

November 2023



Haugh Family Preserve and Gray's Woods Preserve
Forest Management Plan



Completed by:

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Location and general description of Patton Township Properties:

The Haugh Family Preserve and Gray's Woods Preserve are in the Scotia area near State Game Lands (SGL) 176, which forms part of each property's boundary. SGL 176 is an intensively managed forest – with over 2,000 acres managed for early-successional species and specialized barrens species habitat. Both properties are used heavily by the public for outdoor recreation. Extensive trail use by runners and walkers was observed during the inventory data collection period. The Haugh Family Preserve contains ten large agricultural fields as well as 12 “forest management units” (MU A through MU L) and Gray's Woods Preserve contains 4 “forest management units” (MU 1 through MU 4).

Below is an aerial view showing the general location and relationship of the two properties.



History of forest management of the Haugh Family Preserve to date – see [Appendix E](#)

Haugh Family Preserve and Gray’s Woods Preserve Management Goals (2022)

(Established by the Patton Township Open Space Stewardship Committee)

GOAL 1: Maximize forest health and resiliency

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

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

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

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

GOAL 6: Promote educational and research opportunities

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

Additional information is available in [Appendix A](#).

Haugh Family Preserve

a. More specific description

The Haugh Family Preserve property was, and still is, a farm with surrounding woodlots. Much of the acreage is tilled for crops such as corn and soybeans. Circleville Road cuts through the center of the property from northwest to southeast. Patton Woods and Circleville Park, both Patton Township parks, are near the property’s southeast corner. Many of the wooded areas are used extensively for running and walking, as evidenced by numerous observations and paths. “Pothole” areas in the Haugh Family Preserve forest and agricultural fields were dry or nearly dry, similar to what was observed in Grays Woods Preserve. Mapping and forestry statistics are at the [Appendices B and D](#).

State agency responses to the **Pennsylvania Natural Diversity Index** (PNDI) report the potential presence of Eastern Spadefoot (*Scaphiopus holbrookii*, Threatened), and the presence of three species of concern.

DCNR determined potential impacts from forest management to the following threatened or endangered species or species of special concern.

Species of Special Concern

Scientific Name	Common Name	PA Current Status	PA Proposed Status	Survey Window	Suitable Habitat	Local Habitat
<i>Lupinus perennis</i>	Lupine	PR	PR	Flowers April – July	Alluvial sand and gravel bars, open fields, woods edges and roadsides in sandy soils	Haugh Family Farm
<i>Juncus debilis</i>	Weak Rush	N	PT	Fruits late July – early August persisting into fall	River banks, mudflats, shores and ditches	Scotia Barrens
<i>Cuscuta polygonorum</i>	Smartweed Dodder	TU	PT	Flowers June – September; fruits July – October	Parasitic on Polygonum spp., and other plants of moist shores and river banks	Scotia Barrens

A botanical survey for the above species should be conducted by a qualified botanist at the appropriate time of year. Please submit the resulting report to our office for review. Contact our office prior to the survey for detailed information about the species or for a list of qualified surveyors. Your botanist should carefully review the new DCNR Botanical Survey Protocols available at <https://conservationexplorer.dcnr.pa.gov/content/survey-protocols>. These protocols are recommended so that all necessary information is collected and that survey reports are prepared properly. DCNR expects these protocols to be followed when conducting surveys for species under our jurisdiction.

All target and non-target state-listed species found during the botanical survey should be reported to our office. Please submit a completed Botanical Field Survey Form for each occurrence or population identified: <http://www.gis.dcnr.state.pa.us/PNDI/2015%20Field%20Survey%20Form.pdf>. Mitigation measures and monitoring may be requested if state-listed species are found on or adjacent to the site.

If **preferred habitat does not exist on site, a survey may not be necessary**. Please submit a habitat assessment report which describes the current land cover, habitat types, and species found on site.

Additional guidance can be found in the PA Game Commission and DCNR responses in [Appendix C](#).

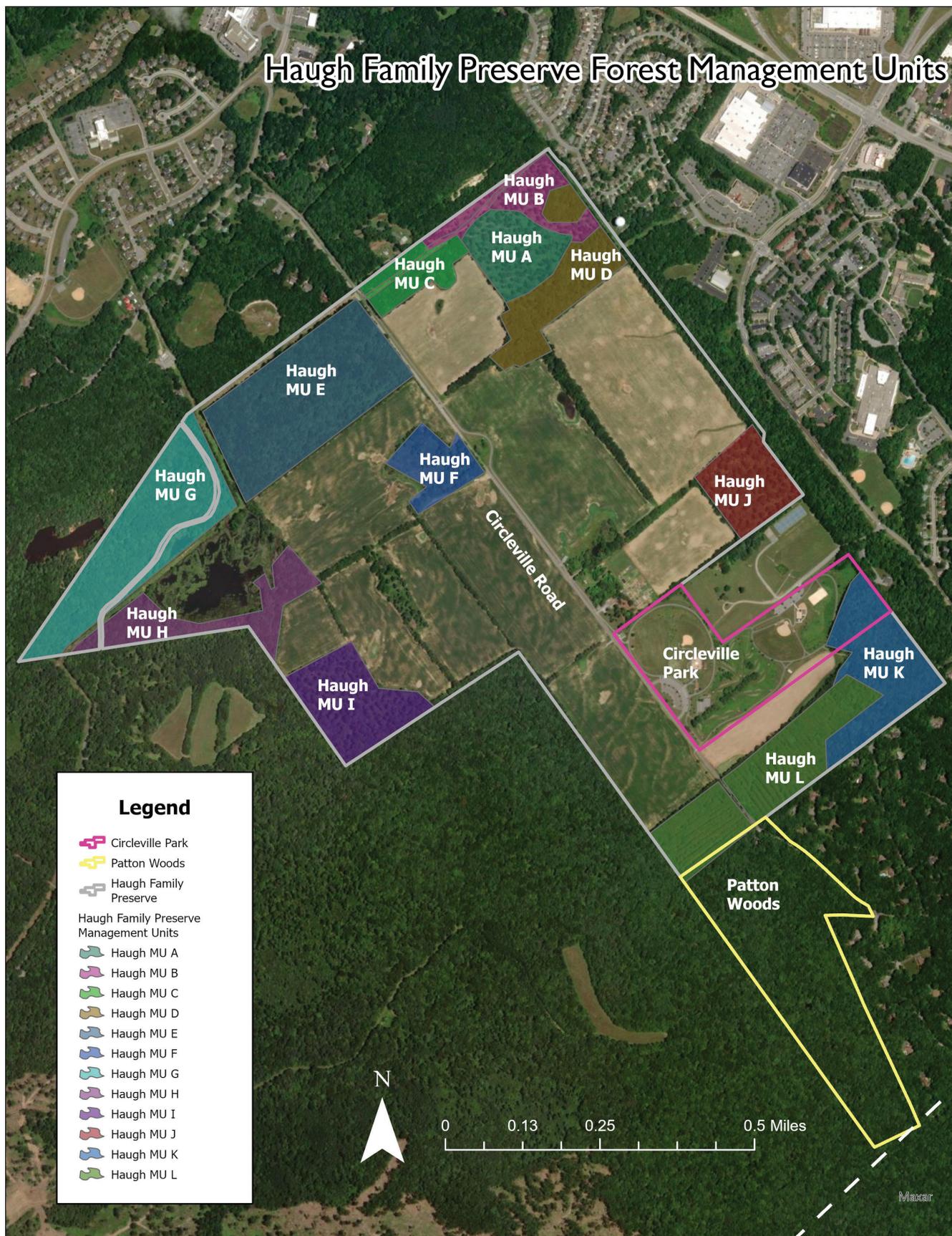
Sampling and Calculations: Sampling was done using a 10-factor prism for variable radius sample points. One hundred twenty-nine (129) sample points were collected. Diameter breast height (DBH) was estimated in 2-inch size classes. All live trees 2-inch or more DBH were tallied. Regeneration data was gathered on all sample plots. Analysis was done using SILVAH software, a timber analysis software developed by the US Forest Service. All calculations use the Scribner rule form class 78. **Full Silvah 7 analyses are provided electronically.**

Overall, the area is calculated as a medium saw timber unit with a medial diameter of 16.2 inches diameter breast height (DBH). Fifty-four percent of the area is rated as medium saw timber and 46% is large saw timber (areas that were harvested using shelterwood techniques were rated on the remaining overstory only), Deer impact is rated as high. Seed supply for desirable timber species is rated as moderate. The acorn supply was rated as sufficient acorns to regenerate a similar stand.

About 51 percent of the plots contained invasive species. Nonnative invasive species have the potential to displace native vegetation, including desirable timber species. **Invasive species included ailanthus, barberry, bush honeysuckle, multiflora rose, privet, garlic mustard, stiltgrass, autumn olive, Norway maple, mile-a-minute weed, burning bush, phragmites, Japanese honeysuckle, and oriental bittersweet.** A lot of the non-native vegetation occurred along the field edges, though a good bit was scattered throughout the stands. Ninety-three percent of the plots contained interfering vegetation. Sixty-nine percent had tall woody interference (birch, blackgum, pin cherry, sassafras, witch hazel, pitch pine, black locust, devil's walking stick, greenbriar, dogwood, blueberry, norway spruce, blue beech, and invasive species). Sixty-seven percent had low woody interference. Thirty-three percent had grapevines.

Soils on the Haugh tract are mapped as mostly Morrison sandy loam, Wyoming gravelly sandy loam, and Leetonia sand, considered well drained soils. MU F is mostly Dunning silty clay loam, a very poorly drained soil. A pocket of Lindsides soils, moderately well drained, is mapped along Circleville Road between MU I and MU J. A portion of MU G is mapped as quarry (QU) and a portion of MU H is mapped as urban soils (URB) (see map in [Appendix B](#)).

Haugh Family Preserve Forest Management Units



Legend

- Cirleville Park
- Patton Woods
- Haugh Family Preserve
- Haugh Family Preserve Management Units
 - Haugh MU A
 - Haugh MU B
 - Haugh MU C
 - Haugh MU D
 - Haugh MU E
 - Haugh MU F
 - Haugh MU G
 - Haugh MU H
 - Haugh MU I
 - Haugh MU J
 - Haugh MU K
 - Haugh MU L

b. Management Unit descriptions and recommended actions

Management Unit – MU A

Area: 10.4 acres

MU A is the old portion of Stand 16 that has a deer fence enclosure around it. Only a portion of the shelterwood harvested area was enclosed in a fence to allow users access to a heavily used walking/running path (see mapping in [Appendix B](#)). Eight- to ten-foot saplings are common (oak, some Black Cherry, a lot of Birch, Sassafras, and Black Gum were noted while traversing the fenced area). Ninety-seven percent of the plots have adequate regeneration.

Nonnative invasive species have the potential to displace native vegetation, including desirable timber species. It appears that control of invasives done in conjunction with the previous harvest was successful. There were no invasives in the overstory, no invasives in the understory, and ten that were found nearby (autumn olive, buckthorn, bush honeysuckle, garlic mustard, Japanese barberry, Japanese honeysuckle, Japanese stiltgrass, multiflora rose, Oriental bittersweet and unspecified non-native shrubs).

The remaining overstory in this Mixed Oak stand is dominated by Chestnut Oak, miscellaneous common species, Red Oak, Scarlet Oak and White Oak which together comprise 86 percent of the basal area. This is a medium sawtimber stand, with average medial diameter of 14.5 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 117 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species would make it difficult to apply selection cutting.

Relative stand density is 25 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is below optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Total growing stock amounts to 47 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 9.6 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 4.5 cords of pulp wood and 3016.5 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock are inadequate to provide a fully stocked stand in themselves.

Large competitive regeneration in the sapling and small pole sizes is abundant as a result of heavy cutting in the past. This understory will respond to form the next stand if the overstory is removed. The next stand will be dominated by Oaks. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover and dense fern cover.

MU A Information on Wildlife Habitat

Mast, Forage and Browse resources - Hard mast such as hickory nuts, acorns and beech nuts are foods that can be consumed immediately or stored for use during the winter season. They are required by many wildlife species, including bears, squirrels and mice. The stand has 40.0 sq.ft. of trees that produce high-quality hard mast (chestnut oak, American chestnut, northern red oak, scarlet oak, white oak, pin oak and black oak), and 6.7 sq.ft. of other hard mast producers (white pine, blackgum and red maple). The understory data has three species that produce high-quality hard mast (American chestnut, chestnut oak and northern red oak) and three of other hard mast producers (aspen, blackgum and red maple).

Soft mast (fruits), such as cherries and berries are high energy foods required by many wildlife species including bears and many species of migrating songbirds where high energy sources are of key importance during fall migration. The stand has one species that produces high-quality soft mast totaling a basal area of 1.7 sq.ft. (blackgum) and no other soft mast producing trees. The understory data has four species that produce high-quality soft mast (blackgum, blueberry, rubus and sassafras) and no other soft mast producing species.

Browse is a critical food resource for herbivores such as deer and rabbits. Because most herbivores of concern are ground foragers, only understory vegetation is considered in this report. This stand contains four species that produce high-quality browse (blackgum, chestnut oak, northern red oak and rubus) and four species that produce lesser quality browse (birch, blueberry, red maple and sassafras). The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has 3.3 sq.ft. of basal area of American chestnut and white oak that provide exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 13.3 sq.ft. (American chestnut and white oak). Another seven species totaling 31.7 sq.ft. provide some additional food value (chestnut oak, northern red oak, scarlet oak, white pine, blackgum, pin oak and black oak). The understory has two species that provides exceptional additional wildlife food in the form of insects and nectar (American chestnut and rubus). Another five species provide some additional food value (blackgum, blueberry, chestnut oak, northern red oak and sassafras). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - Snags and den trees provide shelter for a wide variety of wildlife including owls, ducks, woodpeckers, songbirds, squirrels, fishers, and other mammals. They are also used for foraging by various birds, mammals and amphibians. There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 6.7 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak and white pine).

Stand Structure and Composition - Structurally diverse forests support a greater diversity of wildlife. Understory structure provides foraging and nesting substrate, and escape and roosting cover for birds and mammals. Evergreen and ericaceous species provide thermal cover, structural complexity, nesting and foraging substrate, and compositional (or habitat) diversity for deer, grouse, turkey, black-throated green and -blue warblers, and other species. The stand has one evergreen tree species with a basal area of 3.3 sq.ft. (white pine). The understory has one ericaceous species (blueberry) and no evergreen species.

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

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.00	0.00	
Poles	1.67	3.57	blackgum
Small sawtimber	0.00	0.00	
Medium sawtimber	0.00	0.00	
Large sawtimber	0.00	0.00	
Total	1.67	3.57	blackgum

Recommendations for MU A

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be treated along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

Now is the appropriate time to do a **final removal of the overstory** and allow the sapling stand to develop. Otherwise, **defer any harvest** and reevaluate in 10-15 years.

b. It should be possible to remove the fencing and cease maintaining it.

Management Unit – MU B Area: 8.57 acres

MU B consists of the unfenced, but shelterwood harvested, portion of the old Stand 16 and part of the old stand 13 that was included in the harvest area (see mapping in [Appendix B](#)). Even without a fence, 50% of the plots exhibited adequate regeneration, although the saplings in this area are considerably shorter than those inside the fenced area.

It appears that control of invasives done in conjunction with the previous harvest was successful. There were no invasives in the plots, and nine that were found nearby (autumn olive, buckthorn, bush honeysuckle, garlic mustard, Japanese barberry, Japanese stiltgrass, Norway maple, oriental bittersweet and unspecified non-native shrubs).

The remaining overstory in this Xeric Oak stand is dominated by Chestnut Oak, Scarlet Oak, White Pine and Red Oak which together comprise 89 percent of the basal area. This is a large sawtimber stand, with average medial diameter of 21.2 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 136 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density of the overstory is 22 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is below optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Total growing stock amounts to 45 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 12.8 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 4.5 cords of pulp wood and 4948.5 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock are inadequate to provide a fully stocked stand in themselves.

Competitive seedlings will provide adequate natural regeneration only if protected from deer browsing. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover and dense fern cover.

MU B Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 35.0 sq.ft. of trees that produce high-quality hard mast (chestnut oak, scarlet oak, northern red oak and black oak), and 10.0 sq.ft. of other hard mast producers (white pine). The understory data has two species that produce high-quality hard mast (black oak and chestnut oak) and no other hard mast producing species.

There were no species that produce any soft mast reported in the overstory data. The understory data has two species that produce high-quality soft mast (blueberry and rubus) and no other soft mast producing species.

This stand contains three species that produce high-quality browse (black oak, chestnut oak and rubus) and two species that produce lesser quality browse (birch and blueberry). The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has five species that provides additional wildlife food in the form of insects and nectar totaling a basal area of 45.0 sq.ft. (chestnut oak, scarlet oak, white pine, northern red oak and black oak). None of these species provide high-quality food. The understory has one species that provides exceptional additional wildlife food in the form of insects and nectar (rubus). Another three species provide some additional food value (black oak, blueberry and chestnut oak). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 10.0 sq.ft. of sawtimber size trees that have exceptional value as snags (white pine).

Stand Structure and Composition - The stand has one evergreen tree species with a basal area of 10.0 sq.ft. (white pine). The understory has one ericaceous species (blueberry) and no evergreen species.

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings		0.00	
Poles		0.00	
Small sawtimber		0.00	
Medium sawtimber		0.00	
Large sawtimber		0.00	
Total		0.00	

Silvha Recommendations for MU B

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

Unlike the fenced area, this area does not have the sapling height to preclude deer predation. Therefore, defer any harvest and reevaluate in 10-15 years. However, in an effort to bolster the upcoming pollinator habitat work associated with the powerline right-of-way, large white pines along and outside the powerline right-of-way should be felled. Felling the white pines will add both forest structure and down woody debris enhancements to the pollinator project. Additionally, felling the pines will provide instant wildlife cover and seedling release and protection.

Management Unit – MU C Area: 6.8 acres

This area is the old stands 12 and 14 and the unharvested portion of stand 13. Stand 13 portion is a very narrow strip between private dwellings and the power line that runs along the boundary. Stands 12 and 14 are between the power line and the farm fields (see mapping in [Appendix B](#)).

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

This Mixed Oak stand is dominated by Red Maple, White Oak, Red Oak, Scarlet Oak, White Pine and Black Oak which together comprise 88 percent of the basal area. This is a medium sawtimber stand, with average medial diameter of 16.2 inches. Sapling trees too small to be merchantable represent a significant proportion of stand stocking and should be included in any thinnings. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 113 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 114 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is well above the optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably moderate, while growth rate of the medium and smaller-sized trees is probably poor and mortality due to crowding high.

Total growing stock amounts to 163 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 36.0 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 19.8 cords of pulp wood and 9517.8 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Competitive seedlings are not abundant; they will provide adequate natural regeneration only if supplemented with residual stems retained from the present overstory and protected from deer browsing. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover and dense tall woody cover.

MU C Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 85.7 sq.ft. of trees that produce high-quality hard mast (white oak, northern red oak, scarlet oak, black oak and pitch pine), and 75.7 sq.ft. of other hard mast producers (red maple, white pine, Norway spruce, sugar maple, aspen, black cherry and Virginia pine). The understory data has one species that produce high-quality hard mast (black oak) and five of other hard mast producers (black cherry, blackgum, Norway spruce, red maple and white pine).

The stand has two species that produce high-quality soft mast totaling a basal area of 2.9 sq.ft. (black cherry and flowering dogwood) and no other soft mast producing trees. The understory data has four species that produce high-quality soft mast (black cherry, blackgum, blueberry and flowering dogwood) and no other soft mast producing species.

This stand contains two species that produce high-quality browse (black oak and blackgum) and five species that produce lesser quality browse (black cherry, blueberry, flowering dogwood, red maple and white pine). The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has two species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 24.3 sq.ft. (white oak and black cherry). Another six species totaling 84.3 sq.ft. provide some additional food value (northern red oak, scarlet oak, white pine, black oak, sugar maple and flowering dogwood). The understory has one species that provides exceptional additional wildlife food in the form of insects and nectar (black cherry). Another five species provide some additional food value (black oak, blackgum, blueberry, flowering dogwood and white pine). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 27.1 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak, white pine, sugar maple, aspen and Virginia pine).

Stand Structure and Composition - The stand has five evergreen tree species with a basal area of 30.0 sq.ft. (white pine, Norway spruce, pitch pine, Virginia pine and unspecified commercial softwood). The understory has two evergreen species (Norway spruce and white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	2.86	1.75	Norway spruce and flowering dogwood
Poles	1.43	0.88	Norway spruce
Small sawtimber	0.00	0.00	
Medium sawtimber	1.43	0.88	Norway spruce
Large sawtimber	2.86	1.75	Norway spruce
Total	8.57	5.26	Norway spruce and flowering dogwood

Recommendations for MU C

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

b. Silvah recommends a **Timber Stand Improvement (TSI) and Commercial Pulpwood Thinning**: There is enough volume to combine TSI and a Pulpwood-only Commercial Thinning. The procedures used here are similar to those described for commercial thinning, except that cutting is extended into the sapling size class. The need for stand improvement is greatest in very dense young stands where trees of low-value species or poor form (such as sprout clumps or poor-quality residuals of an older stand) are likely to dominate better stems if not weeded out. This is essential in these stands, for attempts to take a cut from only the merchantable-size trees would result in a high-grading of the fast-growing and high-value species, and loss of so much of the future sawtimber growing stock that long-term yields will be significantly reduced. Include some high-wildlife value species (white oak, northern red oak, scarlet oak, white pine, black oak, sugar maple, aspen, black cherry, flowering dogwood and Virginia pine) for retention in the thinning and TSI.

- Minimum desired relative density = **60**
- Maximum density to remove in a single cut = **40 (35% of stand density)**.
- Removal around the stand mean (structure factor) = **75% below / 25% above**

Removing suppressed and intermediate crown class trees in MU C will enhance the upcoming pollinator habitat improvement project scheduled for the powerline right-of-way corridor that goes through MU C. Removing the pulpwood (smaller diameter) trees will accomplish the following:

- Increase average stand diameter
- Increase filtered light reaching the forest floor
- Increase light reaching the powerline right-of-way corridor and pollinator habitat project area
- Release existing regeneration

c. Alternatively, **defer any harvest** and reevaluate in 10-15 years.

Management Unit – MU D

Area: 13.5 acres

This unit is a combination of the old Stands 11, 17, 18, and the unharvested portion of Stand 16 (see mapping in [Appendix B](#)). When approached from Circleville Road, there are many non-native species along the tree line between fields leading to Circleville Road. Buckthorn was found in this tree line. Again, a nearly dry pothole was in stand 11. The old stands 17 and 18 are fairly open woods. Based on the number of trees counted, no thinning has occurred yet. About half of the plots listed non-native species. A small log structure was found at near the edge of the unit.

Non-native species have the potential to displace native vegetation, including desirable timber species. There were no invasives in the overstory, six invasives in the understory (Japanese barberry, oriental bittersweet, multiflora rose, autumn olive, unspecified non-native shrub-privet and bush honeysuckle), and eight that were found outside the plots (Japanese barberry, oriental bittersweet, multiflora rose, autumn olive, unspecified non-native shrub - privet, bush honeysuckle, garlic mustard and buckthorn).

This Mixed Oak stand is dominated by White Oak, Chestnut Oak, Red Oak, Black Oak, Red Maple, White Pine, Black Cherry and Scarlet Oak which together comprise 90 percent of the basal area. This is a large sawtimber stand, with average medial diameter of 19.1 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 121 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

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

Total growing stock amounts to 139 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 36.0 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 20.8 cords of pulp wood and 8,979.3 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover and dense fern cover.

MU D Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 93.1 sq.ft. of trees that produce high-quality hard mast (white oak, chestnut oak, northern red oak, black oak, scarlet oak and pin oak), and 44.6 sq.ft. of other hard mast producers (red maple, white pine, black cherry, blackgum, aspen, eastern hemlock, pin cherry, red pine and sugar maple). The understory data has three species that produce high-quality hard mast (chestnut oak, scarlet oak and white oak) and six of other hard mast producers (aspen, black cherry, blackgum, eastern hemlock, red maple and white pine).

The stand has three species that produce high-quality soft mast totaling a basal area of 11.5 sq.ft. (black cherry, blackgum and pin cherry) and no other soft mast producing trees. The understory data has six species that produce high-quality soft mast (black cherry, blackgum, blueberry, flowering dogwood, rubus and sassafras) and no other soft mast producing species.

This stand contains five species that produce high-quality browse (blackgum, chestnut oak, eastern hemlock, rubus and white oak) and eight species that produce lesser quality browse (birch, black cherry, blueberry, flowering dogwood, red maple, sassafras, scarlet oak and white pine). The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has three species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 36.2 sq.ft. (white oak, black cherry and pin cherry). Another nine species totaling 81.5 sq.ft. provide some additional food value (chestnut oak, northern red oak, black oak, white pine, scarlet oak, pin oak, blackgum, eastern hemlock and sugar maple). The understory has three species that provides exceptional additional wildlife food in the form of insects and nectar (black cherry, rubus and white oak). Another eight species provide some additional food value (blackgum, blueberry, chestnut oak, eastern hemlock, flowering dogwood, sassafras, scarlet oak and white pine). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 36.2 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak, white pine, aspen, eastern hemlock and sugar maple).

Stand Structure and Composition - The stand has three evergreen tree species with a basal area of 13.1 sq.ft. (white pine, eastern hemlock and red pine). The understory has two evergreen species (eastern hemlock and white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.00	0.00	
Poles	0.77	0.55	blackgum
Small sawtimber	2.31	1.66	blackgum
Medium sawtimber	0.00	0.00	
Large sawtimber	1.54	1.10	eastern hemlock
Total	4.62	3.31	blackgum and eastern hemlock

Recommendations for MU D

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

b. Silvah recommends a **Commercial Thinning**: There is enough volume for a Commercial Thinning. The stand is mature and a Regeneration Establishment treatment can be considered. Stands at or above 80 percent relative density should generally receive a commercial thinning at this time. In calculating the cut and residual stands, attempt to reduce relative stand density to 60 percent, but do not remove more than 35 percent of the stocking in any one cut. The cutting should be concentrated in the smaller, merchantable-size trees. Some larger trees should also be cut to open the canopy, improve spacing, and remove unacceptable growing stock. No non-merchantable saplings need to be cut. This type of thinning should tend to narrow the range of diameters and mold the stand structure (of the merchantable-size trees) into a more pronounced bell-shaped distribution. A commercial thinning should increase stand diameter and reduce the time required for the larger and better-quality trees to reach maturity. They should also increase the proportion of the most valuable species, and improve the average stand quality by removing the poorer stems. Include some high-wildlife value species (white oak, chestnut oak, northern red oak, black oak, white pine, black cherry, scarlet oak, pin oak, blackgum, aspen, eastern hemlock, pin cherry and sugar maple) for retention in the thinning and TSI. Begin to identify islands of vertical structure for final overstory removal. A combined sawtimber and pulpwood sale will yield 1,710 board-feet and 9 cords of pulpwood per acre. A pulpwood only sale will yield 12 cords per acre.

- Minimum desired relative density = **60**
- Maximum density to remove in a single cut = **31 (35% of stand density)**.
- Removal around the stand mean (structure factor) = **75% below / 25% above**

c. Alternatively, defer harvesting and reevaluate in 10-15 years.

Management Unit – MU E

Area: 32.7 acres

This unit is a combination of old Stands 23 and 24 (see mapping in [Appendix B](#)). With exception of the edge along the power line, most of the non-native species in old stand 23 were scattered. The opposite is true for the old stand 24 along the southeast edge. Privet is the main culprit 60% of the plots, though nearly all listed non-native species were found along the edge of the field.

There was one invasive in the overstory (autumn olive), eight invasives in the understory (autumn olive, Japanese barberry, unspecified non-native shrub, multiflora rose, oriental bittersweet, garlic mustard, Japanese stiltgrass and bush honeysuckle), and ten that were found outside the plots (autumn olive, Japanese barberry, unspecified non-native shrub, privet and mile-a-minute weed, multiflora rose, oriental bittersweet, garlic mustard, Japanese stiltgrass, bush honeysuckle, Japanese honeysuckle and buckthorn).

This Mixed Hardwood stand is dominated by Red Maple, Black Oak, Black Cherry, Aspen, Scarlet Oak, Misc Comm. Species and Red Oak which together comprise 89 percent of the basal area. This is a medium sawtimber stand, with average medial diameter of 13.6 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 17 years. Effective stand age is about 87 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 70 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is in the optimum range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low. Thinning to provide more growing space for the better stems is not necessary at this time.

Total growing stock amounts to 115 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 24.6 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 17.9 cords of pulp wood and 3,778.6 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide enough stocking by themselves to warrant stand management.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover and dense tall woody cover.

MU E Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 32.1 sq.ft. of trees that produce high-quality hard mast (black oak, scarlet oak, northern red oak, white oak, pitch pine, American chestnut and pin oak), and 80.4 sq.ft. of other hard mast producers (red maple, black cherry, aspen, blackgum, white pine, hawthorn, sugar maple, Virginia pine and cucumber-tree). The understory data has three species that produce high-quality hard mast (American chestnut, black oak and pitch pine) and four of other hard mast producers (blackgum, hawthorn, red maple and white pine).

The stand has 22.1 sq.ft. of trees that produce high-quality soft mast (black cherry, blackgum, hawthorn, staghorn sumac and sassafras), and 0.4 sq.ft. of other soft mast producers (cucumber-tree). The understory data has three species that produce high-quality soft mast (blackgum, blueberry and hawthorn) and no other soft mast producing species.

This stand contains three species that produce high-quality browse (black oak, blackgum and hawthorn) and three species that produce lesser quality browse (blueberry, red maple and white pine). The distribution of browse across the stand is good, 60.7 percent of plots have at least one browse species.

This stand has three species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 19.3 sq.ft. (black cherry, white oak and American chestnut). Another eleven species totaling 36.4 sq.ft. provide some additional food value (black oak, scarlet oak, blackgum, northern red oak, white pine, hawthorn, staghorn sumac, sugar maple, cucumber-tree, pin oak and sassafras). The understory has one species that provides exceptional additional wildlife food in the form of insects and nectar (American chestnut). Another five species provide some additional food value (black oak, blackgum, blueberry, hawthorn and white pine). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 11.1 sq.ft. of sawtimber size trees that have exceptional value as snags (aspen, white oak, white pine, sugar maple, Virginia pine and sassafras).

Stand Structure and Composition - The stand has four evergreen tree species with a basal area of 3.9 sq.ft. (white pine, pitch pine, Virginia pine and unspecified commercial softwood). The understory has two evergreen species (pitch pine and white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	2.50	2.17	blackgum and hawthorn
Poles	1.43	1.24	blackgum and cucumber-tree
Small sawtimber	1.79	1.55	blackgum
Medium sawtimber	0.36	0.31	blackgum
Large sawtimber	0.00	0.00	
Total	6.07	5.26	blackgum, hawthorn and cucumber-tree

Recommendations for MU E

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them with an **herbicide application**. In this MU, privet and other invasive brush species seemed to be concentrated along the southeast edge of the unit and along the Circleville Road edge. **Follow all PNDI guidance found in [Appendix C](#) (i.e. conduct activities in September)**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

Defer cutting due to low density. Reevaluate in 10-15 years.

b. This stand has **46.4 percent** of the understory plots stocked **with grapevines**. In stands with more than 30 percent of the understory plots stocked with grapevines, it is usually advisable to **treat the vines**. This can be done by cutting the vines close to the ground. Canopy shade will usually prevent the sprouts from surviving. Where canopy density is low, or where harvest cutting will occur within a few years, cut the vines and treat the cut stumps with an herbicide.

Management Unit – MU F

Area: 7.3 acres

This unit is the former Stand 19 (see mapping in [Appendix B](#)). The area appears to be a perennially wet area that has been surrounded by farm fields for years. Privet is very thick, and bittersweet occurs around the edges. The entire area is very thick. Most trees had poor form. The unit is located along Circleville Road.

There were two invasives in the overstory (privet and Norway maple), five invasives in the understory (privet, oriental bittersweet, autumn olive, multiflora rose and bush honeysuckle), and ten that were found outside the plots or nearby (privet, Norway maple, oriental bittersweet, autumn olive, multiflora rose, bush honeysuckle, buckthorn, Japanese barberry, Japanese stiltgrass and garlic mustard).

This Allegheny Hardwood stand is dominated by Black Cherry and Red Maple, which together comprise 88 percent of the basal area. This is a medium sawtimber stand, with average medial diameter of 14.3 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 16 years. Effective stand age is about 83 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 38 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is below optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low. Thinning to provide more growing space for the better stems is not necessary at this time.

Total growing stock amounts to 83 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 17.1 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 14.1 cords of pulp wood and 1648.9 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock are inadequate to provide a fully stocked stand in themselves. Non-commercial saplings and poles represent 8 sq. ft. of basal area and may need to be treated prior to final harvest cutting.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand. A combination of undesirable understory plants and site limitations are likely to interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover and dense tall woody cover. The limitations on this stand include excessively wet soils.

MU F Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 8.3 sq.ft. of trees that produce high-quality hard mast (black oak, black walnut, northern red oak, scarlet oak and white oak), and 65.0 sq.ft. of other hard mast producers (black cherry, red maple, northern catalpa, blackgum, red pine and sugar maple). There were no species that produce any hard mast reported in the understory data.

The stand has two species that produce high-quality soft mast totaling a basal area of 31.7 sq.ft. (black cherry and blackgum) and no other soft mast producing trees. The understory data has three species that produce high-quality soft mast (blueberry, rubus and smilax) and no other soft mast producing species.

This stand contains two species that produce high-quality browse (rubus and smilax) and one species that produce lesser quality browse (blueberry). The distribution of browse across the stand is adequate, 33.3 percent of plots have at least one browse species.

This stand has two species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 31.7 sq.ft. (black cherry and white oak). Another seven species totaling 15.0 sq.ft. provide some additional food value (northern catalpa, black oak, black walnut, blackgum, northern red oak, scarlet oak and sugar maple). The understory has one species that provides exceptional additional wildlife food in the form of insects and nectar (rubus). Another two species provide some additional food value (blueberry and smilax). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 3.3 sq.ft. of sawtimber size trees that have exceptional value as snags (sugar maple and white oak).

Stand Structure and Composition - The stand has one evergreen tree species with a basal area of 1.7 sq.ft. (red pine). The understory has one ericaceous species (blueberry) and no evergreen species.

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.00	0.00	
Poles	1.67	2.00	blackgum
Small sawtimber	0.00	0.00	
Medium sawtimber	0.00	0.00	
Large sawtimber	0.00	0.00	
Total	1.67	2.00	blackgum

Recommendations for MU F

- a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them with **herbicide application**. This unit seemed to have invasive species throughout the unit. **Follow all PNDI guidance found in [Appendix C](#)**. Scattered exotics should also be treated as far as is logistically practical. Japanese stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.
- b. Silvah recommends **defer cutting** due to low density.
- c. This stand has **66.7 percent** of the understory plots stocked **with grapevines**. **Treat the vines regardless of the harvesting options**.

Management Unit – MU G

Area: 26.9 acres

MU G consists of the old stands 25, 26, and 28 (see mapping in [Appendix B](#)). Running along both sides of Scotia Range Road, the unit is bounded by the property boundary with SGL 176 on the north and west and a power line right-of-way on the south and east.

Most of the invasive species seemed to occur along the sides of the road and in old stand 25. There were no invasives in the overstory, eight invasives in the understory (Japanese barberry, privet, burning bush, oriental bittersweet, multiflora rose, Japanese stiltgrass, bush honeysuckle and autumn olive), and nine that were found outside the plots (Japanese barberry, privet, burning bush, oriental bittersweet, multiflora rose, Japanese stiltgrass, bush honeysuckle, autumn olive and garlic mustard).

This Mixed Oak stand is dominated by Aspen, Red Maple, White Oak, Scarlet Oak, Black Oak, Birch and Hickory which together comprise 88 percent of the basal area. This is a medium sawtimber stand, with average medial diameter of 14.8 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 13 years. Effective stand age is about 100 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 82 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is higher than optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably moderate, while growth rate of the medium and smaller-sized trees is probably fair and mortality due to crowding moderate. Thinning to provide more growing space for the better stems is desirable if it will at least pay the cost of harvesting.

Total growing stock amounts to 123 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 28.5 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 18.5 cords of pulp wood and 5752.5 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves. Non-commercial saplings and poles represent 6 sq. ft. of basal area and may need to be treated prior to final harvest cutting.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover.

MU G Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 42.1 sq.ft. of trees that produce high-quality hard mast (white oak, scarlet oak, black oak, northern red oak, pin oak and ironwood), and 72.6 sq.ft. of other hard mast producers (aspen, red maple, blackgum, black locust, sugar maple, Virginia pine, white pine and black cherry). The understory data has three species that produce high-quality hard mast (black oak, ironwood and northern red oak) and seven of other hard mast producers (aspen, black locust, blackgum, blue beech, red maple, Virginia pine and white pine).

The stand has two species that produce high-quality soft mast totaling a basal area of 3.2 sq.ft. (blackgum and black cherry) and no other soft mast producing trees. The understory data has three species that produce high-quality soft mast (blackgum, blueberry and sassafras) and no other soft mast producing species.

This stand contains three species that produce high-quality browse (black oak, blackgum and northern red oak) and seven species that produce lesser quality browse (birch, black locust, blueberry, ironwood, red maple, sassafras and white pine). The distribution of browse across the stand is good, 89.5 percent of plots have at least one browse species.

This stand has three species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 28.4 sq.ft. (white oak, black locust and black cherry). Another eight species totaling 21.6 sq.ft. provide some additional food value (scarlet oak, black oak, northern red oak, blackgum, sugar maple, pin oak, white pine and ironwood). The understory has one species that provides exceptional additional wildlife food in the form of insects and nectar (black locust). Another seven species provide some additional food value (black oak, blackgum, blueberry, ironwood, northern red oak, sassafras and white pine). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 54.2 sq.ft. of sawtimber size trees that have exceptional value as snags (aspen, white oak, black locust, sugar maple, Virginia pine and white pine).

Stand Structure and Composition - The stand has two evergreen tree species with a basal area of 2.6 sq.ft. (Virginia pine and white pine). The understory has two evergreen species (Virginia pine and white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.00	0.00	
Poles	2.11	1.71	blackgum and ironwood
Small sawtimber	1.05	0.85	blackgum
Medium sawtimber	0.00	0.00	
Large sawtimber	0.00	0.00	
Total	3.16	2.56	blackgum and ironwood

Recommendations for MU G

- a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. This unit seemed to have most of the invasive species on the edges of Scotia Run Road and along the trail between the road and the powerline. **Follow all PNDI guidance found in [Appendix C](#)** (i.e. conduct activities in September). Scattered exotics should also be treated as far as is logistically practical. Japanese stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of Japanese stiltgrass should be obvious even when it is not green. After removing large patches of Japanese stiltgrass, reseed bare soil with a pollinator mix to prevent/control resurrection of the Japanese stiltgrass.
- b. SILVAH has recommended a **Defer Cutting (low volume)**. Saplings are not a major stand component (10.5 sq.ft.). There is not enough volume for a commercial sale. Defer any cutting and re-examine the stand in about 10 or 15 years. **Warnings** - The relative density (82.2) is just above the 80% decision point in Chart C; It might be more appropriate to defer cutting at this time.
- c. This stand has **63.2 percent** of the understory plots stocked with **grapevines**. In stands with more than 30 percent of the understory plots stocked with grapevines, it is usually advisable to **treat the vines**.

Management Unit – MU H

Area: 10.5 acres

MU H consists of the old stands 20, 29, and 30 (see mapping in [Appendix B](#)). It is bounded on the north by a large wetland area, on the east by farm fields, and on the south by game lands.

There were no invasives in the overstory, six invasives in the understory (bush honeysuckle, multiflora rose, privet, oriental bittersweet, Japanese barberry and garlic mustard), and six that were found outside the plots (bush honeysuckle, multiflora rose, privet, oriental bittersweet, Japanese barberry and garlic mustard).

This Mixed Oak stand is dominated by White Oak, Red Maple, Black Cherry, Red Oak and White Pine which together comprise 86 percent of the basal area. This is a large sawtimber stand, with average medial diameter of 16.9 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 108 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 100 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is well above the optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably moderate, while growth rate of the medium and smaller-sized trees is probably poor and mortality due to crowding high.

Total growing stock amounts to 148 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 34.7 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 20.8 cords of pulp wood and 8307.3 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Large competitive regeneration in the sapling and small pole sizes is abundant, probably as a result of heavy cutting in the past. This understory will respond to form the next stand if the overstory is removed. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover and dense fern cover.

MU H Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 58.9 sq.ft. of trees that produce high-quality hard mast (white oak, northern red oak, black oak, scarlet oak and American chestnut), and 84.4 sq.ft. of other hard mast producers (red maple, black cherry, blackgum, white pine, aspen, eastern hemlock and sugar maple). The understory data has two species that produce high-quality hard mast (black oak and white oak) and three of other hard mast producers (blackgum, red maple and white pine).

The stand has three species that produce high-quality soft mast totaling a basal area of 42.2 sq.ft. (black cherry, blackgum and flowering dogwood) and no other soft mast producing trees. The understory data has two species that produce high-quality soft mast (blackgum and blueberry) and no other soft mast producing species.

This stand contains three species that produce high-quality browse (black oak, blackgum and white oak) and four species that produce lesser quality browse (blueberry, hickory, red maple and white pine). The distribution of browse across the stand is good, 88.9 percent of plots have at least one browse species.

This stand has three species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 56.7 sq.ft. (white oak, black cherry and American chestnut). Another eight species totaling 57.8 sq.ft. provide some additional food value (blackgum, northern red oak, white pine, black oak, scarlet oak, flowering dogwood, eastern hemlock and sugar maple). The understory has one species that provides exceptional additional wildlife food in the form of insects and nectar (white oak). Another four species provide some additional food value (black oak, blackgum, blueberry and white pine). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 42.2 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak, white pine, aspen, eastern hemlock and sugar maple).

Stand Structure and Composition - The stand has two evergreen tree species with a basal area of 12.2 sq.ft. (white pine and eastern hemlock). The understory has one evergreen species (white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class

	Basal Area	Percent BA	Species List
Saplings	6.67	4.51	blackgum and flowering dogwood
Poles	11.11	7.52	blackgum
Small sawtimber	1.11	0.75	blackgum
Medium sawtimber	0.00	0.00	
Large sawtimber	1.11	0.75	eastern hemlock
Total	20.00	13.53	blackgum, flowering dogwood and eastern hemlock

Recommendations for MU H

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them with **herbicide application**. **Follow all PNDI guidance found in [Appendix C](#)** (i.e. conduct activities in September). Scattered exotics should also be treated as far as is logistically practical. Japanese stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of Japanese stiltgrass should be obvious even when it is not green. After removing large patches of Japanese stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the Japanese stiltgrass.

b. SILVAH has recommended a **Commercial Thinning**. There is enough volume for a Commercial Thinning. The stand is mature and a Regeneration Establishment treatment can be considered by changing the Silvah option to “Create a new stand. In calculating the cut and residual stands, attempt to reduce relative stand density to 60 percent, but do not remove more than 35 percent of the stocking in any one cut. The cutting should be concentrated in the smaller, merchantable-size trees. Some larger trees should also be cut to open the canopy, improve spacing, and remove unacceptable growing stock. No non-merchantable saplings need to be cut. This type of thinning should tend to narrow the range of diameters and mold the stand structure (of the merchantable-size trees) into a more pronounced bell-shaped distribution. A commercial thinning should increase stand diameter and reduce the time required for the larger and better-quality trees to reach maturity. They should also increase the proportion of the most valuable species, and improve the average stand quality by removing the poorer stems. Include some high-wildlife value species (white oak, black cherry, blackgum, northern red oak, white pine, black oak, scarlet oak, flowering dogwood, chestnut, aspen, eastern hemlock, sugar maple and unspecified non-commercial) for retention in the thinning and TSI. Begin to identify islands of vertical structure for final overstory removal. A pulpwood only sale will yield 12 cords. **Warnings** - The stand is close to maturity (0 years), consider starting regeneration now. Change option to “Create a new stand” to see Regeneration Establishment treatments.

c. Alternatively, defer any harvesting and reevaluate in 10-15 years.

d. This stand has **33.3 percent** of the understory plots stocked **with grapevines**. In stands with more than 30 percent of the understory plots stocked with grapevines, it is usually advisable to **treat the vines**. This can be done by cutting the vines close to the ground. Canopy shade will usually prevent the sprouts from surviving. Where canopy density is low, or where harvest cutting will occur within a few years, cut the vines and treat the cut stumps with an herbicide.

Management Unit – MU I

Area: 13.9 acres

MU I consists of the unfenced, but shelterwood harvested, old Stands 21 and 22 (see mapping in [Appendix B](#)). Most of the area is now in 2-in saplings (some oak, red maple, devils walking stick). The overstory could probably be removed before the saplings get too much larger.

It appears that control of invasives done in conjunction with the previous harvest was not as successful as other units. Eighty percent of the plots contained invasive species. There were no invasives in the overstory, five invasives in the understory (Japanese barberry, privet, oriental bittersweet, multiflora rose and garlic mustard), and six that were found outside the plots (Japanese barberry, privet, oriental bittersweet, multiflora rose, garlic mustard and bush honeysuckle).

This Mesic Hardwood stand is dominated by Red Maple, Black Cherry, White Oak, Red Oak and White Pine which together comprise 88 percent of the basal area. Based on only the remaining overstory, this is a medium sawtimber stand, with average medial diameter of 16.0 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 117 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 49 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is below optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Total growing stock amounts to 56 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 11.8 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 6.5 cords of pulp wood and 3,191.9 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide enough stocking by themselves to warrant stand management.

Large competitive regeneration in the sapling and small pole sizes is abundant, probably as a result of heavy cutting in the past. This understory will respond to form the next stand if the overstory is removed. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover and dense tall woody cover.

MU I Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 14.0 sq.ft. of trees that produce high-quality hard mast (white oak, northern red oak, scarlet oak and black oak), and 40.0 sq.ft. of other hard mast producers (red maple, black cherry, white pine and aspen). The understory data has four species that produce high-quality hard mast (black oak, ironwood, northern red oak and white oak) and four of other hard mast producers (black cherry, blackgum, hawthorn and red maple).

The stand has one species that produce high-quality soft mast totaling a basal area of 8.0 sq.ft. (black cherry) and no other soft mast producing trees. The understory data has six species that produce high-quality soft mast (black cherry, blackgum, blueberry, devil's walkingstick, hawthorn and rubus) and no other soft mast producing species.

This stand contains six species that produce high-quality browse (black oak, blackgum, hawthorn, northern red oak, rubus and white oak) and seven species that produce lesser quality browse (birch, black cherry, blueberry, devil’s walkingstick, hickory, ironwood and red maple). The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has two species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 15.0 sq.ft. (black cherry and white oak). Another four species totaling 11.0 sq.ft. provide some additional food value (northern red oak, white pine, scarlet oak and black oak). The understory has three species that provides exceptional additional wildlife food in the form of insects and nectar (black cherry, rubus and white oak). Another seven species provide some additional food value (black oak, blackgum, blueberry, devil’s walkingstick, hawthorn, ironwood and northern red oak). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 11.0 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak, white pine and aspen).

Stand Structure and Composition - The stand has one evergreen tree species with a basal area of 4.0 sq.ft. (white pine). The understory has one ericaceous species (blueberry) and no evergreen species.

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings		0.00	
Poles		0.00	
Small sawtimber		0.00	
Medium sawtimber		0.00	
Large sawtimber		0.00	
Total		0.00	

Recommendations for MU I

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them with **herbicide application**. **Follow all PNDI guidance found in [Appendix C](#)**. Scattered exotics should also be treated as far as is logistically practical. Japanese stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of Japanese stiltgrass should be obvious even when it is not green. After removing large patches of Japanese stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the Japanese stiltgrass.

Silvah has recommended to **defer harvest** due to low density. However, the final removal of the overstory should be considered at this time.

b. Alternatively, **defer any harvest** and reevaluate in 10-15 years.

Management Unit – MU J

Area: 10.2 acres

MU J consists of the unfenced, but shelterwood harvested, old Stand 10 (see mapping in [Appendix B](#)). The area is very brushy, due to a shelterwood cut several years ago. Saplings are 10-12 ft high. Adjacent to Little Lion Park, there is a trail around much of the outer edge. Only 11% of the plots had established regeneration.

It appears that control of invasives done in conjunction with the previous harvest was not as successful as other units. Fifty-six percent of the plots contained invasive species. There were no invasives in the overstory, seven invasives in the overstory (privet, mile-a-minute weed, ailanthus, oriental bittersweet, multiflora rose, bush honeysuckle and autumn olive), and seven that were found outside the plots (privet, mile-a-minute weed, ailanthus, oriental bittersweet, bush honeysuckle, autumn olive and garlic mustard).

This Mixed Oak stand is dominated by White Oak, Red Oak, Non-Comm. Species, Black Cherry, Black Oak, Chestnut Oak and Other Oaks which together comprise 85 percent of the basal area. Based on the overstory, this is a large sawtimber stand, with average medial diameter of 23.5 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 163 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species would make it difficult to apply selection cutting.

Relative stand density is 44 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is below optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Total growing stock amounts to 59 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 14.7 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 5.9 cords of pulp wood and 5682.0 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide enough stocking by themselves to warrant stand management.

Large competitive regeneration in the sapling and small pole sizes is abundant, probably as a result of heavy cutting in the past. This understory will respond to form the next stand if the overstory is removed. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover and dense fern cover.

MU J Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 45.6 sq.ft. of trees that produce high-quality hard mast (white oak, northern red oak, black oak, chestnut oak, pin oak and scarlet oak), and 13.3 sq.ft. of other hard mast producers (pin cherry, black cherry, red maple, eastern hemlock and white pine). The understory data has four species that produce hard mast (black cherry, eastern hemlock, pin cherry and red maple), but none of these species produce high quality hard mast.

The stand has two species that produce high-quality soft mast totaling a basal area of 7.8 sq.ft. (pin cherry and black cherry) and no other soft mast producing trees. The understory data has five species that produce high-quality soft mast (black cherry, devil’s walkingstick, pin cherry, rubus and sassafras) and no other soft mast producing species.

This stand contains three species that produce high-quality browse (eastern hemlock, pin cherry and rubus) and four species that produce lesser quality browse (black cherry, devil’s walkingstick, red maple and sassafras). The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has three species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 24.4 sq.ft. (white oak, pin cherry and black cherry). Another seven species totaling 31.1 sq.ft. provide some additional food value (northern red oak, black oak, chestnut oak, pin oak, scarlet oak, eastern hemlock and white pine). The understory has three species that provides exceptional additional wildlife food in the form of insects and nectar (black cherry, pin cherry and rubus). Another three species provide some additional food value (devil’s walkingstick, eastern hemlock and sassafras). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 17.8 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak, eastern hemlock and white pine).

Stand Structure and Composition - The stand has two evergreen tree species with a basal area of 2.2 sq.ft. (eastern hemlock and white pine). The understory has one evergreen species (eastern hemlock) and no ericaceous species.

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.00	0.00	
Poles	0.00	0.00	
Small sawtimber	0.00	0.00	
Medium sawtimber	0.00	0.00	
Large sawtimber	1.11	1.89	eastern hemlock
Total	1.11	1.89	eastern hemlock

Recommendations for MU J

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them with **herbicide application**. **Follow all PNDI guidance found in [Appendix C](#)**. Scattered exotics should also be treated as far as is logistically practical. Japanese stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of Japanese stiltgrass should be obvious even when it is not green. After removing large patches of Japanese stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the Japanese stiltgrass.

Silvah has recommended to **defer harvest** due to low density. However, the final removal of the overstory should be considered at this time.

b. Alternatively, **defer any harvest** and reevaluate in 10-15 years.

Management Unit – MU K

Area: 16.7 acres

MU K consists of the old stands 2, 3, and 4 (see mapping in [Appendix B](#)). Trails are evident throughout the area. The unit is adjacent to residential properties on the northeast side. None of the plots tallied sufficiently established regeneration.

There were no invasives in the overstory, no invasives in the understory, and seven that were found nearby (bush honeysuckle, garlic mustard, Japanese barberry, Japanese stiltgrass, privet, oriental bittersweet and mile-a-minute weed).

This Mixed Oak stand is dominated by White Oak, White Pine, Red Maple and Scarlet Oak which together comprise 83 percent of the basal area. This is a large sawtimber stand, with average medial diameter of 17.5 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 122 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 122 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is well above the optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably moderate, while growth rate of the medium and smaller-sized trees is probably poor and mortality due to crowding high.

Total growing stock amounts to 168 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 41.1 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 24.2 cords of pulp wood and 9,913.6 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Large competitive regeneration in the sapling and small pole sizes is abundant, probably as a result of heavy cutting in the past. This understory will respond to form the next stand if the overstory is removed. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover and dense tall woody cover.

MU K Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 99.0 sq.ft. of trees that produce high-quality hard mast (white oak, scarlet oak, black oak and northern red oak), and 69.0 sq.ft. of other hard mast producers (white pine, red maple, sugar maple and aspen). The understory data has two species that produce hard mast (red maple and white pine), but none of these species produce high quality hard mast.

There were no species that produce any soft mast reported in the overstory data. The understory data has one species that produce high-quality soft mast (blueberry) and no other soft mast producing species.

This stand contains three species that produce browse (blueberry, red maple and white pine), none of these species produce high quality browse. The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has one species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 56.0 sq.ft. (white oak). Another five species totaling 92.0 sq.ft. provide some additional food value (white pine, scarlet oak, black oak, northern red oak and sugar maple). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 86.0 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak, white pine, sugar maple and aspen).

Stand Structure and Composition - The stand has one evergreen tree species with a basal area of 47.0 sq.ft. (white pine). The understory has one evergreen species (white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings		0.00	
Poles		0.00	
Small sawtimber		0.00	
Medium sawtimber		0.00	
Large sawtimber		0.00	
Total		0.00	

Recommendations for MU K

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them with **herbicide application**. **Follow all PNDI guidance found in [Appendix C](#)**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

b. SILVAH has recommended a **Commercial Thinning**. There is enough volume for a Commercial Thinning. The stand is mature and a Regeneration Establishment treatment can be considered by changing the Silvah option to “Create a new stand. In calculating the cut and residual stands, attempt to reduce relative stand density to 60 percent, but do not remove more than 35 percent of the stocking in any one cut. The cutting should be concentrated in the smaller, merchantable-size trees. Some larger trees should also be cut to open the canopy, improve spacing, and remove unacceptable growing stock. No non-merchantable saplings need to be cut. This type of thinning should tend to narrow the range of diameters and mold the stand structure (of the merchantable-size trees) into a more pronounced bell-shaped distribution. A commercial thinning should increase stand diameter and reduce the time required for the larger and better-quality trees to reach maturity. They should also increase the proportion of the most valuable species, and improve the average stand quality by removing the poorer stems. Include some high-wildlife value species (white oak, white pine, scarlet oak, black oak, northern red oak, sugar maple and aspen) for retention in the thinning and TSI. Begin to identify islands of vertical structure for final overstory removal. A combined sawtimber and pulpwood sale will yield 1,894 board-feet and 12 cords of pulpwood. A pulpwood only sale will yield 15 cords. **Warnings** - The stand is mature, consider starting regeneration now. Change option to “Create a new stand” to see Regeneration Establishment treatments.

Yields The yields pass the breakpoints for either a pulpwood-only or a combined sawlog/pulpwood sale.

- **A combined sawlog/pulpwood sale will yield 1,894 bd.ft. (Scribner) and 12 cords.**
- A sawlog-only sale will yield 1,894 bd.ft. (Scribner)
- **A pulpwood-only sale will yield 15 cords.**

c. Alternatively, **defer any harvesting** and reevaluate in 10-15 years.

Management Unit – MU L

Area: 23.1 acres

MU L consists of the unfenced, but harvested, portion of the old stand 1 and 5 (see mapping in [Appendix B](#)). What was an old pine plantation was treated for invasive species, harvested to allow regrowth as a hardwood forest, and planted with some white pine to provide some thermal cover. Visual screening from public view was accomplished by leaving some trees along the edges. Invasive species control was very successful. Nearly all the invasive species were found along the edges of the area. Only 2 plots (out of 8) contained non-native invasive species. However, while there is some spotty oak regeneration, none of the plots tallied sufficient regeneration to overcome high deer pressure.

There were no invasive species in the overstory, four invasives in the overstory (privet, garlic mustard, oriental bittersweet and bush honeysuckle), and six that were found outside the plots (privet, garlic mustard, oriental bittersweet, bush honeysuckle, Japanese barberry and Japanese stiltgrass). Note: a patch of mature cork trees was found on the northwest corner of MU L and several young cork trees were found nearby.

Based on the remaining overstory, this Mesic Hardwood stand is dominated by Black Cherry, Red Maple and Misc Comm. Species which together comprise 77 percent of the basal area. The overstory analyzes as a large sawtimber stand, with average medial diameter of 20.3 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 0 years. Effective stand age is about 121 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species would make it difficult to apply selection cutting.

Relative stand density is 9 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is below optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low.

Total growing stock amounts to 16 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 4.3 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 3.5 cords of pulp wood and 430.6 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock are inadequate to provide a fully stocked stand in themselves.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover.

MU L Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 3.8 sq.ft. of trees that produce high-quality hard mast (black walnut and white oak), and 12.5 sq.ft. of other hard mast producers (black cherry, red maple and white pine). The understory data has two species that produce high-quality hard mast (northern red oak and white oak) and one of other hard mast producers (red maple).

The stand has one species that produce high-quality soft mast totaling a basal area of 5.0 sq.ft. (black cherry) and no other soft mast producing trees. The understory data has two species that produce high-quality soft mast (blueberry and rubus) and no other soft mast producing species.

This stand contains three species that produce high-quality browse (northern red oak, rubus and white oak) and two species that produce lesser quality browse (blueberry and red maple). The distribution of browse across the stand is good, 87.5 percent of plots have at least one browse species.

This stand has two species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 6.3 sq.ft. (black cherry and white oak). Another two species totaling 5.0 sq.ft. provide some additional food value (black walnut and white pine). The understory has two species that provides exceptional additional wildlife food in the form of insects and nectar (rubus and white oak). Another two species provide some additional food value (blueberry and northern red oak). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - There are no snags recorded in your data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 3.8 sq.ft. of sawtimber size trees that have exceptional value as snags (white pine and white oak).

Stand Structure and Composition - The stand has two evergreen tree species with a basal area of 2.5 sq.ft. (white pine and unspecified commercial softwood). The understory has one ericaceous species (blueberry) and no evergreen species.

High Stand Structure Value Species by Size Class

	Basal Area	Percent BA	Species List
Saplings		0.00	
Poles		0.00	
Small sawtimber		0.00	
Medium sawtimber		0.00	
Large sawtimber		0.00	
Total		0.00	

Recommendations for MU L

a. An effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and treat them with **herbicide application**. **Follow all PNDI guidance found in [Appendix C](#)**. Scattered exotics should also be treated as far as is logistically practical.

Japanese stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of Japanese stiltgrass should be obvious even when it is not green. After removing large patches of Japanese stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

Based upon the remaining overstory, SILVAH has recommended a **Defer Cutting (low relative density)**. The relative density of the overstory is 8.6%, well below the 80% threshold considered necessary for a partial cut. In such a stand, the best prescription is to leave the stand alone for 10 or 15 years, and then re-examine it to see what treatment is appropriate at that time.

b. Unlike the other harvested areas on the property, this unit has not yet regenerated well.

Recommend leaving the overstory as a seed source and, typical advice would be to **consider planting and fencing** the area. The section of MU L that is west of Circleville Road could be fenced in the near-term. This section of MU L is in struggling the most to exhibit hope for a decent result from the previous overstory removal activity. Currently, due to a lack of desirable regeneration, deer are able to access every part of this approximately 8-9 acre section of MU L. Without an access impediment, deer will be able to continue their negative impacts. The approximately 12 acres area east of Circleville Road could be observed for a period of 5 years or so, but be aware that this section of MU L may need to be fenced as well, if regeneration is found to be inadequate.

Gray's Woods Preserve

a. Description

Gray's Woods Preserve is a 150-acre forested inholding to SGL 176. The Preserve also shares a common property boundary with Gray's Woods Park. Both of these Township properties were included in the forest inventory and forest management plan with the understanding that the Patton Township Open Space Stewardship Committee can only advance implementation recommendations for Gray's Woods Preserve. Gray's Woods Park forest management recommendations are not included in the implementation schedule or budget for Gray's Woods Preserve. In total, these properties encompass approximately 194 acres.

Gray's Woods Preserve can be accessed from two public roads. Heritage Trail Road bisects the property and is accessed from Scotia Range Road within SGL 176. The property can also be accessed by parking at the playground off of Grays Woods Boulevard. The parking lot is at the north end of the property (see mapping in [Appendix B](#)).

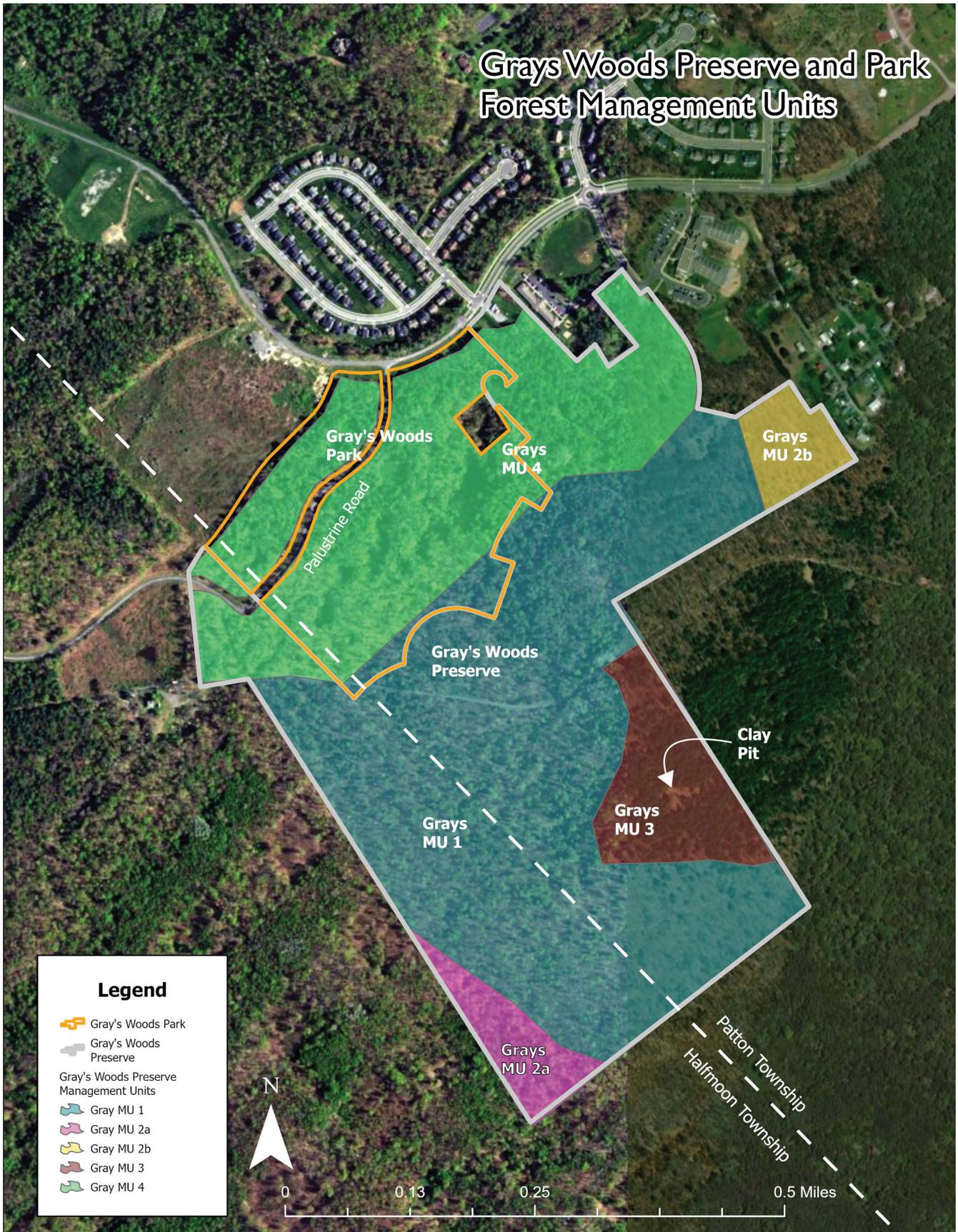
State agency responses to the **Pennsylvania Natural Diversity Index** (PNDI) report the potential presence of Eastern Spadefoot (*Scaphiopus holbrookii*, Threatened), and the presence of wetland species of concern. Additional guidance can be found in the PA Game Commission and DCNR responses at [Appendix C](#).

Sampling and Calculations: Sampling was done using a 10-factor prism for variable radius sample points. One hundred ninety-one (191) sample points were collected. Diameter breast height (DBH) was estimated in 2-inch size classes. All live trees 2-inch or more DBH were tallied. Regeneration data was gathered on all sample plots. Analysis was done using SILVAH software, a timber analysis software developed by the US Forest Service. All calculations use the Scribner rule form class 78. **Because each MU report prints out about 30 pages, full Silvah 7 analyses are provided electronically only.**

Overall, the area is calculated as a small saw timber property with a medial diameter of 12.4 inches diameter breast height (DBH). Deer impact is rated as high. Seed supply for desirable timber species is rated as low. The acorn supply was rated as 'some' indicating that oaks would supply sufficient acorns to regenerate in some, but not all, years. About 39 percent of the plots contained invasive species. Nonnative invasive species have the potential to displace native vegetation, including desirable timber species. **Invasive species included ailanthus, barberry, bush honeysuckle, multiflora rose, privet, forsythia, garlic mustard, stiltgrass, autumn olive, and oriental bittersweet.** One particular area contained heavy, nearly impenetrable barberry (see mapping in [Appendix B](#)). Eighty-seven percent of the plots contained interfering vegetation. Fifty-seven percent had tall woody interference. (birch, blackgum, pin cherry, sassafras, witch hazel, pitch pine, black locust, devil's walking stick, silky dogwood, and invasive species) Forty-three percent had low woody interference. Twenty-seven percent had interfering ferns. Twenty-seven percent had grapevines.

Soils at Grays Woods are mapped as mostly Morrison Sandy loam and Wyoming gravelly sandy loam, well drained soils. A portion of MUs 1 and 4 is mapped as Hagerstown silty clay loam (HcB), also considered well drained. Most of MU 3 is considered quarry (QU) soil. See maps at [Appendix B](#).

Grays Woods Preserve and Park Forest Management Units



Legend

- Gray's Woods Park
- Gray's Woods Preserve
- Gray's Woods Preserve Management Units
 - Gray MU 1
 - Gray MU 2a
 - Gray MU 2b
 - Gray MU 3
 - Gray MU 4

b. Management Unit descriptions and recommended actions

Management unit - MU 1 Area – 103 acres

MU 1 is by far the largest unit on the property (see mapping in [Appendix B](#)). It appears to have had a shelterwood seed cut around 2005-2008. Much of the area is in saplings between 12 and 25 ft tall with a few larger residual seed trees. Surprisingly, relatively few non-native invasive species were found inside MU 1, however, many were found along the previous skid trails (now hiking trails), especially in the small openings along the trails. A 4-wheeler trail runs southward along the west side boundary south of Heritage Trail Road for about $\frac{3}{4}$ of the way to the southern corner. A footpath continues around the remainder of the boundary.

Crown vetch was noted along Heritage Trail Road. There were no invasive species tallied in the overstory, seven invasives in the understory (Japanese barberry, Tatarian honeysuckle, multiflora rose, unspecified non-native shrub, garlic mustard, Japanese stiltgrass and autumn olive), and ten that were found outside the plots (Japanese barberry, Tatarian honeysuckle, multiflora rose, privet, forsythia, garlic mustard, Japanese stiltgrass, autumn olive, ailanthus and oriental bittersweet). A single Ailanthus (sapling) was located along the Heritage trail road under the powerline.

This mixed oak stand is dominated by Red Maple, Chestnut Oak, White Oak, Black Oak, Aspen, Non-Comm. Species, White Pine and Scarlet Oak which together comprise 89 percent of the basal area. This is a small sawtimber stand, with average medial diameter of 10.9 inches. Sapling trees too small to be merchantable represent a significant proportion of stand stocking and should be included in any thinnings. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 25 years. Effective stand age is about 85 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species would make it difficult to apply selection cutting.

Relative stand density is 74 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is in the optimum range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low. Thinning to provide more growing space for the better stems is not necessary at this time. Total growing stock amounts to 85 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 14.5 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 9.9 cords of pulp wood and 2531.8 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Large competitive regeneration in the sapling and small pole sizes is abundant, probably as a result of heavy cutting in the past. This understory will respond to form the next stand if the overstory is removed. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover. A clear browse line exists south of Heritage Trail Road. However, observations of the most deer occurred north of Heritage Trail. Perhaps the availability of water outweighed the wariness to human activity.

MU 1 Information on Wildlife Habitat

Mast, Forage and Browse resources - Hard mast such as hickory nuts, acorns and beech nuts are foods that can be consumed immediately or stored for use during the winter season. They are required by many wildlife species, including bears, squirrels and mice. The stand has 40.0 sq.ft. of trees that produce high-quality hard mast (chestnut oak, white oak, black oak, scarlet oak, northern red oak, pitch pine, pin oak and bur oak), and 38.3 sq.ft. of other hard mast producers (red maple, aspen, white pine, black cherry, blackgum, pin cherry, black locust and sugar maple). The understory data has six species that produce high-quality hard mast (black oak, blackjack oak, chestnut oak, northern red oak, scarlet oak and white oak) and seven of other hard mast producers (aspen, black cherry, blackgum, pin cherry, red maple, white pine and witchhazel).

Soft mast (fruits), such as cherries and berries are high energy foods required by many wildlife species including bears and many species of migrating songbirds where high energy sources are of key importance during fall migration. The stand has four species that produce high-quality soft mast totaling a basal area of 6.7 sq.ft. (sassafras, black cherry, blackgum and pin cherry) and no other soft mast producing trees. The understory data has ten species that produce high-quality soft mast (black cherry, blackgum, blueberry, flowering dogwood, grape, pin cherry, rubus, sassafras, serviceberry and smilax) and one of other soft mast producers (witchhazel).

Browse is a critical food resource for herbivores such as deer and rabbits. Because most herbivores of concern are ground foragers, only understory vegetation is considered in this report. This stand contains ten species that produce high-quality browse (black oak, blackgum, blackjack oak, chestnut oak, grape, northern red oak, pin cherry, rubus, smilax and white oak) and eleven species that produce lesser quality browse (birch, black cherry, blueberry, flowering dogwood, hickory, red maple, sassafras, scarlet oak, serviceberry, white pine and witchhazel). The distribution of browse across the stand is good, 94.1 percent of plots have at least one browse species.

This stand has five species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 15.1 sq.ft. (white oak, black cherry, pin cherry, black locust and bur oak). Another nine species totaling 34.6 sq.ft. provide some additional food value (chestnut oak, black oak, white pine, sassafras, scarlet oak, northern red oak, blackgum, pin oak and sugar maple). The understory has four species that provides exceptional additional wildlife food in the form of insects and nectar (black cherry, pin cherry, rubus and white oak).

Another fourteen species provide some additional food value (black oak, blackgum, blackjack oak, blueberry, chestnut oak, flowering dogwood, grape, northern red oak, sassafras, scarlet oak, serviceberry, smilax, white pine and witchhazel). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - Snags and den trees provide shelter for a wide variety of wildlife including owls, ducks, woodpeckers, songbirds, squirrels, fishers, and other mammals. They are also used for foraging by various birds, mammals and amphibians. There are no snags recorded in the data. Research suggests a minimum of 3 snags per acre of varying diameter and stage of decay. To create snags (by girdling), this stand has 14.8 sq.ft. of sawtimber size trees that have exceptional value as snags (white oak, aspen, white pine, sassafras, black locust and sugar maple).

Stand Structure and Composition - Structurally diverse forests support a greater diversity of wildlife. Understory structure provides foraging and nesting substrate, and escape and roosting cover for birds and mammals. Evergreen and ericaceous species provide thermal cover, structural complexity, nesting and foraging substrate, and compositional (or habitat) diversity for deer, grouse, turkey, black-throated green and -blue warblers, and other species. The stand has two evergreen tree species with a basal area of 4.3 sq.ft. (white pine and pitch pine). The understory has one evergreen species (white pine) and one ericaceous species (blueberry).

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

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.10	0.12	blackgum
Poles	0.79	0.94	blackgum
Small sawtimber	0.10	0.12	blackgum
Medium sawtimber	0.10	0.12	blackgum
Large sawtimber	0.00	0.00	
Total	1.09	1.29	blackgum

Recommendations for MU 1

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass. Additionally, all invasives that are found along the hiking trails, especially in the “wide spot” openings along the trail should be killed. Along with pollinator mix ground seeding, these openings should be planted with trees that will create a much-needed shade layer to prevent a reinfestation of invasive plants and shrubs.

b. There is an approximately 1 acre opening in the northeast corner of MU 1. The opening is filling with invasive plants. Following invasive plant treatment, this 1-acre opening could be purposely disturbed (possibly with a soil conditioner), and planted with a pollinator mix. Also, this 1-acre area should be planted with trees that will eventually add a shade layer that prevents reinfestation by invasive plants and shrubs.

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

d. Because of the juxtaposition to SGL 176 and the late successional management strategy being implemented by the PA Game Commission in close proximity to Gray's Woods Preserve, a unique and strategic cross boundary management opportunity exists in partnership with the PA Game Commission and their 400 Areas Program. Following invasive control within MU 1, a (non-commercial) forest management project will be designed and implemented in partnership with the PA Game Commission to improve forest health with an emphasis on enhancing late successional habitat characteristics including increased down woody debris and improved forest structure. The inferior (lower productivity) trees in MU 1 should be felled. Trees chosen for felling will primarily be those in the suppressed and intermediate crown classes, but lower quality co-dominant trees of less desirable species may also be felled. The felled trees will not be moved or removed. Branches of felled trees will not be cut (or "lopped") – the tops of felled trees will be left intact.

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

Management Unit -MU 2 Area – 12.3 acres

MU 2 consists of MU 2a in the southwest corner and 2b in the north east corner near Marysville Lane (see mapping at [Appendix B](#)). This area is relatively undisturbed when compared to MU 1 with larger trees and few saplings/poles.



A small shed in a state of disrepair was found in the extreme eastern corner of MU 2b.

There were no invasives in the overstory, five invasives in the understory (Japanese barberry, Tatarian honeysuckle, garlic mustard, privet and oriental bittersweet), and nine that were found outside the plots (Japanese barberry, Tatarian honeysuckle, garlic mustard, Privet, oriental bittersweet, Japanese stiltgrass, multiflora rose, autumn olive and ailanthus). Oriental bittersweet was located in MU 2b.

This mixed oak stand is dominated by Red Maple, Aspen, Black Oak, Scarlet Oak, White Oak and Black Cherry which together comprise 86 percent of the basal area. This is a small sawtimber stand, with average medial diameter of 12.0 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 27 years. Effective stand age is about 79 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species would make it difficult to apply selection cutting.

Relative stand density is 77 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is in the optimum range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low. Thinning to provide more growing space for the better stems is not necessary at this time.

Total growing stock amounts to 98 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 19.6 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 15.2 cords of pulp wood and 2447.4 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover.

MU 2 - Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 32.5 sq.ft. of trees that produce high-quality hard mast (black oak, scarlet oak, white oak, black walnut, chestnut oak, northern red oak and pitch pine), and 59.2 sq.ft. of other hard mast producers (red maple, aspen and black cherry). The understory data has two species that produce high-quality hard mast (black oak and blackjack oak) and three of other hard mast producers (aspen, black cherry and red maple).

The stand has two species that produce high-quality soft mast totaling a basal area of 6.7 sq.ft. (black cherry and sassafras) and no other soft mast producing trees. The understory data has three species that produce high-quality soft mast (black cherry, blueberry and sassafras) and no other soft mast producing species.

This stand contains two species that produce high-quality browse (black oak and blackjack oak) and four species that produce lesser quality browse (black cherry, blueberry, red maple and sassafras). The distribution of browse across the stand is good, 75.0 percent of plots have at least one browse species.

This stand has two species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 12.5 sq.ft. (white oak and black cherry). Another six species totaling 25.8 sq.ft. provide some additional food value (black oak, scarlet oak, black walnut, chestnut oak, northern red oak and sassafras). The understory has one species that provides exceptional additional wildlife food in the form of insects and nectar (black cherry). Another four species provide some additional food value (black oak, blackjack oak, blueberry and sassafras). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - To create snags (by girdling), this stand has 16.7 sq.ft. of sawtimber size trees that have exceptional value as snags (aspen, white oak and sassafras).

Stand Structure and Composition - The stand has one evergreen tree species with a basal area of 0.8 sq.ft. (pitch pine). The understory has one ericaceous species (blueberry) and no evergreen species.

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings		0.00	
Poles		0.00	
Small sawtimber		0.00	
Medium sawtimber		0.00	
Large sawtimber		0.00	
Total		0.00	

Recommendations for MU 2

a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

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

Warnings - The relative density (77.2) is just below the 80% decision point; a **Thinning Prescription** may be appropriate.

Because of the juxtaposition to SGL 176 and the late successional management strategy being implemented by the PA Game Commission in close proximity to Gray's Woods Preserve, a unique and strategic cross boundary management opportunity exists in partnership with the PA Game Commission and their 400 Areas Program. Following invasive control within MU 1, a (non-commercial) forest management project will be designed and implemented in partnership with the PA Game Commission to improve forest health with an emphasis on enhancing late successional habitat characteristics including increased down woody debris and improved forest structure. The inferior (lower productivity) trees in MU 1 should be felled. Trees chosen for felling will primarily be those in the suppressed and intermediate crown classes, but lower quality co-dominant trees of less desirable species may also be felled. The felled trees will not be moved or removed. Branches of felled trees will not be cut (or "lopped") – the tops of felled trees will be left intact. This strategy goes hand in hand with the above recommendation to "defer harvesting" by not only allowing additional time (and growth), but also adding to this with the additional benefits provided by the enhancement of late successional habitat characteristics.

c. This stand has **50.0 percent of the understory plots stocked with grapevines**. In stands with more than 30 percent of the understory plots stocked with grapevines, it is usually **advisable to treat the vines**. This can be done by cutting the vines close to the ground. Canopy shade will usually prevent the sprouts from surviving. Where canopy density is low, or where harvest cutting will occur within a few years, cut the vines and treat the cut stumps with an herbicide.

Management Unit - MU 3 Area – 14.0 acres

MU 3 appears to have evidence related to the Scotia iron mine referred to in the previous biological study (see mapping in [Appendix B](#)) and is often referred to as the “clay pit” (see map on page 43). The terrain is obviously disturbed by human activity (steep slopes, deep trenches, spoil piles of iron ore rock). This could be a historically significant site and may need to be checked with the State Historical Preservation Office due to the large number of historical smelting furnaces in the region. The tree canopy is mostly conifer (white pine and pitch pine). A large sand hill remains (i.e., clay pit). Large trees are at the top, so the origin is not obvious on the aerial imagery. However, it appears to be extensively used by ATVs for hill climbing.

There were no invasives in the overstory, two invasives in the understory (Japanese stiltgrass and Tatarian honeysuckle), and nine that were found outside the plots and nearby (Japanese stiltgrass, Tatarian honeysuckle, Japanese barberry, multiflora rose, garlic mustard, autumn olive, privet, ailanthus and oriental bittersweet).

This unknown type stand is dominated by White Pine, Pine, Black Oak, Chestnut Oak and Red Maple which together comprise 89 percent of the basal area. This is a small sawtimber stand, with average medial diameter of 13.0 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 24 years. Effective stand age is about 94 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 89 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is higher than optimum for best individual tree growth. At this relative density, growth rate of the biggest trees is probably moderate, while growth rate of the medium and smaller-sized trees is probably fair and mortality due to crowding moderate. Thinning to provide more growing space for the better stems is desirable if it will at least pay the cost of harvesting.

Total growing stock amounts to 124 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 25.5 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 15.7 cords of pulp wood and 5,498 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves. Non-commercial saplings and poles represent 6 sq. ft. of basal area and may need to be treated prior to final harvest cutting.

Competitive seedlings are not abundant; they will provide adequate natural regeneration only if supplemented with residual stems retained from the present overstory and protected from deer browsing. Undesirable understory plants may interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover.

MU 3 - Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 40.0 sq.ft. of trees that produce high-quality hard mast (pitch pine, black oak, chestnut oak, northern red oak and scarlet oak), and 75.0 sq.ft. of other hard mast producers (white pine, red maple, aspen and blackgum). The understory data has five species that produce high-quality hard mast (black oak, blackjack oak, chestnut oak, northern red oak and pitch pine) and three of other hard mast producers (blackgum, red maple and white pine).

The stand has two species that produce high-quality soft mast totaling a basal area of 2.5 sq.ft. (sassafras and blackgum) and no other soft mast producing trees. The understory data has two species that produce high-quality soft mast (blackgum and blueberry) and no other soft mast producing species.

This stand contains five species that produce high-quality browse (black oak, blackgum, blackjack oak, chestnut oak and northern red oak) and four species that produce lesser quality browse (birch, blueberry, red maple and white pine). The distribution of browse across the stand is good, 100.0 percent of plots have at least one browse species.

This stand has seven species that provides additional wildlife food in the form of insects and nectar totaling a basal area of 90.0 sq.ft. (white pine, black oak, chestnut oak, sassafras, northern red oak, scarlet oak and blackgum). None of these species provide high-quality food. The understory has seven species that provides additional wildlife food in the form of insects and nectar (black oak, blackgum, blackjack oak, blueberry, chestnut oak, northern red oak and white pine). None of these species provide high-quality food. These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - To create snags (by girdling), this stand has 40.0 sq.ft. of sawtimber size trees that have exceptional value as snags (white pine, aspen and sassafras).

Stand Structure and Composition - The stand has two evergreen tree species with a basal area of 78.8 sq.ft. (white pine and pitch pine). The understory has two evergreen species (pitch pine and white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.00	0.00	
Poles	0.63	0.51	blackgum
Small sawtimber	0.00	0.00	
Medium sawtimber	0.00	0.00	
Large sawtimber	0.00	0.00	
Total	0.63	0.51	blackgum

Recommendations for MU 3

a. An effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.

b. SILVAH has recommended a **Commercial Thinning**. The stand is not yet mature (24 years to maturity) and the user does not wish to begin regeneration now. The stand will not be fully mature for another 24 years, but there is enough volume for a Commercial Thinning. Stands at or above 80 percent relative density should generally receive a commercial thinning at this time. In calculating the cut and residual stands, attempt to reduce relative stand density to 60 percent, but do not remove more than 35 percent of the stocking in any one cut. The cutting should be concentrated in the smaller, merchantable-size trees. Some larger trees should also be cut to open the canopy, improve spacing, and remove unacceptable growing stock. No non-merchantable saplings need to be cut. This type of thinning should tend to narrow the range of diameters and mold the stand structure (of the merchantable-size trees) into a more pronounced bell-shaped distribution. A commercial thinning should increase stand diameter and reduce the time required for the larger and better-quality trees to reach maturity. They should also increase the proportion of the most valuable species, and improve the average stand quality by removing the poorer stems. Include some high-wildlife value species (white pine, black oak, chestnut oak, aspen, sassafras, northern red oak, scarlet oak and blackgum) for retention in the thinning and TSI. Begin to identify islands of vertical structure for final overstory removal. A pulpwood only sale will yield 8 cords/ac.

Yields for a commercial thinning - The yield (per ac) only passes the breakpoint for a pulpwood-only sale.

- A combined sawlog/pulpwood sale will yield 848 bd.ft. (Scribner) and 7 cords.
- A sawlog-only sale will yield 848 bd.ft. (Scribner).
- A pulpwood-only sale will yield 8 cords. About 47% of the basal area harvested (39 sq.ft.) will be UGS. This will result in removal of about 74% of the UGS in this stand, and 100% of the merchantable-size UGS.

b. **Recommend no harvesting to preserve cultural site and to develop pollinator habitat.**

Non-commercial forest management that enhances the habitat value for specialist pollinators and tiger beetles is recommended.

Because of the juxtaposition to SGL 176 and the late successional management strategy being implemented by the PA Game Commission in close proximity to Gray's Woods Preserve, a unique and strategic cross boundary management opportunity exists in partnership with the PA Game Commission and their 400 Areas Program. Following invasive control within MU 1, a (non-commercial) forest management project will be designed and implemented in partnership with the PA Game Commission to improve forest health with an emphasis on enhancing late successional habitat characteristics including increased down woody debris and improved forest structure. The inferior (lower productivity) trees in MU 1 should be felled. Trees chosen for felling will primarily be those in the suppressed and intermediate crown classes, but lower quality co-dominant trees of less desirable species may also be felled. The felled trees will not be moved or removed. Branches of felled trees will not be cut (or "lopped") – the tops of felled trees will be left intact. To preserve this cultural site and to enhance pollinator habitat, commercial harvest is not recommended. Additionally, areas of MU 3 not managed for pollinators will be included in the late-successional management strategy recommended for MU 1 and MU 2.

Management Unit - MU 4

Area – 62.9 acres

MU 4 is largely managed by Patton Township as Gray's Woods Park with a small parking area, a playground, and small signs posted through the wooded area (Purple line thru middle of area on map in [Appendix B](#)) prohibiting hunting.



Thick Japanese barberry understory

Heavy barberry (indicated in red area on map in [Appendix B](#)) exists along the edge with MU 1. Barberry was so heavy in this area, walking more on the bushes than on the ground was common.

Several wetlands are located within this MU (light blue on map). Some were an acre or more in size. Some were just potholes. Most were wet, but some were dry with trees and grass growing. The only evidence of wetland in the dry areas was mud stains on the bottom 18 inches of trees and the presence of sedges. Many of the wetlands appear to have been delineated with flagging (a pink/blue combination for actual wet area and orange flags for buffer).



Dry wetland



Typical wetland

Gray's Woods Elementary School is very close to the eastern corner of this MU. Most of the invasive species seemed to occur in this MU. One Oriental bittersweet encountered in transect, not on plot. A 1.2 ac exclusion appears to be privately owned (according to onXmaps and identified as Outparcel C on the recorded Subdivision Plan for Gray's Woods Planned Community Open Space Lot#3) though inventory personnel could find no evidence of boundary delineation other than the paths seemed to avoid the area (see map on page 43). A single woodcock was noted. Several large windthrown trees were found.

About 55% of the plots contained non-native invasive species. There were no invasives in the overstory, seven invasives in the understory (multiflora rose, Tatarian honeysuckle, autumn olive, Japanese barberry, privet, garlic mustard and Japanese stiltgrass), and nine that were found outside the plots (multiflora rose, Tatarian honeysuckle, autumn olive, Japanese barberry, privet, garlic mustard, Japanese stiltgrass, oriental bittersweet and ailanthus).

This stand is dominated by Red Maple, White Pine, White Oak, Misc Comm. Species, Black Cherry, Aspen and Red Oak which together comprise 89 percent of the basal area. This is a medium sawtimber stand, with average medial diameter of 13.8 inches. If this stand is managed under an even-age silvicultural system, the several species groups will mature at markedly different times. The average time to maturity (MDM = 18 inches) is 19 years. Effective stand age is about 90 years. If this stand is managed under an all-age silvicultural system, the distribution of diameters, proportion of sawtimber, and density of shade-tolerant species are adaptable to selection cutting.

Relative stand density is 77 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition. This density is in the optimum range for best individual tree growth. At this relative density, growth rate of the biggest trees is probably excellent, while growth rate of the medium and smaller-sized trees is probably good and mortality due to crowding low. Thinning to provide more growing space for the better stems is not necessary at this time.

Total growing stock amounts to 107 sq. ft. of basal area per acre. Net total volume in all trees, to a 4-inch top, is 23.6 cords per acre; if divided into pulpwood and sawtimber, the net merchantable volume is 16.7 cords of pulp wood and 3928.9 board feet of sawtimber (Scribner log rule). Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves.

Competitive regeneration of all types is insufficient; harvest cuttings at this time will not likely result in a satisfactory new stand. A combination of undesirable understory plants and site limitations are likely to interfere with development of regeneration. Undesirable plants in this stand include dense low woody cover, dense tall woody cover, dense fern cover and dense grass cover. The limitations on this stand include excessively wet soils.

MU 4 - Information on Wildlife Habitat

Mast, Forage and Browse resources - The stand has 31.6 sq.ft. of trees that produce high-quality hard mast (white oak, northern red oak, scarlet oak, black oak, honeylocust, black walnut, blackjack oak and pin oak), and 72.3 sq.ft. of other hard mast producers (red maple, white pine, black cherry, blackgum, aspen and black locust). The understory data has seven species that produce high-quality hard mast (American chestnut, black oak, blackjack oak, honeylocust, northern red oak, scarlet oak and white oak) and five of other hard mast producers (black cherry, black locust, blackgum, red maple and white pine).

The stand has three species that produce high-quality soft mast totaling a basal area of 11.6 sq.ft. (black cherry, blackgum and serviceberry) and no other soft mast producing trees. The understory data has seven species that produce high-quality soft mast (black cherry, blackgum, blueberry, devil's walkingstick, sassafras, silky dogwood and smilax) and no other soft mast producing species.

This stand contains six species that produce high-quality browse (black oak, blackgum, blackjack oak, northern red oak, smilax and white oak) and ten species that produce lesser quality browse (birch, black cherry, black locust, blueberry, devil's walkingstick, honeylocust, red maple, sassafras, scarlet oak and white pine). The distribution of browse across the stand is good, 80.6 percent of plots have at least one browse species.

This stand has three species that provides exceptional additional wildlife food in the form of insects and nectar totaling a basal area of 27.4 sq.ft. (white oak, black cherry and black locust). Another ten species totaling 41.9 sq.ft. provide some additional food value (white pine, blackgum, northern red oak, scarlet oak, black oak, honeylocust, black walnut, blackjack oak, pin oak and serviceberry). The understory has four species that provides exceptional additional wildlife food in the form of insects and nectar (American chestnut, black cherry, black locust and white oak). Another twelve species provide some additional food value (black oak, blackgum, blackjack oak, blueberry, devil's walkingstick, honeylocust, northern red oak, sassafras, scarlet oak, silky dogwood, smilax and white pine). These additional food resources support many songbirds and pollinators.

Snags Cavities and Dens - To create snags (by girdling), this stand has 32.9 sq.ft. of sawtimber size trees that have exceptional value as snags (white pine, white oak, aspen and black locust).

Stand Structure and Composition - The stand has one evergreen tree species with a basal area of 24.2 sq.ft. (white pine). The understory has one evergreen species (white pine) and one ericaceous species (blueberry).

High Stand Structure Value Species by Size Class			
	Basal Area	Percent BA	Species List
Saplings	0.65	0.61	blackgum
Poles	1.61	1.51	blackgum and serviceberry
Small sawtimber	1.77	1.66	blackgum
Medium sawtimber	1.13	1.06	blackgum
Large sawtimber	0.65	0.61	blackgum
Total	5.81	5.45	blackgum and serviceberry

Recommendations for MU 4

- a. Before opening the canopy, an effort should be made to identify the worst patches of **exotic shrubs and herbaceous vegetation** (ferns, grasses, invasive species) and kill them by **herbicide application**. Scattered exotics should also be treated as far as is logistically practical. Stiltgrass and garlic mustard should be controlled along trails, streams, and in openings to the fullest extent possible. Patches of stiltgrass should be obvious even when it is not green. After removing large patches of stiltgrass, reseed bare soil with a **pollinator** mix to prevent/control resurrection of the stiltgrass.
- b. SILVAH has recommended **Defer Cutting** (low relative density). The stand is not yet mature (19 years to maturity) and the user does not wish to begin regeneration now. The relative density is 77.2% which is below the 80% threshold considered necessary for a partial cut. Immature or all-aged stands that are within or below the optimum range of stand density do not need any sort of partial cutting. In such a stand, the best prescription is to leave the stand alone for 10 or 15 years, and then re-examine it to see what treatment is appropriate at that time. **Warnings** - The relative density (77.2) is just below the 80% decision point; a **Thinning Prescription may be appropriate**.
- c. The Gray's Woods Preserve portion of MU 4 should be included in the late successional management strategy as recommended for MU 1, MU 2, and MU 3.

Forest Harvesting Activities Worksheet

This sheet should be reviewed with the consulting forester or state service forester prior to conducting any timber harvesting on the property.

MUs as indicated in management activity schedule below

Silviculture and Harvesting Treatments: The intent of **early succession habitat** creation is to identify and retain 10-25 trees per acre clearing all other trees/shrubs to promote habitat for species of concern. A **Liberation cut** is useful in rehabilitating a degraded MU. It entails removing older, less desirable trees that are over-topping desirable young trees to ensure adequate sunlight for planted seedlings. Implement this practice by cutting or killing undesirable and poor-quality trees from all canopy positions until the relative density of the MU is less than 20 percent. The intent of a **crop tree release** is to identify and release 25 – 40 crop trees per acre within the MU. The intent of a **Commercial Thinning** is to improve the overall MU structure and health, promote regeneration, and promote mast producing species. The intent of a **Timber Stand Improvement (TSI)** is the same as a commercial thinning but the cutting extends into the sapling population. The intent of a **Shelterwood first cut** is to reduce the canopy cover to 60% or less to allow regeneration of the MU to occur. Control competing herbaceous and woody vegetation prior to creation of any openings and for 100 ft into the forest from any thinning or harvest edge.

1. Exercising care to avoid contamination of any streams, control competing **herbaceous vegetation** (i.e., non-native invasive species) by chemical spraying.
2. Control competing low/high interfering understory **brush vegetation** (i.e., spicebush, birch, beech, devil's walking stick, striped maple, grapevines, green briar, serviceberry, black gum, witch hazel, black locust, sassafras, invasive species) by either chemical basal spray or mechanical means.
3. Conduct a **harvest treatment as described above and in the action plan** to release crop trees, improve MU structure and health, regeneration, and promote mast producing species. At time of thinning, remove undesirable species, excess saplings/poles from MU, and create snags.
4. After every harvest operation, rework skid trails and landings -
5. Replant trails and landings with legumes – **Critical area plantings**

Best Management Practices for Timber Harvesting: (Consider BMPs for slash disposal, water quality, soil stabilization, wildlife, nutrient cycling, erosion and sedimentation, etc.)

Establish a buffer zone along permanent streams to maximize shade from remaining trees and minimize siltation of the stream. Establish temporary crossings at the seasonal rivulets through the area. Keep skid trail inclines to between 3 and 7% to promote drainage and minimize erosion. Use sufficient water bars to deflect runoff from eroding trails/roads. Cut slash to less than 6 ft in height (if advised). Slash provides low cover for wildlife and shields regeneration from deer impact. Bumper trees should be utilized to protect any residual timber from skidding damage. In thinning operations, retain seed source trees as residuals to promote natural regeneration. Avoid harvesting timber during the growing months when residual trees are most susceptible to damages. Avoid high-grading the forest. Ensure that a MU compatible with long-term management objectives remains after intermediate treatments. Instead of selecting for cutting, select for retention trees that are species adapted to the site, not likely to develop epicormic branching from exposure to increased sunlight, and properly spaced. Replant skid trails with legumes when logging activities are finished to prevent erosion and benefit wildlife. Reduce deer pressure through hunting or fencing.

Permits: (List permits applied for and needed.)

Permits may include an **Erosion and Sedimentation** permit from Centre County Conservation District. Their website is <http://centrecountypa.gov/200/Conservation-District>. You may contact Jim Coslo, District Manager, at 414 Holmes Ave., Suite 4, Bellefonte, PA 16823. Phone – 814-355-6817. The website has a special package of guidance for timber harvesting.

Any stream crossings (greater than a 100-acre watershed) may require a separate permit.

Contact the **Patton Township** (100 Patton Plaza, State College, PA 16803, Phone: 814-234-0271), or **PennDOT** for road bonding and temporary driveway issues when planning access routes for harvesting activities.

PATTON TOWNSHIP MANAGEMENT ACTIVITY SCHEDULE AND TRACKING

Haugh Family Preserve					
MU	Acres	(sub-acreage)	Recommended Activity	Planned Timing	Tracking Notes
A,B,C,D,E,F,G,H,I, J,K,L	180.57		Control invasive and competing plants	2024-2025	
A	10.4		Overstory removal harvest	2025	
A	10.4		Remove deer fence	2025	
B	8.57		Fell white pine trees	2025	
C	6.8		Timber Stand Improvement thinning	2025	
D	13.5		Thinning	2025	
E	32.7		Control grape vines	2024-2025	
F	7.3		Control grape vines	2024-2025	
G	26.9		Control grape vines	2024-2025	
H	10.5		Thinning	2026	
H	10.5		Control grape vines	2024-2025	
I	13.9		Overstory removal harvest	2026	
K	16.7		Thinning	2027	
L	23.1	8	Deer fence	2024	

Grays Woods Preserve					
MU	Acres	(sub-acreage)	Recommended Activity	Planned Timing	Tracking Notes
1,2,3,4	192.2		Control invasive and competing plants	2024-2025	
1	103		Control grape vines	2024-2025	
1	103		Felling inferior trees/TSI	2024-2026	
1	103	1.5	Seeding and tree planting w/protection	2025-2026	
2	12.3		Control grape vines	2024-2025	

Appendix A

Management Goal Review and Summary for Patton Township's Haugh Family Farm Preserve and Gray's Woods Park and Preserve July 19, 2021

The following is a final draft of the goals developed by the Patton Township Open Space Stewardship Committee Meeting for the Haugh Family Farm Preserve and Gray's Woods Park and Preserve at their April 15, 2021 and May 20, 2021 committee meetings. These goals will be the foundation for the future Forest Management Plan and overall Conservation Plan that are to be developed for these properties. Funding for these plans is pending a grant from the Hamer Foundation.

Haugh Family Farm Preserve and Gray's Woods Park and Preserve Management Goals

- GOAL 1: Maximize forest health and resiliency
- GOAL 2: Protect and enhance wetlands, vernal pools and critical upland habitat
- GOAL 3: Enhance habitat for rare, threatened, and endangered species
- GOAL 4: Encourage regenerative and sustainable agricultural practices that support farm productivity, increase soil health, protect local water quality, meet state requirements and support the Township's Chesapeake Bay watershed goals
- GOAL 5: Conduct outreach to promote recreational use of the Open Space properties
- GOAL 6: Promote educational and research opportunities
- GOAL 7: Establish a long-term financial strategy for the Open Space Program management and operations

The following information was presented and discussed with the Committee at their May 20, 2021 meeting and was used to finalize the goals listed above:

Goals

- Foundation of the forest management and conservation plans
- General guidelines that explain what you want to achieve or protect on these properties
- Long-term vision for the properties
 - Must be consistent with the conservation easement

Objectives

- Defined strategies or implementation steps to achieve your goals
 - Part of plan writing
- Specific, measurable, and have a defined completion date

*Data collected at the 4/15/2021 Open Space Stewardship Committee Meeting on Jamboard

*Notes shown in blue were recorded under “Conservation Values – Other?”

DRAFT GOAL 1: Maximize forest health and resiliency

- Promote forest health
- Maximize forest resiliency
- Maintain/augment forest footprint
- Improve forest structure
- Protect native species/identify and treat noxious weeds/detrimental invasive species
- Improve/maintain migratory bird habitat
- Provide a diverse forest along with open spaces
- American chestnut?

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

- Preserve and protect wetlands
- Augment buffers around vernal ponds near ag fields
- Protect critical upland habitat surrounding vernal pools
- Use water-safe herbicide

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

- Partner with other organizations (USFWS) to leverage resources
- Create/Maintain unique habitat
- Enhance habitat for rare, threatened, and endangered species

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

- Agricultural BMPs, monitor what they are spraying and where, pesticides logs for ag and forest area, fertilizer use logs, cover crops, not farming through vernal/ephemeral water

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

- Create and maintain trails
- Provide designated parking areas
- Provide appropriate parking areas and trail heads
- Geo-referenced map with property boundaries and QR code of signage
- Promote the community gardens
- Trail maps

DRAFT GOAL 6: Promote educational and research opportunities

- Promote research opportunities to Penn State, SCASD, NGO's, PGC, NHP
- Signage listing endangered species
- Don't duplicate Millbrook Mash or other educational assets in the Region
- Share the story of the Scotia Iron ore history
- Annual interpretive walk, host a "Walk in Penn's Woods" walk
- Materials for elementary school field trips
- Increase knowledge of habitat, its flora/fauna, its management and conservation
- Learning to love and appreciate and protect the land where you live
- Target-audience – Patton Township residence about open space program, Centre Region, and/or Centre County. Could encourage other townships to do their own open space programs
- Is there an outreach goal?
- Is there an education goal?
- Guided walks, plants, trees, animals, history
- Outreach to increase appreciation for the natural resources that were protected
- Why the Township created the open space program – Twp is balancing new development and preservation
- Joe Wilson hosts a tiger beetle identification crawl

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

- Committee makes a financial recommendation to the BOS
- Grants and gifts as a supplemental source of funding
- Establish "friends of" group?

Comments from the May 20, 2021 meeting

- Do we keep doing what we have been doing or do we want to change anything/direction?
- All activities to date have been self-sustaining to date. Don't want to use tax dollars for management. Look for outside sources.

Appendix B

Please find the attached mapping documents

1. [General location of Grays Woods in relation to Haugh Tract aerial](#)
2. [General location of Grays Woods in relation to Haugh Tract topo](#)
3. [Grays Woods aerial with management units \(MU\)](#)
4. [Grays Woods topo with management units \(MU\)](#)
5. [Grays Woods aerial showing MU with approximate park sign line](#)
6. [Grays woods aerial showing MU and USFWS wetlands](#)
7. [Grays Woods aerial showing MU, wetlands, heavy barberry](#)
8. [Grays Woods topo showing location of on-plot brush NNIS](#)
9. [Grays Woods topo showing location of on-plot herbaceous NNIS](#)
10. [Grays Woods showing playground and MU](#)
11. [Grays Woods topo with MU](#)
12. [Grays Woods soils](#)
13. [Haugh Tract aerial with new MU](#)
14. [Haugh Tract aerial showing old stands](#)
15. [Haugh Tract aerial showing MU and USFWS wetlands](#)
16. [Haugh Tract showing location of autumn olive plots](#)
17. [Haugh Tract showing location of barberry plots](#)
18. [Haugh Tract showing location of privet plots](#)
19. [Haugh Tract topo with new MU](#)
20. [Haugh Tract topo showing location of on-plot brush NNIS](#)
21. [Haugh Tract topo showing location of on-plot herbaceous NNIS](#)
22. [Haugh Tract stands 1-5 harvest area with old stands](#)
23. [Haugh Tract Stand 16 harvest area with fencing and old stands](#)
24. [Haugh Tract topo with new MU](#)
25. [Haugh Tract soils](#)
26. [Cruise Plot Location Maps \(folder\)](#)

Appendix C

Please find attached documents

1. [Grays Woods FINAL PNDI](#)
2. [Grays Woods DCNR desk audit response](#)
3. [Grays Woods PFBC desk audit response](#)
4. [Haugh Tract FINAL PNDI](#)
5. [Haugh Tract DCNR desk audit response](#)
6. [Haugh Tract PGC desk audit response](#)
7. [Haugh Tract PFBC desk audit response](#)
8. [PFBC Vernal Pool Management guidance](#)

Appendix D

Please find attached documents

1. [Grays Woods stand comparison spreadsheet and estimated volumes \(sheet 2\)](#)
2. [Haugh Tract stand comparison spreadsheet and estimated volumes \(sheet 2\)](#)

Appendix E

Please find attached documents

1. [AFC full report Haugh Tract – review of all forest management activities conducted from 2007 to 2020](#)
2. [Stiber Forestry – Forest Management Plan \(2007-2017\)](#)

