

Table of Contents

1 PLAN PURPOSE AND DESIGN ..... 3

2 PROPERTY LOCATION AND BRIEF DESCRIPTION..... 3

3 LANDOWNER MISSION, PRINCIPLES, AND OBJECTIVES ..... 4

4 GEOLOGIC ATTRIBUTES..... 6

    Topography and Aspect ..... 6

    Brooks, Ponds, and Wetlands..... 6

    Soils ..... 7

5 NATURAL COMMUNITIES ..... 7

    Rare Species and Unique Natural Communities ..... 8

6 WILDLIFE HABITAT CONDITIONS ..... 9

7 RECREATIONAL and EDUCATIONAL OPPORTUNITIES ..... 10

8 FOREST CONDITIONS ..... 12

    Forest Types..... 12

    Age and Age Class Distribution ..... 12

    Growth Rates..... 13

    Tree Quality and Tree Health ..... 13

    Forest Management Approach..... 13

    Applied Silviculture ..... 14

    Access ..... 15

    Operability..... 15

    Boundary Delineation ..... 15

FOREST DATA ..... 17

    Stand 1   White Pine/Hardwood 3-4A 25.3 acres..... 19

TOTAL FOREST TIMBER AND PULP VOLUME..... 25

10-YEAR TREATMENT SCHEDULE ..... 27

APPENDIX A: NATURAL COMMUNITY MAP ..... 29

APPENDIX B: SOILS MAP ..... 33

APPENDIX C: NEW HAMPSHIRE IMPORTANT FOREST SOIL CLASSIFICATION..... 37

APPENDIX D: NON-TECHNICAL SOIL DESCRIPTIONS ..... 39



## **CLAREMONT – WINTER STREET FOREST 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**

The Winter Street Lot Forest is small, with only 26.1<sup>1</sup> acres, but what it lacks in size it makes up for in purpose located very near downtown Claremont in an urban neighborhood. The Winter Street Forest has a multitude of trails with spectacular small wetlands scattered throughout the forest. The neighboring landowners appreciate this natural resource right in their back yards. The forest is located between Winter Street and Hanover Street, just north of Washington Street. Access to the Forest is off Winter Street just south of Anderson Street.

The forest is even-aged and dominated by white pine, with a few scattered hardwoods including black cherry and white ash. The pine is fairly young and dense. There is some regeneration scattered throughout the forest, dominated by hardwoods including sugar maple and American beech with some ash, red maple, black cherry and elm. This forest has a significant population of invasive exotic shrubs including honey suckle, barberry, buckthorn, Euyonomous (burning bush), and autumn olive. These shrubs pose a serious threat to the natural progression of the forest because they out-compete native trees and shrubs. If left untreated not only will this result

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<sup>1</sup> Mapped acres, 1/2008

in a future forest made of solely of these shrubs, it also degrades natural biodiversity a key component to healthy, functioning ecosystems.

### **Woodlot History**

This land likely was cleared for agricultural use until early last century. Claremont has a rich history of agriculture and much of the surrounding land was cleared for crops, hay or pasture. The presence of either stone walls or barbed wire fence on the vast majority of property lines in this area reflects that use, and the Winter Street Forest is no different. After the abandonment of agriculture, the lot grew up to pine, an “early successional” species, meaning one that quickly and ably reclaims open land. The forest likely has seen some timber harvesting over time, but no evidence of recent work was noted during the fall 2007 cruise. The dense stocking and general poor timber quality reflects this lack of management.

The most recent natural disturbance includes several small pockets of trees that blew down during the severe wind events of the summer of 2007. Natural disturbances such as these benefit forests by providing a means to diversify both the structure and species composition thereby making the forest more resilient to large-scale disturbances over time and creating a variety of habitats. Forest management will typically try to mimic the effects of these natural disturbance regimes. One of the management activities on the Winter Street Forest will be to clean these areas up and thin the forest resulting in more vigorous and hopefully wind-firm trees.

Another objective of management in the Winter Street Forest is to get better control over the abuse of the land by errant ATV riders and disrespectful users of the forest who have over time become ambivalent to throwing trash and abusing the forest. A stronger presence of active stewardship of this forest should help to minimize these types of damage to the forest.

### **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 Winter Street Lot**

#### **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*
- Create educational infrastructure such as interpretive signs and kiosks
- Identify and conserve important *archaeological* and *cultural* sites
- Provide for both 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**

The Winter Street Forest ranges from 620 to about 680 feet in elevation. The terrain is gentle, with a slight southerly aspect.

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

Several wetlands exist on the Winter Street Forest. Six significant areas were mapped, but likely many more small examples exist. The wetlands are not all the same, some are shrub wetlands some include areas of wet meadow, and some are vernal pools. These wetlands provide important habitat for many different kinds of wildlife and provide a diversity of vegetative species.

Recommended Actions to Improve and Manage the Wetland and Water Resource of the Winter Street Forest<sup>2</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, cavity trees, and other site-specific features.

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<sup>2</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

## Soils

The upland soils were derived from glacial till and are dominated by Cardigan-Kearsarge rock outcrop complex. These soils vary in drainage, ranging from poorly drained to moderately well-drained dictated primarily by their position on the landscape.

Recommended Actions to Improve and Manage the Soil Resource of the Winter Street Forest<sup>3</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>4</sup>

“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 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.”

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<sup>3</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>4</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

“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.

Based on our interpretation, it is likely the Winter Street Forest is primarily Hemlock-beech-oak-pine, a fairly common natural community type occupying glacial till and terrace soils of low to mid elevations in central and southern New Hampshire. It is a broadly defined type. The shrub wetland communities are likely Highbush blueberry-winterberry shrub thicket, a common and widespread seasonally flooded tall shrub thicket community. Given the topography and shallow to bedrock soils, it is likely there are a number of vernal pools here as well. According to the Habitat Stewardship Series Vernal Pool pamphlet part of the New Hampshire Wildlife Action Plan vernal pools are “unique wetlands that provide critical breeding habitat for several amphibian species of conservation concern in New Hampshire”. “Vernal pools are wetlands with a seasonal cycle of flooding and drying. Some vernal pools flood in the spring with water from melting snow, rain or high groundwater and then typically dry by summer’s end. Other pools follow a similar patten, but full with rain in autumn, hold water all winter and spring, and then dry out by late summer. The annual drying cycle of vernal pools makes them different from other wetlands and play a key role in determining which wildlife species uses which pools as habitat.” See Appendix A for a map of the natural communities.

### **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 on Winter Street Forest 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**

The Winter Street Forest provides a variety of habitats for wildlife, but is dominated by dense white pine with scattered wetlands described above. The habitat provided by the forestland is limited by its small size, unless adjacent land types are taken into consideration. The pine likely serves as habitat for certain songbirds, and the forest in general is utilized by white tailed deer and other mammals. The most common mammal likely is squirrels, but other wildlife is certain to pass through including coyote, fox, and possibly an occasional bear. It is likely turkeys utilize the forest as well. Forest management objectives will integrate actions that improve wildlife habitat found here, including attempt to mimic natural disturbances that will help to create and maintain young tree and shrub growth for browse opportunity and release of individual trees possessing important habitat features such as hard mast from oaks, cavity and snag trees and trees with biological legacy value.

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, there are two wildlife habitat types on the Winter Street Forest- Hemlock-Hardwood-Pine with a small area of Marshland. A summary of this habitat type and the wildlife species found there is in Appendix B of the Master Plan.

Recommended actions to improve and manage the wildlife habitat of Winter Street Forest<sup>5</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 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.

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<sup>5</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

**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 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**

As mentioned above, despite its small size the Winter Street Forest provides an important recreational resource for the local neighborhood. Unfortunately it is also abused, likely by only a small percentage of people, but they have a widespread impact. There is a substantial trail system through the forest, linking this area to a greater network of trails in Claremont. Sadly, some of the ATV riders seek out the important wetland areas to “make mud”. This disrespect to the forest causes more than a poor aesthetic appearance; it can destroy the important habitat these wetlands provide. The trail system in the forest must be carefully restructured, limiting motorized use to one trail (if at all) and creating educational and instructional signage about the proper use of forest trails. In addition, the forest has become a popular party spot, leading to late night noisy parties and a forest full of trash and a smoldering bonfire the next day. A more consistent presence in the forest should help reduce this abuse. A number of activities could help improve the image of the Winter Street forest, including community work days to do trail work, putting in picnic tables or benches to overlook the wetlands, and

signage.



Abuse of the Winter Street forest, such as driving ATV's through wetlands (left photo) and being a popular party spot has been degrading the quality of the forest ecosystem as well as the enjoyment by local residents. An increased stewardship presence of the forest should help stop these types of abuse.

Recommended Actions to Improve and Manage the Recreational Resource of the Winter Street Forest:

- **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 motorized and non-motorized use**
  - Post a map of the trails and allowed uses.
- **Locate and maintain trails to prevent erosion<sup>6</sup>**
- **Locate trails** so they avoid sensitive areas or valuable wildlife habitat such as vernal pools and deer wintering areas.
- **Install benches** for resting along trails and to overlook wetlands

## Education

As with all of Claremont's forestland, educational opportunities are abundant from school trips to forest management based workshops. The general ease of access to this lot benefits its use for school trips.

Forest management operations will also provide educational opportunities in the form of public

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<sup>6</sup> Two good resources include: *Lightly on the Land, The SCA Trail-Building and Maintenance Manual* by Robert C. Birkby and [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

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 the Winter Street Forest:

- **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 on Winter Street Forest
- **Create educational kiosk and signage** about Winter Street and management philosophy and activities
- **Post interpretive signs** along trails
- **Organize community work days** to perform trail maintenance, sign maintenance, and invasive exotic species control

## **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

An inventory was conducted in December, 2007 consisting of 8 sample points. Data was collected as outlined in the Claremont master plan.

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

As with most forests in New England, Winter Street Forest is largely even-aged, with the bulk of the trees getting their start after the abandonment of agriculture here mid last century. That said, different 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. Aspen, 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, Winter Street Forest is dominated by 40-60 year old white pine. Younger trees, often clusters of pole-sized hardwood species, can be found in pockets where past harvesting or natural disturbances, such as blow down, created openings.

### **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 Winter Street Forest falls within this range.

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

Overall tree timber quality on the Winter Street Forest is poor. The overwhelming majority of sawtimber volume includes low quality white pine, comprising approximately 3,300 board feet of sawtimber, another 3,000 feet of pallet logs if which currently there is no market, and approximately 38 cords of pulp per acre. The quality of the pine varies, from some little to no value "wolf pine" that are crooked, multi-stemmed, and branchy to a small amount of decent quality, straight stemmed individuals. No serious disease problems were noted, but one could expect a fair amount of red rot in pine of this size and density. In addition, as mentioned above, there are a few areas of blow down from the summer of 2007. It is likely this timber no longer has any value, as it was fairly poor quality to begin with and now likely is full of blue stain. Blue stain is a common fungus that affects pine after it has been cut or blows over and reduces its value.

### **Forest Management Approach**

Management on the Winter Street Forest will utilize a combination of silvicultural techniques that typically are separated into two general categories, even-age and unevenaged management.

Evenaged management methods include clear-cut, 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 Winter Street 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.

### White Pine Silviculture

White pine dominates Winter Street 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.

### **Access**

Road access to Winter Street Forest is good. Access exists off Winter Street, just below Anderson Street. 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 this tract in general do not limit operability, but the wetlands will need to be worked around. The forest has gentle terrain rocky in areas, but relatively dry, operable land dominates. To protect the soils here it is recommended that only winter harvesting on frozen ground with good snow cover occur if possible. 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 Winter Street Forest boundary is in variable condition and includes approximately 1 and ¼

mile 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**



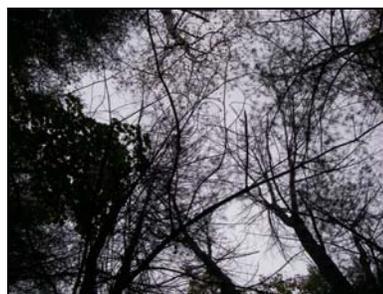
**Stand 1 White Pine/Hardwood 3-4A 25.3 acres**



Stand Structure



Forest Canopy



Forest Floor

**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: Fair  
 Insects/Damage/Disease: Likely some red rot in the pine, presence of invasive exotic shrubs: honeysuckle, barberry, buckthorn, autumn olive and Euyonomous

**SITE CONDITIONS**

NH soil classification: 2A  
 Determined by: Soils and field observation  
 Tree vigor: Medium  
 Soils: Cardigan-Kearsarge rock outcrop complex  
 Drainage: Variable  
 Terrain: Gentle  
 Aspect: South  
 Elevation: 620-680'

**Snags Per Acre**

DBH Class	Moderately punky	Sound	Grand Total
<12"	12.8	5.7	18.5
12-18"	2.0	1.4	3.5
<b>Grand Total</b>	<b>14.9</b>	<b>7.1</b>	<b>21.9</b>

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

**Down Logs Per Acre**

DBH Class	Moderately punky	Sound	Grand Total
<12"			
12-18"		12.2	12.2
<b>Grand Total</b>		<b>12.2</b>	<b>12.2</b>

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

## SILVICULTURE

### Structural and Silvicultural Attributes

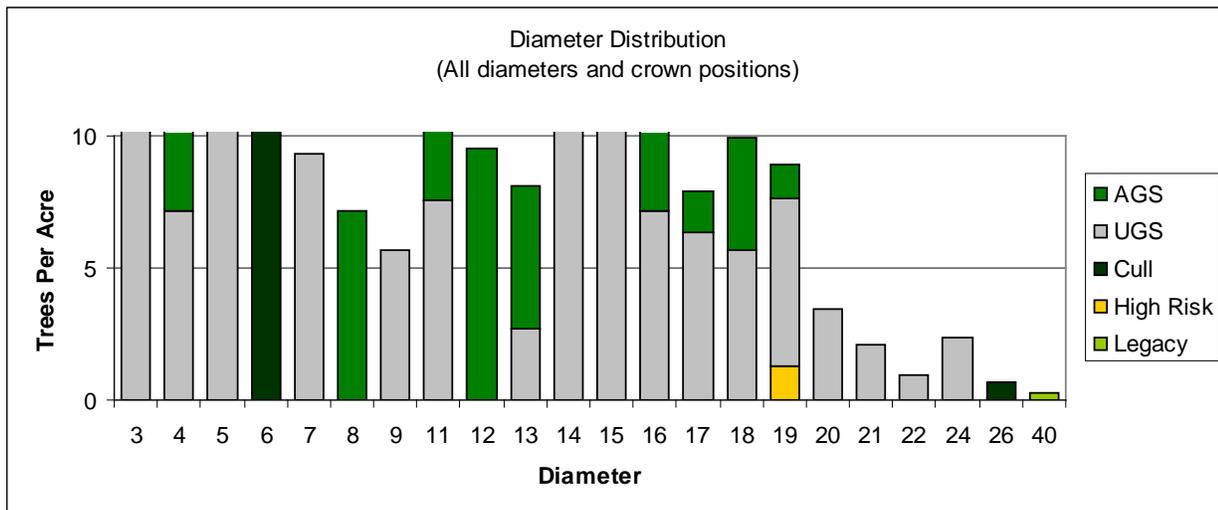
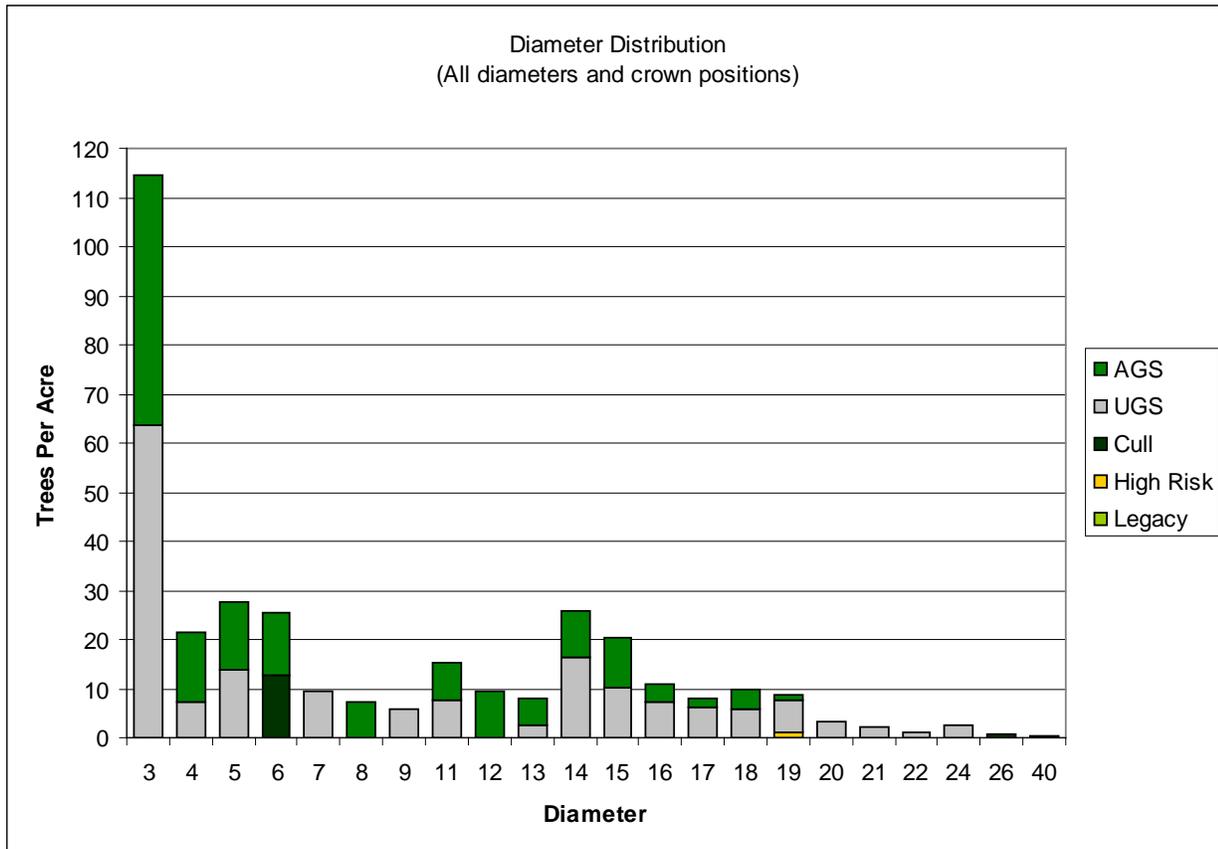
Broad Forest Type:	SH3A
Size Class:	Small sawtimber
Stand Structure:	Evenage
Crown Closure:	90%
Total Basal Area Per Acre:	191
Total Merchantable Basal Area Per Acre:	184
Total Acceptable Basal Area Per Acre:	68
Trees Per Acre:	337
Quadratic Mean Stand Diameter:	10.2
Percent AGS Sawtimber:	70.5%
Basal Area of AGS Sawlogs:	58
Timber Quality:	Fair

### Forest Composition and volume

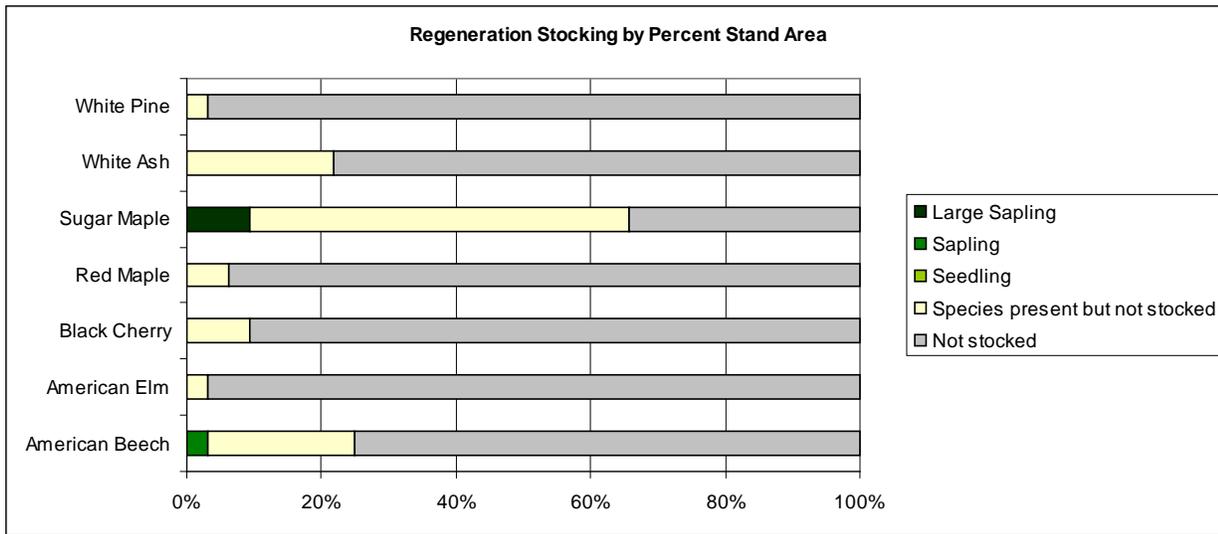
Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Volume in Cords	High Risk	AGS Saw	% AGS Saw
American Elm	1.3%	0	0	0	.6	0.0	0.6	0.0	0	0
Black Cherry	14.5%	0	600	368	3	0.0	6.1	96.5	581	60%
White Ash	11.0%	0	219	168	1	0.0	1.5	0.0	386	100%
White Birch	4.1%	0	0	0	0	0.2	0.6	0.0	0	0%
<b>Total Hardwood Per Acre:</b>	<b>31.0%</b>	<b>0</b>	<b>819</b>	<b>536</b>	<b>5</b>	<b>0.2</b>	<b>8.8</b>	<b>96.5</b>	<b>967</b>	<b>75%</b>
White Pine	69.0%	0	3,386	3,034	38	0.3	51.1	0.0	4,459	69%
<b>Total Softwood Per Acre:</b>	<b>69.0%</b>	<b>0</b>	<b>3,386</b>	<b>3,034</b>	<b>38</b>	<b>0.3</b>	<b>51.1</b>	<b>0.0</b>	<b>4,459</b>	<b>69%</b>
<b>Total Volume Per Acre: Stand Volume:</b>	<b>100.0%</b>	<b>0</b>	<b>4,205</b>	<b>3,570</b>	<b>43</b>	<b>1</b>	<b>60</b>	<b>96</b>	<b>5,426</b>	<b>70%</b>
<b>Volume:</b>		<b>0</b>	<b>105,125</b>	<b>90,333</b>	<b>1,078</b>	<b>14</b>	<b>1,517</b>	<b>2,440</b>	<b>135,650</b>	<b>70%</b>

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

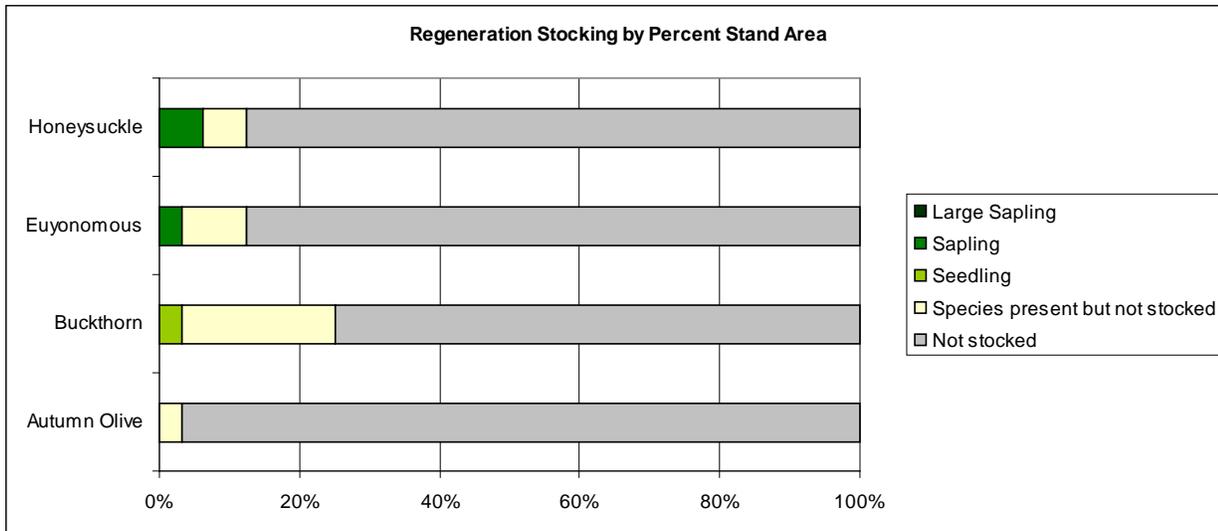
Graph 1.1a and 1.1b: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter. 1.1b provides a close-up of the breakdown in the larger diameter classes.



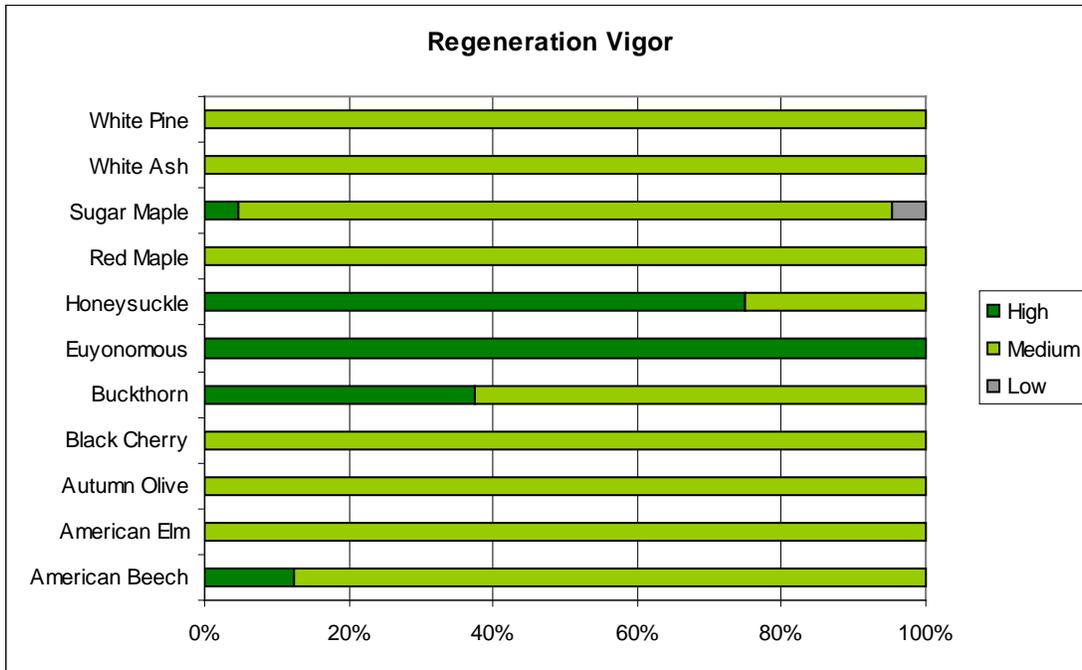
Graph 1.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less 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.



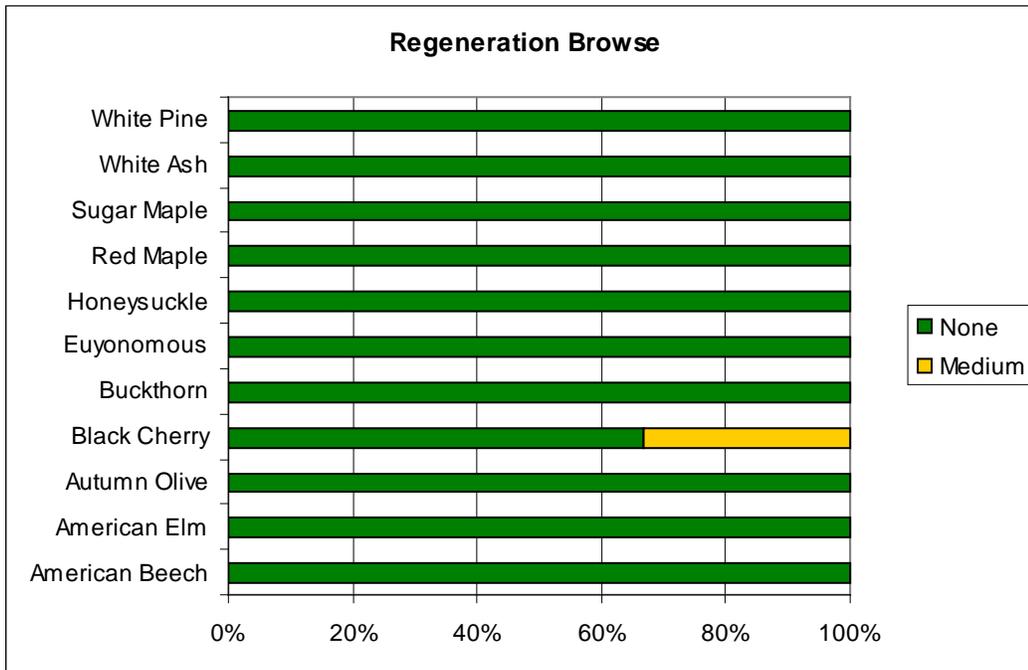
Graph 1.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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:	Even-age, convert to multiple-age over time
Harvest Entry:	20 years
Products:	Pine sawlogs and pulp Manage towards natural community type, favor quality
Desired Composition:	white pine and hardwoods
Crop tree target diameter:	White pine 18-20"

**Operational Considerations**

Operability:	Operable
Seasonal limitations:	Winter preferable
Terrain:	Gentle
Access and landing area:	Good access from Winter Street, no landing exists
Access distance:	¼ mile
General maintenance:	Access and landing to be created
Brook-wetland crossings/buffer requirements:	Several wetland systems to avoid

**STAND SUMMARY  
AND  
10-YEAR MANAGEMENT SCHEDULE**

**Stand 1** is dominated by dense, generally poor quality with pine with a mix of regeneration dominated by hardwoods. Invasive exotic species are present and pose significant threat to future regeneration efforts. The pine is overcrowded and needs to be thinned.

The long term goal here is to manage towards the natural community type and convert the forest to multiple age classes, maximizing both species and structural diversity. The near term goal is to improve the growth on the best quality and vigor stems.

**Silviculture:** The focus of management here is to improve the growth on the best stems, through a combination of thinning from above and below. Reduce overall basal area by approximately 1/3 to 145 square feet of basal area of the best quality and vigor stems.

**Priority:** Medium to High

**2012:** Reduce overall basal area by 1/3 approximately 140 square feet through:

- **Thin:** Combination of thing from above and below to release best quality, health and vigor trees. Leave trees that appear wind firm, sound and vigorous.
- **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.

**WINTER STREET FOREST  
TOTAL FOREST TIMBER AND PULP VOLUME  
December, 2007  
25 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 Elm	0	0	0	15	0	0	15	1.0%
Black Cherry	15,191	9,315	24,506	88	0	22	154	10.2%
White Ash	5,529	4,246	9,775	20	0	5	39	2.6%
White Birch	0	0	0	10	5	0	15	1.0%
<b>Total Hardwood:</b>	<b>25,260</b>	<b>13,561</b>	<b>38,821</b>	<b>125</b>	<b>5</b>	<b>27</b>	<b>223</b>	
<i>Softwood</i>								
White Pine	85,664	76,772	162,436	954	9	63	1,294	85.3%
<b>Total Softwood:</b>	<b>85,664</b>	<b>76,772</b>	<b>162,436</b>	<b>954</b>	<b>9</b>	<b>63</b>	<b>1,294</b>	
<b>Total Volume:</b>	<b>110,924</b>	<b>90,333</b>	<b>201,257</b>	<b>1,079</b>	<b>14</b>	<b>90</b>	<b>1,517</b>	



**WINTER STREET FOREST  
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>
1	WP/H 3-4A	25.3	Thin	Medium- High	2012
all			Blaze and paint property boundary lines		ASAP
all			Reevaluate and update management plan		2018



## **APPENDIX A: NATURAL COMMUNITY MAP**



### WINTER STREET LOT FOREST

#### Natural Community Map



Map Notes:  
This is not a survey, nor is it intended for use as a survey. Map boundary data taken from City of Claremont dataset and GPS location of corner and boundary monumentation. The soils data is a digital version of the Sullivan County Soil Survey developed by the Soil Conservation Service.

	Wetland
	Hemlock-beech-oak-pine



Map Created by:  
TEMCO  
the private consulting  
division of  
Meadowsend Timberlands Ltd.

PO Box 966  
New London, NH 03257  
mtl@tds.net  
May, 2008



## **APPENDIX B: SOILS MAP**



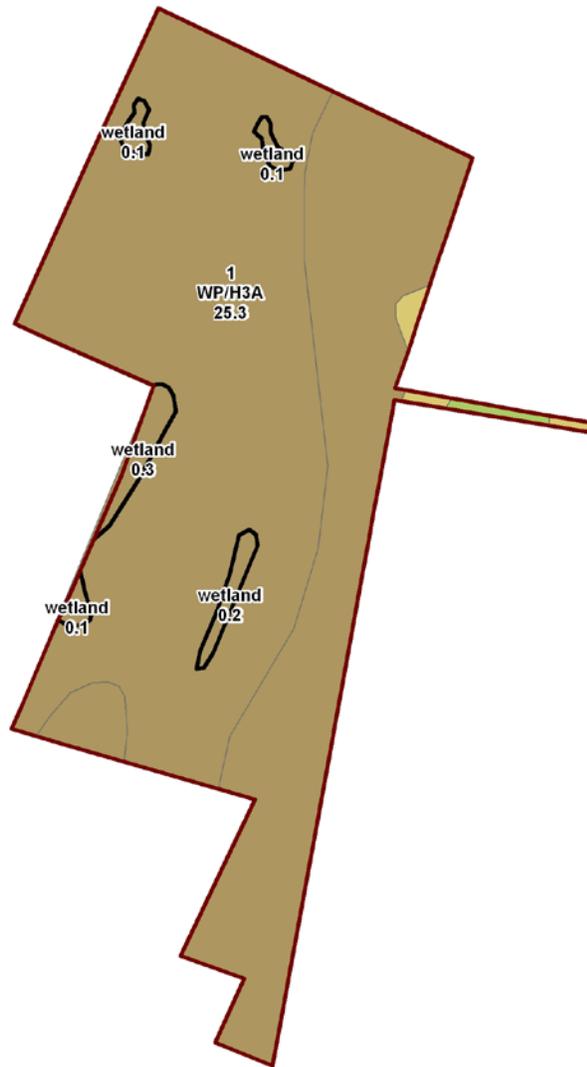
# WINTER STREET LOT FOREST

## Soils Map



Map Notes:  
This is not a survey, nor is it intended for use as a survey. Map boundary data taken from City of Claremont dataset and GPS location of corner and boundary monumentation. The soils data is a digital version of the Sullivan County Soil Survey developed by the Soil Conservation Service.

- Cardigan-Kearsarge rock outcrop complex
- Dutchess silt loam
- Udorthents, smoothed



Map Created by:  
TEMCO  
the private consulting  
division of  
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PO Box 966  
New London, NH 03257  
mtl@tds.net  
May, 2008



## **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: NON-TECHNICAL SOIL DESCRIPTIONS**

## Non-Technical Descriptions

Sullivan County, New Hampshire

Only those map units that have entries for the selected non-technical description categories are included in this report.

**BdC - Bernardston silt loam, 8 to 15 percent Map Unit: t slopes**

**Description Category: 1SOT**

*This well drained soil is on crests of smooth sided hills of the glaciated uplands. The areas are generally oblong. Permeability is moderate in the solum and slow to moderately slow in the compacted substratum, or hardpan. Available water capacity is moderate. The dense hardpan is at depths of 18 to 36 inches and limits the rooting depth of plants. A seasonal high water table is at depths of 2 to 3.5 feet in March and April. The depth to bedrock is generally more than 5 feet. Frost action potential is moderate.*

**Description Category: 3AGT**

*These areas are well suited to use for hay and pasture. Special combinations of conservation practices are needed when used for corn and other row crops. Applicable practices include contour tillage, cover crops, crop residue use, diversions, minimum tillage, stripcropping, and row crop-sod cropping sequences. Subsurface drains for apple orchards and subsurface stones are management considerations.*

**Description Category: 4WOT**

*These soils are well suited to growing high quality hardwood veneer and sawtimber, especially sugar maple, white ash, yellow birch, and northern red oak. Successional trends are toward climax stands of shade tolerant hardwoods, i.e., sugar maple and beech. Early midsuccessional*

*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. Softwoods are usually less abundant and are best managed as a minor component of predominantly hardwood stands. Successful natural regeneration of softwoods and the establishment of plantations is dependent upon persistent, mechanical and chemical hardwood control efforts.*

**Map Unit: BeD - Bernardston stony silt loam, 15 to 25 percent slopes**

**Description Category: 1SOT**

*This moderately steep, well drained soil is on smooth convex sideslopes of the glaciated uplands in the western part of the county. Many of the hills are smooth sided and oval with a northeast to southwest orientation. The areas are long and narrow, oblong, or irregularly shaped. Stones averaging 15 inches in diameter are 15 to 140 feet apart and cover .1 to 1 percent of the surface area. Permeability is moderate in the surface and subsoil and slow in the compacted substratum, or hardpan. Available water capacity is moderate. Depth to bedrock is more than 5 feet. A perched seasonal high water table is at depths of 1.5 to 3 feet from February through April. The hardpan is at depths of 15 to 30 inches and limits the rooting depth of plants. Frost action potential is moderate.*

**Description Category: 3AGT**

*These soils have limitations that make them generally unsuited to conventional field crop cultivation.*

**Description Category: 4WOT**

*These soils are well suited to growing high quality hardwood veneer and sawtimber, especially sugar maple, white ash, yellow birch, and northern red oak. Successional trends are toward climax stands of shade tolerant hardwoods, i.e., sugar maple and beech. Early midsuccessional*

*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. Softwoods are usually less abundant and are best managed as a minor component of predominantly hardwood stands. Successful natural regeneration of softwoods and the establishment of plantations is dependent upon persistent, mechanical and chemical hardwood control efforts.*

**Map Unit: DuC - Dutchess stony silt loam, 8 to 15 percent slopes**

Distribution Generation Date: Page 1 of 4

Sullivan County, New Hampshire

**DuC - Dutchess stony silt loam, 8 to 15 percent Map Unit: ent slopes**

**Description Category: 1SOT**

*This strongly sloping, well drained soil is on hilltops and sideslopes of the glaciated uplands in the western part of the county. The areas are generally irregularly shaped, or are oblong. Stones averaging 15 inches in diameter are 15 to 140 feet apart and cover .1 to 1 percent of the surface area. Permeability is moderate and available water capacity is high. Depth to bedrock is generally more than 5 feet. The seasonal high water table is at depths greater than 6 feet. Frost action potential is moderate.*

**Description Category: 3AGT**

*These soils have limitations that make them generally unsuited to conventional field crop cultivation.*

**Description Category: 4WOT**

*These soils are well suited to growing high quality hardwood veneer and sawtimber, especially sugar maple, white ash, yellow birch, and northern red oak. Successional trends are toward climax stands of shade tolerant hardwoods, i.e., sugar maple and beech. Early midsuccessional*

*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. Softwoods are usually less abundant and are best managed as a minor component of predominantly hardwood stands. Successful natural regeneration of softwoods and the establishment of plantations is dependent upon persistent, mechanical and chemical hardwood control efforts.*

**Map Unit: DuD - Dutchess stony silt loam, 15 to 25 percent slopes**

**Description Category: 1SOT**

*This well drained soil is on sideslopes of the glaciated uplands in the western part of the county. The areas are irregularly shaped, or long and narrow. Stones averaging 15 inches in diameter are 15 to 140 feet apart and cover .1 to 1 percent of the surface area. Permeability is moderate and available water capacity is high. Depth to bedrock is generally more than 5 feet. The seasonal high water table is at depths greater than 6 feet. Frost action potential is moderate.*

**Description Category: 3AGT**

*These soils have limitations that make them generally unsuited to conventional field crop cultivation.*

**Description Category: 4WOT**

*These soils are well suited to growing high quality hardwood veneer and sawtimber, especially sugar maple, white ash, yellow birch, and northern red oak. Successional trends are toward climax stands of shade tolerant hardwoods, i.e., sugar maple and beech. Early midsuccessional*

*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. Softwoods are usually less abundant and are best managed as a minor component of predominantly hardwood stands. Successful natural regeneration of softwoods and the establishment of plantations is dependent upon persistent, mechanical and chemical hardwood control efforts.*

**Map Unit: MwD - Monadnock-lyman-rock outcrop complex, 15 to 25 percent slopes**

Distribution Generation Date: Page 2 of 4

Sullivan County, New Hampshire

**MwD - Monadnock-lyman-rock outcrop complex, 15 to 25 percent Map Unit: ent slopes****Description Category: 1SOT**

*These areas are on mountains, hills and ridges. Monadnock soils formed in glacial till and have bedrock at a depth of more than five feet. They are well drained and make up about 40 percent of the map unit. Lyman soils formed in glacial till and have bedrock at a depth of 10 to 20 inches. They are somewhat excessively drained and make up about 25 percent of the map unit. Rock outcrop consists of areas of exposed bedrock and makes up about 15 percent of the map unit.*

**Description Category: 3AGT**

*These soils have limitations that make them generally unsuited to conventional field crop cultivation.*

**Description Category: 4WOT**

*These soils have physical limitations which make forest management more difficult and costly, i.e., steep slopes, bedrock outcrops, erosive textures, surface boulders, and extreme stoniness. Generally, productivity of these soils is not greatly affected by their physical limitations. However, management activities such as tree planting, thinning, and harvesting are more difficult and more costly. Successional trends and special management opportunities are variable by site.*

**Map Unit: PtB - Pittstown silt loam, 3 to 8 percent slopes****Description Category: 1SOT**

*This moderately well drained soil is on broad crests and lower concave sideslopes of hills of the glaciated uplands in the western part of the county. Many of the hills are smooth sided and oval with a northwest to southeast orientation. The areas are generally irregularly shaped, or somewhat oblong. Permeability is moderate in the surface and subsoil and slow in the compacted substratum, or hardpan. Available water capacity is moderate. Depth to bedrock is more than 5 feet. The seasonal high water table is at a depth of 1.5 to 2.0 feet from November through April. The hardpan is at a depth of 15 to 30 inches and limits rooting depth of plants. Frost action potential is moderate.*

**Description Category: 3AGT**

*These areas are suited to hay, pasture, and row crops. Useful drainage practices may include drainage ditches and subsurface drains. Drainage is critical for high yields of alfalfa corn and apple orchards. Erosion control is critical on sloping soils. Useful practices include stripcropping, contour tillage, minimum tillage, diversions, cover crops, waterways, and row crop-sod cropping sequences. These soils are slow to warm in the spring. Forage varieties adapted to moderately well drained soils should be used. Subsurface stones are a management consideration.*

**Description Category: 4WOT**

*These soils are well suited to growing high quality hardwood veneer and sawtimber, especially sugar maple, white ash, yellow birch, and northern red oak. Successional trends are toward climax stands of shade tolerant hardwoods, i.e., sugar maple and beech. Early midsuccessional*

*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. Softwoods are usually less abundant and are best managed as a minor component of predominantly hardwood stands. Successful natural regeneration of softwoods and the establishment of plantations is dependent upon persistent, mechanical and chemical hardwood control efforts.*

**Map Unit: QsC - Quonset-warwick gravelly fine sandy loams, 8 to 15 percent slopes**

Distribution Generation Date: Page 3 of 4

Sullivan County, New Hampshire

**QsC - Quonset-warwick gravelly fine sandy loams, 8 to 15 percent Map Unit: ent slopes****Description Category: 1SOT**

*These soils are on kames, eskers, and the sides of terraces. They formed in sandy and gravelly glacial outwash. Quonset soils are excessively drained and make up about 50 percent of the map unit. Warwick soils are somewhat excessively drained and make up about 35 percent of the map unit. Depth to bedrock is more than five feet in these soils.*

**Description Category: 3AGT**

*These areas are suited to limited use for hay and pasture. The growing of sod crops and reseeding in strips across the slope where slopes are long are the best methods of preventing excessive erosion. If row cropping sequence of not more than one year, row crop with winter cover crop followed by three or more years of sod together with stripcropping, will reduce soil losses. Frequent fertilizer applications are essential to avoid nutrient loss due to rapid leaching. Choose forage varieties adapted to droughty soil conditions.*

**Description Category: 4WOT**

*These soils are well suited to growing high quality softwood sawtimber, especially white pine, in nearly pure stands. Less site demanding hardwoods such as northern red oak and white birch make fair to good growth on sites where soil moisture is more abundant. Successional trends on these soils are toward stands of shade tolerant softwoods, i.e., red spruce and hemlock. White pine, red maple, aspen, gray birch and paper birch are common in early and mid-successional stands. With modest levels of management, white pine can be maintained and naturally reproduced on these soils.*

**Map Unit: WaB - Warwick-quonset gravelly fine sandy loams, 3 to 8 percent slopes**

**Description Category: 1SOT**

*These soils are on kames, eskers, and the sides of terraces. They formed in sandy and gravelly glacial outwash. Warwick soils are somewhat excessively drained and make up about 50 percent of the map unit. Quonset soils are excessively drained and make up about 35 percent of the map unit. Depth to bedrock is more than five feet in these soils.*

**Description Category: 3AGT**

*This soil needs to be protected from erosion when cultivated. Applicable practices include contour tillage, cover crops, crop residue use, diversion, stripcropping, minimum tillage, grassed waterways, and a row crop-sod cropping sequence. Irrigation is essential to maintain high yields and for growing row crops.*

**Description Category: 4WOT**

*These soils are well suited to growing high quality softwood sawtimber, especially white pine, in nearly pure stands. Less site demanding hardwoods such as northern red oak and white birch make fair to good growth on sites where soil moisture is more abundant. Successional trends on these soils are toward stands of shade tolerant softwoods, i.e., red spruce and hemlock. White pine, red maple, aspen, gray birch and paper birch are common in early and mid-successional stands. With modest levels of management, white pine can be maintained and naturally reproduced on these soils.*

Distribution Generation Date: Page 4 of 4

