

# **FOREST OBSERVATIONS, DESCRIPTIONS, AND PRESCRIPTIONS**

For

## **QUARRY LOTS MOOSE POND CONSERVATION AREA CALITRI CONSERVATION AREA**

Managed by

**Pelham Forestry Committee**

Located in

Pelham, Hillsborough County, New Hampshire

Prepared by:

**FULL CIRCLE FORESTRY, LLC**

Antrim, NH

**Eric Radlof,**

NH Licensed Professional Forester #447

**January 2024**

# General Landowner Information

## January 2024

**Landowner(s) Name:** Town of Pelham c/o Forestry Committee

**Address:** 6 Village Green, Pelham, NH 03076

**Property Location:** Drummer Road, Lannan Drive and Shepard Road, Pelham, Hillsborough County, NH

**Access:** Drummer Road, Lannan Drive and Shepard Road

**Parcel I.D.: Quarry Lots:**

Map 24/Lot 12-216; 11.50 Ac.

Map 24/Lot 12-210; 2.28 Ac.

**Acreage: 13.78 Ac.**

**Moose Pond Conservation Area:**

Map 24/Lot 12-214; 7.40 Ac.

Map 24/Lot 12-213; 10.24 Ac.

Map 24/Lot 12-41; 29.24 Ac.

Map 24/Lot 12-43-22; 1.23 Ac.

Map 31/Lot 12-43; 2.20 Ac.

Map 31/Lot 11-28; 0.87 Ac.

**Acreage: 51.18 Ac.**

**Calitri Conservation Area:**

Map 25/Lot 12-38; 45.38 Ac.

Map 24/Lot 12-39; 4.69 Ac.

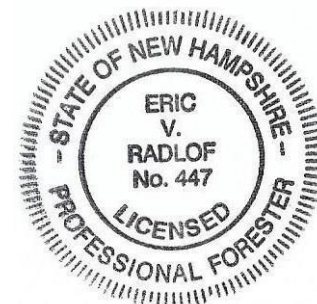
**Acreage: 50.07 Ac.**

**Acreage:** +/-115.03 Acres

**Purchase Date (s):** 1985-2013

**Prepared By:**

Eric V. Radlof  
Full Circle Forestry, LLC  
NH Licensed Professional Forester #447  
113 Old Pound Road  
Antrim, NH 03440  
603-321-3482  
eradlof.fcf@gmail.com

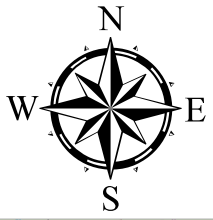


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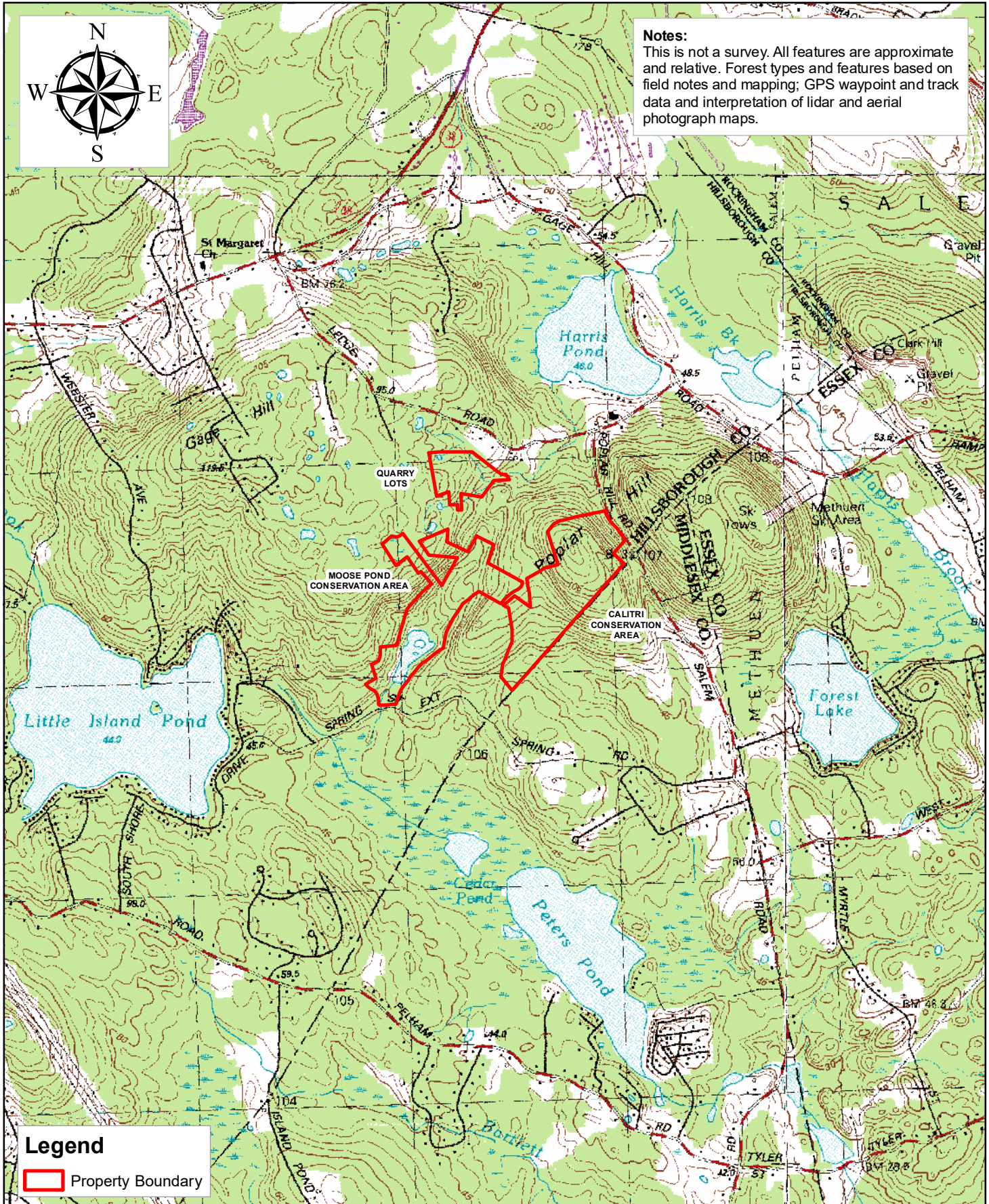
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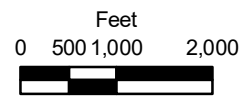
**Notes:**  
This is not a survey. All features are approximate and relative. Forest types and features based on field notes and mapping; GPS waypoint and track data and interpretation of lidar and aerial photograph maps.



**Legend**  
Property Boundary

### Locus Map

**TOWN OF PELHAM**  
Pelham, Hillsborough County, NH  
Drafted and Prepared by:  
Eric Radlof, NHLPF #447



1" = 2,000'

January 2024



## **I. INTRODUCTION**

The Quarry Lots, Moose Pond Conservation Area and the Calitri Conservation Area (QMC) are owned by the Town of Pelham c/o the Forestry Committee; managed as a single unit due to their proximity to each other and shared management considerations. The properties are accessible from Drummer Road, Lannan Drive and Shepard Road in the Town of Pelham, Hillsborough County, New Hampshire, located in the northeastern corner of Pelham, bordering the New Hampshire/Massachusetts Stateline. The properties contain a total of ten separate lots, encompassing 115.03 acres, according to Town records; supported by survey maps, Nashua Regional Planning data and GPS field data. Of the 115.03 acres, 105.85 acres are considered productive forestland covered by the forest management plan.

### **Landowner Goals & Objectives**

A Forest Stewardship Objectives Form was supplied by the Forestry Committee as a first step in forest management planning. The form provides a selection of multiple goals and objectives, further weighed in importance to the landowner. The form allows the Forestry Committee to further state desired goals and objectives beyond what is listed. Goals and objectives are incorporated into data collection and field observations when conducting the forest management plan, producing relevant management recommendations. The Forestry Committee has identified goals and objectives specific to these properties, including:

- Enhance quality and quantity of forest products through appropriately planned silvicultural treatments.
- Protect various non-forest product aspects such as water quality, scenic beauty, privacy and special sites.
- Promote biological diversity, enhance habitat types and control invasive plant species.
- Improve recreational opportunities and access.

The Forestry Committee goals and objectives echo those of the American Tree Farm System balancing wood, water, wildlife and recreation.

### **Forest Management Planning**

Limited documented forest management exists for these properties. The Quarry Lots were often referred to as the Quarry Woodlot or Shepard Street Lot previously and included the northern portion of the now Moose Pond Conservation Area. A forest management plan was written for the Quarry Lots in 1997 with a timber harvest carried out in 1998 in the current footprint Quarry Lots footprint accessible from Shepard Road. The Moose Pond Conservation Area was often associated with the Spring Street Conservation Area but was not included in the 2010 forest management plan. Calitri Conservation Area has limited documentation of prior forest management. Documentation related to this property references boundary line location and designation through blazing and painting.

This forest management plan is the first plan for the Moose Pond Conservation Area and Calitri Conservation Area. The preparation of this forest management plan involved a review of the 1997 Quarry Woodlot Plan, various folders, maps and correspondence from the Forestry Committee over a 20-year period along with NRCS Web Soil Survey and an analysis and summary of the stand data generated from the 2023 inventory. The information presented in this management plan is based on stand data generated from field data collected during the November 2023 forest inventory of the property. The current stand conditions, management recommendations and prescriptions were developed from an analysis of that data. A comparison of current stand conditions to the previous Quarry Lots plan, when applicable, provides insights into any changes that occurred over the last twenty-five years due to tree growth, commercial operations, insect and disease activity, storm events and other phenomenon affecting the forests in our region. This plan is intended as a guide to management and maintenance of the forest for the next ten years with the objective of improving stand vigor, health and quality.

### **Boundary and Survey Information**

Boundary lines for this property are variable in representation and visibility. Corner monumentation is visible in the form of iron pipes, stone bounds or old grade stakes. Stone walls often represent a boundary line but are

considered incomplete or intermittent, often veering off line or incomplete. Where stone walls are absent, barbed wire is often found. However, barbed wire is often absent or undiscernible at times due to age, decay and disturbance. Barbed wire does not always follow the exact boundary line closely. Evidence of traditional blazing and painting is found in varying degrees and representations throughout all the properties at the prior efforts of the Forestry Committee and their forester. Much of the blazing and painting observed is older and in need of refreshing before becoming undiscernible and lost. Flagging of varied ages, colors and condition was observed along some boundary lines, part of prior reconnaissance and subdivision of abutting land. Town of Pelham boundary markers we also observed near some boundary lines but not found on the boundary, often representing prior boundary line locations before lot line adjustments.

Deed descriptions, tax maps, surveys, field evidence and prior forest management plan maps were referenced to locate boundary lines. Preliminary review of the boundary lines was conducted during the field work portion of the forest management plan. Additional time and effort will be required to continue to locate boundary lines before forest management work is planned.

A cursory search for deed and survey information resulted in a variety of deeds and surveys of abutting properties and portions of properties covered by this forest management plan. Deeds and survey information is located within Forestry Committee files or can be obtained from the Hillsborough County Registry of Deeds.

Corner monuments, deed descriptions, surveys, and the field evidence described in those deeds and/or depicted on a survey (fences, walls, land features, blazed lines....) collectively define property boundaries. Clearly marked boundaries protect property owners from adverse possession claims and timber trespass, demonstrate use and occupancy and define the limits of ownership and management. Blazing, followed by painting is the traditional method for marking boundaries; this method also provides the best and longest lasting evidence of a property line. The blaze creates a durable scar that can be detected for decades. Blazes are a method for visually defining property boundaries and for navigating between monuments.

Continued blazing and painting of boundaries is highly recommended for this property to clearly redefine boundary lines. Foresters are not considered licensed surveyors unless licensed as such. Foresters with Full Circle Forestry, LLC make no claim to be licensed surveyors. Blazing and painting can only occur when boundary evidence is visible. Where boundary line evidence is lacking, only a licensed surveyor can reestablish the boundary line location.

### **Recommendations**

- Seek the services of a licensed NH surveyor to confirm boundary lines where evidence is limited.
- Research abutters and provide a letter to each explaining the importance of marking boundaries, describe the process and options and hopefully obtain written permission to blaze and paint common boundaries.
- Maintain boundary lines by painting blazes at 5 to 7-year intervals and re-blazing and painting at 15 to 20-year intervals.

### **Access**

Access to each of the properties is good and supports future forest management opportunities. A small landing area was utilized off Shepard Road for the Quarry Lots and can continue to serve as an access point with future improvements. Moose Pond Conservation Area is accessible from Drummer Road. No existing landing areas exist at this location, but a landing area can be created in the future. Secondary access points to the property include Piper Lane and Lannan Drive. These access points will need further reconnaissance and offer less opportunity for access at this point. Calitri Conservation Area is also accessible from Drummer Road, directly across the street from Moose Pond Conservation Area. Calitri Conservation Area will require the construction of a small access road and landing to gain appropriate access into the property for future forest management opportunities.

Access within the properties is considered good. Old skid trails and woods/farm roads lend opportunity for future management infrastructure. An extensive system of hiking trails often coincides with these trails. Many of the hiking trails will have to coincide with future forest management trails as these trails are often placed in the best location for equipment to operate with the least amount of ground disturbance.

Wetlands, streams and intermittent drainages break up the properties at various locations, limiting access or



requiring temporary measures such as skidder bridges or poled fords to cross. Areas with poorly drained, sensitive soils will be excluded from future forest management due to their fragile condition. Forest management adjacent to these areas within the property will be limited to periods of dry or frozen ground conditions to limit impact to the various ground conditions and soil types encountered. On occasion, steep ground conditions and excessive rockiness will limit forest management. This is limited to Moose Pond Conservation area. Moose Pond sits within a bowl with terrain sloping towards the pond, creating challenging access for forest management adjacent to the pond in the southern portion of the property. Forest management will need to directly interface with hiking trails.

A detailed description of soils information will appear later in this forest management section within the **Soils Information** section.

### **Terrain/ Topography**

The terrain within these properties is typical of the surrounding landscape, rolling terrain broken up by wetland areas and drainages. The properties sit between the western summit of Poplar Hill (385') and Gage Hill (374'). The Quarry Lots are located on the northeastern shoulder of Gage Hill. Moose Pond Conservation Area is positioned in a valley between both hills and Calitri Conservation Area is located on the summit and southern portion of Poplar Hill. The properties exist within the Merrimack River Watershed and directly contribute to Cedar Pond (Dracut, MA), Peters Pond (Dracut, MA), Bartlett Brook and eventually the Merrimack River.

Areas of steep slopes were observed in the western portion of Moose Pond Conservation Area and the northern portion of Calitri Conservation Area. The steepness of these areas limits the potential for forest management and may be deemed inaccessible. Excessive rockiness was observed in the northwestern portion of Moose Pond Conservation Area around old "quarry" sites. Soils are thin and contain fewer organic components, sensitive to forest management activity but hiking trails navigate these areas and lend opportunity to future access points for forest management.

Pockets of poorly drained soils and drainages are located within the depressions of the rolling terrain. Drainages are considered seasonal and intermittent in nature, limiting opportunities for access due to surrounding saturated soils conditions. Seeps were often observed either within these drainages or adjacent to drainages. Most of the properties are otherwise considered well-drained.

## **II. STAND DEVELOPMENT**

Forest development is influenced by bedrock, soil, water, climate and disturbance. Shade tolerant species such as eastern hemlock, red spruce, American beech and sugar maple can reproduce and survive under low light levels. Intolerant species, such as paper birch or aspen require full sunlight to reproduce and thrive. Numerous other species fall in between both ends of the spectrum and are classified as intermediate in tolerance. The complex dynamic of forest succession occurs at different rates within stands on the property and across the landscape. These shifts are affected by past management practices, environmental factors and natural disturbances, such as wind events and ice storms.

These disturbances, human and natural, both further influence and/or interrupt what may otherwise appear to be an orderly stand progression from early-successional to "old forest" stands. Some stand transitions or progressions are readily apparent, while others are more nuanced and challenging to both detect and to predict. These successional tendencies and developmental phases are important to identify; they impact future forest composition and structure and heavily influence stand prescriptions. Stands within the properties often display even-aged structure or even-aged (two-aged) structure due to prior forest management or lack of forest management, resulting in mature forests.

## **Disturbance**

Natural and human disturbances play an integral role in stand development. These disturbances manifest themselves in many forms: timber harvesting, pre-commercial silvicultural treatments, ice and snow damage, wind and rain events (tropical storms, tornadoes and hurricanes), herbivory, invasive plants and insects and biotic and abiotic pathogens.

Forests are subject to many natural disturbances, some small and frequent in occurrence and others extensive and infrequent. Single tree fall is the most common disturbance both in the region's forests and on the subject properties. This form of disturbance is caused primarily by wind, ice loading and/or natural mortality, expressing itself in canopy gaps created by single trees or small groups of trees.

Limited wind damage was noted during the inventory. Signs of snow and ice damage were periodically observed in bent hardwood saplings and poles along with partial crown damage within the hardwoods. Damage from prior ice storms (2008) and the 2011 Halloween Nor'easter is still evident in hardwood crowns. Wind-throw and other disturbances allow greater light levels to reach the forest floor, modify micro-climate and frequently expose mineral soil, thereby providing a seedbed for plants. Disturbances, visualized as waves impacting the forest over time, encourage stand complexity and diversity. Human disturbances, in the form of silvicultural treatments, both pre-commercial and commercial (timber harvesting) can mimic natural disturbances. Timber harvesting has resulted in the largest widespread form of disturbance to these properties, specifically Calitri Conservation Area.

## **Herbivory**

Herbivory, particularly by white-tail deer, is a significant disturbance factor in southern New Hampshire. White-tail deer browsing was evident on the property. Seedlings and saplings below the browse line (+/-6') display varying degrees of browse and are generally absent. Limited hardwood regeneration of commercial and desirable species was observed progressing and developing above the browse line. Regeneration is generally absent or sparse in distribution and inadequate in quality. Notable regeneration includes black oak, red oak, white oak, paper birch and sweet birch observed at or above the browse line often displaying signs of prior browse. White ash, yellow birch and red maple were heavily browsed.

## **Recommendations**

- Periodically monitor the property to note (changes in) the browse intensity.
- Consider using treetops and branches from timber harvesting to protect seedlings from browse.
- Explore intensive silvicultural treatments designed to promote desirable regeneration and slow browse.

## **Invasive Plants**

Invasive plants are a disturbance factor with significant negative impacts for the region's forests. Many invasive alien plants were intentionally introduced from Europe or Asia for ornamental plantings, erosion control, and wildlife food throughout the past.

These alien plants have influenced forest composition, particularly the understory, in the region. Invasive plants are frequently found in or near agricultural areas, particularly along field edges, in younger forests, especially abandoned farmland reverting to forest and in other forest areas that experience disturbance. The fruits of these plants are consumed by various wildlife species, most notably birds, who transport and spread seeds throughout the landscape. Invasive plants displace native species, suppress forest succession and create localized monocultures if left unchecked. These plants and their continued spread are a threat to the composition and functioning of the forest ecosystem throughout the region.

Invasive plants can, and do, displace native woody species. Disturbance, in any form, including silvicultural treatments (logging, creating early-successional habitat, pre-commercial treatments...) improve conditions for invasive plants and promote their spread. The preference by deer for browsing native species provides an additional advantage to these alien plants.



Invasive plant species are present on the property in light populations. Notable areas of invasive plants include oriental bittersweet in the eastern portion of the Quarry Lot, along the hiking trail. Additionally, the greater Moose Pond area of Moose Pond Conservation area, in the western and southern portion of the property adjacent to Moose Pond contains oriental bittersweet, glossy buckthorn, multiflora rose and Japanese barberry. Finally, Calitri Conservation Area contains the least amount of invasive plant species, concentrated to a drainage in the southcentral portion of the property, containing scattered Japanese barberry.

Control of invasive plant species is recommended to prevent further spread and to aid in maintaining natural habitat types. If left untreated, the further spread of invasive plant species is inevitable. Future forest management activities will create opportunities for additional spread and infestation into the forestland of the property. Herbicide use must always be applied by a licensed pesticide applicator following all label instructions. The label is the law. (In New Hampshire, a landowner may apply pesticides, only on their land without a license, following all label instructions and regulations). Forestry Committee members can become licensed in a "not for hire" capacity to treat invasive plant on lands managed by the Forestry Committee.

Scattered populations within the remainder of the property can be hand pulled as encountered but are not a high priority to treat at this time as populations are sparse and not cost effective to treat.

### **Recommendations**

- Continually monitor the property for the presence of invasive plants; specifically openings in the canopy.
- Treat while populations are small to ensure successful and economical control (early detection, rapid response).
- Implement control measures to reduce populations.
- Utilize cost-share opportunities, as applicable, to aid in the control of invasive plants.
- Consider population densities and the ability to effectively manage the current population.

### **Pathogens and diseases**

Pathogens and diseases are real threats to the trees of New Hampshire's forests. During the fieldwork portion of this management plan observations were taken in regard to pathogens and diseases. The following addresses the most common pathogen and disease and how they relate to the property:

**Pine canker** (*Caliciopsis pinea*) typically prevalent in dense pine stands, particularly on, but not limited to, soils with a hardpan layer. This fungus reduces crown density, thereby reducing tree vigor and growth. Trees and stands infected with pine canker are also more susceptible to other pathogens and environmental stresses, such as needle casts and blights which have occurred frequently over the last five plus years. This disease may affect long-term survival of infected trees. Symptoms include significant crown dieback, an increase in crown transparency (light foliage) and pitch flow between whorls in the mid to upper stem where bark is thin. This fungus is not well understood; it was first identified in New Hampshire in 1997. Thinning infected stands to increase light levels, temperature, and air flow, and thereby reducing moisture levels, may reduce the incidence of the fungus and mitigate its impact on tree health. This strategy appears to yield mixed results. White pine is a component of these properties, representing 18% of the total basal area. White pine canker was noted within suppressed or weak intermediate crown positions, notably in the Calitri Conservation Area. Pine canker is generally absent from the remainder of the properties due to prior management resulting in open residual stand structure.

**White pine blister rust** is a fungus which infects and kills white pine. The spores enter the needles of the tree and travel through a branch(s) to the main stem. The infected branch dies and creates a "flag", or dead limb. The fungus eventually girdles and kills the infected tree; pitching and a constriction, with a corresponding swelling of the stem above, is found at the point of entry on the stem. The visual indicators of blister rust are always observed at a branch whorl, unlike pine canker, which displays pitch between the whorls. Little to no signs of white pine blister rust was observed within the productive forestland. White pine blister rust is generally absent from the property due to prior management resulting in open residual stand structure. When observed, white pine canker was noted within suppressed or weak intermediate crown positions.

**Eutypella Canker of Maple** is caused by a fungus, and primarily affects sugar maple in forested situations. The

fungus normally affects less than 10% of the sugar maple stems in a stand, but higher incidence rates can occur. It acts by attacking host trees during dormancy, with the host tree responding with callus development during the growing season, creating concentric ridges of callus tissue, dead bark, and a flattened area on the bole, but tends to be arranged in a more circular pattern. Concerns include bole degradation, girdling of smaller stems, and weakening of wood in the canker region, leading to susceptibility to breakage. Control measures are achieved via removal of infected stems to reduce the chance of infecting neighboring stems. Red maple (<1% of total basal area) and sugar maple (5% of total basal area) are minor components of these properties. Varying degrees of canker were noted, typical for the region and site.

**Perennial Nectria Canker** is caused by a Nectria fungus and is very common in the Northeast. It has the most noticeable effect on black birch, basswood, and yellow birch, although it infects dozens of other hosts. Fungus-host interaction is similar to that described above for Eutypella canker, with the fungus attacking the host tree in the dormant season, and the tree responding with callus growth in the growing season. The resulting canker region has concentric callus ridges and dead bark areas, located on branches and the main stem. The cankers appear circular on basswood and appear more elongated on the birches. The cankers can coalesce and girdle the stem, killing the tree. Bole degradation and decay are the primary concerns, reducing the value of lumber produced from afflicted trees. Control measures are generally ineffectual, given the wide range of host trees. Removal of visibly affected stems will allow capitalization of some timber value, prior to total loss to decay or mortality. Sweet birch and yellow birch are both lesser components (<5% of total basal area) of these properties. Stems display signs of canker typical of the region and site.

**Strumella Canker of Oak** is caused by a fungus, and can be found most commonly in red and black oak. It usually affects less than 5% of oaks in a forested situation, although higher infection rates are known. The activity of the fungus creates a canker on the main stem, usually centered on a branch stub. The fungus is active killing bark during host-tree dormancy. During the growing season, the tree responds by creating callus tissue around the canker margin. This alternating battle can go on for years, and results in a wave of callus ridges, dead bark and wood arranged in a concentric concave, elongated, large, flattened appearance on the stem surrounding the original infection site. Strumella canker rarely kills larger trees; the primary concern is devaluation, since the canker is often found on the most valuable part of the tree, the main stem. Cankers can kill smaller trees via girdling, and the decay associated with the cankers on larger stems can weaken the stem, allowing breakage and subsequent death. Control methods may involve removing those trees with evidence of infection. Oak is a major component (67% of total basal area) of these properties represented through red oak, black oak, scarlet oak and white oak. Few stems were identified with canker, typical of the region.

## **Insects**

Three non-native insects with the capacity to radically alter forest composition loom on the horizon or are present: Asian longhorn beetle, emerald ash borer and Spongy Moth. During the field work portion of this management plan observations were taken in regard to detrimental non-native forest insects. The following addresses the most common non-native insects and how they relate to the property:

**Asian longhorn beetle** (ALB) is responsible for killing thousands of maples, native and alien (Norway), in the Worcester, MA area. The State of NH, Division of Forest and Lands, Forest Health Program is emphasizing both prevention and early detection of this insect. ALB is not currently known to occur in NH. This insect attacks hardwoods, with a particular preference for maples. Red maple (<1% of total basal area) and sugar maple (5% of total basal area) are minor components of these properties, but ALB is still a viable threat for consideration.

The **emerald ash borer** (EAB) infects all species of ash: white, black and green. This insect causes what is believed to be nearly 100% mortality; it will attack trees 2" and greater DBH. EAB was first discovered in the City of Concord, NH in 2013. Subsequently EAB has spread to all counties in NH except for Coos. Vermont, Massachusetts, and New Hampshire are under state-wide quarantine. This allows logs to move within and between each state; firewood may not move across state lines without a compliance agreement from USDA. The State of New Hampshire developed Best Management Practices (BMPs) for limiting the spread of EAB within the infested and high risk areas. The New Hampshire Division of Forests and Lands currently recommends harvesting ash greater than 10" or 12" DBH. Though these small diameter trees are not particularly valuable for logs, the Division believes that eliminating larger trees will reduce the habitat for emerald ash borer and thereby reduce

the ability of this insect to expand its population as rapidly. Emerald ash borer has been identified in Pelham (2017) and the surrounding towns. Signs of emerald ash borer were observed during the field work portion of this forest management plan along with additional white ash decline. White ash makes up a minor component of the species composition of these properties (<1% of the total basal area) and mostly observed outside of inventory points.

**Spongy moth** (*Lymantria dispar*), formerly known as the gypsy moth, is an important defoliating insect of hardwoods in New Hampshire. A native of Europe and Asia, spongy moth was introduced into North America in 1869 when specimens were accidentally released in Medford, Massachusetts. Spongy moth is an outbreak pest and can remain at low levels for several years and then numbers can rise every few years. Many might remember the outbreaks in the early 1980s and 1990s. Unless areas are actively monitored, even moderate spongy moth populations can exist unnoticed. Although these cycles are influenced by numerous factors, the low populations in New Hampshire in recent years generally are believed to be the result, at least in part, of a spongy moth disease caused by the fungus *Entomophaga maimaiga*. A recommended best management practice is not to harvest timber in a stand defoliated by spongy moth until three (3) years after the outbreak subsides. Trees need time to recharge their starch reserves without additional root and soil stress. Signs of spongy moth were not observed during the field work portion of this forest management plan. Oak is a major component (67% of total basal area) of these properties represented through red oak, black oak, scarlet oak and white oak. Spongy moth is the greatest threat to these properties and should be monitored closely.

## **Climate**

The impacts of climate change will result in temperature shifts, variations in disturbance regimes, and altered precipitation levels, all of which will influence our forests. All of these factors and more are already being observed within the past decade. Current predictions indicate that this region will likely become both warmer and wetter; the typical frost-free growing season has already increased by a total of ten days. Winters are likely to be shorter and more precipitation is likely to fall as rain in the future. Species composition and ranges are predicted to shift over time. White pine, red maple, northern red oak, white oak, sweet birch, hickories and black cherry are all predicted to remain stable in the various climate change scenarios. Red spruce, balsam fir, sugar maple and paper and yellow birch are predicted to decline over time. White oak will likely expand its range northward; it will become more prevalent in future stands. Species composition within this property suggests a moderate to high level of resiliency moving forward as many of the species present are projected to remain stable.

Stand development patterns may not conform to those historically experienced. Disturbance regimes and patterns are expected to shift. Large scale weather events, particularly rainstorms and the resulting flooding, accompanied by high winds, are expected to occur more frequently and cause more damage. Many of the impacts and implications of a shifting climate are unknown; however, such changes will create added challenges for both foresters and landowners. Additionally, climate change may create conditions conducive to both alien exotic insects and plants and potentially aid their spread. Forest management will continue focusing on retaining a diversity of species and size classes on the landscape to further promote resiliency.

## **Recommendations**

- Enhance health, vigor and diversity of forest stands to reduce impacts of drought, storms and pests.
- Increase structural diversity by regenerating new cohorts to promote native desirable vegetation.
- Reduce abundance of high-risk trees (succumb to mortality between entries) to reduce loss and hazard.
- Protect water quality, habitats and their buffers to create cover to increase shade and cooling along with opportunity for long lived species to reside in the buffers.
- Retain dominant and well-formed trees to allow for wind firm stand structure.
- Promote legacy trees, snags and underrepresented species to promote structural diversity.
- Develop forest management trail structure considering extreme rain events and extended periods of wet weather.

### **III. MULTIPLE USE VALUES**

#### **Cultural Features**

Review of ground penetrating LIDAR imagery reveals a variety of stone walls and old roads within the properties, some of which are barely discernable in the field. These traces of past agrarian use provide a reminder of just how extensively the original forests were cleared or utilized to raise livestock and crops and how aggressively the forests have regrown after such intensive and extensive disturbance. Old quarry sites were observed just off the property between the Quarry Lots and Moose Pond Conservation Area. Care should be taken to minimize disturbance to foundations or wells both observed and not observed during the forest inventory.

#### **Recommendations**

- Protect cultural features. Maintain the current condition of these features wherever possible and enhance them if and when desirable. Make every attempt to minimize disturbance of historical features on the property when harvesting timber or constructing trails and roads.
- Preserve representation of trees that existed when the land was open, regardless of their species, size, form or condition. These are also historical landscape features.

#### **Wildlife Features**

The Quarry Lots, Moose Pond Conservation Area and Calitri Conservation Area add supporting forest cover within a larger landscape allowing for larger "wild" forested areas to exist. This area of New Hampshire is dominated by residential, suburban, and urban areas further divided by roadways and highways. Forested areas such as these are crucial for maintaining forest cover and habitat for a variety of wildlife species. Additional conservation lands are scattered throughout the immediate landscape and contribute to maintaining forest cover. Future management of the property shall consider the properties placement within this landscape and how it contributes to maintaining forest cover.

Large trees, some with cavities, occur occasionally on the property within the productive forestland; defective red oak, black oak, scarlet oak and white pine with cavities occur. Many of these individuals display open grown characteristics of coarse limbs, poor timber quality and wide-spreading crowns. Down woody material was not inventoried but appeared to occur at typical or slightly less than typical regional levels. Broken topped live trees, encountered rarely, provide ideal perch sites for hunting raptors. These structural components add complexity to the landscape and provide a variety of habitat for a wide array of wildlife.

Hard mast is comprised primarily of red oak, black oak, white oak, scarlet oak and hickory. Seeds from various hardwood species and hardwood shrubs provide an excellent source of food for a variety of migratory birds and small mammals throughout the year. Soft mast producers such as high bush blueberry, low bush blueberry and maple leaf viburnum occur on the property.

The softwood component of this property is composed primarily of white pine and a minor component of hemlock. Hemlock seeds are less desirable than other softwood species such as white pine or red pine but the foliage provides winter feeding opportunities for white-tailed deer and snowshoe hares. Hemlock is also known for its ability to provide cover for grouse, turkey, fishers, and other interior forest dwelling mammals. During the winter, hemlock provides excellent thermal cover for moose and white-tailed deer.

Early-successional habitat afforded by extensive, dense young stands is generally absent on the property. Future management of the property will consider maintaining a portion of the property in this habitat type.

A variety of wildlife utilizes this property; white-tailed deer are ubiquitous on the property and throughout towns in southern New Hampshire. A variety of migratory birds, small mammals, and birds of prey utilize this forest habitat type for both shelter and a food source. Mammals such as coyote, bobcat and fox pass through these areas in search of smaller mammals such as mice, voles and rabbits. Large mammals such as moose and black bear utilize this property within their geographical range but will not reside solely on a property of this size and may be absent from the property for years at a time.

## **General Wildlife Conditions and Considerations**

Larger group selection harvests, patch cuts and low residual density shelterwood harvests, all with perpetual retention, are the best harvesting strategies to establish sufficient hardwood regeneration to provide sufficient stems for both herbivores and the future forest on sites suitable for hardwoods.

Management of the forest will generally focus on creating a diversity of species and size classes, emphasizing species that are long-lived and that possess high timber values.

Identify, designate by marking with tree paint and retain legacy trees, cavity trees along with potential trees for future recruitment of snags, cavity trees and retained organic material (retained organic material (ROM), or down woody material) when designing and implementing forest management activities to provide both habitat and forest structure within the forest.

## **Threatened/Endangered Species, Special Sites, Forests of Recognize Importance, and Unique Natural Communities**

During the forestland examination, no species were identified as either threatened or endangered. Contact with the Natural Heritage Program further determined that no species were identified as either threatened or endangered within this property. See the Appendix for the attached Natural Heritage Report for further details.

Analysis of the NH Wildlife Action Plan (2020) revealed Appalachian oak- pine and hemlock-hardwood-pine as the dominant cover types on the property. Temperate swamp, wet meadow/shrub wetland and open water types were also identified. Portions of the properties are ranked as Supporting Landscape. Calitri Conservation Area and Moose Pond Conservation Area, with a small portion of Moose Pond Conservation Area considered Highest Ranked Habitat in the Biological Region. Meaning this area of wildlife habitat is in the best relative condition, particularly for Species of Greatest Conservation Need. This information can be expanded upon and used as part of decision making processes related to future uses of the property.

Additional information is found at: [NH Wildlife Action Plan | State of New Hampshire Fish and Game](#)

## **Recreational Features and Uses**

The Forestry Committee highly values their properties for scenic beauty and recreational opportunities. A network of multi-use trails currently exists on the properties as part of the Calitri Family Conservation Area, including Calitri Conservation Area, Moose Pond Conservation Area and Spring Street Town Forest. These trails primarily include hiking trails and snowmobile trails. Remnants of old skid trails and woods roads also exist, all of which are noted on the property map. The Forestry Committee wants to continue to improve recreational opportunities for the properties. In recent years signage has greatly improved for many of these trails. Bridges have been installed over sensitive areas such as streams and drainages while fencing has been put up to protect wetland areas where unwanted wheeled recreation has occurred.

Future forest management activities will reuse existing skid trails and woods roads, many of which contain portions of hiking or snowmobiling trails. Forest management trails can be laid out to reduce their impact to the existing hiking trail structure. Landing areas can be converted to small parking areas and utilized as such between forest management operations.

Signs of hunters/ hunting were observed throughout the property. Tree stands of varying ages and conditions were encountered during the field work portion of the forest management plan. Deer hunting is always encouraged to maintain local deer population as a method to control intensive deer browse.

ATV tracks were observed on all of the properties in varying degrees.

## **Recommendations**

- Improve water control measures on trails to eliminate the movement of sediment.
- Limit recreational disturbance to environmentally sensitive areas on the property and during wet times of year.
- Construct additional hiking trails on the property to less traveled areas.
- Incorporate special sites, unique features and vistas into hiking trail layout.

## **Timber**

The Quarry Lots were last harvested in 1998. This resulted in a thinning which removing mature, at-risk and inferior trees resulting in a well-spaced dominant white pine and red oak stand type, allowing for increased growth of the residual stand. Portions of the Moose Pond Conservation Area display signs of limited prior harvesting 40+ years ago with no recent signs. The northern portion of the property still contains trees marked with blue paint from 1998 which is barely discernable. Calitri Conservation Area displays signs of being heavily harvested 40+ years ago throughout much of the central portion of the property. The current stand structures suggest the harvesting intensity was variable throughout the property targeting white pine. No additional harvesting has occurred since then on the properties. A list of management strategies on a stand-by-stand basis is discussed later in this plan.

# **IV. EXAMINATION METHOD & FOREST TYPE CLASSIFICATION**

## **Forest Inventory and Stand Classification**

These properties were inventoried in November 2023 by Eric Radlof of Full Circle Forestry, LLC, assisted by Ryan Fleury. The inventory grid was established at 300' intervals running in cardinal directions parallel and perpendicular, referenced to true north. The inventory grid was transferred into GIS and onto a handheld GPS unit which was utilized to navigate and locate samples. Samples were dropped that fell into inoperable areas of the property. A total of 44 samples were measured on 105.85 acres of "working" commercial forest (productive forestland) for an average sampling intensity of one per 2.40 acres. Seven commercial, productive forest stands were delineated because of the inventory. Areas within this working forest may be excluded from timber harvesting to protect water, soil and fragile sites, or because they are inaccessible or inoperable. Conditions within forested wetlands and areas deemed inoperable/ inaccessible were noted through visual observation.

Forest trees were sampled using a ten basal area factor (10 BAF) prism during the inventory. At each sample point all trees over 6" at diameter breast height (DBH) were tallied by species, 2" diameter classes, crown class, and timber growing stocking category, Acceptable Growing Stock (AGS) or Unacceptable Growing Stock (UGS). AGS is defined as a crop tree managed to meet any given landowners' objective as a commercial tree species containing one 16-foot log or two non-contiguous 8- foot logs, or that have the potential to produce these products in the future. UGS is defined as a tree not capable of producing a desired product or service, typically quantified by ability to produce sawlogs. Both AGS and UGS are in reference to growing stock, further defined as a tree or trees that currently provides a desired product or service, usually quantified as sawlog production, or trees that are currently too small to contain a log, but that possess the necessary characteristics to produce a future sawlog, potential sawlog trees.

Additional notes pertaining to individual trees were made regarding form, damage and cavities. The inventory data from the property was processed using Forest Metrix to generate stand and stocking tables. Data was referenced with stocking guides and stocking levels allowing for comparison of existing number of trees and square feet of basal area in a stand to the amount desired for optimum growth of diameter and volume.

## **Soil Classification and Forest Typing**

Soils information was obtained from the Web Soil Survey (WSS), an online tool that provides soil data and information produced by the National Cooperative Soil Survey. WSS is operated by the USDA Natural Resources

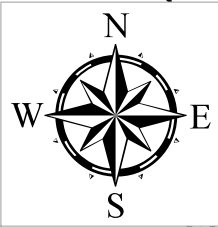
Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. The site is updated and maintained online as the single authoritative source of soil survey information.

Forest types were classified with the publication by the Society of American Foresters (SAF): Forest Cover Types of North America, copyright 1954, reprinted 1975 and Forest Cover Types of the United States and Canada, F. H. Erye, Editor, revised and published in 1980 were used to define what a stand type is. The publication defines a forest type as: "A descriptive term used to group stands of similar character as regards composition and development due to given ecological factors by which they may be differentiated from other groups of stands." Further, "A cover type is a forest type now occupying the ground, no implication being conveyed as to whether it is temporary or permanent." The bulletins emphasize composition instead of development as the basis for identifying forest types and utilize the following principles to recognize them:

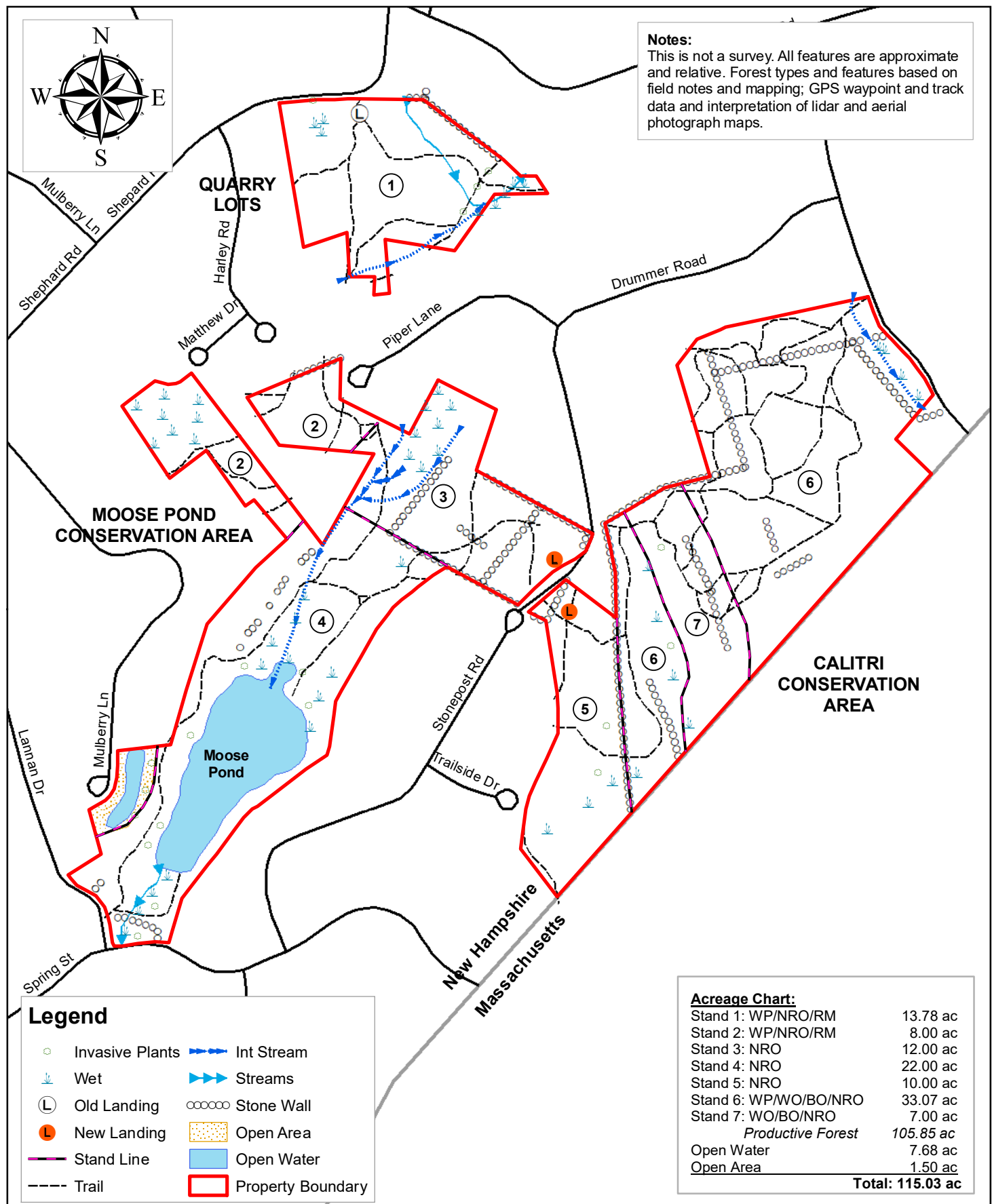
"The cover type occupies large areas in aggregate. The type does not necessarily cover a large area in a single stand, but composition is characteristic and typical throughout a considerable range".

"The cover type is distinctive and easily separated from other types that it closely resembles. Transition areas are always found in the field and result from natural occurrences, including those of man".





**Notes:**  
 This is not a survey. All features are approximate and relative. Forest types and features based on field notes and mapping; GPS waypoint and track data and interpretation of lidar and aerial photograph maps.



**Legend**

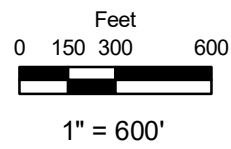
- Invasive Plants
- Int Stream
- Wet
- Streams
- Old Landing
- New Landing
- Open Area
- Open Water
- Property Boundary
- Trail
- Stone Wall

**Acres Chart:**

Stand 1: WP/NRO/RM	13.78 ac
Stand 2: WP/NRO/RM	8.00 ac
Stand 3: NRO	12.00 ac
Stand 4: NRO	22.00 ac
Stand 5: NRO	10.00 ac
Stand 6: WP/WO/BO/NRO	33.07 ac
Stand 7: WO/BO/NRO	7.00 ac
<b>Productive Forest</b>	<b>105.85 ac</b>
Open Water	7.68 ac
Open Area	1.50 ac
<b>Total:</b>	<b>115.03 ac</b>

**Forest Type and Land Features Map**

**TOWN OF PELHAM**  
 Pelham, Hillsborough County, NH  
 Drafted and Prepared by:  
 Eric Radlof, NHLPF #447



January 2024



## V. FOREST PLAN STAND SUMMARIES

### **Stand # 1 Eastern White Pine/Northern Red Oak/Red Maple (SAF #20)**

**Acreage:** 13.78 Ac

**Soil type (% slope):** (CsC) Chatfield-Hollis complex, 8-15% slopes, rocky; (CmC) Canton fine sandy loam, 8 to 15% slopes, very stony; (CnD) Canton very stony fine sandy loam, 15-35% slopes (in descending order by area of stand)

**Ecological Site:** Well Drained Till Uplands

**Forest Soil Group:** IB

**Sampling: Date:** November 2023; **Protocol:** 6"+ DBH & by crown class;

**Method:** Point, 10 BAF; **#:** 5 (1/2.76 ac)

**Stand History:** Prior harvesting +/-1998; Thinning (Ferguson +/-1998)

**Health Issues:** White pine canker and blister rust, light canker in hardwoods

**Invasive Plants:** Scattered, light; autumn-olive along Shepard Road, oriental bittersweet in southern portion of the stand along hiking trail.

**Species Composition (% Main Crown BA):** Red Oak 43%, Scarlet Oak 27%, White Pine 14%, Red Maple 10%, Bitternut Hickory 2%, Paper Birch 2% and Back Oak 2%

**Structure:** Multi-aged **Stocking:** Adequate **AGS:** 58 sq. ft. **UGS:** 30sq. ft. **Total:** 88 sq. ft. **MSD:** 13" **TPA:** 108

**Stand Description:** Stand 1 is located within the Quarry Lots and makes up the balance of the acreage. The stand type is a combination of white oak/black oak/red oak (SAF #52) and eastern white pine/northern red oak/red maple (SAF #20) forest types, being labeled as the latter due to a closer representation. The stand is situated on a southeasterly aspect. Soils are moderately/well-drained higher on the slope where white pine and mixed oak are more abundant. Lesser drained soils occur along drainages, within depressions and lower on the slope containing higher populations of red oak and red maple. Bedrock controlled sites in the western portion of the stand result in shallow soils and subsurface bedrock, limiting site productivity and species composition. Mixed oak and white pine occur at reduced height and diameter, poorer form and quality.

Within the stand, red oak and scarlet oak are the most abundant (10-20"+ at dbh) growing in good form and quality, often found growing together. White pine (12-24"+ at dbh) is growing in good form and quality, well-spaced from prior management. Red maple becomes more abundant in the southern portion of the stand (6-14"+ at dbh) growing with variable quality. Bitternut hickory (6-16" at dbh), paper birch (6-14" at dbh) and black oak (6-12" at dbh) are considered associates and interspersed throughout the stand. White ash (6-14" at dbh) of average quality was observed but did not fall within a sample point.

This stand is comprised of 65% AGS and 35% UGS. Most species carry a high percentage of AGS. Red oak contains 37% UGS, scarlet oak contains 42% UGS and red maple contains 75% UGS, often containing defects, poor growth form and lacking vigor. Prior forest management focused on and will continue to retain site suited species red oak, scarlet oak and white pine. Stocking guides are not referenced for this stand due to the multiage structure of the stand of at least three age classes.

Desirable regeneration is sparse, scattered or patchy, based on site conditions and considered inadequate. When observed, regeneration consists of mixed oak and white pine. Low bush blueberry, highbush blueberry and maple leaf viburnum were observed. Witch hazel was observed where soils are less well-drained.

Access within the stand is good due to an extensive network of skid trails from prior harvesting. An existing landing area is located off Shepard Road and can service this stand in the future. Two main drainages with seasonal flows limit access to the eastern and southern portions of the stand.

**Silvicultural objective:** Even-aged management; promote mixed oak and white pine

**Diam. Objectives:** Red oak 20-24" at dbh; white pine 20-24" at dbh

**Estimated current age:** 90-100+ years

**Cut Cycle:** 20+ years

**Silvicultural Prescription:** The stand structure contains three separate cohorts, the youngest cohort contains inadequate pole stocking while the middle cohort often contains poorly form trees with low vigor and defect. The majority of AGS is within the dominant and codominant cohort. Consider regeneration measure such as the Irregular Shelterwood method characterized by a relatively long, extended period of regeneration, generally greater than 20% of the rotation, and the retention of a portion of the over- wood to achieve optimal size, quality and value for some period, which may be undetermined. The stand resulting from this method includes two age classes that are maintained for long periods, sometimes the entire rotation. This method does not produce three or more age classes and the resultant uneven- aged condition. This variation is frequently associated with managing mixed stands, though can also be utilized in pure stands. Retained trees are composed of vigorous dominants and co-dominants, as typical of the other shelterwood methods, as well as trees in the lower crown classes, providing that they are capable of responding favorably to release. This variation of the shelterwood method results in more structurally diverse stands than those produced using the "conventional" uniform shelterwood method and seems to straddle the "divide" between conventional evenaged and unevenaged management. The adjective irregular refers primarily to the variations in trees heights, or vertical structure.

Coarse dominant overstory trees with little value can be cut and left in place to add down woody material. Trees may also be girdled and left standing creating additional snags on the landscape. Retain legacy trees as applicable for additional stand structure. Avoid areas containing highly erodible soils within bedrock-controlled sites. Remove hazardous trees posing a hazard to the hiking trails.

**Desired Future Conditions:** The stand will contain well-formed and well distributed red oak , scarlet oak and white pine dominants and co-dominants; to a lesser degree well-formed bitternut hickory and red maple as encountered. Main crown basal area will be reduced to 30-50 sq. ft. Establish and/or encouraged desirable regeneration of mixed oak and white pine with good growth form and crown development in the lower crown classes.

## **Stand # 2 Eastern White Pine/Northern Red Oak/Red Maple (SAF #20)**

**Acreage:** 8.0 Ac

**Soil type (% slope):** (CsC) Chatfield-Hollis complex, 8-15% slopes, rocky and (CnD) Canton very stony fine sandy loam, 15-35% slopes (in descending order by area of stand)

**Ecological Site:** Well Drained Till Uplands

**Forest Soil Group:** IB

**Sampling: Date:** November 2023; **Protocol:** 6"+ DBH & by crown class;

**Method:** Point, 10 BAF; #: 4 (1/2.00 ac)

**Stand History:** No recent harvesting

**Health Issues:** White pine canker and blister rust, light canker in hardwoods

**Invasive Plants:** None were observed

**Species Composition (% Main Crown BA):** Scarlet Oak 36%, Red Oak 31%, White Pine 26%, Beech 5% and Black Oak 2%

**Structure:** Even-aged **Stocking:** Adequate **AGS:** 52 sq. ft. **UGS:** 52. ft. **Total:** 104 sq. ft. **MSD:** 12" **TPA:** 140

**Stand Description:** Stand 2 is located within Moose Pond Conservation Area and resides in the northwestern corner of the property between Cobblestone Road and Piper Lane. Similar to stand 1, this stand type is a combination of white oak/black oak/red oak (SAF #52) and eastern white pine/northern red oak/red maple (SAF #20) forest types, being labeled as the latter due to a closer representation. This stand shares many similarities with stand 1 and lends evidence to stand 1's condition prior to harvesting in 1998.

The stand is situated on a southeasterly aspect with the western portion of the stand being level and picking up more slope heading easterly. Soils are well-drained throughout the stand except for a small, forested wetland in the southwestern portion of the stand. Much of the eastern portion of the stand includes bedrock-controlled sites with thin soils and exposed rock, limiting site productivity and species composition. Tree quality, height and abundance diminish within these areas.

Within the stand, red oak and scarlet oak are the most abundant (10-24"+ at dbh) growing in variable form and quality. White pine (12-28"+ at dbh) is growing in good form and quality. Beech, black oak and white oak (6-14" at dbh) occur less frequently and are considered associates. Paper birch and red maple (6-14" at dbh) of varying quality were observed but did not fall within a sample point.

This stand is comprised of 50% AGS and 50% UGS. Drier, nutrient deficient sites and lack of prior forest management contribute to the higher percentage of UGS. Red oak contains 53% AGS but scarlet oak only contains 20% AGS. White pine sampled in this stand contains 100% AGS and over 50% of the total AGS within the stand. Black oak and beech contained 100% UGS along with 47% of the red oak and 80% of the scarlet oak due to defects, poor growth form and lacking vigor.

Total stocking is at the "B" line for mixedwood stocking guides. AGS is below the "C" Line for mixedwood stocking guides. Varying degrees of stagnation and mortality were observed within the white pine and hardwood saplings/poles. Regeneration is considered inadequate with scattered heavily browsed mixed oak saplings. Low bush blueberry, highbush blueberry, maple leaf viburnum and hawthorn were observed.

Access within the stand is variable. The forested wetland in the southwestern corner is considered inaccessible for forest management activities. The eastern portion of the stand poses access issues due to steep slopes and excessive rockiness. A main hiking trail accesses this area in the northern portion of the stand but poses

recreational challenges in conjunction with forest management activities. Furthermore, forest products will need to navigate multiple drainages in stand 3 heading to a new landing area off of Drummer Road to the east.

**Silvicultural objective:** Even-aged management; promote mixed oak and white pine

**Diam. Objectives:** Red oak 20-24" at dbh; white pine 20-24" at dbh

**Estimated current age:** 90-100+ years

**Cut Cycle:** 20+ years

**Silvicultural Prescription:** AGS is below the "C" line, resulting in an understocked stand. There is not enough critical mass to continue to carry the stand. Therefore, this stand can be regenerated through the use of various methods. Utilize the Shelterwood Method (preparatory) for future regeneration; this method closely resembles low thinnings, but with expanded objectives. Preparatory cuttings are conducted to prepare the stand for regeneration by removing undesirable species and trees (weaker, low-vigor individuals) from the lower crown classes to strengthen and improve the vigor of trees retained for the subsequent establishment and removal cuttings. However, it is essential to avoid creating conditions that are more favorable to the establishment of undesirable species, especially those more shade tolerant shrubs and trees that may impede the desired species from regenerating. This treatment can be combined with Establishment and Seed Tree treatments depending on site conditions and desired future conditions, removing the least desirable and vigorous trees (UGS) and retaining the largest, most vigorous and best-formed trees of desirable species.

Coarse dominant overstory trees with little value can be cut and left in place to add down woody material. Trees may also be girdled and left standing creating additional snags on the landscape. Retain legacy trees as applicable for additional stand structure. Avoid areas containing highly erodible soils within bedrock-controlled sites and areas of poorly drained soils.

**Desired Future Conditions:** The stand will contain well-formed and well distributed red oak, scarlet oak and white pine dominants and co-dominants. Main crown basal area will be reduced to 50-80 sq. ft. Establish and/or encouraged desirable regeneration of mixed oak and white pine with good growth form and crown development in the lower crown classes. Consider aesthetics to hiking trails and abutting landowners when planning future forest management activities. Remove hazardous trees that pose a hazard to hiking trails.

### **Stand # 3 Northern Red Oak (SAF #55)**

**Acreage:** 12.0 Ac

**Soil type (% slope):** (CmC) Canton fine sandy loam, 8-15% slopes, very stony; (CnD) Canton very stony fine sandy loam, 15-35% slopes; (StB) Scituate stony fine sandy loam, 3-8% slopes and (CsC) Chatfield-Hollis complex, 8-15% slopes (in descending order by area of stand)

**Ecological Site:** Well Drained Till Uplands; Moist Dense Till Uplands

**Forest Soil Group:** IB; IA

**Sampling: Date:** November 2023; **Protocol:** 6"+ DBH & by crown class;

**Method:** Point, 10 BAF; #: 5 (1/2.40 ac)

**Stand History:** No recent harvesting; old blue paint from 1998(?)

**Health Issues:** Light canker in hardwoods

**Invasive Plants:** None were observed

**Species Composition (% Main Crown BA):** Red Oak 67%, Scarlet Oak 14%, Black Oak 9%, Sweet Birch 4%, Beech 2%, Yellow Birch 2% and White Oak 2%

**Structure:** Even-aged **Stocking:** Over/Adequate **AGS:** 76 sq. ft. **UGS:** 14 sq. ft. **Total:** 90 sq. ft. **MSD:** 13" **TPA:** 80

**Stand Description:** Stand 3 is located within Moose Pond Conservation Area and resides in the northern portion of the property, east of stand 2, to Drummer Road. This stand type closely resembles northern red oak (SAF #55) with aspects of white oak/black oak/red oak (SAF #52) forest types. The stand is situated on a southerly/southwesterly aspect. Soils are well-drained throughout much of the stand, becoming deeper and less well-drained in the western portion of the stand where multiple drainages occur. These drainages originate from a small, forested wetland in the northern tip of the stand. Species diversity and productivity increased throughout this area and the adjacent uplands.

Within the stand, red oak is the most abundant (10-20"+ at dbh) growing with good form and quality. Scarlet oak occurs less frequently (10-16"+ at dbh) growing with good form and quality. Black oak, sweet birch, yellow birch, and white oak (8-14"+ at dbh) are considered associates, scattered throughout, varying in form and quality. Sugar maple and red maple (8-16" at dbh) were observed in the western portion of the stand of varying quality and form but did not fall within any inventory points. White pine (12-20"+ at dbh) was observed throughout the stand growing in good form and quality but did not fall within any inventory points.

This stand is comprised of 76% AGS and 14% UGS. Red oak contains 80% AGS while scarlet oak contains 100% AGS. Black oak, sweet birch, yellow birch, and white oak vary between 75% and 100% AGS. Black oak contains 25% UGS and red oak contains 20% UGS due to defects, poor growth form and lacking vigor.

Total stocking is between the "A" and "B" line for hardwood stocking guides. AGS is just above the "B" Line for hardwood stocking guides. Regeneration is considered inadequate with scattered heavily browsed mixed oak saplings. Low bush blueberry, highbush blueberry, maple leaf viburnum and hawthorn were observed. Witch hazel was also observed where soils are less well-drained.

Access within the stand is good with direct access to Drummer Road. The poorer ground conditions in the western portion of the stand will limit access to dry or frozen ground conditions. Sensitive sites will be excluded from forest management activity. Hiking trails and old woods roads are scattered throughout the stand. Future forest management activity will have an impact to these trails. A new landing area will need to be constructed along Drummer Road to support forest management activities in the stand as well as the rest of Moose Pond Conservation Area.

**Silvicultural objective:** Even-aged management; promote red oak but retain species diversity

**Diam. Objectives:** Red oak 20-24" at dbh; other hardwoods 16-18" at dbh

**Estimated current age:** 60-70+ years

**Cut Cycle:** 20+ years

**Silvicultural Prescription:** Total stocking is between the "A" and "B" line for hardwood stocking guides. AGS is just above the "B" Line. This stand can benefit from thinning. Thinnings are performed to control growth, adjust composition and improve timber quality. Various thinning methods and applications are available and utilized. These methods refer to a single operation, not a sequence thereof or a "system". Based on stand composition and structure, a recommended type of thinning is Crown Thinning or thinning from above or high thinning, involving removing trees in the mid and upper portions of the range of crown and diameter classes. This method removes trees in the upper crown classes to open the canopy and to favor the development of the most promising trees in these same crown classes. Co-dominants compose most of the trees removed, but intermediates and dominants that interfere with the development of the chosen crop trees are also removed. Crown thinnings stimulate growth without sacrificing volume production but may sacrifice quality. Crown thinnings are applied in two manners: 1) uniformly in a stand (area wide thinning); or 2) by selecting a relatively few trees for release that will be carried to the end of the rotation (crop tree release). Evidence indicates that the total yield in cubic feet/acre from crown thinnings is no greater than from a comparable series of low thinnings.

Coarse dominant overstory trees with little value can be cut and left in place to add down woody material. Trees may also be girdled and left standing creating additional snags on the landscape. Retain legacy trees as applicable for additional stand structure. Avoid areas containing highly erodible soils within bedrock-controlled sites and areas of poorly drained soils.

**Desired Future Conditions:** The stand will contain well-formed and well distributed red oak dominants and co-dominants. Main crown basal area will be reduced to 50-70 sq. ft. Consider aesthetics to hiking trails and abutting landowners when planning future forest management activities. Remove hazardous trees that pose a hazard to hiking trails.



## **Stand # 4 Northern Red Oak (SAF #55)**

**Acreage:** 20.0 Ac

**Soil type (% slope):** (CnD) Canton very stony fine sandy loam, 15-35% slopes; (CmC) Canton fine sandy loam, 8-15% slopes, very stony; (StB) Scituate stony fine sandy loam, 3-8% slopes and (Cu) Swansea muck peat, 0 to 2% slopes (in descending order by stand area)

**Ecological Site:** Well Drained Till Uplands; Moist Dense Till Uplands

**Forest Soil Group:** IB; IA; NC (in descending order by stand area)

**Sampling: Date:** November 2023; **Protocol:** 6"+ DBH & by crown class;

**Method:** Point, 10 BAF; #: 9 (1/2.40 ac)

**Stand History:** No recent harvesting; old skid trails and stumps observed (minimal)

**Health Issues:** Light canker in hardwoods

**Invasive Plants:** Light, scattered; oriental bittersweet along hiking trail in southwestern area of stand; glossy buckthorn, multiflora rose, Japanese barberry north side of Moose Pond

**Species Composition (% Main Crown BA):** Red Oak 60%, Scarlet Oak 15%, White Pine 12%, White Oak 6%, Black Oak 3%, Bitternut Hickory 2%, Beech 1% and Red Maple 1%

**Structure:** Even-aged **Stocking:** Fully **AGS:** 88 sq. ft. **UGS:** 6. ft. **Total:** 94 sq. ft. **MSD:** 15" **TPA:** 60

**Stand Description:** Stand 4 is located within Moose Pond Conservation Area and is located to the south of stand 3, extending southerly to Spring Street. This stand type closely resembles northern red oak (SAF #55) with aspects of white oak/black oak/red oak (SAF #52) forest types. This is the largest stand on the property and the dominant stand type. The stand is situated in a bowl within the landscape with a general southerly/southwesterly aspect. Soils are well-drained throughout much of the stand, becoming deeper and less well-drained along the northern edge of Moose Pond and the northwestern corner of the property where drainage occurs. Species diversity and productivity increase throughout this area and the adjacent uplands due to deeper, nutrient rich soils.

Within the stand, red oak is the most abundant (12-28"+ at dbh) growing with good form and quality. Scarlet oak occurs less frequently (12-24"+ at dbh) growing with good form and quality. White pine is scattered throughout the stand (16-26"+ at dbh) also growing with good form and quality. White oak, black oak, bitternut hickory, beech and red maple (12-20"+ at dbh) are considered associates, occurring less in the stand, varying in form and quality. White ash and paper birch (12-18" at dbh) were observed in the northern portion of stand varying in quality and form but did not fall within any inventory points.

This stand is comprised of 93% AGS and 7% UGS. Stand structure suggests prior forest management in the stands history but limited signs of visible stumps (severely decayed) were observed. Species and site characteristics contribute to UGS. Red oak contains 96% AGS while scarlet oak contains 85% AGS. White oak and white pine also contain between 85-100% UGS. Black oak, bitternut hickory and beech contain 100% UGS although encountered less. Red maple is the largest contributor to UGS at 100%.

Total stocking is between the "A" and "B" line for hardwood stocking guides. AGS is also above the "B" Line for hardwood stocking guides. Regeneration is considered inadequate with scattered heavily browsed mixed oak saplings. Low bush blueberry, highbush blueberry, maple leaf viburnum and hawthorn were observed. Witch hazel was also observed where soils are less well-drained.

Access within the stand is good with access to Drummer Road through stand 3. Secondary access to Lannan

Drive and Spring Street is possible but doesn't support larger scale forest management activities. Poorer ground conditions in the northwestern portion of the stand and along the northern edge of Moose Pond will limit access to dry or frozen ground conditions. Sensitive sites will be excluded from forest management activity. Hiking trails and old woods roads are scattered throughout the stand. Future forest management activity will impact these trails. The portion of stand to the west of Moose Pond will need to utilize the same footprint as the hiking trail causing significant impact. A new landing from Drummer Road in stand 3 will service forest management activities throughout this stand.

***Silvicultural objective:*** Even-aged management; promote red oak but retain species diversity

***Diam. Objectives:*** Red oak and white pine 20-24" at dbh; other hardwoods 16-18" at dbh

***Estimated current age:*** 100+ years

***Cut Cycle:*** 10+ years

***Silvicultural Prescription:*** Total stocking is between the "A" and "B" line for hardwood stocking guides. AGS is also above the "B" Line. This stand can benefit from thinning. Thinnings are performed to control growth, adjust composition and improve timber quality. Various thinning methods and applications are available and utilized. These methods refer to a single operation, not a sequence thereof or a "system". Based on the stand composition and structure, a recommended type of thinning is Crown Thinning or thinning from above or high thinning involving removing trees in the mid and upper portions of the range of crown and diameter classes. This method removes trees in the upper crown classes to open the canopy and to favor the development of the most promising trees in these same crown classes. Co-dominants compose the majority of the trees removed, but intermediates and dominants that interfere with the development of the chosen crop trees are also removed. Incorporate Free Thinnings within areas of the stand that are somewhat irregular in age, diameter, density and/or composition to release trees without regard to crown position; essentially a combination of low, high and selection thinnings. The implementation of these two systems may mimic the structure and purpose of a shelterwood by creating conditions favorable to regenerate desirable tree species. The establishment and release of desirable regeneration will be necessary in future forest management activities to ensure a healthy and resilient forest stand.

Coarse dominant overstory trees with little value can be cut and left in place to add down woody material. Trees may also be girdled and left standing creating additional snags on the landscape. Retain legacy trees as applicable for additional stand structure. Avoid areas containing highly erodible soils within bedrock-controlled sites, steep slopes and areas of poorly drained soils.

***Desired Future Conditions:*** The stand will contain well-formed and well distributed red oak dominants and co-dominants. Main crown basal area will be reduced to 50-70 sq. ft. Consider aesthetics to hiking trails and abutting landowners when planning future forest management activities. Remove hazard trees that pose a hazard to hiking trails.

**Stand # 5 Northern Red Oak (SAF #55)**

**Acreage:** 10.0 Ac

**Soil type (% slope):** (CmC) Canton fine sandy loam, 8-15% slopes, very stony;

**Ecological Site:** Well Drained Till Uplands

**Forest Soil Group:** IB

**Sampling: Date:** November 2023; **Protocol:** 6"+ DBH & by crown class;

**Method:** Point, 10 BAF; #: 5 (1/2.00 ac)

**Stand History:** No recent harvesting

**Health Issues:** Light canker in hardwoods

**Invasive Plants:** Light, Japanese barberry individuals in southern portion of stand

**Species Composition (% Main Crown BA):** Red Oak 58%, White Pine 20%, Scarlet Oak 17%, Black Oak 8 %, Paper Birch 2%, Red Maple 2 % and White Oak 2%

**Structure:** Even-aged **Stocking:** Fully **AGS:** 100 sq. ft. **UGS:** 16 sq. ft. **Total:** 116 sq. ft. **MSD:** 16"

**TPA:** 85

**Stand Description:** Stand 5 is located in the southwestern portion of the Calitri Conservation Area. Similar to other stand types on these properties, this stand type closely resembles northern red oak (SAF #55) with aspects of white oak/black oak/red oak (SAF #52) forest types. The stand is situated on a southerly aspect. Soils are well-drained throughout the majority of the stand, becoming deeper and less well-drained along the southern edge of the stand where a small forested wetland and a drainage occurs. Site productivity increases throughout this area and the adjacent uplands due to deeper, nutrient rich soils.

Within the stand, red oak is the most abundant (12-28"+ at dbh) growing with good form and quality. White pine is scattered throughout the stand (16-30"+ at dbh) also growing with good form and quality. Scarlet oak occurs less frequently (10-18"+ at dbh) growing with good form and quality. Black oak, paper birch, red maple and white oak (10-18"+ at dbh) are considered associates, occurring less in the stand, varying in form and quality. White ash, bitternut hickory and sweet birch (8-18" at dbh) were observed in the northern portion of stand with varying quality and form but did not fall within any inventory points.

This stand is comprised of 86% AGS and 14% UGS. Stand structure suggests prior forest management in the stands history but limited signs of visible stumps were observed. Species and site characteristics contribute to UGS. Red oak contains 93% AGS and white pine contains 100% AGS while scarlet oak contains 70% AGS. Additional species present in this stand contain 75-100% AGS. Black oak contains 50% UGS while paper birch contains 100% UGS, common on drier sites.

Total stocking is between the "A" and "B" line for hardwood stocking guides, approaching the "A" line. AGS is also above the "B" Line for hardwood stocking guides. Regeneration is considered inadequate with scattered heavily browsed mixed oak saplings and stagnant white pine saplings. Low bush blueberry, highbush blueberry, maple leaf viburnum and hawthorn were observed. Witch hazel was also observed where soils are less well-drained.

Access within the stand is good with direct access to Drummer Road. The construction of a new landing in this stand with access from Drummer Road can service all of Calitri Conservation Area. Poorly drained soils in the southern portion of the stand and sensitive sites will be excluded from forest management activity. Hiking trails and old woods roads are scattered throughout the stand. Future forest management activity will impact these

trails via crossing or utilizing portions of the trails.

**Silvicultural objective:** Even-aged management; promote red oak but retain species diversity

**Diam. Objectives:** Red oak 20-24" at dbh; other hardwoods 16-18" at dbh, white pine 20"-24" at dbh

**Estimated current age:** 100+ years

**Cut Cycle:** 10+ years

**Silvicultural Prescription:** Total stocking is between the "A" and "B" line for hardwood stocking guides. AGS is also above the "B" Line. This stand can benefit from thinning. Thinnings are performed to control growth, adjust composition and improve timber quality. Various thinning methods and applications are available and utilized. These methods refer to a single operation, not a sequence thereof or a "system". Based on the stand composition and structure, a recommended type of thinning is a Free Thinning within areas of the stand that are somewhat irregular in age, diameter, density and/or composition to release trees without regard to crown position, essentially a combination of low, high and selection thinning. Incorporate Crown Thinning (thinning from above or high thinning) to remove trees in the mid and upper portions of the range of crown and diameter classes. This method removes trees in the upper crown classes to open the canopy and to favor the development of the most promising trees in these same crown classes. The implementation of these two systems may mimic the structure and purpose of a shelterwood by creating conditions favorable to regenerate desirable tree species. The establishment and release of desirable regeneration will be necessary in future forest management activities to ensure a healthy and resilient forest stand.

Coarse dominant overstory trees with little value can be cut and left in place to add down woody material. Trees may also be girdled and left standing creating additional snags on the landscape. Retain legacy trees as applicable for additional stand structure. Avoid areas containing poorly drained soils.

**Desired Future Conditions:** The stand will contain well-formed and well distributed red oak dominants and co-dominants. Main crown basal area will be reduced to 60-80 sq. ft. Consider aesthetics to hiking trails and abutting landowners when planning future forest management activities. Remove hazard trees that pose a hazard to hiking trails.

**Stand # 6 Eastern White Pine (SAF # 21)/White Oak/Black Oak/Red Oak (SAF#52)**

**Acreage:** 33.07 Ac

**Soil type (% slope):** (MtD) Montauk fine sand loam, 15-25%; (MtC) Montauk fine sandy loam 3-8% (CmC) Canton fine sandy loam, 8-15% slopes, very stony; (in descending order by stand area)

**Ecological Site:** Well Drained Dense Till Uplands; Well Drained Till Uplands (in descending order by stand area)

**Forest Soil Group:** IA;IB (in descending order by stand area)

**Sampling: Date:** November 2023; **Protocol:** 6"+ DBH & by crown class;

**Method:** Point, 10 BAF; #: 13 (1/2.54 ac)

**Stand History:** No recent harvesting, evidence of harvesting 40+ years ago

**Health Issues:** Light canker in hardwoods, white pine canker/ blister rust in suppressed white pine

**Invasive Plants:** Light, Japanese barberry individuals in southern portion of stand

**Species Composition (% Main Crown BA):** White Pine 28%, Scarlet Oak 28%, Red Oak 12%, Black Oak 12%, Sweet Birch 8%, Red Maple 8%, White Oak 2%, Yellow Birch 1% and bitternut hickory 1%

**Structure:** Two-aged **Stocking:** Under **AGS:** 52 sq. ft. **UGS:** 23 sq. ft. **Total:** 75 sq. ft. **MSD:** 14" **TPA:** 63

**Stand Description:** Stand 6 is the largest stand type within Calitri Conservation Area, bisected by stand 7 in the southern portion of the stand. This stand type closely resembles both eastern white pine (SAF #21) with areas of white oak/black oak/red oak (SAF #52) forest types. Prior forest management created a patchwork of both types throughout the stand area. The stand is situated on a southwesterly aspect with a plateaued height of land located in the northern portion of the stand. The northernmost portion of the stand slopes steeply to the north toward Poplar Hill Road.

Soils are well-drained/excessively well-drained throughout most of the stand, becoming less well-drained along the southern edge of stand where a drainage occurs in stand 7. Site productivity is variable throughout the stand and directly related to soil depth, drainage class and available nutrients. Soils within this stand are considered loamier and more nutrient rich.

Within the stand, white pine and scarlet oak are the most abundant (14-24"+ at dbh) growing with good form and variable quality. Scattered, open grown scarlet oak individuals were observed exceeding 32" at dbh of variable quality. Red oak and black oak are distributed throughout the stand (14-26"+ at dbh); form and quality directly related to site conditions within the stand. Sweet birch, red maple white oak, yellow birch and bitternut hickory (8-18"+ at dbh) are considered associates, occurring less in the stand, varying in form and quality. White ash and paper birch (8-18" at dbh) were observed in the stand with varying quality and form but did not fall within any inventory points.

This stand is comprised of 68% AGS and 32% UGS. Stand structure supports prior forest management in the stand's history but limited signs of visible stumps (severe decay) were observed. Prior forest management, species and site characteristics contribute to UGS. Of the trees sample, white pine contains 100% AGS while the mixed oak averages between 50% and 66% AGS except for white oak which is 100% UGS. Red maple, sweet birch and yellow birch, although less frequently encountered, include 75% to 100% AGS while bitternut hickory consists of 100% UGS.

Total stocking and AGS is below the "C" line for mixed wood stocking guides. A second pole sized age class exists within this stand. Sweet birch, paper birch, grey birch and mixed oak (2-6" at dbh) are found throughout the stand

in varying densities and quality. White pine poles (2-6"+ at dbh) were also observed but often succumbing to mortality. Pole stocking became established because of prior harvesting decades ago. Desirable quality stems do exist within this age class, however many of the stems are suppressed or have been damaged by weather events. Sweet birch appears to be the strongest competitor lower on the slope. Regeneration is considered inadequate with scattered heavily browsed mixed oak saplings and stagnant white pine saplings. Low bush blueberry, highbush blueberry, maple leaf viburnum and hawthorn were observed. Witch hazel was also observed where soils are less well-drained.

Access within the stand is good with access to Drummer Road through stand 5 and stand 7. A new landing off Drummer Road will service this stand too. Poorly drained soils in the southern portion of the stand and sensitive sites will be excluded from forest management activity. Steep slopes in the northern portion of the stand will limit activity as well. Many hiking trails and old woods roads are scattered throughout the stand. Future forest management activity will impact these trails via crossings or utilizing portions of the trails.

***Silvicultural objective:*** Even-aged management; promote white pine and red oak but retain species diversity

***Diam. Objectives:*** Red oak 20-24" at dbh; other hardwoods 16-18" at dbh, white pine 20"-24" at dbh

***Estimated current age:*** 80-90+ years

***Cut Cycle:*** 20+ years

***Silvicultural Prescription:*** With total stocking and AGS below the "C" line, there is not enough critical mass to continue to carry the stand. As a result, this stand can be regenerated utilizing the irregular shelterwood method. The irregular shelterwood method characterized by a relatively long, extended period of regeneration, generally greater than 20% of the rotation, and the retention of a portion of the over-wood to achieve optimal size, quality and value for some period, which may be undetermined. The stand resulting from this method includes two age classes that are maintained for long periods, sometimes the entire rotation. This method does not produce three or more age classes and the resultant uneven- aged condition. This variation is frequently associated with managing mixed stands, though can also be utilized in pure stands.

Retained trees are composed of vigorous dominants and co-dominants, as typical of the other shelterwood methods, as well as trees in the lower crown classes, providing that they can respond favorably to release. This variation of the shelterwood method results in more structurally diverse stands than those produced using the "conventional" uniform shelterwood method and seems to straddle the "divide" between conventional even-aged and uneven-aged management. The adjective irregular refers primarily to the variations in trees heights, or vertical structure.

Coarse dominant overstory trees with little value can be cut and left in place to add down woody material. Trees may also be girdled and left standing creating additional snags on the landscape. Retain legacy trees as applicable for additional stand structure. Avoid areas containing highly erodible soils within areas of poorly drained soils.

***Desired Future Conditions:*** The stand will contain well-formed and well distributed white pine and mixed oak dominants and co-dominants. Main crown basal area will be reduced to 20-40 sq. ft. Desirable pole stocking will be released and continue to develop as part of this treatment. Consider aesthetics to hiking trails and abutting landowners when planning future forest management activities. Remove trees that pose a hazard to hiking trails.

## **Stand # 7 White Oak/Black Oak/Red Oak (SAF#52)**

**Acreage:** 7.0 Ac

**Soil type (% slope):** (CmC) Canton fine sandy loam, 8-15% slopes, very stony;

**Ecological Site:** Well Drained Till Uplands

**Forest Soil Group:** IA;IB (in descending order by stand area)

**Sampling: Date:** November 2023; **Protocol:** 6"+ DBH & by crown class;

**Method:** Point, 10 BAF; #: 3 (1/2.33 ac)

**Stand History:** No recent harvesting, evidence of harvesting 40+ years ago

**Health Issues:** Light canker in hardwoods

**Invasive Plants:** Light, scattered; Japanese barberry

**Species Composition (% Main Crown BA):** Red Oak 27%, Bitternut Hickory 20%, White Oak 20%, Sweet Birch 12%, Black Oak 7%, Red Maple 7% and Scarlet Oak 7%

**Structure:** Two-aged **Stocking:** Under **AGS:** 30 sq. ft. **UGS:** 20 sq. ft. **Total:** 50 sq. ft. **MSD:** 15" **TPA:** 44

**Stand Description:** Stand 7 is a small stand type within Calitri Conservation Area, which bisects the southern portion of stand 6. This stand shares similarities with stand 6, however the white pine component is absent, closely resembling white oak/black oak/red oak (SAF #52) forest type. Prior forest management was extensive and focused on removing white pine. The stand is situated on a southwesterly aspect at the toe of slope. Soils are less well-drained throughout the stand with a drainage occurring in the middle of the stand. Site productivity is improved due to soil depth, drainage class and more available nutrients. Surface rock/rockiness is more prevalent within the stand compared to adjacent stands.

Within the stand, red oak is the most abundant (12-22"+ at dbh) growing with good form and quality. Bitternut hickory and white oak (10-16" at dbh) commonly occur within drier sites in the stand. Sweet birch and red maple (8-12" at dbh) vary in quality, occupying sites adjacent to the drainage. Black oak and scarlet oak (12-18"+ at dbh) are distributed with red oak, sometimes occurring together on drier sites with variable quality and form. White ash and paper birch (8-18" at dbh) were observed in the stand with varying quality and form but did not fall within any inventory points.

This stand is comprised of 60% AGS and 40% UGS. Stand structure is directly related to prior forest management in the stand's history, visible stumps were observed. Prior forest management, species and site characteristics contribute to the higher percentage of UGS. Of the trees sample, red oak and bitternut hickory contained 100% AGS, while sweet birch and white oak contained between 33% and 50% AGS. All other species encountered within this stand contained 100% UGS.

Total stocking and AGS is below the "C" line for hardwood stocking guides. Like stand 6, a pole sized age class exists within this stand. Sweet birch, paper birch, grey birch and mixed oak (2-6" at dbh) are found throughout the stand in varying densities and quality. White pine poles (2-6"+ at dbh) were observed less frequently. This pole stocking became established because of prior harvesting decades ago. Desirable quality stems do exist within this age class, however many of the stems are suppressed or have been damaged by weather events. Sweet birch appears to be the strongest competitor. Regeneration is considered inadequate with scattered heavily browsed mixed oak saplings and stagnant white pine saplings. Low bush blueberry, highbush blueberry, maple leaf viburnum and hawthorn were observed. Witch hazel was also observed where soils are less well-drained.



Access within the stand is good with access to Drummer Road through stand 5. A new landing from Drummer Road will service this stand too. Poorly drained soils in the central portion of the stand and sensitive sites will be excluded from forest management activity. Hiking trails exist within this stand. Future forest management activity will impact these trails via crossings or utilizing portions of the trails.

***Silvicultural objective:*** Even-aged management; promote red oak but retain species diversity

***Diam. Objectives:*** Red oak 20-24" at dbh; other hardwoods 16-18" at dbh

***Estimated current age:*** 80-90+ years

***Cut Cycle:*** 20+ years

***Silvicultural Prescription:*** With total stocking and AGS below the "C" line, there is not enough critical mass to continue to carry the stand. As a result, this stand can be regenerated utilizing the irregular shelterwood method. The irregular shelterwood method characterized by a relatively long, extended period of regeneration, generally greater than 20% of the rotation, and the retention of a portion of the over-wood to achieve optimal size, quality and value for some period, which may be undetermined. The stand resulting from this method includes two age classes that are maintained for long periods, sometimes the entire rotation. This method does not produce three or more age classes and the resultant uneven-aged condition. This variation is frequently associated with managing mixed stands, though can also be utilized in pure stands.

Retained trees are composed of vigorous dominants and co-dominants, as typical of the other shelterwood methods, as well as trees in the lower crown classes, providing that they are capable of responding favorably to release. This variation of the shelterwood method results in more structurally diverse stands than those produced using the "conventional" uniform shelterwood method and seems to straddle the "divide" between conventional even-aged and uneven-aged management. The adjective irregular refers primarily to the variations in trees heights, or vertical structure.

Coarse dominant overstory trees with little value can be cut and left in place to add down woody material. Trees may also be girdled and left standing creating additional snags on the landscape. Retain legacy trees as applicable for additional stand structure. Avoid areas containing highly erodible soils within areas of poorly drained soils.

***Desired Future Conditions:*** The stand will contain well-formed and well distributed mixed oak dominants and co-dominants. Main crown basal area will be reduced to 20-30 sq. ft. Desirable pole stocking will be released and continue to develop as part of this treatment. Consider aesthetics to hiking trails and abutting landowners when planning future forest management activities. Remove trees that pose a hazard to hiking trails.

## ***Open Water (Moose Pond)***

***Acreage:*** 7.68 Ac

***Soil type(s):*** (W) Water; (Cu) Swansea mucky peat, 0-2% slopes (in descending order by area of stand)

***Ecological Site:*** Water; Acidic Organic Wetlands

***Forest Soil Group:*** NA

***Sampling: Date:*** November 2023; ***Protocol:*** No samples taken; ocular exam

***Stand History:*** NA

***Health Issues:*** NA

***Invasive Plants:*** Light populations along stand edges; oriental bittersweet and glossy buckthorn most common

***Description:*** This area includes Moose Pond in the southern portion of the Moose Pond Conservation Area. Areas such as this are broken out from forestland for their purpose of being noted and retained in their natural state. An intermitted drainage/stream flow enters the pond in the northwestern corner and exists the southern edge of the stand a where a manmade dam exists. Water levels vary throughout the year and during periods of high available water or drought. Speckled alder, high bush blueberry, sedges and various ferns and mosses make up much of the vegetation along the shores of the pond. This pond serves multiple functions on the landscape; it provides hydrological benefits and provides habitat for a variety of amphibians, small mammals, and migratory birds.

***Management objective:*** Maintain the pond and its hydrological function.

***Management Prescription:*** Retain forest buffers in adjacent stands to minimize soils disturbance and protect water quality. Treat invasive plant species as applicable. Treatment will require the use of a Watershed Special Permit with the NH Division of Pesticide Control to apply herbicides within 25' of surface waters.

## ***Open Area***

***Acres:*** 1.5 ac

***Soil type(s):*** (CnD) Canton very stony fine sandy loam, 15-35% slopes

***Sampling: Date:*** November 2023; ***Protocol:*** No samples taken; ocular exam

***Stand History:*** This area was created to function as a retention basin for the adjacent Mulberry Lane.

***Invasive Plants:*** Moderate populations; Oriental bittersweet, autumn olive, glossy buckthorn and multiflora rose; along the stand (eastern) edges

***Description:*** This small stand contains a grassy open area. The area appears to be mowed however the eastern edge contains unmaintained slopes which have become occupied by invasive plant species.

***Management objective:*** Control invasive plant species; prevent further spread into Moose Pond Conservation area.

***Management Prescription:*** Periodically mow in the fall annually or once every 3 years to maintain an open state. Control invasive plant species to reduce their colonization and spread within the open area. Pair invasive plant control the following growing season once the area is mowed.

## V. SUMMARY

Forests are diverse and continually changing. They are influenced by underlying bedrock, soils, drainage, slope, position on the slope, climate, weather and human use. These properties are typical of the region; the current conditions are directly attributable to the land use practices of yesterday. Undoubtedly, human influence, natural succession and disturbance, along with the unknown influences of climate change and invasive plants and insects, will continue to shape the character of this forest.

Properties such as this pose a variety of management challenges. One of the biggest challenges to this property is the presence of invasive plant species. Invasive plant species are often opportunistic and out-compete native vegetation. This can eventually lead to a shift in the ecosystem and loss of habitat types. For a property located in southern New Hampshire, populations are currently low. By deploying early detection rapid response, the current populations can easily be kept at a controllable level. This work is recommended to be done before the disturbance of forest management activities or immediately following. If left unmanaged, the chance for successful control will become limited due to invasives plants opportunistic abilities. The ecological sites that occupy this property are susceptible to invasive plant infestation.

Another challenge for these properties is the extensive network of recreational trails. Trails are a wonderful enhancement to many properties allowing for greater access to enjoy a property for a variety of reasons. As discussed in the plan, the trails will be heavily impacted during forest management activities. Outreach and managing expectations need to occur during the planning process of forest management activities. Recreation and forest management can occur in unison with good communication and setting expectations.

Another challenge to managing properties such as these relate to a social aspect. These properties are surrounded by houses on all sides allowing for high visibility. The extensive trail network within these properties further magnifies this visibility. Consider extensive outreach efforts during the planning process of forest management, allowing those in the surrounding area to become familiarized with the process of managing properties such as these. When carrying out forest management, consider increased aesthetics (visually and buffered).

These properties allow for multiple strategies of forest management. Forest management is recommended for each forested stand within the next 10 years. A variety of even-aged silvicultural systems are recommended for the majority of the property. Shelterwood systems can be employed to start or build upon regeneration and pole stocking while retaining AGS. Implementing an Irregular Shelterwood when applicable can build on desirable cohorts established during prior forest management. Forest management needs to "move the dial" to create conditions favorable for shade intolerant species. A variety of thinnings can be implemented to tend stands and promote growth of desirable dominant and codominant tree species where AGS stocking is higher. Future forest management will focus on maintaining a variety of tree species and size classes on the properties. Retain legacy trees for additional structure and carbon benefits. Forest management will refrain from disrupting sensitive sites; this includes areas of poorly drained soils to areas of thin soils, shallow to bedrock. Portions of these properties will remain in their natural state in perpetuity; allowing for the forest to progress naturally and increase biodiversity on the landscape.

Finally, consider the construction of new landing areas off of Drummer Road for both Moose Pond Conservation Area and Calitri Conservation Area. These landing areas can also be utilized as trailhead parking between forest management activities every 10-20 years. Existing access from Shepard Road can be improved to support lighter scale forest management activities within the Quarry Lots.

Carrying out the recommendations within this forest management plan will result in sound management of the forest stands and the property. The recommendations proposed in this forest management plan can be implemented over the next 10 years and beyond, although timing will depend on landowner priorities, market conditions, and environmental conditions such as pest outbreaks and weather. These recommendations are silviculturally and operationally sound and will result in meeting the landowner's objectives for their property. Implementing these recommendations will help ensure this forestland is being managed with long-term sustainability in mind.

Respectfully Submitted,



Eric V. Radlof, Consulting Forester  
Full Circle Forestry, LLC  
N. H. License #447



**Management Schedule**

See each stand for additional information.

Treatment Year	Stand #	Management Activity
2024-2027	NA	Continue reconnaissance, (re)blaze and paint boundary lines.
2024-2025	All	Conduct invasive plant control based on stand recommendations.
2024-2033	All	Conduct forest management activities based on stand recommendations.
2024-2033	All	Continue to improve recreational opportunities thought the properties.

**NOTES**

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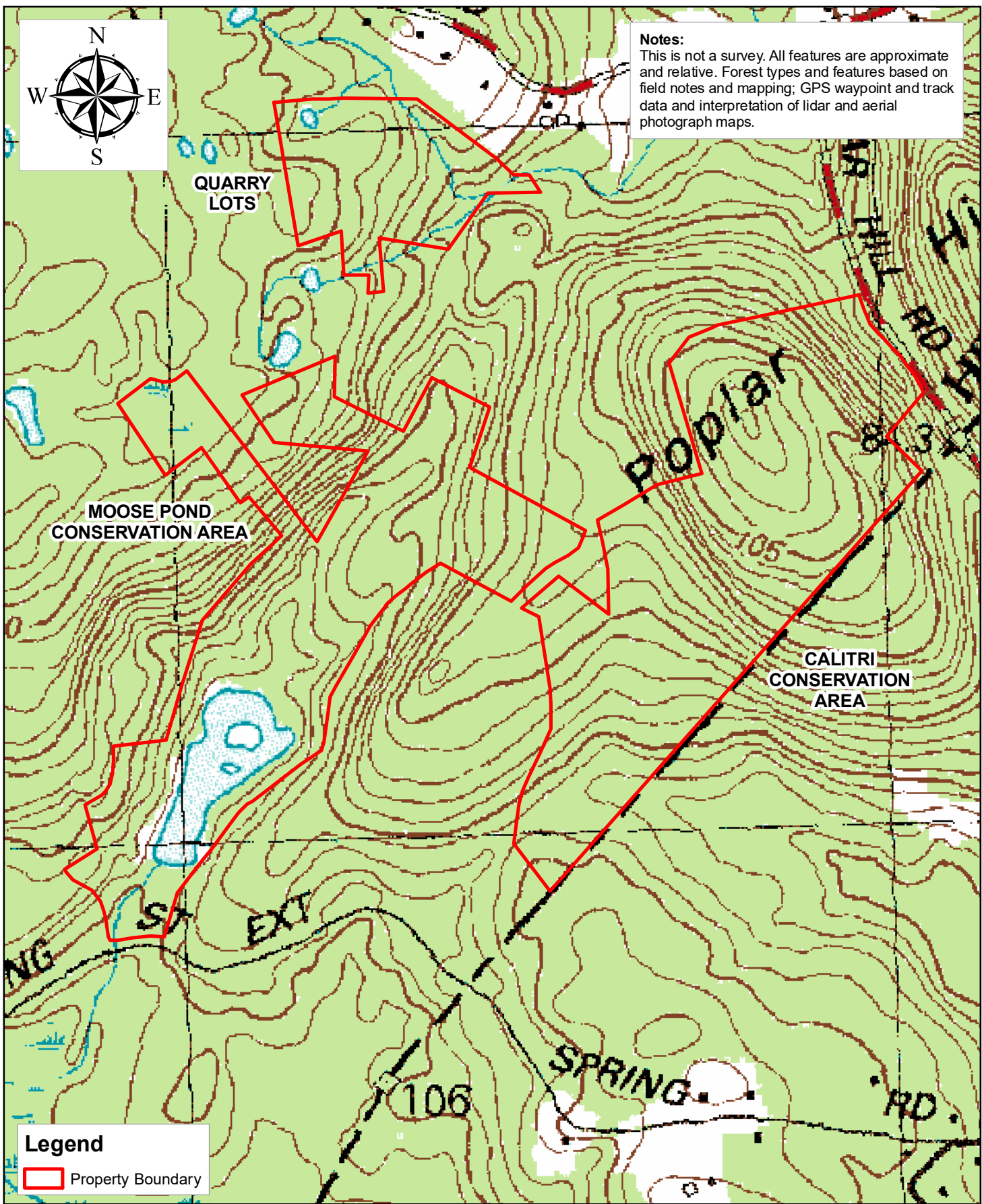
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# **APPENDIX**



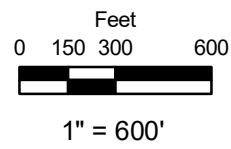
**Notes:**  
This is not a survey. All features are approximate and relative. Forest types and features based on field notes and mapping; GPS waypoint and track data and interpretation of lidar and aerial photograph maps.



**Legend**  
 Property Boundary

### Topographic Map

**TOWN OF PELHAM**  
Pelham, Hillsborough County, NH  
Drafted and Prepared by:  
Eric Radlof, NHLPF #447

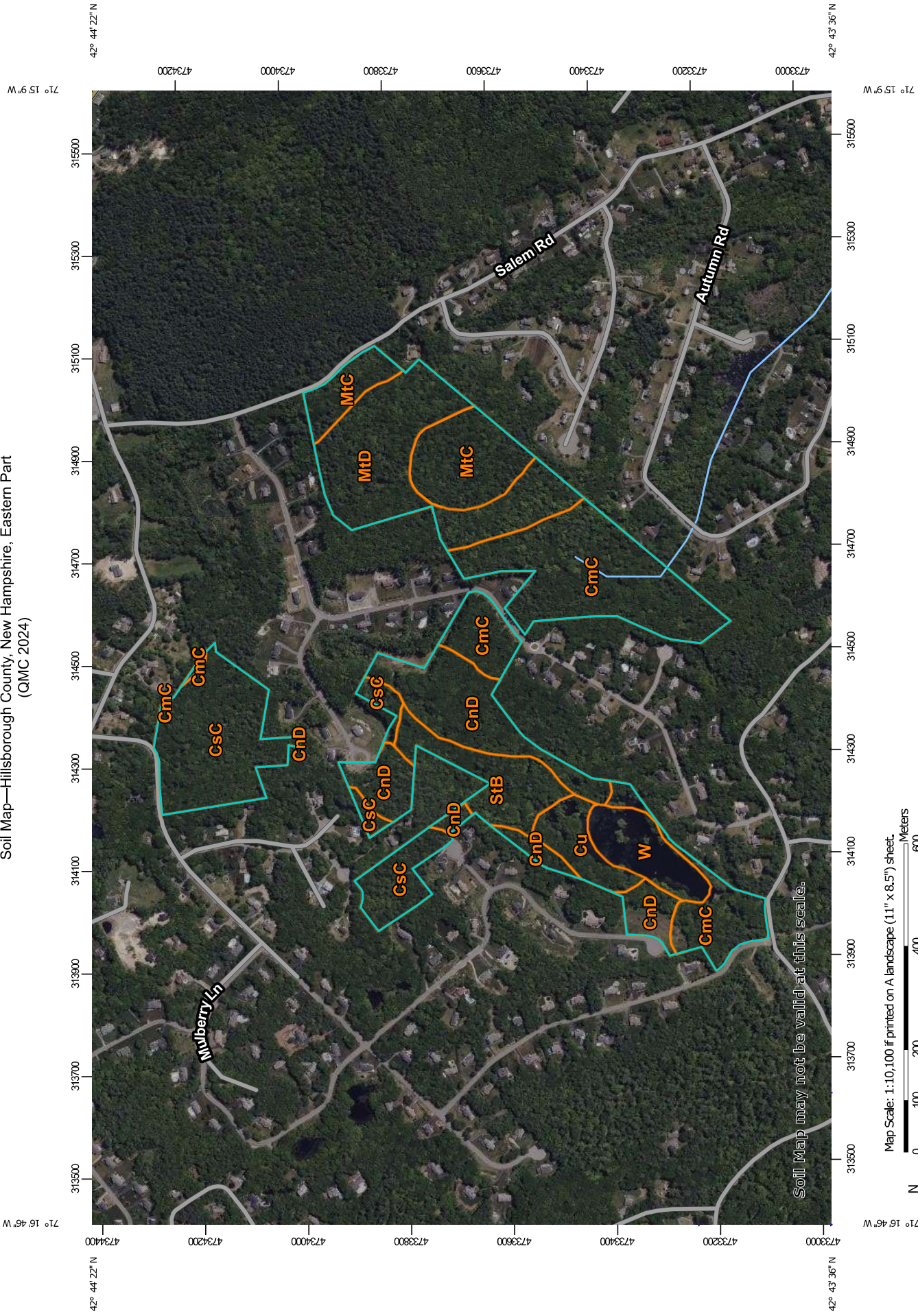


January 2024





Soil Map—Hillsborough County, New Hampshire, Eastern Part  
(QMC 2024)



Map Scale: 1:10,100 if printed on A landscape (11" x 8.5") sheet.

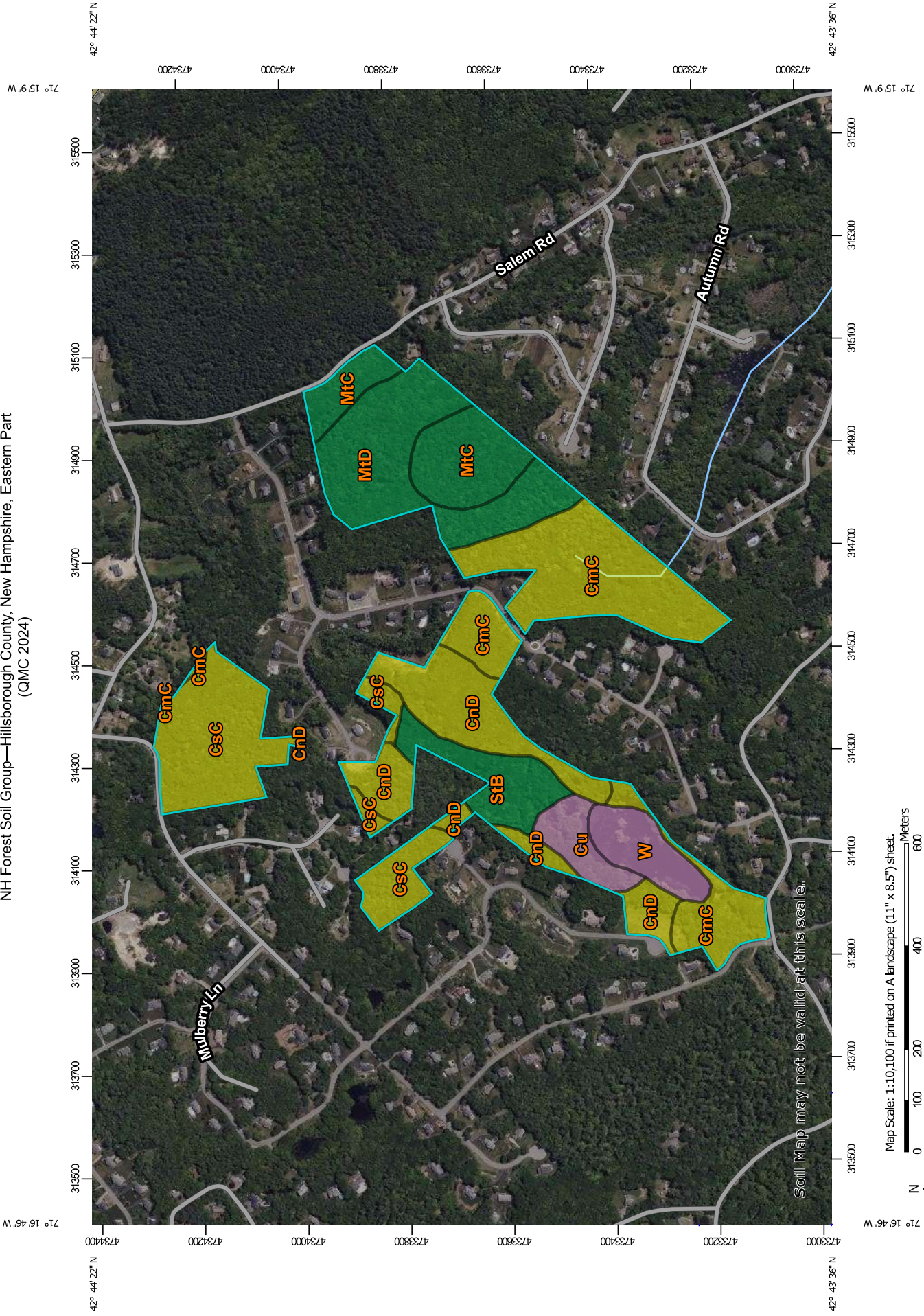


Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84





NH Forest Soil Group—Hillsborough County, New Hampshire, Eastern Part  
(QMIC 2024)







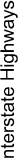



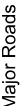



















Soil Map may not be valid at this scale.

Map Scale: 1:10,100 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

## MAP LEGEND

<b>Area of Interest (AOI)</b>	<input type="checkbox"/> Not rated or not available
 Area of Interest (AOI)	
<b>Soils</b>	<b>Water Features</b>
<b>Soil Rating Polygons</b>	 Streams and Canals
 Group IA	<b>Transportation</b>
 Group IB	 Rails
 Group IC	 Interstate Highways
 Group IIA	 US Routes
 Group IIB	 Major Roads
 NC	 Local Roads
 Not rated or not available	<b>Background</b>
<b>Soil Rating Lines</b>	 Aerial Photography
 Group IA	
 Group IB	
 Group IC	
 Group IIA	
 Group IIB	
 NC	
 Not rated or not available	
<b>Soil Rating Points</b>	
 Group IA	
 Group IB	
 Group IC	
 Group IIA	
 Group IIB	
 NC	

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part  
Survey Area Data: Version 26, Aug 22, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—June 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## NH Forest Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CmC	Canton fine sandy loam, 8 to 15 percent slopes, very stony	Group IB	28.4	25.0%
CnD	Canton very stony fine sandy loam, 15 to 35 percent slopes	Group IB	17.7	15.6%
CsC	Chatfield-Hollis complex, 8 to 15 percent slopes, rocky	Group IB	19.8	17.4%
Cu	Swansea mucky peat, 0 to 2 percent slopes	NC	4.2	3.7%
MtC	Montauk fine sandy loam, 8 to 15 percent slopes, very stony	Group IA	11.7	10.3%
MtD	Montauk fine sandy loam, 15 to 25 percent slopes, very stony	Group IA	18.8	16.6%
StB	Scituate stony fine sandy loam, 3 to 8 percent slopes	Group IA	7.2	6.4%
W	Water (less than 40 acres)	NC	5.7	5.0%
<b>Totals for Area of Interest</b>			<b>113.5</b>	<b>100.0%</b>



## IMPORTANT FOREST SOIL GROUPS

New Hampshire soils are complex and highly variable due primarily to their glacial origins. The Natural Resource Conservation Service (NRCS) soil mapping recognizes and inventories these complex patterns and organized them into a useful and understandable planning tool, Important Forest Soil Groups. The objective—a simplified yet accurate tool that will be helpful to natural resource professionals and landowners. These groupings allow managers to evaluate the relative productivity of soils and to better understand patterns of plant succession and how soil and site interactions influence management decisions. All soils have been grouped into one of six categories, as described below. For a complete list, contact your local NRCS field office or [http://extension.unh.edu/resources/files/Resource001580\\_Rep2136.xls](http://extension.unh.edu/resources/files/Resource001580_Rep2136.xls)

**Group IA** consists of the deeper, loamy, moderately well-drained and well-drained soils. Generally, these soils are more fertile and have the most favorable soil-moisture conditions. Successional trends are toward climax stands of shade-tolerant hardwoods such as sugar maple and beech. Early-successional stands frequently contain a variety of hardwoods such as sugar maple, beech, red maple, yellow, gray, and paper birch, aspen, white ash, and northern red oak in varying combinations with red and white spruce, balsam fir, hemlock, and white pine. The soils in this group are well-suited for growing high-quality hardwood veneer and sawtimber, especially, sugar maple, white ash, yellow birch, and northern red oak. Softwoods are usually less abundant and are best managed as a minor component of predominantly hardwood stands. Hardwood competition is severe on these soils. Successful natural regeneration of softwoods and the establishment of softwood plantations require intensive management.

**Group IB** generally consists of soils that are moderately well-drained and well-drained, sandy or loamy over-sandy, and slightly less fertile than those in group 1A. Soil moisture is adequate for good tree growth but may not be quite as abundant as in group 1A. Successional trends and the trees common in early-successional stands are similar to those in group IA. However, beech is usually more abundant on group IB and is the dominant species in climax stands. Group IB soils are well-suited for growing less-nutrient and- moisture-demanding hardwoods such as paper birch and northern red oak. Softwoods generally are scarce to moderately abundant and managed in groups or as part of a mixed stand. Hardwood competition is moderate to severe on these soils. Successful regeneration of softwoods and the establishment of softwood plantations are dependent upon intensive management. The deeper, coarser-textured, and better-drained soils in this group are generally suitable for conversion to intensive softwood production.

**Group IC** soils are derived from glacial outwash sand and gravel. The soils are coarse textured and are somewhat excessively drained to excessively drained and moderately well-drained. Soil moisture and fertility are adequate for good softwood growth but are limiting for hardwoods. Successional trends on these soils are toward stands of shade- tolerant softwoods, such as red spruce and hemlock. White pine, northern red oak, red maple, aspen, gray birch, and paper birch are common in early-successional stands. These soils are well-suited for high quality softwood sawtimber, especially white pine, in nearly pure stands. Less site-demanding hardwoods such as northern red oak and paper birch have fair to good growth on sites where soil moisture is more abundant. Hardwood competition is moderate to slight. With modest levels of management, white pine can be maintained and reproduced. Although

chemical control of woody and herbaceous vegetation may be desirable in some situations, softwood production is possible without it.

**Group IIA** consists of diverse soils and includes many of the soils that are in groups IA and IB. The soils in IIA, however, have limitations such as steep slopes, bedrock outcrops, erodibility, surface boulders, and extreme stoniness. Productivity of these soils isn't greatly affected by those limitations, but management activities such as tree planting, thinning, and harvesting are more difficult and more costly.

**Group IIB** soils are poorly drained. The seasonal high water table is generally at a depth of 12 inches or less. Productivity is lower than in IA, IB, or IC. Fertility is adequate for softwoods but is a limitation for hardwoods. Successional trends are toward climax stands of shade-tolerant softwoods, such as red spruce and hemlock. Balsam fir is a persistent component in nearly all stands. Early-successional stands frequently contain a variety of hardwoods such as red maple, yellow, gray, and paper birch, aspen, and white and black ash in varying mixtures with red spruce, hemlock, balsam fir, and white pine. These soils are well-suited for spruce and balsam fir pulpwood and sawtimber. Advanced regeneration is usually adequate to fully stock a stand. Hardwood competition isn't usually a major limitation, but intensive management by chemical control of competing woody and herbaceous vegetation may be desirable.

**Not Rated-** Several mapping units in New Hampshire are either so variable or have such a limited potential for commercial production of forest products that they haven't been placed in a group. Examples are very poorly drained soils and soils at high elevations.



## Forest Stewardship Objectives

<b>General Information</b>	
Landowner Name(s):	<i>① Town of Pelham</i>
Property Location:	<i>Moose Pond, Calitra and Quarry Town Forests</i>
Mailing Address:	<i>6 Village Green Pelham NH 03026</i>
Phone Number:	<i>(603) 401-7938 Paul Gaynon</i>
Total Property Acreage:	<i>115 acres</i>
Date Property Acquired:	
Deed Book/Page:	

Do you have a survey map of the property?       Yes       No

Is the property enrolled in Current Use?       Yes       No

Are you interested in certifying your property as a Tree Farm?       Yes       No

<b>Landowner Goals</b>					
Please check the column on the right that best reflects the importance of each of the following goals.					
Goal	Importance to Me				
	High	Medium	Low	Don't Know	Not Applicable
Enhance Quality/Quantity of Timber Products	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generate Income from Timber Products	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Produce Firewood for Personal Use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Produce Maple Syrup	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Define Boundary Lines	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Control Invasive Plant Species	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Promote Biological Diversity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enhance Habitat for Birds	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enhance Habitat for Animals	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Develop or Maintain Access Roads and Trails	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improve Recreational Opportunities	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintain or Enhance Privacy	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enroll/Maintain Current Use Property Tax Assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Protect from Development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Preserve or Improve Scenic Beauty	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protect Water Quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protect Unique/Special/Cultural Areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In your own words, describe your goal(s) for the property.

*Balance the enhancement of wood, water, wildlife and recreation.*

Landowner Signature: *[Signature]*      Date: *9/21/23*

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# GLOSSARY

**ACCEPTABLE GROWING STOCK (AGS):** A crop tree managed to meet any given landowners' objective. Use Value Appraisal guidelines define AGS as commercial tree species containing one 12-foot log or two non-contiguous 8-foot logs, or that have the potential to produce these products in the future.

**ACCEPTABLE MANAGEMENT PRACTICES (AMPs):** Standards for protecting water quality on logging jobs developed by the Department of Forests, Parks and Recreation and outlined in the booklet titled *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont*.

**ACRE:** A standard unit of area measure. One acre equals: 43,560 square feet, 10 square chains or an area that is 209' X 209'.

**ADVANCED REGENERATION:** Natural regeneration that was established and has advanced beyond the seedling stage to saplings and/or small poles.

**ALL-AGED (UNEVEN-AGED):** Age class category; applied to a stand of trees in which, theoretically, trees of all ages are found; a stand occupied by three or more age classes.

**ANCIENT FOREST (OLD GROWTH FOREST):** Forest in late successional stages; the older seral stages of natural forests.

**ANNUAL RING:** The growth layer of one year, as viewed on the cross-section of a stem, branch or root.

**ASPECT:** The direction of a slope.

**BASAL AREA:** The cross-sectional area of a tree computed from DBH measurements, expressed in square feet; the sum of the basal areas of all trees on an acre, expressed as basal area/acre, is an objective measure of density and is useful for making forest management decisions.

**BIODIVERSITY:** The variety of life and its processes including living organisms, genetic differences among them, the ecosystems in which they occur and the ecological and evolutionary processes that maintain their functions.

**BIOMASS:** The total above ground volume of a tree, stand or forest, usually expressed in tons/acre. This term is also used to describe a whole tree or chip harvest.

**BOARD FOOT:** A unit of measurement to determine volume of lumber; one board foot equals a board 12" x 12" x 1". Also a measure of standing or logs.

**BROWSE:** Buds, leaves, and twigs of tree seedlings and saplings, shrubs and herbaceous plants that are utilized for food by wildlife.

**CANOPY:** The combined forest cover formed by individual overstory tree crowns.

**CHAIN:** A unit of measure 66 feet or 4 rods in length; ten square chains equals one acre; 80 chains equals one mile.

**CLEANING:** A pre-commercial cutting made in a stand that is not past the sapling stage to release desirable trees from undesirable trees of the same age that overtop them or are expected to do so.

**CLEAR-CUT:** A method of harvesting that removes all the trees in an area for the purpose of regenerating a new stand; results in even-aged stands. Variations include patch cuts and strip cuts.

**CLIMAX:** The theoretical culminating stage in plant succession for a given site; vegetation is self-reproducing; the

resulting community has reached stability under a particular set of environmental conditions through time.

**CODOMINANT TREE:** A crown classification; trees with crowns forming the general level of the forest canopy and receiving full sunlight from above but little from the sides. (See crown class.)

**COHORT:** An aggregation of trees that starts as a result of a single disturbance; a generation of trees.

**CORD:** A unit of roundwood volume equal to 128 cubic feet of wood, air and bark; a pile of four' long round or split wood piled four' high and eight' long; traditional measure of pulpwood and fuelwood, now commonly replaced by weight measurement. A cord generally contains 80 to 90 cubic feet of solid wood. One cord equals 500 board feet.

**CROP TREE:** A tree selected in a stand or plantation based on growth rate, crown position or stem quality which will be grown to maturity; growth of crop trees is the object of frequent thinnings or other improvement cuttings.

**CROWN:** The upper part of a tree including the branches and foliage.

**CROWN CLASS:** Classification of trees based on the relative position of their crowns.

**CULL TREE:** A tree of little or no economic value due to poor form, excessive limbs, rot or other defect. Culls frequently have wildlife, aesthetic or other values.

**CUITING CYCLE:** Frequency of logging operations on the same area, expressed as years.

**CURRENT USE TAXATION:** Assessed values for property tax purposes that are based on the current use of the land, not on fair market value. Such programs are found in many states: New Hampshire Current Land Use and Vermont Use Value Appraisal are examples.

**DAYLIGHTING:** Clearing vegetation along roads and trails to provide light and air drainage, to maintain herbaceous plants and to exclude woody plants from occupying the site; a maintenance and wildlife habitat enhancement practice.

**DEN TREE:** A tree possessing a cavity large enough to serve as a shelter for birds and mammals, or as a site to give birth and raise young. Den trees generally must be 15" DBH or" larger and have a cavity opening of 4" diameter or more.

**DBH (Diameter Breast Height):** Diameter measured outside the bark of a tree at 4 1/ 2 feet above the ground, expressed in inches.

**DOMINANT TREE:** A crown classification; trees with large crowns extending above the general level of the forest canopy and receiving full light from above and partial light from the sides.

**ECOSYSTEM:** A dynamic complex of plant, animal, fungal and microorganism communities and their associated non-living environment interacting as an ecological unit.

**ECOSYSTEM APPROACH:** A strategy or plan to manage ecosystems to provide for all associated native organisms in an ecosystem, as opposed to managing for individual species.

**ECOTONE:** The border between two habitat types that is composed of a mixture of species from neighboring habitats, creating a unique and often very rich habitat.

**EDGE:** The ecological changes that occur at the boundaries of ecosystems or habitats; the interface between different vegetation types. These changes may include species composition, size class, gradients of moisture, sunlight, soil and air temperature, soil type, wind speed...; edge effects can have both positive and negative impacts for wildlife.

**ELDER TREE(S):** An old and often (but not always) large diameter tree(s); occurring singly or in small groups; these are older and/or larger than the majority of the surrounding trees and often possess unique characteristics; often remnants from past harvests; when occupying larger areas or stands these may constitute old growth or ancient forests.

**EROSION:** Usually destructive movement of soil particles, often associated with logging operations and access roads.

**EVEN-AGED:** Age class category; a stand in which a small age differences exist between individual trees; the maximum difference in age permitted in an even-aged stand is usually 10 to 20 years, or 10% of rotation age.

**EVEN-AGED MANAGEMENT:** Any treatment system that establishes or maintains one age class, more than one even-aged stand can occupy a site. Even-age silvicultural systems include clearcut, seed-tree and shelterwood harvests.

**FOREST STAND or FOREST TYPE or VEGETATIVE COVER TYPE:** a group of trees occupying a specific area and similar characteristics of composition, species, age, arrangement, condition and ecological development which is distinguishable from other groups of stands. Forest types are typically defined by one or more of the dominant trees species in the type.

**FOREST STAND IMPROVEMENT (FSI):** Pre-commercial treatments designed to improve stand conditions without producing revenue, including cleaning, weeding, thinning, pruning, or cull removal. Also known as Timber Stand Improvement (TSI).

**GIRDLING:** A method used in FSI to eliminate unwanted trees; also used to create snags and future ROM. Blocking the flow of carbohydrates (food) from the leaves to the roots by cutting, usually with a chainsaw, a ring around the tree that penetrates past the inner bark, ultimately killing the tree; herbicides and hatchet frill can also be used to cut or kill the ring.

**GROUP SELECTION:** A method harvest method where groups of trees are removed to create openings that are designed to promote regeneration; results in an uneven-aged stand.

**GROWING STOCK:** A tree or trees that currently provides a desired product or service, usually quantified as sawlog production, or trees that are currently too small to contain a log, but that possess the necessary characteristics to produce a future sawlog; potential sawlog trees.

**GROWTH RATE:** Measurement of annual rings in the outer radial inch of a tree; indicates the rate of growth of a tree; expressed as rings/radial inch.

**HABITAT:** The environment in which an organism lives; also the organisms and physical environment in a particular place.

**HARVEST:** The removal of a crop or stand of financially or physically mature trees as a with the objective of establishing or releasing regeneration.

**HARVESTING TRAIL:** Small trails laid out in the woods over which logs are pulled (skidded) or carried (forwarded) from the stump to the landing.

**HIGH-GRADING:** A cut that extracts only the best quality trees or high value timber; made without regard to the future composition or quality of a stand or forest; degrades the forest ecosystem.

**IMPROVEMENT CUT:** An intermediate cutting made to regulate species composition and quality; called releasing in young stands.

**INTERMEDIATE CUT:** Various cuttings made during development of the stand from the reproduction stage to maturity; generally for the purposes of improving stand quality and composition for timber production.

**INTERMEDIATE TREE:** A crown classification; trees with small crowns crowded into the general level of the forest canopy, receiving some light from above but none from the sides.

**INTOLERANT SPECIES:** Trees unable to regenerate, grow and develop in the shade of other species; for example paper birch and quaking and big-tooth aspen.

**LANDING:** A place where logs are from the forest and accumulated for loading and transportation to market..

**LEGACIES:** Ancestors; residual organisms and structures handed down from a pre-disturbance ecosystem, including live trees, dead trees and wood, seeds, surviving roots, basal buds, mycorrhizal fungi, other soil microbes, invertebrates, mammals, and soil chemistry and structure. Legacies influence recovery, composition, structure and function of post-disturbance (including harvesting) ecosystems.

**LIQUIDATION HARVEST:** The removal of all, or the majority, of the merchantable products from the forest strictly for short term economic gain; creates a non-performing asset; frequently precedes the sale (liquidation) of the land.

**MAST:** Fruits or nuts produced by woody plants (including trees) which are utilized by wildlife for food; usually divided into hard mast (e.g.: acorns, beech nuts) or soft mast (e.g.: black cherry, apple).

**MATURITY:** 1. Financial maturity; occurs when a tree has reached financial value; frequently based on carrying costs and assumed or expected interest rates of return; reached long before biological maturity; 2. Biological maturity; the point where energy costs exceed the energy input from photosynthesis.

**MBF:** Abbreviation for thousand board feet; the standard unit of measure for logs.

**MEAN STAND DIAMETER (MSD):** The arithmetic mean diameter of the stand measured at DBH.

**MERCHANTABLE TIMBER:** Trees that are currently salable.

**MULTIPLE USE:** Managing the same area of forestland for several uses simultaneously, i.e., recreation, wildlife, water, timber production....

**MYCORRHIZAL FUNGI:** A fungus living in a mutualistic association with plants; facilitates nutrient and water uptake.

**NATIVE SPECIES:** Plants, animals, fungi and microorganisms which naturally occur in an area or region.

**NATURAL COMMUNITY:** An interacting assemblage of plants and animals, their physical environment, and the natural processes that affect them; typically describing an expected or potential condition in the late successional stage of forests.

**OPTIMUM GROWTH:** The greatest growth achievable on a given site, usually in reference to timber volume.

**OVERMATURE:** That period in the life cycle of trees and stands when growth or value declines rapidly; frequently defined from a forest products or timber harvesting perspective; frequently a myth perpetuated to encourage timber harvesting.

**OVERSTOCKED:** A stand where the growing space is occupied leaving no or little room for future stand development or continued growth.

**OVERSTORY:** The upper crown canopy of the forest; the larger diameter and/or taller trees in the stand.

**PIONEER SPECIES:** Shade intolerant species that are the first trees to develop in an area after or the abandonment of a field or after a disturbance that covers a fairly large area. Pioneer species include aspen and paper birch.

**PIT and MOUND:** The micro-topography created on the forest floor when trees fall, resulting in the mound of the root mass and the pit, or depression, in the soil where the tree formally stood.

**POLES:** A size class; trees that are 4" DBH to 10" DBH.

**PRE-COMMERCIAL TREATMENTS:** treatments in young or unmerchantable stands that do not, or can not, economically extract merchantable forest products; e.g.: FSI; cleaning, weeding, thinning and release.

**PRODUCTION POTENTIAL:** Mean Annual Increment (MAI); average growth of the stand over the rotation under optimum stocking conditions; expressed as volume/acre/year.

**PRUNING:** The practice of removing tree limbs so that a bole free of knots will develop over time; after pruning, the resulting wound heals and clear wood (knot free) is produced. Pruning is a component of FSI.

**PULP TREES:** Trees that can yield at least two 8-foot bolts with a minimum 4" top diameter inside the bark and which are unsuitable for sawtimber because of size, crook, rot or other defect; used for manufacturing paper products; these trees frequently represent a negative value on private non-industrial forests in this area.

**REGENERATION:** New growth obtained by natural seeding or sprouts.

**RELEASE OPERATIONS:** Free young stands of desirable trees, not past the sapling stage, from competition of undesirable trees that are or will suppress them; cleanings and liberation cutting.

**REPRODUCTION:** New growth artificially obtained by planting or direct seeding.

**RETAINED ORGANIC MATERIAL (ROM):** Woody material that lies on or near the forest floor; also known as down woody material or down woody debris; provides essential ecosystem functions such as adding organic material to the soil, increasing moisture retention and creating habitat for animals and plants; the larger the diameter and the longer the piece, the greater the ecological value; This material is a stand legacy.

**ROTATION:** The period of years required to reproduce, grow and harvest a crop of timber; applies only to even-aged management.

**SAPLING:** A size class; trees less than 4" DBH and 4 1/2 to 10 feet tall.

**SAWTIMBER:** A product category: usually trees that are greater than 10" DBH for softwoods and 12" DBH for hardwoods and that are reasonably straight, free of defects and otherwise suitable for lumber or veneer production.

**SEEDLING:** A size class; trees up to 4 1/2 feet tall.

**SHADE TOLERANCE:** The ability of trees to reproduce and grow in the shade of other trees.

**SILVICULTURE:** The art and science of tending a forest; the application of the knowledge of silvics in the treatment of a forest; the theory and practice of controlling forest establishment, composition and growth.

**SINGLE TREE SELECTION:** A method of final harvest in which single trees are removed and the vacancies created promote new growth; results in uneven-aged stands.

**SITE:** An area considered in terms of its environment (including climate, slope, soil, temperature and moisture); particularly as a determiner of vegetation type and quality supported by an area.

**SITE CLASS:** A broad category of soil productivity; usually rated site I, TI, III, IV, from highest to lowest productivity.

**SITE INDEX:** A measure of the productivity of the site using the relationship of tree height to tree age; in the East 50 years is the basis: e.g.: a tree 60 feet tall and 50 years old indicates a site index of 60.

**SITE POTENTIAL TREE HEIGHT:** The average height of trees that have attained the maximum height possible on a given site.

**SIZE CLASS:** A classification of trees based on predominate tree size (diameter and/or height) within a stand or type.

**SLASH:** The tops, branches and defective parts of trees that are left on the ground after a logging job; these provide carbon which in the decomposition process produces calcium which is essential for cell formation.

**SNAG:** A standing dead or partially dead tree at least 6" DBH and 10' in height. Large diameter snags meet the needs of more wildlife species than do small diameter snags, and are more persistent.

**STAGNATION:** A condition that occurs when too many trees are growing on a site; growth is minimal and vigor declines.

**STAND:** See "forest stand or forest type" above.

**STANDARD:** A size class; usually trees over 10" DBH for softwood and 12" DBH for hardwood and up to 24" DBH.

**STOCKING LEVEL:** A qualitative expression comparing existing number of trees and square feet of basal area in a stand to the amount desired for optimum growth of diameter and volume. Stocking guides are based on the relationship of the number of trees/acre, the square feet of basal area/acre and the mean stand diameter. Stocking levels are expressed as A, B or C lines. Stands near or above the A line are overstocked. Trees are crowded and growth is slow. Stands between the A and B line are fully stocked. Stands at the B line are at an optimum stocking level. Diameter growth is rapid and volume growth is high. Stands between the B and C lines should be fully stocked within 10 years. Diameter growth remains rapid, but volume growth diminishes. Stands below the C line are understocked. Stocking guides are developed for optimum timber production.

**STUMPAGE:** The value of standing timber dependent upon market conditions, quality of timber, accessibility and other factors.

**STRUCTURAL DIVERSITY:** The diversity in a community resulting from the occurrence of many horizontal or vertical physical elements, e.g., layers or tiers of the canopy; an increase in layering increases structural diversity.

**SUCCESSION:** A process of physical and chemical change which takes place on a site over time, resulting in a progression of forest types; The orderly and predictable replacement of one plant community by another over time in the absence of disturbance.

**SUPPRESSED TREES:** A crown classification; trees with small crowns that are entirely below the general level of the canopy, receiving no direct light from above or from the sides; also called overtopped.

**THINNING:** An intermediate silvicultural treatment that regulates stand density, composition and quality.

**TOLERANT SPECIES:** Trees that are able to reproduce and grow satisfactorily in their own shade or the shade of other trees. Tolerant species include sugar maple, beech, red spruce and hemlock.

**UNACCEPTABLE GROWING STOCK (UGS):** A tree not capable of producing a desired product or service, typically quantified by ability to produce sawlogs; also see growing stock.

**UNDERSTORY:** Trees growing below the main crown canopy, usually advanced natural regeneration.

**UNEVEN-AGED:** A stand that contains trees of many different ages and sizes; all aged.

**UNEVEN-AGED MANAGEMENT:** Any treatment system that establishes or maintains a stand of all age/size classes, treatments are multi-purpose, designed to establish natural regeneration, thin, and achieve other cultural objectives simultaneously.

**VIGOR:** The health and vitality of a tree; generally assessed by observing crown characteristics such as foliage density and color, live crown ratio, crown depth and width.

**WATERBAR:** A diversion created by mechanical means to redirect the flow of water (to prevent erosion) on roads and skid trails.

**WINDTHROW:** Damage to trees caused by winds, usually of a severe nature; results in tip ups and stem breakage.

**A TABLE OF MATURITIES AND/OR NORMAL EXPECTED  
AND MAXIMUM AGES  
for  
SELECTED TREES OF NORTHERN NEW ENGLAND**

<b>Species Common Name</b>	<b>Scientific Name</b>	<b>Expected Normal Age</b>	<b>or Maximum Age in years</b>
Eastern white pine	<i>Pinus strobus</i>	150-200	450+
Red pine	<i>Pinus resinosa</i>	150-200	300-400
Eastern larch	<i>Larix laricina</i>	100-200	335
Red spruce	<i>Picea rubens</i>	200	350-400
Black spruce	<i>Picea mariana</i>	100-150	250
Eastern hemlock	<i>Tsuga canadensis</i>	---	500-900
Balsam Fir	<i>Abies balsamea</i>	90-100	200+
Quaking Aspen	<i>Populus tremuloides</i>	60-70	150
Bitternut hickory	<i>Carya cordiformis</i>	---	175+
Yellow birch	<i>Betula alleghaniensis</i>	150	300
Sweet birch	<i>Betula lenta</i>	100	200-265
Paper birch	<i>Betula papyrifera</i>	60-75	140-200
American beech	<i>Fagus grandifolia</i>	---	300-400
White oak	<i>Quercus alba</i>	---	500-600
Northern red oak	<i>Quercus rubra</i>	---	200-300
American elm	<i>Ulmus americana</i>	150-200	300
Black cherry	<i>Prunus serotina</i>	150-200	
Sugar maple	<i>Acer saccharum</i>	---	200-400
Red maple	<i>Acer rubrum</i>	70-80	150
American basswood	<i>Tilia americana</i>	90-140	100-140
Black ash	<i>Fraxinus nigra</i>		135-150
White ash	<i>Fraxinus americana</i>		300





# New Hampshire Natural Heritage Bureau

DNCR - Division of Forests & Lands  
172 Pembroke Road, Concord, NH 03301  
Phone: (603) 271-2214 Fax: (603) 271-6488

**To:** Eric Radlof  
Full Circle Forestry, LLC  
113 Old Pound Road  
Antrim, NH 03440

**From:** NH Natural Heritage Bureau

**Date:** 2024-01-22

**Re:** Review by NH Natural Heritage Bureau of request dated 2024-01-15

**NHB File ID:** 4263

**Town:** Pelham, NH

**Project type:** Landowner Request

**Location:** Map 24, Lots 12-210, 12-216, 12-213, 12-214, 12-41, 12-43, 12-43-22, 12-39; Map 31, Lots 11-48, 12-43; Map 25, Lot 12-38; Town of Pelham c/o Forestry Committee

We have searched our database for records of rare species and exemplary natural communities on the property(s) identified in your request. Our database includes known records for species officially listed as Threatened or Endangered by either the state of New Hampshire or the federal government, as well as species and natural communities judged by experts to be at risk in New Hampshire but not yet formally listed.

NHB records on the property(s): **None**

NHB records within one mile of the property(s):

	Last Reported	Listing Status		Conservation Rank	
		Federal	NH	Global	State
<b>Invertebrate Species (For more information, contact NH F&amp;G at 271-6544)</b>		<b>Federal</b>	<b>NH</b>	<b>Global</b>	<b>State</b>
Eastern Pond Mussel - <i>Ligumia nasuta</i>	2010	--	T	G4	S1
<b>Natural Community</b>		<b>Federal</b>	<b>NH</b>	<b>Global</b>	<b>State</b>
Atlantic white cedar - yellow birch - pepperbush swamp	1992	--	--	GNR	S2
<b>Vertebrate Species</b>		<b>Federal</b>	<b>NH</b>	<b>Global</b>	<b>State</b>
Common Loon - <i>Gavia immer</i>	2022	--	T	G5	S2B
Spotted Turtle - <i>Clemmys guttata</i>	2005	--	T	G5	S2
Blanding's Turtle - <i>Emydoidea blandingii</i>	2019	--	E	G4	S1

**NOTE:** This review *cannot* be used to satisfy a permit or other regulatory requirement to check for rare species or habitats that could be affected by a proposed project, since it provides detailed information only for records actually on the property.



# New Hampshire Natural Heritage Bureau

DNCR - Division of Forests & Lands

172 Pembroke Road, Concord, NH 03301

Phone: (603) 271-2214 Fax: (603) 271-6488

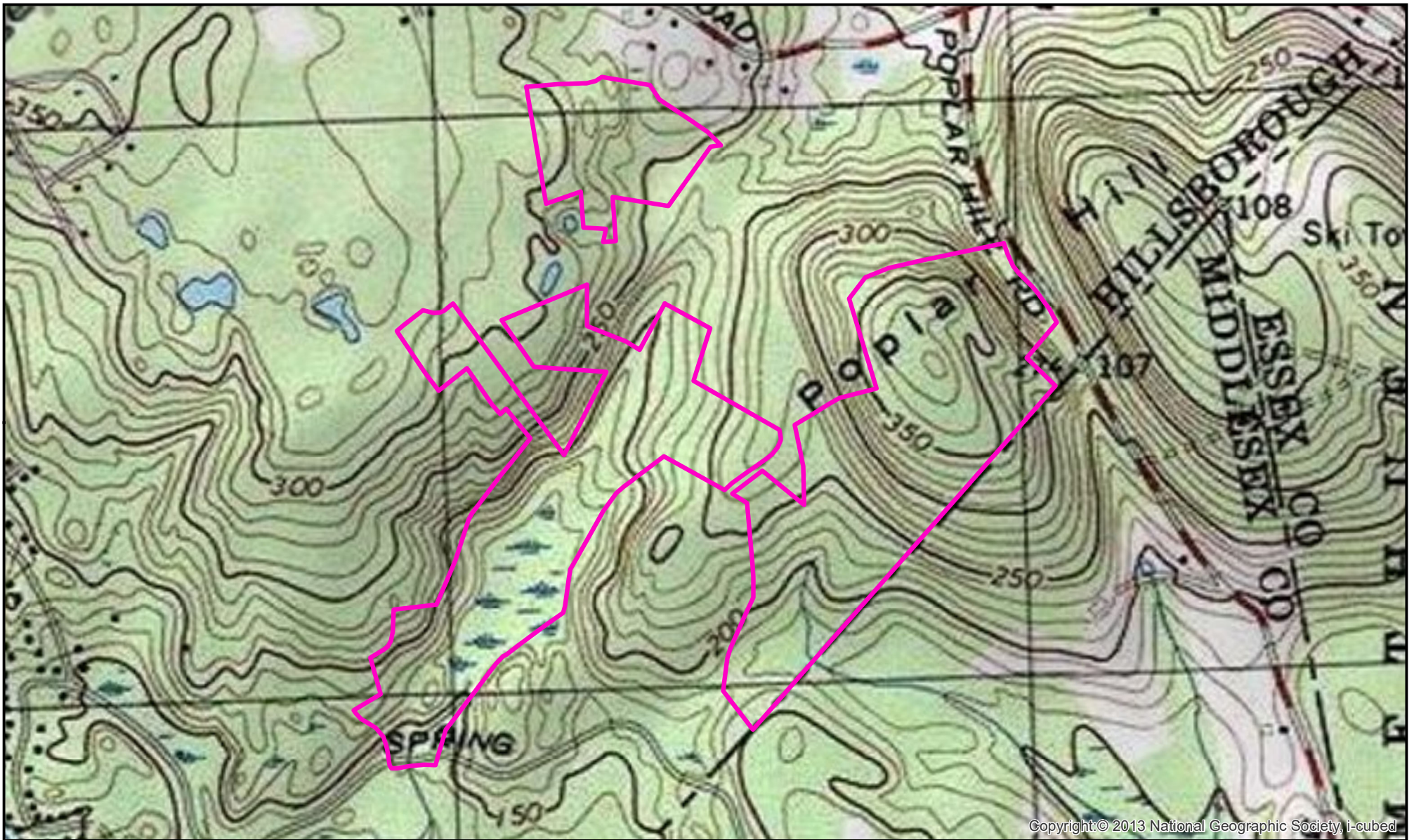
Listing codes: T = Threatened, E = Endangered SC = Special Concern

Rank prefix: G = Global, S = State, T = Global or state rank for a sub-species or variety (taxon)

Rank suffix: 1-5 = Most (1) to least (5) imperiled. "--", U, NR = Not ranked, B = Breeding population, N = Non-breeding, H = Historical, X = Extirpated.

A negative result (no record in our database) does not mean that no rare species are present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

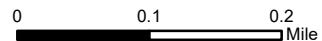
**NOTE: This review *cannot* be used to satisfy a permit or other regulatory requirement to check for rare species or habitats that could be affected by a proposed project, since it provides detailed information only for records actually on the property.**



## Natural Heritage Bureau Landowner Report

*Project ID Number: 4263*

NOTE: Any rare species and/or exemplary natural communities in this area are not shown unless they occur, at least in part, within the property bounds.



Symbol	Category	# of Records
	Property Bounds	
	Plant Occurrence:	0
	Animal Occurrence:	0
	Natural Community:	0
	Ecological System:	0

