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## **VETERAN'S PARK FOREST MANAGEMENT PLAN**

### **1 PLAN PURPOSE AND DESIGN**

The purpose of this forest management plan is to provide the City of Claremont and the resource manager with a comprehensive description of the property and proposed management activities. It is meant to be a "User's Guide" that reflects Claremont's objectives and will remain flexible as changes in the property condition or objectives change through time.

Management planning on the Claremont ownership is a threefold system including a master plan, forest management plans, and pre-harvest planning. The master plan covers broad property descriptions, ownership objectives, and management strategies. Forest management plans, such as this one, are the second piece of this threefold system. They cover specific property descriptions and management activities intended to span a 10-year period. Forest management plans are stand alone documents. The third part of this system involves pre-harvest plans, detailing even more specific management concerns and objectives particular to individual harvests. As their name indicates, pre-harvest plans are prepared prior to a scheduled harvest.

### **2 PROPERTY LOCATION AND BRIEF DESCRIPTION**

Veteran's Park is managed by Claremont's Department of Parks and Recreation. It includes the Park (referred to as the Park Lot in this plan) on Cat Hole Road approximately 1/10<sup>th</sup> of a mile east of the intersection with Winter Street and a second wooded area (referred to as the Pine Lot in this plan) approximately 6/10<sup>th</sup> of a mile further east. The Park includes a swimming facility, ball park and picnic area occupying approximately half of the parks 16.9 acres. The other half is woodland, dominated by large hemlock, white pine and scattered hardwoods. There is a well-established trail system in the wooded area, open to motorized traffic including ATV's and snowmobiles. The second parcel, approximately 8.5 acres, is an old reservoir site that was drained. It was planted to pine approximately 40 years ago. The pine occupies 7 of the acres; the rest is open land with an access road to Cat Hole Road. This property contains a wetland system associated with a brook that bisects the tract.



Veteran's Park provides an outdoor swimming facility, ball field (left photo), and picnic opportunities (right photo). The picnic tables were recently built by the **XXX**, along with the quaint and functional bridge that eases access between the pool and picnic tables.

### **Woodlot History**

There has been little active forest management on either lot, but it is clear both were used for agricultural purposes into the 1900's as evidenced by the presence of barbed wire fence. Agricultural use of the land dominated Claremont until the mid-1900's, about all of the land that could be tilled was and the rest pastured. The small reservoir was built in **XXX** and discontinued in **XXX**. It was supplied by **XXX**.

### **3 LANDOWNER MISSION, PRINCIPLES, AND OBJECTIVES**

As stated in Claremont's master plan, the mission and principles of management on the City of Claremont forestlands are:

#### **Mission Statement**

The City of Claremont will actively manage Claremont's natural areas with a strong land ethic in order to achieve responsible land stewardship. These stewardship activities will help to promote Claremont as a healthy community with a quality of life that values the environmental quality of forest ecosystems and the benefits of commercial and recreational land uses.

#### **Principles for Management**

- Adopt a holistic view of natural systems which places human activity within rather than apart from the natural environment.
- Implement forest management that is ecologically, economically, and socially responsible.
- Resource extraction should not exceed the regenerative capacity of the ecosystem or

reduce natural productivity or diversity.

- Whenever possible management shall incorporate the results of previous actions into future decision-making efforts.
- Management practices shall support indigenous habitats and prevent fragmentation so that wildlife can migrate for seasonal food and reproductive needs.
- Manage for ecologically and socially sustainable recreational opportunities.

### **Management Objectives for Veteran's Park**

#### **Overall:**

- Be responsible *stewards* of the land and its resources
- Maintain the stability and integrity of the ecosystems within our control
- Maintain a healthy, productive and aesthetically pleasing forest
- Manage with respect to *Natural Community* type
- Maintain and improve natural *biological diversity*

#### **Timber:**

- Enhance the *quality* and *quantity* of our timber resource
- Manage for *Sustainable* harvest and growth
- Provide *periodic revenue* through the sale of forest products

#### **Education and Recreation:**

- Provide opportunities for *education*
- Designate some "forever wild" areas to serve natural diversity and educational opportunities
- Create educational infrastructure such as interpretive signs and kiosks
- Identify and conserve important *archaeological* and *cultural* sites
- Provide for motorized and non-motorized sustainable *recreation* opportunities such as ATV and snowmobile trails, foot paths, and cross county skiing and snowshoe trails
- Provide recreational infrastructure such as picnic areas and shelters where appropriate
- Create aesthetic *vistas* along recreational trails
- Create *wildlife viewing* areas

#### **Wildlife:**

- Provide and enhance the naturally diverse variety of wildlife habitat in forest, wetland, and openland settings

#### **Water Quality:**

- Protect our *water resource*
- Protect and improve the *water quality* of streams and wetlands

#### **4 GEOLOGIC ATTRIBUTES**

##### **Topography and Aspect**

Veteran's Park ranges from 600 to 640 feet in elevation and the pine lot ranges from 700 to 780 feet in elevation. The aspect is varied, but is westerly overall.

##### **Brooks, Ponds, and Wetlands**

Veteran's Park includes the convergence of three small streams, and a small forested wetland. As stated above, the pine lot includes a stream and a small, marshy wetland that once was a reservoir. These streams are tributaries to Grandy Brook, which drains out of the Cat Hole Road Forest and the old Fitch and McQuade Reservoirs.

Recommended actions to improve and manage the wetland and water resource of Veteran's Park<sup>1</sup>:

##### **Riparian and Stream Ecosystems:**

- Establish riparian management zones along streams, rivers, ponds, and lakes. These are not intended as no-harvest zones. Forest management systems, such as single-tree or small-group selections cuts, that retain relatively continuous forest cover in riparian areas (65-70 percent canopy cover) can help maintain biodiversity by protecting water quality, providing shade, supplying downed woody material and litter, and maintaining riparian wildlife habitat conditions.
- No-cut zones of 16 to 100 feet are recommended by several management guides on river or pond shores containing wet seeps, shallow or poorly drained soils, or area with slopes greater than 8 percent. Limited single-tree cutting can occur on other sites within this zone, with cabling from outside the zone suggested.
- Consider management at the watershed-level as an approach to avoiding stream channel degradation from excessive runoff.
- Road construction, stream crossings, skid trails, log landings, and all phases of timber-harvesting operations should conform to Best Management Practices

##### **Springs and seeps:**

- Avoid leaving slash in woodland seeps, springs, or associate wildlife trails.
- To the extent feasible, avoid interruption groundwater flow above or below seeps and above springs. When seeps and springs can't be avoided, minimize flow interruption by strictly adhering to appropriate Best Management Practices for water crossings.
- Where feasible, use woodland seeps and springs as nuclei for uncut patches to retain snags,

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<sup>1</sup> Riparian and Stream Ecosystem management recommendations from the publication Biodiversity in the Forests of Maine; Flatebro, Gro, Foss, Carol, and Pelletier, Steven, 1999, UMCE Bulletin #7147

cavity trees, and other site-specific features.

### **Soils**

The upland soils were derived from glacial till and are a mixture of moderately well drained silt loam and loamy sand soils including Bernardston silt loam, Dutchess silt loam, Hermon fine sandy loam, Podunk fine sandy loam, Udorthents smoothed, Warwick-Quonset gravelly fine sandy loam, and Windsor loamy sand. See Appendix B for a map of the soil types and descriptions.

Recommended actions to improve and manage the soil resource of Veteran's Park<sup>2</sup>:

### **Forest soils, forest floor and Site Productivity:**

- Avoid whole-tree removal, particularly on low-fertility sites (i.e., shallow to bedrock soils, coarse sands, wetlands, and area with high water tables), unless replacement of nutrients and organic matter is considered
- Conduct harvest operations during the season of the year that is most appropriate for the site. Operating on snow or frozen ground, whenever possible, minimizes effects of the soils and forest floor.
- Choose harvest equipment to suit the site and minimize disturbance. For example, in dry conditions, and in some wet conditions, consider using tracked vehicles to reduce rutting.
- Minimize skid-trail width using techniques such as bumper trees when appropriate.
- Establish skid trails that follow land contours where possible rather than directed straight uphill.
- When possible, conduct whole-tree harvests of hardwoods during dormant leaf-off season to retain nutrients on site.
- Avoid or minimize practices that disturb the forest floor, remove the organic soil or cover it with mineral soils, except as necessary to accomplish silvicultural goals and to regenerate certain tree species.

## **5 NATURAL COMMUNITIES<sup>3</sup>**

As written in the book *Natural Communities of New Hampshire* by Daniel Sperduto and William Nichols, "Natural communities are recurring assemblages of plants and animals found in particular physical environments. New Hampshire has a fascinating and complex variety of natural communities, from tidal marshes to alpine meadows, river banks to mountain forests, and streams to lakes. Each type of natural community has a unique set of environmental conditions that support certain species adapted to those conditions."

"Just as individual organisms can be classified into species, plant assemblages can be classified into natural community types. Classifying natural communities is a useful way of viewing the landscape because it allows us to distill the broad range of complex interactions

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<sup>2</sup> Soil management recommendations from the publication Biodiversity in the Forests of Maine; Flatebro, Gro, Foss, Carol, and Pelletier, Steven, 1999, UMCE Bulletin #7147

<sup>3</sup> All information on Natural Communities referenced from the publication: Natural Communities of New Hampshire, Daniel Sperduto and William Nichols, New Hampshire Natural Heritage Bureau and The Nature Conservancy 2004

between species and their environments into a limited number of units that share certain key features.”

“Natural community types are usually defined in terms of plants because they are easy to study, often compose the physical structure to which most other organisms respond, and are sensitive indicators of physical and biological factors that influence many types of organism.” “The need to classify natural communities is fundamentally pragmatic: People need a way to sort out, understand, and communicate about nature’s complexity on order to be good stewards.” Determining natural community types can be a challenge because it is uncommon to find land that has not been influenced by human intervention. Past agricultural and silvicultural practices often change the plant communities that you would find on any given acre naturally. Identifying natural communities then becomes a process of understanding the past management activities, the physical conditions of the site, and the plant communities currently found there and determining to the best of our ability what community would occupy that site without human intervention. The natural community types found on Claremont forestland has been identified on a broad level to the best of our ability. A more comprehensive and detailed study by an ecologist would be required to determine natural community types on a more fine-grained and certain basis.

Veteran’s Park and the pine lot are a single natural community type, hemlock-beech-oak-pine forest. This is a common, broadly defined community occupying glacial till and terrace soils of low to mid elevations in central and southern New Hampshire. See Appendix A for a map of the natural community types.

### **Rare Species and Unique Natural Communities**

An in-depth flora and fauna survey was not within the scope of this plan. There were no endangered plants or animals knowingly encountered while collecting the data for this plan. The Natural Heritage Inventory, in Concord, New Hampshire, has been contacted and they have no records of any endangered plant communities in the vicinity. That does not mean there are not any, however.

Realizing the significant habitat conditions found Veteran’s Park demands *adaptive management*. All attempts will be made on the management level to identify unique areas, learn what makes them unique, how to best manage them and most importantly, refine the management of these areas as the knowledge base grows.

## **6 WILDLIFE HABITAT CONDITIONS**

Due to its relatively small size, Veteran's Park provides limited habitat for wildlife. The wildlife expected to be found there is limited to birds, small mammals and amphibians. White tail deer and coyotes are likely the largest mammals to pass through, utilizing the surrounding landscape as well. Though not likely to be common, it's possible larger mammals such as moose and black bear occasionally would pass through. Despite being in a fairly urban setting, the park is adjacent to a large amount of forestland leading up to and including Green Mountain to the Northeast. This large expanse of undeveloped forestland is broken by only one road, Green Mountain road. The park is bordered by undeveloped forestland to the west and open pasture to the south. Veteran's Park forest is dominated by dense white pine, hemlock and scattered hardwoods. There are several large old trees on the Park Lot, providing opportunity for cavity nesting birds and small mammals. The wetland habitat on both pieces adds greatly to the wildlife habitat. Wetlands such as these provide an important source of food in early spring as they tend to be of the first places to "green up". In addition they provide habitat for many kinds of amphibians dependent on them.

The New Hampshire Wildlife Action Plan includes mapping of significant wildlife habitats as they occur throughout the state and provides strategies for the management of wildlife that occur on these habitats, especially as they relate to threatened and endangered species, but also including information on common wildlife species. According to their delineation, two wildlife habitat types are found in Veteran's Park: Hemlock-Hardwood-Pine occupying all the forestland and the ball field is delineated as grassland, although mowed lawn setting provide little in the way of wildlife habitat as you would find in actual grassland. A summary of these habitat types and the wildlife species found there is in Appendix B of the Master Plan.

Recommended actions to improve and manage the wildlife habitat of Veteran's Park<sup>4</sup>:

### **Snags, cavity trees, and down logs:**

- Avoid damaging existing downed woody material during harvesting, especially large (16"+) hollow logs and stumps.
- Leave downed woody material on site after harvest operations when possible.
- Leave several sound downed logs well distributed on the site, where possible. Especially important are logs >12 inches dbh and > 6 feet long. Hollow butt sections of felled trees are also good choices.
- Create additional snag trees by girdling large cull pine where possible. Attempt to retain or create a minimum of 4 secure cavity or snag trees per acre, with one exceeding

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<sup>4</sup> Wildlife habitat management recommendations from the publication Biodiversity in the Forests of Maine; Flatebro, Gro, Foss, Carol, and Pelletier, Steven, 1999, UMCE Bulletin #7147

24" dbh and three exceeding 14" dbh. In areas lacking cavity trees, retain live trees of these diameters with defects likely to lead to cavity formation.

- Retain as many live trees with existing cavities and large unmerchantable trees as possible.
- When possible, avoid disturbing cavity trees, snags, and upturned trees roots from April to July to avoid disrupting nesting birds and denning mammals.
- Retain trees with cavities standing dead trees, downed logs, large trees, and large super canopy trees in the riparian management zone to the greatest extent possible.

**Habitat Connectivity:**

- Avoid harvests that isolate streams, ponds, vernal pools, deer wintering areas, or other sensitive habitats
- Maintain the matrix of the landscape in relatively mature, well-stocked stands. Where even-aged management is practiced, consider the cumulative effects of multiple cuts and include wider habitat connectors as necessary.
- Consider opportunities for coordinating habitat connectivity with other, on-going land-management efforts that maintain linear forested ecosystems, such as hiking trail corridors and natural buffer strips retained to protect water quality. This may require expanding the physical size of the connector habitat and increasing structural values to fulfill multiple management goals. Also consider the potential for effects that may arise because of incompatible uses (e.g., heavily-used ATV or snowmobile routes around and through deer yards).

**Deer Wintering Areas:**

- Identify dense stands of mature softwood as potential DWAs, particularly in riparian ecosystems.
- Whenever possible, schedule harvests in DWAs are during December through April.
- Protect advance conifer regeneration during timber-harvesting operations.
- When conducting harvests in coniferous forest adjacent to watercourses, maintain an unbroken conifer canopy along shorelines to protect riparian travel corridors.
- When planning harvests within any DWA, (strive to) maintain a closed-canopy coniferous overstory over at least 50 percent of the area at any given time. Avoid constructing major haul roads within DWAs.

**Vernal Pools:**

- Identify and mark vernal pool edges in spring when they are filled with water to prevent damage during harvests conducted when pools are difficult to detect
- Avoid any physical disturbance of the vernal pool depression.
- Keep the depression free of slash, tree tops, and sediment from forestry operations.
- Maintain a shaded forest floor, without ruts, bare soil, or sources of sediment, that also provides deep litter and woody debris around the pool. Avoid disturbing the organic layer or drainage patterns within the pool watershed.
- Whenever possible, conduct harvests when the ground is frozen or snow covered.

## **7 RECREATIONAL and EDUCATIONAL OPPORTUNITIES**

### **Recreation**

Veteran's Park is first and foremost an important recreational resource for the people of

Claremont. Providing such resources as a swimming facility, picnic area and ball field, it greatly adds to the recreational opportunities for nearby residents. In addition, the trails and woods provide opportunity for families to spend time in a natural setting. The pine lot provides less of a structured resource, though there are opportunities to expand similar natural recreational resources there as well, such as creating additional picnic areas.

Recommended Actions to Improve and Manage the Recreational Resource of Veteran's Park:

- **Improve existing signage**
  - Post a Welcome sign to the land that identifies the owner and what is allowed or encouraged on the land. This is not the best place to detail what is not allowed.
  - Post signs at all property corners and at intervals along the boundary identifying the landowner.
  - Improve informational signage about use of trails, explaining what is allowed and what is not allowed. For example:
    - Stay on the trail
    - Carry in and Carry out
    - Avoid trails if conditions are muddy
- **Clearly identify what trails are open to non-motorized and motorized use**
  - Post a map of the trails and allowed uses.
- **Create additional walking trail/loop** separate from the ATV trail
- **Maintain trails** to prevent erosion as outlined in Best Management For Erosion Control During Trail Maintenance and Construction by New Hampshire Department of Resources and Economic Development, Division of Parks and Recreation, Bureau of Trails
- **Add additional picnic areas** across from the brook from the pool



Family recreational opportunities are of the highest priority in the Veteran's Park lot. Picnic tables built by the **XXX** (left photo) have enhanced these opportunities. A trail system crosses the same forest, part of a city-wide system. Motorized vehicles such as ATV's and snowmobiles are currently allowed in Veteran's Park, but trucks are not. The gate in the right photo blocks trucks, but provides room for ATV's to pass through.

## Education

Educational opportunities are ample in Veteran's Park. Its close proximity to local school

systems would make it an ideal destination for outdoor classroom activities. Forest management operations, including improving the recreational resource, will also provide educational opportunities in the form of public workshops to see timber harvesting in action or school field trips focused on management of renewable natural resources or to learn more about what land ownership and management can be about. Interpretive signs put in place during forest management operations can be a helpful educational resource that aid in public relations and understanding of land management. The Sullivan County forester is an excellent resource for public education needs and is usually willing to participate in workshops or provide educational resources. There are many creative ways to educate; opportunities are not limited to those listed here.

Suggested opportunities to utilize the public education potential of Veteran's Park:

- **Encourage local schools/clubs/etc.** to utilize this valuable resource.
- Prior to any forest management activities, **promote and present workshops** inviting the public to come learn about management activities in Veteran's Park.
- **Create and post educational signage** about Veteran's Park and management philosophy and activities.

## **8 FOREST CONDITIONS**

### **Forest Types**

The following forest type designations are used in the forest type map:

#### **COVER TYPES**

H ≥ 50% dominant & co-dominant trees are hardwood

S ≥ 50% dominant & co-dominant trees are softwood

HS = Mixed species but dominated by hardwood

SH = Mixed species but dominated by softwood

(in some instances a dominant species, such as WP or HE may be included in the cover type)

#### **SIZE CLASS**

1 = Seedlings or regeneration - 90% of stems < 3" DBH

2 = Saplings or small poles 3" - 8" DBH

3 = Large poles and or small sawtimber 9" - 12" DBH

4 = Sawtimber 13" and larger

#### **CROWN CLOSURE/DENSITY**

A = 75-100% crown closure of co-dominant or dominant trees

B = 50-74% crown closure of co-dominant or dominant trees

C = 0-49% crown closure of co-dominant or dominant trees

### **Forest Inventory**

An inventory was conducted in December, 2007 consisting of 7 sample points.

Data was collected as outlined in the Claremont Master Plan.

### **Age and Age Class Distribution**

As with most forests in New England, Veteran's Park is largely even-aged. The dominant trees likely got their start after the abandonment of agriculture here early last century. The pine in the Pine Lot are younger, planted around 40 to 50 years ago.

The stand structure between the two places varies, with the Park Lot much more varied in structure and species diversity. Aging the Park forest is a bit complicated, since different tree species and individuals within the same species grow faster and mature at different rates than others. White pine, a fast growing tree can get to quite a large size, compared to a hemlock of the same age. White birch, another fast growing tree, doesn't get as large as white pine and in addition, matures at an earlier age. So, variability exists within an evenage forest, providing opportunity to manage for multiple age classes and diversify the forest structure, providing better wildlife habitat, continuous forest cover, and relatively less intensive silvicultural management. In general, Veteran's Park Forest is dominated by 60-70 year old white pine, hemlock and red oak in the overstory. Likely older (perhaps between 100 and 150 years), and definitely larger, white pine and hemlock are scattered through the Park Lot. The pine lot also has dense pockets of white pine regeneration throughout the stand

### **Growth Rates**

An in-depth study of tree growth is beyond the scope of this plan. While not statistically sound, some growth observations can be made by counting tree rings on old stumps and taking increment cores of some trees. Although volume growth is very difficult to accurately calculate using this method, some rules-of-thumb do apply. A tree's growth is directly related to the substrate on which it is located. Wet, ledgy, and dry areas do not promote rapid growth of trees. Lower elevation and cool moist but well drained areas support better tree growth as the soils are deeper and more fertile. The average managed woodlot in New Hampshire grows at a rate of 2 to 4 percent per year. This corresponds to volume increases of approximately 0.5 cords or 250 board feet per acre per year. Given the site conditions and the current density of the forest, it is likely that tree growth of the Veteran's Park Forest falls at the low extent of this range.

### **Tree Quality and Tree Health**

Overall tree quality on the Veteran's Park Lot is generally fair. The Park Lot has been left unmanaged for the most part in recent years. The trees here in general are healthy. The pine lot is a bit different story, because of the overcrowded nature of the stand many of the trees have low vigor or are actually declining. Red rot (a common decay fungus in white pine, typically affecting

the main stem and entering the tree through a wound or dead limb) and white pine blister rust (a fungal disease that requires an alternate host, gooseberry and currants, that typically infects pine in waves when weather is cool and moist) are two common diseases affecting white pine, especially in overcrowded, mono-culture stands. There are nice quality, healthy pines throughout the stand as well.



Red rot, a common fungal disease in over-crowded white pine stands is present in the Pine Lot. The left photo show the fruiting body of the disease on the main stem of a pine. The right photo shows some decent quality and healthy individuals in the same pine stand, with a good stocking of the next generation of white pine underneath.

### **Forest Management Approach**

Active forest management in Veteran's a Park will recognize that timber is not the highest priority. In general, silviculture will have a lighter touch in the park forest than in the pine lot, but both will ultimately utilize a combination of silvicultural techniques that typically are separated into two general categories, even-age and unevenaged management. Evenaged management methods include clearcut, seed tree, overstory removal and patch cut applications and may be used to regenerate a new stand when deemed necessary. Unevenaged management methods generally include single tree and group selection used to regenerate small areas resulting in uneven age classes in a given stand. Often though, applied techniques fall somewhere in between these two text-book defined categories. One may define a large group opening (unevenage management) as a small clear-cut (evenage management). Improvement thinnings often fall somewhere in between as well, depending on the intended results and the actual results. A thinning may result in improved growth of the overstory trees, an even-aged treatment. A thinning may also provide similar conditions as single tree selection, an unevenaged technique, and result in regeneration of shade-tolerant species. Crop tree release, a practice where designated "crop trees" are released from shade of competing trees on typically 2 to 3

sides, falls somewhere in between as well. Given the variability of site quality and stocking, even within a defined stand, unless evenaged management is specifically called for, management typically will fall in the unevenage category.

Further discussion of unevenage management is required. Traditionally, the intent of unevenage management is to attain forest stocking conditions that mimic a specific diameter/age distribution. But, practicably speaking, unevenage management is often carried out as a simpler form of multiple-age management resulting in the introduction of a new age-class on a portion of a stand each harvest entry. Given the even-aged condition of the majority of land in New England, encouraging multiple age classes is a more attainable, practicable goal and in effect, desirable goal. To clarify discussion of management technique on Claremont lands, the term multiple-age management will replace traditional uneven-aged management, but will utilize the same techniques including single tree and group selection.

**Applied Silviculture**

Below are the generalized silvicultural systems and methods that will be broadly applied to the natural forest communities found on Veteran’s Park forest and the forest stands within. The methods and their corresponding cutting cycles, rotation ages and target diameters are described and will serve as management guidelines for application in the field.

Hemlock/Hardwood Silviculture

The hemlock and hardwood community on Veteran’s Park Forest will be largely managed using a multiple-age system. Methods of multiple-age management will involve a combination of singletree and group selection silviculture and will mimic singletree and canopy gap disturbances.

These silvicultural methods are used to create and/or maintain a multi-aged stand of largely mid-tolerant and shade tolerant species. Residual stand basal area densities following cuts will range between 60-90 square ft/acre for the hardwood and 110-200 square ft/acre for areas dominated by hemlock. Where mixed types exist, basal area densities will average between the two types. Depending on a number of considerations, the cutting cycles using this multiple-age system will be between 15 and 20 years. Target diameters of the hemlock and hardwood components are listed below. However because of the variability of sites both diameters and age goals may or may not be reached. Target diameters are as follows:

White Pine	18-24	Beech	14-18
Hemlock	16-20	Aspen	12-14
White Ash	16-22	Sugar Maple	16-22

Black Cherry	14-18	Red Oak	16-24
White Birch	12-16	Red Maple	14-18
Yellow Birch	16-22		

White Pine Silviculture

White pine is found throughout Veteran’s Park Forest. White pine trees generally produce a seed crop every 7 to 10 years during a period commonly known as a “cone year”. The 100-200 seeds produced by each cone are delicately small and remain viable for a short period after dispersal, approximately a year. Because the pine seed is so small, it does not have the stored energy necessary to grow through the forest duff layer, particularly under shady conditions. This means exposed mineral soil, ideally in deep well-drained sandy loams, and heat are required for successful seed germination. Keeping this in mind, these conditions need to be present during the seeds year of viability. To create these requirements, the silvicultural method most appropriate for pine, or most softwood regeneration for that matter, is evenage. Silvicultural techniques that are best applied where opportunity exists are patch, shelterwood and seed tree cuts. These techniques provide the stand dynamics required for pine regeneration that include space, heat, light, uniform canopy level, tight geotropic structure, hence an evenage structure. Timing of treatments is most effective during the snow-less season, where maximum soil scarification is attained. Another variable in obtaining sufficient pine regeneration is the overall ability of the soil to grow hardwood trees. A soil with a high site index for hardwoods is best suited to grow hardwood. In these soils there is a high level of available nutrients that will undoubtedly permit a layer of hardwood regeneration so thick that whatever pine is established will be overgrown readily. This hardwood competition is often seen on the nutrient poor sites as well, but these soils that are better suited for pine. On these sites precommercial weeding of the hardwoods is required for the pine continuance. This hardwood competition is due to the fact that once the seed germinates it has a slow growth rate for approximately 5 years before more rapid growth begins. Site wise, sandy soils, well-drained and low cation exchange, provide excellent pine sites. Timing, silvicultural technique and soil type is critical to promote the continuity of the pine resource.

Red Oak Silviculture

The art and science of growing red oak is equally as tricky as the pine, due to

regeneration challenges. Good seed years for oak are more frequent than that of pine, being 3-5 years. However, two major obstacles affect the germination success of the acorn. As a highly coveted food resource by most wildlife, the acorn is heavily used and if the wildlife does not find the acorn, insects like the acorn grub do. According to USFS studies, up to 500 acorns are required to produce one seedling, but generally 1% of acorns become available for regenerating northern red oak successfully. Thus, the availability of viable acorns is naturally scarce.

To successfully germinate, the acorn prefers exposed mineral soil, ideally in well-drained, deep loams. Scarifying the duff layer during logging operations in the snowless seasons best does this. Oak's overall survival is most importantly related to light intensity levels. For the seedlings/saplings to photosynthesis optimally it requires 30% light intensity in the open, where under a closed forest canopy light intensities are less than 10%. Therefore, heat and space is critical. Once the seed germinates rapid and vigorous taproot development occurs. This root growth contributes to another challenge of oak management, where it causes very slow initial shoot development and competition for light from other species is very common. Thus, achieving lasting regeneration success of oak, weeding of interfering species is often a requirement. The success of regenerating oak is highly dependent on the combination of the availability of viable seed, soil scarification, adequate light levels, implementation of weeding applications and seed distribution by wildlife.

Overall, the oak silvicultural system will be multiple-age. Methods of this system to best achieve the requirements of oak will involve mainly singletree and group selection silviculture. These methods will be used for both regeneration and thinning applications. Cutting cycles of oak dominant types will be between 15-25 years with crop tree diameters of 16-22 inches. During thinning and release applications it is important to maintain minimal direct light exposure to oak boles. Maturing and mature oak stems have large reserves of sensitive hidden buds that respond easily to increased light levels, resulting in epicormic branching and severe quality loss. During these cutting entries, releasing crop trees on eastern and northern sides, while maintaining heavier shade conditions on the south and west sides will ensure less opportunity for epicormic branching.

### **Access**

Road access to the Veteran's Park Forest is excellent. Both lots have good access to the town road. The park has an existing road that is gated to keep trucks out, but will work as a truck access road. The pine lot has access established to an opening that will serve well as a landing. All truck roads, landings and skid trails should be created and maintained according to Best

Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire. Another helpful road building manual is a USDA publication #NA-TP-06-98: A Landowner's Guide to Building Forest Access Roads by Richard L. Wiest.

### **Operability**

The terrain and ground conditions on these two lots in general do not limit operability, through there are some steep areas of the pine lot that may be difficult to work, especially on the bank leading up to the road on the eastern side of the lot. IN addition, a gully that runs from the wetland to the western boundary will have to be worked around. Winter harvesting on frozen ground with good snow cover will provide the best protection for the soils found here. But, given the unreliability of winter conditions, operations may occur during the summer in dry periods as long as wet areas are avoided or tracked with equipment that minimizes impacts such as a cut-to length system that creates a mat of slash to drive over, therefore protecting wet ground from rutting and mitigating negative impacts.

### **Boundary Delineation**

The Veteran's Park Forest boundary is in variable condition and includes approximately 3,400 feet on the Park lot and 1,800feet on the pine lot of maintainable boundary line. A combination of wire fence, corner monumentation and painted blazes make up the boundary. The entire boundary should be blazed and painted where needed as soon as possible. It is recommended that all boundary corners be monumented with City of Claremont signs.

## **FOREST DATA**



**Stand 1 White Pine/Hemlock/Hardwood 4-5A**

**8.6 acres**



Stand Structure



Stand Structure



Forest Canopy

**GENERAL ATTRIBUTES**

Natural Community Type: Hemlock-beech-oak-pine  
 Past Management History: No recent timber management  
 Approximate Age of Dominant Trees: 60-70 years  
 Stand Health: Fair  
 Insects/Damage/Disease: No serious problems noted

**SITE CONDITIONS**

NH soil classification: 1B  
 Determined by: Soils and field observation  
 Tree vigor: Medium  
 Soils: Podunk fine sandy loam, Dutchess silt loam, Windsor loamy sand, Bernardston silt loam  
 Drainage: Moderately well drained  
 Terrain: Variable  
 Aspect: West and South  
 Elevation: 600-640'

**Snags Per Acre**

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"				
12-18"			4.1	4.1
>18"	.6			
<b>Grand Total</b>	<b>.6</b>		<b>4.1</b>	<b>4.7</b>

Table 1.1: Standing dead trees per acre by size and decay class.

**Down Logs Per Acre**

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"				
12-18"			6.4	6.4
>18"		1.9		1.9
<b>Grand Total</b>		<b>1.9</b>	<b>6.4</b>	<b>8.3</b>

Table 1.2: Standing down logs per acre by size and decay class.

**WILDLIFE HABITAT**

Forest type: Mixedwood  
 Vertical diversity: Moderate  
 Vegetative diversity: Moderate  
 Hard mast: Pine, beech  
 Soft mast: None  
 Special habitat features: Mixed stand contains some dense hemlock for shelter  
 Snag trees: Few large snags  
 Down logs: Few large down logs  
 Special wildlife practices: Increase snags and down logs; manage for natural diversity; maintain areas of dense hemlock for deer wintering areas

**RECREATION**

Recreational features: Stand includes heavily used ATV/Snowmobile trail  
 Recreational infrastructure: Picnic tables, informational kiosk, some signage associated with trail  
 Aesthetic resources: Large old pine and hemlock throughout stand  
 Public access: Open to motorized and non-motorized access on designated trails and foot traffic elsewhere.

**SILVICULTURE**

**Structural and Silvicultural Attributes**

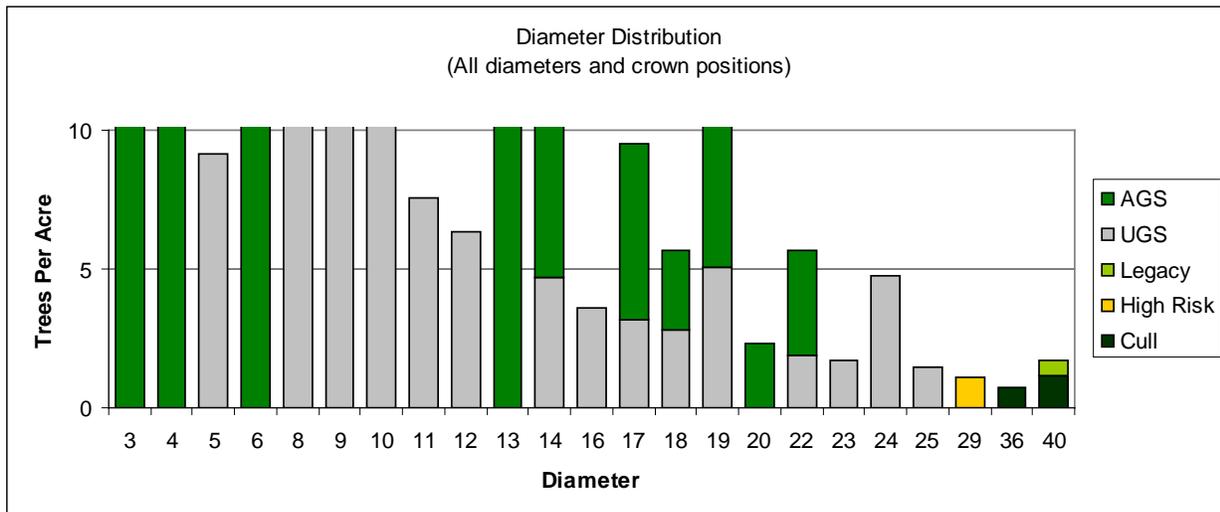
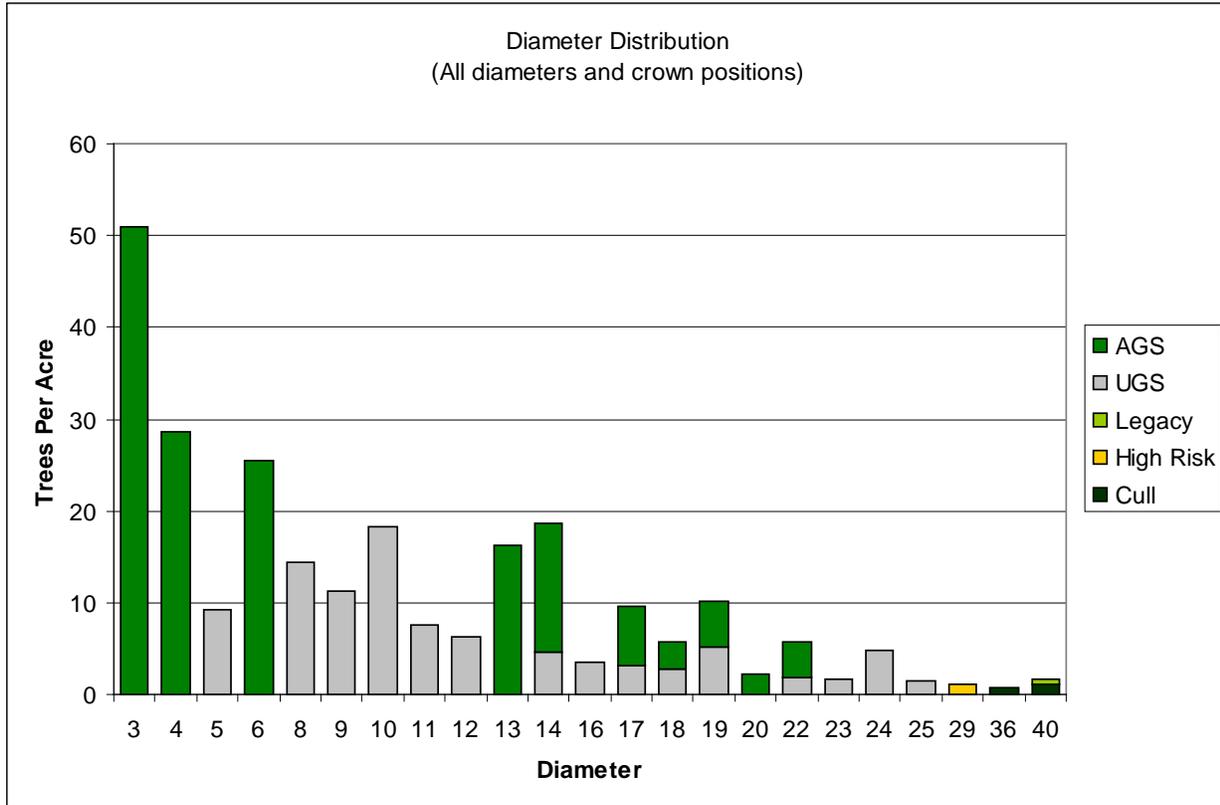
Broad Forest Type:	SH4A
Size Class:	Large sawtimber
Stand Structure:	Multiple-age
Crown Closure:	90%
Total Basal Area Per Acre:	196
Total Merchantable Basal Area Per Acre:	191
Total Acceptable Basal Area Per Acre:	80
Trees Per Acre:	255
Quadratic Mean Stand Diameter:	11.9
Percent AGS Sawtimber:	78.6%
Basal Area of AGS Sawlogs:	70
Timber Quality:	Fair to Poor

**Forest Composition and volume**

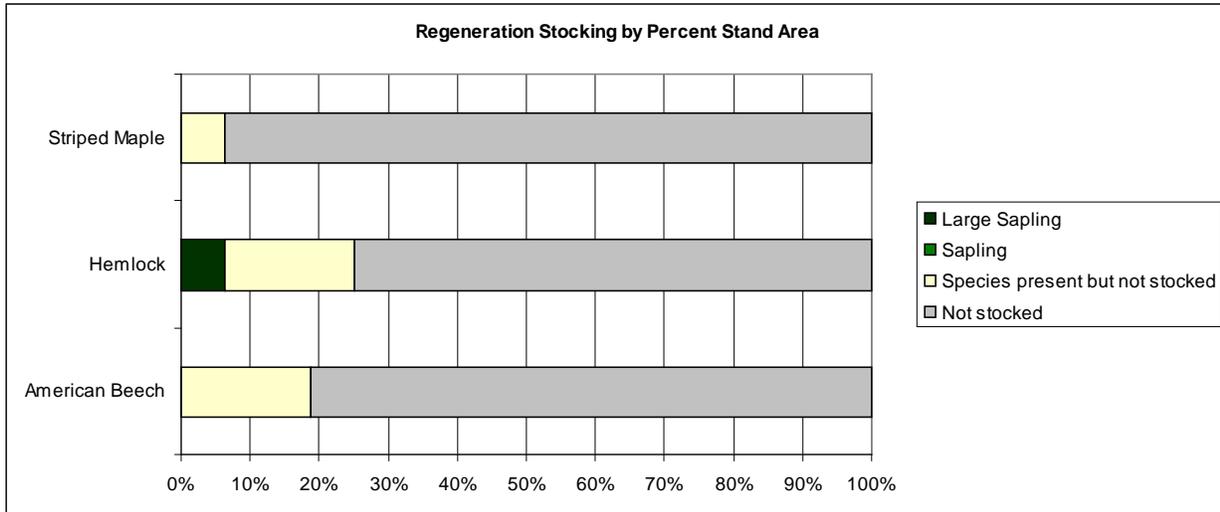
Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Cords	High Risk	AGS Saw	% AGS Saw
American Beech	5.5%	0	0	0	1.1	0.0	1.1	0.0	0	0%
Sugar Maple	2.8%	0	358	0	0.4	0.0	1.0	0.0	358	100%
White Ash	3.3%	0	398	0	0.8	0.0	1.5	0.0	398	100%
<i>Total Hardwood Per Acre:</i>	<i>11.6%</i>	<i>0</i>	<i>756</i>	<i>0</i>	<i>2.3</i>	<i>0.0</i>	<i>3.7</i>	<i>0.0</i>	<i>756</i>	<i>100%</i>
Hemlock	32.5%	0	397	0	6.5	0.0	7.3	0.0	397	100%
White Pine	55.9%	0	9,044	4,063	30.5	0.0	53.0	725.1	10,052	77%
<i>Total Softwood Per Acre:</i>	<i>88.4%</i>	<i>0</i>	<i>9,441</i>	<i>4,063</i>	<i>37.0</i>	<i>0.0</i>	<i>60.3</i>	<i>725.1</i>	<i>10,450</i>	<i>77%</i>
<b>Total Volume Per Acre:</b>	<b>100.0%</b>	<b>0</b>	<b>10,197</b>	<b>4,063</b>	<b>39</b>	<b>0</b>	<b>64</b>	<b>725</b>	<b>11,206</b>	<b>79%</b>
<b>Stand Volume:</b>		<b>0</b>	<b>87,694</b>	<b>34,945</b>	<b>338</b>	<b>0</b>	<b>550</b>	<b>6,236</b>	<b>96,370</b>	<b>79%</b>

Table 1.3: Stand volume by species and product per acre values.

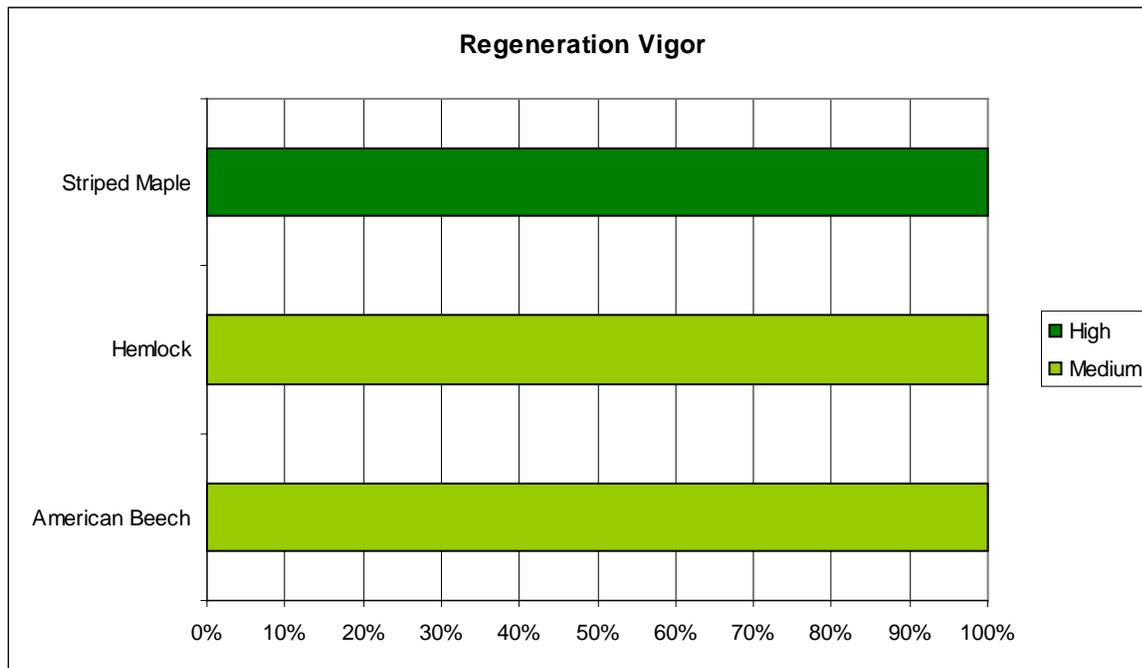
Graph 1.1a and 1.1b: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter. 1.1b provides a close-up of the breakdown in the larger diameter classes.



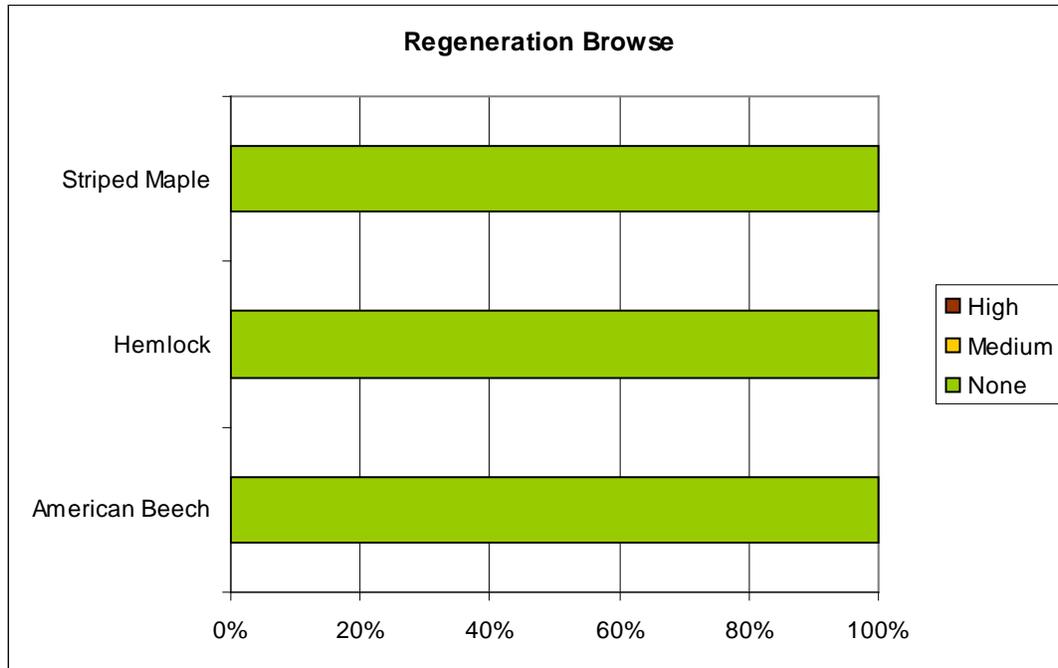
Graph 1.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less than 3 feet tall (Seedling). If a species is present but does not meet one of these conditions, it is recorded as present but not stocked.



Graph 1.4: Vigor of all regeneration and shrub species.



Graph 1.5: Browse level of all regeneration and shrub species.



**Silvicultural Objectives**

Management system:	Multiple age
Harvest Entry:	15-20 years
Products:	Low quality sawlogs and pulp Manage towards natural community type, favor quality white pine and hardwoods
Desired Composition:	
Crop tree target diameter:	White pine 20"      Hemlock 18"

**Operational Considerations**

Operability:	Operable
Seasonal limitations:	Avoid spring and fall mud season
Terrain:	Variable
Access and landing area:	Good access. No landing currently, but there is opportunity in the field or possibly on neighboring land if something could be arranged.
Access distance:	Short
General maintenance:	Road in good shape.
Brook-wetland crossings/buffer requirements:	Several small stream crossings. 50' buffer along streams and wetlands.

## STAND SUMMARY AND 10-YEAR MANAGEMENT SCHEDULE

**Stand 1** is a mixed stand dominated by hemlock and white pine, with scattered hardwood including beech, sugar maple and white ash. There are some fairly large and good quality white pine scattered about this stand. Regeneration is sparse, consists of shade tolerant species such as beech, hemlock and striped maple. The stand is crossed by multiple streams and hosts a wetland system.

The long-term goal of management in this stand is to continually develop multiple age classes of quality sawtimber forest trees of species well suited to the site, improve wildlife habitat, protect wetland features, and provide for recreational opportunity. The multiple age classes will exist primarily as pockets of similarly aged trees mixed throughout the stand. This multiple-age composition will provide a diversity of forest structure beneficial to wildlife and will provide opportunity for a mix of silvicultural operations. Timber production likely will be a benefit of management, but will not be the primary goal of silviculture.

**Silviculture:** The focus of management here is to improve the growth on the best stems, release important biological legacy trees, and create openings for regeneration to become established. This will be accomplished by a mix group selection and crop tree release.

**Priority:** Medium to low

**2016:** Reduce overall basal area to approximately 100 square feet through:

- **Group selection:** Group selection to remove pockets of poor quality stems and create conditions for successful regeneration.
- **Crop tree release** on the best quality and vigor stems, and on biological legacy trees.
- **Invasive Species Control:** Prior to any harvest activity in this stand, invasive species control work is highly recommended. Control of invasives is neither simple, nor inexpensive, yet any silvicultural entry without prior invasive species control will only make the situation worse. See Appendix D in the Master Plan for more detailed information on control techniques. Cost share monies may be available for this type of treatment.

### **Water Quality<sup>5</sup>:**

- Maintain a 50' forested buffer around wetland with only limited harvesting that retains relatively continuous forest cover (65-70 percent canopy cover) to protect water quality.
- Avoid making either roads or landings within the 50' buffer.
- Avoid adding woody material to streams.

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<sup>5</sup> Water quality protection management recommendations from the publication Biodiversity in the Forests of Maine; Flatebro, Gro, Foss, Carol, and Pelletier, Steven, 1999, UMCE Bulletin #7147



**Stand 2    White Pine 3-4A                      7.0 acres**



Stand Structure



Stand Structure



Forest Canopy

**GENERAL ATTRIBUTES**

Natural Community Type: Hemlock-beech-oak-pine  
 Past Management History: No recent management  
 Approximate Age of Dominant Trees: 40-60 years  
 Stand Health: Variable  
 Insects/Damage/Disease: Red rot in pine, presence of invasive exotic species: buckthorn.

**SITE CONDITIONS**

NH soil classification: 1B  
 Determined by: Soils and field observation  
 Tree vigor: Fair to poor  
 Soils: Hermon fine sandy loam, Dutchess silt loam, Bernardston silt loam  
 Drainage: Well-drained  
 Terrain: Variable  
 Aspect: West  
 Elevation: 700-760'

**Snags Per Acre**

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"			54.7	54.7
12-18"			7.2	7.2
>18"				
<b>Grand Total</b>			<b>61.4</b>	<b>61.4</b>

Table 2.1: Standing dead trees per acre by size and decay class.

**Down Logs Per Acre**

<b>DBH Class</b>	<b>Moderately punky</b>	<b>Punky throughout</b>	<b>Sound</b>	<b>Grand Total</b>
<12"	10.1	19.1		29.2
12-18"	4.8		3.8	8.5
>18"				
<b>Grand Total</b>	<b>14.9</b>	<b>19.1</b>	<b>3.8</b>	<b>37.7</b>

Table 2.2: Standing down logs per acre by size and decay class.

**WILDLIFE HABITAT**

Forest type: White Pine  
 Vertical diversity: Low  
 Vegetative diversity: Low  
 Hard mast: Pine  
 Soft mast: None  
 Special habitat features: Stand contains wetland features and gullied stream  
 Snag trees: Few large snags  
 Down logs: Few large down logs  
 Special wildlife practices: Increase snags and down logs; manage for natural diversity

**RECREATION**

Recreational features: Stand includes heavily used ATV/Snowmobile trail  
 Recreational infrastructure: Some signage associated with trail  
 Aesthetic resources: Wetland  
 Public access: Open to motorized and non-motorized access on designated trails and foot traffic elsewhere.

**SILVICULTURE**

**Structural and Silvicultural Attributes**

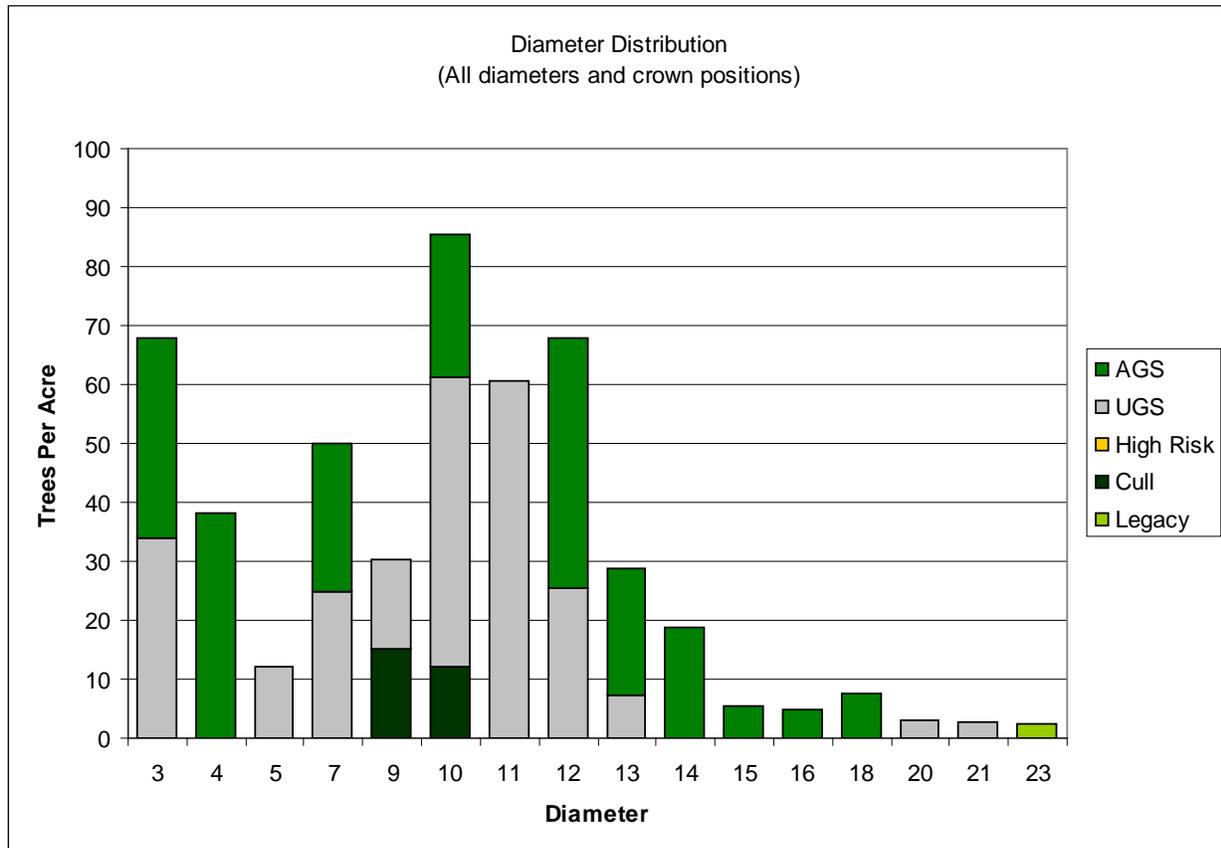
Broad Forest Type: S4A  
 Size Class: Large sawtimber  
 Stand Structure: Evenage  
 Crown Closure: 95%  
 Total Basal Area Per Acre: 268  
 Total Merchantable Basal Area Per Acre: 262  
 Total Acceptable Basal Area Per Acre: 125  
 Trees Per Acre: 486  
 Quadratic Mean Stand Diameter: 10.1  
 Percent AGS Sawtimber: 76.4%  
 Basal Area of AGS Sawlogs: 100  
 Timber Quality: Fair

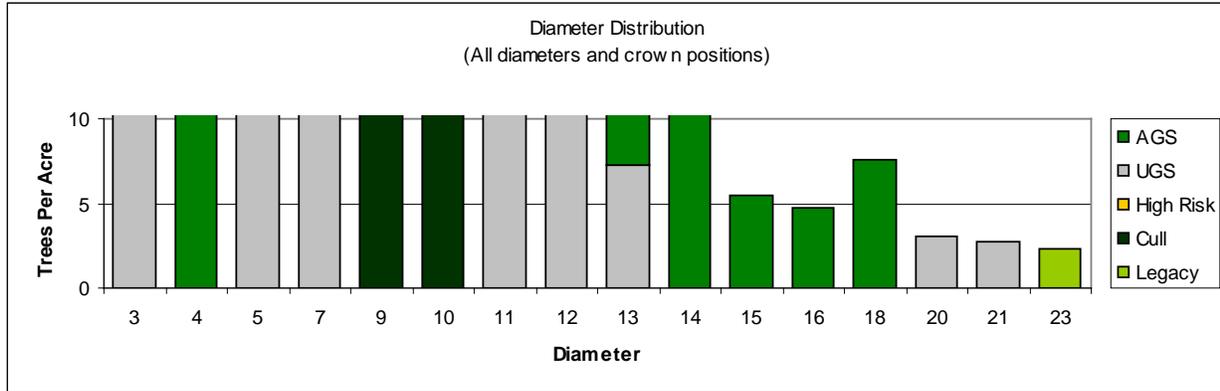
**Forest Composition and volume**

Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Cords	High Risk	AGS Saw	% AGS Saw
Red Maple	10.2%	0	0	0	1.7	1.5	3.3	0.0	0	0%
White Ash	5.8%	0	807	0	3.2	2.5	7.1	0.0	544	67%
<b>Total Hardwood Per Acre:</b>	<b>16.0%</b>	<b>0</b>	<b>807</b>	<b>0</b>	<b>4.9</b>	<b>4.0</b>	<b>10.4</b>	<b>0.0</b>	<b>544</b>	<b>67%</b>
White Pine	84.0%	0	11,272	4,912	50.4	1.3	83.1	0.0	12,441	77%
<b>Total Softwood Per Acre:</b>	<b>84.0%</b>	<b>0</b>	<b>11,272</b>	<b>4,912</b>	<b>50.4</b>	<b>1.3</b>	<b>83.1</b>	<b>0.0</b>	<b>12,441</b>	<b>77%</b>
<b>Total Volume Per Acre:</b>	<b>100.0%</b>	<b>0</b>	<b>12,079</b>	<b>4,912</b>	<b>55</b>	<b>5</b>	<b>93</b>	<b>0</b>	<b>12,985</b>	<b>80%</b>
<b>Stand Volume:</b>		<b>0</b>	<b>84,555</b>	<b>34,381</b>	<b>387</b>	<b>37</b>	<b>654</b>	<b>0</b>	<b>90,893</b>	<b>80%</b>

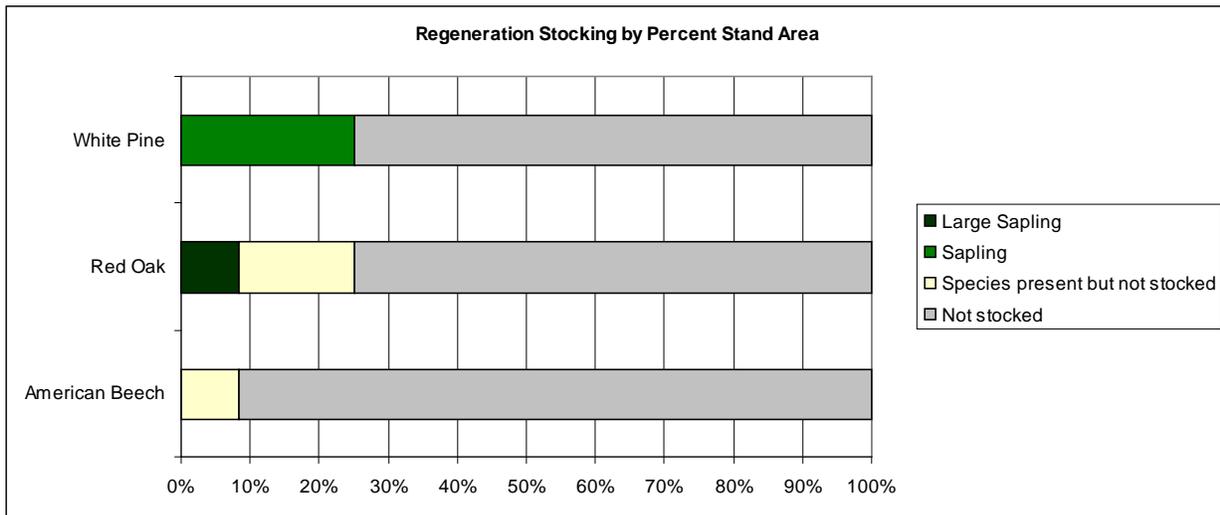
Table 2.3: Stand volume by species and product per acre values.

Graph 2.1a and 2.1b: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter. 2.1b provides a close-up of the breakdown in the larger diameter classes.

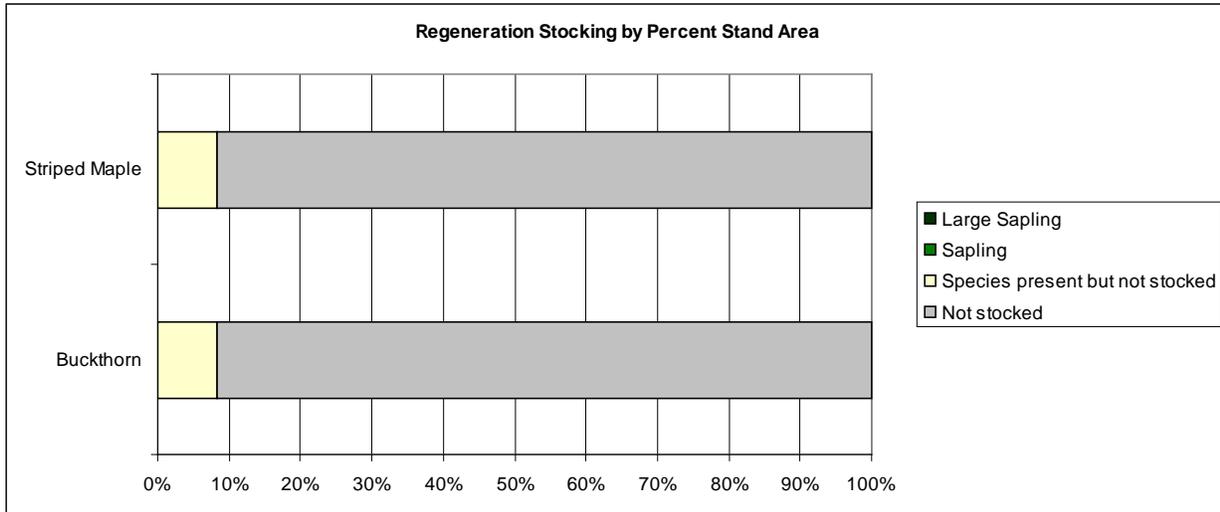




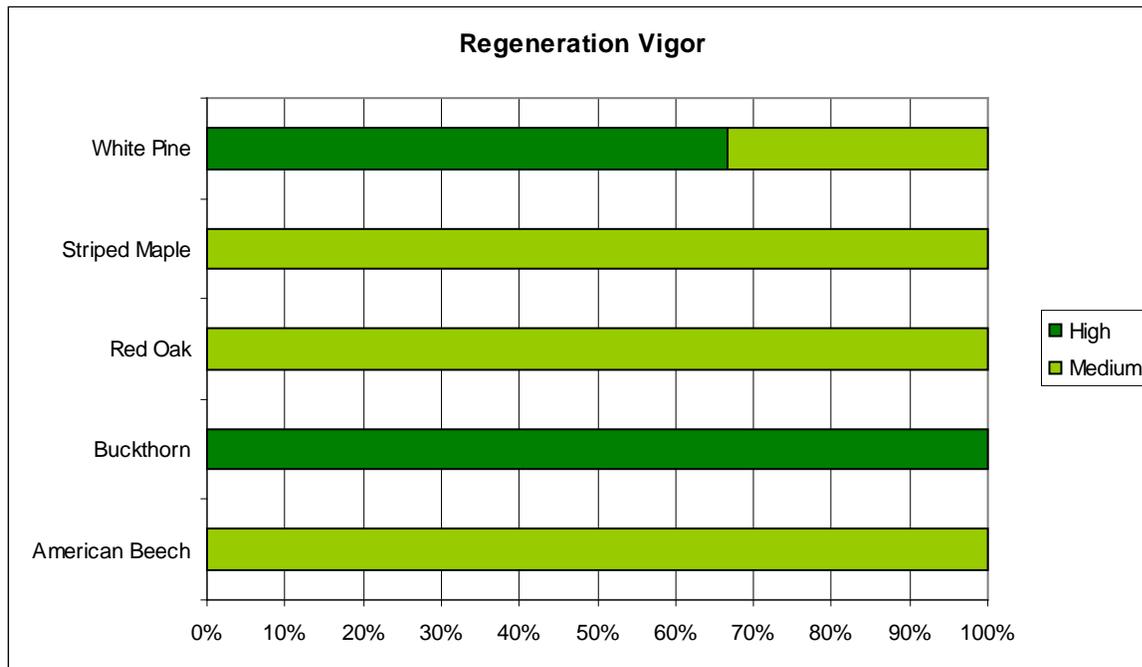
Graph 2.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less than 3 feet tall (Seedling). If a species is present but does not meet one of these conditions, it is recorded as present but not stocked.



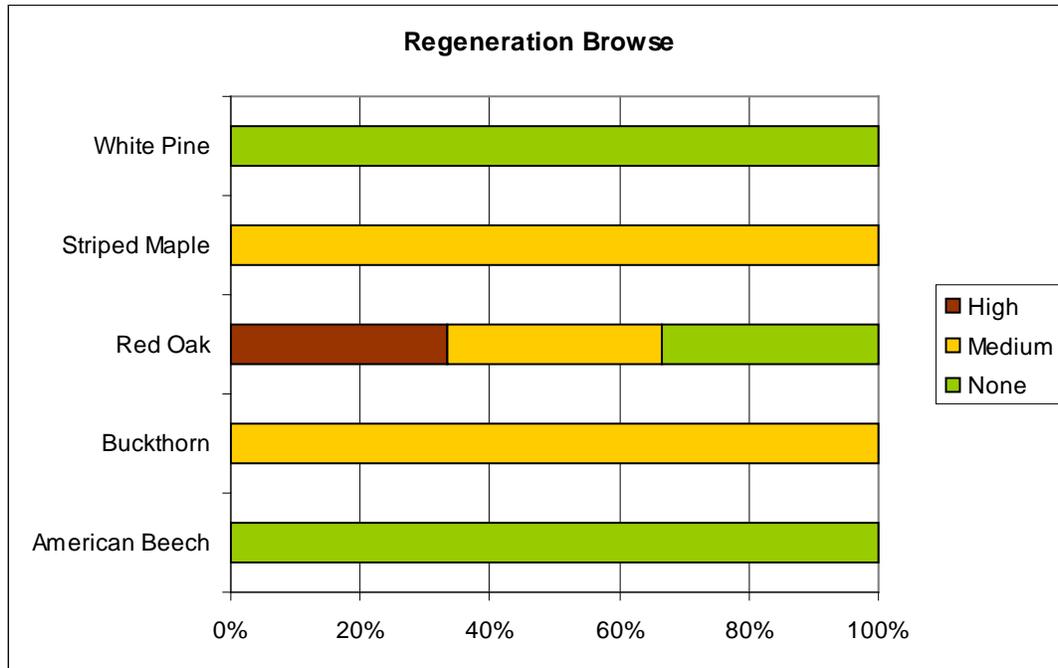
Graph 2.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter (Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less than 3 feet tall (Seedling). If a species is present but does not meet one of these conditions, it is recorded as present but not stocked.



Graph 2.4: Vigor of all regeneration and shrub species.



Graph 2.5: Browse level of all regeneration and shrub species.



**Silvicultural Objectives**

Management system:	Even-aged management
Harvest Entry:	15 years
Products:	Pine sawlogs and pulp
Desired Composition:	Allow stand to naturally transition to natural community type but favor current pine regeneration
Crop tree target diameter:	White pine 18-20"

**Operational Considerations**

Operability:	Operable
Seasonal limitations:	Avoid spring and fall mud season
Terrain:	Variable
Access and landing area:	Good road access and landing site in stand
Access distance:	Short
General maintenance:	None required
Brook-wetland crossings/buffer requirements:	Maintain 50' buffer around streams and wetlands, do not cross wetland.

## STAND SUMMARY AND 10-YEAR MANAGEMENT SCHEDULE

**Stand 2** is a stand almost solely stocked with white pine, except for a few hardwoods scattered near the wetland. The pine is overcrowded resulting in waning vigor. Common health problems associated with dense pine are present, most notably red rot, a fungal disease affecting the main trunk. There are pockets of very good white pine regeneration scattered about, elsewhere the regeneration is sparse. Buckthorn, an invasive exotic shrub is present in the stand.

The long-term goal of management in this stand is to improve the health and vigor of the white pine and eventually manage towards the natural community type in a multiple-aged structure. A more structurally and species diverse stand will be better able to withstand natural disturbances, such as wind and disease and will provide better wildlife habitat and a more reliable timber resource. The multiple age classes will exist primarily as pockets of similarly aged trees mixed throughout the stand. This multiple-age composition will provide a diversity of forest structure beneficial to wildlife and will provide opportunity for a mix of silvicultural operations.

**Silviculture:** The focus of management here is to improve the growth on the best stems, release existing regeneration. This will be accomplished through a mixture of improvement thinning and group selection.

**Priority:** High

**2013:** Remove approximately 1/3 to 1/2 of the basal area (to 135-175 square feet residual) through:

- **Group selection:** Group selection to remove pockets of poor quality stems to release existing regeneration.
- **Improvement thinning:** Use a combination of thinning from above and thinning from below to improve growth on the best quality and vigor stems. Harvest low quality, diseased, or mature individuals.
- **Invasive Species Control:** Prior to any harvest activity in this stand, invasive species control work is highly recommended. Control of invasives is neither simple, nor inexpensive, yet any silvicultural entry without prior invasive species control will only make the situation worse. See Appendix D in the Master Plan for more detailed information on control techniques. Cost share monies may be available for this type of treatment.

### **Water Quality<sup>6</sup>:**

- Maintain a 50' forested buffer around wetland with only limited harvesting that retains relatively continuous forest cover (65-70 percent canopy cover) to protect water quality.
- Avoid making either roads or landings within the 50' buffer.
- Avoid adding woody material to streams.

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<sup>6</sup> Water quality protection management recommendations from the publication Biodiversity in the Forests of Maine; Flatebro, Gro, Foss, Carol, and Pelletier, Steven, 1999, UMCE Bulletin #7147



**VETERAN'S PARK FOREST**  
**TOTAL FOREST TIMBER AND PULP VOLUME**  
**December, 2007**

**16 Forested Acres**

Species	Sawlog (bf)	Tielog (bf)	Total BF	Pulp (cfs)	Growing Stock (cfs)	Cull (cfs)	Total Volume in Cords	Percent Cords
<i>Hardwood</i>								
American Beech	0	0	0	10	0	0	10	0.8%
Red Maple	0	0	0	12	11	0	23	1.9%
Sugar Maple	3,082	0	3,082	3	0	0	9	0.7%
White Ash	9,072	0	9,072	29	17	0	63	5.2%
<b>Total</b>								
<b>Hardwood:</b>	<b>12,154</b>	<b>0</b>	<b>12,154</b>	<b>54</b>	<b>28</b>	<b>0</b>	<b>105</b>	
<i>Softwood</i>								
Hemlock	3,416	0	3,416	56	0	0	63	5.2%
White Pine	156,679	69,325	226,004	615	9	96	1,037	86.1%
<b>Total</b>								
<b>Softwood:</b>	<b>160,095</b>	<b>69,325</b>	<b>229,420</b>	<b>671</b>	<b>9</b>	<b>96</b>	<b>1,100</b>	
<b>Total Volume:</b>	<b>172,249</b>	<b>69,325</b>	<b>241,574</b>	<b>725</b>	<b>37</b>	<b>96</b>	<b>1,205</b>	



## VETERAN'S PARK

### 10-YEAR TREATMENT SCHEDULE

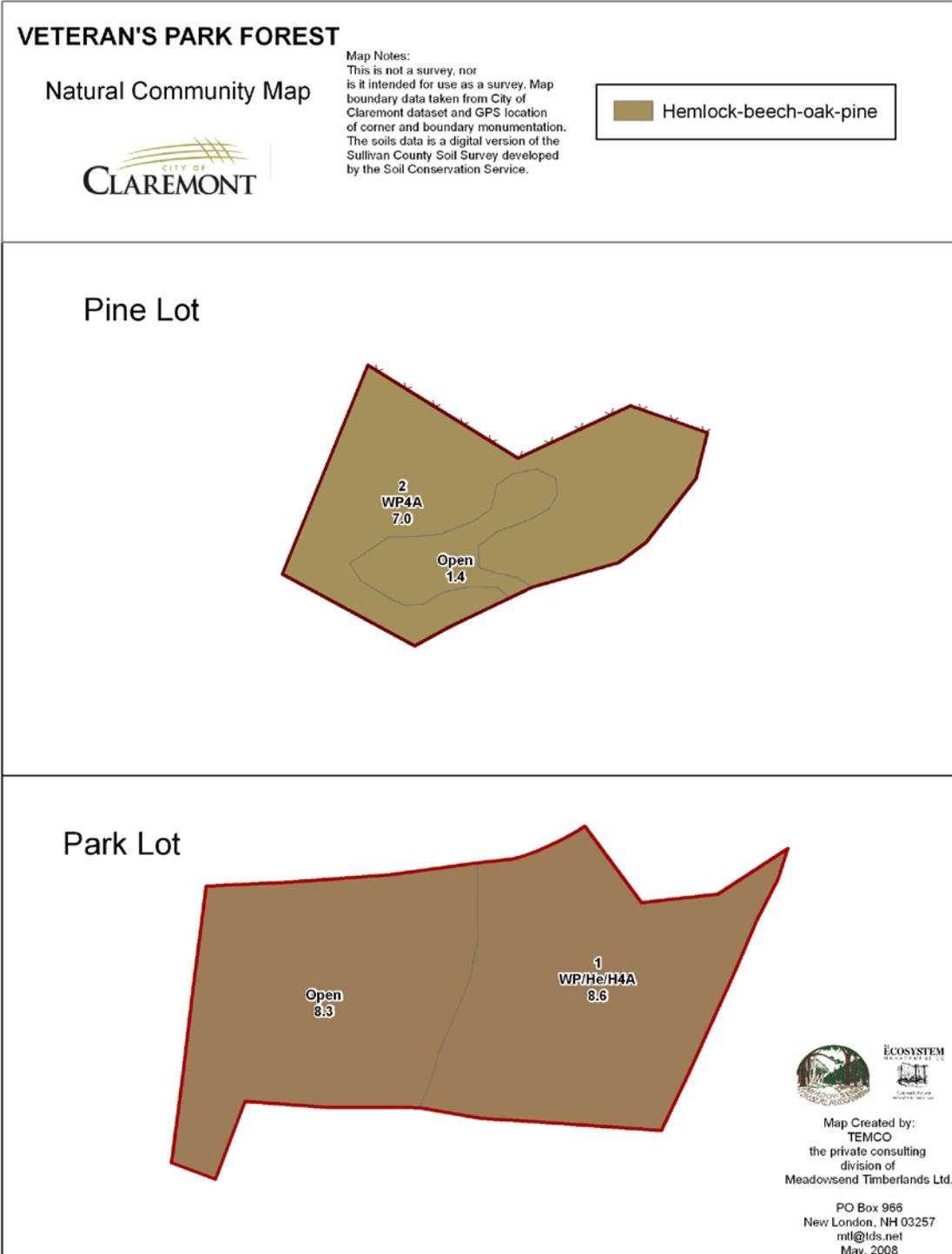
The dates given in this treatment schedule are meant to help prioritize work on the entire Claremont ownership. It is meant to be flexible and may change due to weather and market conditions or to unforeseen opportunities and access issues. The treatment activities may change due to the same reasons if silviculturally justifiable and agree with landowner mission, principles and management objectives.

<b>Stand #</b>	<b>Type</b>	<b>Acres</b>	<b>Treatment</b>	<b>Priority</b>	<b>Year</b>
2	WP3-4A	7.0	Group selection, improvement thinning	High	2013
1	WP/HE/H 4-5A	8.6	Group selection, crop tree release	Medium-Low	2016
all		As required	Paint boundary lines		ASAP
all			Reevaluate and update management plan		2018



## APPENDIX A: NATURAL COMMUNITY MAP

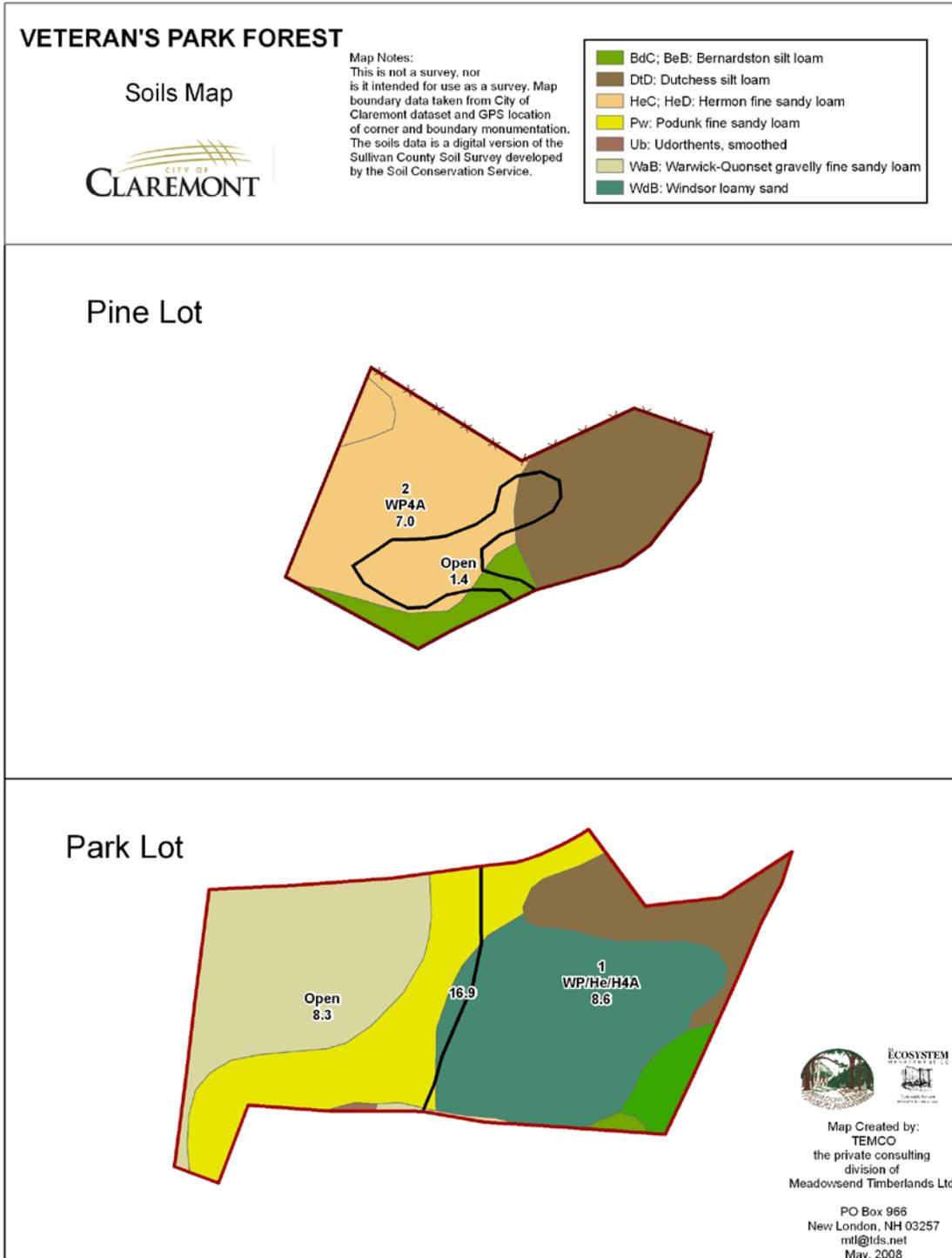






## APPENDIX B: SOILS MAP







## **APPENDIX C: NEW HAMPSHIRE IMPORTANT FOREST SOIL CLASSIFICATION**



### **Productivity of New Hampshire Forest Soils\***

**1A:** Deeper, loamy soils, moderately to well-drained; prime northern hardwood sites.

**1B:** Sandy or loamy soils, moderately to well-drained; oak and beech depending on sites.

**1C:** Outwash sands and gravels; white pine sites.

**2A:** 1A and 1B soils with limitations, for example, very steep, shallow, or rocky; northern hardwood sites.

**2B:** Poorly drained soils; spruce/fir sites in northern New Hampshire.

Not considered because they generally rank low in timber productivity, despite often being very high in wildlife ecological value: Muck and peat, rock outcrop, gravel pits, marsh, etc.

*\*New Hampshire Forest Land Base Study, 2000*



**APPENDIX D:**  
**NH WILDLIFE ACTION PLAN**  
**HAPITAT TYPES**

