MANAGEMENT PLAN FOR MERLINS CAVE PRESERVE

INTRODUCTION

The Northeastern Cave Conservancy, Inc. (NCC) owns and manages the Merlins Cave Preserve in the Town of Canaan, Columbia County, New York. The preserve consists of 35.69 acres, containing Merlins Cave, Dragon Bones Cave, Dome 12 Cave, and numerous sinks. The preserve also includes a 15-foot wide walking right-of-way across the adjacent Belknap/Burke-Hennessy property and a parking area off Tunnel Hill Road. The right-of-way starts from the parking lot and travels roughly north up the hill, before turning northeast to meet the preserve boundary at the Dragon Bones Cave entrance, a distance of 3,200 feet. The preserve has been placed under a conservation easement, which is held by the Columbia Land Conservancy.

PURPOSE OF A MANAGEMENT PLAN

A management plan is not only a good idea but one must be approved by the NCC Board early in the acquisition process for any new cave property. The purpose of a management plan is to describe what is on a property and how it should be managed. It is an operating manual for the preserve. A plan is not a static document that once written is placed on the shelf and forgotten. It is a document that is to be used and referenced on a regular basis. The property manager must follow the plan unless there is a compelling and overriding reason for doing otherwise. Unless there is an immediate need, nothing should be done at a property that is not in the plan. If something new is desired, the plan should be amended only after careful, complete, and thorough analysis of the proposed changes or additions. Then, the amendments must be approved by the NCC board. The NCC requires all of its preserve managers to conduct a thorough review of their preserve management plan every two years and submit a report with their recommendations to the Board. The NCC board will reaffirm the existing management plan or make necessary modifications to ensure the protection of the property and an enjoyable experience for cavers and for the general public. The NCC Secretary issues reminders and puts plan reviews on meeting agendas.

HISTORY OF THE PROPERTY

This wooded hillside has been in the Belknap family since 1971, and has been used for farming and forestry since the late 1700s. A circular trench marks the site of a possible charcoal circle near the entrance to Dragon Bones Cave, and other charcoal circles may exist on the property. Geologist Nicholas M. Ratcliffe plotted a major Taconic thrust fault crossing the property for his 1978 US Geological Survey publication (Interior Geologic Survey, Reston, VA. 1978). The caves are related to this fault.

The human history of the caves on the Merlins Cave Preserve is brief. Animal traps from the 19th century were noted in both caves during exploration, likely washed in by the streams or dragged in by animals, indicating the entrances may have been historically used for trapping. Mike Eaton entered the then-tiny Merlins Cave entrance in 2004 or 2005 and did limited rock removal. A group consisting of Larry Botto, Bob Dion, John Dunham, Clint Matter and Mike Telladira returned to this entrance in September 2006, began digging, and broke through into the entrance maze on 15 October. Continued efforts inside led to the breakthrough at the Beartrap on 19 February 2007. Another breakthrough occurred on 18 March when the Big Room was discovered. After the June 3 2007 survey and photography trip, exploration ceased for several years. Winter bat counts were conducted from 2008 through 2014, often with a New York Department of Environmental Conservation official. A full cartographic survey of Merlins Cave was completed in 2012 and a map was drafted by John Dunham. This map was revised in 2020 to include Dragon Bones Cave and Dome 12, as well as several surface features.

UNDERGROUND RESOURCES

Biological - No troglobites have been observed in either cave. However, known Northeast troglobitic species include: the Taconic cave amphipod (*Stygobromus borealis*) found in springs in western Massachusetts; the Piedmont groundwater amphipod, *Stygobromus tenuis tenuis,* (may be present too far east to be found in these caves.) An in-cave evaluation should be completed for these species. Other species likely to be present would be the cave cricket, *Ceuthophilus maculatus*, the cave moth, *Scoliopteryxlibatrix*, harvestmen, *Leiobunum*sp., and snails, *Mesomphix*spp.

Hundreds of bats have been noted in Merlins Cave, specifically the little brown bat (*Myotis lucifugus*), and the tricolored bat (*Perimyotis subflavus*). Counts are done periodically by NYS Department of Environmental Conservation officials and volunteers.

Geological & Hydrological - The caves on the preserve are formed in the Stockbridge Marble. Numerous dolomitic boudins, gash veins, and insoluble remnants along the fault zone produce interesting passage geometries and photogenic areas.

Merlins Cave is currently surveyed to 2008.4 feet in length and 142 feet of depth. The entrance is a tight stream insurgence near the fault contact between overlying schists and phyllites and the underlying soluble Stockbridge Marble. Several hundred feet of low horizontal maze passage are separated from the main canyon section of the cave by the Beartrap, a tight crawlway. High canyons, large rooms, domes, waterfalls and plunge pools extend beyond the Beartrap. A bolted traverse currently connects the High Room to the canyon passage. The Big Room area, beyond the High Room, contains roughly 1300 feet of parallel passages and rooms of significant size, including excellent formations, and breakdown mazes.

Dragon Bones Cave is currently surveyed to 100 feet in length and 28 in depth. The entrance is a vertical slot beside a marble outcropping. It opens into a low, wide room sloping down some 20 feet to a crawlway leading to a second room with many formations. There is significant airflow in this cave from an unknown source.

Dome 12 is currently surveyed to 211 feet in length and 65 in depth. The cave is accessed through a culvert that was placed in the Dome 12 sinkhole to protect the entrance from filling in. The culvert ends at a small crawl that goes to a 14 drop with a small stream. Down this drop there is continuing walking passage, that goes to a crawl that ends in fill. The passage also continues under the wall where they stream sinks into the current dig.

Paleontological - No significant or unique resources are known to exist.

Archeological – No significant or unique resources are known to exist.

Historical - No significant or unique resources are known to exist.

SURFACE RESOURCES

Biological - The area was logged around 1970. The predominant tree species are black and red oak (Q*uercus* sp.) and sugar maple (*Acer saccharinum*). In addition, there is a significant amount of large-toothed poplar (*Populus grandidentata*). Trees in lesser numbers include, but are not limited to hemlock (*Tsuga canadensis*), beech *(Fagus grandifolia*), hop hornbeam (*Ostraya virginiana*), shagbark hickory (*Hicorialaciniosa*), striped maple (*Acer pennsylvanicum*), eastern white pine (*Pinus stobus*) and cherry (*Prunus* sp.). It is currently recommended that the property not be logged at any point in the future due to the steepness of the terrain and the fragility of the karst (see the appendix for details). If logging is warranted in the future, some trees could be girdled to create wildlife habitat, specifically creating roost trees for bats.

There is a significant mid-story of witch hazel (*Hamamelis virginiana*) on much of the property.

There is a limited ground cover. Ferns include maiden-hair fern (*Adiantum pedatum*), interrupted fern (*Osmundaclaytoniana*), Christmas fern (*Polystichumacrostichoides*), and walking fern (*Asplenium rhizophyllum*). In order to preserve these species, new walking trails will be planned with conservation in mind, and ideally with help of the botanists from the Hawthorne Valley Farmscape Program.

Geological & Hydrological - Some bedrock is exposed at the surface on the top and on the down slope edge of the bench containing the caves. Some bedrock is also visible where exposed by stream erosion. Besides the three caves, there are at least ten large sinkholes on the property. Undoubtedly, all of these transmit water into the marble and may connect with Merlins Cave. As is typical in karst terrain, the few surface streams are short and quickly sink underground.

Paleontological - No significant or unique resources are known to exist.

Archeological - No significant or unique resources are known to exist.

Historical - No significant or unique resources are known to exist. A circular trench 40 feet in diameter near Dragon Bones Cave, and another near the western property boundary, may mark the site of a former charcoal circle. Charcoal circles were used during the 1800s to produce charcoal for the smelting of bog iron. Hardwoods, usually oak, would be cut, piled onto a massive fire, and covered in leaves and dirt. This pile would smolder for several days, after which the charcoal could be removed and transported to kilns. Other former charcoal circles may be present on the property.

ASSUMPTION OF RISK STATEMENT

Cave exploration and hiking on karst terrain may involve risk or injury, even death from various hazards, both obvious and obscure, including, but not limited to, slippery and uneven ground, open pits, injury by acts of other people, falling, being struck by falling objects, becoming lost, the presence or sudden appearance of water, and hypothermia. All cave visitors will abide by the normally accepted rules of safe and conservation minded caving as outlined by the National Speleological Society, 6001 Pulaski Pike, Huntsville, Alabama 35810-1122.

ACCESS POLICY

Surface

The Merlins Preserve is currently open to visitors who wish to explore the surface year-round. Visitors should stay on trails marked with the official NCC trail markers. The trail from the parking area to the caves will be maintained such that emergency ATV use will be possible. Other walking trails should be single track (roughly three feet wide), marked with official NCC trail markers, and will be maintained as the preserve manager sees fit. Ideally, before new trails are cleared, a botanist from the Hawthorne Valley Farmscape Program should be consulted so that fragile plants are not disturbed. If necessary, small foot bridges may be added so that pedestrians can cross streams and muddy areas, thus reducing erosion.

The Merlins Preserve is currently closed to motorized vehicles (except in case of emergency) and camping. Fires are only allowed with Preserve Manager permission.

Underground

Merlins Cave currently exists in nearly pristine condition. Therefore, the cave is only open to small, led trips from May 1 to September 30. All trips will require qualified Cave Stewards who are thoroughly familiar with the cave. Cave Stewards must demonstrate to the Preserve Manager that they are qualified to accompany others through the cave without damaging the cave environment. Cave Steward training will be offered when there is interest, and the Preserve Manager will maintain a list of qualified Cave Stewards. Cave Stewards must receive permission from the Preserve Manager before any trips into Merlins Cave.

Dragon Bones Cave is open to general caving from May 1 to September 30.

Dome 12 is currently only open for visitation with permission from the Preserve Manager.

For all caves, standard caving gear will be required. This includes a helmet with chinstrap; three (3) sources of light, one of which is mounted to the helmet; and at least three (3) people in the party. In addition, cavers visiting Merlins Cave are required to use a seat harness and cows tail to clip into the traverse line leading up to the High Room.

USE CONFLICTS

Currently the only use conflict is with the US Fish and Wildlife Service's listing under the Endangered Species Act of the Northern Long-eared bat, *Myotis septentrionalis*, as threatened. This creates a conflict between bat hibernation and cave visitation from October 1 through April 30. Federal and state law require that Merlins Cave be closed during this period. Should a conflict arise between recreational caving and digging, the recreational caving shall take precedence.

RESEARCH RULES

All research carried out on the NCC preserve must meet the following criteria:

1) Researchers must initially contact the NCC science coordinator.
2) The goals and objectives of the research must be clearly defined.
3) There must be a clear beginning and end to each project, with the exception of long-term monitoring studies.
4) The work must not cause permanent damage to any caves, natural features, native biota, or historical resources nor interfere with natural hydrologic or chemical processes.
5) The research plan must assure the maximum safety of all concerned.
6) The work must not interfere with the "experience" of other property visitors.
7) Unless specifically authorized by the NCC Board, researchers must operate within the confines of the established management plans for each property.

EXPLORATION RULES

The main possibilities for exploration on the Merlins Cave Preserve are cave digging. Any digging projects must be approved by the preserve manager. Persons proposing a dig project shall submit a plan to the manager detailing where they plan to dig, how long they plan to dig, and where they plan to dispose of the spoils. Plans should also include how the diggers plan to remediate the dig should it be abandoned. Projects that include potential passage modification require specific approval from the preserve manager. Any dig that is not worked on for more than one (1) year, excluding cave closures for bat hibernation, shall be considered abandoned and any subsequent work in the same area will require manager approval.

PUBLICITY POLICY

The caves are not to be publicized in books, magazines, or newspapers of general circulation. Cavers' publications like *The Northeastern Caver* and the *NSS News* may contain information on the latest discoveries. Some grotto publications may also include information, but again these have limited circulation and usually do not give precise locations.

SURFACE MANAGEMENT

A trail is marked from the parking area past the Dragon Bones Cave entrance to the Merlins Cave entrance. In 2015 a loop hiking trail was created, and the property is open for the public to visit. A kiosk/changing area exists near the parking lot off of Tunnel Hill Road.

The property has been posted in accordance with the NYS Penal Law and the NYS Environmental Conservation Law. This will provide the NCC with the ability to better control access to the property. Without this, individuals could hunt, trap, or ride motorized vehicles on the property without permission.

RESCUE CONSIDERATIONS

Merlins Cave - A rescue from beyond the Beartrap could present serious potential problems. There are low, wet crawls, some drops, loose rocks, and some tight passages. There are no significant vertical pitches, however there are places with significant vertical exposure. A rescue would likely occur due to a fall at one of the drops, or entrapment at one of the constrictions. A SKED stretcher would be needed along with a way to keep the patient dry and warm. Dome Two should be located on the surface; this would allow a second entrance to be dug in an emergency to bypass the tight main entrance section. Dome Two already allows porcupines and snow into the cave and potentially could be easily opened.

Dragon Bone Cave - At this time no serious rescue problems are likely with Dragon Bones Cave.

Dome 12- A rescue from Dome 12 could also present serious potential problems, and would likely occur due to a fall at the drop. A SKED stretcher would be needed to remove the patient from the cave.

FUTURE PLANS & RECOMMENDATIONS

1. Interpretive signs highlighting the charcoal circles and karst features should be added to the loop trail.

2. It may be desirable to gate Merlins Cave in the future. Possible locations include the entrance crawl and the Beartrap.

3. If surveys indicate that any of the caves extends beyond NCC property, "NO Trespassing" signs must be placed in the cave at such points.

4. Dome Two should be precisely located on the surface to help facilitate a rescue in the event of an emergency.

5. Additional signage will be added to the parking area to inform visitors who wish to visit the property.

6. A surface specific brochure will be printed as an additional resource to preserve visitors.

APPENDIX

The *Merlins Forest Management Plan* is an Appendix to this management plan.

Merlin's Karst Preserve
Forest Management Plan
Canaan, NY

Prepared by John Dunham and Morgan Ingalls
Antioch University New England
Fall of 2012

Landowner and preparer information

Landowner Information:
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Prepared Oct-Dec, 2012
42 acre Merlin's Karst Preserve in Canaan, NY.

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Introduction – Property Description

The Merlin's Karst Preserve is a 42-acre parcel in Canaan, NY, owned by the Northeastern Cave Conservancy (NCC). It was purchased in 2011 as part of an effort to conserve Merlin's Cave, which is one of the largest marble caves in the region. The preserve consists of a 36-acre main parcel, a parking area off of Tunnel Hill Road, and a 3500ft easement trail connecting the two (Map 1, pg. 45). The main parcel is located on the western slope of Vanderburgh Hill and slopes steeply downhill to the west. The forest is primarily northern hardwoods with some conifers also present. The preserve is currently being managed for conservation and recreation, with rare plant and wildlife habitat as secondary goals. This report provides forest management suggestion to help in the long-term achievement of these goals.

Goals and Objectives

The NCC's primary mission is to conserve caves and karst lands for habitat and recreational purposes. The Merlin's preserve is unique among the NCC's holdings because it is a relatively large parcel with other resources present. As such, the following goals and objectives have been set by the NCC Board of Directors and the Preserve Manager:

Conservation Goals:

1. Ensure the conservation and protection of caves and karst resources on the parcel. These include Merlin's Cave, Dragon Bones Cave, and numerous sinkholes and exposed marble ledges.
2. Ensure the conservation and protection of calcium-rich talus slopes where they occur on the parcel.

3. Ensure the conservation and protection of Walking Fern, a rare understory species that occupies several of the exposed ledges on the parcel.

Recreation Goals:

4. Ensure access to the property for caving, hiking, snowshoeing, bird watching, and other forms of passive recreation.
5. Construct limited low-impact trails for non-motorized recreational use.
6. Ensure the preservation of historic resources on the parcel, especially stone walls, field stone piles, and charcoal circles.

Wildlife Habitat Goals:

7. Preserve and improve habitat for cave-dwelling species, especially Little Brown Bats, Eastern Tri-colored Bats, Big Brown Bats, Indiana Bats, Small-Footed Bats, Northern Long-Eared Bats, Spotted Salamanders, and porcupines.
8. Preserve and improve habitat for non-cave species such as Red Bats, Hoary Bats, Silver-haired Bats, Deer, Bears, Fishers, Foxes, and birds such as the Pine Warbler, Black-throated Blue Warbler, and Eastern Towhee, (where this does not conflict with the preceding goal).
9. Create old growth characteristics where possible.

Methods

The property was sampled using the Variable Radius Plot Sampling method with a grid size of 208' established by pacing. Transects were run at an azimuth of 208°/ 028° from a randomly chosen point. 39 points were sampled (Map 2, pg. 46). Each point was assessed using an 80 Basal Area Factor (BAF) angle gauge, a 20 BAF angle gauge, a regeneration stick, and a tape measure for coarse woody debris.

For this sampling trees were defined as greater than 10" dbh (diameter at breast height) 4.5' above the base on the uphill side of the tree, with at least one 16 foot saw log to >8" top. Woody plants with a dbh greater than 4" and less than 10" were considered either acceptable growing stock (AGS) or Unacceptable Growing Stock (UGS). Poles were defined as woody plants with a dbh between 1" and 4". Saplings were defined as woody plants with a dbh of less than 1" and a height of more than 4.5'. Finally, seedlings were defined as woody plants with a dbh of less than 1" and a height of less than 4.5'.

Trees that were "in" using 80 BAF angle gauge were identified, their dbh was measured, and their product type was determined. Trees in this category could be qualified as "Saw timber," "AGS," "UGS," or "Cavity." If trees fell into the category "Saw timber," the number of saw logs in the tree was measured. Dbh was measured using a Biltmore Stick measured to the nearest inch, and 16-foot saw logs were measured using a Biltmore Stick at a distance of 66 feet to the nearest half log. Trees that were "in" using the 20 BAF angle gauge were tallied, identified, and their product type was assessed. The product types using the 20 BAF were the same as for the 80 BAF. The regeneration was measured by determining the species and counting all of the poles, saplings, and seedlings within a one-milliacre plot.

Finally, coarse woody debris was measured using the Fixed Area method. All coarse woody debris within a 33-foot radius plot with a dbh larger than 6" was measured in length and width at each end (down to 6"). The species of the coarse woody debris was identified where possible, and its decay class was determined using a scale of 1 to 5, where 1 was the least decayed and 5 was the most decayed. The dbh of the coarse woody debris was measured using a Biltmore Stick, and the length was measured using a 100-foot measuring tape.

Data was analyzed using Microsoft Excel and Fox DS Cruiser Version 2b. Mapping was done with AcrGIS 10.0.

Landscape Analysis

The Merlin's Preserve is a portion of an unfragmented forest block covering more than six square miles. The entire block is on the western and northwestern slopes of Vanderburgh Hill and ranges from 1000ft – 1300ft in elevation. Some portions of this block are reclaimed fields, while others were never cleared and only used for timber. The major forest type is northern hardwood, with smaller isolated stands of eastern hemlock. Outside of the preserve parcel, the largest block of hemlock is located in a stream valley two miles to the north.

The entire block is located on the contact between the Stockbridge Formation, consisting of marbles, and the Wallomsac formation, consisting mainly of phyllites and schists. The contact runs north to south along the hillside and is also marked by three Taconic thrust faults. As a result, the area contains calcium-rich talus slopes comprised of

marble and schist, a rare substrate for the area, and an abundance of outcrops and microhabitats.

Parcel Analysis

Forest Types

The preserve is mainly stands of mixed hardwoods with some conifers along its eastern edge. Aside from the edge of an old field along the northeast interior corner of the property, the preserve is intact forest that has been logged but never cleared (Map 3, pg. 47). The northern hardwood portion of the preserve has numerous American chestnut snags (Figure 1.1) and white oak stumps (Figure 1.2), suggesting the dominant forest type was once chestnut/oak. After the harvesting of the white oak and the arrival of the chestnut blight, the understory and secondary species became dominant, leading to four distinct stands; a red oak dominant stand, an eastern hemlock dominant stand, a stand with sugar and red maples co-dominant, and a stand of mixed wet-sited species.

Figure 1.1. Course Woody Debris from a chestnut.

Figure 1.2. A white oak stump.

Soil Types

There are three soil types on the property (Map 4, pg. 48). The primary type, occupying the vast majority of the acreage, is the Taconic-Macomber Association. This in an excessively well-drained shallow rocky soil derived from schists and shales and occurring

primarily on steep slopes and hilly terrain. This soil is prone to erosion and rutting, a serious concern during management activities. Upland trees such red oak, white pine, and eastern hemlock do well in this soil.

The second soil type, occupying only the southeast edge of the parcel, is the Macomber-Taconic Association, a similarly well-drained shallow but somewhat less rocky soil also derived from schists and shales and occurring primarily on shoulders and ridgetops. This soil is less prone to erosion. Red oak, white pine, and eastern hemlock do well in this soil.

The third soil type, occupying only the northwest corner of the preserve, is the Stockbridge-Farmington silt-loam. This is a well-drained, shallow rocky soil derived from till and calcium carbonates and occurring on benches, ridges, and till slopes in hilly terrain. It is not prone to serious erosion. Red oak, red maple, white pine, and aspen do well in this soil (see Appendix A for complete soil descriptions).

Ecological Resources

The Wallomsac/Stockbridge contact and associated Taconic thrust faults run roughly through the center of the parcel along a north/south axis. As a result, the southwestern and southeastern edges of the parcel contain numerous exposed ledges and calcium-enriched talus slopes (Figure 2.1). These provide abundant microhabitats utilized by flora and fauna alike. The unfragmented land block in which the parcel is located is also a critical resource for the area, and as such the parcel is part of a much larger habitat area.

Figure 2.1. Calcium-enriched talus slopes.

Rare Plants

The outcrops and ledges on the preserve harbor several examples of Walking Fern, a rare plant for the area (Figure 3.1). There are also two examples of American Ginseng on the property.

Figure 3.1. Walking Fern on a marble outcrop.

Wetlands and Sensitive Areas

There are numerous sensitive wetlands on the parcel. The southeastern edge of the parcel follows a line of vernal pools. The wet-sited forest stand is located along a series of seeps, marshy areas, and intermittent streams that drain off the Wallomsac schist onto the Stockbridge marble (Figure 4.1). When these streams intersect the marble, small gullies have formed leading to sinkholes or cave entrances. Along the thrust fault and over the cave, numerous sinkholes exist, most of which serve to drain runoff during heavy rains. There are no streams or wetlands on the lower and western portion of the parcel. All of the drainages are captured by the marble before reaching this point.

Figure 4.1. Stream flowing into a sinkhole.

Existing Wildlife Habitat

Merlin's Cave is a known to have been a large bat hibernaculum prior to the arrival of White Nose Syndrome in 2007. It should be treated as a major bat habitat regardless of actual current population. Dragon Bones Cave, at the south end of the preserve, is likely a hibernaculum as well, though bats have only rarely been observed there.

The vernal pools along the preserve's southeastern edge provide habitat for the spotted salamander, which is also found at certain times inside the caves (Figure 5.1). The upland forest surrounding the vernal pools is also critical habitat—the spotted salamander is known to travel significant distances from vernal pools during the majority of the year (Calhoun & DeMaynadier, 2008).

The hemlock-dominated stand also along the southeastern edge of the preserve provides local shelter for wintering deer, with the largest alternative deeryard two miles to the north in a large gully.

Maple-leaf viburnum is a common soft-mast understory plant through the remaining three stands, as well as grape vines and blackberry. The oak-dominant stand provides hard mast as well. These are valuable food sources for deer and bear.

The parcel contains numerous snags and cavity trees, providing a variety of habitat needs for mammals, birds, and insects. Bats in particular like to roost in the holes left by pilieated woodpeckers (Bryan, 2007). Several of these cavity trees are still alive, making them long-lasting sources of shelter. The upper slopes of the parcel contain abundant downed woody debris, which is used by 30% of mammals, 50% of reptiles, and 45% of amphibians for various portions of their lifecycles (DeGraaf, 2005).

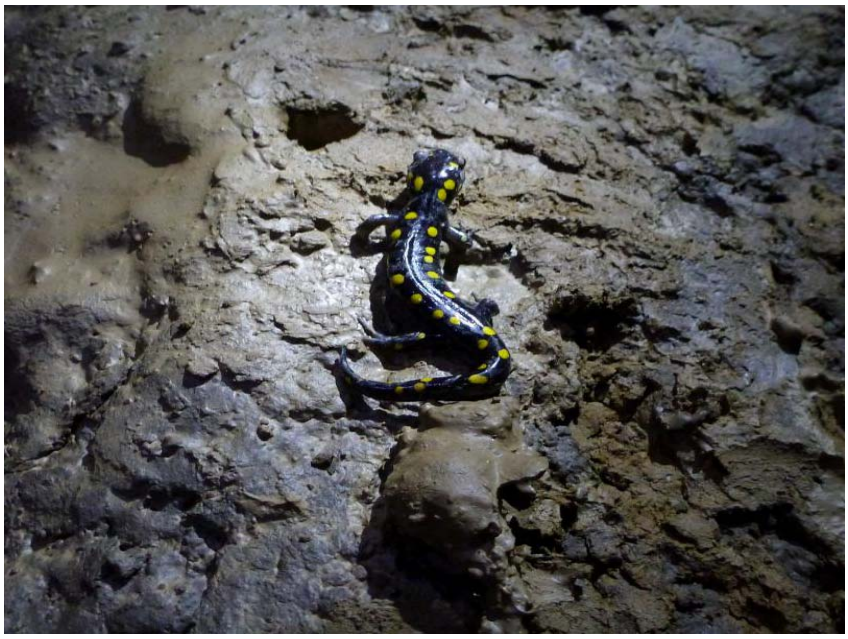


Figure 5.1. Spotted Salamander in Merlin's cave.

Recreation

Merlin's Cave is a major recreational resource for caving groups coming from as far away as Boston and New Jersey. It is the third-longest marble cave in the Northeastern United States, and morphologically one of the most interesting. Banded orange and blue marble also makes it one of the most spectacular for visitors (Figure 6.1).

A trail has already been constructed over the ¾ of a mile from the parking kiosk to the main cave entrance. The NCC would like to see this trail extended along the lower edge of the sinkholes to the stone wall at the north end of the property before looping back to the beginning of the preserve.

Figure 6.1. Banded orange and blue marble in Merlin's Cave.

Historical Resources

The parcel has a history of charcoal production during the 1700s and 1800s, with landscape analysis revealing an end date of around 1900. In addition to the numerous white oak stumps, American chestnut snags, and coppiced red and white oaks, there is a nearly intact charcoal circle (Figure 7.1) located near the parcel's southern border, evidence of production until relatively recently (as compared to other ironworks).

The north end of the parcel is bordered by a stone wall of large and small rocks, suggesting former crop or hayfields once occupied the adjacent parcel (Figure 7.2). The northeastern edge of the preserve has a plow terrace and field stone piles that mark the lower edge of a former crop field (Figure 7.3). Weevil-hit white pines (Figure 7.4) mark the abandonment of this field between 1920 and 1940.

Figure 7.1. A nearly intact charcoal circle.

Figure 7.2. Stone wall marking the north end of the property.

Figure 7.3. Stone pile from a former crop field.

Figure 7.4. Weevil-hit white pine.

Invasive Species

The majority of the parcel is free of invasive species, but some nearby areas have been taken over by Japanese barberry and garlic mustard. Claudia Vispo and Tom Phillips, botanists from the Hawthorn Valley Farmscape Ecology Program, observed some garlic mustard near the parking area and recommended that no significant clearing be done on the preserve to prevent its becoming established. There is an existing plan to pull the garlic mustard in the spring of 2013.

Stand Descriptions

Hemlock

The Hemlock stand contains at least two age classes and covers 3 acres on southeastern edge of the parcel (Figure 8.1). It is dominated by eastern hemlock, which occupies 41% of basal area, with red oak (32%) and white ash (25%) as secondary components (Figure 8.2). This stand occupies flatter, marshy areas along the parcel edge and the upper portion of the west-adjacent steep hillside. The dominant trees are almost all hemlock, with the red oak and white ash primarily composing a suppressed mid-story. Hemlocks are also present in the mid-story. The understory is mostly scattered small hemlock, consistent with the heavy shade. Coarse woody debris is abundant, at an average of 400 ft^3 per acre (Figure 8.3).

Figure 8.1. Uneven aged hemlock stand at the southeastern edge of the property.

The soil type in the Hemlock stand is primarily the Macomber-Taconic Association, with the Taconic-Macomber Association along the stand's western edge. This first is well

drained and the topography is flat enough to allow management activities without significant risk of erosion. The second is also well drained, but carries a high risk of erosion and is located on steep slopes. The underlying substrate is Wallomsac schist. The eastern edge of this stand contains numerous vernal pools, the only surface water evident in the stand. There are several large white ash cavity trees in this stand.

The land-use history of the Hemlock stand is unclear. It does not appear to have been harvested for timber in recent history, although it may have been cleared for pasture at some point in the past. There is an old woods road passing through the stand at its northern end, presumably used to access the Wet-sited stand just to the west, and the far northern corner of the stand is marked by a stone wall.

This stand contains 4,698 board feet of merchantable timber per acre is considered under stocked according to Fox DS Cruiser (Figure 8.4). The relative density of the stand is 37 trees per acre, consisting entirely of Hemlock. Regeneration in this stand would yield mostly red oak (Figure 8.5).

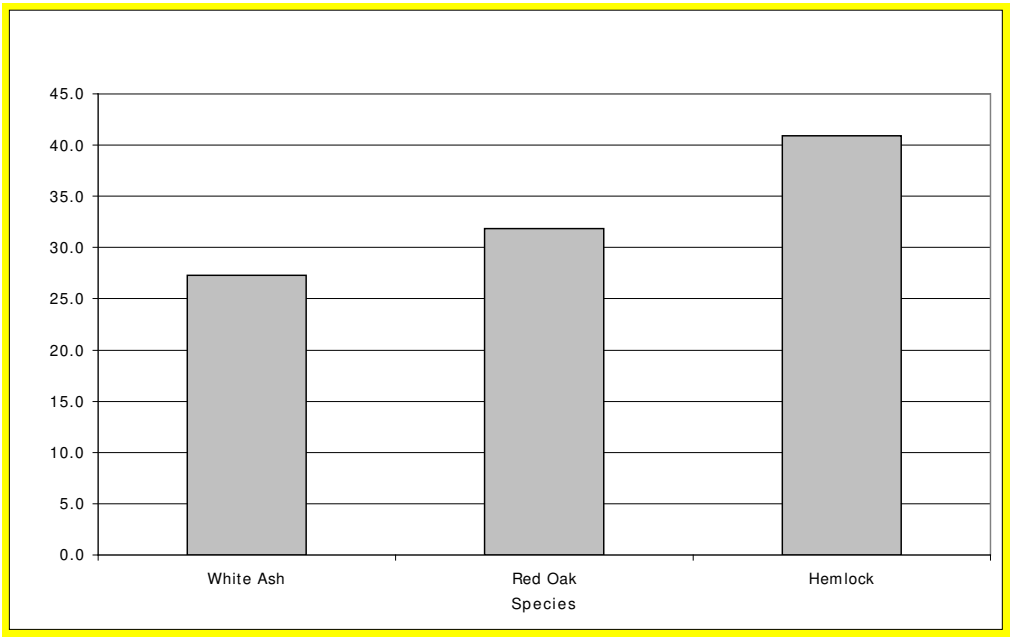


Figure 8.2. Percent basal area by species of the hemlock stand.

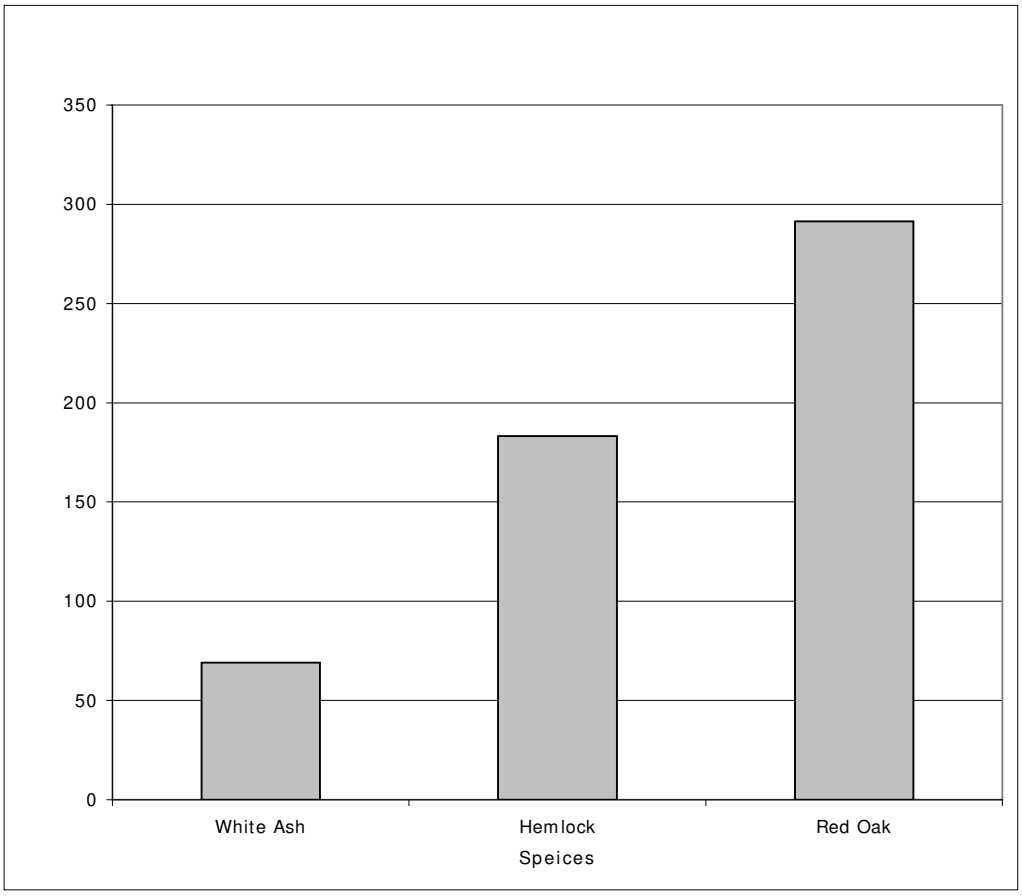


Figure 8.3. Volume of Course Woody Debris per acre in the hemlock stand.

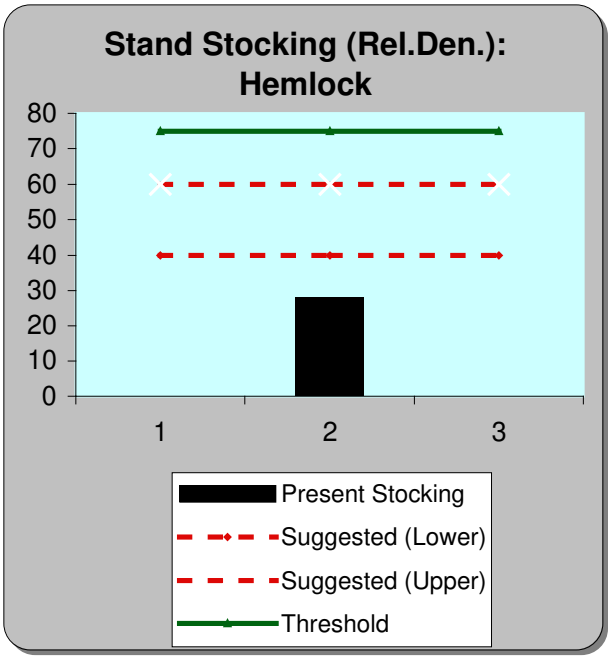


Figure 8.4. Fox DS Cruiser stocking in the hemlock stand.

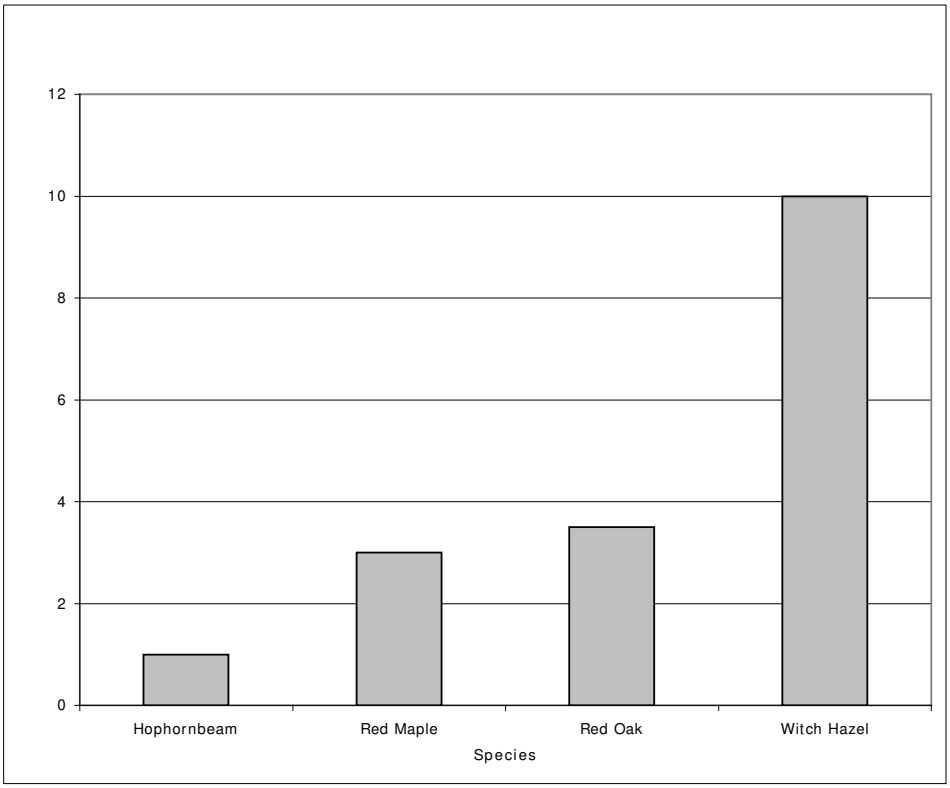


Figure 8.5. Regeneration per acre in the hemlock stand.

Wet-Sited

The Wet-Sited stand has at least two age classes and occupies 7 acres along the parcel's southeastern interior (Figure 9.1). It borders the Hemlock stand to the east and the Maple and Oak stands to the west. The Wet-Sited stand is a true mixed forest, with 23% of basal area in red oak, 20% in white pine, 10% in red maple, 10% in shagbark and pignut hickory, 8% in sugar maple, and 8% in black birch (Figure 9.2). The stand also has smaller components of white ash, white oak, big-tooth aspen, black cherry, and eastern hemlock. The canopy and mid-story are a healthy mix of these species, with only black birch being relegated solely to the mid-story. The understory contains abundant blackberries, maple-

leaf viburnum, ostrich fern, and witch hazel. Coarse woody debris is quite abundant, at an average of 488 ft^3 per acre (Figure 9.3).

Figure 9.1. Wet-sited stand on the southeastern interior of the property.

The soil type in the Wet-Sited stand is the Taconic-Macomber Association. This soil type is normally well-drained and associated with high erosion, but this stand is located on a shelf of the non-permeable Wallomsac schist, which creates a basin affect and inhibits drainage. As a result, the soil in this stand is often muddy or very soft, which limits harvesting activities. The stand along its entire length serves to collect water into small marshes which then drain via intermittent streams into the marbles to the west.

The land use history of the Wet-Sited stand includes portions along the northern edge that were cleared for crop fields, as evidenced by the field stone piles and open-grown white pines in that area. The remainder of the area was used for timber during the charcoaling period in the 1700s and 1800s, and the former owner thinned the stand in early 1980s. The woods road that passes through the Hemlock stand enters the Wet-Sited stand near its center.

This stand contains 7,143 board feet of merchantable timber per acre (mostly red oak) and is considered over stocked according to Fox DS Cruiser (Figure 9.4). The relative density of the stand is 109 trees per acre consisting primarily of red maple (Figure 9.5). Regeneration in this stand would yield primarily hophornbeam (Figure 9.6).

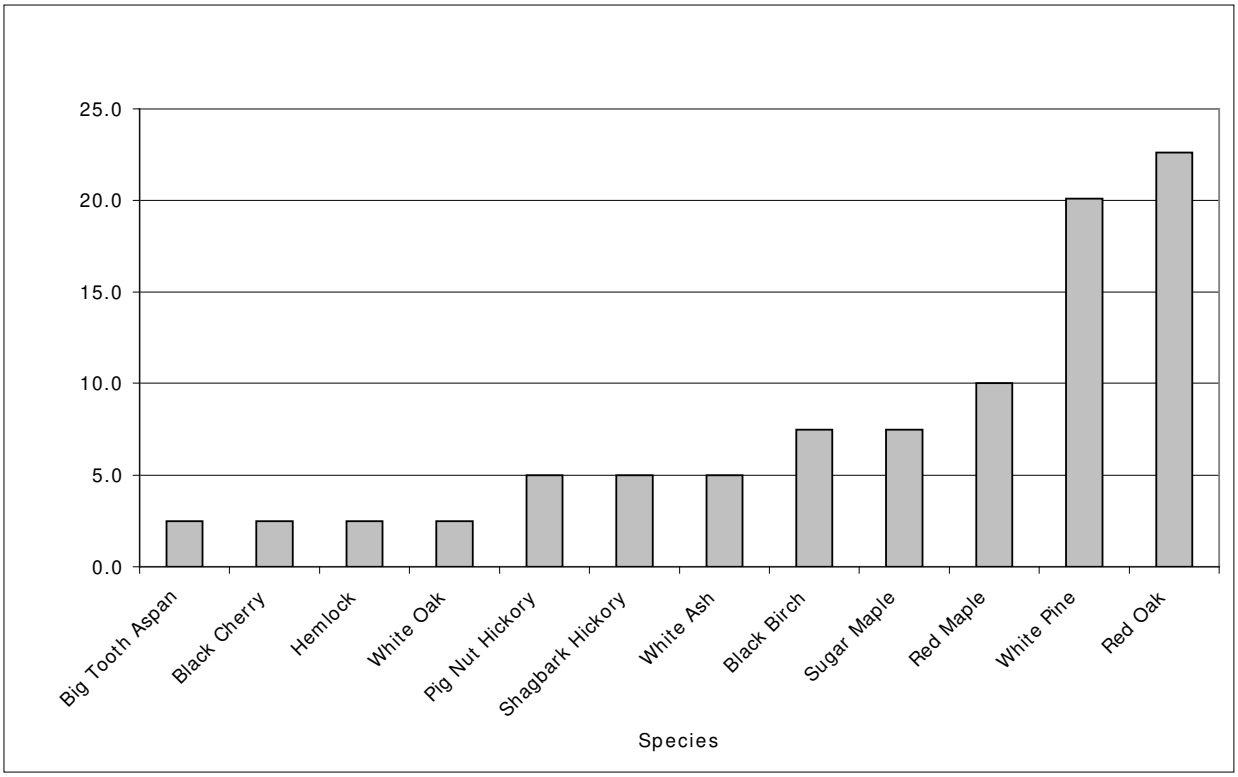


Figure 9.2. Percent basal area by species of the wet-sited stand.

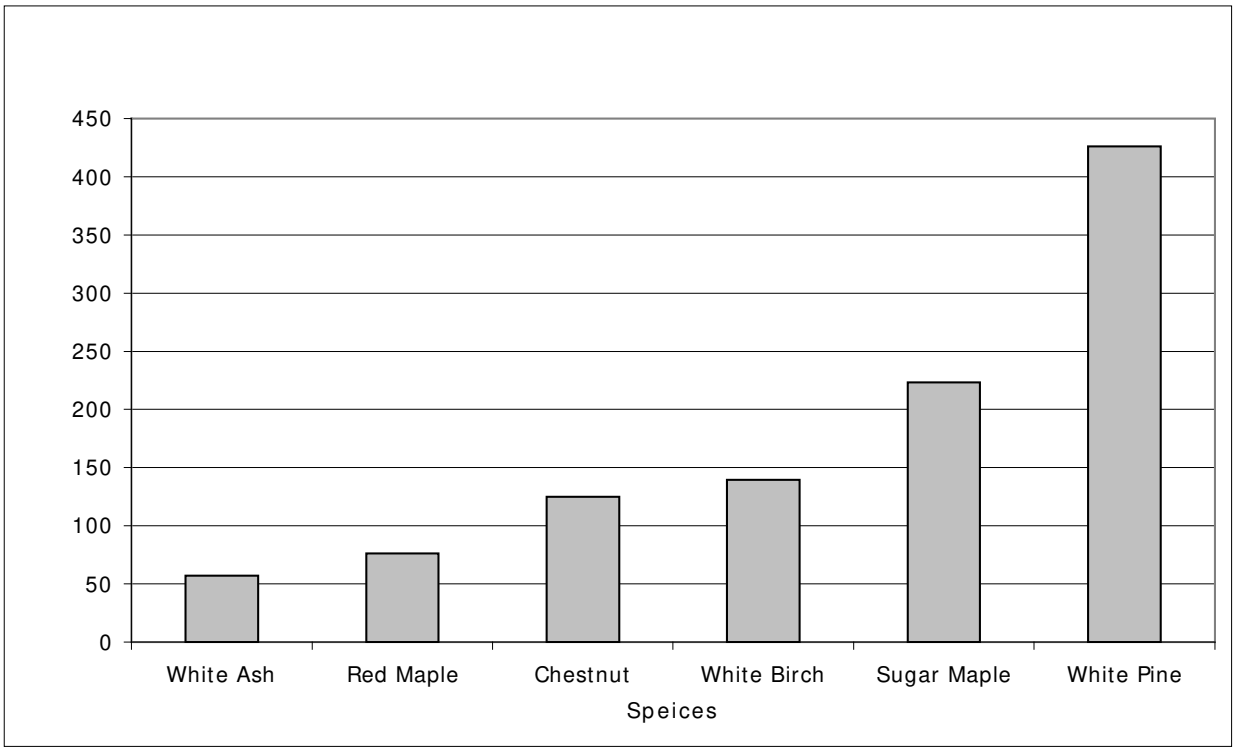


Figure 9.3. Volume of Course Woody Debris per acre in the wet-sited stand.

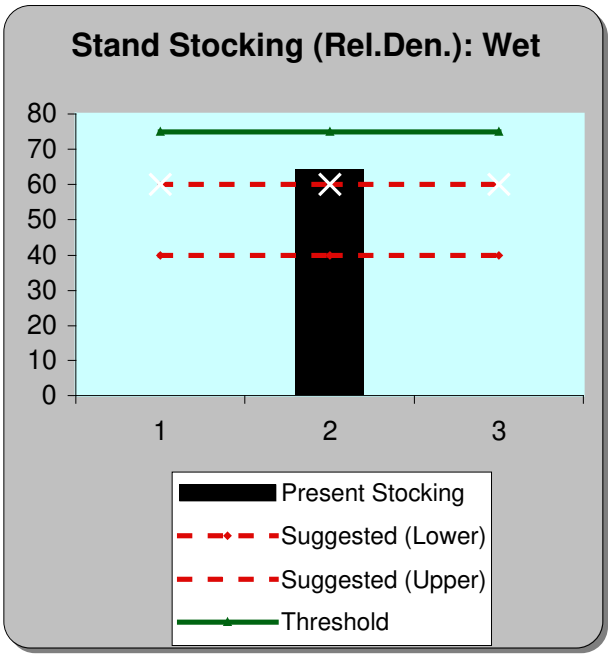


Figure 9.4. Fox DS Cruiser stocking in the wet-sited stand.

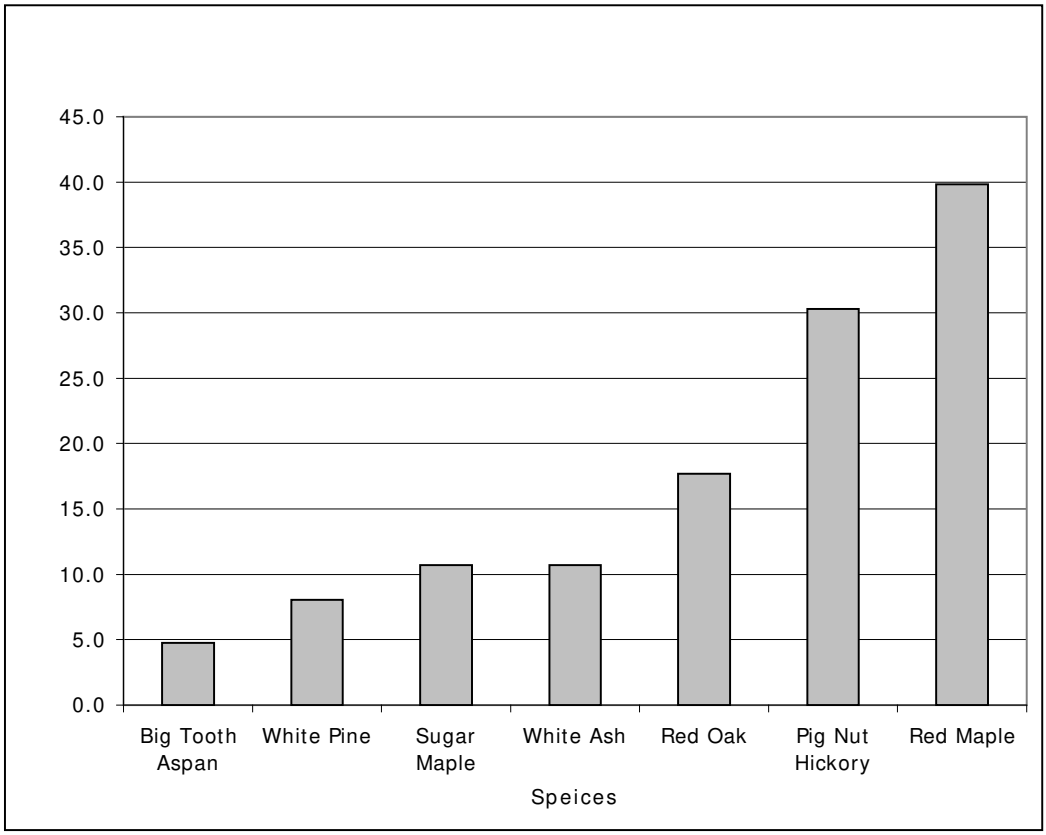


Figure 9.5. Relative density for each species identified in the wet-sited stand.

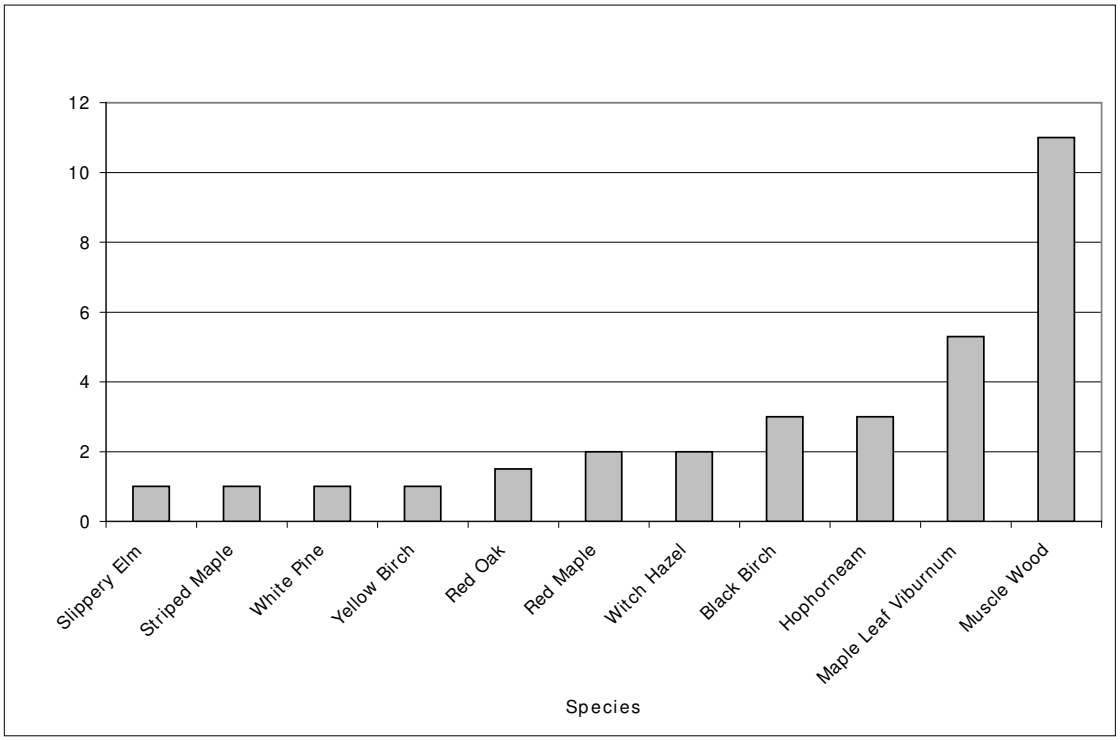


Figure 9.6. Regeneration per acre in the wet-sited stand.

Maple

The Maple stand is an uneven-aged mixed hardwood forest occupying a steep and rocky 6 acres in the center of the preserve (Figure 10.1). It contains the main entrance to Merlin's Cave as well as major sinkholes and rich talus sites. The stand is dominated by sugar maple, which occupies 26% of the basal area, with the remaining components being red oak (15%), red maple (11%), white ash (11%), white pine (11%), black birch (8%), white birch (7%), hophornbeam (7%), and white oak (4%) (Figure 10.2). Only hophornbeam is relegated solely to the mid-story, with all the other species reaching the upper canopy. Coarse woody debris is less common, at an average of 305 ft^3 per acre (Figure 10.3).

Figure 10.1. Uneven aged maple stand at the center of the property.

The soil type in the Maple stand is the Taconic-Macomber Association. It is well drained and very rocky, with abundant outcrops of Stockbridge marble. Erosion is a serious

concern. The stand's eastern edge is also the contact between the Wallomsac and Stockbridge formations, and the terrain character reflects this. There are two small streams flowing through the center of this stand, both of which enter the cave (Figure 10.4). There are four significant sinkholes and three small sinkholes within the stand. The Maple stand is partially located over shallow portions of the cave system that may not be able to support heavy equipment use.

The Maple stand has never been cleared, although portions of it were harvested for timber. White oak stumps attest to its use during the charcoaling period, and more recent large maple stumps remain from the same operation that thinned the Wet-Sited stand. There is a woods road that enters the property from the western edge, switchbacks to avoid the sinkholes and talus, and ends at a small plateau just south of the cave entrance. This is where the majority of past harvesting occurred.

This stand is considered to be on the low end of fully stocked according to Fox DS Cruiser (Figure 10.5). The relative density of the stand is 60 trees per acre, consisting primarily of sugar maple (Figure 10.6). Regeneration in this stand is mostly striped maple (Figure 10.7).

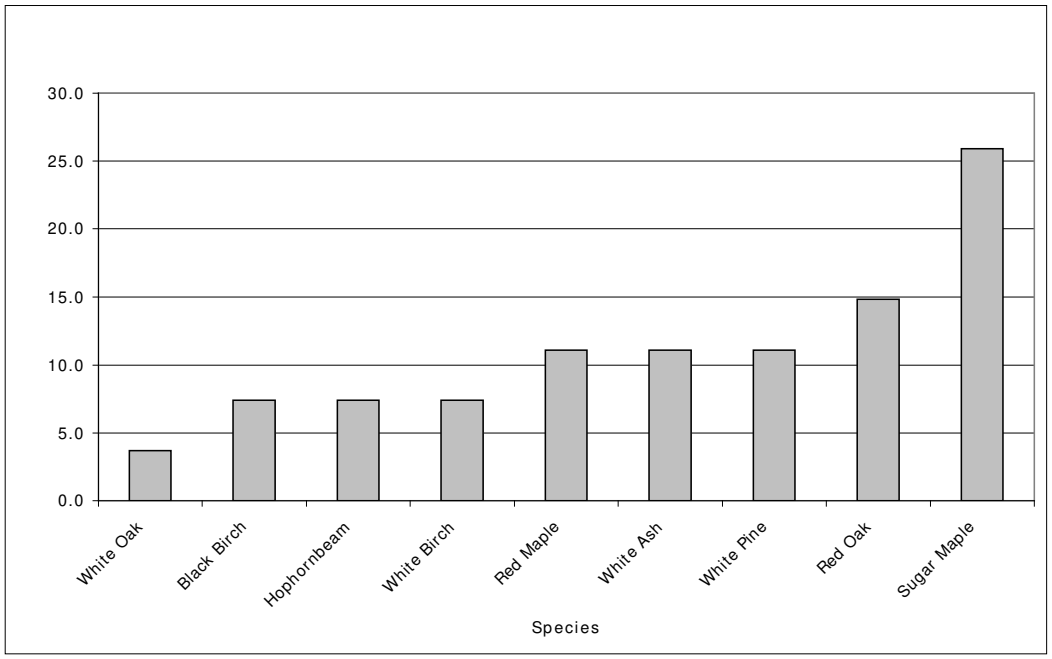


Figure 10.2. Percent basal area by species of the maple stand.

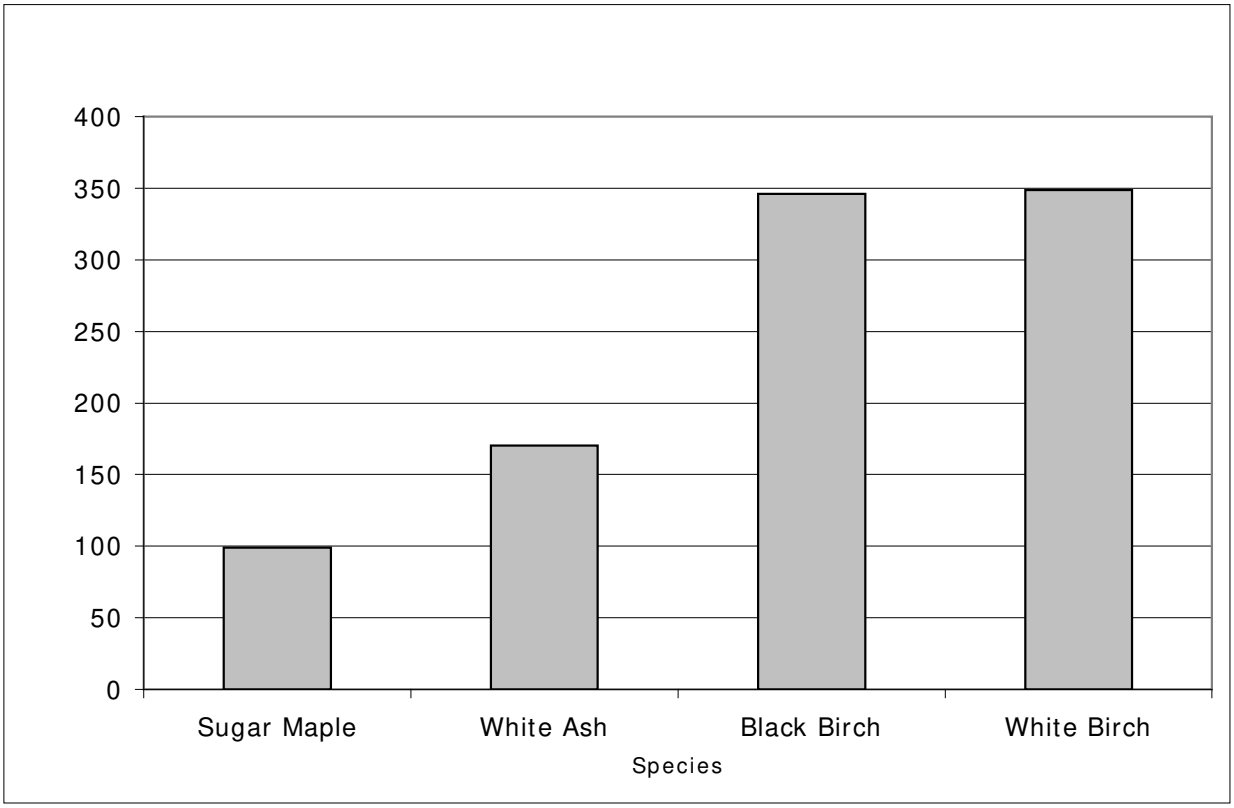


Figure 10.3. Volume of Course Woody Debris per acre in the maple stand.

Figure 10.4. Streams that flow into the entrance of Merlin's cave.

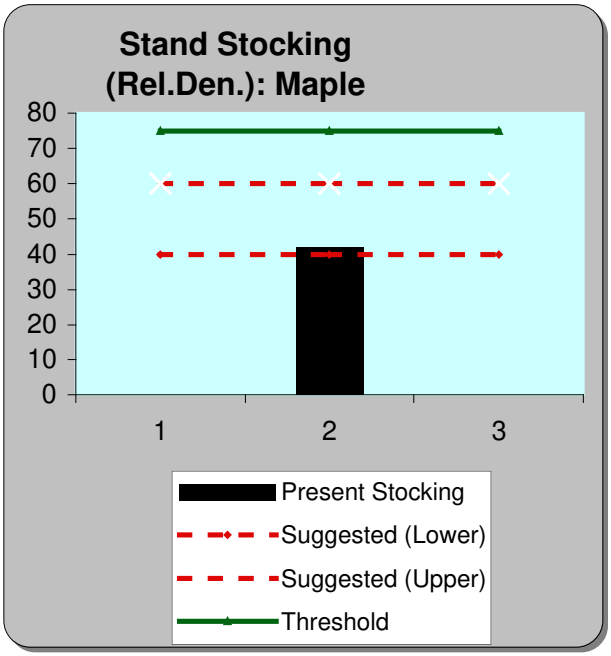


Figure 10.5. Fox DS Cruiser stocking in the maple stand.

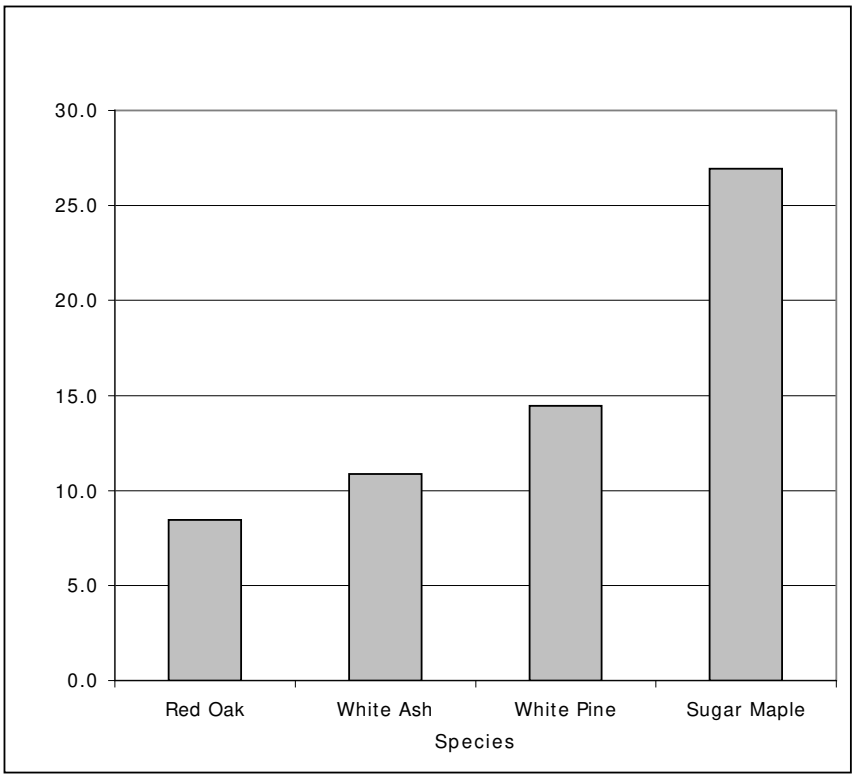


Figure 10.6. Relative density for each species identified in the maple stand.

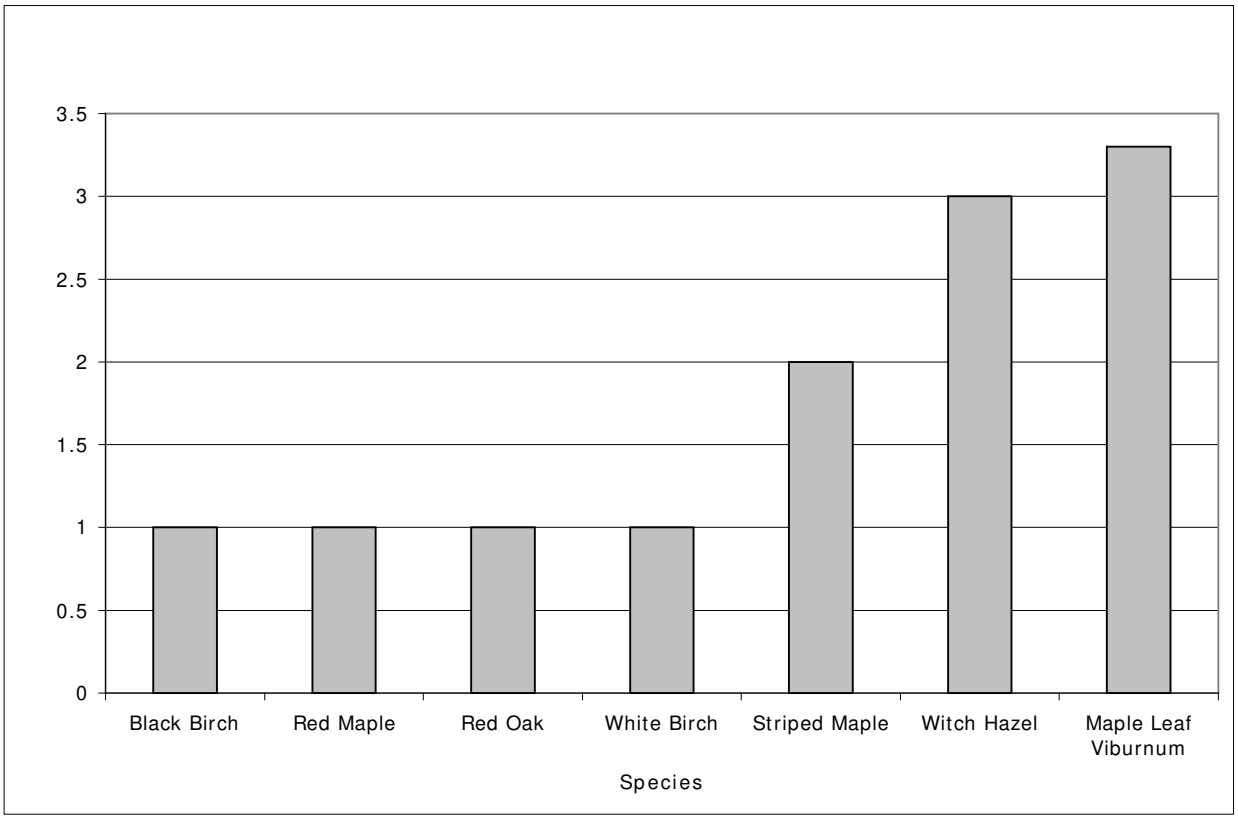


Figure 10.7. Regeneration per acre in the maple stand.

Oak

The Oak stand is the largest stand on the parcel, occupying 23 acres along the western edge and northern end of the preserve (Figure 11.1). It contains several historic resources, small streams, sinkholes, and cave entrances. It is dominated by red oak, which occupies 51% of basal area, with a secondary component of red maple at 25% (Figure 11.2). These two species dominate the canopy, but other species, where they occur, are also represented by large individuals. These include sugar maple, white birch, white pine, white ash, white oak, basswood, big-tooth aspen, hemlock, black birch, and hophornbeam. The latter two trees are limited to the mid-story, which also contains younger and suppressed individuals of the other species. Coarse woody debris is much less common, at only an average of 123 ft^3 per acre (Figure 11.3).

Figure 11.1. Oak stand on the western side of the property.

The soils in the Oak stand are mostly the Taconic-Macomber Association, but there is a small area of Stockbridge-Farmington silt-loams near the northwestern corner. There are abundant outcrops of marble and areas of calcium-enriched talus in the southern half of the stand, while the northern half contains the majority of the large sinkholes. Erosion is a serious concern throughout. The historic charcoal circle is located in this stand near its southern end. There is a stone wall bordering its northern end.

The Oak stand has never been cleared, used instead for charcoaling. During the 1700s and 1800s, white oak, red oak, and American chestnut were harvested for charcoal production. Numerous white oak stumps and coppiced red oaks remain, while chestnut snags attest to their presence before the blight. The area was harvested for red oak as recently as the early 1900s, probably at the very end of the charcoaling period. The northern end of the stand was harvested in the 1980s, likely at the same time as the Maple and Wet-Sited stands. There is a woods road that enters the property from the western edge and travels northeast through the center of the stand's northern half.

This stand contains 12,909 board feet of merchantable timber per acre (mostly red oak and red maple) and is considered over stocked according to Fox DS Cruiser (Figure 11.4). The relative density of the stand is 90 trees per acre consisting primarily of red maple (Figure 11.5). Regeneration in this stand would yield mostly red oak (Figure 11.6).

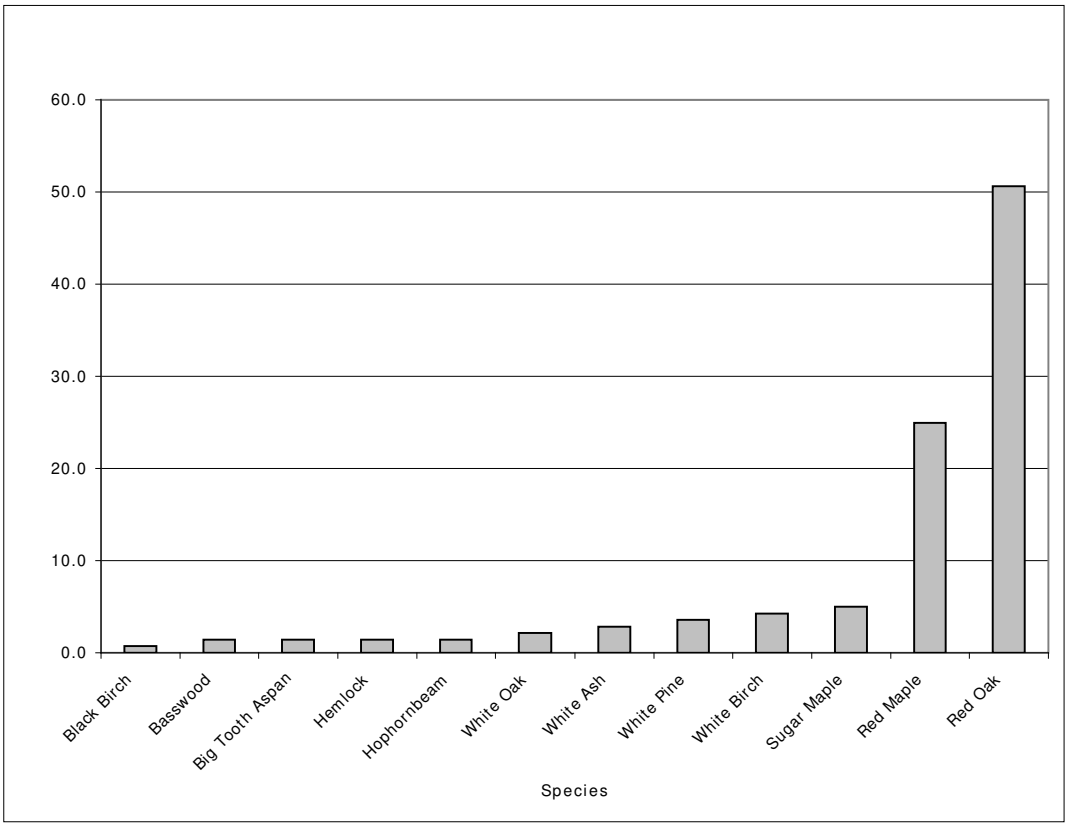


Figure 11.2. Percent basal area by species of the oak stand.

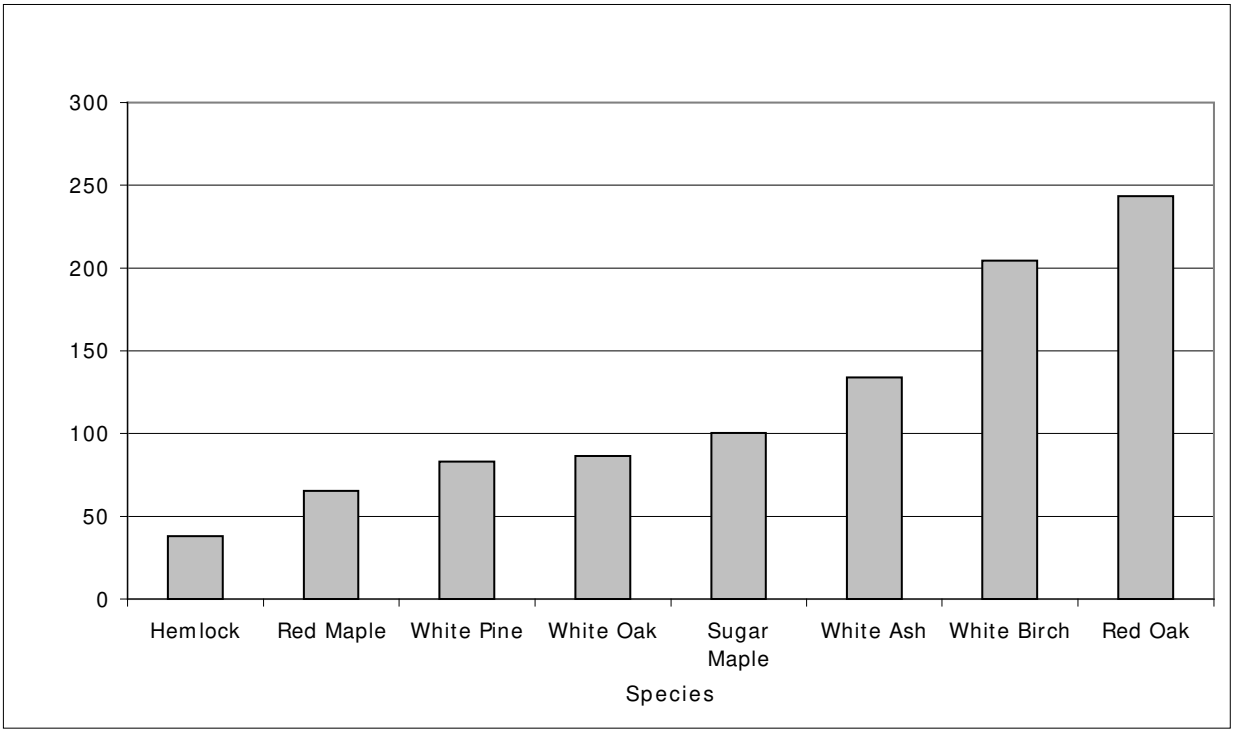


Figure 11.3. Volume of Course Woody Debris per acre in the oak stand.

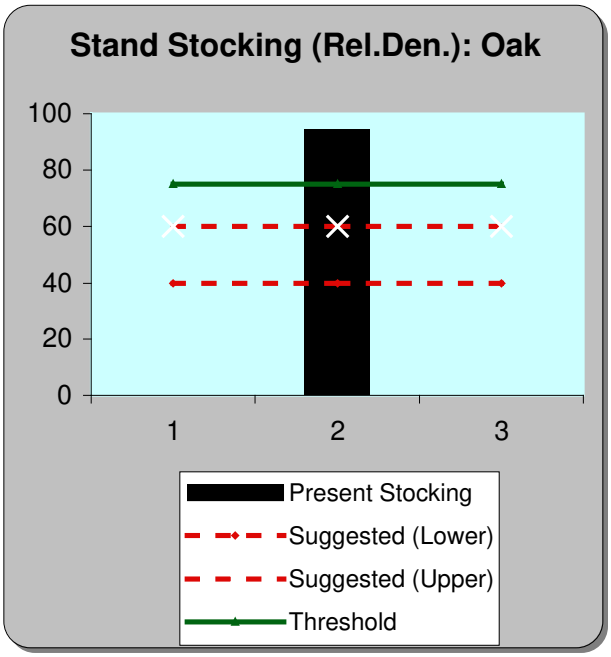


Figure 11.4. Fox DS Cruiser stocking in the oak stand.

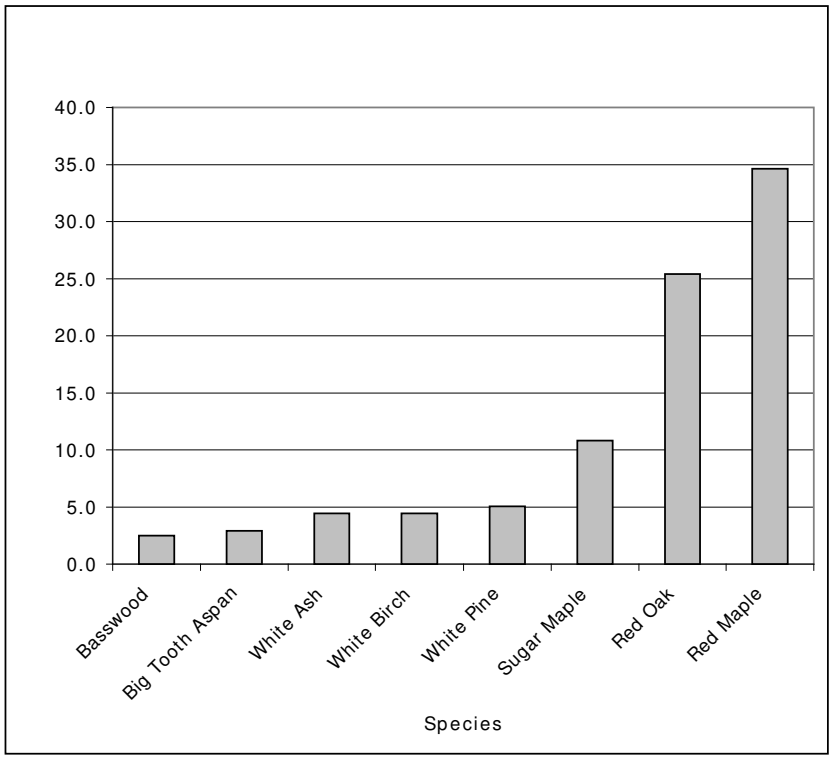


Figure 11.5. Relative density for each species identified in the oak stand.

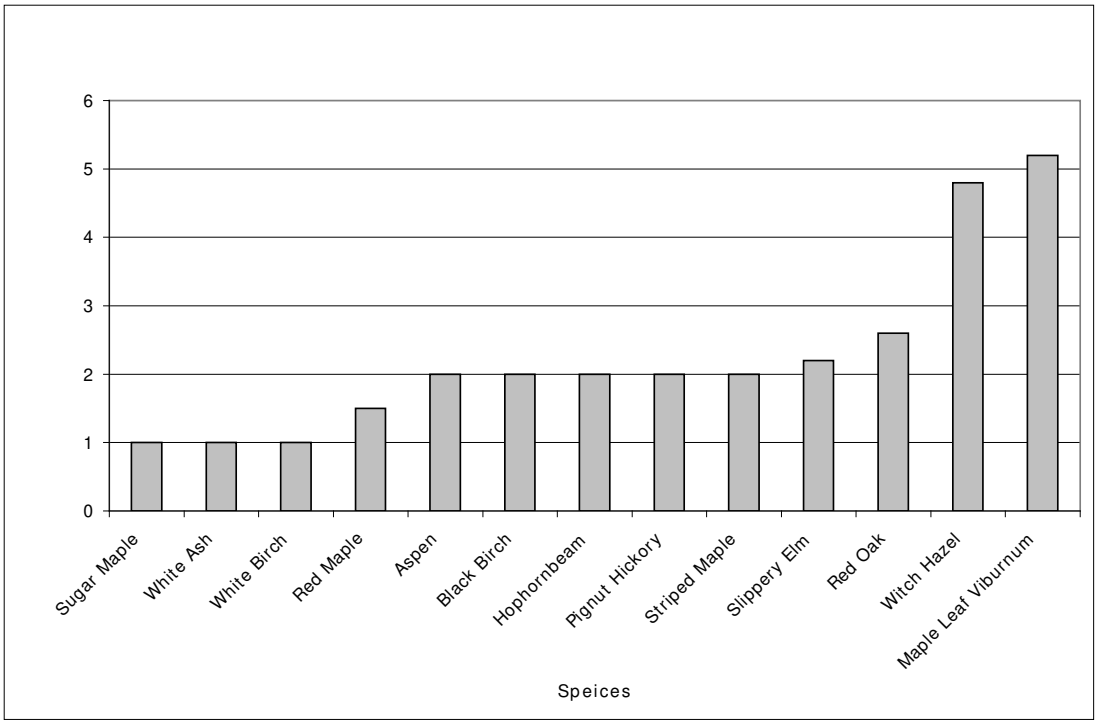


Figure 11.6. Regeneration per acre in the oak stand.

General Restrictions on Management Activities

There are a number of areas on the property that are not appropriate for management activities, many of which cross multiple stands (Map 5, pg. 49). As such, they are described here separately.

Cave Entrances and Sinkholes

The caves and karst are the primary preservation goal of the preserve, and multiple points within the cave approach as closely to the surface as seven feet. These areas are obviously unsuitable for large equipment. There is significant danger of erosion from equipment operation in and around the sinkholes, and danger of damaging shallow underground spaces not currently explored.

Based on management goals 1 and 7, a buffer of 50ft is recommended around all cave entrances and sinkholes in which no management activity will take place. The exception to this buffer will be pre-existing woods roads that cross these areas.

Exposed Ledges and Rich Talus

The marble outcrops located along the southwestern edge of the property are habitat for a diversity of plant species, such as the walking fern, which are extremely sensitive to disturbance. Even foot traffic can potentially destroy habitat along the ledges. These outcrops likely also contain small cave entrances used by bats to access underground spaces too small for humans. To the west of the ledges are several areas of calcium rich talus that also provide diverse microhabitats for plant species and possible habitat for bat species and porcupines.

Based on management goals 1, 2, 3, and 7, a buffer of 50ft is recommended around all marble outcrops and rich talus slopes in which no management activity will take place. The only exception to this buffer will be pre-existing woods roads that cross these areas.

Streams, Seeps, and Swampy Areas

Due to the nature of the upper schist talus and lower marble contact, there are numerous seeps and intermittent stream segments that either originate in swampy areas or resurge from bedrock, travel a short distance above ground, and then vanish into caves or sinkholes. Because these streams follow primarily underground conduits, they form potential wildlife travel corridors for underground species such as crayfish and salamanders, and they are particularly sensitive to disruption. The wet areas from which

these streams originate are also sensitive and, being fed by underground water sources, they do not freeze to significant depth to allow heavy equipment use.

Based on management goals 1 and 7, a buffer of 100ft is recommended around all streams, seeps, and swampy areas in which no management activity will take place. There are no exceptions to this buffer.

Vernal Pools

The southeast edge of the property contains a number of vernal pools that provide habitat for spotted salamanders, a priority species for management. Spotted salamanders are known to migrate up to a great distance from the pools they use, and have been seen in the caves some 800ft away. They also require intact forest for shelter during the other months of the year.

Based on management goal 7, a buffer of 300ft is recommended around all vernal pools in which no management activity will take place. An additional buffer of 200ft is recommended in which limited management activity may take place, so long as 75% of the canopy is retained. These buffers are based on the recommendations provided by Calhoun and DeMaynadier (2008)**.** The exception to this buffer will be pre-existing woods roads that cross these areas.

Historic Resources

The stonewalls, stone piles, and charcoal circle on the property are historic resources that should not be disturbed. Based on management goal 6, a buffer of 25ft is recommended in which no management activity will take place. The exception to this buffer will be pre-existing woods roads that cross these areas.

Erosion-Prone Soils

The majority of the property consists of the Taconic-Macomber Association, a steep, rocky soil that is highly prone to erosion and rutting. As such, it is strongly recommended that existing woods roads be used wherever possible and that no additional roads be constructed in steep areas. Potential acceptable routes include the proposed trail extension from the cave entrance to the northern end of the property, as well as the three existing roads on the property. It is also recommended that management be done with a forwarder where possible rather than a more-disruptive skidder.

Management Prescriptions

Hemlock Stand

The Hemlock Stand is only 3 acres and falls almost entirely within the vernal pool buffer area prescribed above. As such, a portion of the stand is restricted from harvest. The Hemlock Stand additionally represents the only deeryard on the parcel and is a conservation priority for that reason. This makes the maintenance of a closed canopy even more critical, as additional cutting could limit the stand's effectiveness as a deer wintering area (Bryan, 2007).

In addition to these factors, the stand is currently under stocked and has a relatively low volume of acceptable growing stock. It also contains a higher volume of downed woody debris. Finally, it is primarily steep slopes prone to erosion. It is therefore an ideal choice for exclusion from management activity entirely in favor of developing old growth

characteristics, which are advantageous for some species in management goals 7 and 8 and specifically desired by goal 9.

The exception to this is an existing woods road that enters the stand near its northern edge and could be used to access the Wet-Sited stand to the west. This is also the shortest route to a town road, and as such the most economical way of transporting timber harvested from the preserve.

Wet Sited Stand

The Wet-Sited stand falls partially within the buffer zones prescribed for streams, seeps, and swampy areas, but there are still 2 acres available for harvest. These acres do not contain any of the other buffered features and are appropriate for management activity. The majority of the excluded areas are low-grade and not likely to erode, although rutting might still be an issue.

The proposed loop trail would pass through these areas, providing idea access for harvesting equipment. Based on management goals 4 and 5, woods roads should be planned with this in mind—particularly the connection of both ends of an access to existing trails in the Oak Stand.

The Wet-Sited stand has the most soft-mast understory plants on the preserve, and management activity should preserve these wherever possible. Many of them are in the buffered areas, and thus will not be damaged. Based on management goals 7 and 8, it is also recommended that at least 3 large cavity trees (>14" dbh) be maintained per acre to provide bird and bat habitat.

Because this is an uneven aged stand of mainly shade-tolerant species, a single-tree selection system with 100-year rotation is recommended for management. This will

provide for the continued development of uneven-aged forest characteristics while maintaining high-value timber production. Since the stand is only slightly overstocked, a long rotation will also allow for the development of additional coarse woody debris. In accordance with goal 9, at least 2 large (>16" dbh) trees per acre should be left to mature and die naturally; this will provide the physical structure present in old growth trees and large downed boles.

The majority of harvestable timber is red oak, so this stand can be harvested in concert with the Oak stand to allow for overall marketable volume.

Maple Stand

The majority of the 6-acre Maple Stand is located within buffer zones for caves, sinkholes, ledges, rich talus, and streams. This leaves less than an acre in two small pockets that would be acceptable for harvest, but one of these are inaccessible due to buffer zones. Many of these areas would also be good candidates for allowing natural development of old growth characteristics in accordance with goal 9.

The exception to the above is an existing woods road that enters the stand from its southwest corner and switchbacks around the ledges to meet the existing foot trail. Additional clearing to connect this trail with the proposed loop trail would be in line with management goals 4 and 5, and could be accomplished with minimal impact on sensitive areas. Any cutting should be done in concert with entry into the oak stand.

Oak Stand

The Oak Stand is the largest on stand on the parcel, occupying 23 acres along the preserve's western side. Portions of this parcel contain historic resources, cave entrances,

ledges, sinkholes, streams, and rich talus, and the buffers around these items reduce the harvestable area to 15 acres. Because the majority of the stand is below the schist/marble contact and fault line, harvesting outside the buffered areas presents few conservation concerns.

The Oak stand has three existing woods roads that could be used for access, and additional roads could be constructed along the route of the proposed loop trail in accordance with management goals 4 and 5. Other new road construction should be limited to prevent erosion. The existing roads are: 1) The main trail that enters the preserve on the southern side and travels to the entrance of Merlin's Cave; 2) a woods road that enters the Oak stand briefly on its western edge before crossing into the Maple stand; and 3) a woods road that enters the Oak stand from its northwestern edge and remains in the stand as far as the northern end (Map 3, pg. 47).

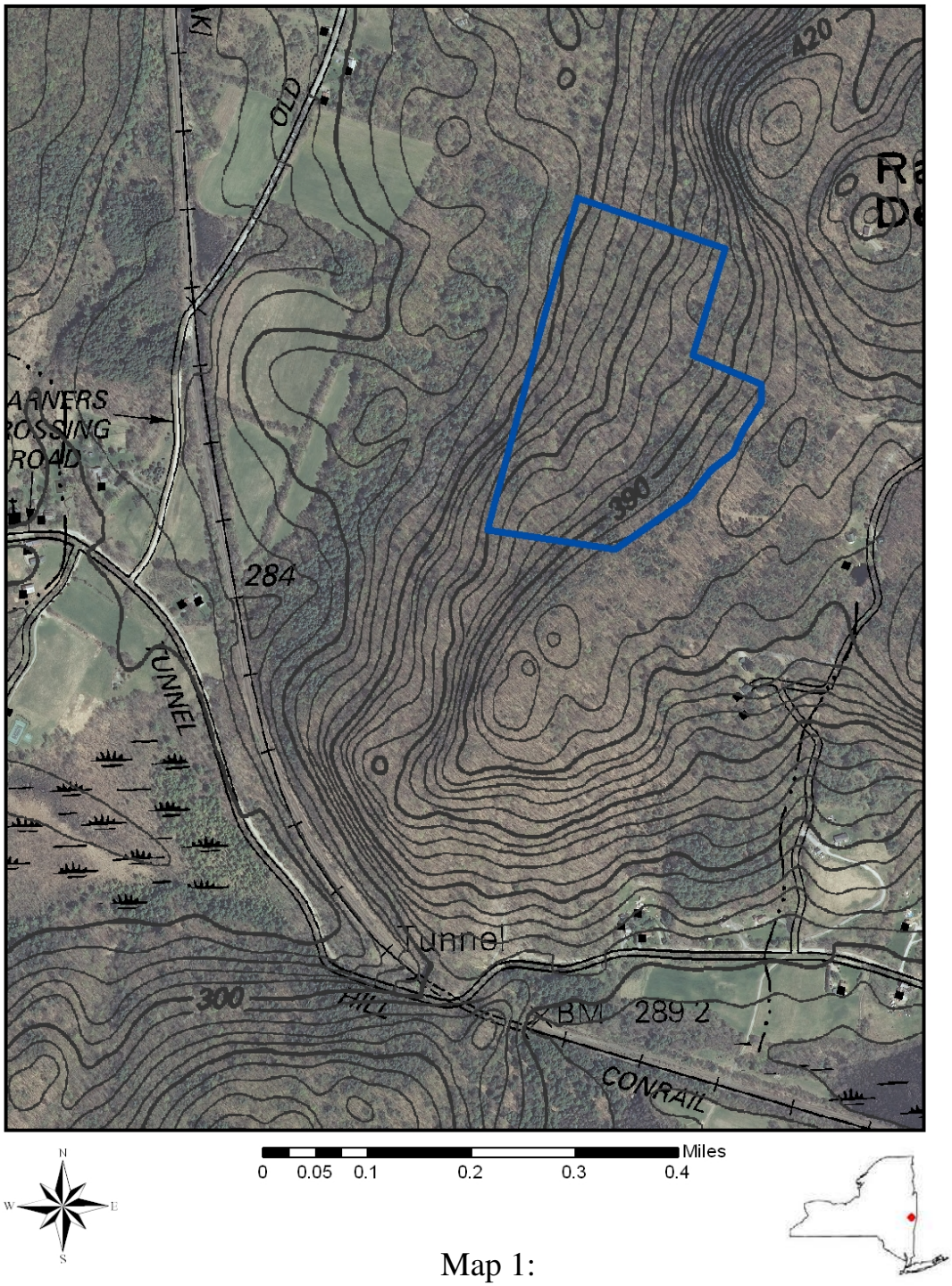
The majority of wildlife habitat in the Oak stand exists in the buffered areas, with the exception of cavity trees. It is recommended that at least 3 large cavity trees (>14" dbh) per acre be maintained to ensure habitat for the bats and birds in management goals 7 and 8.

The vast majority of merchantable timber in the Oak stand is high-quality red oak, so a single-tree and small-group (<1 acre) selection method is recommended to ensure continued oak regeneration. A 90-year rotation with 5 acres being cut every 30 years will ensure continued development of the stand. This rotation is in accordance with management goal 9, at least 2 large (>16" dbh) trees per acre should be left to mature and die naturally; this will provide the physical structure present in old growth trees and large downed boles.

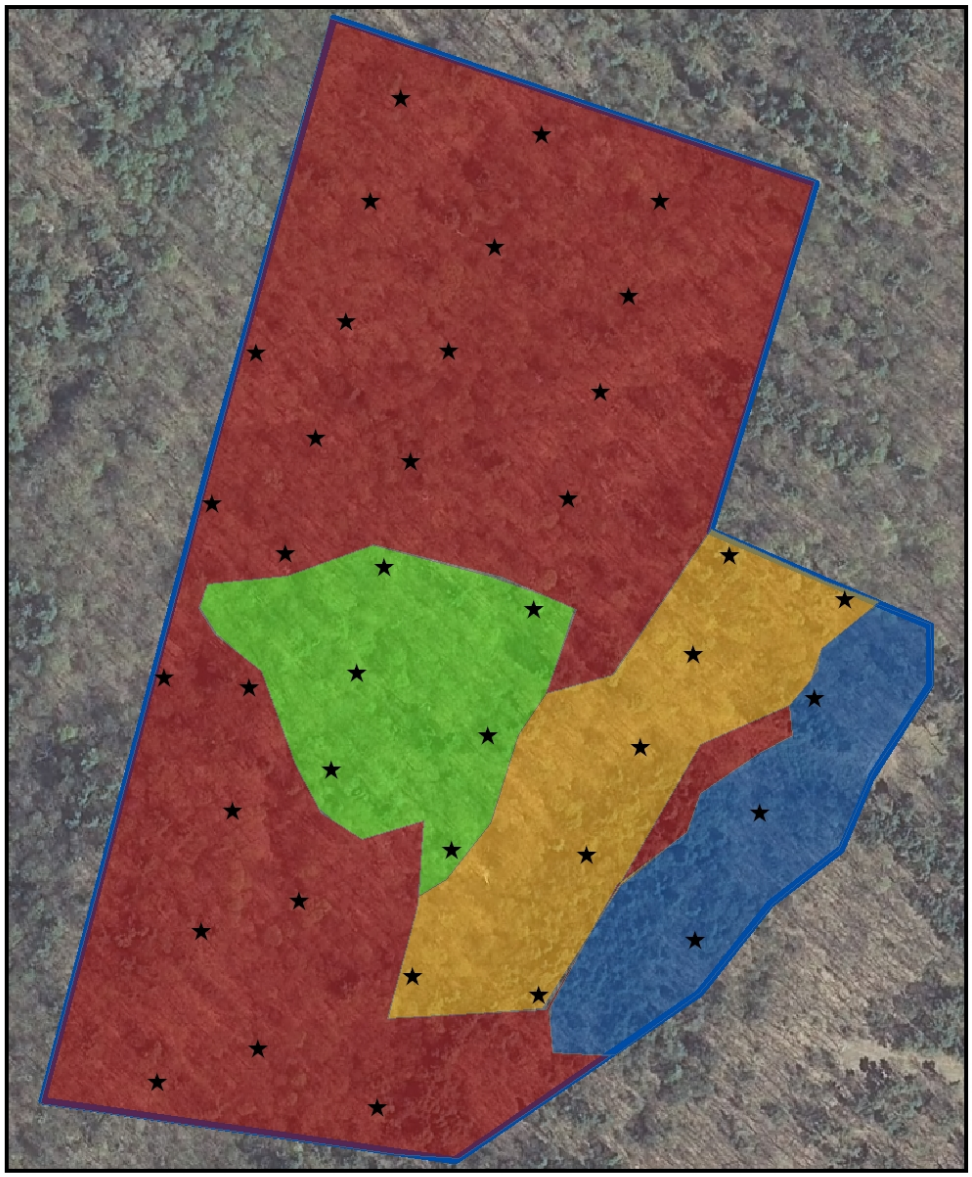
This stand can be harvested in simultaneously with the Wet-Sited stand to ensure a sufficient marketable volume.

Conclusion

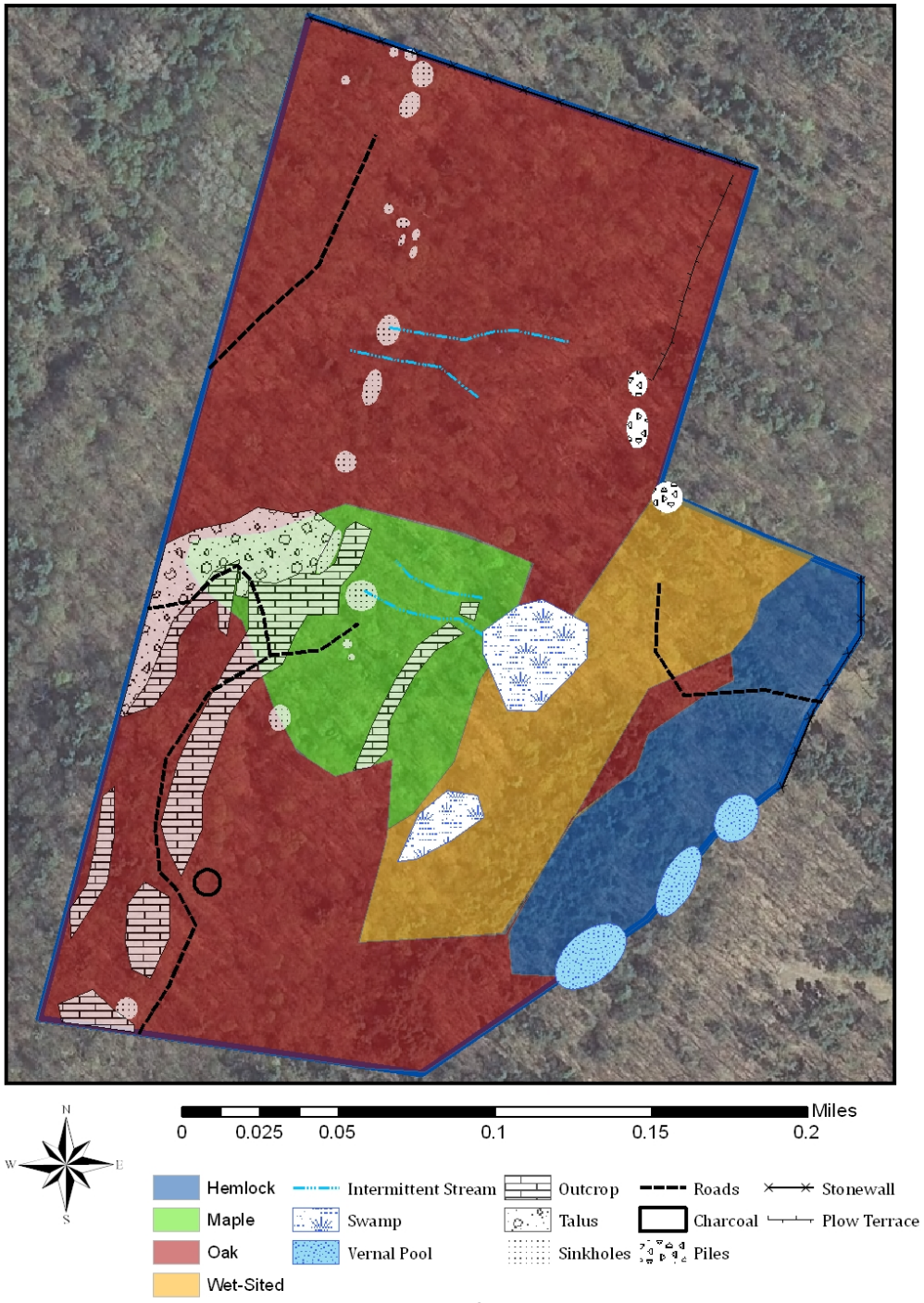
The Merlin's Karst preserve contains a variety of valuable ecological, recreational, and historic resources that need to be carefully protected. It is possible both to preserve those areas and to extract economic value from the remainder of the property, provided it is done carefully. The most appropriate method in the two harvestable stands is a single-tree and occasional small-group selection method with conscientious preservation of old growth characteristics to ensure overall structure and habitat preservation.



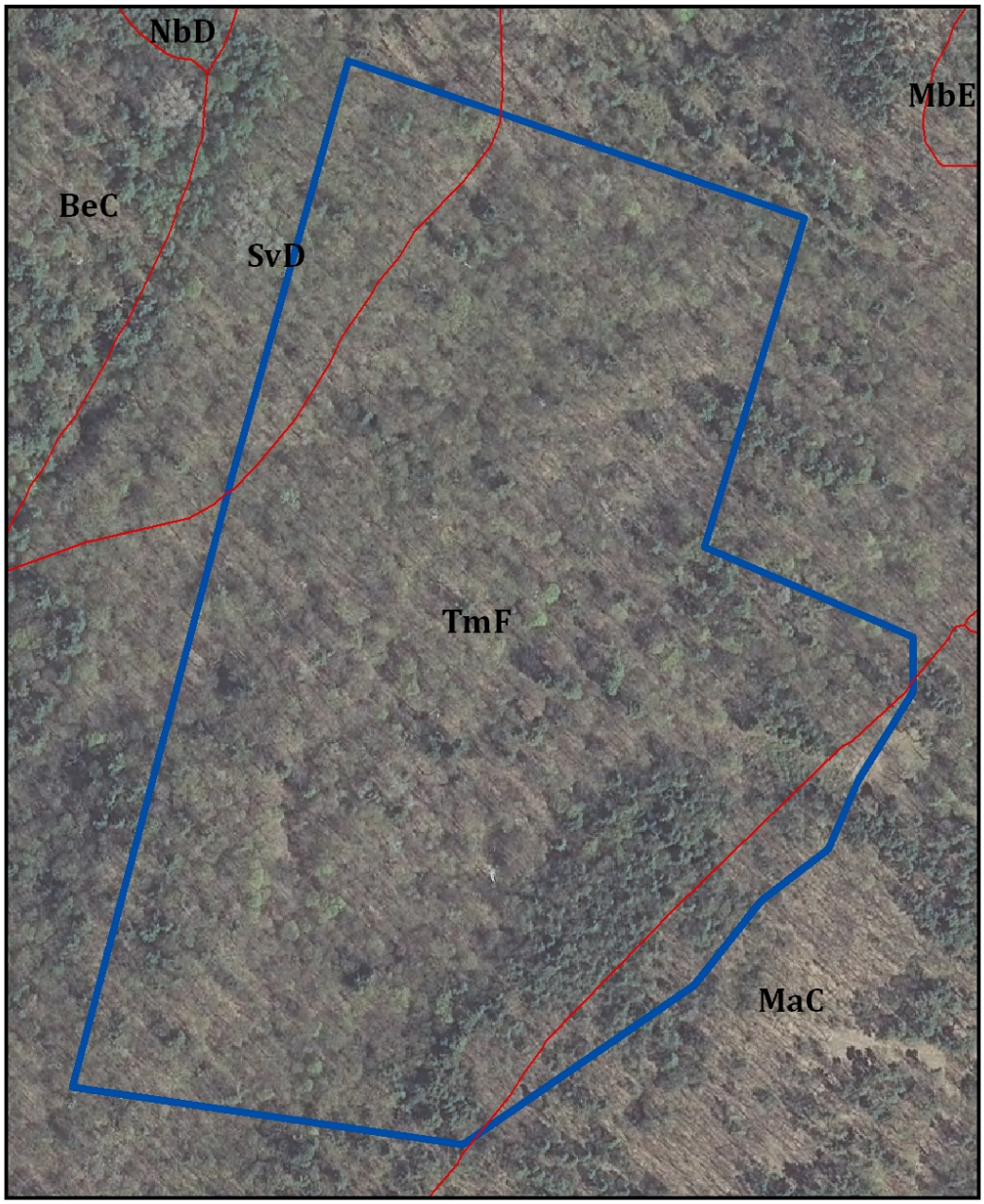
Map 1:
Location Map of the Merlin's Preserve in Canaan, NY



Map 2:
Point Sampling Map
of the Merlin's Preserve in Canaan, NY



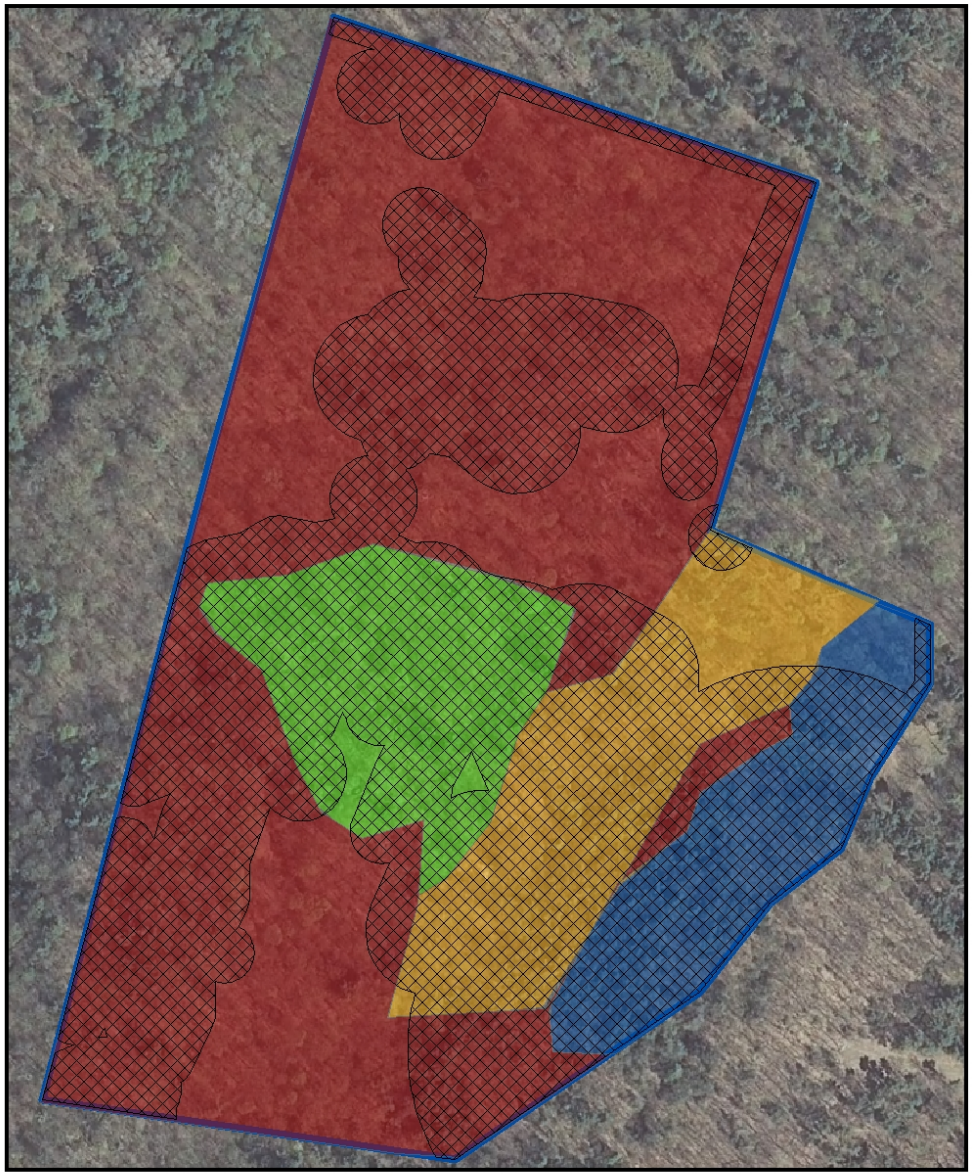
Map 3:
Resource Map of the Merlin's Preserve in Canaan, NY



TmF - Taconic-Macomber Association
MaC - Macomber-Taconic Association
SvD - Stockbridge-Farmington Silt Loams

Map 4

Soils Map of the Merlin's Preserve in Canaan, NY



Map 5:

Harvesting Restriction Map
of the Merlin's Preserve in Canaan, NY

References:

Bryan, R. R. (2007). Focus Species Forestry: A Guide to Integrating Timber and Biodiversity Management in Maine (Third Edition.). Falmouth, ME: Maine Department of Conservation.

Calhoun, A. J. K., & DeMaynadier, P. G. (2008). Science and Conservation of Vernal Pools: In Northeastern North America. CRC Press.

DeGraaf, R. M. (2005). Landowner's Guide to Wildlife Habitat: Forest Management for the New England Region. Vermont.

Appendix A: Soil Descriptions

Map Unit Description: Taconic-Macomber association, very steep, very rocky–Columbia County, New York

Columbia County, New York

TmF—Taconic-Macomber association, very steep, very rocky

Map Unit Setting

Elevation: 1,000 to 1,800 feet *Mean annual precipitation:* 44 to 48 inches *Mean annual air temperature:* 43 to 45 degrees F *Frost-free period:* 105 to 135 days

Map Unit Composition

Taconic and similar soils: 50 percent *Macomber and similar soils:* 35 percent *Minor components:* 15 percent

Description of Taconic Setting

Landform: Hills, ridges *Landform position (two-dimensional):* Backslope *Landform position (three-dimensional):* Side slope *Down-slope shape:* Convex *Across-slope shape:* Convex *Parent material:* Channery loamy till derived mainly from phyllite,
schist, quartzite, and slate

Properties and qualities

Slope: 35 to 45 percent *Depth to restrictive feature:* 10 to 20 inches to lithic bedrock *Drainage class:* Somewhat excessively drained *Capacity of the most limiting layer to transmit water (Ksat):* Very low
to moderately high (0.00 to 0.20 in/hr) *Depth to water table:* More than 80 inches *Frequency of flooding:* None *Frequency of ponding:* None *Available water capacity:* Very low (about 1.5 inches)

Interpretive groups

Farmland classification: Not prime farmland *Land capability (nonirrigated):* 7s *Hydrologic Soil Group:* D

Typical profile

0 to 6 inches: Channery silt loam *6 to 14 inches:* Very channery silt loam *14 to 24 inches:* Unweathered bedrock

Description of Macomber Setting

Landform: Ridges, hills *Landform position (two-dimensional):* Backslope *Landform position (three-dimensional):* Side slope *Down-slope shape:* Convex

Across-slope shape: Convex *Parent material:* Channery loamy till derived mainly from phyllite, slate, and schist

Properties and qualities

Slope: 35 to 45 percent *Depth to restrictive feature:* 20 to 40 inches to lithic bedrock *Drainage class:* Well drained *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr) *Depth to water table:* More than 80 inches *Frequency of flooding:* None *Frequency of ponding:* None *Available water capacity:* Very low (about 2.1 inches)

Interpretive groups

Farmland classification: Not prime farmland *Land capability (nonirrigated):* 7s *Hydrologic Soil Group:* C

Typical profile

0 to 6 inches: Channery silt loam *6 to 22 inches:* Very channery loam *22 to 32 inches:* Unweathered bedrock

Minor Components Rock outcrop

Percent of map unit: 10 percent

Lanesboro

Percent of map unit: 3 percent

Aurelie

Percent of map unit: 2 percent *Landform:* Depressions

Data Source Information

Soil Survey Area: Columbia County, New York Survey Area Data: Version 8, Dec 19, 2011

Columbia County, New York

MaC—Macomber-Taconic association, strongly sloping, rocky

Map Unit Setting

Elevation: 1,000 to 1,800 feet *Mean annual precipitation:* 44 to 48 inches *Mean annual air temperature:* 43 to 45 degrees F *Frost-free period:* 105 to 135 days

Map Unit Composition

Macomber and similar soils: 40 percent *Taconic and similar soils:* 30 percent *Minor components:* 30 percent

Description of Macomber Setting

Landform: Ridges, hills *Landform position (two-dimensional):* Shoulder *Landform position (three-dimensional):* Crest *Down-slope shape:* Convex *Across-slope shape:* Convex *Parent material:* Channery loamy till derived mainly from phyllite,
slate, and schist

Properties and qualities

Slope: 3 to 15 percent *Depth to restrictive feature:* 20 to 40 inches to lithic bedrock *Drainage class:* Well drained *Capacity of the most limiting layer to transmit water (Ksat):* Very low
to moderately high (0.00 to 0.20 in/hr) *Depth to water table:* More than 80 inches *Frequency of flooding:* None *Frequency of ponding:* None *Available water capacity:* Very low (about 2.1 inches)

Interpretive groups

Farmland classification: Not prime farmland *Land capability (nonirrigated):* 4e *Hydrologic Soil Group:* C

Typical profile

0 to 6 inches: Channery silt loam *6 to 22 inches:* Very channery loam *22 to 32 inches:* Unweathered bedrock

Description of Taconic Setting

Landform: Hills, ridges *Landform position (two-dimensional):* Shoulder *Landform position (three-dimensional):* Crest

Down-slope shape: Convex *Across-slope shape:* Convex *Parent material:* Channery loamy till derived mainly from phyllite, schist, quartzite, and slate

Properties and qualities

Slope: 3 to 15 percent *Depth to restrictive feature:* 10 to 20 inches to lithic bedrock *Drainage class:* Somewhat excessively drained *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr) *Depth to water table:* More than 80 inches *Frequency of flooding:* None *Frequency of ponding:* None *Available water capacity:* Very low (about 1.5 inches)

Interpretive groups

Farmland classification: Not prime farmland *Land capability (nonirrigated):* 4e *Hydrologic Soil Group:* D

Typical profile

0 to 6 inches: Channery silt loam *6 to 14 inches:* Very channery silt loam *14 to 24 inches:* Unweathered bedrock

Minor Components Lanesboro, deep

Percent of map unit: 10 percent

Lanesboro, very deep

Percent of map unit: 10 percent

Monarda

Percent of map unit: 5 percent *Landform:* Depressions

Aurelie

Percent of map unit: 4 percent *Landform:* Depressions

Rock outcrop

Percent of map unit: 1 percent

Data Source Information

Soil Survey Area: Columbia County, New York Survey Area Data: Version 8, Dec 19, 2011

Columbia County, New York

SvD—Stockbridge-Farmington silt loams, hilly, very rocky

Map Unit Setting

Elevation: 100 to 900 feet *Mean annual precipitation:* 38 to 46 inches *Mean annual air temperature:* 45 to 50 degrees F *Frost-free period:* 115 to 195 days

Map Unit Composition

Stockbridge and similar soils: 45 percent *Farmington and similar soils:* 30 percent *Minor components:* 25 percent

Description of Stockbridge Setting

Landform: Drumlinoid ridges, hills, till plains *Landform position (two-dimensional):* Backslope *Landform position (three-dimensional):* Side slope *Down-slope shape:* Convex *Across-slope shape:* Convex *Parent material:* Calcareous loamy till

Properties and qualities

Slope: 10 to 30 percent *Depth to restrictive feature:* More than 80 inches *Drainage class:* Well drained *Capacity of the most limiting layer to transmit water*

(Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr) *Depth to water table:* More than 80 inches *Frequency of flooding:* None *Frequency of ponding:* None *Calcium carbonate, maximum content:* 15 percent *Available water capacity:* Moderate (about 8.8 inches)

Interpretive groups

Farmland classification: Not prime farmland *Land capability (nonirrigated):* 7s *Hydrologic Soil Group:* C

Typical profile

0 to 9 inches: Silt loam *9 to 29 inches:* Silt loam *29 to 60 inches:* Gravelly silt loam

Description of Farmington Setting

Landform: Benches, ridges, till plains *Landform position (two-dimensional):* Backslope *Landform position (three-dimensional):* Side slope *Down-slope shape:* Convex

Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Properties and qualities

Slope: 10 to 30 percent *Depth to restrictive feature:* 10 to 20 inches to lithic bedrock *Drainage class:* Somewhat excessively drained *Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr) *Depth to water table:* More than 80 inches *Frequency of flooding:* None *Frequency of ponding:* None *Calcium carbonate, maximum content:* 1 percent *Available water capacity:* Very low (about 2.3 inches)

Interpretive groups

Farmland classification: Not prime farmland *Land capability (nonirrigated):* 7s *Hydrologic Soil Group:* D

Typical profile

0 to 8 inches: Silt loam *8 to 16 inches:* Silt loam *16 to 20 inches:* Unweathered bedrock

Minor Components Massena

Percent of map unit: 10 percent

Sun

Percent of map unit: 10 percent *Landform:* Depressions

Rock outcrop

Percent of map unit: 5 percent

Data Source Information

Soil Survey Area: Columbia County, New York Survey Area Data: Version 8, Dec 19, 2011