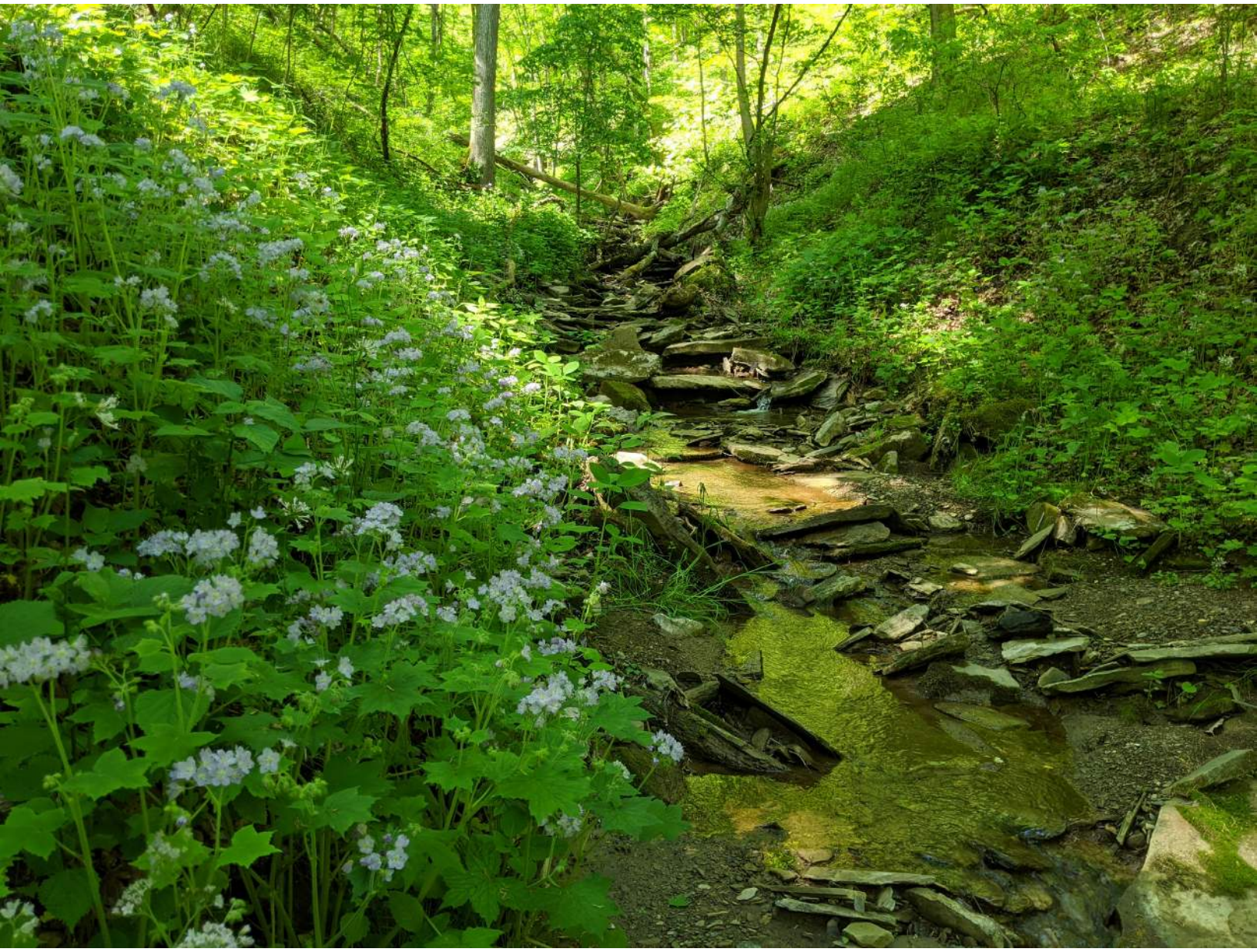
Western Pennsylvania Conservancy



ALLEGHENY COUNTY PARKS ECOLOGICAL ASSESSMENT AND ACTION PLAN

ROUND HILL PARK

Prepared for the Allegheny County Parks Foundation
December 2021

FOREWARD

With nine parks encompassing over 12,000 acres, Allegheny County boasts one of the largest regional park systems in the country. While recreational activities make each park a unique destination, nature is the common thread that connects our parks and is our most treasured – and jeopardized – asset. The abundant resources found in our parks' forests, meadows and streams provide vital habitat for flora and fauna that clean our air and water, pollinate our plants and connect the web of life. We are stewards of these natural sanctuaries and are working to protect them for future generations.

To advance our stewardship efforts, in 2020 the Claude Worthington Benedum Foundation made a grant to the Allegheny County Parks Foundation. The Parks Foundation, together with the Allegheny County Parks, partnered with the Western Pennsylvania Conservancy (WPC) to conduct an Ecological Assessment and Action Plan in Round Hill Park. This study evaluates the park's natural resources and ecological assets and recommends an implementation plan for protecting, preserving and improving the environmental health of the park.

Round Hill Park is unique to the county parks in that it is the only park out of the nine county parks that includes a working exhibit farm. Most of the upland areas of the park were cleared for agriculture in the 30s Douglas Run and its tributary valleys and other steep slopes remained mostly forested. By the late 60s forest regeneration was allowed to occur as agricultural activities came to an end on the lands that would eventually become the park. It also appears that mining never occurred within the park. Geological influences such as high concentrations of calcium in the bedrock contribute to rich soils which support a diverse plant community, especially in the more mature forest areas. Areas of tufa, a rock that forms when seeps of water with a large amount of dissolved calcium reaches the surface, can also be found in the park. These formations are not common in western Pennsylvania and were not known about prior to the study.

Areas of the park have been mapped as best, good, or poor based on their ecological integrity. Round Hill Park contains several populations of plant species that are rare in Pennsylvania and Allegheny County, and conservation should be a management goal, including natives such as James' sedge and ramps. Areas of invasive species populations such as Callery Pear and Japanese Knotweed have been mapped for removal. The challenge ahead is to help maintain the ecological integrity of the "best" areas and improve the "poor" areas using the recommendations provided.

WPC identified several problem areas in Round Hill Park that would benefit from green infrastructure to manage stormwater. Several paved areas could be converted to pervious to increase infiltration of rain water. The report suggests installing deer fencing to protect areas from extensive deer over browsing and creating a comprehensive trail development and management plan to protect tender native plants. The report also brings to attention the threat of the Spotted Lanternfly and Verticillium Wilt within the park.

We are deeply grateful to the Claude Worthington Benedum Foundation for providing the funding to make this report possible. We also thank the outstanding staff at the Western Pennsylvania Conservancy and Allegheny County Parks Department for their expertise and insightful contributions to this effort. We look forward to collaborating with the County Parks staff and other partners to prioritize, fund and implement these recommendations and to continue this type of important ecological work in all of the Allegheny County Parks.

Caren Glotfelty
Executive Director
December 2021

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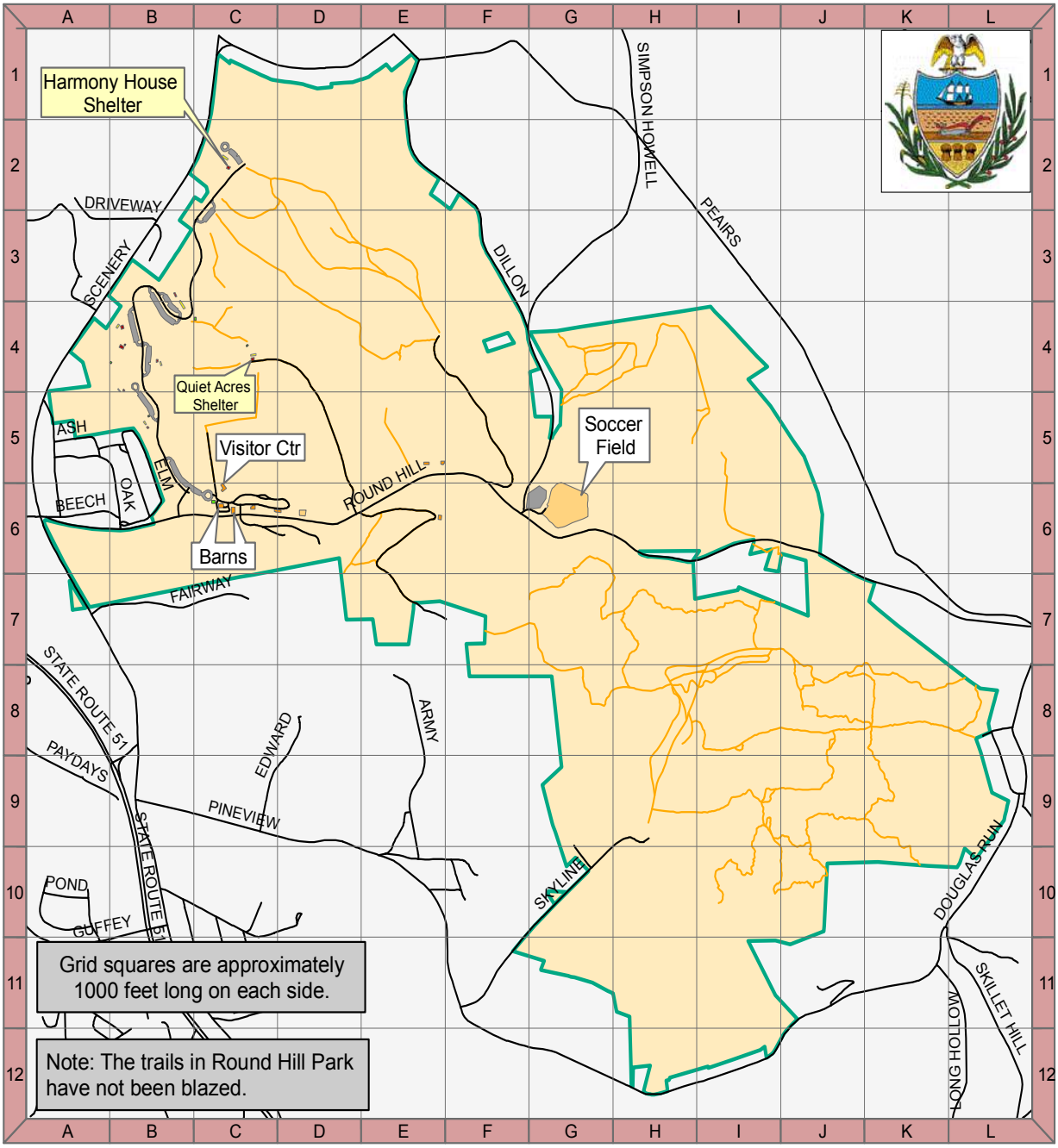
Round Hill Park Trails



Map Created January 11, 2013: BMc

0 650 1,300 2,600 3,900 5,200 Feet

1:19,200

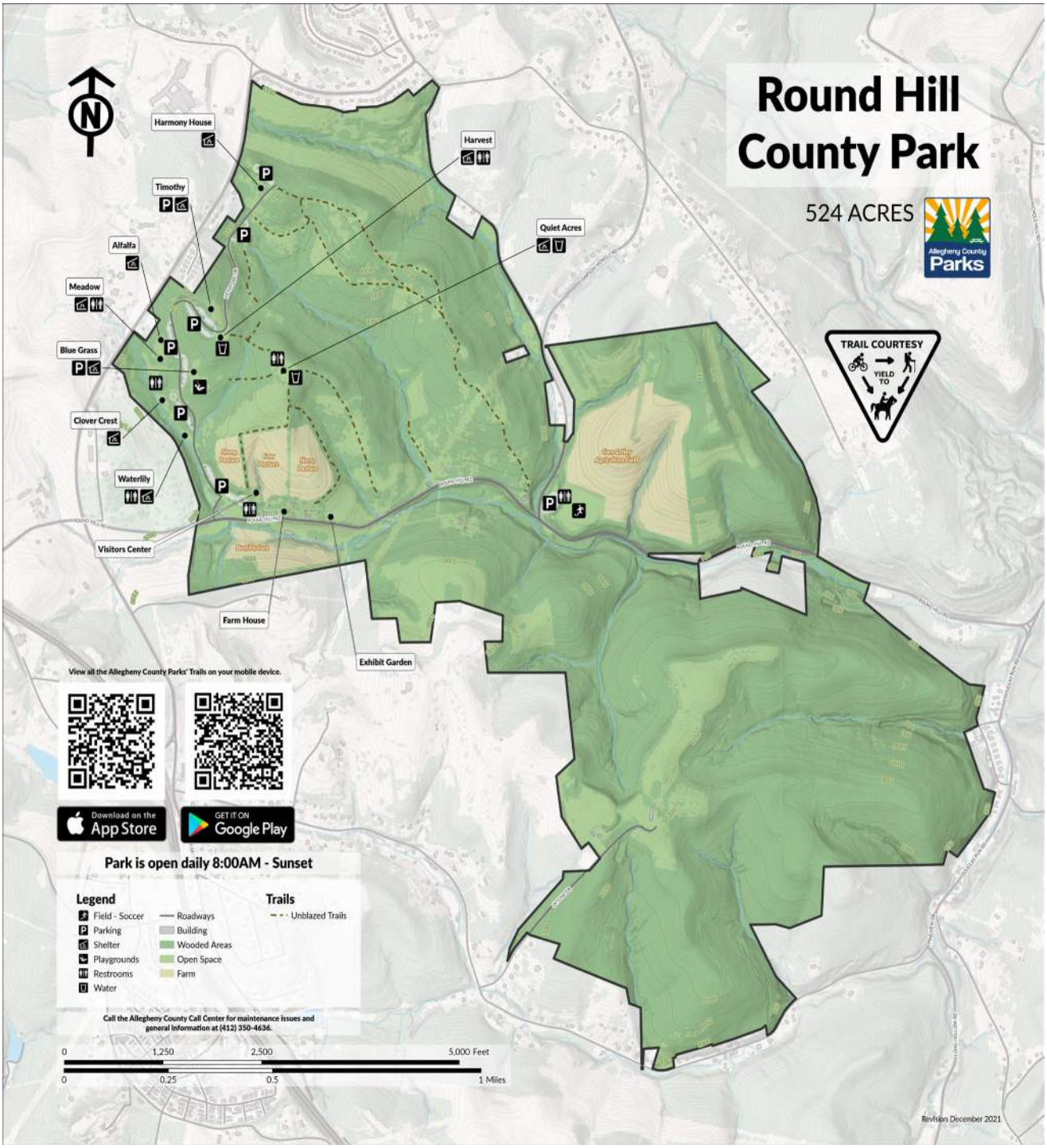
1 inch = 1,600 feet

N W E S

Allegheny County
Division of Computer Services
Geographic Information Systems
621 County Office Building
542 Forbes Avenue
Pittsburgh, PA 15219
(412) 350-4760

Legend

- Park Boundary
- Trails
- Shelters
- Parking Lots
- Playgrounds
- Park Bldgs
- Restrooms
- Ball Fields


Round Hill County Park
524 ACRES
Allegheny County Parks
TRAIL COURTESY
YIELD TO
Harmony House
Harvest
Timothy
Quiet Acres
Alfalfa
Meadow
Blue Grass
Clover Crest
Waterlily
Visitors Center
Farm House
Exhibit Garden
View all the Allegheny County Parks' Trails on your mobile device.
Download on the App Store
GET IT ON Google Play
Park is open daily 8:00AM - Sunset
Legend
Field - Soccer
Parking
Shelter
Playgrounds
Restrooms
Water
Roadways
Building
Wooded Areas
Open Space
Farm
Trails
Unblazed Trails
Call the Allegheny County Call Center for maintenance issues and general information at (412) 350-4636.
0
1,250
2,500
5,000 Feet
0
0.25
0.5
1 Miles
Revision December 2021

SECTION I - ECOLOGICAL OVERVIEW:

1.1 ECOLOGICAL OVERVIEW

This section provides an overview of the ecology of Round Hill Park. The state of ecosystems today in the park is due to the interaction of the basic environmental conditions in the park; the plants, animals and other living organisms that inhabit our region; and the land management activities of people. Allegheny County's Ecological Heritage provides a background for understanding Round Hill park natural communities in a regional context, while Land Use and Ecological History of Round Hill Park describes the ways in which human activities have affected the development of natural communities in the park. The state of the natural communities is the result of historic land-use, most notably surface mining and agriculture. Soils and geology are the foundations of the web of life, providing nutrients and shaping growing conditions for plants, which are the base of the food chain. The Geology and Soils sections below describe these features of the park in more detail.

Round Hill Park Farm

At Round Hill Park, about 75% of the park area is in natural condition (not developed or actively managed), while 25% is managed and maintained as part of the farm or for recreational use. The character of the area in natural condition is primarily determined by past land use; about 75% of that area (73%, 647 acres) was previously cleared for agriculture or mining. These areas today contain forests that are characterized as "modified successional" or "early successional" depending on their maturity. When land uses entail soil turnover and complete removal of living forest plant material and seed banks, the forest communities that regenerate post-disturbance are typically much lower in diversity than undisturbed natural communities and include few "conservative" forest species. If the regeneration occurred in the last 3-4 decades, rather than earlier, it is likely that invasive non-native species have high cover, due to the general ubiquity of invasive species seed in that timeframe. Round Hill park has a fairly large area of forest of this character.

About 25% of the area in natural condition was never tilled or mined and has been continuously forested since the earliest available aerial photographs, dated 1939. These areas today have fairly high quality forest communities, and should be a special focus for management to maintain and enhance their diversity and integrity.

1.2 ALLEGHENY COUNTY'S ECOLOGICAL HERITAGE

This region's natural ecosystems have developed over tens of thousands of years. Further south, the Southern Appalachian Mountains are one of the world's biodiversity hot spots, in part because of a hospitable climate and in part because ecological development was never reset by glaciation. Southwestern Pennsylvania is at the northern edge of this bioregion; the character and diversity of its plant and animal life show both an Appalachian and Midwestern influence and it is markedly different than previously glaciated ecosystems just a short distance to the north. Southern influences extend into Allegheny County in particular because of the moderate climates along the major river corridors: the Ohio, Allegheny, Monongahela and Youghiogheny. Round Hill Park's natural communities show strong influence of mesic southern flora, due to its location at the very southern tip of Allegheny County and near the Monongahela River.

There are no detailed descriptions of the region's ecosystems preserved before about 1900. Historical ecological assessment techniques such as pollen analysis conducted in other areas of the northeast show that significant ecosystem changes were set in motion in the 1600 and 1700s by the arrival of Europeans and the decimation of Native American societies, who had influenced and managed natural landscapes for several thousand years previous to the arrival

of European colonists. Furthermore, by the early 1900s, clearcutting for agricultural development and timber sale was already well advanced in the region and early documentarians could only assess the remaining forest areas. However, despite these limitations, their work remains the best reference we have available for the original character of our region's forest ecosystems.

In the early 1900s, E. Lucy Braun catalogued the natural forest ecosystems of eastern North America, in a definitive work that can never be replicated because these systems have been so extensively altered in the years since. She placed southwestern Pennsylvania within the Cumberland and Allegheny Plateaus section of the original Mixed Mesophytic forest region (Braun, 1950). This region extends from northern Alabama to glaciated northeastern Pennsylvania; Allegheny County is at the far northern end. The Mixed Mesophytic Forest is characterized by an exceptionally diverse tree canopy, and by a rich Appalachian-influenced herbaceous layer. Dominant species of the climax forest in this region are the American beech (*Fagus grandifolia*), tulip tree (*Liriodendron tulipifera*), basswood (*Tilia sp.*), sugar maple (*Acer saccharum*), American chestnut (*Castanea dentata*), sweet buckeye (*Aesculus octandra*), red oak (*Quercus rubra*), white oak (*Q. alba*) and hemlock (*Tsuga canadensis*). According to Braun's work, Allegheny County lies within a subdivision of this region called the Low Hills Belt, characterized by a larger proportion of oak than is typical for Mixed Mesophytic Forest. Round Hill Park includes some areas of remnant mesophytic forest.

Otto Jennings of the Carnegie Museum of Natural History also wrote pioneering baseline ecological descriptions for the region in the early 1900s. He described two forest types for the region, a "White Oak Association" and a "Sugar maple – Beech Association." The White Oak Association is found on rolling uplands and rounded hills and it is dominated by white oak, shagbark hickory, red maple, and other oak species. The Sugar maple – Beech Association is found on richer, moister soils such as floodplains, valleys and lower slopes, and the canopy dominants are sugar maple, American beech, hickories (*Carya spp.*), red oak, white oak, white ash (*Fraxinus americana*) and American basswood.

In the last few centuries, since European colonization, this ecological baseline has undergone unprecedented changes; today's landscape reflects both the rich ecological heritage of the region and the impact of many modern challenges such as forest pests, fragmentation, invasive species and post-agricultural forest recovery. Tree species that were once a ubiquitous part of our region's forests, such as the American chestnut, American elm, white ash and green ash, have been eliminated or greatly reduced in our forests by the introduction of exotic forest pests and diseases. More species may still be lost; oak species, hemlock, and American beech are threatened by the gypsy moth, hemlock wooly adelgid, and beech bark disease complex, respectively.

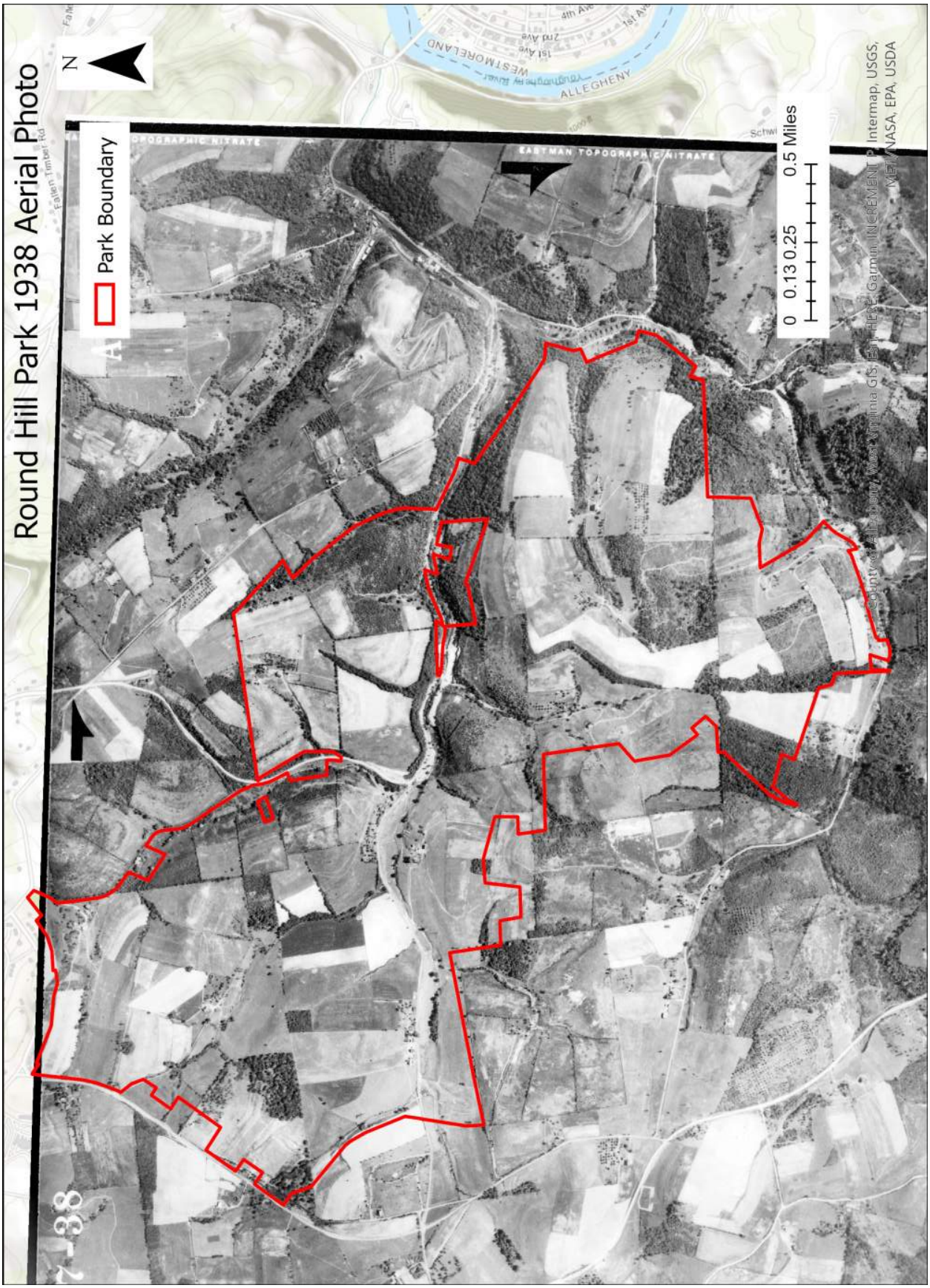
Invasive plant species have been introduced that are displacing native species on a large scale. Excessive deer browse is also a modern problem that threatens forest regeneration and diversity, as deer were previously held in check by keystone predators such as wolves. At Round Hill Park, deer browse is a significant problem but it has not yet severely depleted the diversity of the native mesic forest communities, as has occurred at other parks; this is likely because of the hunting that does occur in the area. Our challenge in landscapes such as the Allegheny County Parks is to safeguard and improve the health of our remaining natural diversity and to restore ecological health where it has been impaired.

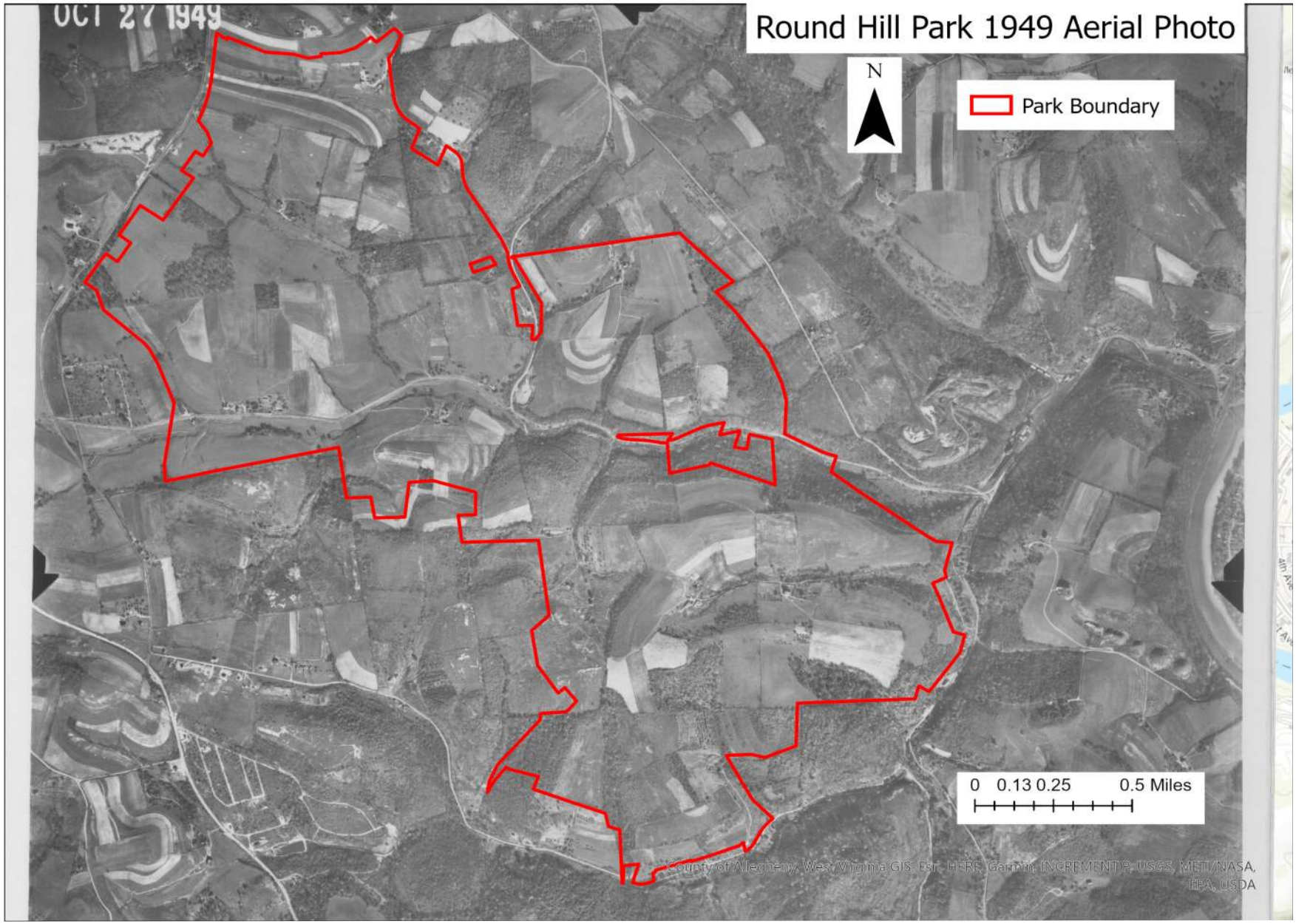
1.3 LAND USE & ECOLOGICAL HISTORY OF ROUND HILL PARK

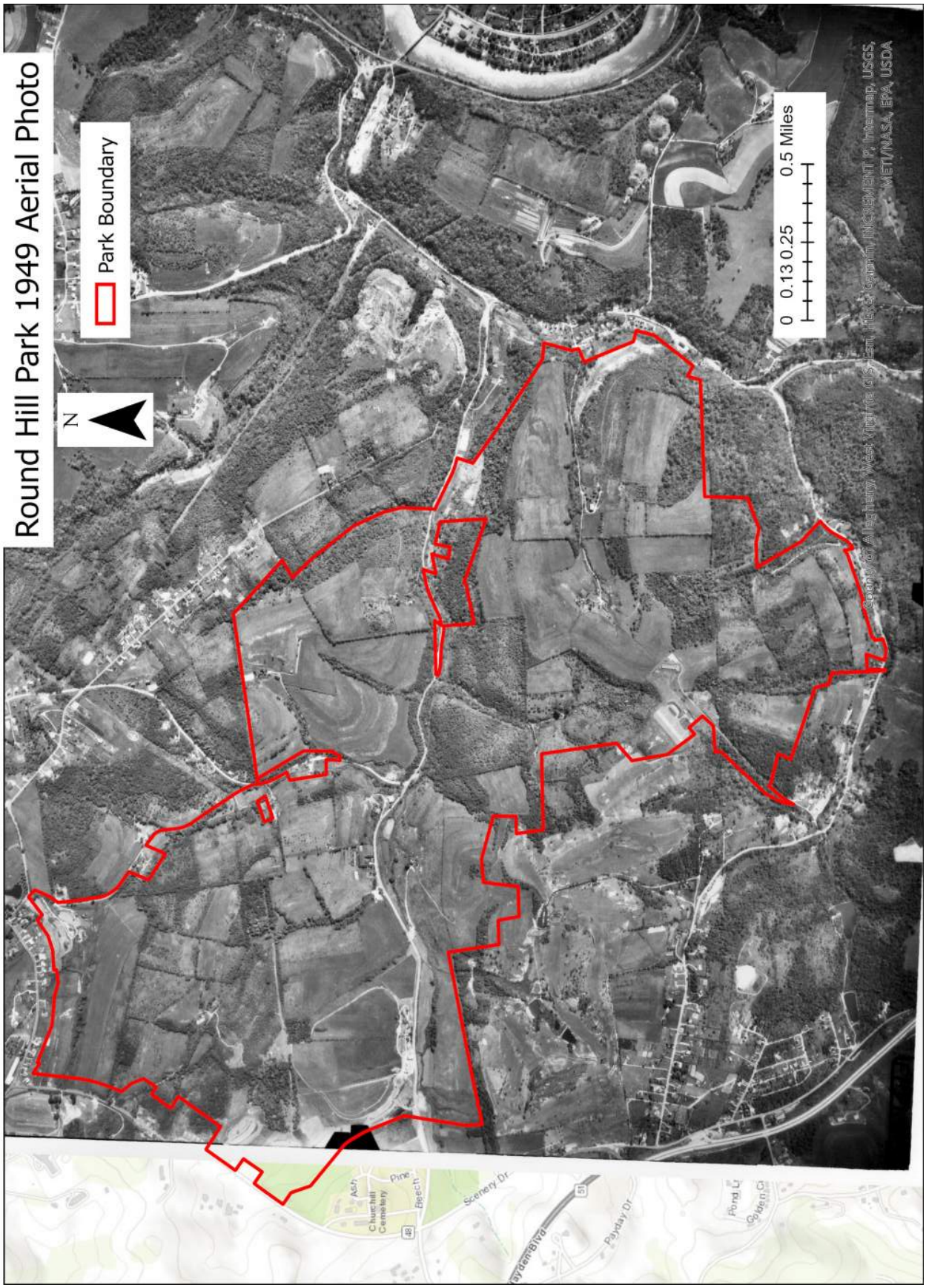
We examined historic aerial photos (Penn Pilot 2021) of Round Hill Park. Historic aerial photos from 1938, 1949 and 1967 were georeferenced in ArcPro. Modern aerial photos (ESRI basemap imagery 2020) were used to make inferences about current land use practices and natural community composition.

By 1938, most upland areas of the park were cleared for agriculture. Some steep slopes and tributary valleys remained at least partially forested (either mature forest or successional forest), including the steepest slopes above Douglass Run and three smaller tributaries valleys. The largest such area is at the eastern end of the park on either side of Round Hill Road. Other tributaries on the southern slope of Douglass Run had been cleared and developed to some degree, with a road installed along one. In 1949 little had changed, with the elapse of only 10 years.

By 1967, regenerating forest can be seen in some of the previously cleared areas. However, most of the cleared areas are still open, showing that regrowth did not begin until after this time, possibly when the park was created (within a few years of the 1967 photo). This may also have been the time that some of the infrastructure within the park was abandoned, including the paved road up the Douglass Run tributary and the paved road extending across the southern end of the park from Douglass Run Road. Much of the successional forest within the park is probably 40-50 years old, with tree propagules slowly spreading across the landscape after the end of maintenance activities.


Round Hill Park 1938 Aerial Photo
N
Park Boundary
EASTMAN TOPOGRAPHIC NITRATE
0 0.13 0.25 0.5 Miles
Intermap, USGS,
NRCAN, NASA, EPA, USDA


Round Hill Park 1949 Aerial Photo
OCT 27 1949
N
Park Boundary
0 0.13 0.25 0.5 Miles
County of Allegheny, West Virginia GIS, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA


Round Hill Park 1949 Aerial Photo
N
Park Boundary
0 0.13 0.25 0.5 Miles
Sources: Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA
Ash
Churchill Cemetery
Pine
Beech
Scenery Dr
48
51
Payday Dr
Pond Ln
Golden Ct

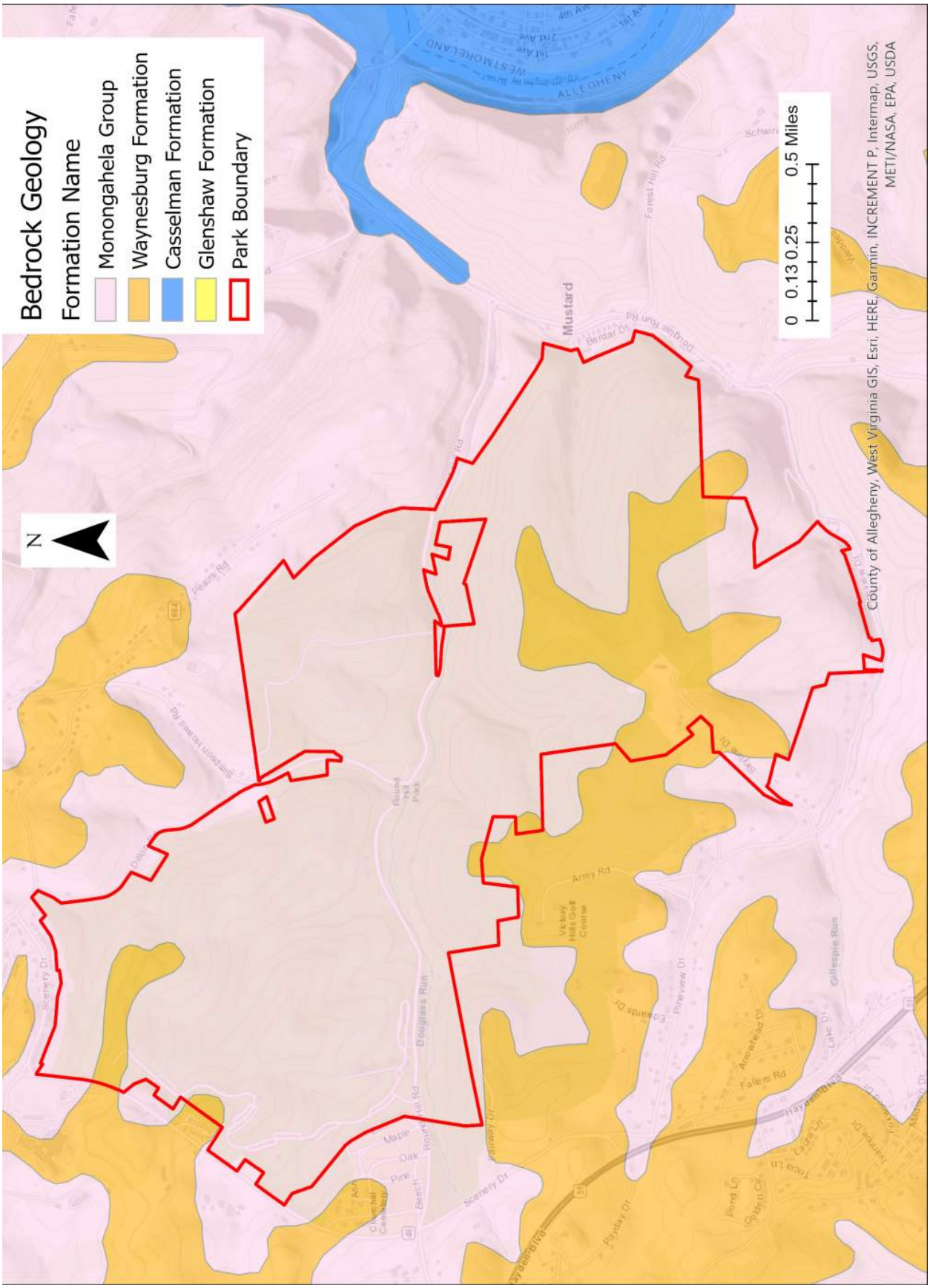
1.4 GEOLOGY

Surface geology refers to the bedrock layers closest to the surface of the earth. Bedrock is the foundation material for soil and also greatly influences the chemistry of water bodies such as streams, rivers and lakes. Surface geology can be a determining factor in the diversity of plant life on land and animal life in streams and lakes.

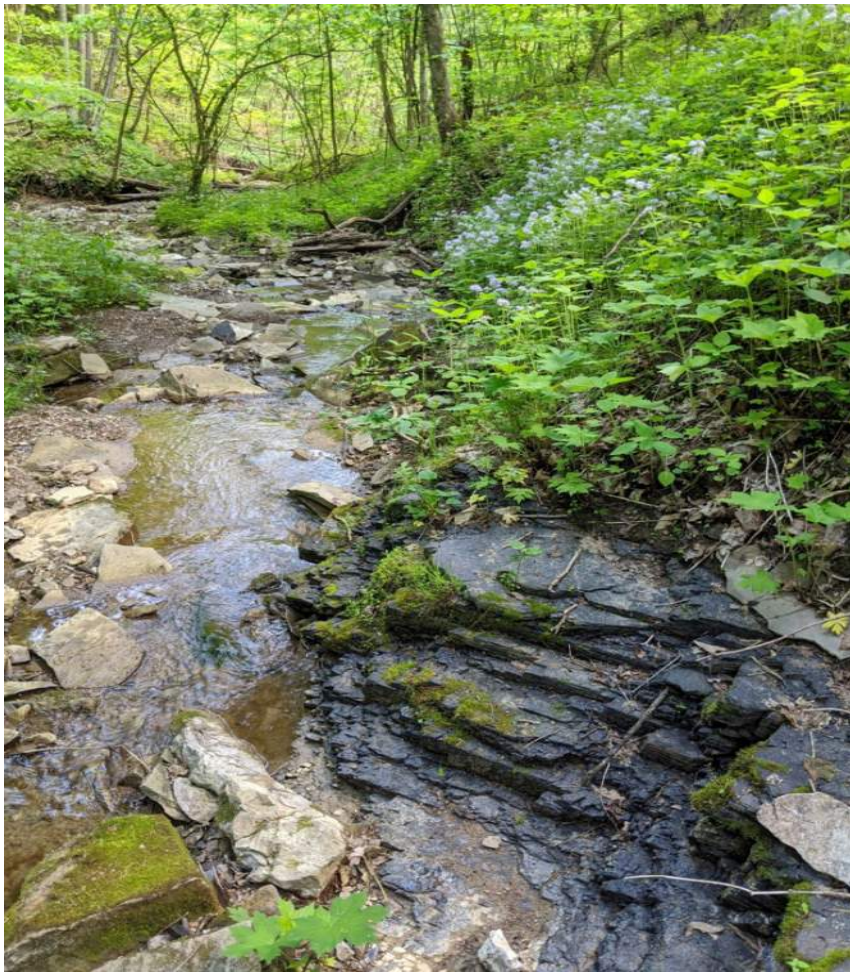
Pennsylvania is divided into physiographic regions based on landforms and geological history. Round Hill Park is located in the Pittsburgh Low Plateau section of the Appalachian Plateau province, characterized by low rolling hills that formed by the gradual erosion of stream valleys, rather than the tectonic upheavals that formed the Allegheny and Appalachian ranges. In this region, the surface geology layers were formed through sedimentary processes and they have not been extensively folded by subsequent tectonic activity; today they lie horizontally or gently undulate over large distances. The Pittsburgh Low Plateau is within the unglaciated portion of the Appalachian Plateau province.

Geologists classify rock layers into groups and formations based on the time period in which they formed. Formations are also described according to their mineral composition, which greatly influences soil materials and plant life. The surface geology of Round Hill Park is almost entirely the Monongahela formation, with a few small areas of Waynesburg formation.

The Monongahela Group consists of many layers of limestone, shale, sandstone, and coal. It has a fairly high proportion of calcareous materials, because some of the limestone layers are relatively thick, and some of the sandstone and shale layers are also calcareous. These calcareous materials in turn influence the calcium content and pH of the soil. This calcareous influence is a major reason for the richness of the plant communities in the mature forested areas of the park. Many plants grow best in soils with pH between 5.0 and 6.5, because in this range, most nutrients are readily available, while toxic metals are chemically bound. However, Pennsylvania's natural diversity of plant species also includes specialists who thrive on acidic or calcareous soils. In many areas of Round Hill Park, soil pH is fairly high, 6.0-7.0, creating the potential to host very diverse plant communities, as well as some calcareous specialists. This type of environment is somewhat uncommon today in Allegheny County, because calcareous geology is a minority component in the county; the Monongahela group has the highest fraction of calcareous materials of the four geological groups mapped in Allegheny County. Another geological manifestation of this calcareous influence is the formation of tufa rock on several of the small, steep tributaries of the park. This rock forms where springs or seeps of water with a large amount of dissolved calcium reaches the surface. The calcium solidifies back into mineral form, building the tufa over time.


Bedrock Geology
Formation Name
Monongahela Group
Waynesburg Formation
Casselman Formation
Glenshaw Formation
Park Boundary
N
0 0.13 0.25 0.5 Miles
County of Allegheny, West Virginia GIS, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA
Mustard
Round Hill Park
Douglass Run
Victory Hills Golf Course
Army Rd
Forest Hill Rd
Scenery Dr
Pleasant Rd
Simpson Mill Rd
Dillon
Maple
Oak
Pine
Beech
Round Hill Rd
Payday Dr
Edwards Dr
Pinaview Dr
Arrowhead Dr
Falls Rd
Hayden Blvd
Gillespie Run
Lake Dr
Laura Ln
Trica Ln
Pond Ln
Gyde Cir
Bridar Dr
Douglas Run Rd
Schwin
WESTMORELAND
ALLEGHENY
Allegheny River
1st Ave
2nd Ave
4th Ave

Because calcium dissolves readily in water and leaches out of soils quickly, the influence of calcareous bedrock materials is strongest on slopes, where erosion removes surface materials and exposes new bedrock relatively quickly (Ciolkosz et al. 1995; Bennie et al. 2006). Floodplains also sometimes have a strong calcareous influence because of the accumulation of materials eroded from the slopes above. Calcareous soils and bedrock affect aquatic ecosystems as well, because they tend to raise the pH of stream waters, and provide buffering capacity that counteracts acidic inputs such as acid rain or acid mine drainage. The Monongahela Group also includes the Pittsburgh coal seam, a very thick and economically important coal layer. Although this coal seam is often mined, it does not appear that mining occurred within the park boundaries. The Waynesburg Formation consists of layers of sandstone, shale and minor amounts of limestone and coal. It contains only a minimal amount of calcareous materials.



Large Tufa Formation in Round Hill Park. Tufa is a mineral formation created when calcareous groundwater emerges and deposits calcium over time.

1.5 SOILS

Soil types vary according to topographic position (USGS 1981). The lowest topographic positions, along the floodplains of major stream channels, have Newark silt loam soils. Gilpin, Weikert and Culleoka channery silt loam (a map unit including several undifferentiated types) is found on lower slopes, often adjacent to the Newark silt loams of the floodplains. Dormont Silt Loams are another major soil type in the park, found on lower to mid-slope positions, adjacent to and upslope of the Gilpin-Weikert-Culleoka type. Culleoka channery silt loams and Culleoka-Weikert channery silt loams are found on upper slopes and ridgetops.

Soil Testing in Round Hill Park

Successional communities are extensive in the park across a variety of topographic settings and found on all of the park's major soil types. Interpreting the association between soils and natural communities, with the exception of successional communities in strip mined areas, should be approached with caution. In this setting, natural communities are more likely associated with disturbance history, aspect and slope, rather than soil types.

1.6 RARE SPECIES CONSERVATION AT ROUND HILL PARK

The park contains several populations of plant species that are rare in the state or region. Conservation of these species should be a management priority. All of these species are found only in calcareous soils.

White Trout Lily (*Erythronium albidum*):


White Trout Lily (*Erythronium albidum*)

The white trout lily is legally listed with a status of Pennsylvania Rare. This small wildflower blooms for only about two weeks very early in the spring and during the rest of the year it cannot be distinguished from the much more common yellow trout lily (*Erythronium americanum*). It is found on calcareous soils of floodplains and mesic lower slopes.

- Location data for this species should be protected as sensitive. This species could be vulnerable to poaching; we are aware of at least one instance where sharing a general location on social media resulted in some plants being dug up and removed.
- Invasive species management will be important to its future survival, as it is a species of low stature, vulnerable to outcompetition. However, it does have the advantage that as a spring ephemeral, it largely completes its lifecycle before Japanese stiltgrass emerges.

Glade Fern (*Diplazium pycnocarpon*)


Glade Fern *(Diplazium pycnocarpon)*

Glade fern is listed on the PNHP Watch List because it is fairly uncommon and it is an indicator species for mesic calcareous forest habitat. It requires high-pH soil with a strong calcareous influence. There is one small population in the Eastern Tufa Ravine High Ecological Integrity Area. The tufa indicates strong calcareous influence in groundwater.

Management Recommendations:

- Maintain overall forest cover and health to mitigate the potential for flash flooding in the stream ravine. The glade fern

population is very close to the streambank and could be damaged or eliminated in an extreme flooding event.
- See stewardship recommendations for the Eastern Tufa Ravine High Ecological Integrity Area in regards to management of invasive species. Glade fern is a fairly tall species and likely emerges early enough that it could remain competitive with Japanese stiltgrass, but it would not be competitive with Japanese knotweed if that were to establish in the ravine.

James' Sedge *(Carex jamesii)*:

James' sedge is listed on the PNHP watch list because it is uncommon and may become rare without conservation action. It is a grass-like plant that forms graceful green tufts and small, balloon-like seed stalks. This species is a specialist of mesic to dry-mesic calcareous soils, and most known populations are in central Pennsylvania. It was found in several of the mature forested areas of Round Hill Park.


James' Sedge growing on Small Rock Formation

Management Recommendations:
- The area of the park where James' sedge was observed has a moderate presence of invasive species. Control efforts to reduce shading and competitive pressure from these species is recommended, using techniques that do not harm other native vegetation. James' sedge is particularly vulnerable to out-competition because of its small stature, only 4-12" tall.
- Adapt trail maintenance to avoid damage to the James' sedge plant, where they occur by trails. Trail rerouting or other significant alterations in current management are not needed, but care should be taken during maintenance activities to avoid damage to the actual James' sedge plants, especially before seeds have fallen.

Dwarf Larkspur *(Delphinium tricorne)*:

Dwarf larkspur (*Delphinium tricorne*) is listed on the PNHP Watch List because it is moderately uncommon and an indicator of rich mesic forest habitat. It is known from one of the tufa ravines in the park, which is indeed a rich mesic forest habitat. It is also a strikingly beautiful wildflower with deep purple blooms.

Management Recommendations:

- This species currently occurs on a steep slope where it is relatively protected from deer browse.
- The main other threat to this species is the expansion of invasive plant species in the stream ravine where it grows; see recommendations for stewardship of the Middle Ravine Best Ecological Integrity Area.

Ramps (*Allium tricoccum, Allium sp.*):


Dwarf Larkspur *(Delphinium tricone)*

Ramps are a conservative species of rich mesic forest habitats; they are also an edible plant with great cultural significance in Appalachia. In recent years, culinary use of ramps has become more widespread and harvesting for sale at farmers' markets and to restaurants has increased. However, the plant grows fairly slowly, requiring 7 years to reach flowering maturity from seed. Although this species can sometime be found growing very abundantly in large patches, research (Rock et al 2004) has shown that only very modest harvesting is sustainable: 10% of the population every ten years (ie, with 9 years in between for recovery). This species is listed on the PNHP Watch List because of its cultural value and concern about overharvesting.

Although our Pennsylvania ramps have generally been viewed as a single species in the past (Allium tricoccum), research on populations further south has shown that there may actually be several distinct species. Local researchers are currently undertaking genetic and ecological studies of Pennsylvania ramps to determine what species we have and where they are distributed within the state. The plants observed in Round Hill Park mostly fit the classic form of Allium tricoccum, but there may also be some that are "highland green" ramps.

Management recommendations:

- The population in Round Hill Park is of moderate size, and it is not near any heavily used trails, so harvest pressure is probably fairly minimal at this time.
- Post generic signs in the park to encourage users to take only photographs and leave only footprints and to convey the message that harvesting any plant materials is not sustainable in a park with a large number of public users.
- The main other threat to this species is the expansion of invasive plant species in the stream ravine where it grows; see recommendations for stewardship of the Middle Ravine Best Ecological Integrity Area.

Core's Chickweed *(Stellaria corei)*:

Core's chickweed is listed on the PNHP Watch List because we do not yet have good data about how abundant the species is in Pennsylvania, and it appears it may be rare. It is very similar in appearance to the starry chickweed (*Stellaria pubera*), but Core's chickweed has a much narrower geographic distribution primarily in the Appalachian Mountains and Ohio River Valley. It appears to reach the northern extent of its range in southwest Pennsylvania, but we are unsure how abundant it is because for many years surveyors did not distinguish the two species. It is a fairly abundant and important part of the herb layer in the Middle Ravine and Douglass Run Slopes ecological integrity areas.

Management recommendations:

- This species showed evidence of frequent browsing, limiting seed production. Efforts to reduce deer browse pressure will benefit the overall health of the species.
- Another threat to this species is the expansion of invasive plant species in the forested areas where it grows; see recommendations for stewardship of the Middle Ravine Best Ecological Integrity Area and Douglass Run Slopes Good Ecological Integrity Area.

Round-leaf ragwort *(Packera obovata)*:

This species is included on the PNHP Watch List because it is an indicator of calcareous forest habitat, and because it is a larval host plant for a rare butterfly species. The caterpillar of the metalmark butterfly feeds exclusively on the round-leaf ragwort. It is present in several of the mature calcareous forested areas of the park. The metalmark butterfly is much less common than the round-leaf ragwort, so most plant populations will not have associated metalmark butterfly populations. However, documenting locations of decent sized populations of the host plant may help butterfly researchers to locate additional butterfly populations and to understand the distribution of potential habitat in the state. The plant is also a nice indicator of quality forest conditions with moderate to high soil pH, and is presence is correlated with higher species diversity.

Management Recommendations:

- The main threat to this species is the spread of invasive species in the areas where it lives. Refer to invasive management recommendations for the Best Ecological Integrity Areas in the Middle Mesic Ravine and Southern Mesic Ravine.

1.7 CONSERVATIVE PLANT SPECIES OF ROUND HILL PARK

The following table lists plant species found in Round Hill Park that require intact natural habitats with little disturbance. The "Coefficient of Conservatism" is a rating developed to estimate how strongly a plant requires such a habitat; a species rated "10" will almost never be found outside of a very intact natural habitat, while a species rated "1" can easily colonize disturbed areas . The presence of species rated "5" or above can serve as a guide to indicate good quality natural habitats (Swink and Wilhelm 1994). They are also important conservation targets because many of the species rated "6" or above generally re-establish extremely slowly once lost (this is especially true for herbaceous species, less so for woody species).

Some natural habitats depend on natural disturbances, such as floodplains or fire. Although species that inhabit these ecosystems generally have low coefficients of conservatism, this does not diminish their ecological importance.

Despite fairly limited areas of mature forest, Round Hill Park is especially rich in conservative plant species compared to other parks, with just slightly fewer such species than Settler's Cabin. This is due to the calcareous geology in the park and the mesic slope positions. Many species are present in multiple areas of the park and have reasonably healthy populations.

Scientific Name	**Common Name**	**C - Value**	**Growth Form**
Anemone acutiloba	Sharp-lobed hepatica	9	herb
Carex albursina	Sedge	8	herb
Carex jamesii	Sedge	8	herb
Carex platyphylla	Broad-Leaf Sedge	8	herb
Diplazium pycnocarpon	Narrow-Leaved Glade Fern	8	herb
Hydrophyllum appendiculatum	Appendaged Waterleaf	8	herb
Mertensia virginica	Virginia Bluebell	8	herb
Mitella diphylla	bishop's-cap	8	herb
Prenanthes crepidinea	crepis rattlesnake root	8	herb
Trillium grandiflorum	large-flowered trillium	8	herb
Magnolia acuminata	Cucumber-tree	8	tree
Tsuga canadensis	Eastern Hemlock	8	tree
Allium tricoccum	ramp	7	herb
Arabis laevigata	smooth rockcress	7	herb

Scientific Name	**Common Name**	**C - Value**	**Growth Form**
Asarum canadense	wild-ginger	7	herb
Cardamine diphylla	two-leaf toothwort	7	herb
Carex communis	red sedge	7	herb
Carex leptonervia	sedge	7	herb
Delphinium tricorne	dwarf larkspur	7	herb
Solidago flexicaulis	zigzag goldenrod	7	herb
Stellaria corei	Core's chickweed	7	herb
Symphyotrichum shortii	Short's aster	7	herb
Trillium erectum	wakerobin	7	herb
Valeriana pauciflora	valerian	7	herb
Acer nigrum	Black Maple	7	tree
Quercus coccinea	Scarlet Oak	7	tree
Tilia americana	American Basswood	7	tree
Actaea racemosa	Black Cohosh	6	herb
Blephilia hirsuta	wood-mint	6	herb
Carex digitalis	sedge	6	herb
Carex gracillima	sedge	6	herb
Erythronium americanum	yellow trout lily	6	herb
Festuca obtusa	nodding fescue	6	herb
Hydrophyllum canadense	Canadian waterleaf	6	herb
Monarda clinopodia	basil-balm	6	herb
Oxalis violacea	violet wood-sorrel	6	herb
Packera obovata	Roundleaf ragwort	6	herb
Polygonatum pubescens	Solomon's-seal	6	herb
Sedum ternatum	wild stonecrop	6	herb
Smilax herbacea	carrion-flower	6	herb
Thalictrum thalictroides	rue-anemone	6	herb
Hydrangea arborescens	wild hydrangea	6	shrub
Acer saccharum	Sugar Maple	6	tree
Carya ovata	Shagbark Hickory	6	tree
Cornus alternifolia	Alternate-leaved Dogwood	6	tree
Fagus grandifolia	American Beech	6	tree
Nyssa sylvatica	Blackgum	6	tree
Solidago caesia	Wreath Goldenrod	6	herb

Scientific Name	**Common Name**	**C- Value**	**Growth Form**
Pinus rigida	Pitch Pine	6	tree
Pinus strobus	Eastern White Pine	6	tree
Quercus alba	White Oak	6	tree
Quercus phellos	Willow Oak	6	tree
Quercus rubra	Northern Red Oak	6	tree
Quercus velutina	Black Oak	6	tree
Arisaema triphyllum	Jack-in-the-pulpit	5	herb
Athyrium filix-femina var. asplenioides	lady fern	5	herb
Botrychium virginianum	rattlesnake fern	5	herb
Cardamine concatenata	cutleaf toothwort	5	herb
Collinsonia canadensis	horse-balm	5	herb
Dryopteris intermedia	intermediate wood fern	5	herb
Eurybia divaricata	white wood aster	5	herb
Floerkea proserpinacoides	false-mermaid	5	herb
Galium triflorum	sweet-scented bedstraw	5	herb
Geranium maculatum	wild geranium	5	herb
Laportea canadensis	wood nettle	5	herb
Lindera benzoin	spicebush	5	herb
Maianthemum racemosum	false Solomon's-seal	5	herb
Osmorhiza longistylis	anise root	5	herb
Podophyllum peltatum	mayapple	5	herb
Polystichum acrostichoides	Christmas fern	5	herb
Sanguinaria canadensis	bloodroot	5	herb
Thelypteris noveboracensis	New York fern	5	herb
Hamamelis virginiana	Witch-hazel	5	shrub
Viburnum prunifolium	Black-haw	5	shrub
Acer saccharinum	Silver Maple	5	tree
Carya cordiformis	Bitternut Hickory	5	tree
Liriodendron tulipifera	Tuliptree	5	tree
Platanus occidentalis	Sycamore	5	tree
Ulmus americana	American Elm	5	tree

1.8 PLANT COMMUNITY TYPES AT ROUND HILL PARK

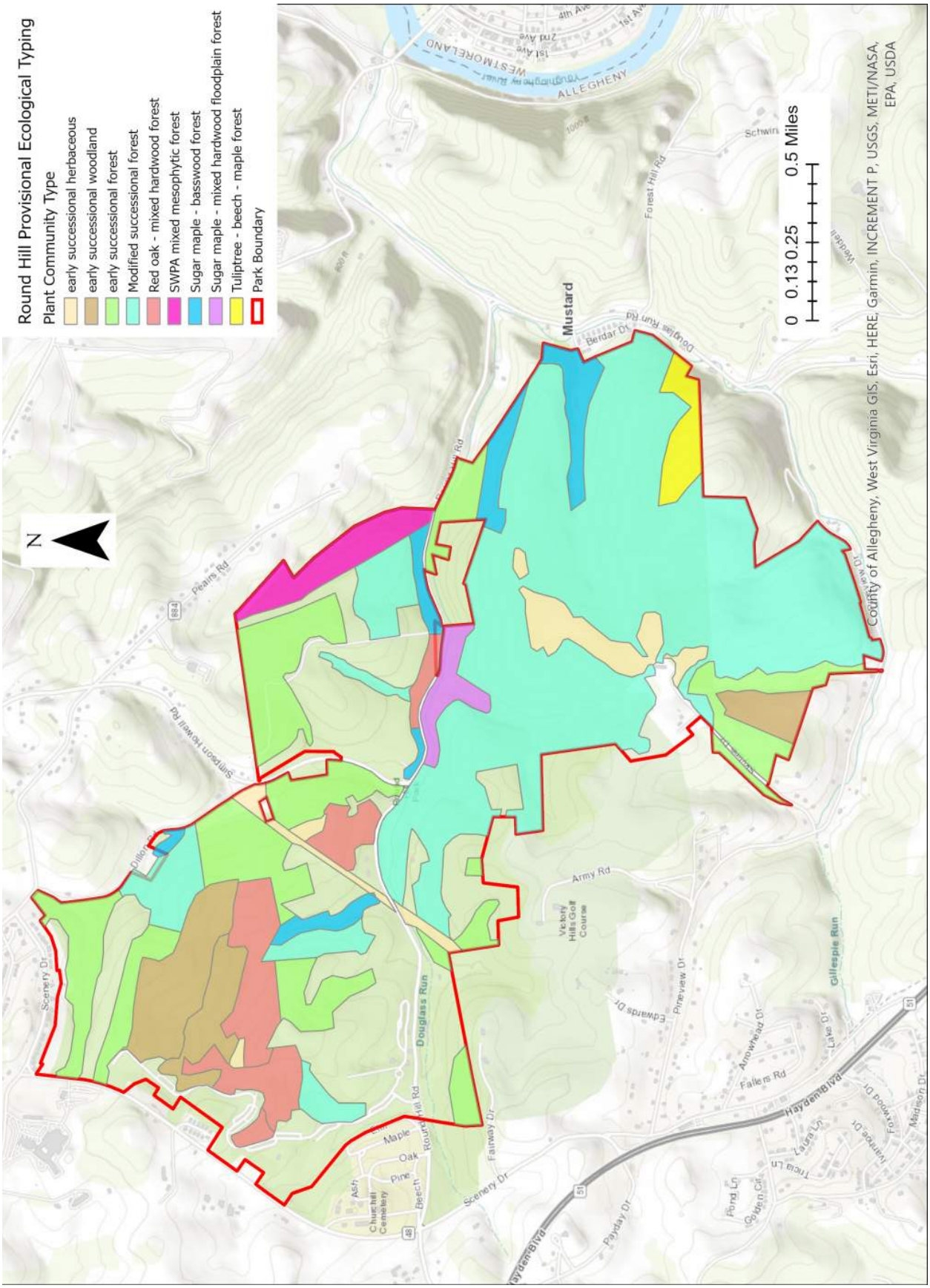
Community types are assigned using the Pennsylvania Natural Heritage Program's plant community classification system and the U.S. National Vegetation Classification. When possible, community types were assigned using the Pennsylvania Natural Heritage Program's plant community classification system (PNHP 2018). In certain situations, we utilized the National Vegetation Classification (USNVC 2018) if a similar but more accurate community type was available for natural or successional communities at Round Hill Park. There were many successional areas that were not easily classified by the Pennsylvania or Natureserve classifications, and are closely associated with disturbance history; these were separated by age and canopy cover in the "Successional Communities" section, but we did not attempt to further subdivide them based on species composition.

1.8.1 TERRESTRIAL COMMUNITIES - Red Oak - Mixed Hardwood Forest

We documented this community type on mid-to upper-slope forests at Round Hill Park. This community type is typically in intermediate positions between low-slope mesic communities and upper-slope dry oak communities; however, due to the topography, aspect and land use history at Round Hill, there are few examples of upper-slope dry oak communities, and the red oak – mixed hardwood forest is often the most xeric community type present. Red oak is a canopy dominant; the community is further characterized by the presence of a sometimes quite diverse canopy that includes both mesic and dry-mesic species, such as: black oak (*Quercus velutina*), white oak, shagbark hickory (*C. ovata*), red maple, black maple (*A. nigrum*), mockernut hickory (*C. tomentosa*), black cherry, tuliptree (*Liriodendron tulipifera*), Sassafras (*Sassifras albidum)* and beech (*Fagus americana*). The shrub layer includes spicebush (*Lindera benzoin*), witch hazel (*Hamamelis virginiana*) and alternative-leaved dogwood (*Cornus alternifolia*). Typical herbaceous species include black snakeroot (*Actaea racemosa*), hog peanut (*Amphicarpea bracteata*), mayapple (*Podophyllum peltatum*), Christmas fern (*Polystichum acrostichoides*) and sweet-scented bedstraw (*Galium triflorum*). The herbaceous layer contains rich indicators such as stonecrop (*Sedum ternatum*), false Soloman's seal (*Maianthemum canadense*), downy yellow violet (*Viola pubescens*) and wood geranium (*Geranium maculatum*).

Sugar Maple - Basswood Forest:

This type was documented in mid-slope positions and in stream ravines within the park, most often on north- and east-facing slopes. It is one of several mesic forest community types found in the park. The canopy typically is dominated


Round Hill Provisional Ecological Typing
Plant Community Type
early successional herbaceous
early successional woodland
early successional forest
Modified successional forest
Red oak - mixed hardwood forest
SWPA mixed mesophytic forest
Sugar maple - basswood forest
Sugar maple - mixed hardwood floodplain forest
Tuliptree - beech - maple forest
Park Boundary
N
0 0.13 0.25 0.5 Miles
County of Allegheny, West Virginia GIS, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA
Mustard
Douglas Run
Douglass Run
Gillespie Run
Victory Hills Golf Course
Churchill Cemetery
Round Hill Rd
Forest Hill Rd
Hayden Blvd
Army Rd
Peaing Rd
Simpson Thomas Rd
Sceinery Dr
Fairway Dr
Payday Dr
Edwards Dr
Pineview Dr
Arrowhead Dr
Fallers Rd
Lake Dr
Laura Ln
Trecia Ln
Pond Ln
Ivanhoe Dr
Forestwood Dr
Midleton Dr
Berdar Dr
Victory Dr
Dillon Dr
Maple
Oak
Pine
Beech
Ash
WESTMORELAND
ALLEGHENY
Monongahela River
1st Ave
2nd Ave
4th Ave
Schwin
Weadsh

by sugar maple, with basswood also present. While there may be a variety of other species present, it is distinguished from the Mixed Mesophytic Forest community by a lower overall canopy diversity. Some of the mid-slope forests in the park are mainly dominated by sugar and/or black maple, with little basswood component, but are classified with this type due to lack of a better fit elsewhere. Typically, this community has a fairly rich herbaceous layer, although this is diminished in many examples by disturbance or deer browse. The examples in Round Hill Park are moderately diverse, including species such as lady fern (*Athyrium felix-femina*), striped violet (*Viola striata*), mayapple, shining fescue (*Festuca obtusa*), zigzag goldenrod (*Solidago flexicaulis*), a sedge (*Carex gracillema*) and bloodroot (*Sanguinaria canadensis*). See the descriptions of the "Douglass Run Slopes" and "Northern Park Slopes" areas for more detail on the examples of this type in the park.

Mature Sugar Maple - Basswood Forest

Tuliptree - Beech - Maple Forest:

This is a mesic forest type found in one of the fairly intact ravines of the park. It is characterized by a canopy including sugar maple, American beech, and tuliptree all in significant proportions. Typically the herbecous layer is fairly rich. The park example is found in the "Southern Mesic Ravine" Best Ecological Integrity area; see description for more detail.

Mixed Mesophytic Forest:

This is a mesic forest type found in the two stream ravines that also contain large tufa formations (the "Middle Tufa Ravine" and the "Northern Tufa ravine" areas). It is an Appalachian forest type that reaches its northern-most extent in Pennsylvania. Although our examples do not have the extreme diversity of this type further south, it is still one of the most diverse forest types found in Pennsylvania. It is characterized by a great diversity of species in the canopy, which many include sugar maple, basswood, American elm and/or slippery elm, red oak, black walnut, butternut (*Juglans cinerea*), hackberry, bitternut hickory and/or shagbark hickory and red mulberry (*Morus rubra*). The herbaceous layers are typically very rich, with many conservative species, as well. In Pennsylvania this forest type is usually found on soils of fairly high pH, as is true in Round Hill Park. Within the park, these communities contain exceptional herbaceous diversity, including some species not found elsewhere in the park.

1.8.2 PALUSTRINE COMMUNITIES - Sugar Maple - Mixed Hardwood Floodplain Forest:

This type typically occurs on small-to-medium size tributaries of the Ohio River Basin. At Round Hill Park, sugar maple – mixed hardwood floodplain forests were documented in floodplain along Douglass Run and at the base of a small tributary hollow that feeds into it. The examples of this type in the park are not in pristine condition, influenced by past and present disturbance and fairly small in extent, but the community is recognizable. It is similar to the sugar maple – basswood forest, but also includes riparian and wetland species such as American sycamore (*Platanus occidentalis*), American elm (*Ulmus americana*), and black walnut (*Juglans nigra*) skunk cabbage (*Symplocarpus foetidus*) and wood nettle (*Laportea canadensis*).

Skunk - Cabbage - Golden Saxifrage Seep:

This wetland type occurs in small patches along stream and tributary floodplains or mid-slope seepage areas, often nested within sugar maple – mixed hardwood floodplain forest or another mesic upland forest type. It provides valuable habitat for amphibians, insects and burrowing crayfish.

1.8.3 SUCCESSIONAL COMMUNITIES - Modified Successional Forest

These are mature forest communities where the composition does not match any described natural forest community types, due to the influence of past disturbance on the site. They may have been tilled or experienced other near-complete vegetation removal in the past, removing most or all conservative

species. They are characterized by a prevalence of early-successional species. The canopy may include black cherry, red maple, sassafras, American elm, black birch, in addition to more scattered additions of typical mature forest species such as sugar maple, red oak and hickories. In our examples, spicebush is the predominant native shrub, sometimes forming dense stands. Non-native invasive shrubs are also common, such as multiflora rose, bush honeysuckles, Japanese barberry and the vine oriental bittersweet. Native herbs often include jumpseed, wingstem, mayapple and golden ragwort. Non-native invasive species such as garlic mustard and Japanese stiltgrass are often common.

Early Successional Forest

These are forest communities with 60-100% canopy cover of relatively young trees. Species composition is very similar to the "modified successional forest" except that the canopy more often is entirely dominated by successional species, and less often has inclusions of more mature forest species such as oaks or sugar maple.

Early Successional Woodland:

These are areas with 10-60% tree canopy cover. The tree canopy is often fairly young, and there is usually dense shrub and vine cover. Grape vine and oriental bittersweet may blanket trees, reducing their growth and viability. Non-native invasive shrubs such as multiflora rose, bush honeysuckles and privet are often dense and abundant. Spicebush may also be present. If Japanese stiltgrass has become established, it often grows dense and high due to the greater light levels, and may be the dominant herbaceous species. Native species of early successional habitats may also be present; in particular, the following species can be co-dominants: jumpseed (*Persicaria virginiana*), golden ragwort (*Packera aurea*), wingstem (*Verbesina alternifolia*) and mayapple (*Podophyllum peltatum*).

Early Successional Herbaceous:

This broad successional type includes grass and forb dominated communities, including managed rights-of-way, and formerly disturbed sites. Some are highly invaded by non-native species. Common native species include goldenrods, blackberries and raspberries, milkweeds, and spicebush; common invasive species include oriental bittersweet (*Celastrus orbiculatus*), multiflora rose (*Rosa multiflora*) and Japanese stiltgrass (*Microstegium vimineum*).

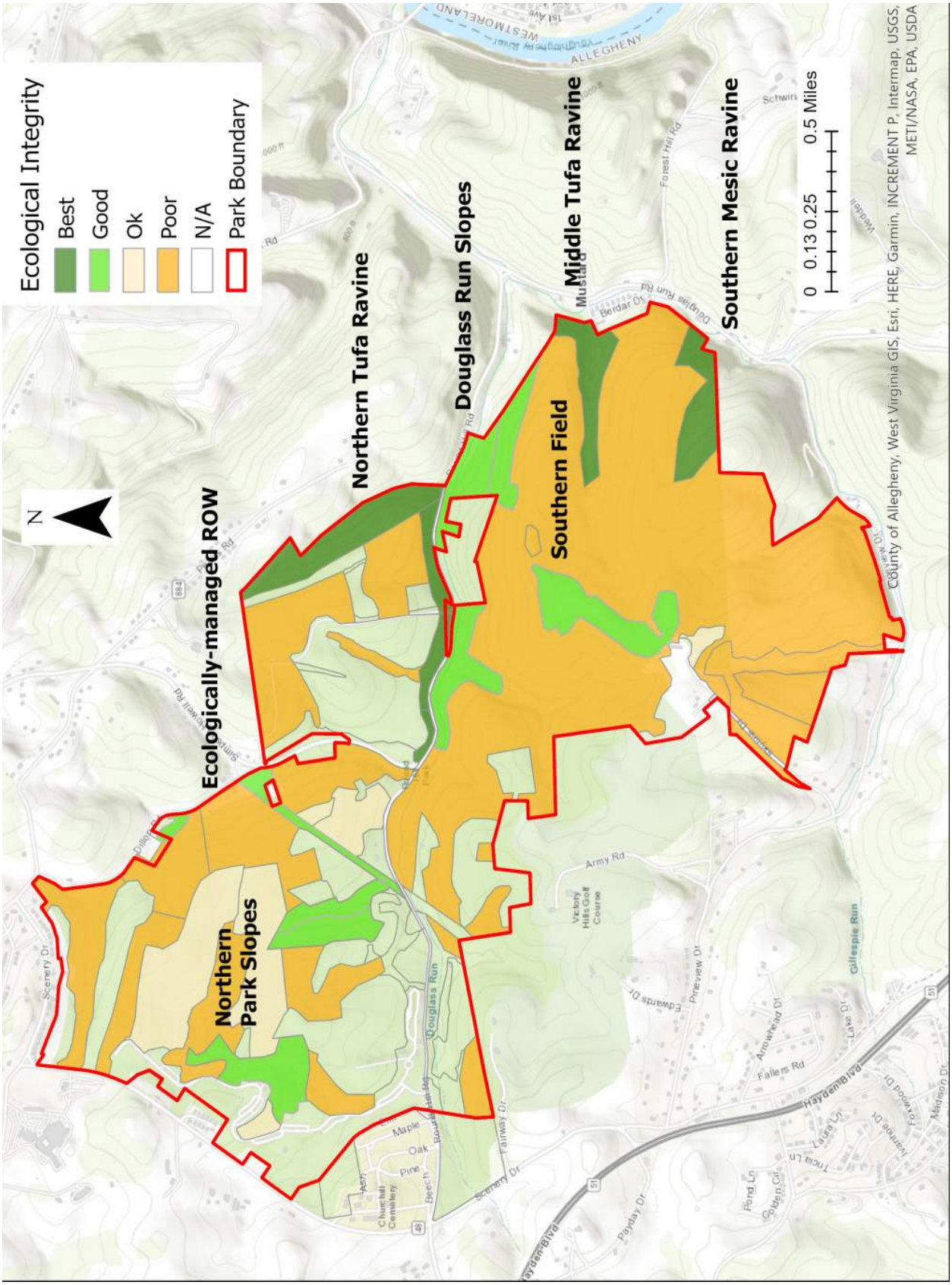
1.9 ECOLOGICAL INTEGRITY MAPPING

In Round Hill Park, the most ecologically intact communities are found in the stream valleys and adjacent steep slopes, as these areas were difficult to log or farm in the past and retained natural plant communities. Although many parks show strong differences in ecological communities based on slope and aspect, most of the communities in Round Hill Park are all fairly mesic, perhaps due to the location of the terrain fairly low in a medium-sized watershed.

Compared to many other county parks, a large part of the park is forested, but a fairly small fraction of the forest is high quality. We have highlighted the areas with the greatest ecological integrity and diversity by mapping areas as "best" "good" and "poor" quality natural communities (Figure 1).

- **"Best quality"** – these areas have mature plant communities with species diversity as good as or better than is typical for an intact example of the community type in our region, including more "conservative" species that require intact forest habitat and do not re-establish quickly after disturbance. These species have special conservation value, because they are difficult to re-establish once lost. They can also provide seed and propagule stock for restoration efforts elsewhere in the park, if they are managed to develop healthy populations and sustainably harvested. These areas also currently have low presence of invasive species and should be monitored and managed to prevent the establishment and spread of invasives.
- **"Good quality"** – these are areas that have medium-aged to mature plant communities, with species diversity that is somewhat lower than expected for a reference example of the community type. "Conservative" species are less common or absent in these areas. Exotic species may be present but native species are dominant. Restoration of greater species diversity should be considered through movement of seed propagules from "best quality" examples of similar community types in the park. Invasive species management may also be needed in these areas.
- **"Poor quality"** – these are areas that have early successional plant communities with low diversity of native plants; species tend to be non-conservative, ie those that can colonize disturbed habitats easily and exotic invasive plants are common. These areas will require intensive management to restore ecological quality and allow them to proceed on a natural successional path to develop a mature native plant community. The primary difficulty is the need to manage invasive species so that natives can establish and mature; propagule introduction may also eventually be needed to restore more conservative species.

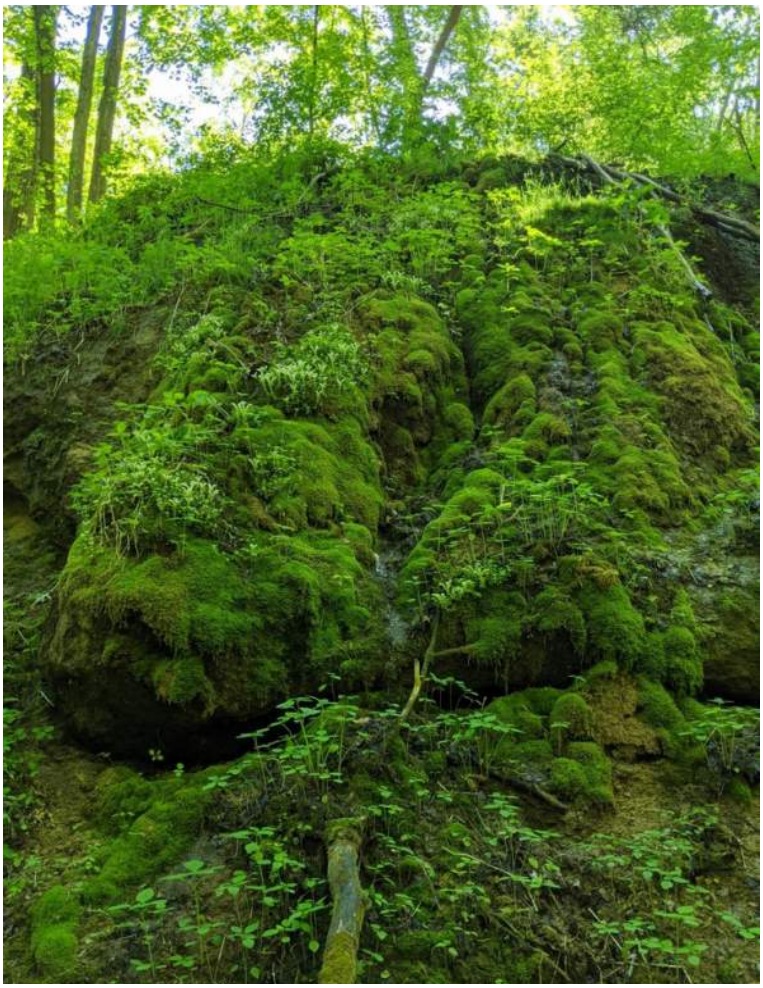
FIGURE 1: ECOLOGICAL INTEGRITY MAP



1.9.1 BEST QUALITY AREAS:

Northern Tufa Ravine:

This area includes a stream ravine at the eastern boundary of the park and the adjacent slope forest to the west, above Round Hill Road. The stream ravine has a very diverse and fairly intact mixed mesophytic forest community, and also has a large tufa formation across the stream in one area. The mixed mesophytic forest community is an Appalachian type that is relatively uncommon in Pennsylvania and hosts a great diversity of tree, shrub and herb species. The forest canopy layer is moderately mature with some larger trees; black maple (*Acer nigrum*) is the dominant species, but red oak (*Quercus rubra*), black walnut (*Juglans nigra*), American elm (*Ulmus americana*), slippery elm (*Ulmus rubra*), hackberry (*Celtis occidentalis*), beech (*Fagus americana*) and bitternut hickory (*Carya cordiformis*) are also present. Spicebush (*Lindera benzoin*) is the dominant shrub, with witch hazel (*Hamamelis virginiana*) also present.


Northern Tufa Formation in Round Hill Park

There is a dense layer of mesic herbaceous species, dominated by Canada waterleaf (*Hydrophyllum canadense*) and Valerian (*Valeriana pauciflora*). Valerian is an uncommon species in Pennsylvania, only found in scattered locations in the SW part of the state. The Watch List species narrow-leaved glade fern (*Diplazium pycnocarpon*) also has a small population in this ravine. Other species include many conservative wildflowers: Jack-in-the-pulpit (*Arisaema triphyllum*), wild-ginger (*Asarum canadense*), cutleaf toothwort (*Cardamine concatenata*), two-leaved toothwort (*Cardamine diphylla*), sedge

(*Carex albursina*), sedge (*Carex blanda*), honewort (*Cryptotaenia canadensis*), cleavers (*Galium aparine*), wild geranium (*Geranium maculatum*), wood nettle (*Laportea canadensis*), false Solomon's-seal (*Maianthemum racemosum*), jumpseed (*Persicaria virginiana*), mayapple (*Podophyllum peltatum*), Solomon's-seal (*Polygonatum pubescens*), northern red oak (*Quercus rubra*), bloodroot (*Sanguinaria canadensis*), wild stonecrop (*Sedum ternatum*), zigzag goldenrod (*Solidago flexicaulis*), Short's aster (*Symphyotrichum shortii*), wakerobin (*Trillium erectum*), wingstem (*Verbesina alternifolia*) and cream violet (*Viola striata*).

Several invasive species were observed: garlic mustard (*Alliaria petiolata*), low smartweed (*Persicaria longiseta*) and Japanese stiltgrass (*Microstegium vimineum*).

Management Recommendations:

- Reduce deer browse pressure in the local area.
- Follow canopy gap recommendations listed under "proactive conservation measures" above.
- Monitor and remove pioneer populations of invasive species. Garlic mustard can be managed to some degree through hand-pulling. Low smartweed and Japanese stiltgrass are harder to effectively hand-pull, due to the numerous small stems of the plants and their vigorous resprouting from seed. We do not have effective control methods for these species at this time, but invasions can be slowed by reducing deer browse and managing any canopy gaps.

Middle Tufa Ravine:

This area is a stream ravine with a fairly mature forest and very diverse herbaceous community with many conservative wildflower species; it also includes the adjacent slope to the east above Douglass Run, where there is mature forest and a few calcareous outcrops on the upper portion of the slope. At the upstream end of the stream ravine, there is a large tufa formation across the stream, and the steep basin-shaped area just downstream of the tufa hosts a particularly lush and diverse herbaceous layer. The forest community is the sugar maple – basswood type, with a canopy of sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), American beech (*Fagus grandifolia*), tuliptree (*Liriodendron tulipifera*), basswood (*Tilia americana*), red elm (*Ulmus rubra*), bitternut hickory (*Carya cordiformis*), black cherry (*Prunus serotina*) and American elm (*Ulmus americana*).

The native component of the shrub layer is primarily spicebush (*Lindera benzoin*) and witch-hazel (*Hamamelis virginiana*), with wild hydrangea (*Hydrangea arborescens*) also scattered.

The diverse herbaceous layer includes four species on the PNHP Watch List: James' sedge (*Carex jamesii*), dwarf larkspur (*Delphinium tricorne*), round-leaved ragwort (*Packera obovata*) and Core's chickweed (*Stellaria corei*).

Other species include: smooth rockcress (*Arabis laevigata*), Jack-in-the-pulpit (*Arisaema triphyllum*), rattlesnake fern (*Botrychium virginianum*), cutleaf toothwort (*Cardamine concatenata*), two-leaved toothwort (*Cardamine diphylla*), sedge (*Carex albursina*), sedge (*Carex leptonervia*), honewort (*Cryptotaenia canadensis*), field horsetail (*Equisetum arvense*), white wood aster (*Eurybia divaricata*), cleavers (*Galium aparine*), beggar's-lice (*Hackelia virginiana*), Canadian waterleaf (*Hydrophyllum canadense*), jewelweed (*Impatiens sp*)., wood nettle (*Laportea canadensis*), Virginia bluebell (*Mertensia virginica*), anise root (*Osmorhiza longistylis*), jumpseed (*Persicaria virginiana*), mayapple (*Podophyllum peltatum*), Solomon's-seal (*Polygonatum pubescens*), Christmas fern (*Polystichum acrostichoides*), small-flowered crowfoot (*Ranunculus abortivus*), hooked crowfoot (*Ranunculus recurvatus*), bloodroot (*Sanguinaria canadensis*), wild stonecrop (*Sedum ternatum*), carrion-flower (*Smilax herbacea*), zigzag goldenrod (*Solidago flexicaulis*), wakerobin (*Trillium erectum*), large-flowered trillium (*Trillium grandiflorum*), wingstem (*Verbesina alternifolia*) and downy yellow violet (*Viola pensylvanica*).

Middle Tufa Formation in Round Hill Park

Management Recommendations:

- Invasive shrubs and herbs are moderately common in this area and some management efforts may be required to maintain the current high ecological integrity. Herbs include garlic-mustard (*Alliaria petiolata*), Japanese stiltgrass (*Microstegium vimineum*), and periwinkle (*Vinca minor*), while shrubs include Amur honeysuckle (*Lonicera maackii*), multiflora rose (*Rosa multiflora*) and Japanese barberry (*Berberis thunbergii*).
- Deer browse was also observed in areas that were not prohibitively steep for deer to access. Reduction of deer browse pressure will positively impact the long-term viability of the native wildflower species, and if it is not reduced, these species may be lost over time.
- The tufa basin contained some tires and other dumped trash; remove rubbish while taking care not to damage vegetation. Avoid traversing the steep slopes of the basin-edges, especially when the soil is wet or moist.
- A trail runs high along the northern bank of the stream, which was formerly a road. Take particular care in maintenance of the trail:
    - Maintain the structural integrity of the slope.
    - Avoid soil erosion and excessive water drainage.
    - Avoid damage to native vegetation on the trail edges and slope below, or introduction of non-native propagules
    - The trail crosses near to the summit of the tufa basin. It is not easily visible right now, but it could easily become an off-trail destination for hikers. The tufa and the steep slopes are extremely sensitive to damage from climbing or foot traffic. Maintain vegetation screening the summit from view and monitor usage at this location; if off-trail traffic increases, place signage and physical structures to keep visitors to a limited area at the top of the summit and prevent climbing along the tufa or adjacent slopes.

Southern Mesic Ravine:

This ravine has a mature forest community with a moderately diverse native herbaceous layer, including some conservative species. The forest type is tuliptree-beech-maple forest. The most common tree species are black maple (*Acer nigrum*) and sugar maple (*Acer saccharum*), while American beech (*Fagus grandifolia*) and tuliptree (*Liriodendron tulipifera*) are co-dominant. Other species with lower cover include bitternut hickory (*Carya cordiformis*), hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), black cherry (*Prunus serotina*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*) and black oak (*Quercus velutina*).

The shrub layer includes a strong component of spicebush (*Lindera benzoin*) and also black haw (*Viburnum prunifolium*).

The herbaceous layer is not as healthy as the other high ecological integrity ravines in the park, as there is lower overall cover of native herbs and many species have small, local populations. This may reflect the long-term impact of deer browse, gradually reducing the population size and cover of native herbs. Low native herb cover with relatively high amounts of bare soil also increases the vulnerability of the area to establishment of non-native invasive species.

The PNHP Watch List species round-leaved ragwort is present in the ravine. Other species include: hog-peanut (*Amphicarpaea bracteata*), smooth rockcress (*Arabis laevigata*), Jack-in-the-pulpit (*Arisaema triphyllum*), rattlesnake fern (*Botrychium virginianum*), two-leaved toothwort (*Cardamine diphylla)*, cuckoo-flower (*Cardamine pratensis*), sedge (*Carex albursina*), red sedge (*Carex communis*), honewort (*Cryptotaenia canadensis*), hay-scented fern (*Dennstaedtia punctilobula*), intermediate wood fern (*Dryopteris intermedia*), white wood aster (*Eurybia divaricata*), false-mermaid (*Floerkea proserpinacoides*), cleavers (*Galium aparine*), Canadian waterleaf (*Hydrophyllum canadense*), wood nettle (*Laportea canadensis*), Virginia cutgrass (*Leersia virginica*), false Solomon's-seal (*Maianthemum racemosum*), violet wood-sorrel (*Oxalis violacea*), ragwort (*Packera obovata*), jumpseed (*Persicaria virginiana*), mayapple (*Podophyllum peltatum*), Solomon's-seal (*Polygonatum pubescens*), Solomon's-seal (*Polygonatum pubescens*), hooked crowfoot (*Ranunculus recurvatus*), wild stonecrop (*Sedum ternatum*), wild stonecrop (*Sedum ternatum*), bluestem goldenrod (*Solidago caesia*), zigzag goldenrod (*Solidago flexicaulis*), rue-anemone (T*halictrum thalictroides*) and cream violet (*Viola striata*).

Invasive species observed in the ravine include narrowleaf bittercress (*Cardamine impatiens*), which is currently very scattered but can spread extremely fast, and garlic mustard (*Alliaria petiolata*). Invasive shrubs are very common in the successional forest surrounding this ravine.

Management Recommendations:

- Reduce deer browse pressure. This will allow native wildflower populations to recover and expand within the ravine. If deer browse pressure is not reduced, populations will likely continue to shrink and species may be lost.
- Monitor for and remove pioneer populations of invasive species. All those observed can be effectively reduced with hand-pulling efforts.

1.9.2 GOOD QUALITY AREAS:


Wild Ginger (*Asarum canadense*), found at Douglass Run Slopes

Douglass Run Slopes:

The floodplain is fairly narrow along much of Douglass Run, in part because of the close presence of Round Hill Road adjacent to and above the road. However, there are some areas of sugar maple floodplain forest, where the canopy includes sycamore (*Platanus occidentalis*), sugar maple (*Acer saccharum*), black maple (*Acer nigrum*), black walnut (*Juglans nigra*), bitternut hickory (*Carya cordiformis*) and American elm (*Ulmus americana*). Some floodplain areas contain a fairly mature canopy, while others have been more recently disturbed and show a higher prevalence of the early-successional species such as black walnut and American elm. The floodplain forest community also extends up the small tributary drainage near the western end of the mapped area. This drainage includes a small tufa formation, about 2 m high on one side of the stream channel. The sugar maple floodplain forest community often has a rich community of mesic, conservative herbaceous species; while the diversity was somewhat reduced by disturbance and deer browse, these species were still present in some areas.

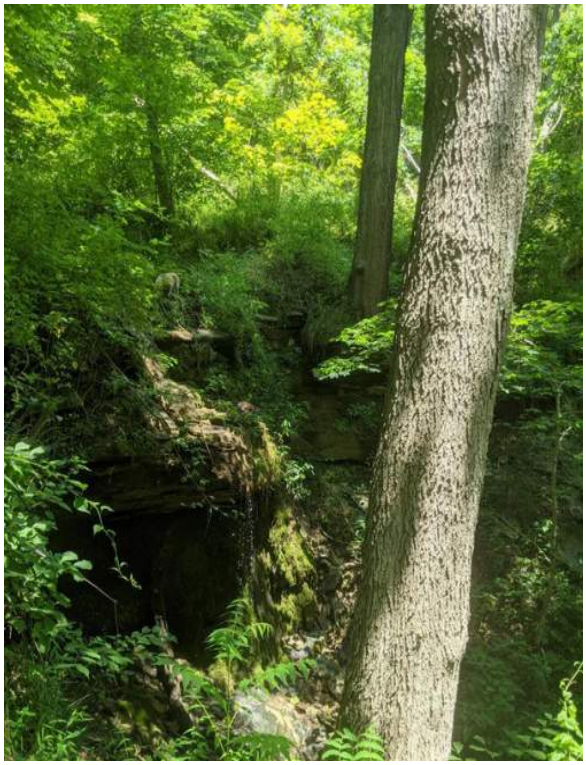
To the south of Douglass Run beyond the floodplain, mature forest extends upslope to varying degrees before transitioning to a modified successional forest of very different character, as shown in the mapped boundaries of the "good" ecological integrity area and the adjacent "poor" ecological integrity areas. The mature forest of the slope is classified as sugar maple – basswood forest, although it doesn't have much basswood component. It is very similar to the floodplain forest in composition, minus the more wetland-oriented species such as American elm, black walnut and wingstem. The canopy is dominated by sugar maple.

Herbaceous species include: yellow trout lily (*Erythronium americanum*), dutchman's breeches (*Dicentra cucullaria*), Canada waterleaf (*Hydrophyllum canadense*), Carolina spring beauty (*Claytonia caroliniana*), starry chickweed (*Stellaria pubera*), common purple violet (*Viola sororia*), multiflora rose (*Rose multiflora*), a grape species (*Vitis*), crepis rattlesnake-root (*Prenanthes crepidinea*), cutleaf toothwort (*Cardamine concatenate*), false Solomon's seal (*Maianthemum racemosum*), downy yellow violet (*Viola pennsylvanica*), clearweed (*Pilea sp.*), jumpseed (*Persicaria virginiana*), hog peanut

(*Amphicarpaea bracteata*), wood nettle (*Laportea canadensis*), zigzag goldenrod (*Solidago flexicaulis*), striped violet (*Viola striata*), sharp-lobed hepatica (*Hepatica acutiloba*), Solomon's seal (*Polygonatum pubescens*) and wild ginger (*Asarum canadense*).

Management Recommendations:

- Monitor and manage pioneer populations of invasive species. Several species were observed.
    - Garlic mustard (*Alliaria petiolata*), oriental bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*) can all be addressed somewhat effectively through removal by hand, especially with smaller populations.
    - Creeping smartweed (*Persicaria longiseta*), Japanese stiltgrass (*Microstegium vimineum*) are harder to hand-pick effectively, because of the density of stems and vigorous regrowth from seed.
- Monitor informal trail network in this area to ensure ATV use and excessive erosion does not occur, as it would damage the sensitive and diverse vegetation.



Douglass Run Slopes

Douglass Run Slopes

Northern Park Slopes:

The Northern Park Slopes are two areas in the portion of the park north of Round Hill Road that have patches of relatively good quality mature forest. One is centered around a small stand of red oak – mixed hardwood forest, with mature red oak, beech, sugar maple, black cherry and shagbark hickory. This area contained mature trees visible in 1967 aerial photographs. As is common in a small stand surrounded by successional forest, the herbaceous layer is somewhat reduced in diversity from what might be optimally expected for this community type.

The second good quality forest area is centered around a stream ravine. The lower portion has mature sugar maple – basswood forest, with some very large basswood (Tilia americana), American elm (Ulmus americana), black walnut (Juglans nigra) and sugar maple (Acer saccharum). The herbaceous layer had some conservative indicator species, including lady fern (Athyrium felix-femina), striped violet (Viola striata), mayapple, shining fescue (Festuca obtusa), zigzag goldenrod (Solidago flexicaulis), a sedge (Carex gracillema) and bloodroot (Sanguinaria canadensis). Invasive shrubs were common but not dominant, including multiflora rose (Rosa multiflora), privet (Ligustrum sp.) and Japanese barberry (Berberis thunbergii).

Northern Park Slopes

The two "good" ecological integrity forest patches are connected by a broad slope of red oak – mixed hardwood forest that was rated "ok" ecological integrity, due to a somewhat greater presence of invasive species and a lower presence of native herbaceous species, especially conservative forest specialists; however, this area is in good condition compared to many of the successional forest areas of the park, with a fairly mature closed canopy of native species and a predominantly native composition. The canopy consists of black cherry, beech, sassafras, sugar maple, scarlet oak, black oak, red oak and scattered Norway spruce. Spicebush predominates in the shrub layer.

Ecologically - Managed Right of Way

The large right-of-way that runs through the park is classified as "good" ecological condition because it has been managed with plantings of native species that provide value to pollinators and other native animals, and invasive species are uncommon.

Management Recommendations:

- Continue ecologically-oriented management of right-of-way to preserve and enhance the diversity of native species and habitat value to native insects and other animals.

Southern Field:

This area is a field where periodic mowing appears to have been recently reduced; it currently has a good variety of native early-successional herbaceous and shrub species and a fairly minimal presence of invasive species.

Management Recommendations:

- Monitor for establishment of non-native invasive species and remove individuals while populations are small, to ensure that this area maintains a diversity of native early-successional species and provides habitat value to native animals.

General Management Recommendations for Areas of "Best" and "Good" Ecological Integrity

- Manage deer populations in the park to reduce browsing pressure. Immediate deer fencing around especially sensitive areas may be a good way to stop further loss of plant diversity, as long-term deer management plans are developed.
- Trail development should be limited in the mature forest areas. If mountain biking cannot be contained to trails, trails should be restricted to foot traffic.
- Interpretive signage regarding the biodiversity value of the mature forest areas, including requests not to pick flowers or other native vegetation and to refrain from damaging recreational activities, may help with public cooperation in conservation-oriented management of these areas.
- Mature forest areas should be a special focus for invasive species management to preserve these ecosystems while they are still in reasonably good condition. These areas should be monitored for pioneer invasive species and removed when detected.

1.10 OVERALL RECOMMENDATIONS

1.10.1 Ecological Management of Farmed Areas:

There are many practices currently in place to mitigate negative ecological impacts and enhance ecological functions in the farmed areas. These include:

- Crop Rotation
- Seeding pollinator friendly mixes including native species around field edges and in fallow fields.
- Riparian Buffers
- Runoff Management

As a public demonstration farm, it is extremely valuable that Round Hill Park puts these practices in place to show their feasibility and their ecological and aesthetic benefits. The park staff's expertise in these practices is a resource for the public and for the park system. Field and meadow management techniques have been shared with several other parks.

Round Hill Park Fields

1.10.2 Trail Management:

At Round Hill Park, the trails that see the most public use are in the northern section of the park and are largely wide, mowed routes that are also farm travel routes or extensions thereof. They appear in good condition with few problems related to erosion or runoff. There are additional foot trails in other areas of the park that are less formally maintained. The successional forest portions of the park would be largely untraversable without this informal trail network, due to the density of the vegetation and prevalence of vines. ATV use has been a problem in the past, causing damaging erosion on steep slopes and wet areas, but appears much reduced at present.

Trail Recommendations

- Follow best management practices to minimize trail impact on surrounding vegetation, topography and erosion.
- Professional assessment of the trail system can identify problem areas and recommend alternative solutions.
- Avoid routing trails near sensitive ecological features that would be vulnerable to poaching or damage from recreational exploration; this might include attractive rare flower species, delicate geological formations such as waterfalls, caves, or cliffs, etc.. If trail routing cannot avoid such features, signage and physical barriers can help prevent damage to these features.

Foot Trail through Round Hill Park

    - At Round Hill Park, the only present conflict between trail use and sensitive features is the formerly paved road that runs north from Mustard, which passes near one of the large tufa formations in the park. The summit of the tufa is at the same elevation as the trail and about 15' away. Although it is not visible from the trail, it could easily be discovered by hikers and might attract people attempting to climb it or view the small waterfall area from below. The tufa geology and the surrounding vegetation on steep-sloped, moist soils are very fragile and even small amounts of foot traffic could cause significant damage. If usage for this trail is expanded in the future, strategies should be employed to prevent trail users from accessing the tufa. These might include physical barriers, signage, discouraging unplanned trail development, or maintaining a vegetated buffer to provide a visual screen between the trail and the tufa.
- From the perspective of ecological impact, the areas rated "OK" and "poor" ecological integrity are ideal for trail placement and for more active uses. The majority of the informal forest trail network is currently in these areas.
- Minimize trail density in high ecological integrity areas; while some trail development is not incompatible with these areas and can create the benefit of developing public appreciation, dense networks of trails can erode the area available to native plants and wildlife.
    - Limit use to foot traffic in particularly sensitive areas, ie those with steep slopes, abundant and diverse native vegetation or wetland terrain.
    - In less-sensitive high ecological integrity areas, active use should be contingent on the user community's ability to stay on existing trails and avoid unsanctioned trail proliferation.
    - Horses can transport invasive species, horse use should be avoided in high ecological integrity areas.
    - At Round Hill, there are currently few trails through any of the "best" or "good" ecological integrity areas. Those that do exist are foot trails that do not appear to get heavy or damaging levels of traffic.

1.10.3 Direct Proactive Conservation Measures towards the most ecologically intact and regionally imperiled features in the park

There is a great a range of ecological stewardship needs within the park landscapes; however, we suggest two priorities. Those areas that remain in good condition ecologically should be stewarded to remain in good condition; and populations of species that are regionally rare should be protected. Both of these categories are prioritized because they are difficult to restore

once lost and because they are particularly significant to maintaining native biological diversity in our region.

The "Ecological Integrity Mapping" section (Figure 2) below identifies areas within the park that are in good condition and are good repositories of native diversity; specific recommendations are provided for each area. In general, the following kinds of stewardship are useful:

- Invasive species control (see recommendations below)
- Canopy gap remediation. Where canopy gaps exist within high quality forest, there is a risk that they will degrade the surrounding forest, as vines spread to pull down adjacent trees and invasive species establish populations in the favorable gap conditions that can then spread into adjacent high quality areas. In most cases, even when canopy gaps occur from natural events such as treefall, native forest will not be able to re-establish without protection from deer browse and management of invasive species. Figure 2 shows canopy gaps noted during this study, overlaid on Ecological Integrity mapping. However, this should not be considered a comprehensive inventory of all gaps.
- Management of stormwater and runoff issues to prevent severe flash flooding or severe bank erosion in stream ravines.

The "Rare Species Conservation in Round Hill Park" section below identifies regionally rare species that occur within the park and provides specific recommendations for the conservation of each.

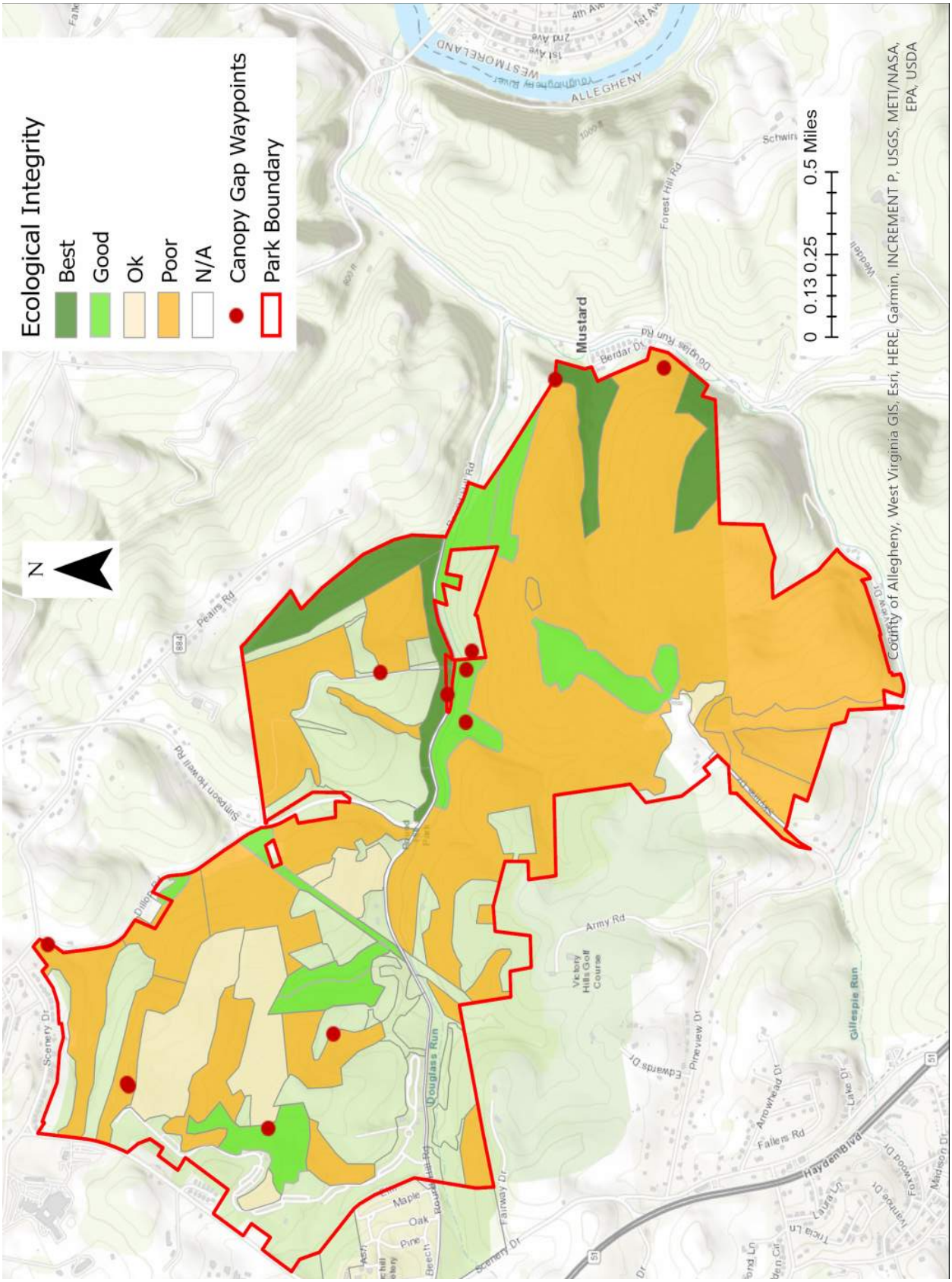
1.10.4 Invasive Species Management

Because invasive species have established so extensively at this point that it is impossible to control or eradicate them in all areas, efforts must be strategically directed towards the areas where they will have the most impact. Appendix 1 lists all invasive species found in the park. The highest management priorities are outlined below:

Remove Pioneer Populations of Invasive Species

It is far easier and less labor intensive if new invasive species that have not previously established in an area are detected and removed before they become well-established, rather than attempting to eradicate them over a large area once they have become established. Figure 3 shows a map of pioneer invasive species populations observed during the ecological study. Appendix 1 provides further description and management recommendations for the "pioneer" species populations in Round Hill Park.

FIGURE 2


Ecological Integrity
Best
Good
Ok
Poor
N/A
Canopy Gap Waypoints
Park Boundary
N
0 0.13 0.25 0.5 Miles
County of Allegheny, West Virginia GIS, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA
Mustard
Douglas Run Rd
Berdar Dr
Forest Hill Rd
Schwin
Weadah
Pearis Rd
Simpson Howell Rd
Dillon
Scenery Dr
Douglass Run
Victory Hills Golf Course
Army Rd
Edwards Dr
Pineview Dr
Arrowhead Dr
Fallers Rd
Haydem Blvd
Gillespie Run
Lake Dr
Laura Ln
Tricia Ln
Ivanhoe Dr
Forestwood Dr
Madison Dr
Fairway Dr
Maple
Oak
Pine
Beech
Asty
Ford Ln
Dr
WESTMORELAND
ALLEGHENY
1st Ave
2nd Ave
4th Ave
884
51

Steward "Best" and "Good" Ecological Integrity Areas

- Most **"best"** and **"good"** ecological integrity areas have fairly low levels of invasive species infestation at present. The most effective strategy in maintaining the quality of these areas is to develop a program for volunteer or staff personnel to periodically monitor these areas for new invasive species and remove them while the plants are few in number.
- Where infestations exist that cannot be controlled through casual hand-picking efforts, a more detailed area-specific assessment and treatment plan will be needed.
- Canopy gaps are prime areas for establishment of invasive species, due to high light levels, disturbance and lack of established native vegetation. Remediating canopy gaps can help to maintain ecological integrity over the long term.
    - When canopy gaps develop naturally, monitor and manage to prevent invasive species infestations from developing.
- Japanese stiltgrass (*Microstegium vimineum*) is a species that is becoming ubiquitous in our forests. It spreads extremely rapidly and there are no particularly effective ways of controlling it without also damaging native vegetation, especially at large scale. Many of the "best" and "good" ecological integrity areas currently have some degree of infestation, which will likely worsen over time. Disturbances that result in high-light areas and removal of vegetation greatly facilitate invasion. To slow down the progress of this invasive species:
    - Reduce deer browse pressure
    - Avoid creating disturbances in intact forested areas
    - Follow above-listed recommendations on canopy gaps.

Manage Invasives where they have Particular Impact on Recreational or Other Park Uses.

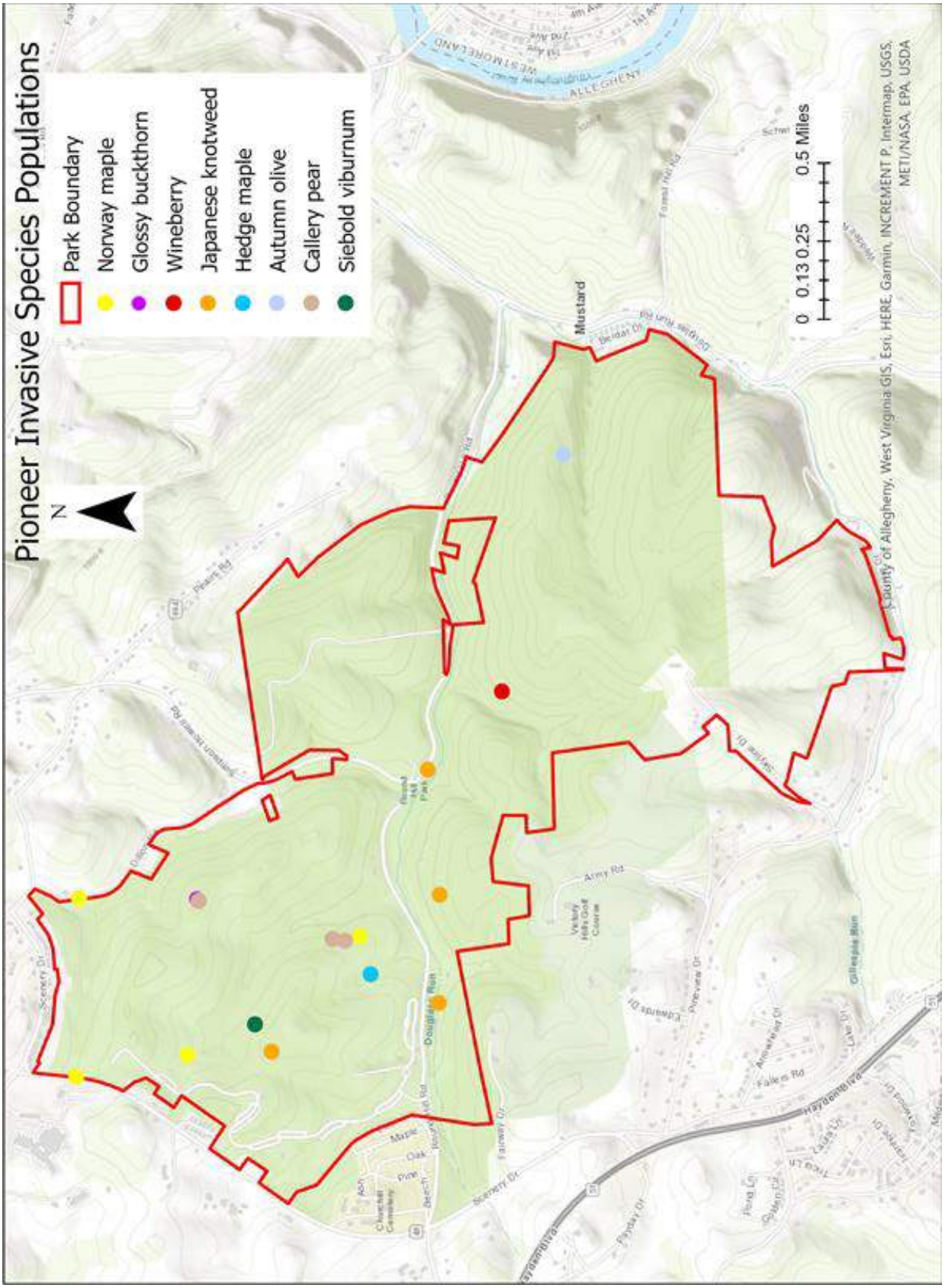
In the case of Round Hill Park, two species that may fall into this category are mile-a-minute and Callery pear.

Callery Pear Management:

Callery pear is a species very widely used in landscape planting. It was initially designed to be sterile, so that it would not be able to seed into wild areas, but the introduction of new varieties allowed successful cross-pollination and reproduction. Furthermore, the naturalized forms of the plant often have thick, pointy thorns that can damage tires and injure hikers. The plant now escapes to form dense thickets along roadsides, meadows and edges. Further east, vast expanses of it can be seen blooming in the spring. In our area, it is just now beginning to establish in natural areas.

- Only a few individuals were seen in the park and it is an ideal time to remove them before the population expands any further.

FIGURE 3


Pioneer Invasive Species Populations
Park Boundary
Norway maple
Glossy buckthorn
Wineberry
Japanese knotweed
Hedge maple
Autumn olive
Callery pear
Siebold viburnum
N
0 0.13 0.25 0.5 Miles
County of Allegheny, West Virginia GIS, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA

- Staff and volunteers should keep an eye out for new individuals that could seed in in the future, as well.

Mile-a-Minute Management:


Mile - a - Minute Covering a Forest in Round Hill Park

Mile-a-minute (*Persicaria perfoliata*) is a non-native invasive species that forms dense, vining mats in high light areas, climbing over and smothering native vegetation. Although it is an annual, it grows extremely fast and seeds can persist for 6 years. The stems, while fairly weak, are covered in small thorns. The mat-like growth habitat and thorniness create a particular problem in recreational use settings. Once well established in an open area, it is very difficult to eradicate. However, it does not grow nearly as vigorously under shaded conditions, so if canopy cover can be restored in an area, its presence will likely diminish greatly. This species has currently established extensively in an early successional woodland area in the southern end of the park. Seeds can be moved around by birds, other animals, and by flowing water (Templeton et al 2020).

- If small populations are observed in other areas of the park, remove them before they spread extensively. Hand-pulling with gloves on is effective and not difficult for a small number of plants. If seeds have not formed, plants can be left to dry; if seeds have already formed, plants must be bagged, removed and destroyed.
- If the species establishes in canopy gaps in or near high-quality forest areas, the best long-term solution is to restore forest in the gap, eliminating the edge and open conditions where mile-a-minute thrives. However, if canopy gap restoration projects are undertaken where mile-a-minute has already established, ongoing control of this species while woody species mature to provide shade must be built into the restoration plan.
- For larger areas of successional forest where mile-a-minute has already established extensively, consider introduction of the biological control weevil *Rhinoncomimus latipes*, approved by the USDA for distribution for this use.
- Do not move plant materials, soil or leaf litter from areas where mile-a-minute is established to areas where it has not yet established, as the seeds remain viable for 6 years and could be transported even if no living plants are visible.

Holisitc Planning for Invasive Control:

- Whenever control efforts are undertaken, plans should be included for subsequent revegetation, either through protection of natural seed source germination or through introduction of native plant materials consistent with the site and the surrounding natural communities.
- Restoration efforts will be most successful if time and resources are allocated for thorough invasive control before introduction of new plant materials. All restoration plans should also include long-term maintenance efforts to monitor and control invasive species while native vegetation is establishing.
- Many species commonly used in landscaping are highly invasive in natural settings, such as burning bush, privet, Japanese barberry and Japanese silver-grass (Miscanthus sinensis). All species introduced for horticultural purposes should be reviewed for invasiveness and excluded if they exhibit invasive tendencies.
- Take precautions to prevent accidental introduction of invasive species from equipment and the movement of materials. Earth moving equipment should always be cleaned between sites to prevent movement of seeds in dirt on tires or blades. Fill, compost and soil moved from other areas can also be sources of invasive plant material; know the source and vet it before use.
- Reduction of seed and propagule from surrounding areas is also helpful in preventing new populations from establishing in new areas.
- Deer browse pressure makes natural areas more susceptible to the establishment of invasive species by creating bare soil areas and reducing competition from native species. Reducing deer browse pressure can strengthen the natural resilience of forest communities.

1.10.5 Deer Browse Management:

When deer population densities are too high, native plants and natural communities can be severely impacted. These species are their primary food. While plants can typically recover from some browse impact, when high levels of browse continue for many years, the recovery capacity is diminished and populations begin to decline. Many native wildflowers do not disperse or re-establish quickly or easily and if they are eradicated from an area due to overbrowsing, they may not replenish even if browsing is reduced (Goetsch et al. 2011; Pendergast IV et al. 2016). Studies have shown that long-term overbrowsing causes a permanent reduction in native species diversity that can only be remediated through active re-introduction of lost species. This effect is clearly visible in many of Allegheny County's forests, where the tree canopy composition and site conditions suggest a diverse array of native herbs should be present. But instead there is only bare soil with scattered herbs or deer-resistant fern species. Deer overbrowsing also reduces other ecological functions: excessive bare soil reduces rain absorption capacity and

increases soil erosion and flood vulnerability; long term overbrowse increases susceptibility to establishment and spread of invasive species (Averill et al. 2018; Knight et al. 2009); and overbrowsing also prevents forest regeneration.

In Round Hill Park, current evidence is mixed. Some of the “best” and “good” integrity areas show good species diversity and only moderate browse impacts, while other areas show browse damage and diversity reduction in areas that are accessible to deer. Steep slopes and outcrops are naturally inaccessible to deer and when these show a clear difference in species composition from flat areas, it is evidence that deer browse has altered the community.

- Continue efforts to encourage and facilitate deer hunting within the parks. Support regional efforts to increase hunting and reduce deer populations.
- Put up deer fencing around any particularly valuable ecological areas that are showing browse impact and around any restoration projects

: Deer Browse Damage

1.11 APPENDIX I:

Appendix 1

Invasive Species of Round Hill Park, Pioneer species listed first with management detail.

= low effort = medium effort = high effort

Scientific name	Common name	Growth Form	Distribution in Park	Regional distribution	Habitat	Cultivated?	Management
Acer campestre	hedge maple	tree	pioneer	uncommon	forest	yes	We found only a few individuals of this species, it would be easy to eradicate at this point.
Acer platanoides	Norway maple	tree	pioneer	moderately widespread	forest	yes	We found 1-few individuals in most locations of this species, although the northern end of the park has a larger population in successional forest there. Removing the small populations would not be difficult at all, and the larger ones are not beyond reach either.
Cardamine impatiens	narrow-leaved bittercress	herb	pioneer	moderately widespread	forest, wetlands		This was currently rare in the park and in low numbers, but it spreads incredibly rapidly, and I am seeing more and more of it everywhere I go. If there's a chance to contain it, that is now, but the chances of success are probably not great.
Elaeagnus umbellata	autumn-olive	shrub	pioneer	widespread	open areas		This species can form large stands, especially in meadows and edges, and can also establish to some degree in closed-canopy forests. We recommend removing it while the population is still small.
Fallopia japonica	Japanese knotweed	herb	pioneer	widespread	forest, floodplain		In most locations, this species was found in a small patch at an edge; this is a very good time to attempt control. A few locations outside of the park had more substantial stands that could spread into the park, such as behind the village of Mustard.
Lonicera morrowii	Morrow's honeysuckle	shrub	pioneer	widespread	forest, open areas		We only observed this in a few locations, but this likely represents under-documentation and it probably isn't really a pioneer species.

Scientific name	Common name	Growth Form	Distribution in Park	Regional distribution	Habitat	Cultivated?	Management
Persicaria perfoliata	mile-a-minute	vine	pioneer	uncommon	open areas		This species can greatly degrade early successional areas for recreational use, due to its prickly stems and matted, blanket-like growth form. Reducing the areas where it has currently established may help keep it from spreading to more areas of the park. However, the patch established in the southern end of the park is very extensive and will be difficult to control.
Pyrus calleryana	callery pear	tree	pioneer	uncommon	edges, open areas	yes	This species forms dense, thorny thickets and is highly problematic further east; now is an excellent opportunity to remove pioneer individuals before they spread further.
Rubus phoenicolasius	wineberry	shrub	pioneer	uncommon	forest, open areas		This species can become a dense invader of forested settings, and is currently very limited in the park, an ideal time to remove it.
Viburnum sieboldii	Siebold viburnum	shrub	pioneer	uncommon	forest	yes	This species spreads readily in forested conditions; as a large, fast-growing shrub with high reproductive potential, it can quickly change the composition of a forest's shrub layer. Only a few individuals were observed in one forested area of the park, so now is an ideal time to prevent the infestation from expanding.
Vinca minor	common periwinkle	herb	pioneer	uncommon	former homesteads and gardens	yes	This species is a fairly low priority for treatment because it spreads vegetatively, and doesn't seed in to new locations.
Frangula alnus	Glossy buckthorn	shrub	rare	moderately widespread	forest, open areas		This becomes a major forest invasive, and can also be dense in wetlands, meadows and open areas. One area of the two areas it was seen was a wetland. Treatment is much the same as other shrubs, so not tremendously difficult. Good to attempt removal while numbers are still low,

Scientific name	Common name	Growth Form	Distribution in Park	Regional distribution	Habitat	Cultivated?	Management
							although continued vigilance against re-establishment will be needed, since the seeds are dispersed by birds.
Artemisia vulgaris	common mugwort	herb	uncommon	moderately widespread	open areas, edges		
Berberis thunbergii	Japanese barberry	shrub	uncommon	widespread	forest		yes
Lonicera japonica	Japanese honeysuckle	vine	uncommon	moderately widespread	forest, open areas		yes
Lonicera maackii	Amur honeysuckle	shrub	uncommon	widespread	forest, open areas		
Stellaria media	common chickweed	herb	locally common	moderately widespread	forest		
Ailanthus altissima	tree-of-heaven	tree	moderately widespread	widespread	forest, open areas, waste ground		
Microstegium vimineum	Japanese stiltgrass	herb	moderately widespread	widespread	forest, open areas, wetland		
Persicaria longiseta	Low smartweed	herb	moderately widespread	moderately widespread	forest, wetland		
Alliaria petiolata	garlic-mustard	herb	widespread	widespread	forest		
Celastrus orbiculatus	oriental bittersweet	vine	widespread	widespread	forest, openings		
Rosa multiflora	multiflora rose	shrub	widespread	widespread	forest, open areas		

SECTION II - SUGAR MAPLE ALLEE RECOMMENDATIONS:

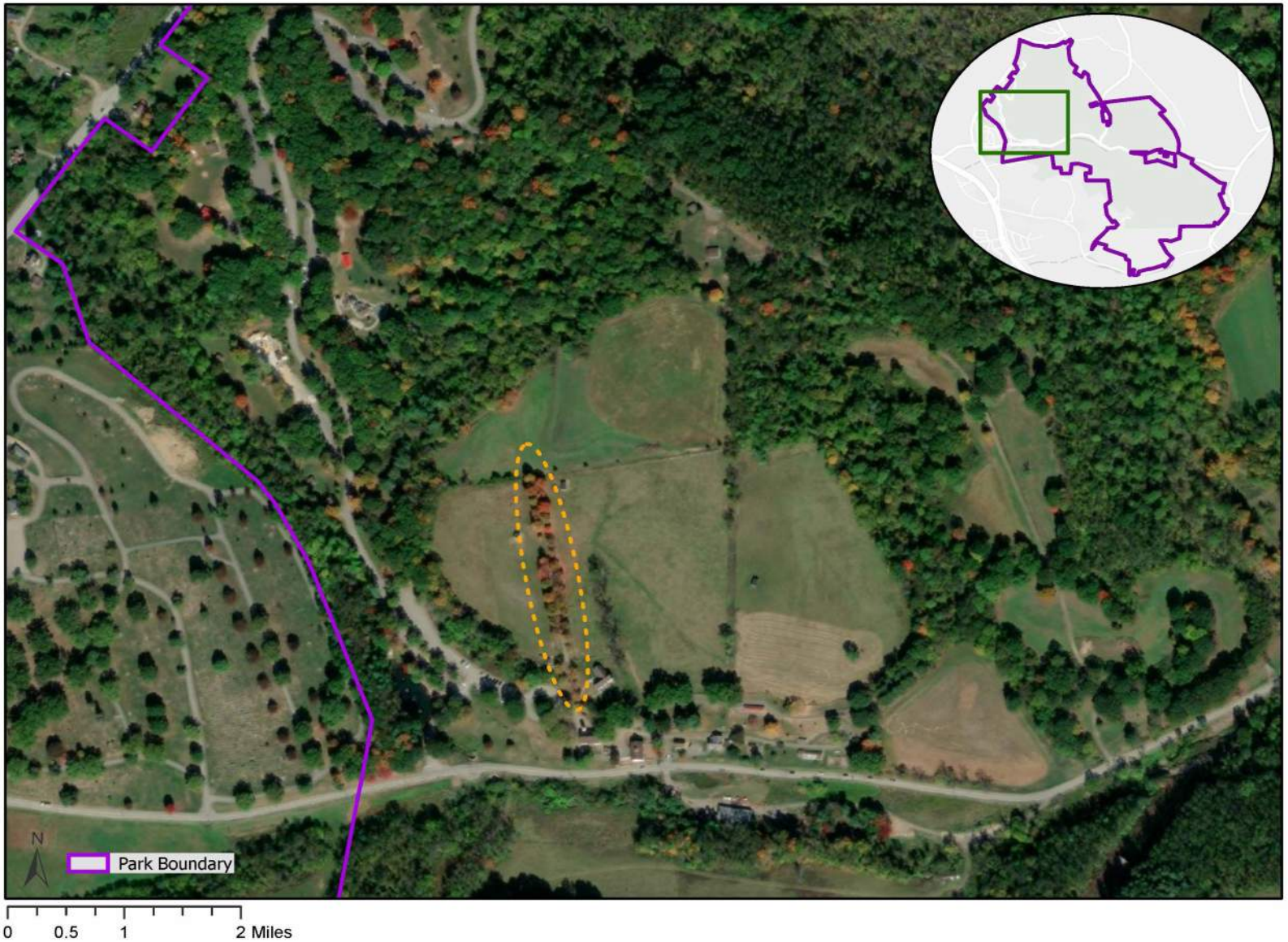
2.1 ROUND HILL PARK: SUGAR MAPLE ALLEE

One prominent forestry feature at Round Hill Park is the long allee of sugar maples. Several dozen of these trees line a dirt farm lane between the sheep and cattle pastures. The trees provide a spectacular display of fall color, which can be seen on the aerial imagery on the following map.

Unfortunately many of the maple trees are declining. Some have already died and have been removed. The WPC Forester assessed these trees and believes the cause of tree decline is verticillium wilt. This tree pathogen is a soil born fungus that infects tree roots. It then spreads throughout the tree within the vascular system. As with many fungal diseases, the tree's response is to plug up its vascular tissue in an attempt to prevent the pathogen from spreading. This, however, also prevents the transport of water and nutrients to those quarantined regions, causing them to decline.

While verticillium is an easy scapegoat for tree mortality, it is actually not the only culprit. Verticillium is primarily only an opportunistic pathogen, meaning that an otherwise healthy tree is unlikely to become severely affected. Most often, only a tree that is predisposed to some other kind of other stress, will it become negatively affected by verticillium. A similar analogy could be made with people and compromised immune systems.

Round Hill Park: Sugar Maple Allee



Frequent extremes in precipitation and temperature, as well as soil nutrient imbalances, are common causes of tree stress that also favor verticillium wilt. Western Pennsylvania is increasingly becoming subjected to long periods of hot and humid temperatures. Furthermore, rainfall is becoming more intense and intersected with droughty conditions. Warm and wet weather favors fungal pathogens. Acute fluctuations in heavy rain and dryness significantly increase tree stress.

Too little or too much of a soil nutrient, especially nitrogen, can increase verticillium wilt severity. The WPC Forester believes that the trees within this allee are subjected to an especially high level of nitrogen due to the close proximity of the livestock pastures. Both lines of maples are immediately growing along the fence lines for the sheep and cattle fields. Livestock manure has incredibly high nitrogen content. Maple trees are known to have very aggressive root systems; they can spread laterally well beyond the farthest reach of the tree's canopy. Each tree in this allee has a large portion of its root system growing well into the adjacent pasture.

There is no cure for verticillium wilt. As trees decline and are removed, it is strongly recommend to only replant with tree species known to be resistant to the disease. Currently, maple trees are one of the most highly susceptible trees to verticillium wilt. While fall color is a wonderful attribute of sugar maples, no species of maple should be replanted on this site. A complete list of resistant tree species recommended for this site is provided below, along with a highly susceptible species list not recommend for planting.

2.2 RECOMMENDED SPECIES FOR REPLACEMENT TREE PLANTING

All of the following tree species are resistant to verticillium wilt:

Common Name	***Scientific Name***
American Sweetgum	*Liquidambar styraciflua*
Swamp White Oak	*Quercus bicolor*
White Oak	*Quercus alba*
Chinkapin Oak	*Quercus muehlenbergii*
American Sycamore	*Platanus occidentalis*
London Planetree	*Platanus x acerifolia*
American Basswood	*Tilia americana*
Honeylocust	*Gleditsia triacanthos*
Crabapple	*Malus spp.*
Eastern White Pine	*Pinus strobus*
Baldcypress	*Taxodium distichum*
Hornbeam	*Carpinus caroliniana*
Hophornbeam	*Ostrya virginiana*

2.3 TREE SPECIES TO AVOID PLANTING

All of the following tree species are highly susceptible to verticillium wilt:

Common Name	***Scientific Name***
Maple (All Species)	*Acer spp.*
Catalpa	*Catalpa speciosa*
Eastern Redbud	*Cercis canadensis*
Magnolia	*Magnolia spp*
Blackgum	*Nyssa sylvatica*
Tuliptree	*Liriodendron tulipifera*
Yellowwood	*Cladastrus kentukea*
Cherry	*Prunus spp.*

All of the following tree species are not recommended for planting due to other serious pest or disease issues:

Common Name	***Scientific Name***	**Disease**
Beech	*Fagus spp.*	Beech Leaf Disease
Spruce	*Picea spp.*	Needlecast / Canker
Ash	*Fraxinus spp.*	Emerald Ash Borer
Hemlock	*Tsuga spp.*	Hemlock Woolly Adelgid
Walnut	*Juglans spp.*	Thousand Canker Disease
Flowering Dogwood	*Cornus florida*	Anthracnose
Northern Red Oak	*Quercus rubra*	Oak Wilt Disease
Pin Oak	*Quercus palustris*	Oak Wilt Disease
Shingle Oak	Quercus imbricaria	Oak Wilt Disease

Sugar Maple Allee

SECTION III - GREEN INFRASTRUCTURE OVERVIEW & RECOMMENDATIONS:

3.1 GREEN INFRASTRUCTURE APPROACHES TO STORMWATER MANAGMENT:

WPC has identified specific locations within Round Hill Park where green infrastructure facilities can help address stormwater management problems. Park managers met with WPC, ACPF, and County Parks staff members to assess these locations where stormwater runoff is creating serious water quality issues including non-point source pollution, erosion and sedimentation. The issues present within the parks is consistent with stormwater management problems throughout the region, wherein wet weather runoff damages water quality, stream morphology and habitat due to excessive runoff from large areas of impermeable surfaces such as parking lots, roads, buildings and sidewalks. Within the parks, this runoff is typically discharged to open greenspaces such as fields and woods where the flush of hot, dirty water creates the damage. In collaboration with the Allegheny County Parks Department landscape architecture staff, WPC is outlining some straightforward approaches for green infrastructure for both parks below.

3.1.1 HARVEST PAVILION PARKING LOT

The Harvest Pavilion parking lot presents a substantial opportunity for addressing pretty significant stormwater runoff issues using green infrastructure. The park manager suggested that this parking lot could be reduced by 50%. The stormwater issues are typical of what we see throughout the parks—runoff is channeled down through the stormwater conveyance system via catch basins, piping and released through culverts into open space, whether mowed or wooded. Much like the Beech lot in White Oak Park, the erosion, flooding and sedimentation issues are substantial because of the extent of the impermeable areas drained, resulting in hot, dirty water discharges directly into streams and negatively impacting water quality and habitat.

Ultimately, the runoff from the Harvest Shelter lot makes its way down a wooded hillside causes severe erosion along Hereford Drive at the bottom of the hillside, runs over Hereford Drive, then over another parking lot, and floods the Meadow Shelter and surrounding lawn area.

The Harvest Grove Parking Lot. Runoff from this lot, another nearby lot, and Hereford Drive enter this catch basin which empties into the adjacent forest.

Looking down to the Harvest Grove lot & Hereford Drive from the upper lot. Catch basins and sewers are “daisy - chained” and release into open space.

Severe erosion below the Harvest Grove lot. Park Management installed stone aggregate to help slow runoff.

The runoff from the Harvest Lot washes across Hereford Drive, across another parking lot, and floods this pavilion during wet weather events.

Watershed Modeling Data:

For project planning purposes, WPC has utilized the online "Model My Watershed" tool to estimate the efficacy of green infrastructure modifications to the project recommendations in this report. As stated on the Wikiwatershed website, "Model My Watershed" is part of Stroud Water Research Center's WikiWatershed initiative. WikiWatershed is a web toolkit designed to support citizens, conservation practitioners, municipal decision-makers, researchers, educators and students to collaboratively advance knowledge and stewardship of fresh water."

This data is intended only for planning purposes. Hydrologic analyses and runoff models should be undertaken by qualified professionals prior to construction of any green infrastructure facility. Modelling data generated by the Wikiwatershed "Model My Watershed" web toolkit is required for several Pennsylvania state agency grant programs that fund watershed protection analysis and implementation projects.

Bioswale Approach for the Harvest Grove Lot:

The installation of a bioswale would entail the following:

- Hydrologic analysis to determine runoff volume from the Harvest lot and adjacent impermeable surfaces.
- Infiltration testing.
- Land survey.
- Design of the bioswale (contracted or in-house) to meet desired stormwater runoff capture goals. Controlling 100% of the first inch of runoff is a fairly standard approach in this region.
- Asphalt demolition.
- Construction—excavation, grading, connection to existing sewer/catch basin, stone and plants installations.
- Maintenance and monitoring.
- Informational signage.

The Harvest Grove Lot and the Drainage Area with the proposed bioswale area at the northwest end.

Specifications for Harvest Grove Parking Lot Bioswale:

- The area of the parking lot and adjacent road and additional parking lot were used as the basis for calculating runoff and totals 73,493 square feet.
- The addition of a 9,439 square foot vegetated bioswale in the north west corner of the lot would intercept and infiltrate 94% of a 1" 24-hour wet weather event and eliminate runoff altogether.
- The capture volume per 1" wet weather event would be 3,374 cubic feet of runoff.
- Infiltration would increase from 55% to 94% (the other 6% is evapotranspiration).
- The bioswale would completely remediate suspended solids, Nitrogen and Phosphorous during a 1" wet weather event.
- Modeling data specific to the Harvest Grove Parking Lot bioswale can be accessed online at https://modelmywatershed.org/project/37245/

Budget Estimates for the Harvest Grove Parking Lot Bioswale:

The tables below represent outsourcing all of the project components and utilizing of volunteers for the installation of all plant material. Any in-house or in-kind services would reduce the project implementation costs.

Trees, Supplies & Planting Site Prep.				
Category	**Description**	**Unit Cost**	**Units**	**Total**
Landscape Trees	2" Caliper Balled and Burlapped Landscape Trees	$225.00	20	$4,500.00
Restoration Trees	2-5 Gallon Native Trees	$60,00	75	$4,500.00
Shrubs	Native Shrubs for Bioswales	$35.00	300	$10,500.00
Perennials & Grasses	Native Grasses & Perennial Flowers	$25.00	2000	$50,000.00
Planting Supplies	Mulch, Soil, Stakes, Tubes, Fencing, Tie	$3,500.00	1	$3,500.00
Subtotal				**$73,000.00**

Project Management				
Category	**Description**	**Unit Cost**	**Units**	**Total**
Project Director	Manage RFP Process & Contracts, Convene Partners, Financial Management, Staff and Contractor Oversight	$100.00	60	$6,000.00
Coordinator	Coordinate Partners & Volunteers for Planting	$50.00	80	$4,000.00
Subtotal				**$10,000.00**

Contracted Professional Services				
Category	**Description**	**Unit Cost**	**Units**	**Total**
Landscape Architect	Design Services, Plant Selection and Sourcing Drawings, Planting Oversight	$150.00	125	$18,750.00
Civil Engineering	Hydrologic Analysis, Construction Drawings	$150.00	50	$7,500.00
Construction of GI	Demolition, Heavy Construction, Piping for GI facilities, Stone Installation, Excavation, Grading	$120,000.00	1	$120,000.00
Monitoring GI	Monitoring Protocol Developed for at least 1 Year. Monitoring Stream Channel Morphology	$3,000.00	1	$3,000.00
Signage	Durable Signage	$2,500.00	1	$2,500.00
Survey	Land Survey for Construction	$3,000.00	1	$3,000.00
Subtotal				**$154,750.00**
Harvest Grove Parking Lot Total				**$237,750.00**

3.1.2 HORSE TRAILER PARKING LOT

The Horse Parking Lot is located on Hereford Drive, situated below the street level. This lot is frequently used by people bringing horses to the park for trail riding. The lot is adjacent to wooded areas with wetlands and unnamed streams. Permeable aggregate paving could be a good green infrastructure approach for this lot to maintain its size while allowing more natural infiltration of stormwater that will protect the nearby streams and wetlands.

Horse Trailer Parking Lot

Permeable Paving Approach for Horse Trailer Parking Lot:

The installation of permeable paving would entail the following:

- Hydrologic analysis to determine runoff volume from the lot and adjacent impermeable surfaces.
- Infiltration testing.
- Land survey.
- Lot design and drawings.
- Asphalt demolition.
- Construction—excavation, grading, sewer connections, catch basins, re-paving.
- Perimeter landscape tree plantings.
- Maintenance, monitoring and informational signage.

Proposed Porous Paving at the Horse Trailer Parking Lot

Specifications for the Horse Trailer Permeable Parking Lot:

- The area of the parking lot and adjacent road were used as the basis for calculating runoff and totals 31,714 square feet.
- The addition of a 9,972 square feet of porous paving would intercept and infiltrate 94% of a 1" 24-hour wet weather event and eliminate runoff altogether.
- Infiltration would increase from 64% to 94% (the other 6% is evapotranspiration.)
- The lot would completely remediate suspended solids, Nitrogen and Phosphorous during a 1" wet weather event.
- Modeling data specific to the Horse Trailer permeable parking lot can be accessed online at https://modelmywatershed.org/project/37246/

Budget Estimates for Horse Trailer Parking Lot

The tables below represents outsourcing all of the project components. Any in-house or in-kind services would reduce the project implementation costs.

Trees, Supplies & Planting Site Prep.				
Category	**Description**	**Unit Cost**	**Units**	**Total**
Landscape Trees	2" Caliper Balled and Burlapped Landscape Trees	$225.00	30	$6,750.00
Planting Site Prep	Contracted Tree Planting Site Prep.	$300.00	30	$9,000.00
Planting Supplies	Mulch, Soil, Stakes, Tubes, Fencing, Tie	$3,500.00	1	$3,500.00
Subtotal				**$19,250.00**

Project Management				
Category	**Description**	**Unit Cost**	**Units**	**Total**
Project Director	Manage RFP Process & Contracts, Convene Partners, Financial Management, Staff and Contractor Oversight	$100.00	60	$6,000.00
Coordinator	Coordinate Partners & Volunteers for Planting	$50.00	40	$2,000.00
Subtotal				**$8,000.00**

Contracted Professional Services				
Category	**Description**	**Unit Cost**	**Units**	**Total**
Landscape Architect	Design Services, Plant Selection and Sourcing Drawings, Planting Oversight	$150.00	125	$18,750.00
Civil Engineering	Hydrologic Analysis, Construction Drawings	$150.00	75	$11,250.00
Construction of GI	Demolition, Heavy Construction, Piping for GI facilities, Permeable Paving Installation	$150,000.00	1	$150,000.00
Monitoring GI	Monitoring Protocol Developed for at least 1 Year. Monitoring Stream Channel Morphology	$3,000.00	1	$3,000.00
Signage	Durable Signage	$2,500.00	1	$2,500.00
Survey	Land Survey for Construction	$3,000.00	1	$3,000.00
Subtotal				**$188,500.00**
Horse Trailer Parking Lot Total				**$215,750.00**

The above approach for green infrastructure implementation, including the project components, watershed modeling, and budget tables, can be replicated for other parking areas of the park based on needs and priorities.

SECTION IV - PROJECT MANAGEMENT RECOMMENDATIONS:

Adult spotted lanternfly. Credit: Jon-Marc Burdick, Cameron County Conservation District (Pennsylvania iMapInvasives Database - Presence record #1071021

4.1 Invasive Monitoring & Management Zones

The "best" ecological integrity areas within this park are fairly small and discrete (Figure 4). These areas could be adopted by staff and/or volunteers to traverse a couple times a year, monitoring for invasive species and removing pioneer individuals if found. Ideally monitoring/management trips could be conducted once in late spring (before invasive mustard species fruits are mature) and once later in the growing season when shrubs and trees have fully leafed out to be easily identifiable.

4.2 Pioneer Invasive Species Control

Eight species of invasive plant were found in Round Hill park that only have small populations at this time. Each of these could be undertaken as a staff or volunteer project of small to moderate size.

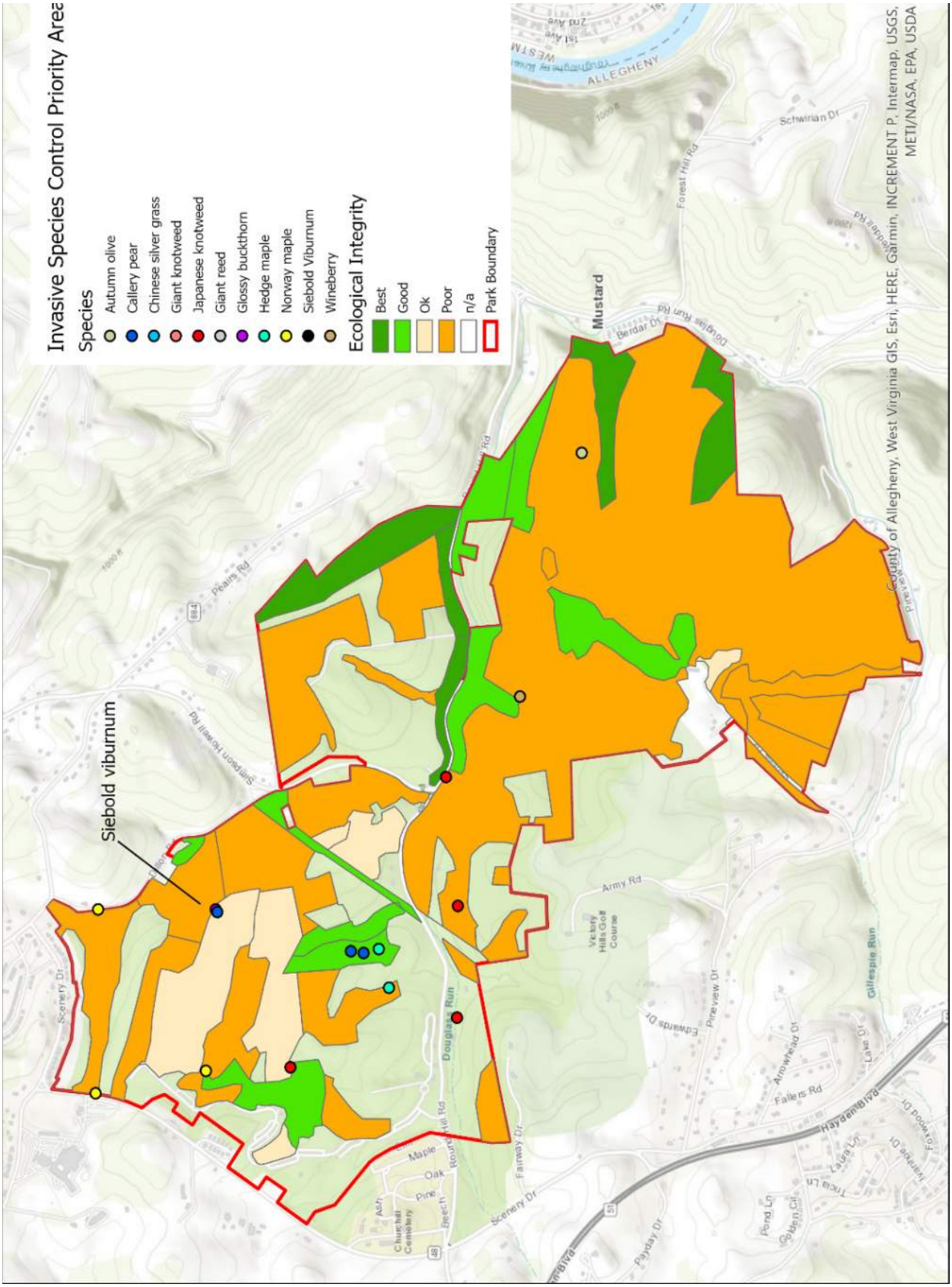
Japanese Knotweed *(Fallopia japonica)*

Only a few fairly small stands of this species were observed in the park. Although this species is extremely hard to control, efforts to contain and potentially eradicate these few stands seem feasible, and much preferable to attempting to contain it once it has spread further. If not controlled, Japanese knotweed will continue to spread and form dense thickets that entirely dominate floodplains, and exclude almost all other vegetation. This not only reduces plant biodiversity, but greatly degrades the habitat for native animals. Control usually requires continued monitoring with follow-up efforts as needed for a few years. The plants are extremely vigorous, with deep root systems, and even small fragments of roots can regenerate. It is debatable whether any mechanical control techniques are effective. Chemical control requires several rounds. Biocontrols have been under development and may be worth examining. It may be beneficial to consult with a professional in developing a control plan.

Wineberry *(Rubus phoenicolasius)*

Small project. This is a non-native species of red raspberry that can form dense thickets, especially in more open areas. Only a few shrubs were observed; they can be removed manually with a spading fork when soils are moist. This species can be identified any time of the year due to its distinctive branches covered in red bristles.

FIGURE 4


Invasive Species Control Priority Area
Species
Autumn olive
Callery pear
Chinese silver grass
Giant knotweed
Japanese knotweed
Giant reed
Glossy buckthorn
Hedge maple
Norway maple
Siebold Viburnum
Wineberry
Ecological Integrity
Best
Good
Ok
Poor
n/a
Park Boundary
Siebold viburnum
Mustard
County of Allegheny, West Virginia GIS, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA

Siebold Viburnum *(Viburnum sieboldii)*

Small project. This species is a shrub that can grow to form a dense layer and displace native forest species. It was found in a single area of the park. Small seedlings can be pulled, while larger individuals should be cut and treated with herbicide.

Norway Maple *(Acer platanoides)*

Small project. Norway maple can form thickets and eventually dense canopy that shades out almost all other species. Only a few individuals were observed in the park, however, and control is easily implemented by volunteers with mechanical techniques. Saplings and small trees can be cut to ground level. Larger trees can be girdled by making a cut all the way through the bark in a complete circle around the trunk, several inches wide.

Hedge Maple *(Acer campestre)*

Small project. Only a few trees of this species were observed in the park, and these could be girdled by staff or volunteers.

Callery pear *(Pyrus calleryana)*

Small project. This species has not yet become a widespread invader in southwestern Pennsylvania, but is rapidly establishing pioneers. While it may be familiar as a widely used ornamental tree, the plant has a very different form when it naturalizes into wild settings; it grows in dense thickets with long thorns strong enough to puncture tractor tires. It was initially promoted as sterile, but the creation and sale of new varieties has led to cross-fertilization between varieties to produce viable seed. It resprouts if cut, and if it is pulled, all root fragments must be removed to prevent resprouting. Both strategies are more effective if combined with herbicide application. However, only a few individuals have been seen in the park so far, so it is an ideal time to control them with minimal effort.

Glossy buckthorn *(Frangula alnus)*

Small project. Glossy buckthorn was observed in a few locations in the park. It has not spread extensively yet, and the scattered plants we observed could be managed by volunteers or quickly dealt with by staff with herbicide application qualifications. Staff and volunteers should continue to watch for this species and treat it if new arrivals are found; as the seeds are bird-dispersed, it is

likely more pioneer individuals will continue to seed in to forests and early successional areas of the park.

This species resprouts when cut or mowed. Seedlings can be pulled if roots are removed with the plant, and larger individuals can be girdled, although sometimes girdled individuals resprout if herbicides are not used in the cut. As only a few individuals were seen, mechanical removal could be attempted with follow up to check for resprouting. Even if the plants are not immediately killed, prevention of seed set is beneficial. However, if the species gets further established, populations often consist of many medium-sized shrubs which may not be easily removed by pulling or girdling; this may require herbicide use. This shrub seeds prolifically and seeds grow from the seed bank for a couple years; however, most will germinate in the first year. Treatment will likely require monitoring for several years with repeated rounds of control on individuals that resprout or grow from seed.

Autumn Olive *(Elaeagnus umbellata)*

Medium-sized project. This shrub was found in a single early-successional area of the park, although it seems likely it might also be in others. It can be controlled by pulling shrubs with good root removal just after leaf out, or by herbicide application later in the year. Several rounds of treatment may be necessary.

4.3 Deer Exclusion Areas:

While deer browse was not extreme, impacts were definitely visible in the "best" and "good" ecological integrity areas. Some species favored by deer only existed in mature form in locations where deer could not access them, such as very steep slopes; others had only scattered populations. Fencing around the "best" integrity ravines, or portions of them, would help to preserve the unique wildflower diversity that exists now, and allow browse-sensitive species to recover and expand. If it is not feasible to fence entire ravines, areas of a feasible size to fence could be selected around particularly interesting features such as uncommon species or the tufa formations.

Project Budgets:

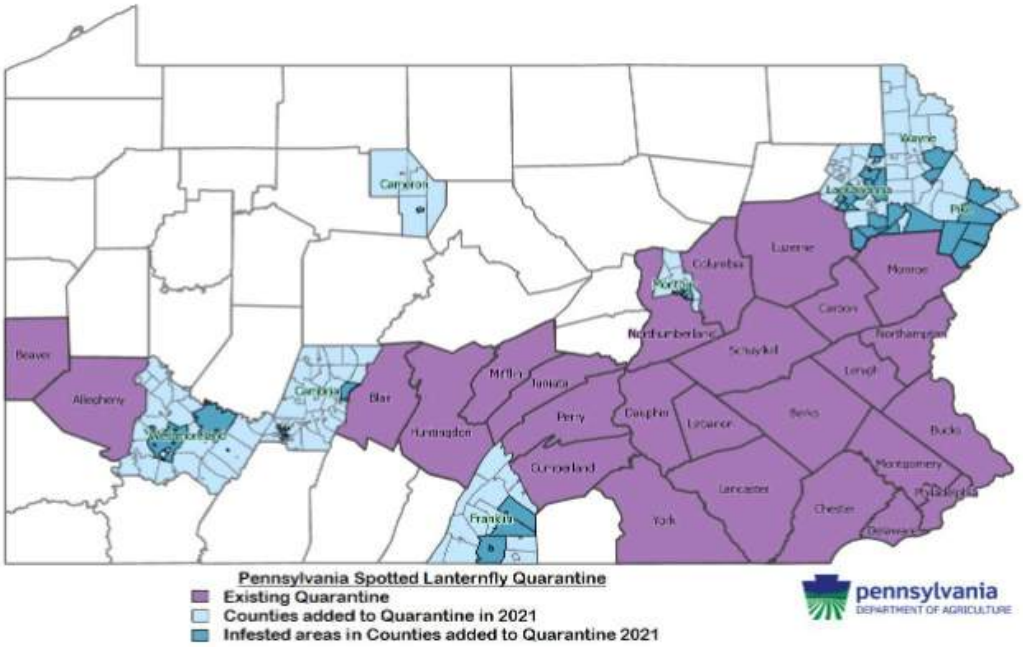
Invasive Plant Control			
Description	**$ per Acre**	**$ per 1/4 Acre**	**Species Treated**
Invasive Plant Control, Foliar Spray w/ Backpacks	$2,200.00	$550.00	Mile a Minute, Garlic Mustard
Invasive Vine Control	$4,000.00	$1,000.00	Grapevine, Oriental Bittersweet & Porcelain Berry
Invasive Tree/Brush Control	$7,000.00	$1,750.00	Norway Maple, Tree of Heaven, Honeysuckle, Winged Euonymus, Barberry, Autumn Olive, Buckthorn & Multiflora Rose
Herbaceous Plant Control	$5,400.00	$1,350.00	Knotweed

Deer Fencing Per Acre			
Description	**Quantity**	**Unit Cost**	**Total Cost**
Deer Fencing, 8ft Woven Fence, 12ft Galvenized Steel Posts	740 ft	$6.00	$4,440.00
Deer Fence Gate	1	$500.00	500.00
			$4,940.00
Deer Fencing Per 1/4 Acre			
Deer Fencing, 8ft Woven Fence, 12ft Galvenized Steel Posts	370 ft	$6.00	$2,220.00
Deer Fence Gate	1	$500.00	500.00
			$2,720.00

4.4 SPOTTED LANTERNFLY IN PENNSYLVANIA

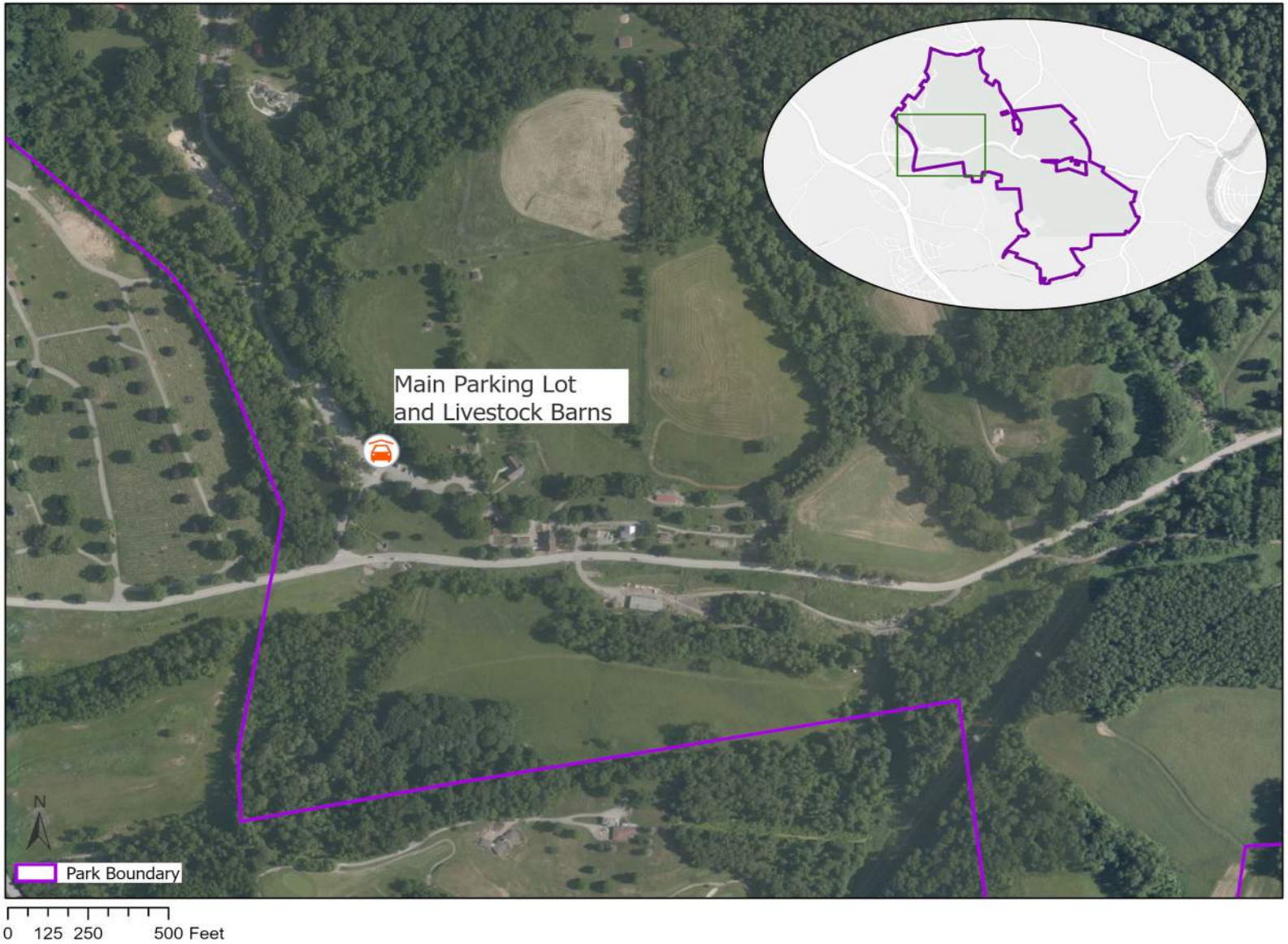
The spotted lanternfly (*Lycorma delicatula*) (SLF) is an invasive pest native to China, India and Vietnam. This insect is a type of planthopper with colorful markings on its wings and body. Though it may appear attractive on the surface, the spotted lanternfly continues to cause significant economic damage to the agricultural, forestry and tourism industries and poses a severe threat to our local and regional ecosystems. It's also a nuisance to business and homeowners due to the sticky "honey dew" it excretes that encourages the growth of a black, sooty mold. This mold is not harmful to humans, but can cause damage to plants and make outside recreational areas unusable.

Spotted lanternflies are often found on vegetation and are known to feed on the sap of over 70 different plant species. These include grapevines, maple trees, black walnut, birch, willow and other trees. It also has a strong preference for the invasive tree-of-heaven (Ailanthus altissima) which is (unfortunately) quite prevalent in much of Pennsylvania.



This map shows the current extent of the spotted lanternfly quarantine zone in Pennsylvania as of November 9, 2021. Credit: Penn State Extension

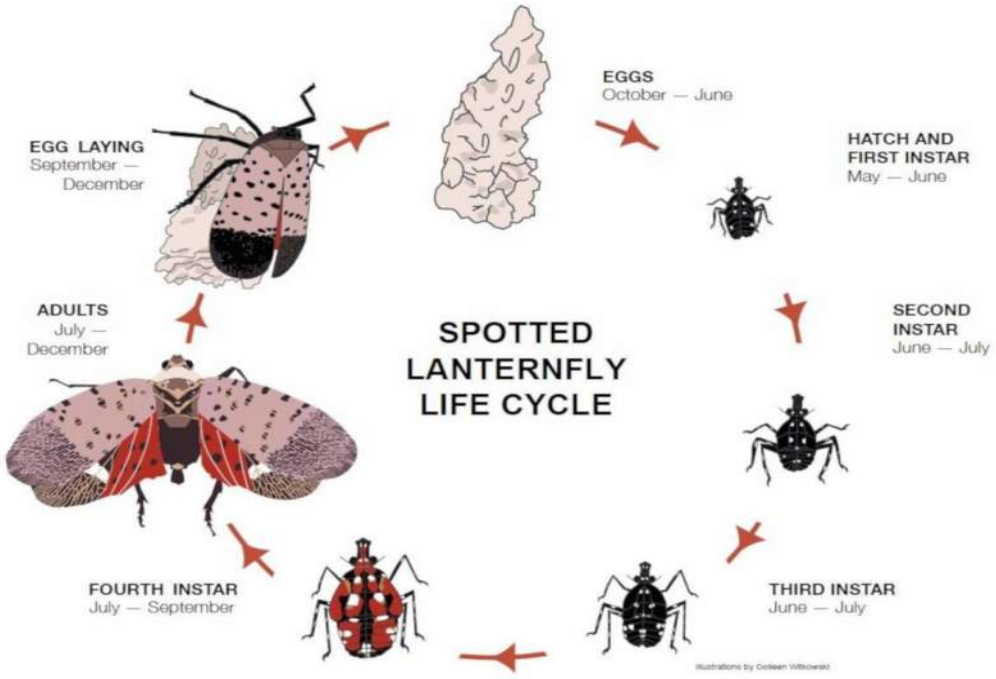
Round Hill Park: Spotted Lanternfly Target Area



Spotted lanternfly was first found in the United States in September 2014 in Berks County, PA. It has since spread to 34 counties in Pennsylvania (or half of the state), as well as several other states.

Round Hill Park has a specific threat of acquiring a spotted lanternfly infestation due to the popularity of its unique agricultural attractions. This park is the only park within the County Park system with a working exhibition farm. Many people travel to Round Hill Park to observe the livestock animals and learn about farming operations.

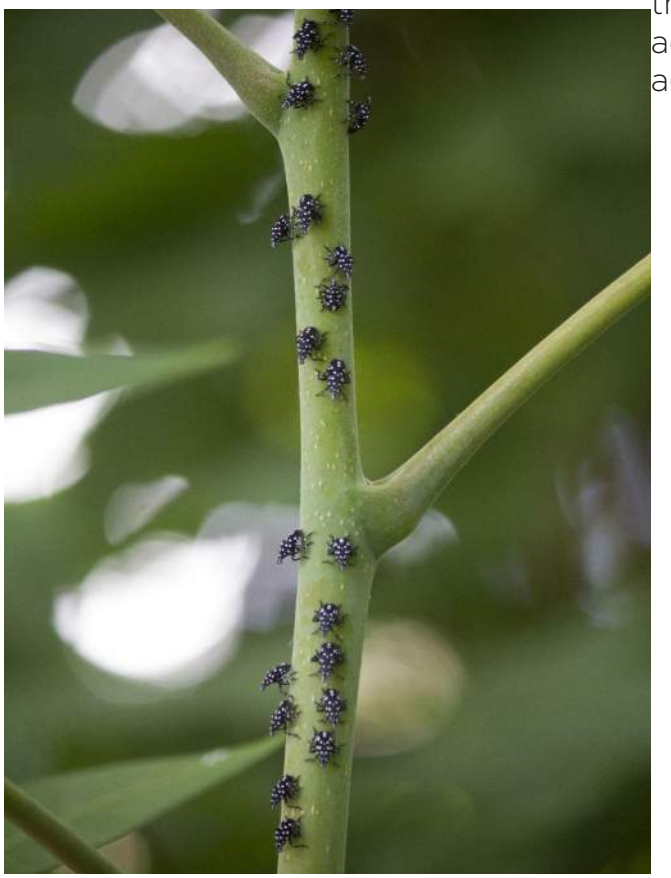
The main parking lot off of Round Hill Road, which is adjacent to the livestock barns and duck pond, is where the majority of visitors park. These visitors travel from all over Allegheny County and surrounding areas and may unknowingly bring spotted lanternflies or egg masses with them. The WPC Forester recommends that County Park staff routinely monitor Round Hill Park, particularly the areas immediately surrounding this parking lot, for spotted lanternfly infestation. Additionally, park staff should inspect farm equipment, such as tractors, mowers, and trailers for egg masses



The lifecycle of a spotted lanternfly involves several different stages including an egg mass, various instars (nymphs), and finally an adult insect.

The lifecycle of spotted lanternfly begins with a female laying her eggs (i.e., an egg mass) on any hard surface she can find such as a tree, picnic bench, car, truck, trailer, etc. Eggs are laid from September through December and will overwinter into spring. The first instars (or nymphs) of spotted lanternfly are black in color with white dots on their back. These nymphs emerge from an egg mass in May-June and molt into larger instars throughout the summer months. They eventually change their color from black to red and beginning in July, will transform into adults that resemble colorful moths. Adult spotted lanternflies are noticeable from July through December, and beginning in September, will begin the life cycle over again with the females laying their eggs.

If any life stage of a spotted lanternfly is observed (egg mass, instars, adults), it's important to report your finding to the Pennsylvania Department of Agriculture and Penn State Extension. An easy-to-use online tool has been developed for this specific purpose and is accessible at https://services.agriculture.pa.gov/SLFReport/.



Spotted lanternfly nymphs. Credit: Nicholas Macelko (Pennsylvania iMapInvasives Database - Presence record #955014)

Spotted lanternfly is just one of several other tree pests to be on the lookout for in the Commonwealth. Other insects that can cause harm to our urban and natural forests include:

Common Name	***Scientific Name***	**Notes**
Asian Longhorned Beetle (ALB)	*Anoplophora glabripennis*	To date, ALB has not been found in PA.
Hemlock Woolly Adelgid	*Adelges tsugae*	-
Elongate Hemlock Scale	*Fiorinia externa Ferris*	-
-	*Lymantria Dispar*	Formerly known as Gypsy Moth
Oak Wilt	*Ceratocystis fagacearum*	Also known as *Bretziella fagacearum*
Root Rot	*Phytophthora spp.*	Also known as Sudden Oak Death

More information about the spotted lanternfly can be obtained from:

- Penn State Extension
- Pennsylvania Department of Agriculture
- Cornell College of Agriculture and Life Sciences

4.5 PARK STAFF TRAINING

Tree Planting and Care (Tree Tender Training)

WPC has been working with the non-profit Tree Pittsburgh since 2008 through the TreeVitalize Pittsburgh project. An important component of the success of that project has been the training of volunteers through Tree Pittsburgh's "Tree Tender" program. Tree Pittsburgh has trained over 1,600 Tree Tenders in Allegheny County through an eight hour workshop that covers everything from the benefits of trees to communities to the planting and care of trees over the long term. Based on past recommendations from earlier Ecological Assessments, the Allegheny Count Parks staff hhave undergone Tree Tender

Volunteers and staff plant and protect restoration trees during a planting along a river trail in Pittsburgh's South Side.

training to support the long term health of newly planted trees. WPC continues to recommend that new Allegheny County Parks Maintenance staff undergo Tree Tender Training to promote the sustainability of ongoing tree plantings in the parks.

4.6 REDUCE MOWING, PRIORITIZE ECOLOGICAL MANAGEMENT AND MAINTENANCE OF CAPITAL PROJECTS

As staff time availability increases with reduced mowing obligations, staff capacity should be re-allocated more heavily toward ongoing maintenance and management of the capital projects mentioned above.

- Invasive Weed Management
    - As described in previous sections of this report, managing invasive weed infestations impacting mature forest areas of Round Hill Park is a priority management concern, and will continue to be into the future. Investments in tools and staff training are priority recommendations also mentioned in this section.

- Trail System Maintenance

- Green Infrastructure Maintenance

- Meadows and Reforested Areas Maintenance

4.7 PROCURE TOOLS AND EQUIPMENT

For invasive weed management, trail maintenance, meadow management, tree planting, fence building and maintenance. Procuring an adequate supply of the tools listed below will cost approximately $20,000 total, although the tools could be acquired as needed over the course of several months/years.

Hand Tools:

Hedge shears:	$20-$75 each (depending on size)
Hand pruners:	$15-$45 each
Loppers:	$20-$80 each (depending on size)
Bow saws:	$15-$30 each
Long reach pruners:	$75-$150 each
Picks mattock:	$15-$40 each

Specialty Tools:

Tree and root puller (Pullerbear):	$200
Root Talon:	$70
Root Buster:	$45
Tree planting dibble bar:	$35-$45 each

Power Tools:

Professional-grade chain saws:	$350-$600 each (depending on size and brand)
Professional-grade Pole saws:	$400-$700 each (depending on size)
Walk-behind brush cutter:	$1,500 - $3,000
Brush hog tractor attachment:	$2,000 - $4,000
Tree hole auger:	
Attachment for tractor with 3-point hitch:	$450-$1,000
Hand-held:	$200-$400

Goat herd:

- Use of goat herds to graze on invasive weeds has emerged locally as a

potentially high impact, low cost strategy to be used in combination with other treatment methods, either chemical or mechanical. For example, spraying a systemic herbicide (i.e. tryclopyr or glyphosate) immediately following grazing by goats can create good conditions for herbicide absorb into the plants' vascular system, increasing the chances of a total kill of the unwanted vegetation.

- There is one location non-profit organization that uses goats as a way to manage invasive and unwanted plant species - Alegheny GoatScape - that used to to business as Steel City Grazers. WPC engaged Steel City Grazers on one project to control a small patch of Japanese knotweed and other invasives in the City of Pittsburgh that proved to be highly effective. The fee for that project was based on a $500 base fee plus $100 per day for a 10-goat herd with an expectation that it could take two to three weeks per acre to be cleared. Those fees included transportation of the goats, temporary electric fencing to contain the goats to the area being managed, a donkey whose role was to protect the goats from predators such as coyotes and feral dogs and daily care of the animals.

- Interest was also raised by County Park staff and others during the meetings conducted in conjunction with this project about the possibility of acquiring a permanent goat herd (or herds) to manage invasive weeds across the County Parks system. Because of recent notoriety, demand is quite high for privately owned goat herds. Acquiring a goat herd would help to ensure goats are always available for weed management.

- Goats themselves are relatively inexpensive to buy (sometimes even free). However, they do require good fencing, food and shelter during winter and inclement weather, transportation to and from weed management projects, protection from predators, and a knowledgeable

caretaker.

4.8 DEVELOP A SUSTAINABLE TRAIL MANAGEMENT PLAN

In conjunction with training Parks staff on trail management and maintenance, developing a sustainable trail management plan that provides a comprehensive vision and management framework for all trails in Round Hill Park is a top priority. Such a plan should include broad stakeholder and public input, as well as engagement of trail design, construction and maintenance professionals.

The scope of the plan should include the following:

- Survey and evaluation of current and future trail usage.
- A comprehensive assessment and evaluation of the existing trail system by trail consultants.

THE POWER OF GREEN

Round Hill Park is in a great position to use the power of green to enhance its immediate present and support its future. With the engagement and leadership of the Allegheny County Parks Foundation and the Allegheny County Parks, it has many of the elements that are necessary for successful greening projects. Strategic greening has the potential to be a rallying point for community improvement that can involve citizens from school children to seniors, from business owners to cultural institutions, from novices to skilled members of the community. The power of green is found in the multifaceted benefits and the profoundly satisfying experience of improving the living landscape of the community. Round Hill Park has the elements in place to harness this power for all its constituents, employees and its landscape.