity and ecological health benefits of high-fence exclosures. Include information on Latham's Acre (SGL 30, McKean County, PA) as a model for a woodland without deer browsing which has been in existence since 1949.
5. Utilize local university researchers, forest ecologists, and government deer biologist expertise to establish estimates of deer numbers in White's Woods and from these assessments, develop goals for population control, if necessary for forest or human health. Ensure to monitor progress of any control measures implemented.
6. If above methods cannot achieve necessary and publicly supported deer management goals, elevate control measures to include the hire of an experienced, government-approved firm who specializes in sharp-shooting

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(culling) and removal of deer. Any deer harvested should be donated to local food banks.

References:

¹ Blosssey, "Red Oak Seedlings as Indicators of Deer Browse Pressure: Gauging the Outcome of Different White-Tailed Deer Management Approaches," *Ecology and Evolution*, Nov. 8, 2019 (Online at <https://onlinelibrary.wiley.com/doi/epdf/10.1002/ece3.5729>). [See Appendix (F)(2)(b)(iv).]

● A 27-page, in-depth guide, on "Community Deer Management" is produced and available from the Pa. Game Commission and can be found online at: <https://www.pgc.pa.gov/Wildlife/WildlifeSpecies/White-tailedDeer/Documents/Guide%20to%20Community%20Deer%20Management.pdf>

c. Biodiversity

Biodiversity of native species was highlighted by many experts as the best way to establish a resilient woodland. An abundance native plants ensures an abundance of seedlings may be available for regeneration of the forest, a wide amount of food for supporting native insects, birds and mammals, and of lesser importance, a way to attract more visitors into the woodland for interest through the seasons.

Consultants reported that White's Woods is a biodiverse forest as compared to others of its age and location. Local reports by IUP biology professors and local wildflower experts have reported that locations of wildflowers and ferns that used to be found no longer appear in the woods. Native plant growth, however, is being suppressed in part, due to the high populations of white-tailed deer. Invasive species are another factor in the decreased native biodiversity since invasive plants displace native plants or outcompete them and invasive pests have threatened native plants by weakening them and in some cases cause death of the plants/trees.

The committee recommends keeping apprised of threats to the trees in the woods, decrease the risks when possible and improve the health of the woods and protect it from threats. These initiatives are supported in Goal 2 and Goal 3.

Community input was received suggesting it is not necessary to have all possible plants in the woods for the woods to be enjoyed by most people. This is true but to maximize the resilience of the woods is a very desirable goal. To care for the woods to help it exist into the future in the best ways possible is required for a good Stewardship Plan.

Recommendations:

1. Investigate ways to control the deer-browse in the woods (see Consultant Recommendations, Canopy Gap Recommendations, and Deer Management Section);
2. Control invasive plants in the woods (see Invasive Plant Section);
3. Work with forest ecologists, independent natural area consultants, service foresters, and/or ecologists associated with IUP or other universities to review the plant biodiversity already in the woods. Also, work with the Western Pennsylvania Conservancy regarding the Natural Heritage Inventory, as well as other lists from local experts;
4. Consider planting native plants to replenish or enhance biodiversity. Review the recommendations provided in the Duff Park Stewardship Plan and the Okehocking Plan (see appendix) and other sources;
5. Request other recommendations on plant (tree, shrub and herbaceous) species that would typically be found in the woods that are not present and work to establish those species in the woods, including DNCR's list of deer-resistant plants.
6. Consider small deer exclosures around known locations of plants no longer seen in the woods to observe if the plants are succumbing to deer browse or other reasons.
7. Reach out to IUP and other universities as well as DCNR entomologists to pursue research on insect biodiversity.

d. Protect At-Risk Species/Species of Special Concern

At-risk and/or protected plant, amphibian, reptilian, and migratory bird species have been confirmed in White's Woods. It has also been confirmed that White's Woods is within the range of the Federally-protected Indiana Bat. Available inventories and records of species sightings and observations are listed below. Additionally, a list of 19 confirmed protected, at-risk, or vulnerable species identified in WWNC is found in [Appendix \(F\)\(2\)\(d\)](#).

It is important to note that a detailed inventory has been completed on only 43 acres of the 243 248.52 acres in White's Woods: It is possible, if not likely, that more at-risk or vulnerable species are in our community forest and more

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detailed recording is important going forward.

Definitions of terms and Natural Heritage Program general management recommendations regarding at-risk species are found in Appendix and recorded in the 2021 NHI.

White's Woods At-Risk Species Inventories and Records:

- Indiana County Natural Heritage Inventory (NHI), (2021).
- The Pennsylvania Natural Heritage Program. Pennsylvania Natural Diversity Inventory (PNDI) Draft for White's Woods (2023). DCNR & The U.S. Fish and Wildlife Service.
- Forest Bird Survey, Margaret Higbee, President, Todd Bird Club.
- Native Plant (Wildflower) List in White's Woods, Cindy Rogers, President, Evergreen Conservancy. Native Plant List in White's Woods, Dana Driscoll, Ph.D.
- At-risk Species Report Item, Ed Patterson, Director, Parks and Trails.
- iNaturalist, confirmed record of sightings in White's Woods.
- ebird, confirmed record of sightings of birds in White's Woods.

Recommendations:

The Subcommittee has five recommendations aimed to protect Federally-protected, at-risk, and vulnerable species. These recommendations are drawn from the PNDI and NHI inventories, as well as from DCNR in their 2021 letter to White Township:

1. Do not timber - or remove dead wood.
2. Control invasive plants. Protect the canopy.
3. With the help of citizen/scientists - monitor...keep track of how they are doing.
4. Be very careful with the use of herbicide.
5. Inventory and map ecologically sensitive or unique areas in the WWNC.

These recommendations are consistent with information provided by consultants to the White Township Stewardship Committee and with Stewardship Plan goals 1 (a, b), 3 (a, c, g, h, j), and 6 (a, b, c).

3. Watershed Protection and Stormwater Management

Stormwater is water from rain or melted snow that generally flows across a property or infiltrates into the ground. A woodland is a special environment. Because of the humus layer, infiltration is generally high and the process of interception where the water is captured by the leaves occurs. The trees and vegetation in White's Woods help with water infiltrating into the ground and in sunny areas the water evaporates, or it is transpired into the atmosphere from the respiration of the plants (sometimes called evapotranspiration). Most of the stormwater in White's Woods is intercepted or falls on the forest floor and is infiltrated through the ground layer.

In areas of mowed grass like the utility right-of-way or areas of compacted soils like on trails and gas well roads because of low vegetation or compacted soils, there is more runoff and sometimes erosion issues occur. This erosion can carry away soils and stone which creates rough and irregular walking and driving surfaces. Drainage features are needed in these areas to help dissipate the stormwater.

Forested watersheds are important sources of groundwater recharge for many areas. The waterways in White's Woods should be protected and any disturbance should avoid waterways. Water crossings should be on bridges that are securely anchored which allows for crossing with no erosion or sediment movement. Strongly discourage fording of or riding through streams to avoid sediment movement and erosion.

Riparian buffers are to be protected. These are the areas of trees and shrubs adjacent to the streams and springs in the woodland. In White's Woods, the areas are currently growing with trees and shrubs. Generally, a minimum riparian buffer of 20 feet will provide roots to hold the streambank but of course, a wider area is preferred to reduce sediment and other issues. The shade, leaves and sticks provided by the trees help the creatures in the stream. The cooler temperatures provided by the shade are needed for survival of micro and macro invertebrates and the leaves and sticks are food for the aquatic creatures. At least one of the streams has a known 'species of special concern' for Pennsylvania.

Spring seeps are natural water sources where fresh water from below the ground flows to the surface to form small streams or small bodies of water. Spring seeps can be found in White's Woods along hillsides where groundwater flows to the surface. These areas usually have a small, year-round source of fresh water. Spring seeps provide a variety of important

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benefits for wildlife.

The most important management practice for spring seeps is to protect them from any activities that could degrade the seep, such as removal of vegetation beside the seep. Options for enhancing the habitat associated with a spring seep include encouraging the growth of herbaceous vegetation around the seep's perimeter.

Temporary pools are wetland habitats that fill with water during a rainy season and then dry up later in the year. Most people consider temporary pools to be synonymous with vernal pools. "Vernal" means "of, relating to, or occurring in the spring," and these pools fill with water in the spring and dry up in the late summer or early fall. However, there are also autumnal pools, which fill with water in autumn. Temporary pools are found where small depressions and swales collect runoff or intercept seasonally high-water tables. It is unknown if White's Woods has any of these pools though they may be present in areas yet undiscovered.

A concern was raised by Indiana Borough if trees were removed there may be stormwater impacts in the borough. This is a concern even if trees are not removed as trees fall, die or are unable to absorb stormwater.

Possible Erosion Control Methods for Drainage Areas which are supported in Goal 4:

Grade Breaks are raised areas on a road or drainage channel that help divert stormwater on the surface. Water is directed to the sides of the roads where it can flow to a pipe or swale. Those can be added as needed along long roads or trails.

Underdrains can be used to help direct subsurface water or springs in areas of paths or roadways to help keep the water flowing and avoid water on the pathways.

There are other methods depending on the issues that need to be addressed.

Recommendations:

1. Maintain the forested land as the best stormwater management control.
2. Minimize any disturbance within 50 feet of the headwaters of both streams to avoid impacts.
3. Protect locations of spring seeps and any temporary pools with an area of no disturbance around it.
4. Monitoring the woods for dying or fallen trees that could cause erosion issues. Monitor especially after large storm events.
5. Investigations on ways to reduce erosion on the roadways and drainage ways be conducted and plans made to update the slopes and add diversion channels, underdrains or other best management practices. Consult with experts on best management.
6. Work with consultants and Indiana Borough to be sure of no impacts or to mitigate impacts from trees that fall from unexpected events. These may contribute to an increase in runoff.
7. Assess other drainage issues as they arise. Collaborate with local stakeholders and agencies (like the Indiana County Conservation District).

Sources:

Westmoreland Conservation District, A Guide to Improving Driveways & Access Lanes, 2021 Westmoreland Conservation District Videos, Improving Driveways & Access Lanes, 2020 Management Practices for Enhancing Wildlife Habitat from Penn State Extension

Best Management Practices for Water in the Forest from Penn State Extension Pa. Stormwater Best Management Practices Manual <http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=4673>



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G. Recreation Enhancement and Improvement Plan

1. Wayfinding/Signage

The existing trail system's markers and signage in White's Woods is in dire need of renovation. Presently, the wooden signs containing red and blue dot-patterned trail markers are ineffective for guidance. Trail name deciphering requires the user to cross-reference the pattern of dots with a key/legend which is found only on trail maps.

Consequently, alerting and guiding Emergency Medical Services personnel to a location is challenging due to the confusion caused by existing trail makers. For these reasons, all park users who are unfamiliar with the trail system, and even experienced users, are advised to carry either a map with the trail signage key, and/or a smartphone or smartwatch with GPS so that in the event of an emergency GPS coordinates can be passed along to dispatchers.

White's Woods Nature Center (WWNC) trail system has been mapped as recently as 2022 by IUP students, and pre-existing trails are named as indicated on the maps, which can be found in the Appendix of this plan and posted on the wooden bulletin boards at the parking area and in the woods. The stewardship committee advises that copies of paper maps be made available at the parking lot kiosk. These can be supplied to the public in permanently placed weatherproof acrylic holders commonly seen at other parks in the region.

The committee has been made aware of several variations of fiberglass trail markers (stakes, poles, arrows, etc.) which may be purchased from park supply distributors and manufacturers in color-coded designs which are long-lasting and environmentally friendly types of trailblazes. Some of these manufacturers also offer customization of their markers to include trail names. Those nature center users who carry a smartphone when they walk in the woods might want to take photographs of these map signs as they enter the woods and keep a cellular phone on their person in case of an emergency, and for general wayfinding. Should a user become lost they can use available maps on a smart phone to navigate back to the parking lot or a roadway, or ultimately to call for help if necessary. Most of the trails feature good cellular phone reception, however the central valley in the woods drops several hundred feet of elevation and service there can be poor.

2. Policies

a. Bikes

Bicycles are permitted in the woods. Riders are required to stay on the pre-existing trail system only in WWNC. Helmet use is encouraged due to the terrain and trail hazards as well as high number of trees in close proximity to trails. Please keep control of your bicycle at all times and avoid excessive speed, especially when passing other trail users.

Electric bikes are not permitted on Indiana County hiking trails and similarly are prohibited in White's Woods.

Share the trail! Pedestrians have the right of way. Bicyclists should yield the right of way to walkers and joggers. Bicyclists and runners should announce themselves to pass, and to avoid startling other guests of the woods. Bicyclists should walk their bike or pull over on narrow trails to allow pedestrians to pass. Walkers and joggers should kindly allow space for other users of the woods to pass by.

b. Trails

White's Woods Nature Center has two types of trails. The first is a typical single-track hiking trail of packed earth base. The second type is two-track gated vehicle access pathway for the gas wells and power line that exist on the property. The terrain is wooded and hilly with approximately 300 feet of elevation change from parking areas to ridgelines. The parking area on N. 12th Street is approximately a one-mile hike to IUP's College Lodge and Coop Farm properties that border the woods to the north.

Please obey the following rules while visiting White's Woods to make your visit and the visit of other users as safe and enjoyable as possible. WWNC contains hazards that you or your family may not normally encounter. Please stay on the dedicated trail system as much as possible so that new trails do not form. Users are permitted to explore the flora and fauna of the woods off-trail but please practice 'Leave No Trace' guidelines. Natural terrain in the woods features countless rocks and roots due to vegetation, topography and geology. Some rocks are loose and others sharp. Wear proper footwear and keep an eye to where you are walking. Please use the woods during the hours of sunrise to sunset.

Share the trail! Pedestrians have the right of way. Bicyclists should yield the right of way to walkers and joggers. Bicyclists and runners should announce themselves to pass, and to avoid startling other guests of the woods. Walkers and joggers should kindly allow space for other users of the woods to pass by. On narrow trails where biking is permitted, bikers should walk their bikes or pull over before passing pedestrians.

Camping of any kind is not permitted on the property. ATVs and motorized vehicles, including electric bikes, are not permitted in the woods or on the trail system. Please do not smoke on the premise due to wildfire risk and out of respect

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for those exercising in the park. Campfires are not permitted at any location in White's Woods.

Respect the property lines and privacy of adjacent landowners.

Do not litter on the property, and if you see litter on the property, please kindly pick it up and take it to the trash can available at the trailhead parking lot. Trail users are encouraged to report any downed trees blocking the trails, hazards or concerns to the township office via phone or email.

This stewardship plan advises seeking best practice guidance from state and national regulatory agencies on the selection of trail locations and protection of fragile trails as the Whites' Woods trail system is maintained moving forward.

c. Dog Walking

Pets are permitted and welcomed in White's Woods Nature Center (WWNC) so long as White Township ordinance 851 is followed, which prohibits the walking of unleashed dogs in all township parks. Leashes should not exceed 6 feet in length in keeping with Indiana County Parks and Trails guidance.

The current policy on dog leashing is ineffective as heard in multiple testimonies during stewardship committee meetings. This stewardship plan advises that more prominent signage should be made visible by the township and if necessary enforcement measures should be sought to bring about a culture of compliance among dog walkers.

Dog owners must clean up after and properly dispose of excrement and maintain control of their dog at all times. Dog owners must keep clear of other park users such as runners and mountain bikers where a hazard exists if a dog leash were to become entangled in pedals or runner's feet. Dogs shall not be permitted to jump on or injure other park users at any time.

In no circumstance should dogs be permitted to run freely, off leash, or be permitted to chase game. White's Woods is does not permit off-leash dog training, scent trailing, chasing game, field trials, etc. These rules apply to personal service dogs as well.

Dogs should not cause annoyance to the users of the park by barking, yelping, howling or causing unseemly noise. Dogs should not be allowed to damage property, vegetation or other users' personal property such as bikes and cars while on the premises.



H. Necessary Actions for Success

1. Ecosystem Monitoring

The White's Woods Nature Center is comprised of only 248.52 acres, yet the ecosystems within it, of course, are highly diverse and complex. Like other natural areas, it hosts thousands of species of plants, mammals, birds, insects, fungi, and more, that form complex and delicately balanced interlocking communities.

A stewardship plan cannot possibly hope to monitor all of these ecosystems simultaneously at the plan's first implementation. An initial monitoring program must be concentrated on the most critical elements.

As such, initial monitoring activities will be designed to address to key questions:

(1) What is the population status of selected special-status species?

(2) How well are the ongoing, long-term projects regarding invasive plant removal and natural canopy gap restoration succeeding in terms of project goals?

Goal 1: Monitoring special status species

The species to be monitored will be selected from the protected, at-risk, and vulnerable species identified by the Pennsylvania Natural Diversity Inventory, the Pennsylvania Natural Heritage Inventory, the Pennsylvania list of Rare, Threatened, and Endangered Plants, as well as species of concern listed in the Pennsylvania Wildlife Action Plan, 2015-2025, that have been identified in the White's Woods Nature Center. The list may be revised at any time. The most current information is online at <https://www.pgc.pa.gov/Wildlife/WildlifeActionPlan/Documents/SWAP-CHAPTER-1.pdf>.

The first step in any monitoring project is the collection of base-line data: Where are these populations located? What are the growth trends for each of these populations and for the species as a whole within the natural area?

Monitoring At-Risk Plant Species

The plant species currently recommended as a first-level priority list include those plants, reptiles, and amphibians identified in the Indiana County PNDI and by local citizen-scientists.

Action 1: Locating Populations. The specific locations of all special-status plant populations should be identified.

Action 2: Mapping Populations. Each population should be mapped in the field using Global Positioning System (GPS). The GPS unit will be used to record either the perimeter of each population or locations of individual plants. All data will be stored so that population changes can be analyzed by individual populations, by site, or throughout all of the Natural Area.

Action 3: Assessing Population Change. Populations will be assessed annually for 3 to 5 years or until a population trend is evident.

Monitoring American Chestnut Trees

The 2022 White's Woods Tree Species Inventory conducted by Dr. Holmes identified the location of multiple young American Chestnut Trees, one with a diameter of about six inches. This fungal-free six-inch American Chestnut is larger than those typically found. Dr. Holmes recommended that the Township contact a regional American Chestnut Tree Nursery to establish a monitoring program for the American Chestnut Trees.

Monitoring Special-Status Wildlife

Three wildlife species have been selected for monitoring due to their rarity: The Indiana Bat, the Eastern Box Turtle, and the Seal Salamander. (The first two identified in the PNHI; the third, with the official status still in process, verified by Indiana County Parks & Trails Director, Ed Patterson.)

Action 1: Locating Populations. The specific locations of all special-status wildlife populations in WWNC should be identified. Habitat surveys should be conducted at a time interval appropriate for the sensitive species. The presence or absence of species should be noted within areas containing target habitat. Specific coordinates where each population occurs should be recorded using a GPS unit where feasible. Presence and absence data will be recorded.

Action 2: Assessing Population Change. An annual assessment of the status of selected wildlife species will be conducted based upon monitoring findings.

Goal 2. Measuring Success of Conservation Projects

The success of two ongoing projects that have been designed to enhance or restore natural systems will be analyzed in terms of the management goals of the project.

Managing Invasive Species

In general, the goal of this project is to decrease the abundance and diversity of invasive plant species and support the abundance and diversity of native species. The target levels for this project's success are site dependent and dependent, as

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well, on the targets identified in the multi-decade invasive plant prevention and management prioritization plan.

Managing Natural Canopy Gaps

The goals and specific steps required for managing naturally-occurring canopy gaps have been identified by Dr. Tyree. The success of the natural canopy gap project will be measured by the reduction of invasive plants and the growth of native plants and trees. [See appendix (F)(1)(b).]

Future citizen/scientist inventory of forest songbirds

According to the National Audubon Society, the population of migrating forest songbirds in the Eastern United States has dropped by nearly one-third since 1970, including species verified in White's Woods.

Citizen/scientists in our region that are capable of conducting an inventory of migrating forest songbirds in White's Woods and their efforts should be supported/encouraged.

Long-term trends of conservation

The 2021 Pennsylvania Forest Health Report (online at <https://extension.psu.edu/forests-and-wildlife/forest-management/pests-and-diseases>) cautions that we regularly see "a wide variety of forest health issues (like insects, diseases, and weather stressors) pop up and fade away" in our woods. A few of these stressors may leave some observable damage; the impact of others is barely noticeable.

"Truthfully, in many cases," the report cautions, the best thing to do is monitor and wait. It can feel frustrating to 'do nothing,' but there is tremendous value in understanding and tracking stressors in your forest over a number of years."

Keeping tabs on our forest over many years should be complemented by keeping abreast of developing solutions to threats to our forest: Recent research has indicated, for instance, that biological control may be feasible soon for existing threats to hemlock and other trees common in Pennsylvania forests.

Recommendations:

1. Monitor at-risk species as identified above. The species currently recommended as a first-level priority list include those plants, reptiles, and amphibians identified in the Indiana County Pennsylvania Natural Heritage and PNDI Inventories and by local citizen-scientists.
2. Contact Pennsylvania Natural Heritage Program, along with universities and colleges, conservation professionals, or talented community scientists to identify locations of exemplary plant communities and all locations of plant or animal species of concern (rare, threatened, or endangered).
3. Work with Indiana Area School District (IASD) teachers/students and IUP professors/students and others to conduct a survey of all of the species in the woods. Possibly have a yearly bioblitz to record species.
4. Monitor ongoing conservation projects, including (a) removal of barberry, tree of heaven, stiltgrass and other invasives species identified and (b) canopy gap deer exclosures.
5. Contact an American chestnut tree nursery/specialist to obtain recommendations for monitoring these trees in White's Woods.
6. Conduct bi-annual (or more) surveys of the White's Woods perimeter, with special attention devoted to entrances and woodland edges, to intercept new invasive plants.

2. Climate Change Mitigation

The Pennsylvania Department of Conservation and Natural Resources (DCNR) Director of Applied Climate Science, Greg Czarnecki, presented to the FWW a webinar titled "Climate Change in Penn's Woods: What Does the Future Hold," on September 22, 2022. The recording of this webinar (<https://www.friendsofwhiteswoods.org/events>) was reviewed by committee members in preparation for completion of this Plan.

In part, because the changing Pennsylvania climate has already had significant impact on patterns of recreational resource use, resilience of DCNR facility infrastructure, and overall annual expenses, in 2018, DCNR produced an agency Climate Mitigation and Adaptation Plan.

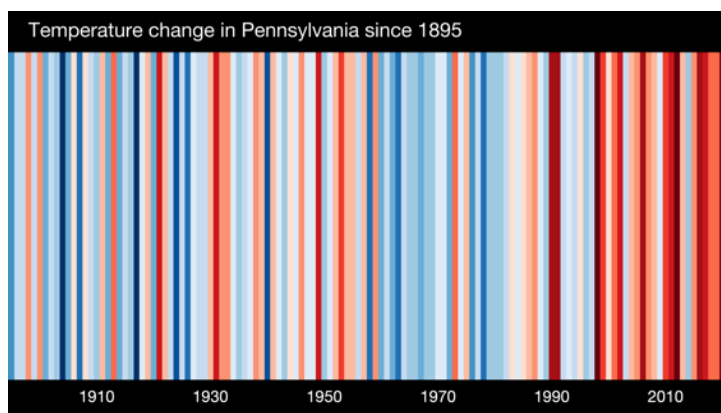
According to DCNR and the Pa. Department of Environmental Protection:

Pennsylvania's climate has already warmed by 1.8° F since the early 1900s. Scientists know the rate of warming is accelerating and expect as much as a 5.9° F increase by 2050. Average winter temperatures are increasing more than any other season, by 1.3° F per decade since 1970.

Our climate has also become wetter. Average annual rainfall has increased 10% over the last century and heavy downpours have increased by 71% in the northeastern US.

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Overall, primary impacts of ongoing climate change in Pennsylvania include: increased temperatures, precipitation, and storm events, reduced snow cover, and changing plant and animal distributions. These warming conditions are visually represented in Ed Hawkins' "warming stripes" [Figure H(2)(a)(i)].



[Figure H(2)(a)(i). Warming stripe for Pennsylvania by Ed Hawkins. Each stripe represents a yearly average temperature from 1895 to 2022.]

These ongoing and projected changes will impact existing trees, plants, animals, and birds, who will need to adapt, move northward (shifts in geographic range), or disappear. In this way, changes in precipitation and temperature are impacting overall species composition in White's Woods, combined with the introduction of invasive species that favor warmer, wetter conditions. According to Czarnecki, Red-tail hawks are no longer migrating out of Pennsylvania in the winter. Carolina chickadees have already moved into some parts of our state. The exceptionally damaging "southern" invasive plant, Kudzu, has been found in 60 Pennsylvania locations. Almost all bird species are shifting north.

Some tree species, including tulip poplar and red maple are identified as especially resilient and are rated as having "good climate change capability." Tulip poplar comprises about 25% of the White's Woods canopy; red maple is prominent in the White's Woods sapling level. [See Appendix (D)(1)(b)(ii).]

DCNR is taking action to adapt to the warming temperatures, in part by adapting infrastructure, working to minimize flood damage, preparing for a much longer summer recreation season, and protecting more mature forests for maximum carbon sequestration (DCNR, 2018 Climate Mitigation and Adaptation Plan). (Online at https://elibrary.dcnr.pa.gov/GetDocument?docId=1743769&DocName=Climate_Change_Adaptation_Plan_Final_Aug2018.pdf) [See Appendix (H)(2)(b).]

Wildfire risk in Pennsylvania has historically remained low to moderate (the lowest two risk tiers in DCNR's five-tiered scale), according to DCNR's wildfire prevention information on their website (<https://www.dcnr.pa.gov/Communities/Wildfire/>). Climate impacts including increased temperatures and changes in precipitation may change this risk trend, however one of the leading causes of forest fires in Pennsylvania is careless debris burning. No recommendations regarding wildfire risk are suggested at this time, other than to continue to monitor wildfire risk in Indiana County and to provide WWNC visitors with rules and guidelines for wildfire prevention (such as Smokey Bear educational materials).

The committee has also learned that recent research indicates that mature forests create "microclimates" that help preserve forest biodiversity in the midst of ongoing climate change and that the older, and bigger, a tree gets, the more carbon it absorbs.

Recommendations:

1. Protect the trees, to maximize carbon sequestration, stormwater mitigation, and forest biodiversity.
2. Protect understory and overstory native plant species to minimize impacts of soil erosion from projected increased storm and precipitation events.
3. Anticipate longer outdoor recreation seasons.
4. Protect the shaded trails to significantly reduce trail temperatures.

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5. Anticipate, monitor, and document, a transition of tree, plant, wildlife, bird, and insect species as annual and seasonal temperatures warm.
6. Prepare for possible increased invasive species management needs.
7. Protect the greenspace that is WWNC, as these spaces are increasingly important in communities for mental and physical health as climates change.

Sources:

- Hawkins, E. Show Your Stripes. 2018-2019. <https://showyourstripes.info/>.
- DCNR, 2018 Climate Mitigation and Adaptation Plan can be downloaded here <https://www.dcnr.pa.gov/Conservation/ClimateChange/pages/default.aspx>
- DEP, 2021 Climate Impact Assessment <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=3667348&DocName=PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%202021.PDF%20%20%3cspan%20style%3D%22color:green%3b%22%3e%3c/span%3e%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e%204/30/2023>
- Matt Betts, Forest Management and Conservation as a Bulwark Against Climate Change

3. Volunteering

National, state, and municipal parks of every variety rely on volunteers. Volunteers do not replace paid staff. But volunteers can and do address tasks that could not otherwise be accomplished.

Volunteer work can certainly stretch a municipal dollar. An investment of some paid staff time is often necessary to support volunteer work. Overall, however, volunteer programs are both cost-effective and productive. Data suggests that almost all volunteers contribute their time for altruistic reasons and expect very little beyond the satisfaction of their work in return.

In the past, local Scout troops have volunteered their time to install benches and even build a bridge in White's woods. Over time, however, much of the volunteer work in White's Woods has been contributed by individuals working on their own initiative to clear a fallen log from a trail, mow along the major ridgetop trail, repair the steps on the Spring Trail bridge, or offer various types of nature education programs.

Since July 2023, FWW has organized 10 volunteer sessions to remove Japanese barberry from the Natural Heritage area and from a least-invaded area near the intersection of the Fleming Trail with the IUP College Lodge property. White Township has provided work gloves for volunteers and has helped to transport the barberry that has been removed to a "quarantine" location behind the S & T Recreation Center. FWW has contacted a variety of organizations who have joined in to assist with this project.

Liability

All volunteers are required to sign a "Volunteer Liability Waiver." Copies of the signed waivers are kept on file at the White Township office.

What can volunteers do?

Generally, nature centers and parks rely on volunteers for trail maintenance, invasive plant control, tree planting, park clean-up, and education.

Right now, the most pressing need for volunteer contributions is that of helping hand-pull Japanese barberry and Japanese stiltgrass. This is a very important, if not urgent, task for the future care of White's Woods. Volunteers can also sponsor educational programs and, in coordination with White Township staff, identify other ways to protect the Nature Center and increase visitor appreciation for this valuable resource.

What can't volunteers do?

Safety concerns dictate that volunteers will not use power tools or herbicides in their volunteer work.

Volunteer Planning: Near-term

Fortunately, and thanks to the efforts of White Township Manager Chris Anderson, the White's Woods Friends group has stepped up to organize volunteers to address invasive plants in White's Woods. In the near-term, organizing volunteers from FWW, working with White Township and local schools, churches, businesses, youth groups, community organizations, sports teams and our local university will address the urgent need to attend to invasive plants in our Nature Center and help to build our community, as well.

Volunteer Planning: Long-term

Both White Township and/or FWW have working relationships with other parks or conservancies that have extensive

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volunteer programs including Duff Park, Indiana County Parks, Allegheny County Parks & Trails, the Natural Areas Conservancy, and the Powdermill Nature Preserve. Careful study of these programs and consultation with their volunteer directors will provide additional avenues for working with WWNC volunteers.

Goals: 1 (a, b); 2 (a, b, c, d); 3 (a, b, c, f, g, h); 5 (a, b, c); 6 (b)

I. Future Management

Detailed plans for the future ongoing care of White's Woods are important for the permanent preservation of the woods. How this plan is implemented over time will determine its success.

Five future management options were identified by the White Township Stewardship Committee, four related to direct oversight of our community forest and a fifth regarding the potential for acquiring additional land.

Direct Oversight: Four future management options for direct care of the WWNC

Three of the "management" options regarding ongoing care for the WWNC have drawn particular committee scrutiny: (1) a Township Park Manager; (2) enrolling White's Woods in the Old Growth Forest Network; and (3) a Nature Center Stewards Committee that emphasizes a strong public-Township partnership. The fourth option is to transfer WWNC to a land conservancy which will be addressed later.

Implementing all three of these options simultaneously is not only possible, but is likely to provide the surest route to long-term success.

1. Township Park Manager

White Township is listed as the owner of the parcels that comprise White's Woods, even as this Project 70 land was dedicated as a park for the Indiana region and a portion of White's Woods is located in Indiana Borough. White Township has financial and oversight responsibilities. Up until now, the Township has engaged in various maintenance tasks, including removal of fallen trees from blocked trails; working with public groups, including local Boy Scouts and FWW, to facilitate Nature Center maintenance projects; coordinating with utility companies regarding rights-of-way; and engaging external professional assistance to address invasive plants, improvement of trails, erosion control and possible other assistance. Obviously, all of these responsibilities remain in Township hands. In addition, the Township's role in future management is likely to require additional expertise from forests ecologists for monitoring and planning, as well as additional staff time to address hands-on concerns such as the control of invasive plants. The good-faith leadership of White Township staff, in collaboration with the public, is critical to the successful protection of the WWNC for future generations.

2. The Old Growth Forest Network

The Old-Growth Forest Network (OGFN) aims to preserve at least one forest in every county in the U.S. so that it can mature into old growth. White's Woods could be the first forest in Indiana County to join the OGFN. Enrolling White's Woods in the OGFN would (a) publicize White Township's commitment to the type of quality of life that keeps residents here and encourages young professionals and retirees alike to relocate to our area; (b) reaffirm the original Project 70 goal of permanently preserving White's Woods as a natural area ideal for passive recreation & conservation for present and future generations; (c) affirm the nearly three decades of public input declaring the importance of leaving White's Woods in its natural state; (d) protect in perpetuity the "ecosystem services" - air quality, stormwater control, carbon sequestration, temperature mitigation - that are provided by this community forest; (e) support DCNR's ongoing project to protect more Pennsylvania forests so that they may return to old growth; (f) increase tourism in the area as OGFN enthusiasts visit the designated forests; and (g) protect the woods from commercial timbering.

Steps for enrolling in the OGFN

OGFN Executive Director Joan Maloof explained that to enroll a forest in the OGFN legal steps must be taken to assure permanent protection of the forest. Typically, what is required is a simple ordinance guaranteeing that the forest will be allowed to mature to old growth. [\[See Appendix \(1\)\(2\)\]](#) for a sample of a memorandum of agreement that would be accepted by OGFN for enrollment of a forest.]

Once the OGFN is contacted and alerted to the goal of enrolling WWNC in the OGFN, the OGFN staff will finalize enrollment with the township.

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3. Nature Center Stewards Committee

The White Township Stewardship Committee recognizes the expertise that the public has brought to Stewardship Committee deliberations and strongly encourages the Township to continue this engagement [See Appendix (I)(3) for a list of FWW contributions.].

A Nature Center Stewards Committee should include representation from FWW, along with representation of other community environmental leaders and experts in forest ecology, such as the Evergreen Conservancy, Plant Patrol, and forest ecologists with expertise in preserving natural areas (e.g., plant biologists, forest ecologists).

Establishing a public/conservation group stewards committee (a) makes certain that public input for care for White's Woods is secured for every management step; (b) provides a mechanism to improve the likelihood of success for any proposed management step; (c) provides a mechanism for tapping public expertise in identifying management solutions; and (d) ensures that public involvement in maintenance tasks and educational programming is integrated into the oversight process, (e) help to prioritize the implementation of this stewardship plan and (f) identify professional expertise needed for implementation.

4. Transfer management of White's Woods to a Land Conservancy

Although this option remains as a consideration for the future, it was not considered for recommendation at this time.

5. Land Acquisition

Fifty years ago, federal, state, and local leaders demonstrated the extraordinary foresight that allowed communities all over the United States to protect land for recreation, including forested areas that were open to the public for the solitude, education, social, and health benefits that nature can provide.

Significant population migration to this region, due, in part, to internal U.S. climate migration, is expected to occur in the next few decades. Habitat loss is of increasing concern. Land adjacent to White's Woods is now available for purchase and external funds are now available to support purchase of land for conservation and for recreational use.

Greenspace and parks are important factors for businesses, young people, and retirees as they select new places to live. If purchased now, greenspace can be protected for the community and future generations.

Recommendations:

1. Equip the Township manager with the resources to acquire adequate expertise in forest ecology and adequate staff for ongoing maintenance tasks, including invasive plant removal. 3 (i, j).
2. Enroll White's Woods in the OGFN. 2 (a, c); 3 (c, d, e, f, g, h); 4; 6 (a, b).
3. Establish a White's Woods Nature Center Stewards Committee with conservation groups and the public, including FWW, to coordinate with White Township to care for WWNC. 2 (a, b, c, d); 3 (h); 5 (c).
4. Seek opportunities to purchase additional, adjacent forested land. 1 (b); 3 (c); 6 (a, b).



J. Conclusions

1. Summary of Recommendations

Recommendations for the management of White's Woods Nature Center, compiled below from the respective sections of the report, are consistent with Project 70 guidelines, subject matter expert (SME) advice, and public input compiled throughout the park's existence.

Subject Matter Expert Review (A.3.a)

Goals and Objectives (C)

Canopy Gaps (F.1.b)

Risk Trees (F.1.b)

Invasive Plants (F.2.a)

Engagement (E.3.b)

Insects (F.1.c)

Herbicides (F.2.a.i)

Deer Management (F.2.b)

Biodiversity (F.2.c)

At-Risk Species (F.2.d)

Stormwater Management (F.3.a)

Recreation Enhancement and Improvement (G)

Eco-system Monitoring (H.1)

Climate Change Mitigation (H.2)

Continued Community and SME Engagement (H.3)

Future Management (I)

The following recommendations for WWNC recur throughout, most occurring in multiple sections of the plan as noted:

1. Protect the canopy (SME, goals & objectives, invasive plants, stormwater management, at-risk species, climate change)
 - Leave dead wood in the forest (canopy gaps, risk trees, at-risk species)
 - Cut only trees that pose a clear and present danger (canopy gaps, insects/disease, at-risk species)
 - Avoid mechanical intervention (canopy gaps, risk trees, insects)
2. Remove invasive plants by the least intrusive method (SME, goals & objectives, invasive plants, biodiversity, at-risk species)
 - Pull by hand where feasible (invasive plants, canopy gaps)
 - Use hack & squirt as well as cut stump methods where necessary (invasive plants, canopy gaps)
 - Use herbicides judiciously (invasive plants, herbicides, at-risk species)
 - Establish research plots to inform future decisions (canopy gaps)
3. Address deer browse (SME, goals & objectives, insects, deer management, biodiversity)
 - Install deer exclosure fencing (insects, biodiversity)
4. Monitor native and non-native species (SME, goals & objectives, invasive plants, insects/disease, biodiversity, at-risk species, at-risk species, stormwater management, ecosystem monitoring, climate change)
 - Conduct a survey of all species in WWNC (ecosystem monitoring)
 - Monitor ongoing conservation projects (ecosystem monitoring)
 - Conduct bi-annual surveys of the WWNC perimeter to intercept new invasive plants (ecosystem monitoring, climate change)
5. Protect the ecosystem services provided by WWNC (SME, goals & objectives, consultants, climate change, stormwater management)
6. Establish a Nature Center Stewards Committee to coordinate with Township staff to manage WWNC (goals & objectives, engagement, future management)
7. Consult with ecologists and subject matter experts to improve WWNC health and biodiversity (SME, goals & objectives, invasive plants, biodiversity, climate change)
8. Collaborate with volunteers to maintain WWNC where possible (goals & objectives, invasive plants, insects/disease, at-risk species)
9. Use a variety of methods to communicate with the stakeholders about WWNC (goals & objectives, engagement)

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10. Promote passive recreation and educational opportunities in the Nature Center (goals & objectives, engagement, climate change)
11. Join the Old Growth Forest Network (SME, goals & objectives, climate change, future management)
12. Seek opportunities to purchase additional, adjacent forested land (climate change, future management)

2. Future Plans & Goals

The White Township Stewardship committee has worked diligently for 24 months to learn about the White's Woods Nature Center and the steps required to preserve this valuable natural area for future generations. This document lays out both short-term actions and long-term goals. It is clear that targeting the primary current threats to White's Woods, including invasive plants, destruction of plants by excessive deer-browse, and ongoing impact of a changing climate, requires not only short-term action, but, also, long-term commitment. Effective response to each of these ongoing threats will require decades of attention and action.

Over the last 24 months, the committee has also learned the importance of working closely with the public. Public input is, as it must be, the basis for all White's Woods management plan goals and objectives. Volunteers have been, and will continue to be, essential to the control of invasive plants. Programming for nature education and natural area experiences, such as hiking, is sponsored by the public (such as FWW, IUP, and the Indiana County Decathlon), as well. Further, members of the public provide critical resources and significant expertise necessary for the protection of our natural area. A strong partnership with the public must be maintained and strengthened across future decades to ensure the long-term protection of White's Woods.

The committee's own education since 2022 has also taught the group that there are many valuable trees, plants, amphibians, reptiles, mammals, and insects in White's Woods that require more attention and protection. Future work with local scientists, citizen-scientists, and the Pennsylvania Natural Heritage Program will be essential to identifying the best ways to protect these valuable species.

Preservation of the WWNC, so that this forest may mature into old growth and achieve the goals laid out by the public, will also require long-term connections with forest ecologists, as well. In future decades, experts will teach us more about how to support forests, and the plants, wildlife, and birds that live within them. It is important that the wisdom of experts help us to become wiser about the protection of the WWNC.



Appendix

[Appendix \(A\)\(2\)\(b\)\(i\) Project 70 Land Acquisition and Borrowing Act](#)

[Appendix \(A\)\(2\)\(b\)\(ii\) Partial original White Township application for Project 70 grant](#)

[Appendix \(A\)\(3\)\(a\) Davey Tree Expert report](#)

[Appendix \(A\)\(3\)\(b\)\(i\) Public Input Data Regarding White's Woods 1974-2022](#)

[Appendix \(A\)\(3\)\(b\)\(ii\) Questions that appeared in the public input surveys](#)

[Appendix \(A\)\(3\)\(c\) Summary of stewardship plans reviewed](#)

[Appendix \(D\)\(1\)\(a\)\(i\) – Park map shows special features of WWNC including topography, streams, trails, utility line location and park boundary.](#)

[Appendix \(D\)\(1\)\(a\)\(ii\) – Map shows the park boundaries drawn by Botsford Surveying Inc.](#)

[Appendix \(D\)\(1\)\(b\)\(i\) – Habitat map by Marion Holmes](#)

[Appendix \(D\)\(1\)\(b\)\(ii\) – Habitat list: White's Woods Nature Center tree community map legend](#)

[Appendices \(D\)\(1\)\(c\)\(i\) and \(D\)\(1\)\(c\)\(ii\) – Wildflower maps created by Cindy Rogers in 2000, identifying wildflowers both by common names and scientific names.](#)

[Appendix \(D\)\(1\)\(d\) – Soils map compiled using the Web Soil Survey](#)

[Appendices \(D\)\(1\)\(e\)\(i\) and \(D\)\(1\)\(e\)\(ii\) – Soils and Slopes \[Map\]\(#\) and accompanying \[legend\]\(#\) were created by rendering the Soils maps to show areas of similar slopes](#)

[Appendix \(D\)\(1\)\(f\) – Native plants list, an inventory prepared for WWNC by Sara Kuebbing and Marion Holmes in October 2021](#)

[Appendix \(D\)\(2\) – Pa. Natural Diversity Inventory \(PNDI\), created through the Pennsylvania Natural Heritage Program](#)

[Appendix \(D\)\(3\) – Indiana County Natural Heritage Inventory, prepared for the Southwestern Pennsylvania Commission by the Pennsylvania Natural Heritage Program](#)

[Appendix \(D\)\(4\) – Invasive Species Mapping & Assessment, conducted by Sara Kuebbing, Ph.D. and Marion Holmes, Ph.D.](#)

[Appendix \(F\) Pennsylvania Forests Changing From Red Oak To Red Maple Dominated](#)

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[Appendix \(F\)\(1\)\(b\) Canopy Openings and trees at risk of falling – how to handle](#)

[Appendix \(F\)\(2\)\(a\) WTSC Herbicide policy – Recommended by the stewardship committee](#)

[Appendix \(F\)\(2\)\(a\)\(i\) Invasive Plant Inventory and Management Report, Marion Holmes and Sara Kuebbing](#)

[Appendix \(F\)\(2\)\(a\)\(ii\) Joece Lynn, IUP student handout](#)

[Appendix \(F\)\(2\)\(a\)\(iii\) Invasive Species Management Program, ConserveTools.org](#)

[Appendix \(F\)\(2\)\(a\)\(iv\) Invasive Species Management – Duff Park Herbicide Policy](#)

[Appendix \(F\)\(2\)\(a\)\(v\) Invasive Species Management – Okehocking Preserve Herbicide Policy](#)

[Appendix \(F\)\(2\)\(a\)\(vi\) – Duff Park, Native Shrubs Recommended for Wildlife Habitat \(Online at \[https://www.murrysville.com/DocumentCenter/View/3134/Duff-Park_FinalReducedSize\]\(https://www.murrysville.com/DocumentCenter/View/3134/Duff-Park_FinalReducedSize\) \)](#)

[Appendix \(F\)\(2\)\(a\)\(vii\) – Okehocking Preserve plan \(Online at <https://www.willistown.pa.us/DocumentCenter/View/198/OkehockingManagementPlan2006?bidId=> \)](#)

[Appendix \(F\)\(2\)\(b\)\(i\) – Map of CWD DMAP unit encompassing WWNC](#)

[Appendix \(F\)\(2\)\(b\)\(ii\) – Pa. Game Commission general information on CWD](#)

Appendix (F)(2)(b)(iii) – For all information about CWD, refer to the Pa. Game Commission Chronic Wasting Disease (CWD) web page at <https://www.pgc.pa.gov/Wildlife/WildlifeHealth/Pages/ChronicWastingDisease.aspx>

[Appendix \(F\)\(2\)\(b\)\(iv\) – Cornell University report published in Ecology and Evolution](#)

[Appendix \(F\)\(2\)\(d\) – Protect At Risk Species/Species of Special Concern](#)

[Appendix \(F\)\(2\)\(d\)\(i\) – Plant Species at Risk](#)

[Appendix \(F\)\(2\)\(d\)\(ii\) – State of the Birds 2022](#)

[Appendix \(F\)\(2\)\(d\)\(ii\)\(x\) – State of the Birds 2022 alternate \(Online at <https://www.stateofthebirds.org/2022/wp-content/uploads/2022/10/state-of-the-birds-2022-pages.pdf> \)](#)

[Appendix \(H\)\(1\)\(a\)\(i\) – Species of Greatest Conservation Need](#)

[Appendix \(H\)\(1\)\(a\)\(ii\) – Pennsylvania Wildlife Action Plan](#)

[Appendix \(H\)\(1\)\(b\) – Eastern Box Turtle](#)

[Appendix \(H\)\(2\)\(b\) – Climate Change: Adaptation and Mitigation Plan, Pa. Department of Conservation & Natural Resources, June 2018](#)

[Appendix \(I\)\(2\) – Old Growth Forest Network MOA for enrolling WWNC](#)

[Appendix \(I\)\(3\) – Nature Center Stewards Committee/Conservation Groups](#)