

FOREST OBSERVATIONS, DESCRIPTIONS, AND PRESCRIPTIONS

For

Merriam Farm

Managed by

The Pelham Forestry Committee

Located in

Pelham, Hillsborough County, New Hampshire



Prepared by:

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Locus Map

Town of Pelham- Merriam Farm
+/-46.52 ac (Map 39/ Lot 6-181)

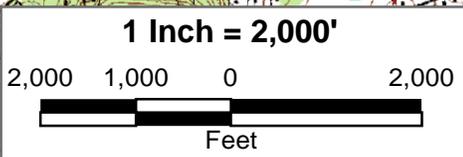
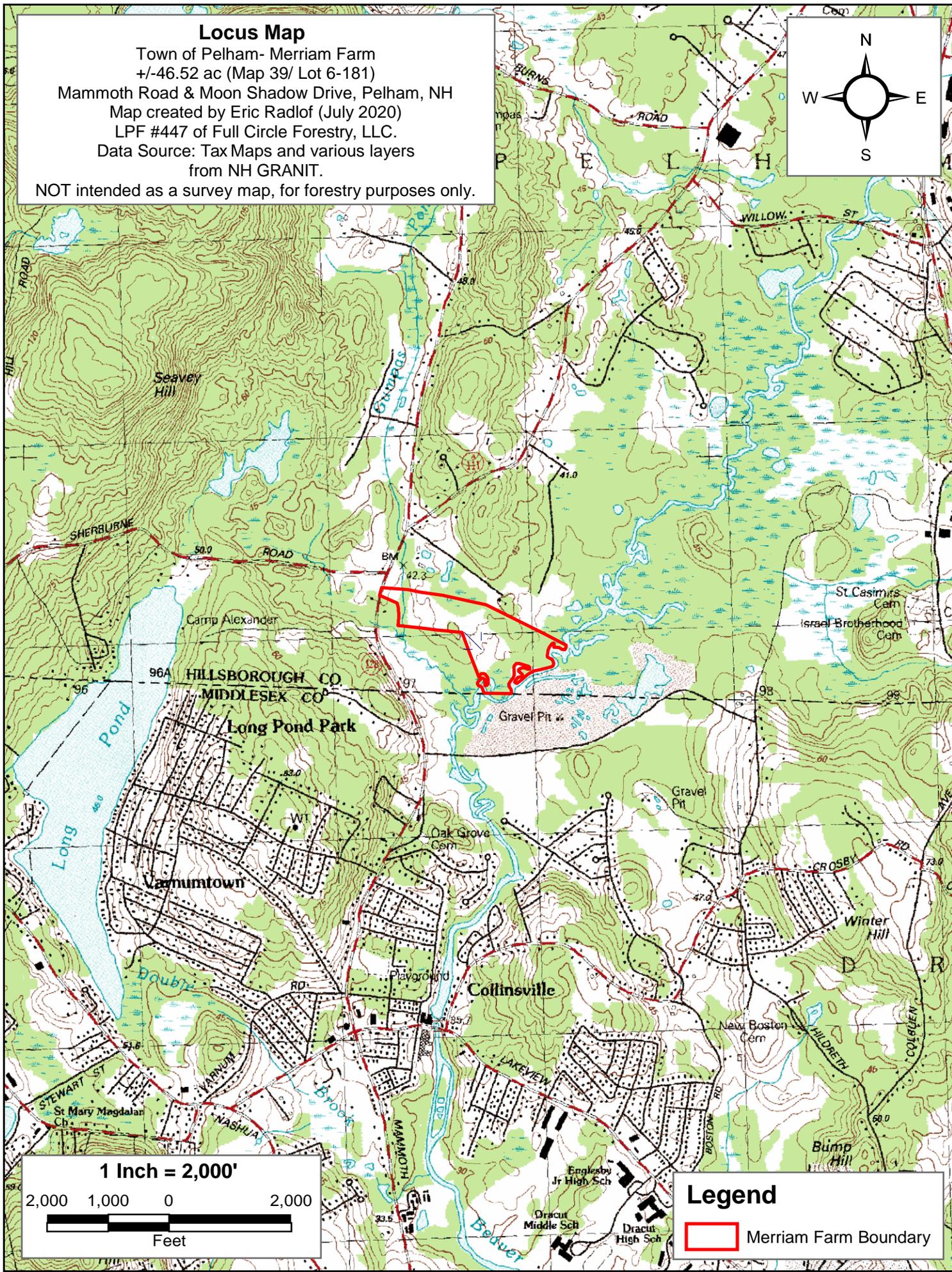
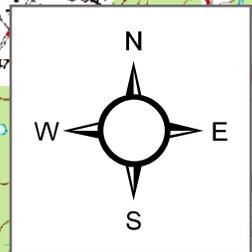
Mammoth Road & Moon Shadow Drive, Pelham, NH

Map created by Eric Radlof (July 2020)

LPF #447 of Full Circle Forestry, LLC.

Data Source: Tax Maps and various layers
from NH GRANIT.

NOT intended as a survey map, for forestry purposes only.



Legend

Merriam Farm Boundary

I. INTRODUCTION

The Merriam Farm property is located off of Mammoth Road (Rte. 128) and is accessible from both Mammoth Road and Moon Shadow Drive. The property is located in the southern portion of the Town of Pelham, Hillsborough County, New Hampshire adjacent to the New Hampshire/ Massachusetts town line. The property encompasses 46.52 acres, of which 23.2 acres are considered forestland, 7.32 acres are considered forested wetlands and the remaining 16.0 acres consists of open/idle agricultural land.

To the knowledge of this forester, there is no history of documented forest management on this property. The information presented in this management plan was developed from an analysis of field data collected during a woodland cruise of this property in August of 2020 in addition to information provided by the Pelham Forestry Committee and the Nashua Regional Planning Commission.

The 2020 fieldwork provided baseline information of the various forest stands with respect to tree growth, commercial operations, insect and disease activity, storm events and other phenomenon affecting the forests in this region. A thorough examination of the data derived from the fieldwork allows for an accurate assessment of the current status of the various forest stands. It also provides the information needed to develop management recommendations for the next ten years as part of the general maintenance of the property and to improve the health and quality of the trees in the forest.

The process that was followed in developing the information utilized for the preparation of this management plan involved a summarization of data gathered from maps, soil surveys, field observations, forest inventory, and past property records. The principal contribution to this summary of gathered data is the forest inventory. Data such as tree species, diameter, heights and biological observations were collected in twelve systematically placed sample plots throughout the woodlot. The inventory data from the Merriam Farm property was processed using the Multicruise program developed by Computer Forest Consultants, Inc. to generate stand and stock tables. This results in a reliable estimate of densities, quality, and volumes of standing timber and roundwood presently growing on the property.

The observations and data collected were incorporated into the map of the property where appropriate and have been noted in the various stand descriptions within the plan. Together with existing information about the property this new data provides information for an evaluation of the eight different forest stands and the open agricultural land found here in order to develop management recommendations for the coming ten- year period to realize the objectives of the landowner.

These objectives include:

- Generation of income and enhancement of the quality of the various forest stands through appropriately planned silvicultural treatments.
- Protection of sensitive wetland sites and waterways by maintaining a forested buffer between the open water and adjacent uplands.
- Maintain and manage forestland for wildlife habitat of native wildlife species of New Hampshire.
- Retain open space for passive recreation, benefiting from wooded areas for walking and nature watching, including maintaining aesthetics and protection of cultural attributes.

Forest Planning History

The Town of Pelham came into possession of this property in December of 2017 through an acquisition by the Conservation Commission pursuant to RSA-36A. This plan is considered to be the first forest management plan prepared for the property. Minimal evidence of prior documented forest management has been obtained from the prior ownership. Such information gathered has been expressed verbally and pertains to the general history of the property. Little is known of forest management from the prior ownership.

Boundary and Survey Information

The boundary lines of the property consist of partial stone walls and wire fences. Boundary line evidence is generally absent where stone walls and wire fences do not exist. Corner monuments consist of iron rods or iron pipes when present. The majority of the northern boundary line is made up segments of stone wall. This evidence becomes limited in wetland areas as well as areas of poorly drained soils. Little boundary line evidence is noted west of Gumpas Pond Brook. The deed description notes stone bounds adjacent to Gumpas Pond Brook and adjacent to Mammoth Road. The southwestern boundary line is discernible and in good .

condition. Surveying relating to an adjacent subdivision in the mid 2000's notes stone walls and various iron rods and iron pipes. Evidence becomes limited along the southern most boundaries where stone wall is no longer present. The remaining southern/southeastern boundary line is made up of Beaver Brook. A preliminary search and review of property deeds for this tract and abutting tracts shares minimal information related the boundary lines beyond general compass direction and general distances. It can also be noted that the tax map shape of this property does not accurately reflect the deed description. See Deed Book 9038/ Page 2057 for the full deed description. The boundary shape reflected in this management plan more accurately represents the deed description and is considered to be the boundary shape for this management plan.

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, even if not maintained as described below.

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. Blazes are a method for visually defining property boundaries and for navigating between monuments.

Long standing blazing protocols have been established and accepted by surveyors and foresters alike. These protocols involve blazing trees along property boundaries, on both the subject and abutting properties and at corner monuments. Boundary lines are a common resource; blazing property lines mutually serves all abutting landowners' interests and defines the shared property line.

Unfortunately, demographic changes in landownership along with an apparent lack of knowledge and understanding by the judiciary, has resulted in a number of lawsuits initiated by landowners seeking damages for trees blazed (damaged) on their property abutting lands where this activity has been commissioned to define the common boundaries between the parties. These actions, and the resulting decisions and damage awards, fail to recognize that property boundaries are a common resource and that defining them serves and benefits all parties. As Robert Frost wrote in his poem Mending Wall: "good fences make good neighbors". The same concept applies to well defined boundary lines.

Due to the growing potential of legal action it is now necessary to contact all abutting landowners to obtain permission to blaze common property boundary lines to limit liability and to prevent the possibility of any legal action. Absent that permission to traditionally blaze the common property line, those portions of the boundary line can only be marked with flagging (which is very temporary) and paint, without blazing abutting trees. Trees on the subject property can be blazed. Blazing line trees is a gray area and may invite disputes regarding the ownership of those trees; line trees are best flagged and painted, not blazed, to avoid this possibility.

Recommendations

- Seek the services of a licensed NH surveyor to confirm the boundary lines for this property.
- Research abutters, 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.
- Blaze the boundary lines for which permission has been obtained in 2021-2022.
- Paint blazes one to eight months after blazing and only paint those portions of the boundary where permission has not been secured.
- Maintain boundary lines by painting blazes at 5 to 7-year intervals and re-blazing and painting at 15 to 20-year intervals.

Access

This property fronts along Mammoth Road with access to Moon Shadow Drive in the town of Pelham. Access from Mammoth Road is limited and does not support timber harvesting activities due to poorly drained soils and a crossing at Gumpas Pond Brook. Utilization of this access point would require significant infrastructure upgrades. Access from Moon Shadow Drive is easily obtainable and is the recommended access point for future timber harvesting activities. There is no existing landing area on the property therefore construction of a landing area will have to be done during the first timber harvest entry off of Moon Shadow Drive. Another access point was observed along the northern boundary line. This appears to be a private road used by the previous landowner and/ or abutter to the north. A large chain linked gate now blocks this access point. (See the **Stand Map** for the location of the town road, landing and major trails).

Access within the property is generally good and easily accommodates logging equipment that is currently in common use.

Skidding or hauling of forest products through the open agricultural land should be limited to dry or frozen ground conditions to limit ground disturbance.

II. STAND DEVELOPMENT

Forest development is influenced by bedrock, soil, water, climate and disturbance. Shade tolerant species such as hemlock, red spruce, 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, the environmental factors mentioned above 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.

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. Old ice damage, likely from the 2008 ice storm and the 2011 Halloween snowstorm is evident in stand 1 within the oak 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.

Large-scale wind events or ice storms generally occur at intervals, that in the past, have transcended human life-spans. Return intervals for large-scale disturbances are typically 100 to 150 years or greater. Recent evidence suggests that climate change may be reducing the return intervals between large-scale disturbances. The changing climate is also creating more frequent and intense disturbances on a localized scale.

Fire is not a primary disturbance factor in this area of the Northeast due to the humid climate and the species composition of the region; hardwood stands are not fire prone. Fire plays a greater role in the boreal softwood forests to the North than it does in hardwood forest. However, lightning- caused fires and fires resulting from human negligence have resulted in small scale forest fires. During droughty conditions, a poorly extinguished cigarette or campfire can ignite the duff layer, starting a forest fire.

Herbivory

Herbivory, particularly by white-tail deer, is a significant disturbance factor in portions of New Hampshire. Severe browse on hardwood seedlings, including black birch, was observed on the Merriam Farm property. Viable hardwood regeneration of commercial and desirable species, other than black birch, was rarely observed progressing and developing above the browse line. Red oak, black oak, and white oak seedlings were observed. Further examination revealed these seedlings have been consistently browsed, resulting in a habitually stunted seedling.

Deer typically browse hardwood species heavily when either: 1) populations are high; or 2) food is scarce, depending on your perspective. Over-browsing significantly impacts seedling survival, the ability of the forest to recruit a subsequent cohort, and thus, the future species composition and structure of the forest.

Preferred browse species are typically those commercial species that both landowners and foresters desire for timber production; sugar maple, red maple, white ash, yellow birch and red oak are highly favored by deer. Beech is not preferred, but is subject to browsing when preferred species are lacking. (This is due to over browsing and mortality of those preferred species.) Highly degraded habitat is indicated by deer browse on white pine, balsam fir or hemlock and an over-abundance of fern cover (particularly hayscented fern).

The inability of hardwoods to naturally develop on hardwood sites in some areas because of herbivory is creating a 20 to 25 year age class void in our forests, favoring softwood development on these hardwood sites and at times allowing invasive species to more readily proliferate in those impacted areas of the region.

The migration of moose southward and their expanding population also has negative implications for hardwoods. Moose impact regeneration, saplings, and pole-sized trees of some species, particularly red maple; they commonly strip the bark of this species. Moose browse is less common in this area due the urban/ suburban interface but moose have been observed in this area.

Recommendations

- Periodically monitor the property to note (changes in) the browse intensity.
- Consider using tree tops and branches from timber harvesting to protect seedlings from browse.

Invasive Plants

Invasive plants are another 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 then 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.

Timber harvesting scarifies the soil and increases light levels and soil temperatures, thereby creating conducive conditions for both seed germination and growth of these species. Seeds of many upland woody invasive plants remain viable for three to seven years, creating an on-site seed bank ready to respond to favorable conditions.

Invasive plants were observed throughout the Merriam Farm property at varying levels; higher localized levels occur along the edges of the open agricultural land as well as the majority of the forested area throughout the western portion of the property. Limited populations were observed in the eastern portion of the property in stand 1. Glossy buckthorn was the most notable invasive plant with smaller populations of honeysuckle, burning bush, multiflora rose, autumn olive, oriental bittersweet and Japanese barberry. These plants may also be present in areas of the properties that were not observed during the inventory; additional species may also be present.

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.

Recommendations

- Continually monitor the property for the presence of invasive plants.
- Implement control measures while populations are low. Early detection and treatment is the cornerstone of successful and economical control.
- Seek cost-share opportunities to aid in the control of invasive plants.
- Consider population densities and the ability to effectively manage the current population.

Pathogens and diseases

Ash decline and/or ash yellows disease, beech bark disease, pine canker, and white pine blister rust are forest health concerns that impact trees in our region. Each are described below:

Ash yellows disease or ash decline is a disease that causes slow growth and decline of ash species, particularly white and green ash. Only discovered in the 1980's, ash yellows is caused by wall-less microbes, called mycoplasma like organisms (MLOs), that are thought to be transmitted by leaf hoppers and related insects. Symptoms include permanent and rapid declines in tree growth, crown dieback and witches brooms at the trunk base. Diseased ash may still exhibit moderate growth unless other factors, like drought and competition, provide additional stress. Infected trees typically die within one to five years. Cures or protection methods are unknown. White ash represents a very small proportion of the total stocking and volume on the Merriam Farm property and occurs as scattered individuals.

Beech Bark Disease affects American beech, which prior to the introduction of this insect/fungus complex, was the longest lived hardwood in the forests of our region. A scale insect inoculates the tree with the fungal spores of *Nectria coccinea* when its sucking mouth penetrates the bark. *Nectria* upsets normal bark formation, which renders the tree susceptible to decay-producing fungi that subsequently attracts carpenter ants. The weakened trees are susceptible to beech snap, caused by the inability of the trunk to support the weight of the crown, and therefore breaking. American beech responds to this disease and the resulting stress by vigorously sprouting from the roots and the stump. Eventually a dense beech thicket emerges on some sites resulting in difficulty establishing a diverse mix of regeneration. Approximately 5% of the beech are believed to be genetically resistant to this pathogen. Retain individuals exhibiting smooth bark and manifesting no beech bark disease symptoms. The majority of the beech in New England and New York are infected; remedies are unavailable. Beech is a minor component of the Merriam Farm property occurring as scattered individual stems.

Pine canker (*Caliciopsis pinea*) is 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 or so 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 major component of stands 1-4 on the Merriam Farm property. Pine canker does not presently seem to be an issue on this property, but should be watched for future developments especially in stand 4.

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. Blister rust was not observed at the time this plan was being written on the Merriam Farm property.

Insects

Three non-native insects with the capacity to radically alter forest composition loom on the horizon or are present: hemlock woolly adelgid, Asian longhorn beetle and emerald ash borer. In addition to these three insects, the red pine scale insect must be mentioned due the presence of a red pine plantation on the property.

The **woolly adelgid** (HWA) has caused wide spread mortality of hemlock throughout the Southern portion of this species' range, from Massachusetts South to the Appalachians in the Carolinas. This insect is present in Massachusetts, in the Connecticut River valley of Vermont and throughout New Hampshire. The woolly adelgid was first detected in Exeter and Peterborough, NH in 2001. HWA has since spread to about 120 towns and all counties in New Hampshire except Coos, the Northern-most NH county. HWA is currently limited by cold minimum temperatures in the winter. Hemlock is a very small component on the commercial forest of the Merriam Farm property and occurs in small population as scattered individual stems.

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. With hardwood being a major component of the species composition of this property, ALB is a viable threat.

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 Merriam Farm property is currently just outside of the infested area but within the High Risk Zone. There are known infestation sites within Pelham since 2017.

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.

Red Pine Scale is one of the most detrimental invasive insects affecting red pine in the northeast. Red pine scale was first detected in Connecticut in 1946 and has slowly spread throughout southern New England targeting red pine plantations along the way. Red pine scale was first reported in 2012 at Bear Brook State Park in Allenstown, NH among their extensive red pine plantations. Red pine scale is a flightless insect that is spread by birds, squirrels and the wind, generally occurring in the tree tops on small branches and limbs. Foliage color changes slowly from light green to yellow to red appearing first on individual branches on the lower part of the crown then gradually over the entire crown. Extensive harvesting of red pine plantations is being conducted throughout the central portion of the stand in an effort to salvage red pine before it is affected by the red pine scale. Red pine is a minor component of the Merriam Farm property however stand 7 is composed entirely of red pine. At the time of the field work, no signs of red pine scale insect were observed.

The prospect of these four non-native insects, and others, such as the elongate hemlock scale, and their collective impact on the region's forests is numbing. Control efforts are expensive and frequently ineffective, especially at landscape scales. The best protection against these insects is to encourage and maintain both species and age class diversity to the greatest possible extent.

Climate

Lastly, 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. 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, red oak, white oak, black 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, which is present on the Merriam Farm property, will likely expand its range northward; it will become more prevalent in future stands. Stand development patterns may not conform to those historically experienced. Disturbance regimes and patterns are expected to shift. Large scale weather events, particularly rain storms 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.

III. MULTIPLE USE VALUES

Cultural Features

Wire fences and/or stone walls, form the majority of the boundary lines. The remnants of an old bridge crossing Gumpas Pond Brook, scattered apple trees in stands 5 and 6 are all indications of prior land use. 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.

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 Merriam Farm property is one small property supporting a forest cover on a landscape composed of a patchwork of forest land, idle open land, active agricultural land, and residential development that frequently encroaches into and fragments the forest.

Gumpas Pond Brook, Beaver Brook and their associated tributaries and wetlands provide vegetative and habitat diversity. The densely vegetated adjacent upland acts as a riparian buffer and functions as a wildlife travel corridor.

Large trees, some with cavities, occur occasionally on the property; defective oak species with cavities occur in stands 1, 2, 3, and 4. Many of these individuals display the 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 regional levels. Broken topped live trees, encountered rarely, provide ideal perch site for hunting raptors. These structural components all 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, and to a lesser degree hickory, and hophornbeam. Soft mast producers, such as black cherry, occur occasionally. The softwood component in forest stands 1,2, 3, 4, 6, and 8, composed of white pine, and stand 7, composed of red pine all provide seeds from conifer cones for squirrels and chipmunks, as well as for birds such as finches, crossbills and grosbeaks; in aggregate, these conifer species are very abundant on the property. Hardwood regeneration, when present, is heavily browsed.

Early successional habitat afforded by extensive, dense young stands is present on the Merriam Farm property where open agricultural land has succumbed to the process of edge effect and the natural process of succession. Early successional habitat only functions as such for a period of about 5 to 8 years and is generally a highly sought after habitat type. This type makes up a minor component of the vegetative cover on this property.

A variety of wildlife has been observed on this property; deer are ubiquitous on the property and throughout towns in southern New Hampshire. The open agricultural land is a major habitat type, drawing in a variety of neo-tropical migratory birds, small mammals, and birds of prey for both shelter and a food source. Larger mammals such as coyote and fox frequent these areas in search of smaller mammals such as mice and rabbits.

The Northern long-eared bat (NLEB) is listed as a threatened species by the US Fish and Wildlife Service (USFWS) and is protected under the Endangered Species Act. This bat favors hardwoods forests for its habitat. Any federally funded activities must comply with guidelines established by the USFWS to afford protection to NLEB and its required habitat. Any NRCS funded tree cutting practice is prohibited in June and July and requires a review if conducted between April 15 and May 31 or August 1 to October 31 (the shoulder season). Tree cutting between November 1 and April 14, or in young forests (< 6"DBH) is permitted. Additional criteria apply if the site is within 1/4 mile of a known hibernaculum or within 150' of a known roost tree. Additional information is found at: https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/KeyFinal4dNLEBFedAgencies_17feb2016.pdf. In New Hampshire NRCS routinely files for a review and variance during the "shoulder seasons" of April 15 through May 31 and August 1 through October 31. This enables cutting during those periods, confining the cutting prohibition for any federally funded practices to June and July.

General Wildlife Conditions and Considerations

The lack of species diversity in hardwood regeneration throughout the Merriam Farm property is attributable to severe over browsing by white-tailed deer. 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.

Recommendations

- Establish or maintain early successional habitat
 - Support other wildlife goals and objectives, particularly snag creation and recruitment of future down woody material
 - Incorporate delayed field mowing, creating various old field/ shrub habitat types
- See https://extension.unh.edu/resources/files/Resource001937_Rep2855.pdf for management suggestions.

Recreational Features and Use

The Pelham Forestry Committee highly values their land for aesthetics and outdoor recreation. The Pelham Forestry Committee supports the use of their land for hiking and wildlife observations. The Merriam Farm property is currently being used for hunting and hiking by local residents with no official trail network. The Pelham Forestry Committee is currently working with the Nashua Regional Planning Commission to establish a network of hiking trails resulting in minimal impact on the natural environment.

Recommendations

- Encourage continued deer hunting, especially the taking of does, to reduce the deer population.
- Establish a hiking trail network that allows for both logging and recreational access.
- Limit recreational disturbance to the open agricultural area and reduce impacts to environmentally sensitive areas on the property.
- Explore opportunities for an interpretive trail discussing the multiple wildlife habitats throughout the property.

Timber

This property has seen minimal timber harvesting activities over the years. This can be attributed to being surrounded by agricultural land and suburban areas. In many cases, the forested areas of this property either contained poorly drained soils or are acting as a vegetative buffer to adjacent landowners. Firewood cutting tends to be the most common type of management within properties such as this. No tree stumps were noticed within the forested areas of this property, indicating a lack of recent harvesting activity. Site conditions, tree species, and stump size are variables in stump decomposition within the forest. With the lack of stump evidence, it is safe to determine that no harvesting of mature trees has occurred for at least 40 years on this property.

A unique feature of this property is the presence of a red pine plantation. This was likely planted by a previous landowner. Additionally, red cedar was also discovered in the northwestern portion of the property. Red cedar can become established during the abandonment of open agricultural land. Another explanation for the presence of this tree species is due to being planting. Additionally, a very unique tree species was observed during the field work portion of this management plan. An Atlantic white cedar was noted in the northern area of the property adjacent to a forested wetland. This species does not naturally occurring in this region with the exception of Atlantic white cedar swamps. The tree appears to be healthy and growing with good form. See <https://www.des.nh.gov/organization/commissioner/pip/factsheets/cp/documents/cp-20.pdf> for additional information on Atlantic White Cedar Swamp Communities.

IV. EXAMINATION METHOD *and* FOREST & SOIL TYPE CLASSIFICATION

Forest Inventory and Stand Classification

Forest trees were sampled using a *twenty basal area factor (20 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 (AGS or UGS). Additional notes pertaining to individual trees were made regarding form, damage and cavities. The inventory data from the Merriam Farm property was processed using the Multicruise program developed by Computer Forest Consultants, Inc. to generate stand and stock tables.

An inventory grid was established and sample points were numbered where each north/south line intersects each east/west line. Samples are sometimes moved from their predetermined grid location, either in the office prior to conducting the inventory, or in the field. This occurs when samples land in non-forested areas, at type changes, in non-productive forest (I. e.: forested wetlands) or in areas that are not dedicated to the production of timber. Inventory points are also "dropped" for various reasons, including, but not limited to those reasons for moving sample points.

The Merriam Farm property was inventoried in August of 2020 by Eric Radlof and Jeffrey Snitkin. The inventory grid was established using grid north in ArcGis with transects and sample points both located at 300' intervals. The grid contained 11

samples located as described above. The inventory grid was transferred into GIS and onto AcrPad on a handheld GPS unit which was utilized to navigate to and locate samples.

A total of 11 samples were measured on 18.0 acres of “working” commercial forest for an average sampling intensity of one per 1.6 acres.

Five commercial, productive forest stands were delineated as a result of the 2020 inventory. The remaining forested areas were deemed non-commercial for the purpose of the inventory.

Soil Classification and Forest Typing

Soils information was obtained from the Soil Survey of Hillsborough County Eastern Part a publication by the United States Department of Agriculture, Soil Conservation Service in Cooperation with New Hampshire Agricultural Experimental Station. The NH Granit data soils layer from Hillsborough County was utilized to create the soils map.

Forest types were classified 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”.

V. ADAPTIVE FOREST MANAGEMENT & ECOLOGICAL FORESTRY

This section of the forest plan is an attempt to define a new paradigm for forest management and the practice of silviculture. In developing the following silvicultural guidelines we draw heavily on personal beliefs and many years of forestry experiences, and observations of the forest. “Guidelines for Biodiversity Compatible Forestry” from Wetland, Woodland, Wildland by Elizabeth Thompson and Eric Sorenson and research and publications by renowned and innovative foresters such as Jerry Franklin, Herb Hammond and Bill Leak.

The practice of forestry in this country is very young, only about 100 years old. Expressed another way, forestry has been practiced in this country for a time period that is less than the maximum age that big tooth aspen can attain or for less than about one-eighth the maximum age of Eastern hemlock can reach. Our silvicultural systems were handed down to us from Europe. These systems applied orderly agricultural models to the forest ecosystem. Forestry emphasized simplification and uniformity of the forest for the singular purpose of commodity production. Rotation ages and diameter objectives were rigidly applied. Regeneration methods were developed for the sole purpose of regenerating and growing commercially important tree species.

As society demands an increasingly intricate array of amenities from the forest, and as we realize that maintaining ecological function is essential to the production of these amenities, it follows that silvicultural systems must naturally evolve to address both societal demands and our increased knowledge of natural functions. The basis of traditional forestry is actually rendered obsolete by the changing demands of our society and our increased knowledge of the complexity of all natural systems, including our forests.

A change of perspectives is the first essential element necessary to implement ecological forestry. The forest must become the focus, not the forest products. Forest structure, function, complexity and processes are necessary, and in fact, are responsible for

creating the desired products. Further, we must recognize and appreciate the limits of our knowledge. Foresters prescribe and implement environmental modifications every day over thousands, if not millions of acres, without an awareness of basic ecological functions. We must embrace humility in our approach to the forest instead of the pervasive arrogance that permeates the designation of “expert”.

The top down management approach to forestry serves to perpetuate a litany of forestry myths that are designed solely to further business interests, not the integrity of the forests we purport to manage. Traditional forestry has largely been involved with the management of capital, not forests. Hence, procurement foresters are frequently compensated at higher levels than forest managers are. Effective and truly sustainable forestry requires a bottom up approach, a grass roots perspective, not a hierarchical system. Dynamic systems require dynamic, not rigid, management systems.

New nomenclature and terminology is also required to move beyond the traditional confines of even-aged and uneven-aged forest management. New definitions broaden perspectives, allow for a wider range of options and expand the walls of the boxes we draw around forest management and silvicultural systems. Expanded definitions and new terminology allow us, as foresters, to move into a new and dynamic role in concert with the forest ecosystem instead of in opposition to it.

Forest management and applied silviculture requires an adaptive management approach. Foresters must practice from a humble perspective, acknowledging that our prescriptions are merely working hypotheses with uncertain outcomes. And those outcomes are subject to increasing and unknown influences such as climate change, excessive herbivory and invasive plants and insects. Management must be designed to enhance learning, knowledge and awareness, not to promote and maintain the status quo. Foresters must monitor and evaluate prescriptions, treatments and outcomes. Forestry must be flexible to adapt to changes in both knowledge and conditions. Management must be as dynamic as the very system it hopes to manage. Nothing in the forest is static. Why should management approaches and silvicultural systems remain rigid?

Who among foresters can state with absolute certainty that the traditional even-aged and uneven-aged management systems are successful, never mind sustainable? Why do foresters continually experience regeneration “failures” if these systems are so infallible? Only through observation and monitoring can foresters continually hone their silvicultural skills and avoid management pitfalls. This requires active, ongoing involvement, site-specific knowledge and a continual search for better understanding. Complacency results in the failure to maintain the forest structure, integrity and function required to maintain sustainable forests. There are numerous examples and research findings that indicate that traditional forestry, rather than enhancing the forest, is ultimately compromising it and jeopardizing that very system responsible for producing the wealth that society is demanding. Foresters must also assume responsibility for informing clients when unrealistic demands are made on the forest and its capacity to produce goods and services.

Forests are complex and as such must be managed for wholeness and complexity instead of efficiency and simplicity (Kohm and Franklin 1997). “A biologically sustainable forest is a prerequisite for a biologically sustainable yield (harvest)” (Maser 1994). Sustainable ecological forestry must be based on the interaction between species and the processes that both create interdependence and define ecosystems (Kohm and Franklin 1997). Time must be redefined and thought of on an ecological scale, not a human scale. The emphasis must be on structure, function and process, not on a desired commodity outcome. Society can extract commodities and amenities from the forest, but only in so far as structure, function and process are supported by the management system.

Ecological forestry is then necessarily based on a new perspective and that requires new terminology, both of which work together to create new approaches to management. The following ecological forestry principles and guidelines provide the foundation to strive for and the framework to guide the silvicultural prescriptions within this forest plan.

- Maintain soil structure and productivity. Minimize soil erosion, disturbance and compaction. Protect soil by harvesting **only** during appropriate weather and seasons. Frozen and/or snow covered ground affords maximum protection, though may be less ideal when regenerating. Maintain nutrient cycles by retaining organic material on the forest floor and above ground as both live and dead trees. Do not interrupt the downslope movement of soil, water and nutrients, except as needed to access the forest while better protecting these elements.
- Maintain the naturally occurring species composition of **all** native plants and animals. Utilize silviculture to restore the composition of radically altered stands to a naturally occurring species mix for the site.
- Harvest only from the abundance and retain and protect the rarities. Generally utilize silviculture to create diversity of species, size and age classes and forest structures. Attempt to increase minority species within stands and throughout ownerships that would naturally occur on sites.

- Emulate natural disturbance regimes. Design silvicultural techniques and schedules that are similar to natural disturbance patterns. Maintain higher stocking levels than traditionally recommended for optimum, short rotation timber production. Allow trees to achieve larger diameters than traditionally advocated. Utilize longer cutting cycles, generally 15 to 25 years, especially as stands mature. Occasionally a 10-year cycle is appropriate in young stands and/or on highly productive sites; cycles of greater than 25 years may be desirable in older stands and/or on poor sites. It is natural for a tree to fall, however, it is not natural for that tree to move off site. Do not harvest decayed trees. Allow them to return to the site. The lifetime of a tree may be far shorter than the time required for it to decompose. There is life in death and the decomposition process is a part of the essential energy flow within the forest. Death that provides vitality; perhaps a new definition of life is needed.
- Utilize silviculture to stimulate the development of species and structures that will naturally evolve over time on a site. Thin stands early and lightly to emulate the stem exclusion stage and promote development of a complex understory. Harvest to mimic natural disturbance. Use what is traditionally known as single tree and group selection when possible to achieve regeneration objectives. Single tree selection mimics individual tree fall. Group selection takes many forms from very small openings to mid-sized patches to large groups, all of which have counterparts in natural disturbance regimes. Allow natural disturbances, which will occur regardless of human management, to initiate stand replacement (clearcuts) on a large scale.
- Incorporate perpetual, variable retention of Legacy Trees to ensure that the entire range of species composition and naturally occurring forest structures, such as old, larger diameter trees, declining or decaying stems, snags, cavity trees, retained organic material (retained organic material or down woody material), mycorrhizal fungi, etc. are present in the forest. Legacy Trees remain for their natural life cycle; they represent the perpetual retention component of a multi-aged, retention harvesting system. Strict criteria for the number of trees or basal area/acre are not necessary. However, recognizing the critical role these Legacy Trees play, and the structures and functions they support, is necessary for successful implementation. Generally, retained Legacy Trees should fall in a range of 10% to 20% of the basal area of a fully stocked stand within the managed forest. Legacy Tree retention targets can be reduced in the working forest to some degree depending on the area of forest reserved from timber management on any given tract. In large diameter Northern hardwoods assume full stocking is between 100 and 125 square feet of basal area/acre; retain 10 to 25 square feet of basal area/acre represented by roughly 5 to 10 trees/acre that are 18" DBH and greater. Full stocking of softwood stands ranges from 180 to 260 square feet of basal area/acre, depending on species; retain between 18 and 50 square feet of basal area/acre or about 10 to 25 trees/acre, depending on the forest type and DBH. These Legacy Trees provide a biological legacy for subsequent cohorts, provide essential elements of stand structure and insure the continued function of the forest. Maintaining the dynamic natural processes of the forest is the only certain mechanism that will allow truly sustainable human extractions from that forest.
- Practice multi-aged management to the degree that sites permit. Site constraints may limit age classes to two, with a low density Legacy component, rather than to three or more. A variety of age classes and canopy layers incorporating perpetual, variable structure retention harvesting principles are adaptable to a wide range of species and forest types. Multi-age management requires working at various crown levels within the stand. Visualize regeneration as a continuous wave-like pattern rather than a definitive point in time triggered by age or diameter. Base the selection process for retention and removal on tree quality and vigor and on Legacy Tree targets when marking for harvest. For timber production retain those trees most likely to survive and maintain or improve in quality. Harvest those trees that appear least likely to live and improve in quality. However, always retain some trees that are not suitable for timber as Legacies (see above); they serve essential biological functions.
 - Multi-age management requires working at various crown levels within stands. Follow harvests with forest stand improvement (FSI) practices such as cull removal, weeding, thinning and release.
 - Accomplish this by girdling large excess trees that do not contain sawlog volume or are not designated as Legacy Trees and drop excess smaller stems.
- Eliminate and prevent the spread of exotic invasive plants. Utilize both mechanical and chemical control methods. Control invasives prior to or within 2 years after implementing silvicultural treatments. Limit disturbance and when possible maintain dense stands for long time periods to discourage invasives. Ideally, retain 300' uncut buffers between untreated infested areas and uninfected areas. Invasive plants can, and do, modify and effect natural vegetation.
- Maintain a functioning forest first and foremost; all other desired outcomes will follow. Implement treatments that preserve future options and opportunities. Evaluate and modify treatments as necessary to achieve the desired goals and to accommodate an understanding of the site as more information is obtained.
- Identify, protect, and where appropriate manage, sensitive, fragile, unusual or rare plants, animals or communities. These are necessary and vital parts of the ecosystem.

VI. GUIDING PRINCIPLES

The recommendations and prescriptions in this report are firmly guided by the belief that all things are connected. These recommendations are further based on a respect for the intrinsic worth of all things; a respect for all components of the forest, those known and unknown, those seen and unseen, those understood and those not understood.

"The Practice of Forestry" assumes new meaning: I am eternally practicing, continuously observing and endlessly learning. After over a decade of "practicing" forestry I have discovered that my intuition provides a reliable guide that is just as valid as my professional, scientific and technical knowledge.

My prescriptions are made from this perspective, with strong convictions, but understanding that I, the "professional" forester", still have more questions than answers. I know very little relative to the incredible intricacies of the forest, yet my recommendations and actions can have far-reaching implications.

Forests live in a time frame beyond human scale. Any given ownership is only one small strand of the larger web. Forests are functioning, diverse, dynamic and resilient systems composed of a vast array of plants and animals, both large and microscopically small. All these forest components contribute to forest function. A forest is more than trees, and certainly far more than only those trees considered to possess commercial value at some arbitrary point in time.

Responsible forest use maintains options and choices. After a choice is made we can make another choice, and still another. The more options we create with our choices, the more choices we have. Design prescriptions and implement treatments that maintain numerous future options and that harvest from the abundance while protecting and maintaining the rare and unique. Maintain and respect forest integrity, diversity and function. The cardinal rule of "tinkering" with our environment is to keep all the parts. Waste does not exist in natural systems; all naturally occurring components occupy a place and a purpose. Diversity, stability and resiliency are ecologically inherent and necessary characteristics of all natural systems.

VII. MANAGEMENT OBJECTIVES

- ❖ Maintain and encourage a diverse, vibrant, functioning, indigenous forest by maintaining all native forest components and functions. Retain and protect a portion of the large diameter and unique trees.
- ❖ Protect soil, water, nutrient and energy cycles, fragile habitats and conditions, rare plants, animals and exemplary natural communities.
- ❖ Maintain and improve wildlife habitat for a variety of mammals and birds.
- ❖ Maintain scenic beauty.
- ❖ Maintain open agricultural land.
- ❖ Maintain and enhance recreational opportunities.
- ❖ Produce high quality saw timber in an environmentally responsible manner.
- ❖ Control invasive plant populations and prevent their spread.

VIII. FOREST TYPES: DESCRIPTIONS AND PRESCRIPTIONS

Managed Forestland

The managed or working forest of the Merriam Farm property forest is comprised of stands 1, 2, 3, 4, 6 and 7 encompassing 23.2 acres. 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. Forested wetlands and open agricultural areas make up the remainder of the total acreage. This includes stands 5, 8, and Open Agricultural Land. Although these areas are not defined as managed or working forests, they are covered within this plan.

Forest Plan Stand Summaries *managed by Pelham Forestry Committee*
located in Pelham, Hillsborough County, New Hampshire

Stand # 1 Forest type: White Pine/ Red Oak/ Red Maple (SAF# 20) **Acreage:** 13.5 acres

Soil type (% slope): Windsor loamy sand (0-3%), Rippowam fine sandy loam (0%), Hinckley loamy sand (8-15%), and Deerfield loamy fine sand (0-3%).

Forest Soil Group: IC/ IIB

Sampling: Date: August 2020; **Protocol:** 6"+ DBH & by crown class; **Method:** point, 20 BAF; #: 7 (1/1.9 ac.)

Stand History: This stand displays minimal evidence of commercial harvesting within the past 40 years. Firewood harvesting may have occurred during this time.

Health issues: Minor blowdown, ice/ snow damage.

Invasive Plants: Low overall with locations having moderate populations; oriental bittersweet, autumn olive, honeysuckle, and glossy buckthorn being the most prominent adjacent to the open agricultural land.

Structure: even-aged **Stocking:** over **AGS** 137 sq. ft. **UGS** 60 sq. ft. **Total** 197 sq. ft. **MSD:** 14.7"

Species Composition (% overstory BA): 67% *Hardwood*/ 33% *Softwood*: Red Oak 46%, White Pine 33%, Scarlet Oak 9%, Black Oak 4%, Red Maple 4%, White Oak 2%, Sugar Maple 2%

Size Class: Small to large sawtimber

Volume proportion: Logs 84% and Pulp 16%

STAND VOLUMES	Veneer Log Int. 1/4" Volume	Sawlog Int. 1/4" Volume	Pallet Log Int. 1/4" Volume	Mat Log Int. 1/4" Volume	Pulp Cords Volume
White Pine	-	137,324	14,365	-	46
Sugar Maple	-	-	-	-	6
Red Maple	-	-	-	7,513	9
Red Oak	-	108,648	27,723	11,476	36
White Oak	-	1,898	1,412	-	5
Black Oak	-	7,068	-	-	12
Scarlet Oak	-	-	-	19,261	18
Total	-	254,938	43,500	38,250	132

LOGS	VOLUME		PULP	VOLUME	
	BF/Ac	% Total		Cords/Ac	% Total
Grade	18,884	76%			
Palet	3,222	13%	Hardwood	6.4	65%
Mat Log	2,833	11%	Pine	3.4	35%
TOTAL	24,939	100%	TOTAL	9.8	100%

Log Composition (% BF Volume): White Pine 45%, Red Oak 44%, Scarlet Oak 6%, Black Oak 2%, Red Maple 2 %, and White Oak 1 %

Stand Description: White pine and red oak dominate most of this stand. Scarlet oak, black oak, red maple, white oak, and sugar maple are associates dispersed throughout the stand. Crown closure is nearly 100%. A mixture of stagnant white pine and oak saplings make up the majority of the regeneration in this stand. Oak seedlings found on the forest floor below the browse line are showing signs of heavy browse. Timber quality throughout most of this stand is very good. Most of the red oak is in the 14-20" DBH range with white pine in the 20+" DBH range. Stocking is fairly consistent throughout the stand with white pine being more dominant in the southwestern portion of the stand.

The terrain within this stand is relatively flat, with sites sloping towards Beaver Brook to the southeast. Most of this stand contains good growing sites with deep, well-drained soils. High bush blueberry was observed throughout the stand.

Silvicultural objective: A shelterwood harvest system is recommended for this stand. This entry will be considered the first entry in a multiple entry system. The emphasis for this entry will be to create openings in the canopy by removing the unacceptable growing stock, typically trees in the lower crown classes but not excluding those in the upper crown class. The cutting will assist in the development of wind-firm trees growing space in the canopy, as well as increasing light on the forest floor, in order to provide favorable conditions to establish regeneration. Trees that are retained are full-crowned, healthy trees with good form. Harvesting should be carried out during a year in which the target species bear seed in abundance, traditionally in the fall time for white pine and red oak. The intensity and pattern of the cutting should be adjusted to the target species so the residual stand provides optimum conditions for germination and establishment of the target species. Subsequent entries will be timed based on the establishment and response of desired regeneration. Future entries will continue to remove a portion of the overstory canopy in order to continually release desirable regeneration.

Diam. Objectives: Red Oak 20-24", White Pine 20- 24"+ & 16-18" for the associated species such as red maple, black oak, scarlet oak, and white oak.

Cut Cycle: 8-20 yrs. depending on conditions

Silvicultural Prescription: In 2021 conduct a shelterwood harvest. (Consider combining harvest with other stands on the property.)

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required.

Stand # 2 Forest type: White Pine/ Red Oak/ Red Maple (SAF# 20) **Acreage:** 1.0 acres

Soil type (% slope): Pipestone loamy sand (0 to 3%) and Hinckley loamy sand (3 to 8%)

Forest Soil Group: IC/ IIB

Sampling: Date: August 2020; **Protocol:** 6"+ DBH & by crown class; **Method:** point, 20 BAF; #: 1 (1/1.0 ac.)

Stand History: This stand displays minimal evidence of commercial harvesting within the past 40 years. Firewood harvesting may have occurred during this time.

Health issues: Minor blowdown, ice/ snow damage.

Invasive Plants: Moderate populations; oriental bittersweet, autumn olive, honeysuckle, and glossy buckthorn being the most prominent adjacent to the open agricultural land.

Structure: even-aged **Stocking:** over **AGS** 80 sq. ft. **UGS** 260 sq. ft **Total** 340 sq. ft. **MSD:** 11.3"

Species Composition (% overstory BA): 80% Hardwood/ 20% Softwood: Red Maple 47%, Red Oak 26%, White Pine 21%, Hickory 3% and Black Gum 3%.

Size Class: Large pole to medium sawtimber

Volume proportion: Pulp 63%/ Logs 37%

STAND VOLUMES	Veneer Log Int. 1/4" Volume	Sawlog Int. 1/4" Volume	Pallet Log Int. 1/4" Volume	Mat Log Int. 1/4" Volume	Pulp Cords Volume
White Pine	-	4,297	810	-	9
Red Maple	-	-	-	-	40
Hickory	-	-	-	-	1
Red Oak	-	7,764	850	1,874	3
Total	-	12,061	1,660	1,874	53

LOGS	VOLUME		PULP	VOLUME	
	BF / Ac	%		Cords / Ac	%
Grade	12,061	77%			
Pallet	1,660	11%	Hardwood	44.0	83%
Mat Log	1,874	12%	Pine	9.0	17%
TOTAL	15,595	100%	TOTAL	53.0	100%

Log Composition (% BF Volume): Red Oak 68% and White Pine 32%

Stand Description: Red maple, red oak, and white pine dominate the majority of this stand. Hickory and black gum are associates dispersed throughout the stand. Red maple resulting from stump sprouts lends evidence to past harvesting in the early to mid-1900's. Overall crown closure is nearly 100%. This stand is heavily overstocked. As a result, regeneration is very limited in this stand. Hay scented fern and high bush blueberry make up with majority of the regeneration. Red maple and mixed oak seedlings found on the forest floor below the browse line are showing signs of heavy browse. Timber quality throughout most of this stand is poorer. Most of the red maple is in the 10" DBH range with red oak in the 22-24" DBH range and white pine in the 12"-20+" DBH range. Stocking is fairly uniform throughout the stand.

The terrain within this stand is relatively flat, with sites sloping towards a forested wetland to the north. Most of this stand contains good growing sites with deep, well-drained soils.

Silvicultural objective: A free thinning is recommended in the stand, releasing trees without regard to crown class position; it is essentially a combination of low, high, and selection thinnings. This thinning will remove numerous weak competitors favoring well-formed trees with 30% or more live crown, aiding in the establishment and release of crop trees. The ultimate goal of this thinning is to adjust tree composition and improve timber quality. The majority of this thinning will focus on removing poorly formed hardwood trees, reducing the basal area to an optimal growing level.

Diam. Objectives: Red Oak 20-24", White Pine 20- 24"+ & 16-18" for the associated species such as red maple, black gum, and hickory.

Cut Cycle: 10-20 yrs. depending on conditions

Silvicultural Prescription: In 2021 conduct a free thinning. (Consider combining harvest with other stands on the property.)

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required.

Stand # 3 Forest type: Eastern White Pine (SAF # 21)

Acreage: 1.0 acres

Soil type (% slope): Pipestone loamy sand (0 to 3%) and Hinckley loamy sand (3 to 8%)

Forest Soil Group: IC/ IIB

Sampling: **Date:** August 2020; **Protocol:** 6"+ DBH & by crown class; **Method:** point, 20 BAF; **#:** 1 (1/1.0 ac.)

Stand History: This stand displays minimal evidence of commercial harvesting within the past 40 years. Firewood harvesting may have occurred during this time.

Health issues: Minor ice/ snow damage.

Invasive Plants: Moderate populations; oriental bittersweet, autumn olive, honeysuckle, and glossy buckthorn being the most prominent adjacent to the open agricultural land.

Structure: even-aged **Stocking:** over **AGS** 40 sq. ft. **UGS** 80 sq. ft **Total** 120 sq. ft. **MSD:** 8.2"

Species Composition (% overstory BA): 83% Softwood/ 17% Hardwood: White Pine 83% and Red Maple 16%.

Size Class: Large pole to medium sawtimber

Volume proportion: 53% Pulp/ 47% Logs

STAND VOLUMES	Veneer Log Int. 1/4" Volume	Sawlog Int. 1/4" Volume	Pallet Log Int. 1/4" Volume	Mat Log Int. 1/4" Volume	Pulp Cords Volume
White Pine	-	4,445	895	-	9
Red Maple	-	-	-	-	3
Total	-	4,445	895	-	12

LOGS	VOLUME		PULP	VOLUME	
	BF/Ac	% Total		Cords/Ac	% Total
Grade	4,445	83%			
Palet	890	17%	Hardwood	3.0	25%
Mat Log	0	0%	Pine	9.0	75%
TOTAL	5,335	100%	TOTAL	12.0	100%

Log Composition (% BF Volume): White Pine 100%

Stand Description: White pine dominates the majority of this stand. Red maple, red oak, and hemlock are associates dispersed throughout the stand. Overall crown closure is variable throughout the stand with areas of 100% crown closure. This stand is overstocked. As a result, regenerations is very limited in this stand. The southern edge of this stand does contain large sapling white pine and mixed hardwoods around the open agricultural land. Hay scented fern and high bush blueberry are sparse and generally make up the remaining regeneration. Timber quality throughout most of this stand is average. Most of the red maple is in the 6" DBH range with white pine in the 12-18" DBH. Scattered red oak within the stand is in the 20-24" DBH range although not picked up in the cruise. Stocking is fairly consistent throughout the stand.

The terrain within this stand is relatively flat, with sites sloping towards a forested wetland to the north. Most of this stand contains good growing sites with deep, well-drained soils.

Silvicultural objective: A free thinning is recommended in the stand, releasing trees without regard to crown class position; it is

essentially a combination of low, high, and selection thinnings. This thinning will remove numerous weak competitors favoring well-formed trees with 30% or more live crown, aiding in the establishment and release of crop trees. The ultimate goal of this thinning is to adjust tree composition and improve timber quality. The majority of this thinning will focus on removing poorly formed hardwood trees, reducing the basal area to an optimal growing level. This treatment will indirectly create small openings in the canopy allowing this stand to function as a soft edge adjacent to the open agricultural land. The soft edge will improve the wildlife habitat by creating a brushy early successional edge, enhancing the wildlife habitat opportunity for the open agricultural land.

Diam. Objectives: Red Oak 20-26", White Pine 20- 24"+ & 16-18" for the associated species such as red maple.

Cut Cycle: 10-20 yrs. depending on conditions

Silvicultural Prescription: In 2021 conduct a free thinning. (Consider combining harvest with other stands on the property.)

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required.

Stand # 4 Forest type: Eastern White Pine (SAF# 21)

Acreage: 1.5 acres

Soil type (% slope): Hinckley loamy sand (3 to 8%)

Forest Soil Group: IC

Sampling: Date: August 2020; **Protocol:** 6"+ DBH & by crown class; **Method:** point, 20 BAF; #: 1 (1/1.5 ac.)

Stand History: This stand displays minimal evidence of commercial harvesting within the past 40 years. Firewood harvesting may have occurred during this time. This stand as well as stands to the west are generally younger in age, suggesting more recent abandonment from open agricultural or pastoral land.

Health issues: None noted

Invasive Plants: Moderate populations; oriental bittersweet, autumn olive, honeysuckle, and glossy buckthorn being the most prominent adjacent to the open agricultural land.

Structure: even-aged **Stocking:** over **AGS** 160 sq. ft. **UGS** 0 sq. ft **Total** 160 sq. ft. **MSD:** 11.1"

Species Composition (% overstory BA): 75% Softwood/ 25% Hardwood: White Pine 75%, Red Maple 13%, and American Elm 12%.

Size Class: Large pole to small sawtimber

Volume proportion: 74% Logs/ 26% Pulp

STAND VOLUMES	Veneer Log Int. 1/4" Volume	Sawlog Int. 1/4" Volume	Pallet Log Int. 1/4" Volume	Mat Log Int. 1/4" Volume	Pulp Cords Volume
White Pine	-	29,483	-	-	11
Red Maple	-	-	-	-	5
A. Elm	-	-	-	-	5
Total	-	29,483	-	-	21

LOGS	VOLUME		PULP	VOLUME	
	BF/Ac	% Total		Cords/Ac	% Total
Grade	29,483	100%			
Palet	0	0%	Hardwood	10.0	48%
Mat Log	0	0%	Pine	11.0	52%
TOTAL	29,483	100%	TOTAL	21.0	100%

Log Composition (% BF Volume): White Pine 100%

Stand Description: White pine dominates the majority of this stand. Red maple and American elm are associates dispersed throughout the stand. Overall crown closure is between 75% and 100%. This stand is overstocked. As a result, regeneration does not exist within the stand. The southern and western edges of this stand contain sapling white pine and mixed hardwoods around the open agricultural land. Hay scented fern and high bush blueberry are sparse within the stand. Timber quality throughout most of this stand is average. Most of the red maple is in the 8-10" DBH range with white pine in the 8-14" DBH with scattered individuals in the 28-32" DBH range adjacent to the open agricultural land and can be considered pasture white pine. Scattered American elm is also within the stand in the 8" DBH range. Stocking is consistent throughout the stand.

The terrain within this stand is relatively flat, with sites sloping towards a forested wetland to the northeast. Most of this stand contains good growing sites with deep, well-drained soils.

Silvicultural objective: An improvement thinning is recommended in this stand. Improvement thinnings are conducted in stands past the sapling stage to improve the composition and quality by removing trees of undesirable species, form, or condition from the main crown canopy, providing the treatment is not intended to make way for regeneration. The most fundamental characteristic of improvement cuttings is the elimination of poor trees in favor of good ones. Improvement cuttings are strictly preliminary operations of a remedial nature, designed to set the stage for systematic thinnings and eventual regeneration cuttings. This treatment will indirectly create small openings in the canopy allowing this stand to function as a soft edge adjacent to the open agricultural land. The soft edge will improve the wildlife habitat by creating a brushy early successional edge, enhancing the wildlife habitat opportunity for the open agricultural land.

Diam. Objectives: White Pine 20- 24"+ & 16-18" for the associated species such as red maple and American elm.

Cut Cycle: 10-20 yrs. depending on conditions

Silvicultural Prescription: In 2021 conduct an improvement thinning. (Consider combining harvest with other stands on the property.)

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required.

Stand # 5 Forest type: Red Maple Forested Wetland(SAF #108)

Acreage: 1.6 acres

Soil type (% slope):, Pipestone loamy sand (0 to 3%)

Forest Soil Group: IIB

Sampling: *Date:* August 2020; *Protocol:* No samples taken; ocular exam

Stand History: None

Health issues: Minor ice/ snow damage.

Invasive Plants: Moderate populations of glossy buckthorn throughout the stand

Species Composition: Red maple, black birch, white birch, high bush blueberry, scattered woody wetland shrubs

Size Class: Pole sized

Stand Description: Red maple dominates the majority of this stand. White birch and black birch are associates dispersed throughout the stand. Overall crown closure is between 35% and 75%. Regeneration is sparse in this stand and consists of red maple and black birch saplings with high bush blueberry and witch hazel among other scattered woody wetland shrubs. Most of the red maple and associated hardwoods are in the 4-8" DBH range. Stocking is consistent throughout the stand.

The terrain within this stand is relatively flat, located within a large depression, retaining water throughout the majority of the year. This stand makes up the southernmost area of a larger forested wetland with the majority of the forested wetland existing to the north of the property. Soils are poorly drained/ ponded with trees growing from mounds within the forested wetland area. At the time of the ocular exam of this stand, no water was present within the stand and forested wetland to the north due to drought conditions.

As mentioned prior in this management plan, an Atlantic white cedar was observed along the southern edge of this stand. Although rare in this area of New Hampshire, this tree species does exist within natural communities. It is believed this Atlantic white cedar may have been planted. The Atlantic white cedar is in the 14-16" DBH range and appears to be in good condition with a healthy crown and growth form. Refer to the link provided earlier in this management plan for additional information regarding Atlantic white cedar.

Silvicultural objective: No treatments are recommended for this stand. This stand should be retained and allowed to grow in its natural state protecting the forested wetland and allowing it to function as such.

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required. Treatment can be timed during the dry summer months when water is absent within the stand. This may not occur every year and should be monitor for when the opportunity arises.

Stand # 6 Forest type: White Pine/ Red Oak/ Red Maple (SAF# 20) **Acreage:** 5.2 acres

Soil type (% slope): Hinckley loamy sand (3 to 8%), Deerfield loamy fine sand (3 to 8%), and Windsor loamy sand (0 to 3%)

Forest Soil Group: IC

Sampling: Date: August 2020; **Protocol:** No samples taken; ocular exam

Stand History: Abandoned agricultural land

Health issues: Minor ice/ snow damage.

Invasive Plants: Moderate to high populations; oriental bittersweet, autumn olive, honeysuckle, multiflora rose and glossy buckthorn.

Species Composition: White pine, red maple, white birch, black birch, white ash, American elm and mixed oak (red, white, and black).

Size Class: Large sapling to pole sized

Stand Description: White pine dominates the majority of the stand however red maple becomes more prominent heading westerly in the stand. White birch, black birch, white ash, American elm and mixed oak are associated species found throughout the stand. Also observed in this stand were red cedar and apple trees. Overall crown closure is between 75% and 100%. This stand is considered even aged with areas of dense canopy. Regeneration is very limited in this stand and primarily consists of invasive plant species. Most of the tree species found in this stand are in the 4-8" DBH range. Scattered individuals are found in the western portion of the stand in the 10-14" DBH range. Portions of the eastern most part of the stand contain large pole sized individuals. The majority of this stand contains open grown, coarse bodied trees consistent with abandoned agricultural or pastoral land representing differing ages of abandonment. Remnants of wire fencing/ posts and ground disturbance are past indicators as to the use of this area of the property.

Gumpas Pond Brook flows southerly through the western portion of this stand. Soils appear to be poorly drained immediately surrounding the brook and heading westerly toward Mammoth Road. The terrain to the east of the brook is relatively flat with well drained soils. An abandoned farm road leads from Mammoth Road easterly through the stand into the open agricultural land. The farm road has grown in and the bridge over Gumpas Pond Brook is in need of repair. Although this provides direct access for the property, it does not support access for harvesting activity without significant improvement.

Silvicultural objective: An improvement thinning is recommended in this stand. Improvement thinnings are conducted in stands past the sapling stage to improve the composition and quality by removing trees of undesirable species, form, or condition from the main crown canopy, providing the treatment is not intended to make way for regeneration. The most fundamental characteristic of improvement cuttings is the elimination of poor trees in favor of good ones. Improvement cuttings are strictly preliminary operations of a remedial nature, designed to set the stage for systematic thinnings and eventual regeneration cuttings. In areas of the stand containing low levels of acceptable growing stock that are unlikely to increase in value, it is preferable to regenerate the stand than to extend the rotation by applying improvement cuttings. This treatment will indirectly create small openings in the canopy allowing this stand to function as a soft edge adjacent to the open agricultural land. The soft edge will improve the wildlife habitat by creating a brushy early successional edge, enhancing the wildlife habitat opportunity for the open agricultural land. The harvestable area should remain east of Gumpas Pond Brook due to access and ground conditions west of the brook.

Diam. Objectives: White Pine 20- 24"+ & 16-18" for the associated hardwood species

Cut Cycle: 10-20+ yrs. depending on conditions

Silvicultural Prescription: In 2021 conduct an improvement thinning. (Consider combining harvest with other stands on the property.)

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required. This stand displays the highest densities of invasive plant species on the property. Management should consider the overall goal of treatment and use treatment as a way to control invasive plant species, preventing their spread. There will always be a population of invasive species within this stand due to its density and sensitive areas adjacent to Gumpas Pond Brook. Treatment can be timed to act as a control to prevent further spread and to allow native species a greater chance to regenerate and out compete invasive plants.

Stand # 7 Forest type: Red Pine (SAF# 15)

Acreage: 1.0 acres

Soil type (% slope): Hinckley loamy sand (3 to 8%)

Forest Soil Group: IC

Sampling: Date: August 2020; **Protocol:** 6"+ DBH & by crown class; **Method:** point, 20 BAF; #: 1 (1/1.0 ac.)

Stand History: Plantation

Health issues: None

Invasive Plants: Low to moderate populations; oriental bittersweet, autumn olive, honeysuckle, and glossy buckthorn being the most prominent adjacent to the open agricultural land.

Structure: even-aged **Stocking:** over **AGS** 180 sq. ft. **UGS** 0 sq. ft **Total** 180 sq. ft. **MSD:** 9.3"

Species Composition (% overstory BA): 100% Softwood/ 0% Hardwood: Red Pine 100%

Size Class: Large pole to Small Sawtimber

Volume proportion: 68% Pulp/ 32% Logs

STAND VOLUMES	Veneer Log Int. 1/4" Volume	Sawlog Int. 1/4" Volume	Pallet Log Int. 1/4" Volume	Mat Log Int. 1/4" Volume	Pulp Cords Volume
White Pine	-	8,802	-	-	38
Total	-	8,802	-	-	38

LOGS	VOLUME		PULP	VOLUME	
	BF/Ac	% Total		Cords/Ac	% Total
Grade	8,802	100%	Hardwood	0.0	0%
Pallet	0	0%	Pine	38.0	100%
Mat Log	0	0%	TOTAL	38.0	100%
TOTAL	8,802	100%			

Log Composition (% BF Volume): Red Pine 100%

Stand Description: This stand consists of a small red pine plantation with red pine dominating the majority of this stand. Red maple and white birch are associates found along the northern and eastern edges of the stand. There is no evidence of past management in this stand. Overall crown closure is between 75% and 100%. This stand is currently overstocked. As a result, regeneration is sparse and contains red maple, white birch, mixed oak, white pine, and red pine saplings generally along the edges of the stand. Timber quality throughout most of this stand is good. Most of the red pine is in the 8-12" DBH range and stand composition is consistent throughout.

The terrain within this stand is relatively flat. Most of this stand contains good growing sites with deep, well-drained soils.

Silvicultural objective: A clearcut is recommended in this stand. This method involves removal of all trees, both large and small in one entry within a stand or part of. In practice all trees over 2" DBH are cut. There are multiple methods and variations of clearcuts. For this stand, the clearcut shall be conducted as part of a salvage cutting. Salvage cuttings are conducted primarily to remove trees that have been, or are in imminent danger of being killed or damaged by agents other than competition. In this scenario, red pine scale is the agent. Red pine scale has been identified in Hillsborough County and close by Rockingham County and is slowly spreading outward. At this time Pelham is not on the list of infected towns but red pine scale may eventually spread to this area. Given the high concentration of red pine in this old plantation, this stand is at high risk of an infestation.

Diam. Objectives: N/A

Cut Cycle: 10-20 yrs. depending on regeneration conditions

Silvicultural Prescription: In 2021 conduct a salvage clearcut. (Consider combining harvest with other stands on the property.)

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required.

Stand # 8 Forest type: Red Maple Forested Wetland (SAF #108)

Acres: 5.72 acres

Soil type (% slope): Rippowam fine sandy loam (0 %)

Forest Soil Group: IIB

Sampling; Date: August 2020; **Protocol:** No samples taken; ocular exam

Stand History: None

Health issues: Blowdown, minor ice/ snow damage.

Invasive Plants: Moderate populations; multiflora rose, Japanese's barberry with glossy buckthorn being the most prominent along the western edge.

Species Composition: Swamp white oak, silver maple, basswood, red maple, black cherry, white pine, red oak, black birch, white birch, river birch, high bush blueberry, scattered woody wetland shrubs

Size Class: Large pole sized to large sawtimber

Stand Description: Poor to good quality swamp white oak, silver maple, and red maple dominate this stand. White pine, red oak, white birch, black birch, American elm, basswood and river birch are associates dispersed throughout the stand. Overall crown closure is between 75% and 100%. Regeneration is sparse in this stand and consists of mixed hardwoods with high bush blueberry and other scattered woody wetland shrubs. Most of the red maple and associated hardwoods are in the 10-18" DBH range. White pine and swamp white oak appears to be in the same diameter range with some individuals 20"+ DBH. Stocking is consistent throughout the stand.

This stand consists of uplands broken up by a series of oxbows and backwater areas making the stand inaccessible. The terrain within this stand is relatively flat, with small upland areas rolling towards Beaver Brook and associated wetland areas. This stand makes up a small portion of a large forested wetland complex associated with Beaver Brook. Soils are generally well drained on the upland areas but the majority of the stand contains poorly drained soils with ponding throughout the year. A large abandoned sandpit area is just off the property to the southeast. This area appears to have been abandoned in the late 1990's, became flooded and now serves as a pond area adjacent to the forested wetland within the stand. The wildlife value of this stand is very high and serves as a riparian buffer to Beaver Brook and nearby Gumpas Pond Brook.

Silvicultural objective: No treatments are recommended for this stand. This stand should be retained and allowed to grow in its natural state protecting the forested wetland and allowing it to function as such.

Treat invasives along the western edge of the stand using foliar herbicide application and a cut stump application, repetitive treatments are required. This will aid in the control of the continual spread of invasive plants westerly into the property over time. Special permitting with the Division of Pesticide control may have to be obtained in order treat invasives in close proximity of surface waters as necessary.

Open Agricultural Land

Acreage: 16.0 Acres

Soil type (% slope): Deerfield loamy fine sand (0 to 3%), Hinckley loamy sand (0 to 3%) and Windsor loamy sand (0 to 3%)

Forest Soil Group: IC

Farmland of Local Importance: Yes

Sampling: Date: August 2020; **Protocol:** No samples taken; ocular exam; Meeting with UNHCE Wildlife Specialist Matt Tarr July 30th.

Stand History: Agricultural land utilized for hay, crops, and/or pasture. Abandoned less than 5 years ago with periodic mowing since abandonment.

Invasive Plants: Low to moderate populations; oriental bittersweet, autumn olive, honeysuckle, and glossy buckthorn being the most prominent adjacent to the forested land with low populations within the open agricultural land.

Description: This area is the largest type on the property. This area consists of open agricultural land which was previously being used before the Town of Pelham came into possession of the property. As a result, the open land consists of a variety of grasses typical of the region with a scattering of native shrubs. Signs of past cropland can still be observed in the southeastern most portion of the stand. Review of ground penetrating LIDAR reveals that the majority of this open area has been plowed and utilized as cropland at one point. The remnants of a small irrigation pond are located in the southwestern most corner of the open area surrounded by woody shrubs and saplings.

Management objective: This open area allows for the opportunity to create and maintain a variety of field habitats for wildlife. The two main habitats that can be managed for are fields/ grassy openings and shrubby old field types. With the large size of this area, three distinct management areas can be created. The northwestern portion of the open area can be managed as it's own area. Soils in this area tend to be more poorly drained than the remaining open areas, lending itself to supporting a different variety of vegetation than the rest of the open area. The remaining open area to the east can be split into two separate management units of roughly 5 acres with staggered management schedules. This area has more well drained soils allowing for differing vegetation from the first management area. For all areas, mowing can be done annually in the late fall to maintain field/ grassy opening habitat type. Mowing can be deferred for 3 to 5 years to allow for shrubby old field habitat type to develop. Deferring mowing for 5-10 years can lead to early successional habitat types. Management of the adjacent forestland can also add an early successional habitat component through forest less than 10 years old. This type currently exists where open areas have been abandoned.

Mowing can become more difficult from year 3 to 5+ if woody shrubs and tree sapling become heavily established. This may lead to the use of more heavy duty mowing equipment beyond the standard tractor and brush hog, especially beyond year 5. All of the habitat types mentioned are becoming more rare in southern NH as this land type is lost to the natural process of succession or development. Mowing shall be done as growing conditions and budgets allow. See additional information at: https://extension.unh.edu/resources/files/Resource001937_Rep2855.pdf for Field, Old-fields, and Shrublands for Wildlife.

Management Cycle: 1-5 yrs depending on growing conditions and desired results.

Management Prescription: Create three management areas and offset their management by 1-5 years of each other. Annually review early successional habitat areas for maintenance and incorporate with mowing schedule as needed. Mow during the late fall.

Treat invasives using foliar herbicide application and a cut stump application, repetitive treatments are required.

IX. 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. The Merriam Farm property is 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.

White pine dominates the composition of the property with red oak being the next most dominant species. White pine was once more prominent, but the proportion of these species has been reduced by a combination of natural mortality, weather events and previous logging. This property will continue to transition to mixed oak dominated forest as white pine matures.

	Veneer Log Int. 1/4" Volume	Sawlog Int. 1/4" Volume	Pallet Log Int. 1/4" Volume	Mat Log Int. 1/4" Volume	Multicruise Total Log Volume	Pulp Cords Volume
White Pine	0	146066	16065	0	162131	64
Red Pine	0	8802	0	0	8802	38
Sugar Maple	0	0	0	0	0	6
Red Maple	0	0	0	7513	7513	52
Hickory	0	0	0	0	0	1
Red Oak	0	116412	28573	13351	158336	40
White Oak	0	1898	1412	0	3310	5
Black Oak	0	7068	0	0	7080	12
Scarlet Oak	0	0	0	19261	19261	18
Total	0	280246	46050	40125	366421	236
%	0%	76%	13%	11%		

The majority of the forest stocking is of long-lived trees such as white pine, red oak, white oak, and black oak. White birch and aspen, short-lived species, are found in some stands; white birch is in severe decline in most cases. Red maple, a moderately-lived species, plays a dominant role in the current composition and is likely to continue to do so in the future forest.

The size class is fairly uniform throughout the property with a high proportion of stems in the large pole to small sawlog size classes. Much of stand 1 contains a higher proportion of stems in the small to large sawlog size classes while the remaining stands contain stems in the large pole to small sawlog size classes, reflecting their abandonment from open agricultural or pastoral land. Stands are generally well-stocked with desirable, site-suited species.

Stand quality is fair; acceptable growing stock (AGS) and high quality forest products are often found at a majority within the commercial stands.

Regeneration is a key to sustained harvests as well as to the development of two aged and multi-aged forests. This forest structure is characterized by greater complexity and diversity than that found in even-aged stands. These attributes provide increased resiliency, enabling the forest to withstand the impacts of a changing climate and the more frequent and intense disturbance we are experiencing and are expecting in the future. Only by supporting ecological integrity and forest function can humans expect to produce the desired goods and services from the forest on a sustained basis. Silvicultural knowledge and information provides the blueprint to manipulate the forest to achieve goals and objectives; timber harvesting and non-commercial forest tending treatments are the tools used to implement the plan and achieve those outcomes.

Commercial treatments are designed to obtain regeneration, maintain or improve growth, improve stand quality and manipulate composition while providing a revenue stream. Non-commercial tending practices (Forest Stand Improvement, or FSI) such as weedings, thinnings, cull removal, pruning and release are utilized in the same manner to maintain or improve growth and vigor, improve quality and manipulate composition as stands develop, but do not yet support sufficient merchantable volume to generate revenue. Tending young, developing stands, or stand components, along with periodic harvests of commercial size trees will produce multi-aged stands over time that fully occupy sites, provide increased diversity and complexity while improving resiliency to natural disturbances and climate change. Stands on the property already support varying degrees of diversity and complexity. However, approximately 30 to 40 years is required to transition from an even-aged condition to a multi-aged stand; about 20 years is required to shift from a two- aged structure.

Periodic investments of time and/or money for non-commercial tending treatments and invasive control are required to ensure forest productivity. Conservation programs funded by the NRCS, such as the Environmental Quality Incentive Program (EQIP) can substantially contribute funds for some conservation activities. Planning activities and devoting money and labor to them on a scheduled basis fosters steady progress and permits continuous evaluation of treatment results and modification of prescriptions as necessary to best accomplish landowner goals.

The composition of the future forest is partly dependent on many factors including the relationship of sunlight and shade, site characteristics, the unknown impact of invasive alien plants and insects, the degree of herbivory, climate change and natural events.

A warming climate scenario will likely result in a shift of species composition in the future. Red spruce, balsam fir, yellow and paper birch and sugar maple are all predicted to decline and shift northward in a warming climate. Red oak, present on the property, is likely to expand its proportion of the species composition. Species now typically found further south will migrate northward resulting in the very likely inclusion of white oak, bitternut hickory and black (or sweet) birch, which are currently present on the tract (other than bitternut hickory) in the future forest. White pine, black cherry and red maple are all suited to future climate scenarios as well.

Recommendations

- Encourage a diverse mix of site appropriate regeneration where timber production is a desired objective.
- Invest in non-commercial forest stand improvement (FSI), especially at the early stages of stand development, to increase diversity and maintain site-suited commercially valuable trees.
- Higher stand densities and small crown openings will tend to favor tolerant hardwoods. Heavier cuts and larger openings

will increase the proportion of intolerant hardwoods such as white birch and aspen. Group selection, shelterwood harvests and patch cuts favor a diverse mix of species including white pine, red oak, white oak, black oak, red maple, black birch and white birch on many of the sites on this tract. The high levels of herbivory in the region dictate larger canopy gaps to successfully regenerate hardwoods.

Incorporate the following principles when designing and implementing silvicultural treatments on the property:

- Utilize long rotations based on 50% to 75% of expected maximum ages unless pathogens, pests or disturbances threaten or damage the stand or negatively impact merchantable volume.
- Maintain higher stocking levels than traditionally recommended for optimum, short rotation timber production wherever stem quality is above average.
- Utilize cutting cycles of 15 to 20 years.
- Strive for consistent, somewhat slow growth (10 to 16 rings/radial inch) to achieve high quality, fine-grained timber.
- Harvest from the abundance and retain the rarities within the stand.
- Retain snags that do not present safety hazards.
- Monitor browse pressure and intensity and adjust canopy gap openings as needed.

Wildlife habitat can be maintained and improved in many ways on the tract. The non-commercial portion of the forest ensures the continued availability of dense cover and unique habitats. These areas also provide travel corridors and landscape connectivity. Hardwoods will sprout when cut, providing succulent browse. Creating a mosaic of age and size classes across the ownership and the surrounding landscape will benefit numerous mammals, large and small, as well as songbirds and raptors. Developing multi-layer stands provides similar benefits. Modifying the current stand structure and the prevailing uniform range of size classes will provide the greatest wildlife benefits, absent a cure for beech bark disease or the introduction of other hard and soft mast species.

Woody plants and flowers are all generally capable of fruit production, and this fruit, whether in the form of berries, seeds or nuts, provides a food source for wildlife. The foliage of various flowers, ferns, grasses, sedges, shrubs and trees are subject to browsing by a variety of animals, providing that they are within reach. Black bear eat accessible beech buds in the spring and aspen buds are a preferred food for grouse. Blackberries and raspberries are consumed by a variety of wildlife, including bear; deer will browse the young stems. Some species of ferns are also consumed by deer. In summary, the foliage, stems, flowers and fruit of all plants contribute in some manner to the available food supply for wildlife.

Soft mast producers occur moderately in areas of the property. Hard mast occurs at high levels, supplied by both red oak, white oak, and black oak.

Recommendations

- Identify and release black cherry to encourage crown development and seed production.
- Utilize patch cuts and group selection harvests to increase horizontal diversity, to provide early-successional habitat and to regenerate stands. As stands become more complex and support two or more age classes shift to irregular shelterwood methods to promote and maintain a multi-aged structure.
- The forest habitat of the Merriam Farm property supports white-tailed deer, black bear, moose, porcupine, fisher and other upland mammals; it may also support bobcat. Red squirrels and chipmunks are common in stands with a softwood component.
- Snags, cavity trees and dying trees also provide important habitat: perches for raptors and songbirds, potential nesting cavities, valuable food sources, bat roosting sites and a future source of large woody material for the forest floor. They are essential components of a dynamic forest, and in death, provide life.

Recommendations

- Retain all snags and dying trees except when safety is an issue.
- Retain large trees and trees with cavities.
- Designate at least 5% to 10% of the trees to remain as Legacy Trees to achieve Elders status and to live for their entire natural life cycle within managed stands.
- The current condition of the majority of the property boundaries is fair. Portions of the boundary lines are stone walls and or wire fences. The adjacent subdivision to the southwest of this parcel resulted in the additional iron pins (re-bar) at the newly established corners.

Recommendations

- Inspect and walk the property boundaries or portions thereof, periodically.
- Locate, blaze, and pain the boundaries within this management cycle, after securing permission from abutting landowners.
- Maintain boundaries as specified in the Boundary section of this plan.

Access infrastructure is generally lacking on the property. The old access has either been lost due to change in ownership or lack of use. An investment in reconnaissance, design and planning and ultimately construction, is necessary to create viable access for forest management activities and to protect soil and water. Moon Shadow Drive has created a great opportunity for viable access. Further planning and design can upgrade this access point for future permanent use.

The recommendations proposed in this 10-year management plan should be implemented within the next 10 years, 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 should result in meeting the landowners' objectives for their property. Implementing these recommendations will help ensure that this forestland is being managed with long-term sustainability in mind.

Respectfully Submitted,



Eric V. Radlof, Consulting Forester
N. H. License #447



Management Schedule

Treatment Year	Stand #	Management Activity
2021	N/A	Construct Access and Landing Area
2021	1,2,3,4,6,7	Conduct Timber Harvest
2021	All	Blaze and Paint Discernable Boundary Lines
2021	All	Control of Invasive Vegetation
2023-2025	All	Follow-up Control of Invasive Vegetation
2021	N/A	Determine Mowing Schedule for Open Agricultural Land
2020-2022	All	Finalize Hiking Trail Layout, Design & Construction
2020-2029	All	Continue to Explore Management Opportunities
2029	All	Reevaluate the Property for Updated Management Plan

APPENDIX

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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

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 white 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 IA. Soil moisture is adequate for good tree growth but may not be quite as abundant as in group IA. 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-nutrientand-moisture-demanding hardwoods such as white 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 white 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 11A 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 11B 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.

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.

Topographic Map

Town of Pelham- Merriam Farm

+/-46.52 ac (Map 39/ Lot 6-181)

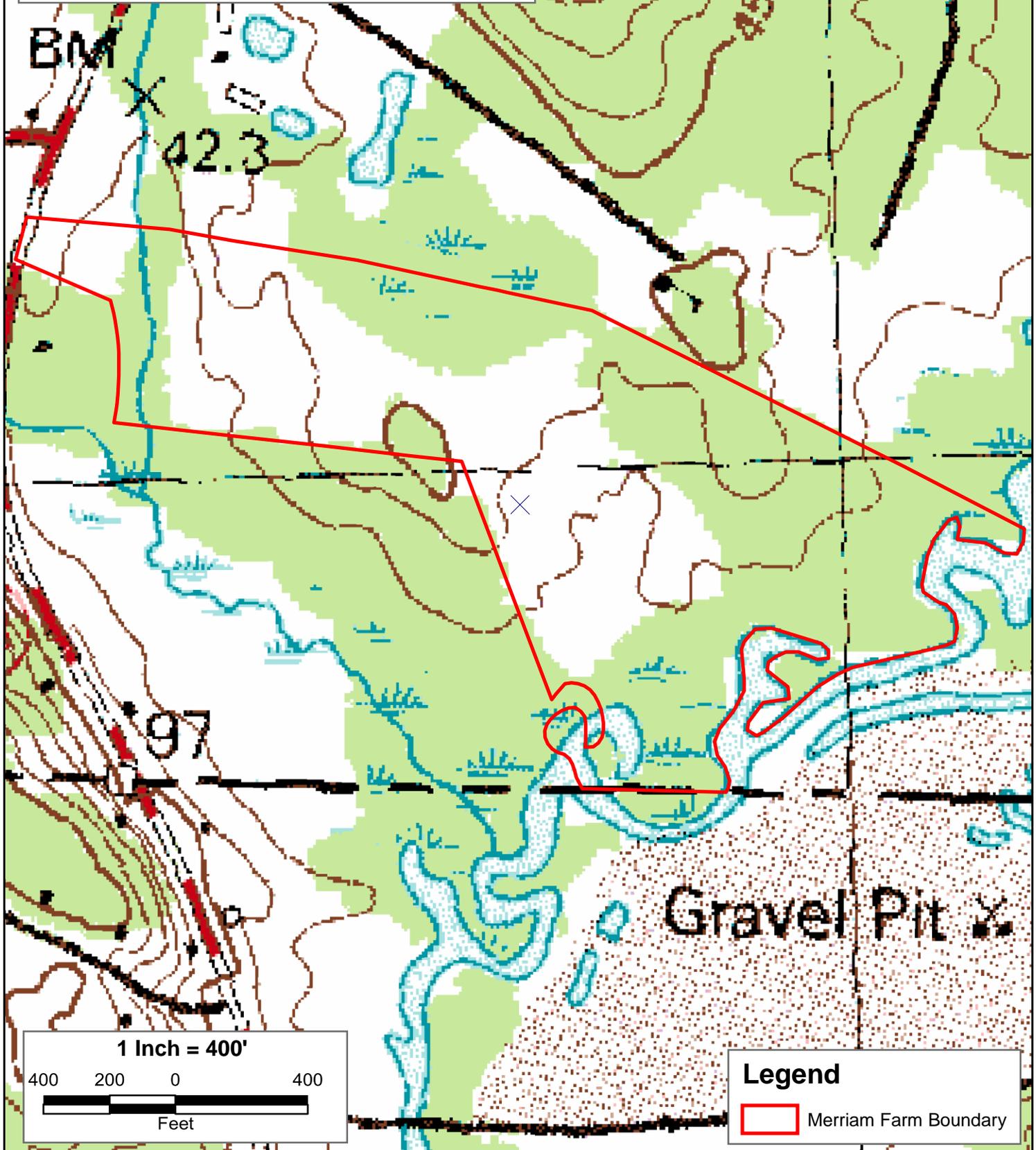
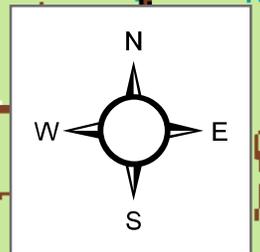
Mammoth Road & Moon Shadow Drive, Pelham, NH

Map created by Eric Radlof (July 2020)

LPF #447 of Full Circle Forestry, LLC.

Data Source: Tax Maps and various layers
from NH GRANIT.

NOT intended as a survey map, for forestry purposes only.



Legend

 Merriam Farm Boundary

Soils Map

Town of Pelham- Merriam Farm
+/-46.52 ac (Map 39/ Lot 6-181)

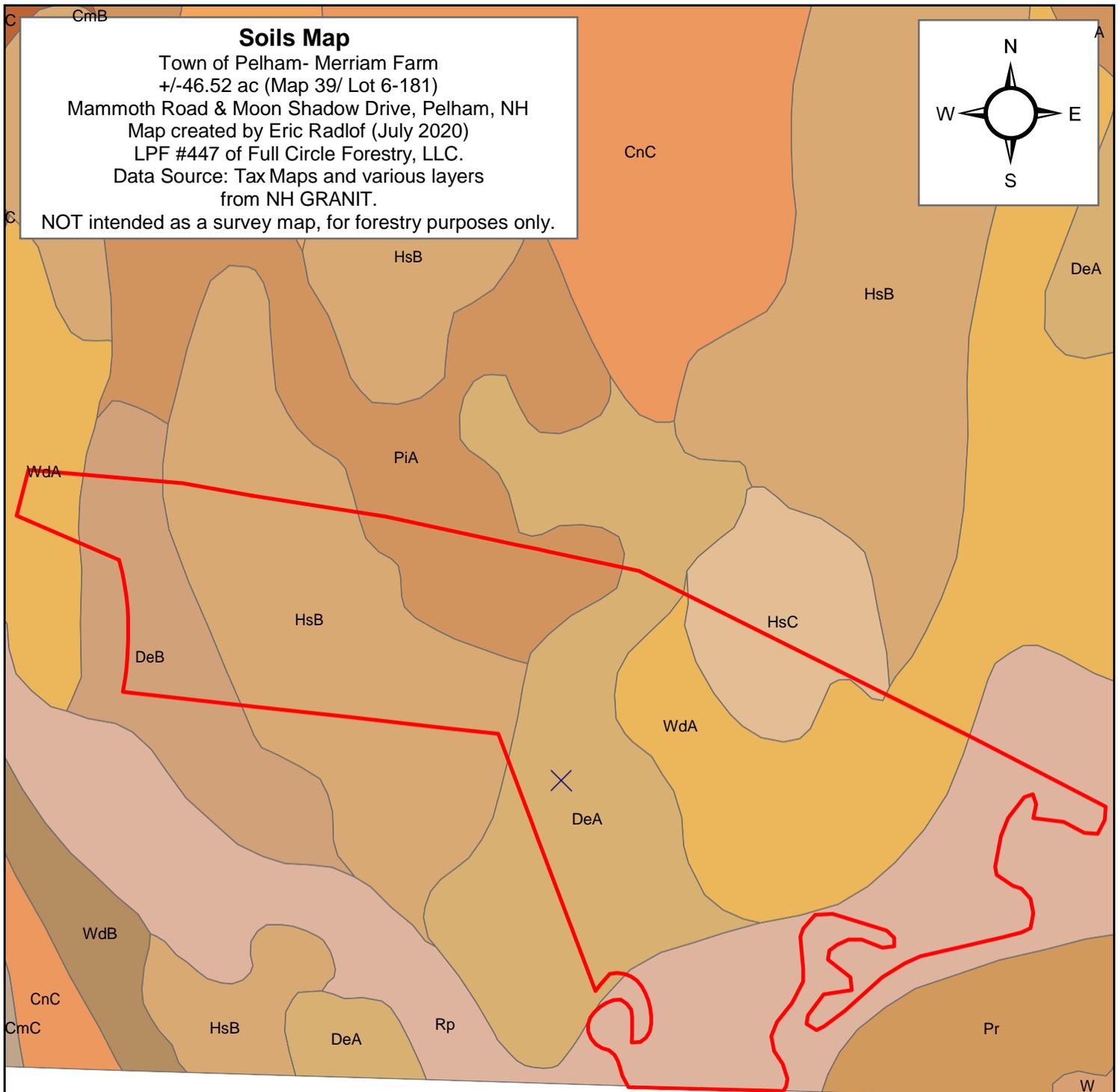
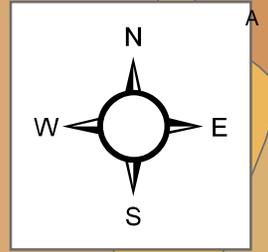
Mammoth Road & Moon Shadow Drive, Pelham, NH

Map created by Eric Radlof (July 2020)

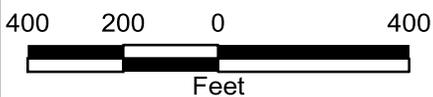
LPF #447 of Full Circle Forestry, LLC.

Data Source: Tax Maps and various layers
from NH GRANIT.

NOT intended as a survey map, for forestry purposes only.



1 Inch = 400'



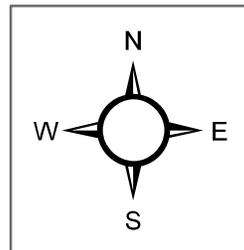
Legend

 Merriam Farm Boundary

Stand Map

Town of Pelham- Merriam Farm
 +/-46.52 ac (Map 39/ Lot 6-181)
 Mammoth Road & Moon Shadow Drive, Pelham, NH
 Map created by Eric Radlof (July 2020)
 LPF #447 of Full Circle Forestry, LLC.
 Data Source: Tax Maps and various layers
 from NH GRANIT.

NOT intended as a survey map, for forestry purposes only.



Stands

Type

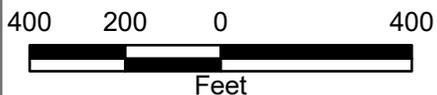
- Red Maple Forested Wetland
- Red Pine
- Eastern White Pine
- White Pine/Red Oak/Red Maple



Legend

- Iron Pipe
- Stone Bounds
- Proposed Landing
- Pond
- Wetlands
- Trail
- Old Woods Road
- Stone Walls
- Streams
- Merriam Farm Boundary

1 Inch = 400'





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: 2020-11-24

Re: Review by NH Natural Heritage Bureau of request dated 2020-11-04

NHB File ID: 3604

Town: Pelham, NH

Project type: Landowner Request

Location: Map 39 / Lot 6 - 181 (Merriam Farm)

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):

	Mapping Precision	% within tract	Last Reported	Listing Status		Conservation Rank	
				Federal	NH	Global	State
Natural Community							
Swamp white oak floodplain forest	High	4	2011	--	--	GNR	S1
Plant Species							
river birch (<i>Betula nigra</i>)	High	4	2017	--	T	G5	S2
meadow garlic (<i>Allium canadense</i> var. <i>canadense</i>)	High	4	2017	--	E	T5	S1

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

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.

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

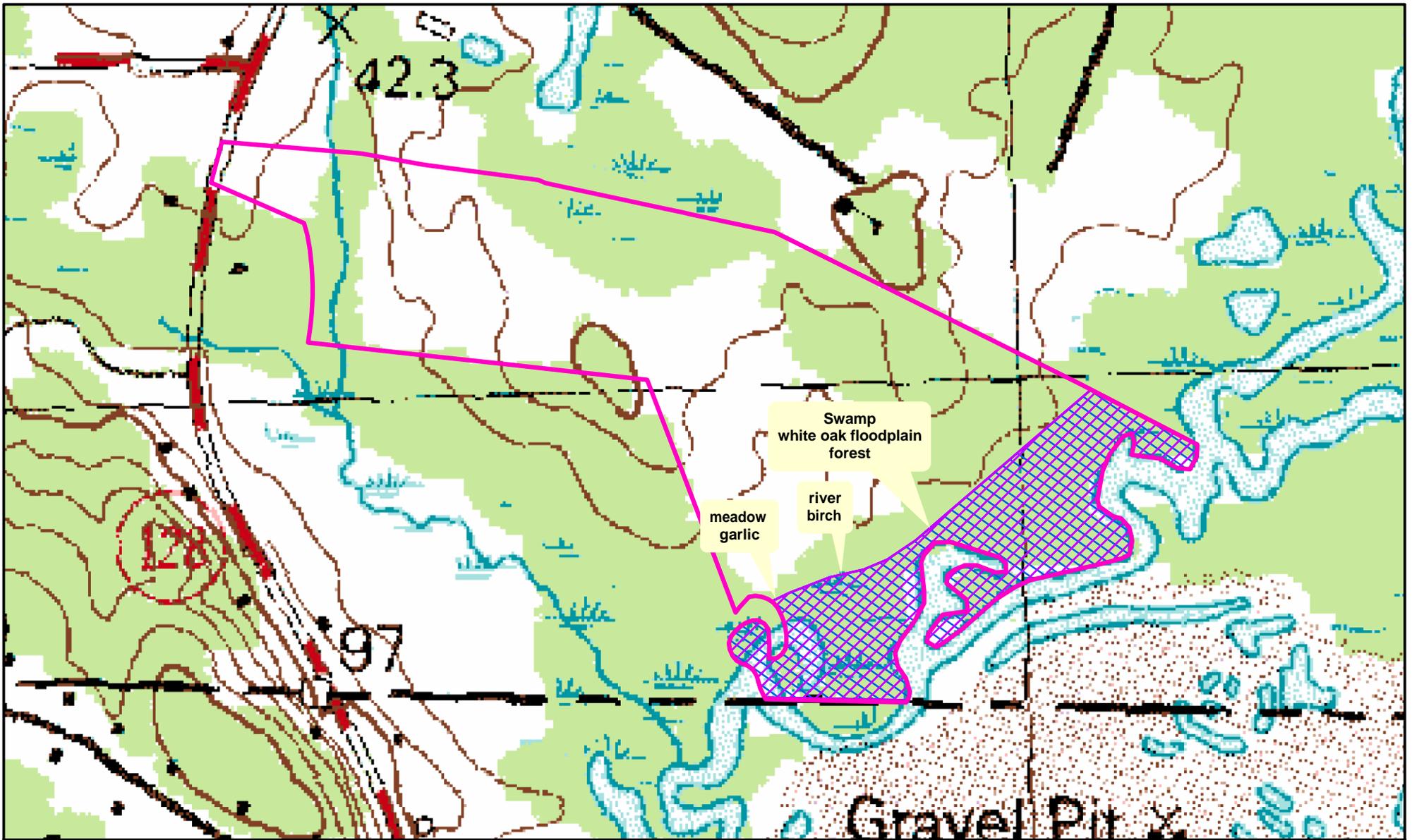
DNCR - Division of Forests & Lands
172 Pembroke Road, Concord, NH 03301
Phone: (603) 271-2214 Fax: (603) 271-6488

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

	Last Reported	Listing Status		Conservation Rank	
		Federal	NH	Global	State
Natural Community					
Swamp white oak floodplain forest	2011	--	--	GNR	S1
Plant Species					
river birch - <i>Betula nigra</i>	2017	--	T	G5	S2
round-leaved trailing tick-trefoil - <i>Desmodium rotundifolium</i>	2007	--	T	G5	S2
button sedge - <i>Carex bullata</i>	2007	--	E	G5	S1
meadow garlic - <i>Allium canadense</i> var. <i>canadense</i>	2017	--	E	T5	S1
Vertebrate Species					
Blanding's Turtle - <i>Emydoidea blandingii</i>	2013	--	E	G4	S1

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.

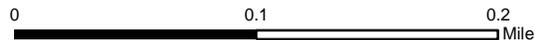
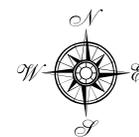


Natural Heritage Bureau
Landowner Report

Project ID Number: 3604

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.

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



New Hampshire Natural Heritage Bureau - Plant Record

meadow garlic

Allium canadense var. canadense

Legal Status

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Excellent quality, condition and landscape context ('A' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2017: Tens of thousands of plants documented over 45 separate observation points, all vegetative. 2011: Two patches, both within 0-25 ft from the river edge. A total of 46 flower buds were counted. Total estimated population area about 1500 square feet. 1992: The state's largest population. Some were found primarily in forested areas while others were found in shrubby areas with *Crataegus* spp. and *Cornus ammomum*. 1950: Herbarium specimen of Straughan at NHA.

General Area: 2011: Within an exemplary swamp white oak floodplain forest. Associated tree species include:swamp white oak (*Quercus bicolor*), river birch (*Betula nigra*), basswood (*Tilia americana*), black cherry (*Prunus serotina*) and green ash (*Fraxinus pennsylvanica*). Other species in the immediate vicinity include:spotted touch-me-not (*Impatiens capensis*), poison ivy (*Toxicodendron radicans*), kidney-leaved buttercup (*Ranunculus abortivus*) and Jack-in-the-pulpit (*Arisaema triphyllum*). Invasives include: multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*) and alder-buckthorn (*Frangula alnus*). 1992: The banks of Beaver Brook are lined with the state threatened *Betula nigra* (river birch), as well as *Quercus bicolor* (swamp white oak). Other tree species include: *Fraxinus pensylvanica* (red ash), *Acer saccharinum* (silver maple), *A. rubrum* (red maple), and *Tilia americana* (basswood). Some of the lower lying areas support shrub dominated swamp and emergent marsh conditions. The southern portion of the brook has more substantial *Acer saccharinum* stands. *Cardamine bulbosa* (bulbous bitter-cress) occurs in this community. A rare Blanding's turtle was also seen here.

Location

Survey Site Name: Beaver Brook
Conservation Land: Lower Beaver Brook Land

County: Hillsborough
Town(s): Pelham
Size: 233.9 acres

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Banks of Beaver Brook. 2017: Pelham Schools Natural Area along Beaver Brook. 2011: Only a small portion of the overall site was visited. The parcel surveyed was located at 139 Bridge St. in Pelham. 1992: The portion investigated is on Lowell Quad, extending south to the state line.

Dates documented

First observation: 1950
Last observation: 2017-04-27

New Hampshire Natural Heritage Bureau - Plant Record

river birch

Betula nigra

Legal Status

Federal: Not listed
State: Listed Threatened

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Excellent quality, condition and landscape context ('A' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2017: 2 plants with several sapling-sized trunks. 2011: 19 trees ranging in size from 5-14 inches dbh were counted within surveyed parcel. 1992: Lines the banks of the brook. May be the best population in the northeast. 1950: Specimen collected, "beautiful trees" on label.
1946: Abundant. 1935: Specimen collected. 1902: Abundant.

General Area: 2017: Golden Brook: Population located within floodplain marsh of a perennial stream within a maintained transmission right-of-way. Associated species include tussock sedge (*Carex stricta*), smooth arrowwood (*Viburnum dentatum* var. *lucidum*), broad-leaved cattail (*Typha latifolia*), wire sedge (*Carex lasiocarpa* ssp. *americana*), and red maple (*Acer rubrum*). Invasive species include glossy false buckthorn (*Frangula alnus*) and purple loosestrife (*Lythrum salicaria*). Brown bog sedge (*Carex buxbaumii*) was also observed within nearby floodplain marsh areas. 2011: Most of the river birch (*Betula nigra*) occurred within 25 feet of the river edge. Associated tree species include: swamp white oak (*Quercus bicolor*), basswood (*Tilia americana*), black cherry (*Prunus serotina*) and green ash (*Fraxinus pennsylvanica*). Other species in the immediate vicinity include: spotted touch-me-not (*Impatiens capensis*), wild garlic (*Allium canadense*), poison ivy (*Toxicodendron radicans*), kidney-leaved buttercup (*Ranunculus abortivus*) and Jack-in-the-pulpit (*Arisaema triphyllum*). Invasives include: multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*) and alder-buckthorn (*Frangula alnus*). 1992: *Quercus bicolor* (swamp white oak) also observed. Other tree species include: *Fraxinus pensylvanica* (red ash), *Acer saccharinum* (silver maple), *A. rubrum* (red maple), and *Tilia americana* (basswood). Some of the lower lying areas support shrub dominated swamp and emergent marsh conditions. The southern portion of the brook has more substantial *Acer saccharinum* stands. The state's largest population of *Allium canadense* (wild garlic), as well as Hillborough county's only known record of *Cardamine bulbosa* (bulbous bitter-cress) were within this entire community complex. A rare Blanding's turtle was also seen here. 1950: Brook side. 1935: Bank.

Location

Survey Site Name: Beaver Brook
Conservation Land: Lower Beaver Brook Land

County: Hillsborough
Town(s): Pelham
Size: 232.9 acres

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Beaver Brook. 2017: Golden Brook: Population is difficult to reach. It was observed via

temporary construction timber mats within the Golden Brook floodplain marsh. Access to the wetland system is possible within the right-of-way from Windham Road (Route 111A; walk southeast) or Tina Avenue (walk northwest). Saplings are located within inundated marsh habitat in the western side of the right-of-way. 2011: Only a small portion of the overall site visited, parcel located at 139 Bridge Street in Pelham. 1992: The portion investigated is on the Lowell quad, extending south to the state line. 1950: Beside Beaver Brook at Pelham Village. 1946: Beaver Brook (Batchelder's station). 1935: Beaver Brook. 1902: Along Beaver Brook at least 4 miles north of the state line.

Dates documented

First observation: 1946-05-24

Last observation: 2017-08-25

New Hampshire Natural Heritage Bureau - Community Record

Swamp white oak floodplain forest

Legal Status

Federal: Not listed
State: --

Conservation Status

Global: Not ranked (need more information)
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Excellent quality, condition and landscape context ('A' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2011: River birch (*Betula nigra*) dominant tree within immediate river side at parcel visited. Scattered swamp white oak (*Quercus bicolor*) also on site along with basswood (*Tilia americana*), American elm (*Ulmus americana*), and green ash (*Fraxinus pennsylvanica*). Poison ivy (*Toxicodendron radicans*) abundant. 1992: Floodplain forest up to 500 feet wide extends north from the state line for an almost continuous 4 miles.

General Area: 2011: Other species in the immediate vicinity include: wild garlic (*Allium canadense*), spotted touch-me-not (*Impatiens capensis*), kidney-leaved buttercup (*Ranunculus abortivus*) and Jack-in-the-pulpit (*Arisaema triphyllum*). Invasives include: multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*) and alder-buckthorn (*Frangula alnus*). 1992: The banks of Beaver Brook are lined with the state threatened *Betula nigra* (river birch), as well as *Quercus bicolor* (swamp white oak). Other tree species include: *Fraxinus pennsylvanica* (red ash), *Acer saccharinum* (silver maple), *A. rubrum* (red maple), and *Tilia americana* (basswood). Some of the lower lying areas support shrub dominated swamp and emergent marsh conditions. The southern portion of the brook has more substantial *Acer saccharinum* stands. The state's largest population of *Allium canadense* (wild garlic), as well as Hillsborough County's only known record of *Cardamine bulbosa* (bulbous bitter-cress) were within this entire community complex. A rare Blanding's turtle was also seen here.

Location

Survey Site Name: Beaver Brook
Conservation Land: Lower Beaver Brook Land

County: Hillsborough
Town(s): Pelham
Size: 231.9 acres

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Beaver Brook. 2011: Only a small portion of the overall site was visited. The parcel surveyed was located at 139 Bridge St. in Pelham. 1992: The portion investigated is on Lowell quad, extending south to the state line.

Dates documented

First observation: 1992
Last observation: 2011-05-18

Carmela O Caughlin

E20

Return to:
Donahue, Tucker & Ciandella, PLLC
PO Box 630
Exeter, NH 03833

**THIS TRANSFER IS EXEMPT FROM TRANSFER TAXES
PURSUANT TO RSA 78-B:2**

WARRANTY DEED

KNOW ALL PERSONS BY THESE PRESENTS that **FREDERIC S. MERRIAM AND CAROL W. MERRIAM, TRUSTEES OF THE FREDERIC S. MERRIAM REVOCVABLE TRUST** u/d/t dated December 19, 2007, with a mailing address of 8 Lovett Lane, Chelmsford, Massachusetts, for consideration paid, grant to the **TOWN OF PELHAM**, a New Hampshire municipal corporation, with an address of 6 Village Green, Pelham, New Hampshire, with **WARRANTY COVENANTS**, the following described premises:

The land and the buildings thereon, if any, situate in the Town of Pelham, County of Hillsborough and State of New Hampshire, more particularly described as follows:

PARCEL I

A certain tract or parcel of land situate in Pelham aforesaid containing 5 acres and 122 rods, more or less, and known as the "Barker Meadow"; bounded and described as follows: beginning at the northwesterly corner of the premises at land of H.A. Jones Heirs and land formerly of A.D. Greeley at the end of a wall and ditch; thence S 37 ½° E, 45 rods by land of said Jones and land formerly of E.B. Gage to Beaver Brook; thence southerly by said Beaver Brook to a stake at land formerly of E.M. Marsh; thence by said "Marsh" land N 34 ½° W, 41 rods 6 links to the end of a wall at land formerly of A.D. Greeley; thence by said Greeley land by the ditch N 44 ½° E, 5 rods 11 links, and N 72° E 14 ½ rods to the place of beginning.

Meaning and intending to describe and convey the same premises conveyed to the within Grantor by deed of Frederic S. Merriam dated May 4, 2011 and recorded at the Hillsborough County Registry of Deeds at Book 8316, Page 2629.

PARCEL II

A certain parcel of land situated on the easterly side of Mammoth Road in Pelham, Hillsborough County, New Hampshire and thus bounded: Beginning at the northwesterly corner of the premises on the easterly side of said road and at the southwesterly corner of land supposed to belong, now or formerly, to Susan M. Cutter; thence southeasterly by said last mentioned land forty four rods to land supposed to belong, now or formerly, to John G. Meseth, et ux; thence still southeasterly by said last mentioned land sixty eight rods to an angle in the wall; thence still southeasterly by said last mentioned land seventy three rods to the end of the wall; thence still southeasterly by said last mentioned land twenty eight rods ten links to Beaver Brook; thence southwesterly, westerly and northwesterly by various courses along said Beaver Brook to land supposed to belong, now or formerly, to Abbie Jones; thence northerly by said last mentioned land fifty five rods to a corner of the wall; thence westerly still by said last mentioned land by the wall and fence 1004 feet to the middle of Gumpus Brook, so called; thence northerly by the middle of the said Brook and by other land of Frederic S. Merriam 364 feet to a stone bound; thence westerly still by other land of Frederic S. Merriam 412 feet to a stone bound at Mammoth Road; thence northerly along said road 161.5 feet to the point of beginning.

Meaning and intending to describe and convey the same premises conveyed to the within grantor by deed of Frederic S. Merriam dated May 4, 2011 and recorded at Book 8316, Page 2627.

CERTIFICATE OF TRUSTEE

Pursuant to New Hampshire RSA 564-A:7 II, the undersigned Trustees under The Frederic S. Merriam Revocable Trust dated December 19, 2007, and any amendments thereto, hereby certify that they have full and absolute power in said trust agreement to convey any interest in real estate and improvements thereon held by the trust and no third person or purchaser, without actual knowledge to the contrary, shall be obligated to further inquire as to the power or authority of the trustee to convey or

to see to the application of any trust assets paid or delivered to the trustees.

Witness my hands this 26th day of December, 2017.

FREDERIC S. MERRIAM REVOCABLE TRUST

Stephen A. Cary
Witness

Frederic S. Merriam
Frederic S. Merriam, Trustee

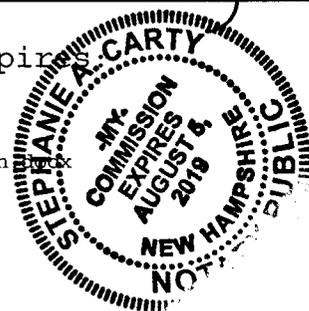
Stephen A. Cary
Witness

Carol W. Merriam
Carol W. Merriam, Trustee

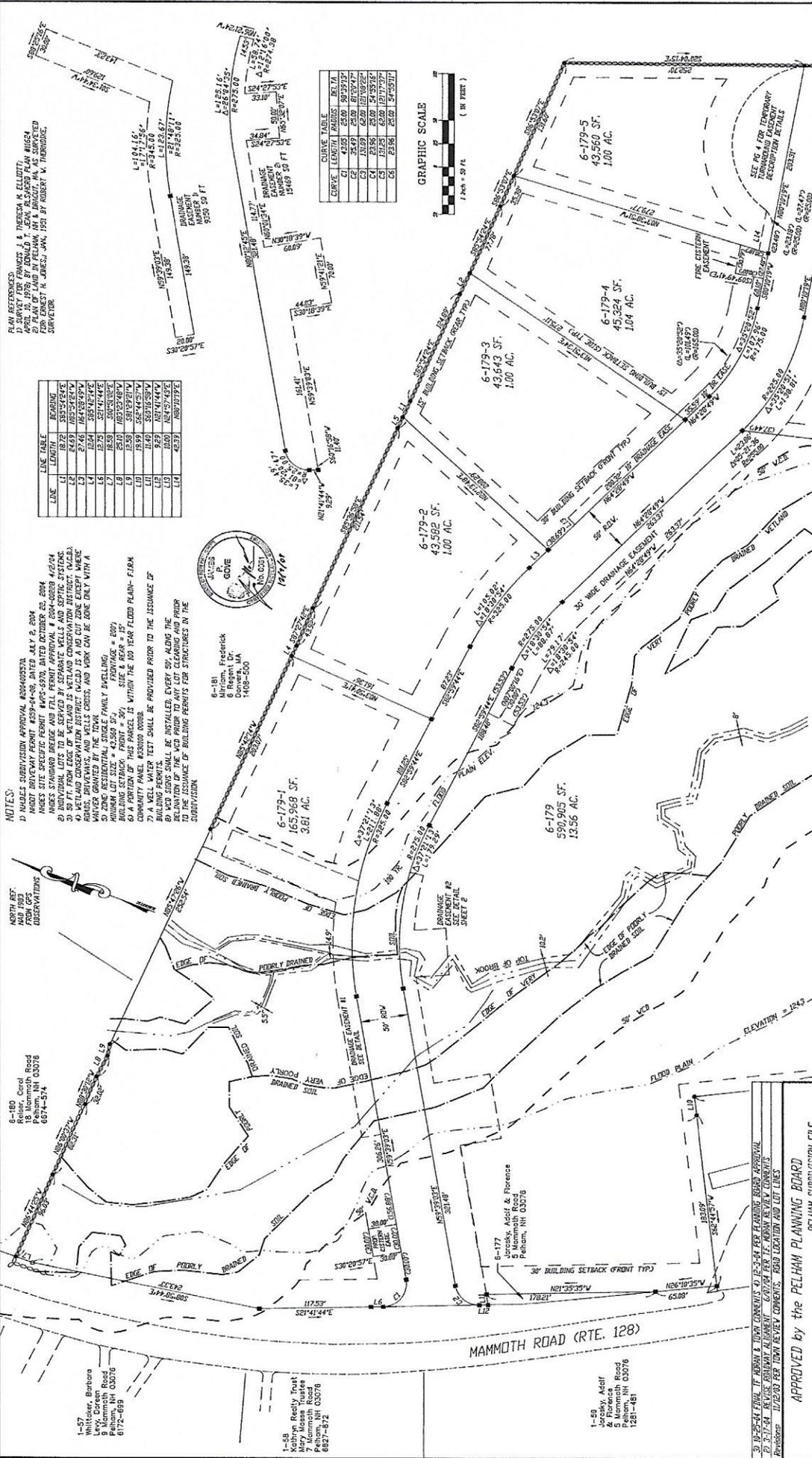
STATE OF NEW HAMPSHIRE
COUNTY OF HILLSBOROUGH

On this 26th day of December, 2017, personally appeared the above-named **FREDERIC S. MERRIAM AND CAROL W. MERRIAM**, in their capacity as Trustees of the Frederic S. Merriam Revocable Trust, whose names are subscribed to the foregoing instrument, and acknowledged that they executed the foregoing instrument for the purposes therein on behalf of the Trust.

Stephen A. Cary
Notary Public
My Commission Expires



S:\PA-PL\Pelham, Town\ConCom\Merriam, Frederic\2017 12 19 Deed to Town



LINE	LENGTH	BEARING	AREA
L1	18.72	S85°24'24"E	
L2	27.45	S85°24'24"E	
L3	27.45	S85°24'24"E	
L4	27.45	S85°24'24"E	
L5	27.45	S85°24'24"E	
L6	27.45	S85°24'24"E	
L7	27.45	S85°24'24"E	
L8	27.45	S85°24'24"E	
L9	27.45	S85°24'24"E	
L10	27.45	S85°24'24"E	
L11	27.45	S85°24'24"E	
L12	27.45	S85°24'24"E	
L13	27.45	S85°24'24"E	
L14	27.45	S85°24'24"E	

CURVE	LENGTH	RADIUS	DELTA
C1	43.05	25.00	50.93913°
C2	25.49	25.00	61.9747°
C3	23.29	25.00	62.01052°
C4	13.25	25.00	32.00121°
C5	23.26	25.00	57.95917°



NOTES:

- 1-57 Kellyn Realty Trust, 8 Mammoth Road, Pelham, NH 03076, 612-868-6688
- 1-58 Kellyn Realty Trust, 7 Mammoth Road, Pelham, NH 03076, 682-7187
- 1-59 Joseph, Adolf & Florence, 5 Mammoth Road, Pelham, NH 03076, 421-1461
- 6-177 Joseph, Adolf & Florence, 5 Mammoth Road, Pelham, NH 03076
- 6-180 Carol, 6674-574, Pelham, NH 03076
- 6-181 Miriam, Frederick, 1488-500, Dover, NH 03824

1. THIS PLAN IS A RESULT OF A CLOSED BOUNDARY TRAVERSE WITH AN ERROR OF CLOSURE OF 1:15,727. I CERTIFY THAT THE WORK NECESSARY FOR THIS PLAN WAS AN ERROR OF CLOSURE NO GREATER THAN 1 IN 1000.

2. UNDIVIDED LOTS TO BE SERVED BY SEWAGE WELLS AND SEPTIC SYSTEMS SHALL BE SERVED BY SEWAGE WELLS AND SEPTIC SYSTEMS.

3. 30 FT. FROM EDGE OF WETLAND IS WETLAND CONSERVATION DISTRICT (WCD).

4. WETLAND CONSERVATION DISTRICT (WCD) IS A 100' BUFFER ZONE AROUND WETLANDS.

5. 30' ZONE RESIDENTIAL SINGLE FAMILY DEVELOPMENT.

6. A PORTION OF THIS PARCEL IS WITHIN THE 100 YEAR FLOOD PLAIN - FIRM.

7. A VEIL WATER TEST SHALL BE PROVIDED PRIOR TO THE ISSUANCE OF BUILDING PERMITS FOR STRUCTURES IN THE FLOOD PLAIN.

8. WCD SIGNS SHALL BE INSTALLED EVERY 50' ALONG THE BOUNDARY OF THE WCD PRIOR TO ANY LOT CLEARING AND PRIOR TO THE ISSUANCE OF BUILDING PERMITS FOR STRUCTURES IN THE FLOOD PLAIN.

FINAL PLAN
 TAX MAP 39 LOT 6-179
 IN PELHAM, NH
 DRAWN FOR
 128 REALTY CORPORATION
 4 MAMMOTH ROAD
 PELHAM, NH 03076
 SCALE: 1"=50'
 DATE: AUG. 2003

EDWARD N. HERBERT ASSOC. INC.
 LAND SURVEYING - CIVIL ENGINEERING
 1 POST ROAD WINDHAM, NH 03093 (603)283-8448

SHEET 2 OF 14

SIGNATURE: *Edmund Herbert* DATE: 12-28-04
 NAME: EDWARD N. HERBERT
 TITLE: REGISTERED PROFESSIONAL LAND SURVEYOR

1. I CERTIFY THAT THIS PLAN IS A RESULT OF A CLOSED BOUNDARY TRAVERSE WITH AN ERROR OF CLOSURE OF 1:15,727. I CERTIFY THAT THE WORK NECESSARY FOR THIS PLAN WAS AN ERROR OF CLOSURE NO GREATER THAN 1 IN 1000.

2. UNDIVIDED LOTS TO BE SERVED BY SEWAGE WELLS AND SEPTIC SYSTEMS SHALL BE SERVED BY SEWAGE WELLS AND SEPTIC SYSTEMS.

3. 30 FT. FROM EDGE OF WETLAND IS WETLAND CONSERVATION DISTRICT (WCD).

4. WETLAND CONSERVATION DISTRICT (WCD) IS A 100' BUFFER ZONE AROUND WETLANDS.

5. 30' ZONE RESIDENTIAL SINGLE FAMILY DEVELOPMENT.

6. A PORTION OF THIS PARCEL IS WITHIN THE 100 YEAR FLOOD PLAIN - FIRM.

7. A VEIL WATER TEST SHALL BE PROVIDED PRIOR TO THE ISSUANCE OF BUILDING PERMITS FOR STRUCTURES IN THE FLOOD PLAIN.

8. WCD SIGNS SHALL BE INSTALLED EVERY 50' ALONG THE BOUNDARY OF THE WCD PRIOR TO ANY LOT CLEARING AND PRIOR TO THE ISSUANCE OF BUILDING PERMITS FOR STRUCTURES IN THE FLOOD PLAIN.

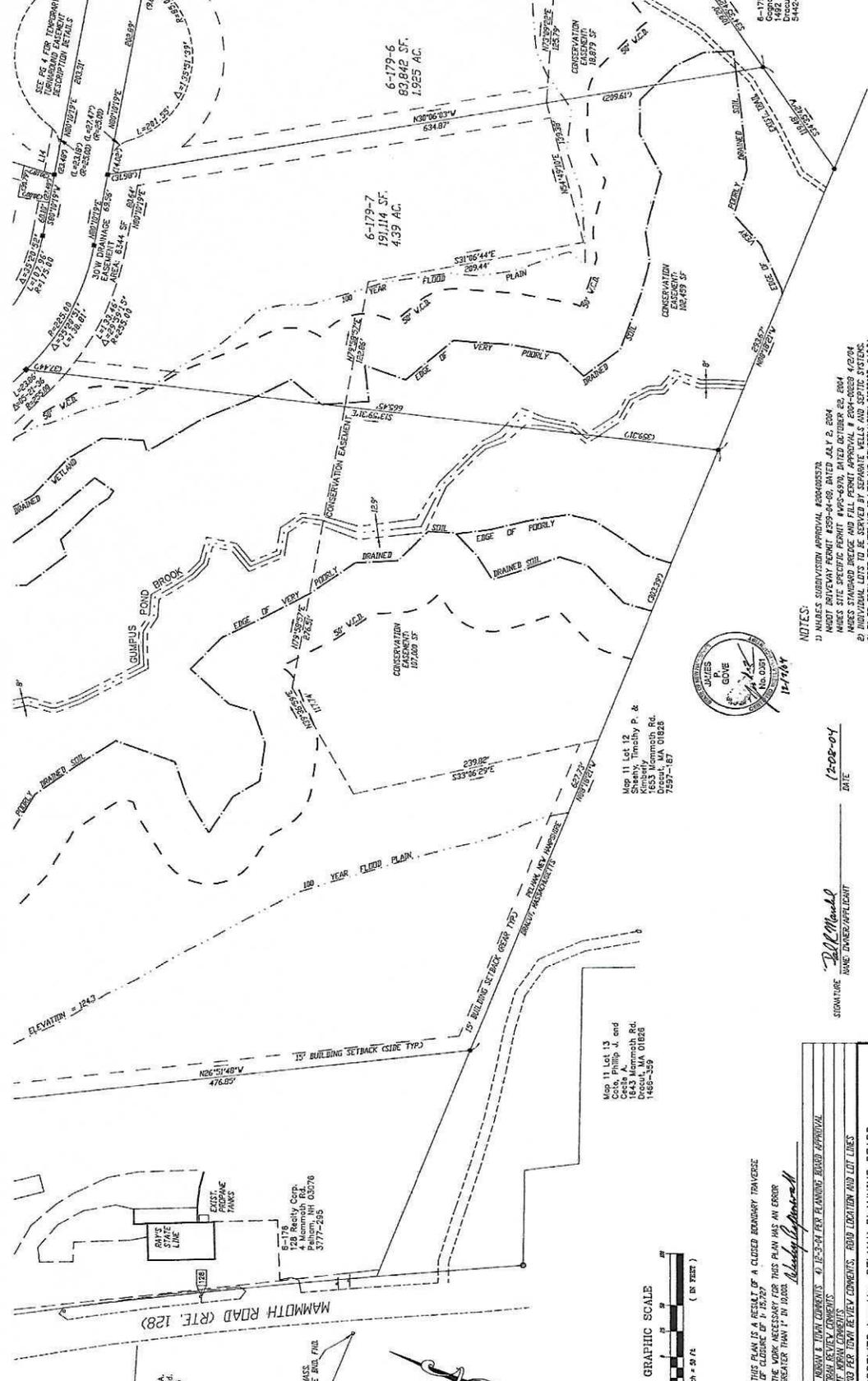
APPROVED by the PELHAM PLANNING BOARD
 PELHAM SUBDIVISION FILE
 SHEET 2 OF 14
 DATE: 12-28-04

30. 10-25-04 FINAL PLAN FOR MAMMOTH ROAD TO 128-34 PER PELHAM PLANNING BOARD APPROVAL.
 31. 12-28-04 REVISION TO CORRECT ALLOCATION - CORRECT PER 128. REVIEW COMMENTS.
 REVISIONS: 12/28/04 PER TOWN REVIEW COMMENTS, ROAD LOCATION AND LOT LINES.

STONE WALL FOUND ON SET.
 IRON PIPE OR IRON ROD TO BE SET.
 BENCH MARK SET.
 EDGE OF PAVEMENT.
 WETLAND CONSERVATION DISTRICT (WCD).
 EDGE OF MET AND ROCK FLOOD PLAIN.

33459 Dwr 156 2 of 4

PLAN, 2003
 DWR 156 2 OF 4



FINAL PLAN
 TAX MAP 59 LOT 6-179
 IN PELHAM, NH
 128 REALTY CORPORATION
 128 MAMMOTH ROAD
 PELHAM, NH 03076

SCALE: 1"=50'
 DATE: AUG. 2004

EDWARD N. HERBERT ASSOC. INC.
 LAND SURVEYING - CIVIL ENGINEERING
 1 FROST ROAD WOODMILL, NH 03097 (603)432-3482

PLANS 33659
 DWG. 156 3 OF 4

NOTES:

- 1) NAD83 SUBDIVISION APPROVAL #2004005378
- 2) NAD83 SUBDIVISION APPROVAL #2004005378
- 3) NAD83 SUBDIVISION APPROVAL #2004005378
- 4) NAD83 SUBDIVISION APPROVAL #2004005378
- 5) NAD83 SUBDIVISION APPROVAL #2004005378
- 6) NAD83 SUBDIVISION APPROVAL #2004005378
- 7) NAD83 SUBDIVISION APPROVAL #2004005378
- 8) NAD83 SUBDIVISION APPROVAL #2004005378
- 9) NAD83 SUBDIVISION APPROVAL #2004005378
- 10) NAD83 SUBDIVISION APPROVAL #2004005378
- 11) NAD83 SUBDIVISION APPROVAL #2004005378
- 12) NAD83 SUBDIVISION APPROVAL #2004005378
- 13) NAD83 SUBDIVISION APPROVAL #2004005378
- 14) NAD83 SUBDIVISION APPROVAL #2004005378
- 15) NAD83 SUBDIVISION APPROVAL #2004005378
- 16) NAD83 SUBDIVISION APPROVAL #2004005378
- 17) NAD83 SUBDIVISION APPROVAL #2004005378
- 18) NAD83 SUBDIVISION APPROVAL #2004005378
- 19) NAD83 SUBDIVISION APPROVAL #2004005378
- 20) NAD83 SUBDIVISION APPROVAL #2004005378

LEGEND

- STORE WALL
- 12" DIA. PIPE OR 12" DIA. RCP
- 12" DIA. PIPE OR 12" DIA. RCP TO BE SET
- GRANITE FOUNDATION TO BE SET
- GRANITE FOUNDATION TO BE SET
- EDGE OF WETLAND
- BUILDING SETBACK
- WETLAND CONSERVATION DISTRICT (WCD)
- 100 YEAR FLOOD PLAIN
- 50 YEAR FLOOD PLAIN

APPROVED by the PELHAM PLANNING BOARD

Secretary: *[Signature]* DATE: 7-8-04

CHAIRMAN: *[Signature]*

APPROVAL IS GRANTED SUBJECT TO ALL CONDITIONS AND REQUIREMENTS AND SUBDIVISION REGULATIONS OF THE TOWN OF PELHAM AND FURTHER SUBJECT TO ALL SPECIFIC CONDITIONS AND REQUIREMENTS AS FOLLOWS:

1. CERTIFY THAT THIS PLAN IS A RESULT OF A CLOSED BOUNDARY TRAVERSE WITH AN ERROR OF CLOSURE OF 1:10,000.

2. I CERTIFY THAT THE WORK NECESSARY FOR THIS PLAN HAS AN ERROR OF CLOSURE NO GREATER THAN 1 IN 10,000.

[Signature]

GRAPHIC SCALE 1" = 50' (ON TEXT)

33659 Dwr 156 3 of 4