Friends of Princeton Open Space

Natural Resources Management Plan
2014

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INTRODUCTION

The Mountain Lakes Management Area (MLMA) refers to The Billy Johnson Mountain Lakes Nature Preserve, John Witherspoon Woods, and Mountain Lakes North. The Billy Johnson Mountain Lakes Nature Preserve ("MLP" or "the Preserve") includes the Mountain Lakes House, which serves as the home base for Friends of Princeton Open Space (FOPOS). In 1987, FOPOS was instrumental in the acquisition of the Preserve. Today it holds MLP's conservation easement, and has also adopted the Preserve through the former Princeton Township's Adopt-A-Park Program. FOPOS has also adopted John Witherspoon Woods and Mountain Lakes North through this program. As a result, these natural areas have become a focus of the organization's land stewardship efforts. Since 2006, FOPOS has actively managed all three parcels for higher plant diversity and greater habitat value. The enclosed management plan seeks to continue these efforts with a focused set of goals and strategies for land stewardship at the Preserve, Mountain Lakes North, and John Witherspoon Woods- collectively referred to as the Mountain Lakes Management Area.

The Mountain Lakes Management Area includes 145 acres of public open space, located near the center of Princeton. Together with Community Park North, Farmview Fields, Coventry Farm, and the preserved fields of Tusculum, the full Mountain Lakes Open Space Area (MLOSA) makes up nearly 400 acres of contiguous preserved open space and farmland. With its two lakes, numerous rocky creeks, wooded wetlands, and upland forests, this area provides a diversity of ecosystems for native flora and fauna. These features combine with the area's 8+ miles of maintained trails to make the Mountain Lakes Open Space Area an important source of beauty and recreation for the community, as Princeton's "Central Park."

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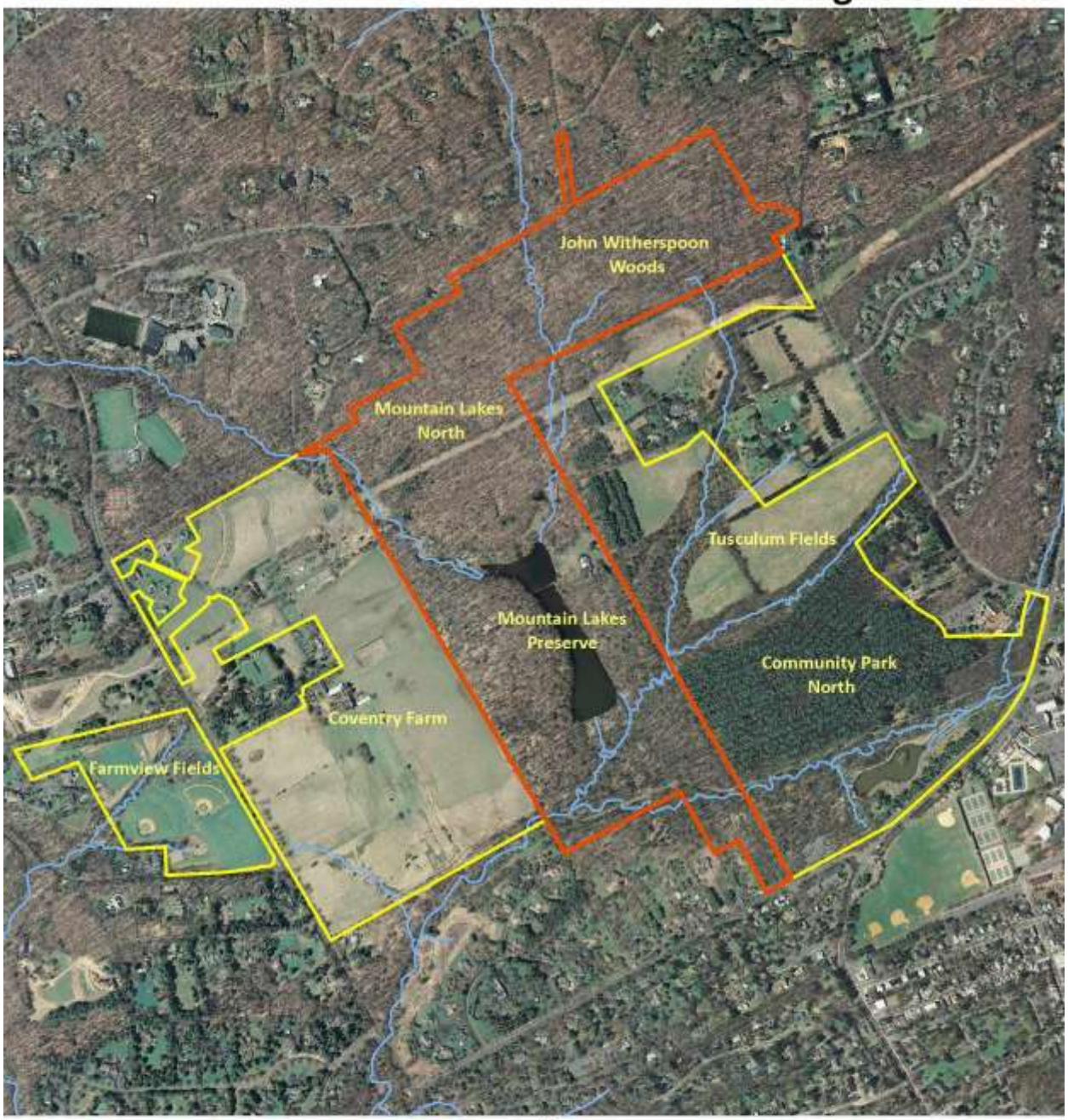
Map 1: Mountain Lakes Management Area



Mountain Lakes Management Area

Mountain Lakes Open Space Area

1:9,500

0 125 250 500 Meters

Sources: New Jersey Department of Environmental Protection, NJ Office of Information Technology, Office of Geographic Information Systems

OVERVIEW

Management Objectives

Natural resource management of the Mountain Lakes Management Area will follow three broad objectives:

1. **Restore diverse, native plant communities that will, in turn, support local fauna and provide important ecosystem services**. Strategically control the spread and abundance of invasive species, as a major source of degradation to plant communities and biodiversity. Managing plant communities will also require elements of rare plant conservation, herbaceous and woody understory layer conservation, and facilitation of community regeneration.
2. **Enhance Mountain Lakes' value to park visitors.** This objective calls for collaboration with the FOPOS Trails Committee to prevent encroachment by invasive plants onto trails, improving them for visitors' use. It also involves careful consideration of the Preserve's recreational value. As the management plan is executed, priority should be given to sites with greatest value to park visitors, along with ecosystem importance.
3. **Help foster an interest in land preservation and stewardship throughout the Princeton community.** Invite the public to learn about and participate in land stewardship at the Preserve through regular nature walks, educational events, and volunteer work days. Maintain a connection with the public through the FOPOS website and Facebook page, updating them with information on the Preserve and organization events.

Site Description

Mountain Lakes Preserve Easements

The Billy Johnson Mountain Lakes Nature Preserve (MLP) is subject to a conservation easement, held by FOPOS, which was placed on MLP when it was preserved in 1987 by FOPOS and Princeton Township with the generous support of the Willard Trotter Case Johnson Trust. MLP is also on the National and New Jersey State Registers of Historic Places as the Princeton Ice Company.[1] Both MLP and MLOSA contain sewer easements, which also serve as paths; MLOSA also includes a gas pipeline easement. MLP and almost all of the MLOSA are listed on the NJDEP Green Acres Program Recreation and Open Space Inventory (ROSI); listing protects

[1] National Register 28 August 2007; State Register 25 June 2007. MLP is thus subject to Section 106 Review under the National Historic Preservation Act for any federally funded, licensed or permitted projects. Perhaps more significant, under the New Jersey Register of Historic Places Act MLP is also subject to review and authorization by the NJ Historic Preservation Office (NJHPO) of actions that impact the property; The NJHPO also provides advice and comment for a number of permitting programs within the Department of Environmental Protection, including some permits required under the NJDEP Land Use Regulation Program

the property and also subjects it to NJDEP Green Acres Program regulations. These regulations severely restrict any diversion of protected land to non-park uses, and require a multi-step approval process in the limited circumstances in which that may be allowed (including replacement land).

Plant Communities

The Mountain Lakes Management Area supports five broad plant communities: upland deciduous forest, deciduous wooded wetlands, mixed brush/shrublands, mixed scrub/shrub wetlands, and herbaceous wetlands. Covering 59% of total acreage, upland deciduous forest is the most abundant community class found in Mountain Lakes. This information is illustrated in the Land Cover map on page 7 and detailed in Table 1: Land Cover Classes.

Mountain Lakes' forests are largely dominated by beech, maple, ash, oak, and hickory species, in addition to black walnut in a small region of the Preserve. While native trees dominate the Preserve's canopies, much of its understory is heavily invaded by non-native shrubs and vines. Similarly, invasive groundcover species frequent the forests' floors, forming impenetrable blankets in certain regions. Still, the Mountain Lakes Management Area supports a diversity of native plants and wildlife. Native dogwood and viburnum shrubs, as well as spicebush and other beneficial species grow at healthy populations throughout the area. Similarly, the Management Area supports a diversity of native and rare groundcover species, including the regionally rare wild comfrey (*Cynoglossum virginianum*) and two state ranked (S3-Vulnerable) species of native sedges, Frank's sedge (*Carex frankii*) and field sedge (*Carex conoidea*). See Appendix A and B for current and past inventories of the Mountain Lakes Management Area's plant species. These are not complete records of biodiversity, and efforts to inventory the area's plant communities are ongoing.

Table 1: Mountain Lakes Management Area Land Cover Classes

LAND COVER CLASS	ACRES	PERCENT
DECIDUOUS FOREST	86.21	58.84%
DECIDUOUS WOODED WETLANDS	43.95	30.00%
ARTIFICIAL LAKES	7.53	5.14%
RESIDENTIAL, RURAL, SINGLE UNIT	2.70	1.84%
MIXED SCRUB/SHRUB WETLANDS	2.38	1.62%
RIGHTS-OF-WAY	2.36	1.61%
MIXED BRUSH/SHRUBLAND	0.93	0.63%
HERBACEOUS WETLANDS	0.45	0.31%

Source: NJDEP, Bureau of Geographic Information Systems, 2007 data, released 2010 (Modified)

Waterbodies

The Mountain Lakes Open Space Area is part of the Stony Brook-Millstone Watershed. The Management Area contains 7.5 acres of open water, including two man-made lakes and an upstream settlement pond. The lakes were created in the late 1800's by the Princeton Ice Company, and used for ice harvesting until the 1930's. Today, they provide an incredible source of habitat to local wildlife, including great blue herons and various waterfowl, in addition to a diversity of reptiles, amphibians, and aquatic life. They're also an important feature to Mountain Lakes visitors, for their tremendous aesthetic and recreational value. Additionally, the Mountain Lakes Open Space Area supports a network of over 3 miles of streams, including portions of Mountain Brook's headwaters, and their associated tributaries. Around 1.5 miles of this stream network falls within the Mountain Lakes Management Area; the streams connect the Preserve and its lakes to the Stony Brook. They also offer a beautiful focal point for hikers and MLP visitors.

Geology and Soils

MLOSA lies within New Jersey's Piedmont physiographic region, just north of the Fall Line, the boundary between the Piedmont Plateau and the Inner Coastal Plain. The Piedmont region is characterized by topography of gently rolling hills and valleys, with elevations between 100 and 400 feet. The highest elevation within the MLOSA sits within the northern corner of John Witherspoon Woods, at 302 feet.

MLP is underlain by four types of bedrock, including: the Passaic Formation, composed of reddish-brown siltstone and shale; the Passaic Formation Gray Bed, of siltstone and shale occurring as thin sheets between layers of the Passaic Formation; the Lockatong Formation, composed of dolomitic or silty argillite, mudstone, sandstone, siltstone, and minor silty limestone; and Jurassic Diabase, composed of medium- to coarse-grained diabase rock (Bedrock Geologic Map of Northern New Jersey, NJDEP & NJGS). The Mountain Lakes Management Area contains 22 unique soil types. These are listed in Table 2 and illustrated in Map 3. They include various silt loams of level to moderately steep slopes, and some very stony soils.

Table 1: Mountain Lakes Management Area Soils

SYMOL	DESCRIPTION	ACRES
BoyAt	Bowmansville silt loam, 0 to 2 percent slopes, frequently flooded	16.71
BucB	Bucks silt loam, 2 to 6 percent slopes	1.67
DOZB	Doylestown and Reaville variant silt loams, 2 to 6 percent slopes	6.40
DOZB2	Doylestown and Reaville variant silt loams, 2 to 6 percent slopes, eroded	3.70
KkoE	Klinesville channery loam, 18 to 35 percent slopes	3.66
LDXB	Lawrenceville and Mount Lucas silt loams, 2 to 6 percent slopes	18.57
LemB	Lehigh silt loam, 2 to 6 percent slopes	0.59
LemC2	Lehigh silt loam, 6 to 12 percent slopes, eroded	2.20
MonBb	Mount Lucas silt loam, 0 to 6 percent slopes, very stony	10.06
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	1.28
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	2.21
PeoB	Penn channery silt loam, 2 to 6 percent slopes	18.38
PeoC	Penn channery silt loam, 6 to 12 percent slopes	10.09
PeoD	Penn channery silt loam, 12 to 18 percent slopes	9.28
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	7.67
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	1.39
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	2.15
RehB	Reaville silt loam, 2 to 6 percent slopes	1.15
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.99
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	4.13
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	1.59
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	13.81

Source: U.S. Department of Agriculture, Natural Resource Conservation Service, 2008

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Map 2: Land Cover Classes

1 DECIDUOUS FOREST
2 DECIDUOUS WOODED WETLANDS
3 MIXED BRUSH/SHRUBLAND
4 RESIDENTIAL, RURAL, SINGLE UNIT
5 ARTIFICIAL LAKES
6 MIXED SCRUB/SHRUB WETLANDS
7 HERBACEOUS WETLANDS

1:7,000

N

0 125 250 500 Meters

Sources: NJ Department of Environmental Protection, NJ Office of Information Technology, Office of Geographic Information Systems (Modified)

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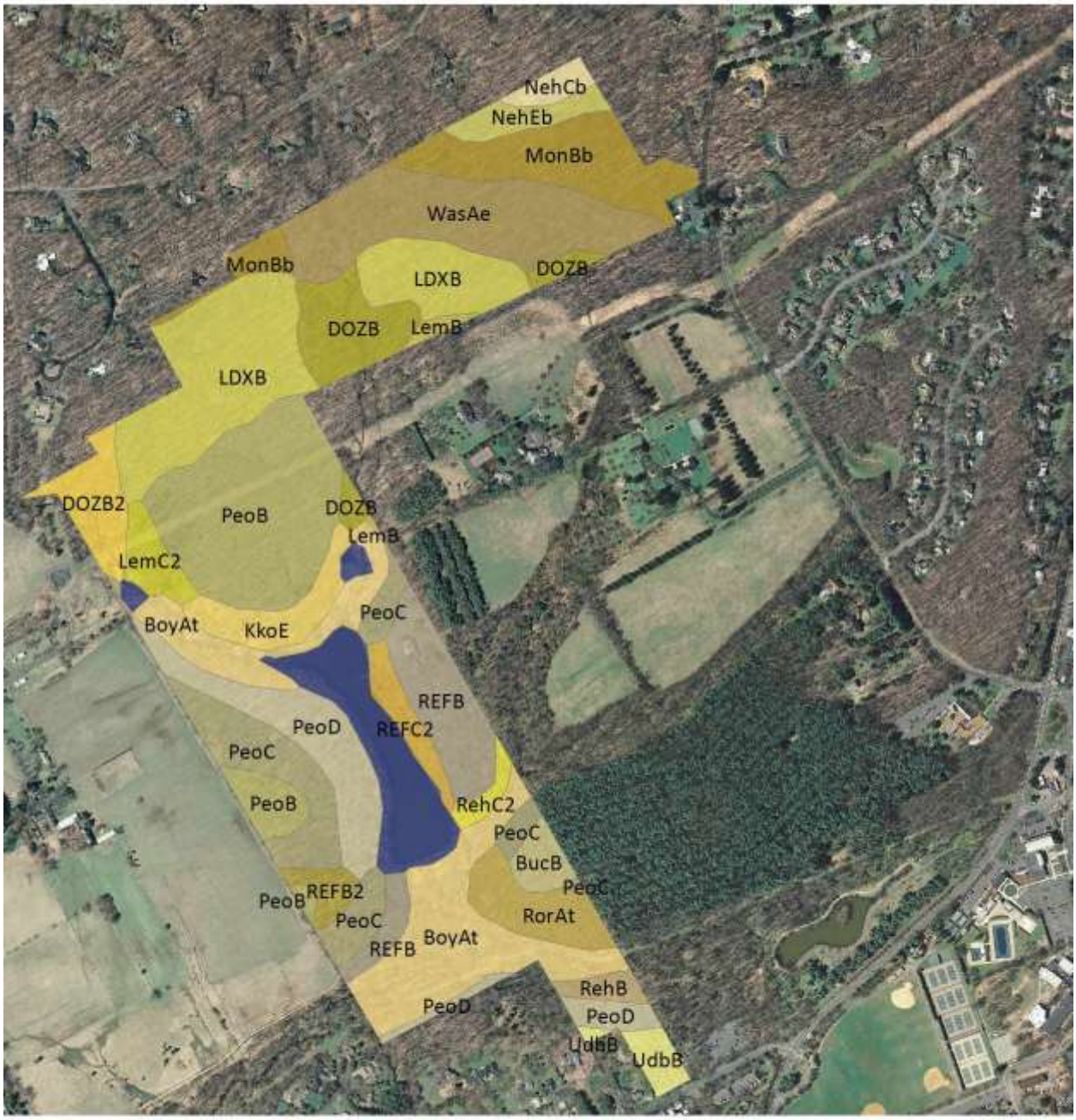
Map 3: Soils



INVASIVE SPECIES MANAGEMENT

Stewardship of the Mountain Lakes Management Area will follow a two-tiered approach to invasive species management. The first tier will prioritize the control of invasive plants according to a list of target species. The second tier will address regions with high conservation value, thereby prioritizing invasive removal by location, not taxonomy. The following section addresses the first management tier, applying it to the Management Area as a whole. The second, site-specific approach is detailed in later sections.

Targeting Emerging Invasive Species

Management of invasive species respective to the entire preserve will follow an approach of Early Detection/Rapid Response, prioritizing efforts on emerging invasive species and populations. The goal of Early Detection/Rapid Response is to eliminate emerging invasive plants before populations can spread and cause significant ecological damage to local and statewide landscapes. This prevention-based approach calls for a shift in priorities away from widespread exotics, such as Japanese honeysuckle, and towards less common, though equally threatening species, such as Siebold's viburnum. Because their populations are less established, eradication of emerging species requires less investment of time and resources. However, their rapid eradication will greatly benefit the future of local and statewide ecosystems. Widespread invasive species should still be controlled, though on a site-specific basis, as detailed in later sections.

This strategy incorporates a partnership with the New Jersey Invasive Species Strike Team (NJISST) to monitor and control emerging invasive species in the MLMA and neighboring ecosystems. NJISST identifies a total of 116 emerging invasive species, including 84 plant species (http://njisst.org/files/TargetSpeciesList.pdf); NJISST's target species list is updated annually. Using updated lists, FOPOS's Natural Resources Manager should walk the property every growing season in search of newly established populations of emerging invasives. With the help of the NJISST Field Stewards Program, populations should be recorded and eradicated as appropriate. When prioritizing eradication efforts, the FOPOS Natural Resources Manager should consider each population's size and location, as well as the species' assigned ED/RR Action Code. This code reflects NJISST's suggested course of action for each species, as determined by its current state-wide distribution and threat level.

In addition to early detection surveys, the Natural Resources Manager should periodically revisit previously recorded and eradicated populations, to monitor and control for possible spread or regrowth. Taking these important steps will help FOPOS effectively control emerging invasive species, to the benefit of local wildlife and neighboring ecosystems.

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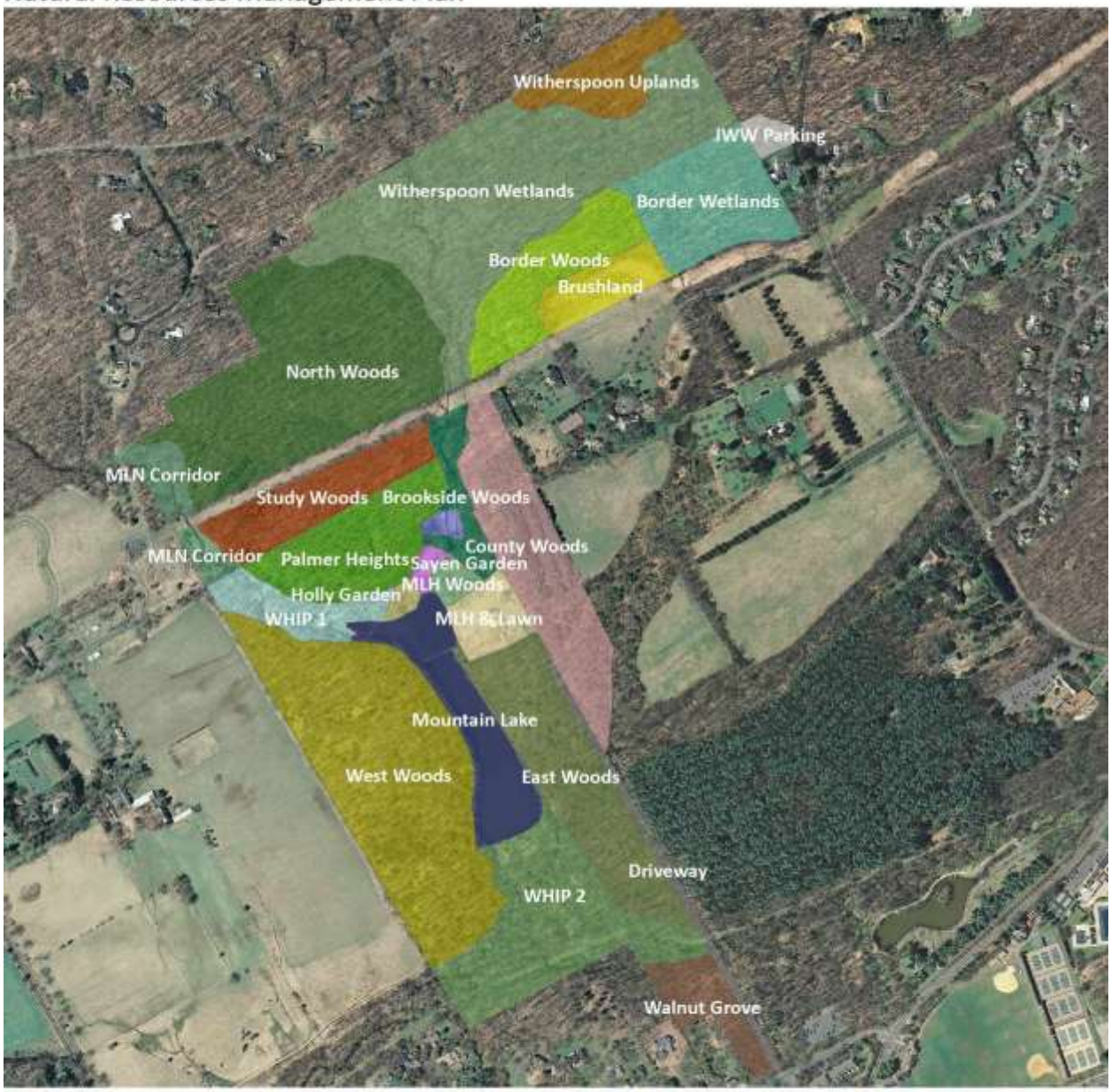
Map 4: Management Units



- Border Wetlands
- Border Woods
- Brookside Woods
- County Brushland
- County Woods
- Driveway
- East Woods
- Holly Garden
- JWW Parking
- MLH Woods
- MLN Corridor
- Mountain Lake
- MLH & Lawn
- North Woods
- Palmer Heights
- Sayen Garden
- Settlement Pond
- Study Woods
- WHIP 1
- WHIP 2
- Walnut Grove
- West Woods
- Witherspoon Uplands
- Witherspoon Wetlands

1:7,000

0 100 200 400 Meters

Sources: NJDEP, NJ OIT, Office of Geographic Information Systems

MANAGEMENT UNITS

The Mountain Lakes Management Area has been divided into 22 management units, based on a variety of characteristics, including location, hydrology, soils, and vegetation. This section describes each unit and discusses the goals and strategies that address its site-specific needs.

Mountain Lakes House and Open Space

The Mountain Lakes House and Open Space corresponds to the parcel of land held, under lease from Princeton Township (now the municipality of Princeton), by the Mountain Lakes Holding Corporation. For the purpose of this plan, the area has been divided into four management units: the Mountain Lakes House and Lawn, Historic Holly Garden, Sayen Memorial Garden, and MLH Woods. While Mountain Lakes Holding Corp. is responsible for maintaining the house and its lawns, FOPOS should help manage certain regions of ecological importance. Below is an overview of each subunit, and their respective management guidelines. This unit is a high-priority management site, for its accessibility and value to park visitors.

The Mountain Lakes House and Lawn

Site Description

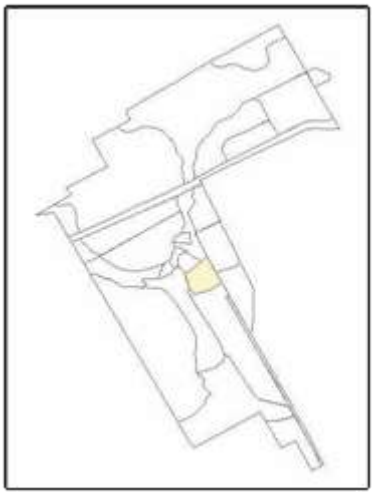


Figure 1: Mountain Lakes House and Lawn

The Mountain Lakes House and Lawn includes the landscaping around the house, the circular flower bed in front of the garage, and the interface of the lake and lawn. In recent years, the Mountain Lakes Holding Corp. and FOPOS worked to transform the House's landscaping from a mixture of invasive and non-invasive exotic species to primarily native plants. Today, the House is landscaped with rhododendrons, spireas, witch hazels, and several other native species that offer food and habitat to pollinators, birds, and other wildlife. FOPOS also installed a beautiful rain garden just north of the house. Each of these features offers an excellent opportunity to educate visitors on important ways to reduce their own ecological footprints. In addition to FOPOS-led talks and website posts, some informational signage may be appropriate to convey the importance of native landscaping and rainwater management.

In the past, the lakeshore supported a healthy border of many native shrubs and wildflowers, through both active plantings and natural colonizations. This border of vegetation was lost to periods of extended drought and disturbances associated with nearby dam restoration work. Ideally, the lake edge should be replanted with an abundance of shrubs and wildflowers to discourage geese, stabilize soils, and provide shoreline habitat. However, to keep in line with the site's historic significance and current land use, efforts have been made to restrict plantings of

tall vegetation along the lake's edge below the house. Only low-growing native plants have been actively introduced here.

Management Progress

- Since 2012, FOPOS has completed many efforts to help return a healthy border of diverse, native vegetation along the lawn's shoreline with the upper lake. FOPOS staff, board members, volunteers, and summer interns have helped replant the shoreline with hundreds of locally grown sedges, rushes and native wildflowers. Species include: golden ragwort, narrow leafed mountain mint, cardinal flower, blue-flag iris, swamp milkweed, and steeplebush. The NRM and summer interns also spent many work days controlling invasive weeds along the shoreline, to reduce competition around plantings and encourage long term biodiversity.
- FOPOS planted the area along the back patio with approximately 50 native wildflowers, transplanted from the rain garden and greenhouse. FOPOS also removed the remaining exotic landscaping features- namely, the few large winged euonymus along the House's back side, and covered the area with fresh top soil.
- Hurricane Sandy brought down one of the large rhododendrons on the lawn in front of the House. FOPOS replaced and expanded this landscaping feature with one flowering dogwood, one American Holly, and an abundance of wildflowers, including wild senna, autumn heleniums, and black-eyed susans
- Eradicated invasive shrubs and vines from the naturalized area on the edge of the front lawn (behind the large kousa dogwood). Planted 100 native wildflowers, including 44 cutleaf coneflowers, 28 meadow rue, 7 wild senna, 15 penstemons, and 6 Joe-Pye weeds.
- Controlled invasive thistle population on the lawn's north border (where the lawn meets the MLH Woods management unit).
- Worked with the local Girl Scouts Unit to plant and fence 25 redbud trees along the forested edge of the Mountain Lakes lawn. Multiflora rose and Japanese honeysuckle were eradicated along the length of the forested edges, in preparation for those plantings.
- Installed fence posts along the lawn's shoreline and wired it with heavy duty fishing line to act as a barrier to geese. All the fishing line snapped and was removed within one month. Even so, it was very effective at keeping geese off the lawn for the full season.

Future Actions and Priorities

- Mountain Lakes Holding Corp. and FOPOS plan to install a wooden fence behind the greenhouse, where the winged euonymus was removed. When this step is completed, the area along the fencing should be landscaped with native plants, in the same style as the House's front. Recommendations are for 4-6 witch hazels (dwarf, standard, or some combination of both) and 8-12 lady ferns, or a similar groundcover species.
- Protect and nurture native plantings at the shoreline by removing competing invasive weeds. Give special priority to eradicating the small yellow iris population in the

southern corner. Pull carpgrass and horseweed, as necessary. Monitor for mugwort and thistle; spray in early spring if needed.

- Thread existing fence posts along the shoreline with wire or extra heavy duty fishing line in the early spring season to deter geese.

Historic Holly Garden

Site Description

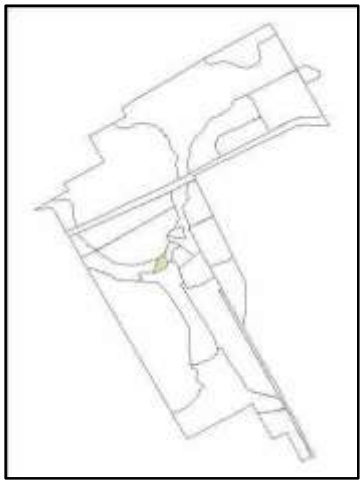


Figure 2: Historic Holly Garden

The Historic Holly Garden refers to a small, half-acre area just north of the upper lake. Its name is derived from the mature American hollies (*Ilex opaca*) that border the unit on either side. The Historic Holly Garden features several azaleas, lilac, and other remnant plantings from a past garden. Young pin oaks line a trail that takes walkers to the lakeshore and up to an adjoining hiking trail. Many native species have colonized the area, including silky dogwood (*Cornus amomum*), swamp milkweed (*Asclepias syriaca*), and clustered mountain mint (*Pycnanthemum muticum*). However, an abundance of invasive plants, including Japanese honeysuckle (*Lonicera japonica*), multiflora rose (*Rosa multiflora*), and linden viburnum (*Viburnum dilatatum*) dominate much of the area, growing over the native plants and non-invasive garden remnants.

Management Progress

- FOPOS effectively closed the trail through the Holly Garden. Ground vegetation and poison ivy along the trail was too dense; we could not meet the constant need for weed whacking. Also, recent improvements to the adjacent Sayen Trail (turnpiking and addition of gravel) made a trail through the Holly Garden redundant.
- Freed up all existing native shrubs (azaleas, spicebush, silky dogwoods) in the site's core from invasive vines, competing exotics, and fallen trees and limbs.
- Cleared an area of dense invasive shrubs along this unit's shoreline with Mountain Lake. Since then, the NRM has completed 2 follow-up eradications to eliminate resprouts, and cleared Japanese honeysuckle vines. The area was then planted with several smooth alders and buttonbush, particularly on the lake's edge to help with bank stabilization.
- Planted many natives throughout the unit, including smooth alders, buttonbush, silky dogwoods, and several trays of wetland wildflowers from the greenhouse.

Future Actions and Priorities

- Follow-up invasive removal within site's core. We can expect much of the vines, multiflora rose, and linden viburnums to resprout next spring. Prioritize eradication around existing and newly planted natives.

Sayen Memorial Garden

Site Description

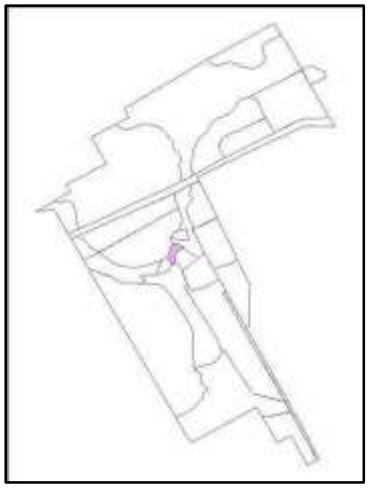


Figure 3: Sayen Memorial Garden

The Sayen Memorial Garden refers to a small, open wetland meadow, just east of the Historic Holly Garden. The field represents one of the few locations in MLP where sun-loving plants can thrive. As a result, it supports several species not found elsewhere in the Preserve. Many native flowers and sedges have been introduced to the unit, and it is periodically maintained with the volunteered help of Princeton botanist, Elizabeth Horne. During the growing seasons, plant labels are placed throughout the garden, indicating the names and native status of each species. The Sayen Garden is a high-priority management site, as a source of rich biodiversity, habitat, and high aesthetic and educational value for MLP visitors. Regular maintenance is needed here, to prevent encroachment of invasive species and to foster the continual growth of native plants. Additionally, the Sayen Memorial Garden's trail needs regular mowing to keep it visible and open for visitors' use.

Management Progress

- Eradicated thistle and mugwort populations from the unit's western border through to its core: completed a foliar spray during the early spring, and 3 follow-up eradications during the summer to pull and/or treat newly germinated plants and resprouts.
- Planted 130+ wetland wildflowers within the unit's core and along its shoreline with Mountain Lake. Many were planted in areas previously dominated by mugwort or thistle. In order of abundance, species planted include: cardinal flower, winged monkey flower, wild senna, blueflag iris, cutleaf coneflower, autumn helenium, swamp milkweed, tall meadow rue, and black-eyed susan.
- Planted 4 river birch and 3 buttonbush along the stream bank and shoreline to assist in bank stabilization.
- Cleared dense invasive vines and shrubs from a fenced plot near the garden's eastern border. This plot can now be used to grow up greenhouse plants.
- Continued annual control of multiflora rose.

Future Actions and Priorities

- Monitor mugwort and thistle population throughout the unit. Treat as necessary in spring or early summer. By the end of the 2013 growing season, these invasive populations had grown significantly along the northern border of the unit. Special attention should be given to monitor and treat this section.
- Continue to annually cut/treat multiflora rose and other invasive shrubs throughout the unit, maintaining the site as a rich wetland meadow.

MLH Woods

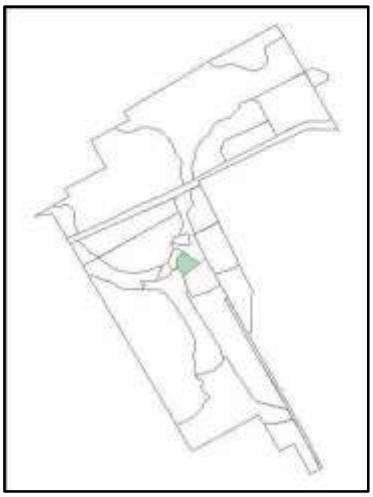


Figure 4: MLH Woods

Site Description

The MLH Woods refers to a 1.5-acre section of deciduous forest, just north of Mountain Lakes House. This unit includes a forested slope, wooded wetlands, and a mossy floodplain. A vernal pool sits at the base of the slope, providing habitat to many amphibians, including a spring peeper population; their chorus is heard in the MLH Woods throughout the spring and early summer months. Additionally, the small floodplain area along the Mountain Brook tributary supports wildflowers not seen anywhere else in the Preserve, including yellow star grass (*Hypoxis hirsuta*), wood betony (*Pedicularis canadensis*) and bastard toadflax (*Comandra umbellate*). The variety of mosses and wildflowers growing along this floodplain make it one of MLP's most unique, high-quality sites. Much work has been done to improve biodiversity elsewhere in the unit, as well. Several flowering dogwoods (*Cornus florida*) and shadblows (*Amelanchier arborea*) were planted along the border of the MLH Woods and lawn. Also, great progress has been made in recent years to reduce populations of invasive multiflora rose and garlic mustard (*Alliaria petiolata*) that populated much of the slope and wetlands. As a result, the unit now supports a greater diversity of native wetlands plants, including Jack-in-the-pulpit (*Arisaema triphyllum*), Virginia knotweed (*Polygonum virginianum*), and jewelweed (*Impatiens capensis*). However, sizeable populations of exotic shrubs and groundcover species still remain in the MLH Woods. Continued efforts are needed to eradicate remaining invasive species, and to foster the existing biodiversity and high quality habitat of MLH Woods.

Management Progress

- Planted 20 buttonbush along the edges of MLH Woods. Also planted 90 wetland wildflowers, mainly along the unit's waterways (stream bank and shoreline). Species include: cardinal flower, cutleaf coneflower, blue-flag iris, and tall meadow rue.
- Eradicated all Oriental photinia shrubs above waist height, in efforts to contain the population by preventing plants from reaching maturity and reproducing.
- Eradicated invasive shrubs where they directly compete with native plants, or encroach on trails. Thickets of invasive multiflora rose, linden viburnum, and honeysuckle were removed from the woods edge and adjacent shoreline. The remaining gaps were planted with elderberries, buttonbush, and smooth alders.
- Continued annual efforts to pull garlic mustard in the early spring; the population persists, but has been significantly reduced.

Future Actions and Priorities:

- Continue monitoring this unit's Oriental photinia population, eradicating individuals before they reach maturity.
- Continue pulling garlic mustard early each spring (before it flowers). Target population on the unit's slope, beginning at forested edge at the top of lawn, and working down into the bottomland. (If flowers have already begun to form at time of pulling, flower/seed heads must be removed and bagged.)
- Eradicate multiflora rose and other invasives where they encroach on the unit's mossy floodplain. Pull Japanese honeysuckle, particularly along the unit's sunny forested edge. (MLH Woods is a high priority site for invasive species control. It supports a very unique native plant community, which requires protection from the many invasive populations surrounding the unit.)

Driveway

Site Description

The 700-meter driveway leading into the Preserve is a focus of this management plan for its value to park visitors. For many, the paved driveway is all they know of the Preserve; this is true not only for those who attend functions at the ML House, but also for many walkers who are reluctant to explore beyond the pavement. Additionally, the driveway is a site of several trail crossings, including a trail kiosk with maps and information on FOPOS.

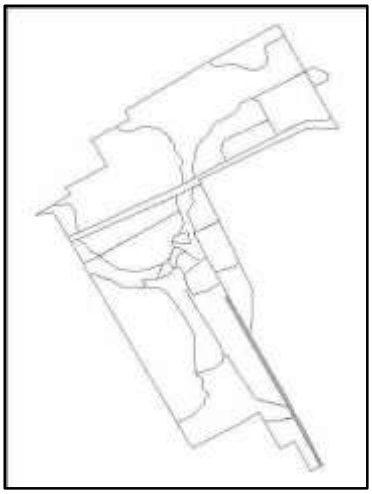


Figure 5: Driveway

Most shrubs growing along the driveway are non-native invasives, such as multiflora rose, Amur honeysuckle (*Lonicera mackii*), and Oriental photinia (*Photinia villosa*). Native spicebush (*Lindera benzoin*) is common between the entry gate and the first stream crossing; a large hazelnut also grows within the spicebush. Flowering dogwoods grow in abundance along the driveway's northern portion, nearing the house. Virginia knotweed is a native wildflower that commonly grows along the driveway close to the entrance, forming an attractive, low border; spring beauty, cuckoo flower, and other native species add a beautiful diversity to this border.

Management Progress

- In past years, many actions have been taken to improve the aesthetic and ecological value of communities growing along the Mountain Lakes Driveway. Wood growth was removed from the bridge; garlic mustard has been pulled seasonally in several areas; and spicebush has been selectively managed for at the southern end of the driveway.

- In 2013, Friends of Princeton Open Space staff and volunteers spent many field days cutting and treating invasive vines along the driveway. Exotic Japanese honeysuckle and Oriental bittersweet climb and girdle many of the trees lining the Mountain Lakes Driveway. In some areas, they create dense blankets of leaves and vines on the trees' upper branches, suffocating and weighing down limbs of native trees and shrubs. Unfortunately, these populations are too large and well established to fully eradicate; nevertheless, significant progress has been made to contain and reduce these populations' impact on native communities. FOPOS has eradicated vines along the driveway, prioritizing these efforts to those found climbing, girdling, or otherwise directly threatening existing native species.
- Princeton Municipality executed new landscaping plans for the driveway entrance. They cleared all plants between the sidewalk and driveway gate, completed some grading, and reseeded the full area with grass. They then planted 1 Redbud and 3 black walnuts on the east side of the driveway, and installed new signage for the Preserve.

Future Actions and Priorities

- Additional plantings are recommended at the driveway entrance to expand availability of wildlife habitat, protect adjacent forests against increased invasives, and improve the entranceway's natural appearance. The forest's edge should planted with an abundance of native shrubs (spicebush, silky dogwood, witch hazel, winterberry), and the existing grass should be replaced with native groundcover species (golden ragwort, swamp milkweed, butterfly milkweed, blazing star, wild bergamot, autumn heleniums, mountain mint, and bottlebrush grass).
- Actively protect the spicebush population bordering the driveway's southern end. Eradicate invasive shrubs and vines that directly compete or threaten the health of spicebush, and other native shrubs.
- Continue eradicating invasive vines along the length of the driveway, with full priority on mature Oriental bittersweet vines, attacking Japanese honeysuckle only when it directly threatens native species (i.e. girdling trunks, weighing down branches).

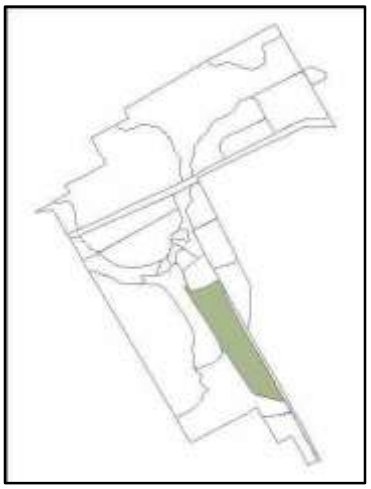


Figure 6: East Woods

East Woods

Site Description

The East Woods refers to the 11-acre section of deciduous forest located along the Mountain Lakes driveway, just east of the lakes. The unit supports predominantly closed-canopy, deciduous forests. It also includes just under 2 acres of deciduous wooded wetlands, as classified by NJDEP's 2007 Land Use/Land Cover

data. These wooded wetlands lie in the flood plain of a second-order tributary of Mountain Brook.

Historically, intense plowing and grazing cleared the area and its seed bank of its original plant communities. Today, the East Woods's canopy is dominated by ash, with red maple and other species in smaller numbers. While native species fill the canopy, exotic invasive plants now largely dominate the understory layer. Amur honeysuckle and common privet are most abundant; they are accompanied by Oriental photinia and multiflora rose, and in lesser degrees, wineberry (*Rubus phoenicolasius*) and burning bush (*Euonymus alata*). Additionally, Japanese honeysuckle vine is found abundantly throughout this section, climbing trees and matting the forest floor. For much of the season, these mats of Japanese honeysuckle are interrupted only by clumps of garlic mustard. Thus, much of the East Woods's ground cover is similarly dominated by invasive plant species.

Nevertheless, clusters of native plants, both understory and groundcover species are found throughout the unit. Blackhaw viburnum (*Viburnum prunifolium*) and flowering dogwood scatter the East Woods, though these populations are old and showing little signs of successful regeneration. Elsewhere in the unit spicebush and native alders, as well as swamp rose (*Rosa palustris*) and winterberry (*Ilex verticillata)* grow in small numbers. Along the forest's edge, the East Woods supports several native perennial species, including spring beauty (*Claytonia virginica*) and white wood aster (*Eurybia divaricata*), and in lesser degree, cuckoo flower (*Cardamine pratensis*). The East Wood's lake-side trail provides a beautiful view of these flowering natives.

Management Progress

- In partnership with Princeton Municipality, FOPOS completed initial phases of a 2-acre Forest Restoration Project in the East Woods. The restoration site sits within the northern portion of this unit, along its border with the Mountain Lakes House's lawn, parking lot, and the Mountain Lakes shoreline. Prior to the start of this project, dense thickets of non-indigenous, invasive plants dominated the region's understory community. The invasive populations, coupled with overabundant deer browse, diminished the site's biodiversity and heavily impacted the forest's long-term health and sustainability. In early August 2013, Princeton contracted Stryker Forestry Products to remove understory invasive species across the 2-acre restoration site. Later that month, deer fencing was installed around the project site, to protect forest regeneration. Since then, FOPOS has conducted follow-up invasive species eradications, targeting Japanese honeysuckle vines and resprouts from Oriental photinia and multiflora rose. FOPOS has also worked with local volunteers to plant over 500 native trees, shrubs, and wildflowers throughout the restoration area.
- Many work days spent with summer interns to reduce Oriental photinia in the southern portion of the East Woods, nearer to the sewer-line. This area supports the Preserve's

densest population of mature photinia. The region may require large-scale methods of control, like those used in the Forest Restoration Project. If the methods used in the Forest Restoration Project are proved successful after 2-3 years of evaluation, this southern area would be a good candidate for the next phase. Until then, the FOPOS NRM and volunteers can continue chipping away at the population, gradually reducing and containing it.

- Continued restoration at former equipment staging area. In 2012, Princeton replanted the site with a diversity of trees, and installed deer fencing around the perimeter. Since then, FOPOS has continually monitored the site, making repairs to fencing after every major storm. With the help of summer interns, FOPOS has introduced native groundcover species to the site, planting 50+ native wildflowers; weeded invasive grasses & vines within the exclosure; and eradicated invasive vines and shrubs along the fence-line to help reduce seeding into the restoration site.
- Improved plant communities on either side of the Sayen Trail, and along the unit's shoreline. Approximately 500 feet of that stretch was included in the above described Forest Restoration Project; as part of that project, invasives were cleared and gaps replanted with native shrubs. In addition to that work, FOPOS eradicated mature invasive shrubs along on the full length of the historic overflow channel and wooded shoreline. (Some diseased multiflora rose was deliberately left alone, where it acted as a barrier between deer and native arrowwood viburnums.) Garlic mustard was pulled in the early spring each year.
- Planted approximately 75 native plants on the grassy slope that extends from the Sayen Trail to the lake at the southern end of this management unit (directly across from the staging area, beyond the wooden railing). Species planted include cardinal flower, cutleaf coneflower, tall meadow rue, black-eyed susan, and buttonbush.

Future Actions and Priorities

- Continue regular maintenance of the 2-acre Forest Restoration Site. It is critical that follow-up invasive control take place during the spring, summer, and fall of 2014 (and likely beyond). Pull invasive vines and groundcover species; cut and treat resprouts of invasive shrubs. Care for and expand native plantings.
- Repair or replace fencing at staging area. The exclosure installed by Compass did not hold up to the many ice and snow storms of early 2014. As of February, 2014, fencing is fully collapsed along several sections of the exclosure; also several posts have fallen down, others are standing but are too weak to keep fencing taut, allowing deer to easily jump over. Major repairs are needed.
- Expand plantings along East Woods' shoreline with Mountain Lake to improve bank stabilization. Large invasive earthworm populations are active along the length of the shoreline (and most areas of the preserve), allowing for increased erosion and

sedimentation. Additional native plants would improve shoreline habitat and assist in soil retention.

- Continue efforts to reestablish native plants on the grassy slope, located between the wooden railing and the lake, at the unit's southern end. There are very few locations within Mountain Lakes that have as much sun exposure; take advantage of this open area to propagate sun-loving native species, to the benefit of pollinators.

Palmer Heights

Site Description

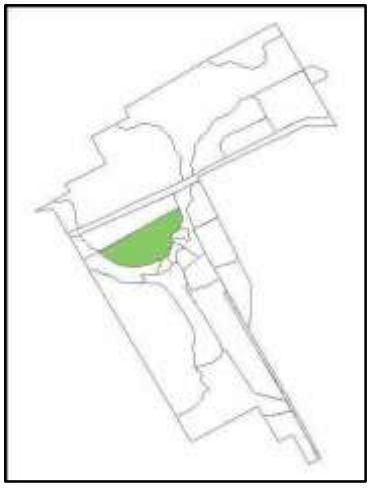


Figure 7: Palmer Heights

Palmer Heights refers to a 9-acre section of closed-canopy, mixed deciduous upland forest on the northern border of Mountain Lakes Preserve. Roughly 3 acres of this forest sits on 18 to 35 percent slopes.

Similar to the East Woods, this unit supports post-agricultural forests, with a heavily invaded and deer-browsed understory. While native oaks, maples, and hickories make up the canopy, and flowering dogwoods fill much of the midstory, invasive plants once again dominate the unit's understory and groundcover vegetation. However, this region is far less densely invaded than the East and West Woods of MLP. While multiflora rose, privet, and exotic honeysuckles maintain strongholds elsewhere in the preserve, Palmer Heights contains smaller populations of mostly emergent invasive species. Also unlike the East Woods, some native regeneration is evident throughout this unit. Young dogwoods, cherry, and oak seedlings are found across Palmer Heights, though in low abundances and never reaching above the browse-line. Also, the unit supports sizeable populations of native wildflowers, including cutleaf toothwort, and spotted wintergreen.

Palmer Heights includes a small, 0.15-acre area that was once fenced and used as a tennis court; much of this original fencing is still intact. Princeton Township targeted the area for a reforestation project in 2012. The project was intended to help mitigate disturbances created elsewhere in the Preserve, as a result of the dam rehabilitation work. The Township covered the site with a fresh layer of soil and planted it with a diversity of native trees and shrubs. They then patched up the existing fencing, to establish a full deer exclosure around the site. Continued efforts are still needed to ensure the establishment of healthy, native plant communities in this section of Palmer Heights.

Management Progress

- Since its installation, FOPOS has made multiple repairs to the tennis court's deer exclosure, and replaced approximately 70 feet of the green fencing with the more durable

black mesh deer fence. FOPOS's NRM also planted 60 native groundcover plants within the tennis court exclosure, including bloodroot, cutleaf coneflower, black-eyed susan, tall meadow rue, Joe-Pye weed, and Indian grass. FOPOS NRM and summer interns spent time eradicating invasive grasses & weeds within the exclosure, focused on weeding around recent plantings.

- Eradicated mature Oriental photinia and linden viburnum surrounding the tennis court and majority of the unit; some mature plants still exist along the unit's edge and many young photinia and linden viburnums remain throughout.
- Created a blockage in the water channel along the unit's northern boundary, by creating a dam of leaves and brush from invasive eradications. It was hoped this would create a vernal pool "upstream" from the blockage. However, the area was too shallow and sloped for water to significantly accumulate. The blockage does seem to slow the movement of water through the channel, helping to reduce runoff and silt deposition down-slope.
- Planted 25 wildflowers, including a mix of cardinal flowers and cutleaf coneflowers, at the base of the steep slope leading into the northwestern edge of the settlement pond. This slope is susceptible to high erosion rates as a result of sparse vegetation (deer) and large exotic earthworm populations. Also, planted 2 buttonbush and laid small logs across the slope to help stabilize soils.

Future Actions and Priorities

- Continue regular management of the tennis court exclosure. Exotic grasses, including stiltgrass, barnyard grass, and carpgrass still dominate groundcover vegetation. (This is not a huge concern; they will be naturally shaded-out over time.) Additional native wildflowers and grasses can be planted here, particularly deer-susceptible species. Weed around past and new plantings. Continue monitoring the fence line, making repairs as needed. In February, 2014, heavy winds and fallen branches damaged much of the fencing, leaving the site exposed to deer. A few quick repairs can return the site to a functioning exclosure; however, FOPOS and/or Princeton may consider replacing the remaining portion of green fencing with the more durable, black mesh fence material to reduce the need for future maintenance.
- Additional work is needed to help stabilize the slope leading into the settlement pond. Lay logs across the slope (8" bamboo stakes can be hammered at their base, to help keep them in place); plant additional shrubs, grasses, and wildflowers in the spaces between logs. [How wide are those supposed to be?]
- Identify populations of wild comfrey, wintergreen, and other uncommon forbs. Concentrate invasive control in these areas of Palmer Heights, with special focus on controlling garlic mustard and Japanese honeysuckle, as well as invasive shrubs.

West Woods

Site Description

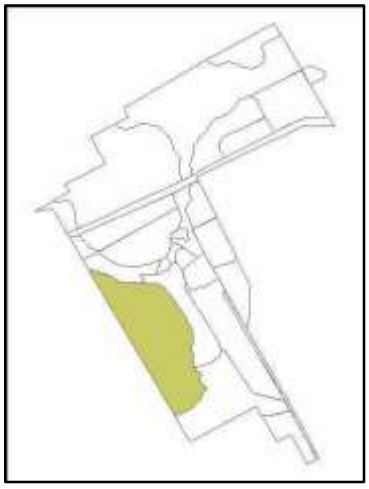


Figure 8: West Woods

The West Woods is a 23-acre section of mixed deciduous upland forest on Mountain Lakes Preserve's western border. The unit remains relatively flat along its border with Coventry Farms, and then slopes down to the lake shoreline. About 8 acres of the West Woods sits on a 12-to-18 percent, northeastern-facing slope. Like the East Woods, this unit sits on disturbed, post-agricultural soils. As a result of this historic land use and present deer densities, much of the West Woods supports non-native plant communities of low biodiversity and limited ecosystem function. However, pockets of diversity still exist and thrive within the West Woods. These and other features are accessible to visitors via a trail loop that encircles the entirety of the unit.

Ash, sugar maple, and red maple are the most abundant canopy species found in the West Woods. Flowering dogwoods, blackhaw viburnums, and sassafras create a healthy layer of midstory vegetation in certain sections of the unit. Like the East Woods, however, invasive shrubs dominate much of the unit's understory, creating dense thickets of winged euonymus and exotic honeysuckles. In some regions, invasive honeysuckles crowd out both understory and midstory vegetation. They are accompanied by climbing exotic vines, Japanese honeysuckle and Oriental bittersweet, which girdle and suffocate the unit's smaller trees. Large individuals of fruiting Oriental photinia grow abundantly throughout the unit's southern sections and are slowly spreading northward, and into adjacent units.

Native trout lily (*Erythronium rostratum*) is an abundant ground cover species here; Solomon's seal (*Polygonatum biflorum*), bloodroot (*Sanguinaria canadensis*), tall meadow rue (*Thalictrum pubescens*), and other spring ephemerals and native sedges are also present. Grape vines grow along the Coventry Farm fence, providing food and habitat to birds. In some locations, many young sassafras fill in the understory, where they've managed to successfully grow above the deer browse line. Elsewhere, native dogwoods, viburnums, spicebush and various tree saplings grow frequently, though stunted at knee height by excessive deer herbivory. Continued deer management may enable these native populations to grow and successfully compete with existing invasive species.

Though invasive shrubs and vines dominate much of the West Woods, the unit still sustains diverse populations of native plants. Successful management of the unit can encourage those populations to grow and expand, providing crucial habitat to birds and other wildlife. This will

involve strategic invasive plant removal, prioritized around existing pockets of native plant communities.

Management Progress

- Completed major efforts to control Oriental photinia in this unit. A large stand of mature (fruiting) photinia grows in the West Woods' center. During the winter of 2013, Natural Resource Manager treated approximately 70% of the population using basal bark application of triclopyr. The treatment was not fully effective for all plants. A significant portion of the population remains.
- Steps taken to restore native plants to the sunny slope near ML's upper dam, where lawn grass was seeded at the close of the dam restoration work. Together with summer interns, large sections of lawn grass were dug up and replaced with 75 native wildflowers from the greenhouse, including cardinal flowers, cutleaf coneflowers, wild senna, and tall meadow rue.
- Planted an additional 30 cardinal flowers along West Woods' shoreline with Mountain Lake, and along the adjacent slope (between the lakes and sewer line trail).
- Pulled garlic mustard, Japanese honeysuckle, and other groundcover invasive species around all known populations of bloodroot, to help reduce competition and encourage reproduction of the native spring ephemeral.
- Eradicated many mature Oriental bittersweet vines, particularly along the eastern slope.

Future Actions and Priorities

- Continue with each of the above activities; all five projects are still on-going.
- Focus invasive control all along the eastern slope (area between ML shoreline and sewer ROW trail). This section of West Woods supports small populations of diverse, uncommon native species. Witch hazels, mapleleaf viburnums in the understory, as well as bloodroot, wintergreen, and Solomon's seal on the forest floor. Reduce competition from invasive species, particularly Japanese honeysuckle.
- A small population of Ailanthus was identified east of the sewer line, near the small hemlock grove. Quick measures should be taken to eradicate the entire population. **Ailanthus should not be cut**; eradicate the species using a basal bark application of triclopyr (brand names: Pathfinder II, Garlon 3A)

WHIP 1

Site Description

WHIP 1 is a 6-acre section of wetlands in the northwestern corner of Mountain Lakes Preserve, where Mountain Brook enters the preserve and empties into the upper lake. The unit features a mixture of herbaceous, scrub/shrub, and deciduous wooded wetlands; it also includes just over

one acre of adjacent deciduous upland forests. Several trails cross through and around WHIP 1, making it accessible to hikers from both MLP and the Great Road entrances.

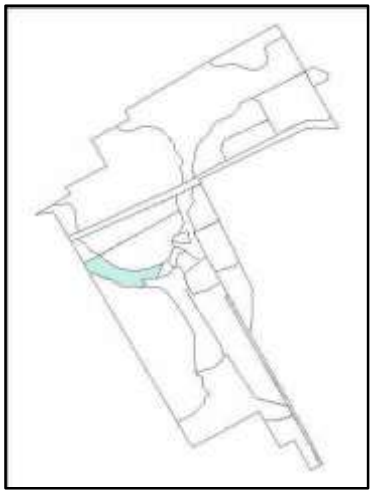


Figure 9: WHIP 1

The 3-acre section at the unit's core was selected for a habitat restoration project by the Wildlife Habitat Incentive Program (WHIP) in 2008. As a result, tremendous work has been done to improve biodiversity and habitat quality in this section. Today, the unit supports many species of wetland plants, including a meadow of skunk cabbage and populations of Jack-in-the-pulpit, jewelweed, and bulltongue arrowhead (*Sagittaria lancifolia*), as well as sweet wood reed (*Cinna arundinacea*), bottlebrush grass and wild-rye. WHIP 1 also features patches of bladdernut and spicebush. Though invasive species still dominate regions of the unit, WHIP 1 offers an important source of biodiversity and wildlife habitat to MLP; it seems to be a particularly favorite location of the great blue heron that frequents the Preserve.

Management Progress

- Planted abundance of cardinal flowers and wetland sedges along the inlet stream, and planted stakes of wetland shrubs (buttonbush, elderberry, and silky dogwood) throughout the unit. Also planted and fenced three 6-foot trees (swamp oak, willow oak, black tupelo) within WHIP 1.
- Eradicated all mature Oriental photinia in this unit (it was a small population). Also eradicated patches of bush honeysuckles and multiflora rose in areas immediately surrounding newly planted trees, in efforts to reduce competition.

Future Actions and Priorities

- Additional wetland shrubs, sedges, and wildflowers should be planted along the inlet stream to help stabilize the bank. Much of the stream and surrounding floodplains were eroded during Hurricane Sandy's flooding; additional native plantings could help contain and reverse those impacts.
- This unit's Japanese honeysuckle population has grown very dense through its eastern section, near the unit's border with the Holly Garden. The population may be too large to fully eradicate with existing resources. Instead, focus on cutting and treating vines that are found climbing trees or girdling native shrubs. (Eradicating climbing vines helps reduce the reproductive potential of the population.) Then, begin eradications at the unit's core (the healthiest portion of the unit) and around native plantings; gradually radiate outwards.

WHIP 2

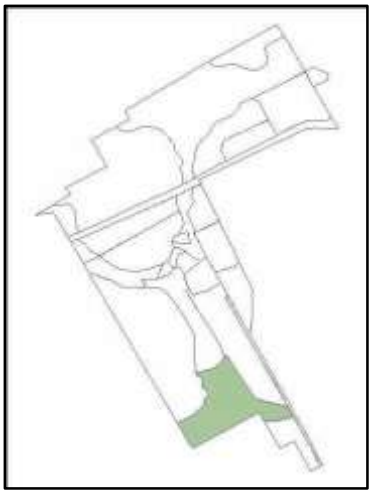


Figure 10: WHIP 2

Site Description

WHIP 2 refers to a 12.5-acre section of deciduous wooded wetlands in the southern portion of MLP. The 2 acres of spring-fed wetlands at the unit's center was one of two areas in MLP selected for a habitat restoration project by the Wildlife Habitat Incentive Program (WHIP) in 2008. The WHIP 2 unit encompasses that restoration site, and all of its surrounding wetlands. In addition to the spring-fed wetlands, this also includes the portions of the stream corridors of Mountain Brook and one of its major tributaries.

WHIP 2 supports a broad diversity of native plant species. Tussock sedge grows in the lower wetlands, with swamp rose and winterberry on its borders. Spicebush, skunk cabbage, and white snakeroot are also abundant, with tall meadow rue in lesser degrees. On a visit to MLP, the WHIP official explained that the unit's tussock sedge population is representative of bog turtle habitat, though the location probably lacks adequate size to sustain a population.

In 2008, considerable work was done to remove exotic invasive species in this unit. The invasives, primarily multiflora rose, Oriental photinia, Oriental privet, and exotic honeysuckles and viburnums, were growing abundantly on the higher ground between the wetland and the bordering streams. The exotics were selectively removed so that intermixed native spicebush, alders, blackhaw viburnums, and silky dogwoods could grow quickly into the voids. A few red chokeberry (*Photinia pyrifolia*), elderberry (*Sambucus canadensis*), silky dogwood (*Cornus ammomum*) and buttonbush (*Cephelanthus occidentalis*) were also planted in what few gaps could be found. In the years since the initial removal of invasive species, additional work has been done to further diminish the presence of exotic invasive shrubs. Given the dense growth, this work has been carried out primarily during the winter months, when access is easier. The natives, particularly spicebush, have rebounded nicely, filling the voids left by removed exotics. Working off these successes, invasive species eradication should continue each winter, in efforts to maintain and foster the unit's rich biodiversity.

Management Progress

- After many attempts, the full population of Siebold's viburnum (a highly threatening emergent invasive species) was successfully eradicated. This was the only known population in the Mountain Lakes Area, though it has been seen growing on nearby properties. Must continue to look for and eradicate this species across the Preserve.
- Worked with volunteers and interns to remove Japanese honeysuckle vines from spicebush and other native trees and shrubs.

- Seasonally pulled garlic mustard and dame's rocket, focusing in areas where native groundcover species are present to fill in the remaining gaps. (Otherwise, the garlic mustard and dame's rocket are more than likely to grow back the next season.)
- Continued annual control of lesser celandine in the early spring.

Future Actions and Priorities

- Many **large**, fruiting photinia grow in WHIP 2, particularly in the unit's difficult-to-reach core. Populations identified during the growing season can be treated in the winter months, when access is easier.
- Continue to monitor for and quickly eradicate resprouts or new populations of Siebold's viburnum.
- Take measures to stabilize stream banks of Mountain Brook. The banks of the western portion (nearer to the Coventry boardwalk) are particularly scoured. Plant native shrubs along the stream banks to help stabilize and retain soils; buttonbush is a particularly effective species for this task.
- Continue annually treating lesser celandine populations in WHIP 2. Take care not to spray its native look-a-like, marsh marigold, which is present in this unit and a regionally rare species.

Walnut Grove

Site Description

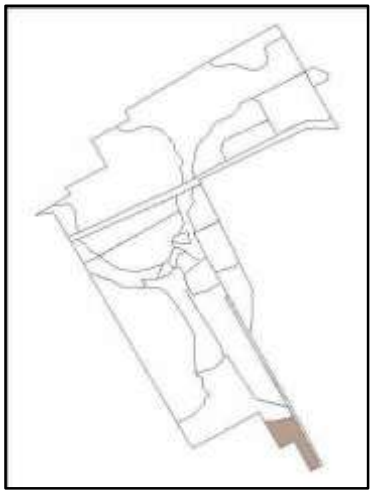


Figure 11: Walnut Grove

The Walnut Grove refers to 3 acres of upland deciduous forest in the southern portion of Mountain Lakes Preserve. The unit supports predominantly closed canopy deciduous forest. The unit is characterized by a dominating presence of mature black walnut trees. Ash and maples accompany black walnut in the unit's canopy, while young elms and redbud fill in much of its midstory. The Walnut Grove supports populations of native spicebush, in addition to exotic privets and shrub honeysuckles throughout its understory. The unit supports a variety of woodland sedges and native herbs. However large monotypic patches of exotic dame's rocket and Japanese stiltgrass threaten to out-compete the Walnut Grove's plant diversity.

Dame's rocket is an exotic, perennial forb that grows up to 4 feet in height. Its purple and white showy flowers make it a common component in wildflower seed mixes. Though it's often not considered a large-scale invasive plant, this prolific seed producer can cause significant harm to natural systems. In the Walnut Grove, Dame's rocket forms dense monocultures, excluding native plants. Presently, the species is still very uncommon elsewhere in MLP. It's therefore important to contain and minimize populations before they are able to spread significantly.

A trail leads visitors into the Walnut Grove from the Community Park North parking area, as well as the Preserve's Mountain Avenue entrance, making this unit the primary entranceway to MLP's forests. Its proximity to restrooms and a parking area, as well as its large supply of invasive plants, makes the Walnut Grove an ideal location for hosting larger groups of volunteers.

Management Progress

- Spent many work days eradicating invasive vines, including Japanese honeysuckle and Oriental bittersweet throughout this unit. Many old bittersweet vines were found choking canopy trees, and honeysuckle vines girdling native spicebush.
- Pulled dames rocket with volunteers, targeting populations nearest to the trail. Currently, this invasive herb is concentrated almost exclusively within Walnut Grove. However, its seeds are easily dispersed by wind and hikers' boots. Small populations (1-5 plants) have been discovered (and eradicated) along trails in connected areas (WHIP 2 and East Woods), showing that this plant has and will continue to spread via trails.

Future Actions and Priorities

- Actively protect Walnut Grove's population of spicebush. The beneficial native shrub maintains a sizeable population in this unit. However, it grows alongside an abundance of exotic honeysuckle shrubs and vines, as well as other competing invasives. Encourage the growth of the spicebush population by selectively eradicating invasive shrubs throughout the unit: begin by removing invasive shrubs growing immediately next to a spicebush, then move outwards; the spicebush will naturally fill in the remaining gaps. This should be a high priority project.
- Continue regular eradications of climbing Japanese honeysuckle and Oriental bittersweet vines where they directly threaten native species. (Populations are too abundant to fully eradicate; use time/resources wisely.)
- Continue eradicating dames rocket, first targeting plants growing along trails, then small clusters elsewhere in the unit. Once those populations are controlled, shift efforts to the dense population near the unit's southern end.

MLN Corridor

Site Description

The Mountain Lakes North Corridor includes 2.7 acres of open and wooded wetlands, surrounding 700 feet of Mountain Brook, a first order inlet stream of Mountain Lakes. A trail crosses through the unit, connecting Mountain Lakes Preserve to Mountain Lakes North and the Stuart School woods. This trail also features a particularly attractive rock crossing.

The unit is transected by a gas pipeline right-of-way. The MLN Corridor's open borders with both the right-of-way and Coventry Farm makes this unit open to increased sunlight, wind, and a regular influx of exotic weeds. As a result, invasive shrubs and groundcover species dominate much of the unit, including teasel, blue chicory, Japanese honeysuckle, multiflora rose, and many others. A somewhat protective border of small trees and shrubs, made up of box-elder maples, slippery elms, and hop hornbeams, surrounds much of the stream, allowing skunk cabbage, broadleaf arrowhead, and other native floodplain species to grow commonly along the corridor. However, lesser celandine, sweet flag, and other wetland invaders also grow in abundance.

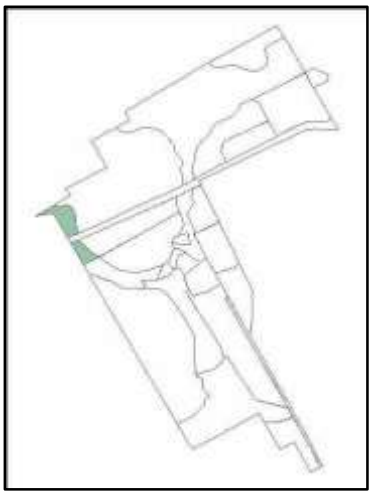


Figure 12: MLN Corridor

Management Progress

- FOPOS has annually controlled MLN Corridor's populations of lesser celandine. Controlling lesser celandine along this area of Mountain Brook is key to the protection of wetland communities in MLN Corridor, as well as downstream units. (Lesser celandine is very easily dispersed by water, and has a high potential to form carpet-like mats across a full wetland area). Early each spring, the NRM surveyed along both sides of the stream and treated any discovered population of lesser celandine, using a low concentration foliar spray. Plants found on the water's edge were *very carefully* dug up, to avoid incidental dripping or spraying of herbicide into the water.
- Eradicated mature Oriental photinia and linden viburnum throughout the unit (populations were small).

Future Actions and Priorities

- Continue controlling lesser celandine early each spring, before native plants emerge from dormancy. As a rule, lesser celandine should never be pulled, and should only be dug up as a last resort. Pulling only removes top growth vegetation, along with a few bulbs; it almost guarantees that some bulbs will be left in the soil. Digging can work, but it is often ineffective for lesser celandine. If even one small bulb remains, it's likely the full plant will return. Also, the digging and/or pulling process sometimes helps to dislodge bulbs, thereby encouraging the spread of the population.
- MLN Corridor's population of sweet flag is slowly spreading downstream, supplying Mountain Lakes shoreline and WHIP 2 with propagules of the exotic plant. At its current population size, this species is very difficult to eradicate by conventional means; it grows in and around open water, making it too hazardous to attempt herbicide applications, and its thick rhizomes make it very difficult to remove manually. Creative control options should be explored to contain and reduce this population of sweet flag, to the benefit of all Mountain Lakes Preserve's wetland areas.

- MLN Corridor will be affected by the upcoming pipeline expansion project. The pipeline work area crosses through the northern portion of this unit, and a segment of Mountain Brook. The unit should be carefully monitored- photograph and take field notes- before, during, and after the pipeline project, to ensure minimal impacts to the long-term health of the unit. The stream bank and surrounding areas should be replanted with an abundance of native shrubs and wetland plants.

North Woods

Site Description

The North Woods refers to 22 acres of mixed deciduous, upland forest, which includes a major portion of Mountain Lakes North and parts of John Witherspoon Woods. According to historic aerial photographs, the full unit was forested since at least 1953, and some portions since at least 1930. It features a diversity of mid-to-late-successional canopy species, including shagbark hickory, American beech, red oak, and red maples, among others. Muscle wood is also common in the understory, as well as remnant blackhaw viburnums.

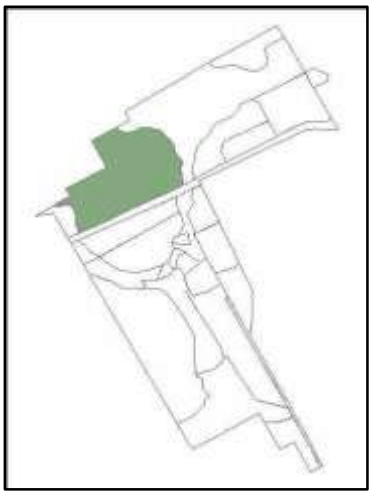


Figure 13: North Woods

This unit is heavily impacted by overabundant deer populations. As a result, the understory and forest floor supports very little native vegetation. In the absence of a healthy understory, Japanese stiltgrass has formed large, dense patches throughout the North Woods. Native sedges, ferns, and some forest wildflowers are also present, but in small numbers. Oriental photinia is the most abundant invasive shrub of the North Woods. Its population exists mostly as scattered individual shrubs, and occasionally as clusters of 15 or more plants. Though common throughout the unit, Oriental photinia has not yet formed the large, dense stands found elsewhere in the Mountain Lakes Management Area.

Management Progress

- In summer and fall of 2013, FOPOS began a concentrated effort to contain and reduce the North Wood's population of Oriental photinia. Beginning at the unit's southern corner, FOPOS NRM and summer interns zigzagged through the unit, eradicating all Oriental photinia found growing above waist height. We also treated emergent populations of other invasive species (examples include: small populations, defined as 1 to 12 individual plants, of Japanese barberry, winged euonymus, and wintercreeper). FOPOS completed these eradications for approximately 50% of the North Woods' area before winter, 2013.
- Pulled stilt grass and planted wetland sedges along the ML North trail, including 30 *Carex lupulina* and 30 *Carex squarrosa.* (Plantings were completed in Spring 2012; stilt grass was controlled in 2013.)

Future Actions and Priorities

- Continue efforts to contain and reduce Oriental photinia in the North Woods. Begin from 2013's last eradication point (very near the large, old beech tree on the ML North trail; see GPS data) and continue zigzagging towards the Witherspoon Wetlands management unit; cut and treat all photinia found above waist height. Return to monitor and eradicate mature Oriental photinia, and other emerging invasive species every year.
- The North Woods is a high priority unit for Early Detection/Rapid Response. Conduct more thorough surveys through this unit, and make every effort to quickly eradicate emergent populations.

Study Woods

The Study Woods refers to the 6-acre section of upland, mixed deciduous forest located between Mountain Lakes Preserve's border (marked by the old chain-link fence) and the pipeline right-of-way. In April, 2012, a forest fire burned through the leaf layer and understory of a 2-acre section within the Study Woods. The unit now contains FOPOS's Fire Regeneration Study Plots: three 1-acre plots that were established and are regularly monitored to evaluate the effects of fire and deer browse on forest regeneration. As part of this study, a 2-acre deer exclosure was installed within the Study Woods.

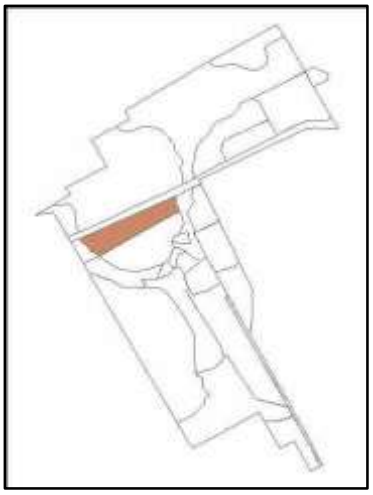


Figure 14: Study Woods

The Study Woods features a rich canopy of American beech, and various hickories, oaks, elms and maples; muscle wood and flowering dogwood are also common. This unit is heavily impacted by overabundant deer browse, and therefore supports only spare understory vegetation. Also, the Study Woods' populations of invasive shrubs, including Japanese barberry and Oriental photinia, grow more densely than in the adjacent North Woods. However, the Study Woods' plant communities are currently in a state of transition, due to the recent forest fire, fence installation, and many down trees recently felled by Hurricane Sandy. It's likely this site description will change significantly in the years ahead.

Management Progress

- Fire Regeneration Study Plots, including a 2-acre deer exclosure, were established in 2012. The plots are photographed each season; plant communities are thoroughly inventoried each year; and fencing is regularly monitored and maintained.
- Eradicated invasive shrubs within and immediately surrounding the study plots. Oriental photinia and Japanese barberry were the most common invasive species here. Largely mature plants were targeted, to help reduce seeding into the open, burned forest and exclosure.

Future Actions and Priorities

- Continue controlling invasive species throughout this unit, to help contain populations from spreading into study sites, and to encourage the regeneration of native plant communities. Target mature Oriental photinia, linden viburnum, Japanese barberry, and winged euonymus, as well as any emergent species. Pull garlic mustard in early spring seasons.
- Continue monitoring and managing the Fire Regeneration Study Plots.

Witherspoon Wetlands

Site Description – Witherspoon Wetlands

The Witherspoon Wetlands refers to 25 acres of old growth, forested wetlands which extends through much of John Witherspoon Woods and part of Mountain Lakes North. It features rocky streams, diabase boulders, and a rich forest of large hickories, white oaks, tulip trees, tupelos, red maples, sweet gums, and beech trees. Witch hazel and muscle wood are common in the understory. However, Witherspoon Wetlands is severely impacted by overabundant deer browse; as a result, its understory is only sparsely populated.

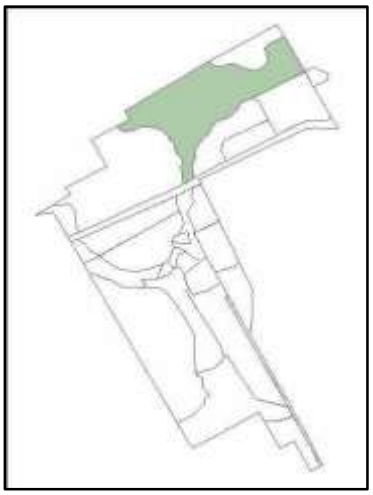


Figure 15: Witherspoon Wetlands

Nevertheless, diverse forest ephemerals fill patches of the forest floor each year; trout lily, skunk cabbage, and Jack-in-the-pulpit grow throughout the unit, as well as small populations of blood root, cutleaf toothwort, and wood geranium. A population of wild comfrey, a state ranked imperiled species, has also been observed in this unit. White wood aster, native ferns, cardinal flowers, forest goldenrods, and a variety of other native forbs grow throughout the Witherspoon Wetlands.

Oriental photinia is the most abundant invasive shrub of the Witherspoon Wetlands; Japanese barberry and winged euonymus are also common, accompanied by patches of greenbrier (native, sometime weedy vine). This unit also contains large carpets of Japanese stiltgrass across most canopy gaps.

Management Progress

- In the summer and fall of 2013, FOPOS began a concentrated effort to contain and reduce Oriental photinia throughout John Witherspoon Woods (in a similar fashion to that used in the North Woods management unit). We began eradications near the core of the Witherspoon Wetlands, where invasive populations are less dense, and radiated outwards, toward Witherspoon Uplands and the parcel's eastern border. We eradicated all Oriental photinia found growing above waist-height. We also eradicated small populations of

wintercreeper and winged euonymus as they were encountered. Completed eradications over approximately 50% of the management unit.

- Working with 15 Rider University volunteers, FOPOS cleared Japanese barberry and multiflora rose across a large area of the Witherspoon Wetlands: between the old chain-link fence line and the remnant rock wall.

Future Actions and Priorities

- Continue eradicating mature Oriental photinia. Expand these efforts to include winged euonymus and Japanese barberry, which are still emergent in this unit. Each of these species has come to dominate plant communities elsewhere in the Mountain Lakes Management Area; it's critical to control Witherspoon's populations before they are able to expand and eliminate existing native understory species. Return each year to monitor and eradicate matured populations. (These invasive populations are very abundant in the adjacent management units- Border Woods and Border Wetlands.)
- Manage for rare groundcover species. Wild comfrey is a state ranked imperiled species; one population was observed in this unit. Additionally, Witherspoon Woods support a number of high conservation-value species, blood root, Solomon's seal, and others. Control invasive plants surrounding these populations. Expand wild comfrey habitat by reducing stilt grass populations in Witherspoon Woods' canopy gaps (wild comfrey often grows along trails or the edges of canopy gaps in rich, old growth forests). Collect seeds to propagate and expand populations throughout the Open Space Area.
- Witherspoon Wetlands is also a high priority unit for Early Detection/Rapid Response. Conduct more thorough surveys through this area, and quickly eradicate emergent populations.

Witherspoon Uplands

Site Description

The Witherspoon Uplands includes 4 acres of upland deciduous forest, found in the northeast corner of John Witherspoon Woods. It represents the oldest known forest community in the Mountain Lakes Management Area, established at least since 1840. (Portions of Witherspoon Wetlands have been forested as long or possibly longer, but records are unclear on the exact areas and extent of past land use activities there.)

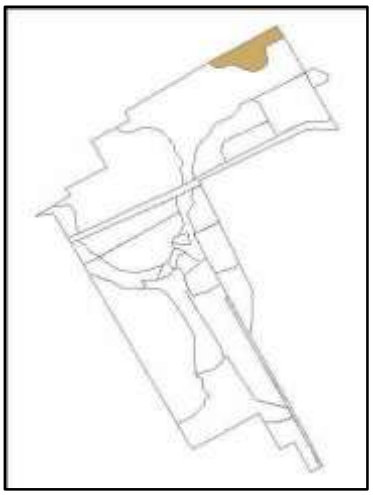


Figure 16: Witherspoon Uplands

The Witherspoon Uplands includes large American beech trees, hickories, oaks, maples, and a diversity of other native canopy species. This unit also supports several small populations of late-successional forest herbs, including black cohosh, and naked-

flowering tick trefoil, and many additional native groundcover species. Witherspoon Uplands also features Devil's Cave, a unique geological feature formed by an arrangement of large diabase boulders. The many large boulders throughout this area make it a popular venue for rock climbers.

Management Progress

- In the summer and fall of 2013, FOPOS began a concentrated effort to contain and reduce Oriental photinia in the John Witherspoon Woods (in a similar fashion to that used in the North Woods management unit). These efforts included several eradications of mature photinia in the Witherspoon Uplands, particularly in areas that already support native groundcover species. Overall, we completed eradications over approximately 30% of the unit.
- Fully eradicated Witherspoon Uplands' population of jet bead, a state-wide emerging invasive species.

Future Actions and Priorities

- Continue eradicating mature Oriental photinia. Expand these efforts to include winged euonymus and Japanese barberry, which are still emergent in this unit.
- Manage for rare or uncommon groundcover species, including black cohosh (*Cimicifua racemosa*), naked-flowered tick trefoil (*Desmodium nudiflorum*), blood root (*Sanguinaria canadensis*), Solomon's seal (*Polygonatum biflorum*), and others. Control invasive plants surrounding these populations. Collect seeds to propagate and expand populations throughout the Open Space Area.
- Witherspoon Uplands is also a high priority unit for Early Detection/Rapid Response. Conduct more thorough surveys through this area, and quickly eradicate emergent populations. (Be especially alert to new or re-sprouting populations of jet bead.)

Brookside Woods

Site Description

The Brookside Woods includes 2.5 acres of mixed deciduous woods, surrounding the settlement pond and a 400-foot portion of its inlet stream- a second order tributary of Mountain Brook. The unit extends from the start of the Brookside Trail, near the Mountain Lakes House, and continues to the pipeline right-of-way crossing. It also includes the open area between the settlement pond dam, and the paved driveway (an area previously included in the Palmer Heights management unit.) The Brookside Woods

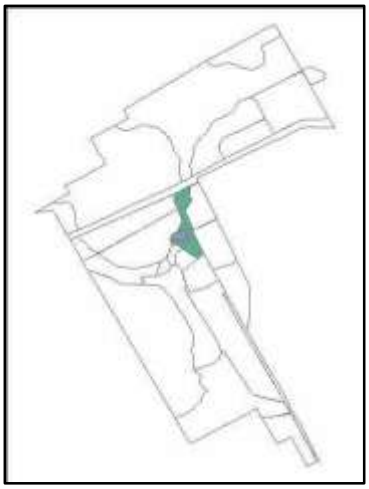


Figure 17: Brookside Woods

includes mostly forested wetlands, featuring a diversity of maples, oaks, hickories, elms and beech, with cuckoo flower (a state ranked vulnerable species), skunk cabbage, jewelweed, and a variety of native sedges along the forest floor. This stream corridor has experienced very little historical disturbance, as compared to surrounding post-agricultural lands. As a result, this unit shows a richer diversity of forest species, and increased resistance to invasive exotics. Nevertheless, invasive plant populations are found throughout the management unit. Japanese stiltgrass, multiflora rose, and Japanese honeysuckle are particularly abundant.

Management Progress

- Planted many wetland sedges and winged monkey flowers along the stony path (40 winged monkey flowers, 25 *Carex lupulina*). Also planted several elderberry and silky dogwood stakes within the unit's wettest areas, to help stabilize the stream bank, and/or shade out stilt grass.
- Completed stream bank restoration on a small section of this unit's tributary. Laid several logs across an eroded slope, which extends from the Brookside trail to the inlet stream, and staked them in place with short bamboo rods. Then planted the spaces between each log with tall meadow rues and cardinal flowers.
- Cleared and seeded areas in front of the settlement pond's dam with a mixture of native wildflowers and sedges. Also planted ~150 native wildflowers (mostly cardinal flowers; some cutleaf coneflowers, tall meadow rue, and autumn heleniums) in front of the dam, and around the edge of the pond.
- Seasonally pulled garlic mustard along trails and wooded slope.

Future Actions and Priorities

- Expand stream bank restoration work to include nearby eroded slopes along the Mountain Brook tributary and settlement pond. Incorporate additional native plantings, to assist in soil retention and improve understory biodiversity.
- In early 2013, Princeton cut trees and cleared the understory across a 0.75-acre section of the Brookside Woods to make the site more suitable for deer management activities. They cut down approximately 20 trees and many more shrubs (including some invasives), cut vines, and cleared branches off several beech trees. They have since determined this site does not fit their needs, and have moved culling activities to a different area of the preserve. Efforts should be made to restore the understory here. Replant the area with 30+ native shrubs (silky dogwood, spicebush, buttonbush, witch hazel, or others). Also, eradicate nearby populations of Japanese barberry and Oriental photinia. These invasive populations are currently small, but somewhat dense; they are very likely to grow and expand in response to the recent increase in sunlight and wind exposure (resulting from the cut trees and cleared brush). These populations should be eradicated and remaining gaps replanted with additional native shrubs.

- Continue controlling garlic mustard each year, to protect existing native groundcover species.

County Land- Fallen Pines

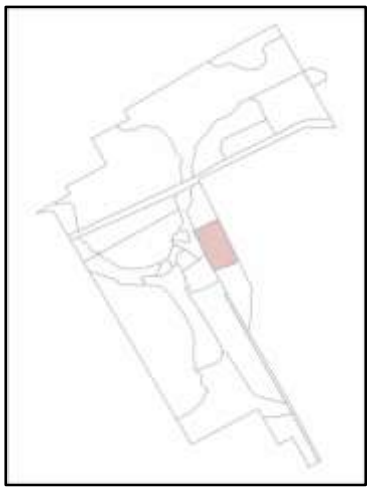


Figure 18: Fallen Pines

Site Description

The Fallen Pines refers to the 4-acre portion of the County Land that was most impacted by the strong winds of Hurricane Sandy, Hurricane Irene, and other major storms of recent years. This unit borders an open field of Tusculum, making it more vulnerable to westward winds. Hundreds of trees came down over the years, leaving only a minority of trees standing. Previously, this area was planted (at around 1970, according to historic aerial photographs) as plantation of mostly Norway spruce and white pines; black locust was also present in large numbers. As trees fell each year, it shifted from a closed canopy plantation, to an open scrub/ shrubland. The site filled in with a variety of brambles, pokeweed, and young black locust sprouts.

Actions Taken

- The County hired a contractor to clear the hundreds of trees felled by Hurricane Sandy, Irene, and other major storms. FOPOS previously planted 25 trees (each approximately 6 feet tall), and a number of native wildflowers throughout the area. The trees were then transplanted out, into large pots, in preparation for the clearing project. Those trees are currently being stored (in pots) within the East Woods' Forest Restoration deer exclosure.

Priorities

- Return potted trees to wetter areas of the Fallen Pines. The trees available are better adapted to moist-to-wet soils; also, stiltgrass is likely to "re-carpet" moist areas of the unit. Planting trees in those sections may help control the return of stiltgrass.
- A plan is needed to guide ecological restoration of the Fallen Pines area. Without careful management, this very open and recently disturbed site will become a haven for invasive plant species. Also, black locust roots are well established throughout the unit; this species has the potential to densely resprout, and dominate the area. Generally, the site should be managed to encourage natural seeding/regeneration of native species, with some active plantings included. Some reforestation techniques to consider:
    - Deer exclosure to protect natural regeneration of native plants
    - Amend soils to favor native forest species. Invasive species favor soils with high pH and increased nitrates. It may be helpful to test soils, and amend as needed. (Addition of sulfur can reduce pH, and there's some evidence that sulfur added to

soils can help reduce deer browse by making plants less palatable; woodchips can help deplete nitrates.)
    - Cover the site with about 1 inch of woodchips prior to plantings. The wood attracts fungi, insects, and other important forest soil components, while also deterring invasive weeds and bacteria. (Bacteria is an agricultural detritivore; for reforestation, we want to attract forest detritivores)
    - Plan to replant the area this fall, or early next spring. (Ideally in the fall, when rainfall is more reliable.) I'd recommend planting with bare-root stock.
- Note: members of the FOPOS Board have expressed interest in possibly designating this area as a "Memorial Grove." Plans were drawn, which include a landscaped arrangement of trees and wildflowers. It is not clear if a decision has been made to move forward with this project, or continue managing the site as a natural forested area.

Additional Management Units

No significant stewardship activities were conducted in the following units during 2013. They were included in plant inventories, early detection/rapid response surveys, and general invasive species control along trails (pulling garlic mustard and invasive vines, cutting/treating multiflora rose that encroaches on trails, and so on).

These areas, along with the Fallen Pines and parts of the Brookside Woods are not technically within the Mountain Lakes Management Area, which has been formally adopted by FOPOS. However, the ecosystems are well connected with the Management Area, and ecology notoriously does not adhere to parcel boundaries. These sites should also be managed for increased biodiversity and ecosystem health. (I simply did not have the time to complete site descriptions and set priorities for these units.)

- County Woods
- County Brushland
- Border Woods
- Border Wetlands

MONITORING PROGRAM

Monitoring is an important and essential tool to natural resource management. It helps us to better understand our stewardship successes and failures, and act more effectively in the future. Therefore, all actions taken in accordance with this management plan- including native plantings, invasive species eradications, habitat restorations, and so on, should be systematically recorded and periodically evaluated.

The monitoring program should incorporate the following important steps:

> ***Locate and record*** points of interest or concern, including: invasive species populations, rare plants, and restoration sites. Record locations using a collection of available tools, including maps, handheld GPS devices, and smart phone applications. Take photographs and detailed descriptions for continued reference. Maintain and organize all data in a centralized system of Excel spreadsheets and GIS data layers.
>
> ***Monitor*** changes by periodically revisiting point locations and recording new observations. Maintain detailed records of any actions taken and their apparent results. This information may include changes in populations, percent mortality of planted seedlings, localized plant inventories, or wildlife sightings.
>
> ***Adapt*** methods and management strategies based on observed successes and failures, as well as perceived environmental changes. Reflect these changes in future drafts of the Mountain Lakes Preserve Management Plan.

To help us understand the broader impacts of our land stewardship efforts, MLP's monitoring program should also include information on the Preserve's overall plant composition and biodiversity. FOPOS's natural resource manager should conduct annual plant surveys, compiling inventories of plant communities across Mountain Lakes Preserve and within each of its management units. Utilize the **Plant Stewardship Index (PSI)** to determine if and where stewardship is improving the health of MLP's communities. PSI is a tool developed by Bowman's Hill Wildflower Preserve to help measure the floristic quality of ecological communities within the Piedmont region. More information on the tool and its methodology can be found at http://www.bhwp.org/plant-stewardship-index.htm. The natural resource manager should calculate a PSI each time a plant inventory is compiled, comparing changes to the index over time. These actions to monitor and evaluate changes to MLP will provide important information on the long-term effects of stewardship, allowing FOPOS to understand and ultimately improve its management practices.

APPENDIX A: 2013 Mountain Lakes Management Area Plant Inventory

The inventories listed here, in Appendix B, and Appendix C do not represent complete records of Mountain Lake's plant diversity.

Mountain Lakes Management Area – 2013 Plant Inventory

Mountain Lakes Preserve, Mountain Lakes North, John Witherspoon Woods

Native or non-invasive
Invasive

SCIENTIFIC NAME	COMMON NAME
Acalypha rhomboidea	Three-seeded mercury
Acer negundo	boxelder maple
Acer platanoides	Norway maple
Acer rubrum	red maple
Acer saccharinum	silver maple
Acer saccharum	sugar maple
Achillea millefolium	common yarrow
Acorus calamus	sweetflag
Agrimonia pubescens	downy agrimony
Agrimonia striata	woodland agrimony
Agrostis hyemalis	ticklegrass
Ailanthus altissima	Ailanthus
Ajuga reptans	Carpetbugle
Alisma subcordatum	small waterplantain
Alliaria petiolata	garlic mustard
Allium vineale	wild garlic
Alnus serrulata	smooth alder
Amorpha fruticosa	desert false indigo
Ampelopsis brevipedunculata	porcelain berry
Amphicarpaea bracteata	hog peanut
Anemonella thalichtroides	rue anemone
Arctium lappa	great burdock
Arctium minus	common burdock
Arisaema triphyllum	jack in the pulpit
Artemisia vulgaris	mugwort
Arthraxon hispidus	carpgrass
Asclepias incarnata	swamp milkweed
Asclepias syriaca	common milkweed
Asclepius tuberosa	milkweed
Athyrium filix-femina	lady fern

Barbarea vulgaris	wintercress
Berberis thunbergii	Japanese barberry
Betula lenta	black birch
Betula populifolia	gray birch
Bidens connata	swamp beggartick
Bidens coronata	tickseed sunflower
Bidens frondosa	devil's beggartick
Boehmeria cylindrica	false wood nettle
Boehmeria cylindrica	false nettle
Calystegia sepium	hedge bindweed
Cardamine bulbosa	bittercress
Cardamine concatenata	cutleaf toothwort
Cardamine hirsuta	hairy bittercress
Cardamine pensylvanica	Pennsylvania bittercress
Cardamine pratensis var palustrus	Cuckoo flower
Carex communis	fibrous-rooted sedge
Carex crinita	fringed sedge
Carex glaucodea	blue sedge
Carex laxiflora	loose-flowered sedge
Carex lupulina	hop sedge
Carex lurida	sallow sedge
Carex pensylvanica	pennsylvania sedge
Carex prasina	drooping sedge
Carex squarrosa	squarrose sedge
Carex stricta	Tussock sedge
Carpinus caroliniana	musclewood
Carya cordiformis	bitternut hickory
Carya ovata	shagbark hickory
Carya tomentosa	mockernut hickory
Catalpa speciosa	Catalpa
Celastrus orbiculatus	Oriental bittersweet
Cephalanthus occidentalis	buttonbush
Cerastium nutans	nodding chickweed
Cerastium vulgatum	mouse-ear chickweed
Cercis canadensis	redbud
Chamaecyparis thyoides	Atlantic white cedar
Chelone glabra	turlehead
Chenopodium album var. album	lamb's quarter
Chimaphila maculata	spotted wintergreen
Chrysanthemum leucanthemum	oxeye daisy
Cimicifuga racemosa	black cohosh

Cinna arundinacea	woodreed
Cinna arundinacea	sweet wood reed
Circaea lutetiana ssp. canadensis	enchanter's nightshade
Cirsium arvense	Canada thistle
Cirsium vulgare	bull thistle
Claytonia virginica	spring beauty
Clethra alnifolia	sweet pepperbush
Comandra umbellata	bastard toadflax
Commelina communis	Asiatic dayflower
Convallaria majalis	lily of the valley
Convolvulus arvensis	field bindweed
Conyza canadensis	horseweed
Cornus amomum	silky dogwood
cornus florida	flowering dogwood
Cornus kousa	Kousa dogwood
Coronilla varia	crown vetch
Corylus americanus	hazelnut
Crataegus sp.	hawthorne
Cryptogramma stelleri	slender rock-brake
Cynoglossum virginianum var virginianum	wild comfrey
Cyperus esculentus	nutsedge
Cyperus strigosus	false nutsedge
Daucus carota	wild carrot
Desmodium canadense	tick trefoil
Desmodium nudiflorum	naked-flowered tick trefoil
Desmodium paniculatum	panicled tick trefoil
Desmodium perplexum	tick trefoil
Dichanthelium acuminatum	hairy rosette panicgrass
Dichanthelium clandestinum	deertongue
Diospyros virginiana	persimmon
Dipsacus fullonum	Fuller's teasel
Duchesnea indica	false strawberry
Echinacea purpurea	purple coneflower
Echinochloa crusgalli	barnyard grass
Elymus hystrix	bottlebrush grass
Epifagus virginiana	beechdrops
Epilobium ciliatum	willowherb
Equisetum arvense	horsetail
Equisetum arvense	field horsetail
Erechtites hieraciifolia	fireweed
Erigeron annuus	daisy fleabane

Erythronium americanum	yellow trout lily
Euonymus alatus	winged euonymus
Euonymus fortunei	winter creeper
Eupatorium coelestinum	mistflower
Eupatorium fistulosum	Joe pyeweed
Eupatorium perfoliatuum	boneset
Eupatorium rugosum	white snakeroot
Eupatorium serotinum	late flowering boneset
Eurybia divaricata	white wood aster
Euthamia tenuifolia	slender goldentop
Fagus grandifolia	American beech
Festuca sp.	fescue
Fragaria virginiana	wild strawberry
Fraxinus americana	White ash
Fraxinus pennsylvanica	green ash
Galinsoga quadriradiata	quickweed
Galinsoga quadriradiata	hairy galinsoga
Galium aparine	cleavers/bedstraw
Galium circaezans	wild licorice
Galium triflorum	sweet-scented bedstraw
Geranium maculatum	wood geranium
Geum aleppicum	yellow avens
Geum canadense	white avens
Glechoma hederacea	ground ivy
Hackelia virginiana	Virginia stickseed
Hamamelis virginiana	witch hazel
Hedeoma pulegioides	American pennyroyal
Hedera helix	English Ivy
Helenium autumnale	autumn helenium
Helianthus divaricatus	woodland sunflower
Hesperis matronalis	dame's rocket
Hieracium kalmii	Canada hawkweed
Hypericum mutilum	dwarf st. john's wort
Hypericum prolificum	Shrubby St. John's-wort
Hypoxis hirsuta	yellow stargrass
Ilex opaca	American holly
Ilex verticillata	winterberry holly
Impatiens capensis	jewelweed
Iris pseudacorus	paleyellow iris
Iris versicolor	blueflag iris
Juglans nigra	black walnut

Juncus effusus	soft rush
Juncus tenuis	path rush
Juniperus virginiana	Eastern red cedar
Lapsana communis	nipplewort
Leersia virginica	white grass
Lespedeza repens	creeping bushclover
Leucanthemum vulgare	oxeye daisy
Ligustrum sinense	Oriental privet
Ligustrum vulgare	common privet
Linaria vulgaris	butter-and-eggs
Lindera benzoin	spicebush
Liquidambor styraciflua	sweetgum
Liriodendron tulipifera	tulip tree
Lobelia cardinalis	cardinal flower
Lobelia inflata	Indian tobacco
Lobelia siphilitica	blue lobelia
Lobelia siphiltica	great blue lobelia
Lonicera japonica	Japanese honeysuckle
Lonicera maackii	Amur honeysuckle
Lonicera tatarica	Tartarian honeysuckle
Lotus corniculatus	bird's foot trefoil
Ludwigia alternifolia	seedbox
Luzula bulbosa	woodrush
Luzula echinata	woodrush
Luzula multiflora	woodrush
Lycopus virginicus	Virginia bugleweed
Lysimachia ciliata	fringed loosestrife
Lysimachia nummularia	moneywort
Maianthemum racemosum	false solomon's seal
Malus coronaria	crabapple
Microstegium vimineum	Japanese stiltgrass
Mimulus alatus	winged monkey flower
Mitchella repens	partridge berry
Narcissus pseudonarcissus	daffodil
Nyssa sylvatica	sourgum
Onoclea sensibilis	sensitive fern
Ornithogalum umbellatum	star of bethlehem
Ostrya virginiana	hop hornbeam
Oxalis stricta	yellow sorrel
Packera aurea	golden ragwort
Panicum virgatum	switchgrass

Parthenocissus quinquefolia	Virginia creeper
Pedicularis canadensis	wood betony
Penstemon digitalis	foxglove beardtongue
Penthorum sedoidies	ditch stonecrop
Phegopteris connectilis	northern beech fern
Photinia villosa	Oriental photinia
Phytolacca americana	pokeweed
Pilea pumila	clearweed
Pinus strobus	White pine
Plantago lanceolata	English plantain
Podophyllum peltatum	mayapple
Polygonatum biflorum	Solomon's seal
Polygonum arifolium	halberdleaf tearthumb
Polygonum caespitosum	Oriental ladysthumb
Polygonum caespitosumvar. longisetum	Oriental lady's thumb
Polygonum pensylvanicum	Pennsylvania smartweed
Polygonum persicaria	lady's thumb
Polygonum sagittatum	tearthumb
Polygonum virginianum	jumpseed
Polystichum acrostichoides	Christmas fern
Potentilla indica	false strawberry
Potentilla norvegica	rough cinquefoil
Potentilla reptans	creeping cinquefoil
Potentilla simplex	common quinquefoil
Prenanthes alba	white lettuce
Prenanthes altissima	tall white lettuce
Prunus avium	sweet cherry
Prunus serotina	black cherry
Pycnanthemum tenuifolium	narrowleaf mountain mint
Pycnanthemum muticum	clustered mountain mint
Pyrus calleryana	Callery pear
Quercus alba	white oak
Quercus bicolor	swamp white oak
Quercus palustris	pin oak
Quercus robur	English oak
Quercus rubra	red oak
Quercus velutina	black oak
Ranunculus abortivus	small-flowered crowfoot
Ranunculus acris	common buttercup
Ranunculus ficaria	lesser celandine
Ranunculus recurvatus	recurved crowfoot

Rhododendron periclymenoides	pinxter azalea
Rhododendron viscosum	swamp azalea
Rhodotypos scandens	jetbead
Rhus glabra	smooth sumac
Robinia pseudoacacia	black locust
Rosa multiflora	multiflora rose
Rosa palustris	swamp rose
Rubus allegheniensis	Alleghany black berry
Rubus occidentalis	black raspberry
Rubus phoenicolasius	wineberry
Rudbeckia hirta	blackeyed susan
Rudbeckia laciniata	cutleaf coneflower
Sagittaria latifolia	broadleaf arrowhead
Sagittaria latifolia var. latifolia	arrowhead
Salix sp.	willow
Sambucus canadensis	elderberry
Sanguinaria canadensis	bloodroot
Sanicula odorata	black snakeroot
Sassafras albidum	sassafras
Saxifraga virginiensis	early saxafrage
Schoenoplectus purshianus	Pursh's bulrush
Scirpus atrovirens	black bulrush
Scirpus cyperinus	woolgrass
Scutellaria lateriflora	mad-dog skullcap
Securigera varia	crownvetch
Senna hebecarpa	wild senna
Setaria faberi	nodding foxtail
Sisyrinchium angustifolium	blue eyed grass
Smilacina racemosa	false solomon's seal
Smilax rotundifolia	greenbrier
Solanum dulcamara	bittersweet nightshade
Solidago altissima	tall goldenrod
Solidago caesia	blue-stemmed goldenrod
Solidago canadensis	Canada goldenrod
Solidago odora	sweetscented goldenrod
Solidago rugosa	rough leaved goldenrod
Solidago speciosa	showy goldenrod
Sonchus asper	spiny sowthistle
Spiraea tomentosa	steeplebush
Staphylea trifolia	bladdernut
Stellaria media	common chickweed

Symphyotrichum lateriflorum	Calico aster
Symphyotrichum undulatum	wavy-leaved aster
Symplocarpus foetidus	skunk cabbage
Syringa vulgaris	lilac
Taraxacum officinale	common dandelion
Thalictrum pubescens	tall meadow rue
Thalictrum thalictroides	rue anenome
Thelypteris noveboracensis	New York fern
Tilia americana var. heterophylla	white basswood
Toxicodendron radicans	poison ivy
Tridens flavus	purple top tridens
Trifolium pratense	red clover
Trifolium repens	white clover
Tsuga canadensis	Eastern hemlock
Ulmus americana	American elm
Ulmus pumila	Siberian elm
Ulmus rubra	slippery elm
Uvularia sessilifolia	sessile leaved bellwort
Verbascum blattaria	moth mullein
Verbascum thapsus	common mullein
Vernonia noveboracensis	New York ironweed
Veronica officinalis	common speedwell
Viburnum acerifolium	maple leaf viburnum
Viburnum dentatum	arrowwood viburnum
Viburnum dilatatum	linden viburnum
Viburnum prunifolium	blackhaw viburnum
Viburnum sieboldii	Siebold's viburnum
Viola sororia var. sororia	blue violet
Vitis riparia	riverbank grape
TOTAL RECORDED	**305 Species**

APPENDIX B: 2012 Mountain Lakes Preserve Plant Inventory

2012 Mountain Lakes Preserve Plant Inventory

*Planted

Native or non-invasive
Invasive

SCIENTIFIC NAME	COMMON NAME
Acalypha rhomboidea	Three-seeded mercury
Acer negundo	boxelder maple
Acer platanoides	Norway maple
Acer rubrum	red maple
Acer saccharinum	silver maple
Acer saccharum	sugar maple
Acorus calamus	sweetflag
Ageratina altissima	white snakeroot
Agrimonia parviflora	swamp agrimony
Ailanthus altissima	Ailanthus
Ajuga reptans	Carpetbugle
Alliaria petiolata	garlic mustard
Alnus serrulata	smooth alder
Amorpha fruticosa	desert false indigo
Anagallis arvensis	scarlet pimpernel
Andropogon gerardii	big bluestem
Arisaema triphyllum	jack in the pulpit
Artemisia vulgaris	mugwort
Arthraxon hispidus	jointed Arthraxon
Asclepias incarnata	swamp milkweed
Asclepias syriaca	common milkweed
Athyrium filix-femina	lady fern
Barbarea vulgare	wintercress
Berberis thunbergii	Japanese barberry
Betula populifolia	gray birch
Bidens connata	swamp beggartick
Bidens frondosa	devil's beggartick
Boehmeria cylindrica	false wood nettle
Calystegia sepium	hedge bindweed
Cardamine pratensis var. palustris	cuckoo flower
Carex lupulina	hop sedge*

Carex lurida	sallow sedge
Carex pensylvanica	pennsylvania sedge
Carex stricta	Tussock sedge
Carpinus caroliniana	musclewood
Carya cordiformus	bitternut hickory
Carya ovata	shagbark hickory
Carya tomentosa	mockernut hickory
Catalpa speciosa	Catalpa
Celastrus orbiculatus	Oriental bittersweet
Centaurea stoebe L. ssp. micranthos	spotted knapweed
Cephalanthus occidentalis	buttonbush
Cerastium vulgatum	mouse-ear chickweed
Cercis canadensis	redbud
Chamaecyparis thyoides	Atlantic white cedar
Chelone glabra	turlehead
Chenopodium album var. *album*	lamb's quarter
Chimaphila maculata	spotted wintergreen
Cinna arundinacea	sweet wood reed
Circaea lutetiana ssp. canadensis	enchanter's nightshade
Cirsium arvense	Canada thistle
Cirsium vulgare	bull thistle
Claytonia virginica	spring beauty
Clethra alnifolia	sweet pepperbush
Commelina communis	Asiatic dayflower
Conoclinium coelestinum	Mist flower*
Convallaria majalis	lily of the valley
Convolvulus arvensis	field bindweed
Conyza canadensis	horseweed
Cornus amomum	silky dogwood
Cornus florida	flowering dogwood
Cornus kousa	Kousa dogwood
Corylus americana	American hazelnut
Crataegus sp.	hawthorn
Cynoglossum virginianum var. virginianum	wild comfrey
Cyperus esculentus	nutsedge
Daucus carota	wild carrot
Desmodium canadense	tick trefoil
Dichanthelium clandestinum	deertongue
Dioscorea villosa	American yam
Dipsacus fullnom	Fuller's teasel
Duchesnea indica	false strawberry

Echinacea purpurea	purple coneflower*
Echinochloa crusgalli	barnyard grass
Elymus hystrix	bottlebrush grass
Epibolum coloratum	willowherb
Erigeron annuus	daisy fleabane
Erythronium americanum	trout lily
Euonymus alatus	winged euonymus
Euonymus fortunei	winter creeper
Eupatoriadelphus fistulosus	Joe pyeweed*
Eupatorium perfolatium	boneset
Eurybia divaricata	white wood aster
Fagus grandifolia	American beech
Fosythia viridissima	forsythia
Fragaria virginiana	wild strawberry
Fraxinus americana	White ash
Fraxinus nigra	black ash
Fraxinus pennsylvanica	green ash
Galinsoga quadriradiata	hairy galinsoga
Galium aparine	cleavers/bedstraw
Galium triflorum	sweet-scented bedstraw
Geranium maculatum	wood geranium
Glechoma hederacea	ground ivy
Hackelia virginiana	Virginia stickseed
Hamamelis virginiana	witch hazel
Hedera helix	English Ivy
Helianthus microcephalus	small woodland sunflower
Helianthus sp.	woodland sunflower
Hemerocallis fulva	daylily
Hesperis matronalis	dame's rocket
Humulus japonicus	Japanese hops
Hypericum mutilum	dwarf st. john's wort
Ilex opaca	American holly
Ilex verticilata	winterberry holly
Impatiens capensis	jewelweed
Iris pseudacorus	paleyellow iris
Iris versicolor	blueflag iris*
Juglans nigra	black walnut
Juncus effusus	soft rush
Juncus tenuis	path rush
Juniperus virginiana	Eastern red cedar
Laportea canadensis	woodnettle

Leucanthemum vulgare	oxeye daisy
Ligustrum sinense	Oriental privet
Ligustrum vulgare	common privet
Linaria vulgaris	butter-and-eggs
Lindera benzoin	spicebush
Liriodendron tulipifera	tulip tree
Lobelia cardinalis	cardinal flower*
Lobelia inflata	Indian tobacco
Lobelia siphiltica	great blue lobelia*
Lonicera japonica	Japanese honeysuckle
Lonicera maackii	Amur honeysuckle
Lonicera tartarica	Tartarian honeysuckle
Lotus corniculatus	bird's foot trefoil
Ludwigia alternifolia	seedbox
Lycopus americus	American bugleweed
Lycopus virginicus	Virginia bugleweed
Lysimachia ciliata	fringed loosestrife
Lythrum salicaria	purple loosestrife
Malus coronaria	crabapple
Mentha arvensis	field mint
Microstegium vimineum	Japanese stiltgrass
Mimulus alatus	winged monkey flower
Mitchella repens	partridge berry
Nyssa sylvatica	sourgum
Onoclea sensibilis	sensitive fern
Ornithogalum umbellatum	star of bethlehem
Oxalis stricta	yellow sorrel
Packera aurea	golden ragwort
Parthenocissus quinquefolia	Virginia creeper
Penstemon digitalis	foxglove beardtongue
Penthorum sedoidies	ditch stonecrop
Philadelphus indorus	mock orange
Photinia villosa	Oriental photinia
Phytolacca americana	pokeweed
Pilea pumila	clearweed
Podophyllum peltatum	mayapple
*Polyganum caespitosum*var. *longisetum*	Oriental lady's thumb
Polygonatum biflorum	Solomon's seal
Polygonum cuspidatum	Japanese knotweed
Polygonum pensylvanicum	Pennsylvania smartweed
Polygonum virginianum	jumpseed

Polystichum acrostichoides	Christmas fern
Potentilla simplex	common quinquefoil
Prenthes altissima	tall white lettuce
Prunus avium	sweet cherry
Prunus serotina	black cherry
Pycnanthemum tenuifolium	narrowleaf mountain mint
Pycnanthemum muticum	clustered mountain mint
Pyrus calleryana	Callery pear
Quercus alba	white oak
Quercus palustris	pin oak
Quercus robur	English oak
Quercus rubra	northern red Oak
Quercus velutina	black oak
Ranunculus ficaria	lesser celandine
Rhododendron periclymenoides	pinxter azalea
Rhododendron viscosum	swamp azalea
Rosa multiflora	multiflora rose
Rosa palustris	swamp rose
Rubus allegheniensis	Alleghany black berry
Rubus occidentalis	black raspberry
Rubus phoenicolasius	wineberry
Rudbeckia laciniata	cutleaf coneflower*
Rumex crispus	curly dock
Sagittaria lancifolia	bulltongue arrowhead
Sambucus racemosa	elderberry
Sanguinaria canadensis	bloodroot
Sanicula odorata	black snakeroot
Sassafras albidum	sassafras
Securigera varia	crownvetch
Senna hebecarpa	wild senna*
Sisyrinchium angustifolium	blue eyed grass
Smilacina stellata	false solomon's seal
Smilax sp.	smilax
Solidago canadensis	Canada goldenrod
Solidago patula	rough-leafed goldenrod
Solidago sp.	goldenrods
Sorghastrum nutans	Indian grass*
*Spirea tomentosa**	steeplebush
Staphylea trifolia	bladdernut
Symphoricarpos orbiculatus	coralberry
Symphyotrichum lateriflorum	Calico aster

Symplocarpus foetidus	skunk cabbage
Syringa vulgaris	lilac
Thalictrum pubescens	tall meadow rue
Thalictrum thalictroides	rue anenome
Thelypteris connectilis	narrowbeech fern
Thelypteris noveboracensis	New York fern
Toxicodendron radicans	poison ivy
Tridens flavus	purple top tridens
Trifolium campestre	yellow hop clover
Trifolium pratense	red clover
Tsuga canadensis	Eastern hemlock
Ulmus americana	American elm
Ulmus rubra	slippery elm
Urtica dioica ssp. *Gracillis*	tall nettle
Verbascum thapsus	common mullein
Vernonia noveboracensis	New York ironweed
Viburnum dentatum	arrowwood viburnum
Viburnum dilatatum	linden viburnum
Viburnum plicatum	doublefile viburnum
Viburnum prunifolium	blackhaw viburnum
Viburnum sieboldii	Siebold's viburnum
Viola sororia	blue violet
Vitis sp.	Vitis sp.
TOTAL RECORDED	**218 Species**

APPENDIX C: Earlier Plant Inventories of Mountain Lakes Preserve

Compiled & amended by Steve Hiltner, 2007

Native or non-invasive
Invasive

Scientific Name	Common Name	2007 Mountain Lakes/ Witherspoon Wood	1988 TNC Survey of MLP
Acer negundo	Box Elder	X	X
Acer platanoides	Norway maple	X	X
Acer rubrum	Red maple	X	X
Acer saccharinum	Silver Maple	X	X
Acer saccharum	sugar maple	X	X
Achillea millefolium	Common Yarrow	X	X
Acorus calamus	Sweetflag	X	X
Agropyron repens	Witch Wheatgrass	X	X
Alliaria petiolata	garlic mustard	X	X
Allium canadense	Wild Onion	X	X
Alnus serrulata	Smooth Alder	X	X
Amorpha fruticosa	False Indigo	X	X
Amphicarpa bracteata	Hog Peanut	X	
Anagallis arvensis	Scarlet Pimpernel	X	X
Anemone quinquefolia	Wood Anemone/Windflower	X	
Anthoxanthum odoratum	Sweet Vernalgrass	X	X
Apocynum cannabinum	Indian Hemp	X	X
Arisaema triphyllum	jack in the pulpit	X	
Aronia arbutifolia	red chokeberry	X	
Artemesia vulgaris	mugwort	X	
Arthraxon hispidus	Small Carpgrass	X	
Asclepias syriaca	Common Milkweed	X	X
Aster divaricatus	White Wood Aster	X	
Athyrium felix-femina	Lady Fern	X	X
Berberis thunbergii	Japanese Barberry	X	X
Betula populifolia	Gray Birch	X	X
Brassica sp.	mustard	X	X
Cardamine bulbosa	Spring Cress	X (April)	
Cardamine pratensis	Cuckoo Flower	X	
Carex conoidea	Field Sedge	X	X

Carex crinita	Fringed Sedge	X	X
Carex frankii	Frank's Sedge	X	X
Carex intumescens	Bladder Sedge	X	X
Carex lurida	Sallow Sedge	X	X
Carex pennsylvanica	Pennsylvania sedge	X	
Carex scoparia	Pointed Broom Sedge	X	X
Carex squarrosa	Squarrose Sedge	X	X
Carex stipata	Awl-fruited Sedge	X	X
Carex stricta	Tussock Sedge	X	
Carpinus caroliniana	American Hornbeam	X	X
Carya ovalis	Red Hickory	X	X
Carya ovata	Shagbark Hickory	X	X
Carya tomentosa	Mockernut Hickory	X	X
Catalpa bignonioides	Catalpa	X	X
Celastrus orbiculatus	Oriental bittersweet	X	X
Chelone glabra	turtlehead	X	
Chimaphila maculata	Spotted Wintergreen	X	X
Chrysanthemum leucanthemum	Ox-eye Daisy	X	X
Cimicifuga racemosa	Black Cohosh	X (early July)	
Cirsium arvense	Canada Thistle	X	X
Cirsium vulgare	Bull Thistle	X	X
Claytonia virginica	Spring Beauty	X	
Commelina sp.	Dayflower	X	X
Cornus drummondii	Roughleaf Dogwood	X	X
Cornus florida	Flowering Dogwood	X	X
Coronilla varia	Crown Vetch	?	
Dentaria laciniata	Cut-leaved Toothwort	X	
Dichanthelium clandestinum	deertongue grass		(Panicum clandestinum)
Elymus hystrix	Bottlebrush Grass	X (early July)	
Elymus virginicus	Wild Rye	X	
Erythronium americanum	Trout Lily	X	
Euonymus alata	winged euonymus		X
F. virginiana	Wild Strawberry	planted	
Fagus grandifolia	beech		X

Festuca rubra	Red Fescue		X
Fragaria vesca	Woodland Strawberry		X
Fraxinus americana	White Ash		X
Fraxinus pennsylvanica	Green Ash		X
Geranium maculatum	Wild Geranium	X (May)	
Hamamelis virginiana	Witch Hazel	X	
Helenium nudiflorum	Purple-Headed Sneezeweed	planted	
Hesperis matronalis	Dame's Rocket	X (May)	
Hieracium sp	Hawkweed	X (May)	
Hypoxis hirsute	Stargrass	X (May)	
Impatiens capensis	jewelweed		X
Impatiens palida	Pale Jewelweed	X	
Iris pseudacorus	Yellow Flag Iris	X	
Iris versicolor	Blue Flag Iris	X (probably planted)	
Juglans nigra	Black Walnut		X
Juncas effusus	Soft Rush		X
Juncas tenuis	Path Rush		X
Juniperus virginiana	Eastern Redcedar		X
Lepidium virginicum	Wild Pepperweed		X
Ligustrum sinense	Chinese privet	X	
Ligustrum vulgare	Common (European) Privet		X
Lindera benzoin	spicebush		X
Liriodendron tulipifera	Tuliptree		X
Lonicera japonica	Japanese Honeysuckle	X	
Lonicera sp.	additional shrub species?	X	
Lonicera sp.	Bush Honeysuckle		X
Lotus corniculatus	Birdsfoot Trefoil	Alien	
Lysimachia ciliata	Fringed Loosestrife		X
Lysimachia nummularia	Moneywort		X
Maclura pomifera	Osage-orange		X
Malus coronaria	Wild Crabapple		X
Malus pumila	Apple		X
Microstegium vimineum	Japanese stiltgrass	X	

Onoclea sensibilis	Sensitive Fern		X
Ostrya virginiana	Hop Hornbeam		X
Oxalis sp.	Wood Sorrel		X
P. sagittatum	Arrow-leaved Tear Thumb		X
P. virginianum	Virginia Knotweed		X
Panicum virgatum	Switch Grass		X
Paronychia canadensis	Slender Forked Chickweed		X
Parthenocissus quinquefolia	Virginia Creeper	X	X
Penstemon digitalis	Foxglove Beardtongue	X	
Phleum pratense	Timothy		X
Phytolacca americana	Pokeweed		X
Pilea pumila	Clearweed		X
Pinus strobus	White Pine		X
Pinus sylvestris	Scotch Pine		X
Plantago lanceolata	English Plantain		X
Plantago major	Common Plantain		X
Platanus occidentalis	sycamore		X
Podophyllum peltatum	Mayapple	X	
Polygonum caespitosum	Long-bristled Smartweed		X
Polygonum sp.	smartweed		X
Polystichum acrostichoides	Christmas Fern	X	
Prenanthus alba	White Lettuce	?	
Prunus serotina	Black Cherry	X	
Pycnanthemum tenuifolium	Narrow-leaved Mountain Mint	X W.Woods 7/26	
Q. palustris	Pin Oak		X
Q. rubra	Red Oak		X
Q. velutina	Black Oak		X
Quercus alba	White Oak		X
Quercus macrocarpa	Bur Oak	X	
Ranunculus ficaria	lesser celandine	X	
Rhus glabra	Smooth Sumac		X
Robinia pseudoacacia	Black Locust	X	

Rosa multiflora	multiflora rose		X
Rubus allegheniensis	Common Blackberry		X
Rubus occidentalis	Black Raspberry		X
Rubus phoenicolasius	Wineberry	(bear in mid-July)	X
Rudbeckia laciniata	Cutleaf Coneflower	planted	
Rumex crispus	Curled Dock		X
Sagittaria latifolia	Broad-leaved Arrowhead		X
Salix nigra	Black Willow		X
Sassafras albidum	Sassafras		X
Scirpus atrovierens	Dark-green Bulrush		X
Scirpus cyperinus	Wool Grass		X
Sisyrinchium angustifolium	Northern Blue-eyed Grass		X
Smilacina stellata	Starry False Solomon's Seal	?	
Smilax sp.	Catbriar		X
Solanum carolinense	Horse Nettle		X
Symplocarpus foetidus	Skunk-Cabbage		X
T. palustris	Marsh Fern		X
T. repens	White Clover		X
Thalictrum polygamum	Tall Meadow Rue	X (early July)	
Thelypteris noveboracensis	New York Fern		X
Tilia americana	Basswood		X
Toxicodendron radicans	Poison Ivy		X
Trifolium agrarium	Yellow Clover		X
Tsuga canadensis	Eastern Hemlock		X
Ulmus americana	American elm		X
Ulmus rubra	Slippery Elm		X
V. prunifolium	Blackhaw		X
V. thapsus	Common Mullein		X
Verbascum blattaria	Moth Mullein		X
Verbena urticifolia	White Vervain	?	
Vernonia noveboracensis	New York Ironweed	planted	
Viburnum dentatum	Southern Arrowwood		X
Viburnum sp.	unidentified at M.L.	X	

Viola spp.	violets		X
Vitis spp.	grapes		X
TOTAL RECORDED		**92 species**	**115 species**