Table of Contents

WEARE – EASTMAN FOREST
FOREST MANAGEMENT PLAN

1 PLAN PURPOSE AND DESIGN

The purpose of this forest management plan is to provide the Town of Weare 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 Weare's objectives and will remain flexible to mirror changes in the property condition or objectives through time. A 10-year management schedule can be found at the end of this plan and used as a quick reference to the timing and areas with scheduled management.

Management planning on the Weare 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 Eastman Forest is 597.8 acres[1] and is managed under the supervision of the Weare Conservation Commission. The property is located in north-central Weare, east of Route 114 and north of Route 77. The northern boundary line runs along the Henniker-Weare town line, and a small strip of the property is located north of the town line in Henniker. It contains several parcels in one contiguous tract. The terrain is variable, but generally includes moderate to gentle slope. The entire property is protected with a working forest conservation easement.

This property is largely wooded uplands composed of 563.8 acres of commercial forestland, 11.9 acres of open land, 1 acre of landings and just over 1 acre of talus/steeps. The

1 Mapped acres, 1/2008

balance of the acreage is of scattered wetlands that total 20.1 acres.

The former New Hampshire Central RR grade runs north-south and bisects the northern portion of the property. It was constructed from 1849-50, and was first operated in 1850. The line faced many financial difficulties, and was run by a series of operators over the years. The tracks were removed from this portion of the mainline from North Weare to Henniker Junction in 1858, earning it the distinction of being the first-ever railroad abandonment in northern New England. Trackage was restored in 1891, and passenger and freight service continued until flooding in the spring of 1936 washed out several sections of the mainline between Goffstown and Henniker Junction. This culminated in the final abandonment of the line, now by the Boston and Maine Railroad, in 1937, when the tracks were once again removed.[2]

A series of wetlands runs alongside the former railroad grade, and the associated stream flows southward from wetland to wetland. Beaver activity has flooded some portions of the rail bed adjacent to the property; there are many acres of open-water. This particular watershed flows into the Piscataquog River as it flows through North Weare Village.

The forestland is varied, but is dominated by white pine that came in after the abandonment of agriculture earlier last century. In places white pine is the only species; elsewhere it is a scattered but consistent component of the overstory in combination with mixed hardwoods. Hemlock occupies the wetter sites and areas of shallow soil, and the steep slopes leading down to the old NHCRR grade.

Invasive exotic shrubs are presently minimal. The primary area of concern is the recently abandoned agricultural land in the southern tip of the property, as well as the areas of Stand 3g surrounding this recently abandoned field and most of the acreage in Stand 3i. Invasive shrubs are detrimental to the natural succession of the forest as they out-compete the native trees and shrubs. Additionally, they typically produce copious amounts of berries that are eaten by birds and other small mammals and turkeys that then spread the seed through their scat. Invasive exotic shrubs are becoming an increasingly devastating problem for forests in the Northeast and globally. Noted invasives in this area include Japanese barberry, oriental bittersweet, and winged euyonomous. One other invasive incidence was noted during the timber cruise. Several non-native honeysuckle plants were observed in Stand 3b. These were likely established following a disturbance in the area, probably from seed distribution from bird droppings.

---

2 Robt. Lindsell, *The Rail Lines of Northern New England*, chapter 22, 2000

Woodlot History

The land has a long agricultural history; the abundance of stone walls throughout the property suggests a fairly intense use. Weare had a prosperous agricultural history, which peaked in the mid to late 1800's. This agricultural use of the land came to a halt early last century when many farmers in New England abandoned their agrarian lifestyles and once-open land has since become reforested.

Other cultural evidence exists within the property. There are several open field quarry locations, where surface stones (fieldstones) were drilled, split and harvested for use, especially for sill support as upper structural members of a foundation. There was also a small collection of relatively unique cellar holes and stone walls found in Stand 3g.

Some examples of the fieldstone quarry sites. Stones have been drilled and split.

The unique wall formations in Stand 3g.

The majority of the tract acreage was at one time open agricultural land, a mix of pasture, hayfields and crop lands. The present forest is a mix of hardwoods, dominated by red oak, red maple, sugar maple, and beech, hemlock, and white pine approximately 65-75 years old. Pine often is the first forest type to occupy abandoned agricultural land, especially old pasture land as the cattle or sheep typically browsed any hardwood that came into the field and left the pine alone. Abandoned crop land quite commonly was planted with either white or red pine or a mix of spruce, but natural succession beginning with pine occurred frequently. The resulting forest has been through a series of timber harvests since its reforestation in the early part of last century, as evidenced by old forest access roads and tree stumps of varying ages.

Example of past use – note stone wall – and different tree species and varying tree size.

3 LANDOWNER MISSION AND OBJECTIVES

As stated in Weare's forest master plan, goals and objectives of management on the Town of Weare forestlands are:

1. The first goal of stewardship is to maintain the diversity of plant and animal life in the Town Forests so as to sustain ecological processes.
2. The second objective is to maintain a healthy and vigorous forest that can sustainably yield forest products.
3. Hunting, fishing, hiking, botanical observation, and wildlife observation are important functions of the Town Forests. The properties will be managed so as to maintain and enhance these recreational opportunities.
4. Maintain Tree Farm status

4 GEOLOGIC ATTRIBUTES

Topography and Aspect

The Eastman Forest ranges from 475' along the access of the old town road at Route 77 in the south to about 850' at hilltop locations in the north, including Rattlesnake Hill. The terrain is variable, with moderate slopes occupying the majority of the tract, steep slopes leading down to the old New Hampshire Central RR grade and on the flanks of Rattlesnake hill, and gentle terrain throughout much of the southern portion.

Aspect varies, although it is easterly to the west of the NHCRR grade and it is westerly to the east of the NHCRR grade.

Brooks, Ponds and Wetlands[3]

A total of 22.1 acres of wetland areas are found on this property. A significant open-water wetland system parallels the old NHCRR grade that bisects the northern half of the property. The system is being manipulated by beaver activity, with many types of natural communities as identified by Bill Nichols in the *Weare Town Lands Inventory* published in February 2008.

Elsewhere, Nichols identified an exemplary natural community, the black gum-red maple basin swamp found in the west-central part of the Easement. Although Nichols decries the land-use history in the area specific to the swamp, especially the timber harvesting that took place near and in it, as having a negative impact on this particular natural community, it is unlikely that the extensive regeneration of black gum would have occurred without it. There are very few examples of densely regenerating black gum regionally or state-wide.

There are also several small red maple-sphagnum basin swamps scattered throughout the property, primarily in the northern half of the property. This natural community is relatively common in New Hampshire, and on other Town of Weare properties.

The final example of a forested wetland natural community is the red maple-red oak-cinnamon fern forest, which is located in the northeast part of the easement in Stand 1a. This natural community typically occurs in transition zones between upland and wetland communities.

Recommended Actions to Improve and Manage the Wetland and Water Resource of the Eastman Forest[4]:

Riparian and Stream Ecosystems:

---

3 Natural Community descriptions from Weare Town Lands Inventory, Bill Nichols, The NH Natural Heritage Bureau, February 2008

4 Riparian and Stream Ecosystem management recommendations from the publication Biodiversity in the Forests of

- 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 published standards, as found in the most recent update of "Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire".

Springs and seeps:

- Avoid leaving slash in woodland seeps, springs, or associate wildlife trails.
- To the extent feasible, avoid interrupting 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.

Soils

The upland soils were derived from glacial till and are primarily moderately well drained stony silt loam soils. The major soil types present include Monadnock stony fine sandy loam, Tunbridge-Lyman-Monadnock complex stony, and Skerry stony fine sandy loam. Other minor soils include Colton loamy sand, Naumberg fine sandy loam, Ossipee peat, Borohemists ponded, and Lyman-Tunbridge-rock outcrop complex. The majority of the soils are well drained and generally productive, but have limitations due to rockiness and to a lesser degree slope, dominated by the Tunbridge-Lyman-Monadnock complex stony. See soils map in Appendix A.

Recommended Actions to Improve and Manage the Soil Resource of the Eastman Forest[5]:

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

---

Maine; Flatebro, Gro, Foss, Carol, and Pelletier, Steven, 1999, UMCE Bulletin #7147

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

- 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[6]

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 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

6 Most 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

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 Weare forestland has been identified on a broad level to the best of our ability, in conjunction with the information contained in *Weare Town Lands Inventory*.

The dominant natural community type found on the Eastman Forest is hemlock-beech-oak-pine forest. It is a common, broadly defined community occupying glacial till and terrace soils of low to mid elevations in central and southern New Hampshire. The forested wetland and open wetland natural communities found within the Eastman Forest are described elsewhere.

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 Bureau was contacted for a search of their data records involving rare species/exemplary natural communities within the entire Weare Town Forest(s) ownership. Only two records were found and both involve the Eastman Lot. The *Weare Town Lands Inventory* identifies a state-threatened species in the vicinity of the Eastman Forest, located on the John Stark Regional High School property: American cancer root. Because the plant was found in close proximity to the Eastman Forest, it is possible that an example could be located here. At present, there has been no documentation to suggest an actual finding; however that does not mean there are not any.

One exemplary natural community is located within the property: black gum-red maple basin swamp. It is described previously.

Integrating the significant habitat conditions found on Eastman 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.

“Ecological Reserve” Areas

As part of the management of the Eastman Forest, some areas may be designated as “Ecological Reserve”, meaning there will be no active management, allowing the area to progress and change naturally with limited human influence. “Ecological Reserve” areas offer unique

opportunity to learn about the natural succession and disturbance pattern on the forest. These areas can be incorporated into the recreational and educational components of the forest, as well as benefit the diversity of wildlife habitat. These areas can be designated on the forest management map. Acceptable uses of these areas include establishing non-motorized trails to and through them. Unacceptable uses include motorized traffic including logging equipment, infrastructure construction including benches and or shelters. These areas will not be actively managed, and will not be traveled through when actively managing adjacent forest stands.

6 WILDLIFE HABITAT CONDITIONS

Eastman Forest provides a variety of habitats for wildlife, but is dominated by dense forestland. There is a substantial amount of hardwood browse, especially in the most recently cut areas. Deer and moose evidence is abundant. Bear sign, most notably claw marks on beech trees, were abundant. Bear likely frequent the adjacent wetlands areas. Red oak, also fairly abundant on the property provides a source of hard mast (acorns) that is eaten by a variety of animals from birds to many mammals including both turkeys and deer. There is a small amount of open land provided by the recently abandoned agricultural field in the southern tip of the property. The wetland areas provide important habitat for amphibians such as the spotted salamander and red newts. Wetlands also provide an important source of food in early spring as they tend to be one of the first places to “green up”. Moose are also frequent visitors to these wetlands systems. The beaver meadows and flowage associated with the area paralleling the old NHCRR grade provides habitat for riverine associated animals, including mink and otters.

The forestland is fairly dense and uniform, offering little in terms of structural diversity. It is somewhat lacking in older, larger trees, which is mostly a consequence of prior timber harvesting practices, although the larger trees that were left behind are actually good candidates to become snags, den trees, and large down woody debris. Time is the only way to acquire large trees, and this should be considered during any applied silvicultural treatments. Releasing existing understory trees, especially mast producers, will improve the wildlife habitat. A total of 11 acres of old pasture is found in the southwest corner of the property. The pasture is quickly reverting back to forest and should be brush-hogged soon and mowed once every 3 years or more frequently. Early successional habitat is minimal here; creating more will be one goal of silviculture. Ideally, areas with a large amount of aspen, or with isolated large aspen will be cut fairly intensively to encourage sprouting. Aspen sprouts are a preferred browse source for many kinds of wildlife. In addition, keeping historic landing sites open providing a grassy, open habitat through regular

maintenance will help maintain a diversity of land types. Snags and down logs will be managed for throughout the property. As this woody debris decays, it houses numerous insects, invertebrates, small mammals, amphibians, birds and larger mammals As many as 40 different types of songbirds use standing dead trees with cavities as part of their habitat requirements. Down logs are a crucial part of amphibian habitat as they provide cool moist, shady conditions necessary for their survival.

Old white pine lower bole section being used as a den.

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, a variety of habitat types can be found on Eastman and on adjacent lands. Hemlock-Hardwood-Pine dominates the site. A summary of these habitat types and the wildlife species found there is in Appendix B in the Master Plan.

Recommended actions to improve and manage the wildlife habitat of Eastman Forest.[7]:

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 love 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 trial 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

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

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 form 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

Eastman Forest provides ample recreational and educational opportunities. An extensive skid trail network exists throughout the forest, one that could be improved for both non-motorized and motorized access. Other recreation opportunities include snowshoeing and cross country skiing during winter months, and hiking in the summer.

Recommended Actions to Improve and Manage the Recreational Resource of the Eastman 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 that trails are closed to motorized use**
  - Post a map of the trails and allowed uses.
- **Locate and maintain trails to prevent erosion**[8]
- **Locate trails** so they avoid sensitive areas or valuable wildlife habitat such as vernal pools and deer wintering areas.
- **Create additional foot traffic trails** for hiking and snowshoeing to more remote areas of the forest and to vista sites
- **Create vistas** overlooking views and significant or interesting natural features of the forest
- **Install benches** for resting along trails and at vistas
- **Consider designating low impact camping sites**

8 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

Education

Educational opportunities are limitless on Eastman Forest. The proximity of the site to the John Stark Regional High School could allow for "outdoor classroom" presentations to expose students to the myriad processes in the natural world, and related studies including cultural history, resource utilization, tree and plant identification, and wildlife habitat concepts and conditions. Forest management operations 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 Hillsboro 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 Eastman Forest:

- **Encourage local schools/clubs/etc**. to utilize this valuable resource.
- Prior to, during, or after any forest management activities, **promote and present workshops** inviting the public to come learn about management activities on Eastman Forest.
- Create and **post educational signage** about Eastman Forest and management philosophy and activities.
- Create **interpretive trails** with signs about management and natural features

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 July, 2008 consisting of 96 sample points. Data was collected as outlined in the Weare master plan.

Age and Age Class Distribution

As with most forests in New England, Eastman Forest is largely even-aged, with the bulk of the trees getting their start after the abandonment of agriculture here early 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. White birch, another fast growing tree, doesn't get as large as white pine and in addition, matures at an earlier age. 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, Eastman Forest is dominated by 65-75 year old white pine, hemlock and red oak in the overstory. 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 Eastman Forest falls within this range.

Tree Quality and Tree Health

Overall tree quality on the Eastman Forest is fair. White pine dominates the timber volume on the forest. The quality of the pine varies, previous harvests removed much of the "wolf pine" that are crooked, multi-stemmed, and branchy, but some still remain. Other pine is fairly decent quality, straight stemmed individuals but growing in overcrowded conditions that leads to decline. Given the age and average diameter of the pine, red rot (a common decay fungus in white pine, typically affecting the main stem) is likely widespread. Red oak, ranking just behind pine out of the three dominant tree species, is of fair to excellent quality. Red oak appears to do well on these sites and should be favored. Hemlock, far below but third to pine in volume, is of average quality. The remainder of the volume is a mix of hardwood species, with some maturing but fair quality white birch, somewhat older sugar maple of low to average quality, average quality red maple, low quality and declining beech, white ash of decent quality, and a mix of other hardwood species.

Commonly occurring tree diseases and damage were noted on the forest; including weevil damage and blister rust in pine, beech bark disease, sugar maple borer, decline in the white ash, and sterile conk of birch. These diseases and insect damage alone do not signal the need for treatment, but should one occur high priority should be given to improving stand quality and health by removing trees with signs of the above mentioned diseases and damage, especially where removal of the afflicted tree won't adversely impact specific wildlife management goals.

Forest Management Approach

Management on the Eastman Forest will utilize a combination of silvicultural techniques that typically are separated into two general categories, evenaged and unevenaged management. Evenaged management methods include clearcut, seed tree, shelterwood, 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 Weare 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 Eastman 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 Eastman 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 abundant in Eastman 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 one 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 seed’s 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. 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 are better suited for pine. On these sites precommercial weeding of the hardwoods is required for 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 with low cation exchange, provide excellent pine sites. Timing, silvicultural technique and soil type is critical to promote the continuity of the pine resource.

The soils on Eastman are generally suited for moderate to vigorous white pine growth. Pine will remain a part of the forest type, especially where silvicultural treatments favor it.

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 much wildlife, the acorn is heavily consumed; 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 photosynthesize optimally it requires 30% light intensity in the open. Under a closed forest canopy light intensities are less ten 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, to achieve 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 Eastman Forest is generally poor to nonexistent. The only interior

access at present is provided by the former Town road that runs north/south through the center of the parcel, leading directly to three former log landings in the south and central part of the property. Even here, the road would need work to be utilized as a truck road. The road continues north through the parcel for some distance, but doesn't lead to any more log landings. Its condition beyond the third log landing is less improved, and would be a marginal truck road without significant upgrades. It is said that there is a good access point into the property via the Pine Hill Road; however, this has not been verified at the time of this writing.

Access to the northern areas of the Eastman Forest is either undeveloped or nonexistent. The parcel does have frontage along Route 114 right at the Henniker/Weare town line, but no access has been developed here. There is a small wetland paralleling the highway along the parcel's entire frontage. Permitting through the Wetlands Bureau at NH Department of Environmental Services will likely be required in order to install a truck road access from this frontage along Route 114.

Access to the northeast part of the Eastman Forest is even less available. Previously, the NHCRR grade was used as a truck road to access small landings located in the parcel on both sides of the RR grade. However, beaver activity has rendered this option impractical, as much of the former rail bed is now flooded. There don't appear to be any other obvious avenues to provide truck road access to this northeast area. Thus, access may need to be provided by utilizing long, uphill skidding of forest products. These inaccessible areas will require working with abutting landowners and exploring the possibility of gaining temporary access.

Operability

The terrain and ground conditions on this tract in general do not limit operability, although care needs to be taken when treating areas near and along the numerous forested wetlands found in the Eastman Forest. The general rockiness of the soil in the northeastern portion creates obstacles that must be worked around, but again in general does not limit operability. The small wetland areas generally are not productive timber growing sites and should be avoided during operations. 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, thereby protecting wet ground from rutting and mitigating negative impacts.

Property Boundary

The Eastman Forest boundary is in very poor condition with virtually no line monumentation visible. In some stretches, it is doubtful that the line was ever blazed and painted. Interestingly, the corners appear to have been located and monumented via survey, but apparently no attempt was made to update the perimeter evidence. There are approximately 9 miles of maintainable boundary line. The entire boundary should be blazed and painted where needed as soon as possible. It is recommended that the boundary be monumented with Town of Weare signs, especially at corners, roads, and trails.

FOREST DATA

Stand 1 Mixed Hardwood 2-3A 155.5 acres


Stand Structure


Stand Structure


Forest Canopy

GENERAL ATTRIBUTES

Natural Community Type:	hemlock-beech-oak-pine forest red maple-sphagnum basin swamp red maple-red oak-cinnamon fern forest black gum-red maple basin swamp
Past Management History:	several stand entries (ca 1955, 1970, 1988), generally high graded or clearcut; large scale white pine removals ca 1970; earlier sawtimber harvests; scattered moderate removals ca 1988
Approximate Age of Dominant Trees:	50
Stand Health:	decent, especially large saplings and poletimber
Insects/Damage/Disease:	minor; beech bark disease, sugar maple borer, white pine blister rust

SITE CONDITIONS

Determined by:	soils map & field observation
Tree vigor:	moderate to high, especially poles/large saplings
Soils:	Monadnock stony fine sandy loam Tunbridge-Lyman-Monadnock complex, stony Skerry fine sandy loam
Drainage:	well-drained
Terrain:	flat to moderately steep, some rock outcrop
Aspect:	primarily south, some west/southwest
Elevation:	520-760’

Snags Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	11.7		5.3	16.9
12-18"		0.5		0.5
>18"	0.3	0.4		0.7

Grand Total	**12.0**	**0.9**	**5.3**	**18.1**

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"	14.1	12.6	10.6	37.3
12-18"	0.9	3.1		4.0
>18"		0.3		0.3
Grand Total	**15.0**	**16.0**	**10.6**	**41.6**

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

WILDLIFE HABITAT

Forest type:	forestland, forested wetland
Vertical diversity:	moderate – low/mid/canopy vegetation present
Vegetative diversity:	moderate – more than 15 tree/5 shrub species represented
Hard mast:	oak, beech
Soft mast:	maple, ash, cherry
Special habitat features:	bear markings on many beech
Snag trees:	mostly smaller diameter, very few large snags
Down logs:	den noted in old logging debris – hollow log
Special wildlife practices:	retain beech capable of producing moderate nut crops

RECREATION

Recreational features:	upland game hunting possible; scenic; hiking & winter activity possible; wildlife viewing
Recreational infrastructure:	minimal – some existing skid trails are used as part of an internal network for access; former Town road used by hikers, horses, ATVs
Aesthetic resources:	hardwood forest should present decent fall foliage viewing unique black gum regeneration in small wetland pockets
Public access:	primarily via the old Town road from North Weare Village area access to the northeast from the old NHCRR grade, impeded by flooding caused by beaver impoundments remote – parking opportunities not close by

SILVICULTURE

Structural and Silvicultural Attributes

Broad Forest Type:	H2-3A
Size Class:	Pole to small sawlog
Stand Structure:	Evenaged
Crown Closure:	85%
Total Basal Area Per Acre:	116

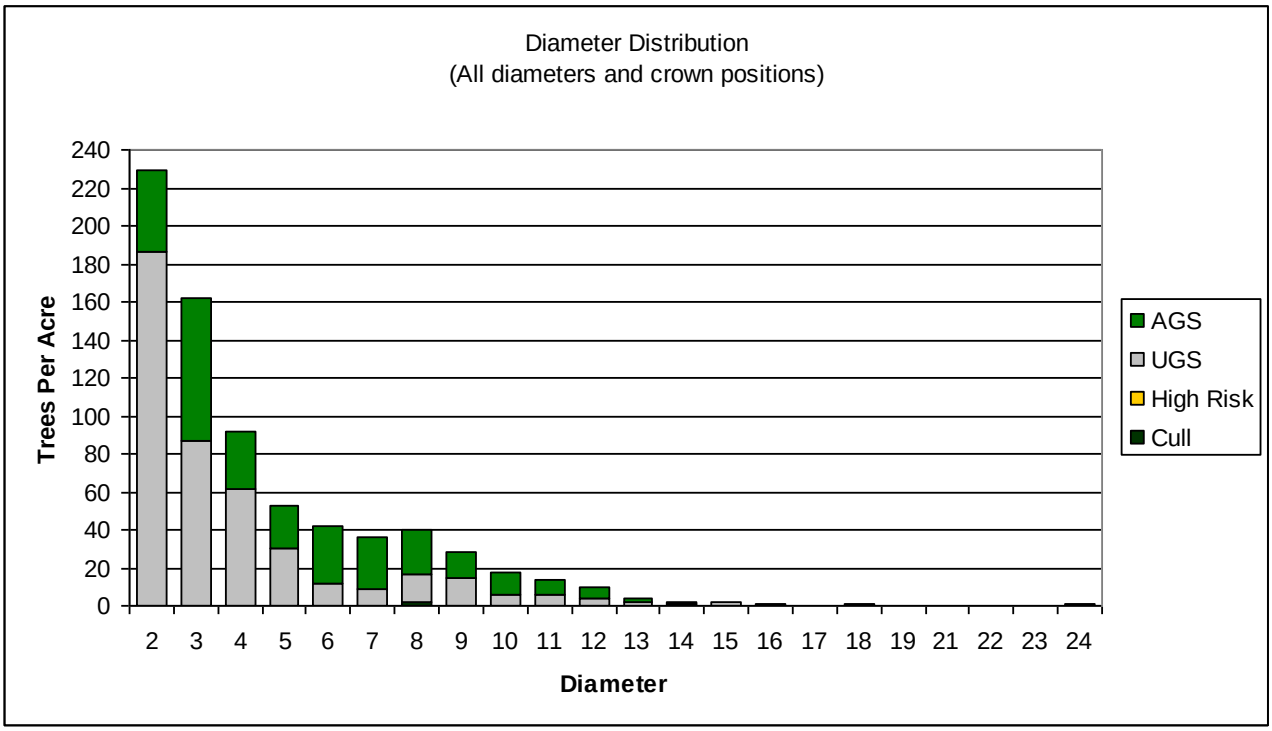
Total Merchantable Basal Area Per Acre:	95
Total Acceptable Basal Area Per Acre:	58
Trees Per Acre:	735
Quadratic Mean Stand Diameter:	5.4
Percent AGS Sawtimber:	46.9
Basal Area of AGS Sawlogs:	13
Timber Quality:	average; poletimber/large saplings better

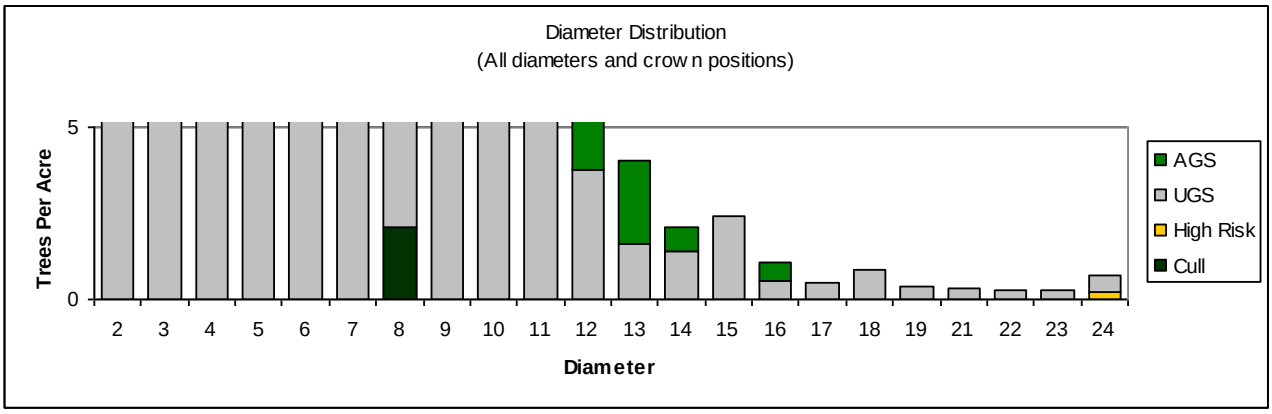
Forest Composition and Volume

Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Cords	High Risk	AGS Saw	% AGS Saw
American Beech	7.7%	0	67	0	1.8	0.0	1.9	0.0	33.3	50%
Aspen	6.1%	0	63	0	1.2	0.0	1.3	0.0	62.6	100%
Black Birch	3.2%	0	0	0	0.3	0.0	0.3	0.0	0.0	0%
Black Cherry	1.7%	0	0	0	0.2	0.0	0.2	0.0	0.0	0%
Hop Hornbeam	0.3%	0	0	31	0.0	0.0	0.1	0.0	0.0	0%
Red Maple	19.4%	0	65	31	1.7	0.0	2.0	0.0	96.1	100%
Red Oak	23.2%	0	290	323	2.5	0.5	4.1	0.0	450.2	73%
Sugar Maple	3.0%	0	27	0	0.3	0.0	0.3	0.0	27.5	100%
White Ash	4.6%	0	0	0	0.3	0.0	0.3	0.0	0.0	0%
White Birch	8.3%	0	0	0	0.9	0.0	0.9	0.0	0.0	0%
Total Hardwood Per Acre:	***77.6%***	***0***	***511***	***385***	***9.0***	***0.5***	***11.4***	***0.0***	***669.6***	75%
Hemlock	5.2%	0	0	0	0.3	0.0	0.4	0.0	0.0	0%
White Pine	17.1%	0	485	45	1.4	0.0	2.3	129.9	0.0	0%
Total Softwood Per Acre:	***22.4%***	***0***	***485***	***45***	***1.7***	***0.0***	***2.7***	***129.9***	***0.0***	0%
Total Volume Per Acre:	**100.0%**	**0**	**997**	**430**	**11**	**1**	**14**	**130**	**670**	47%
Total Volume:		**0**	**155,006**	**66,938**	**1,661**	**81**	**2,189**	**20,199**	**104,129**	

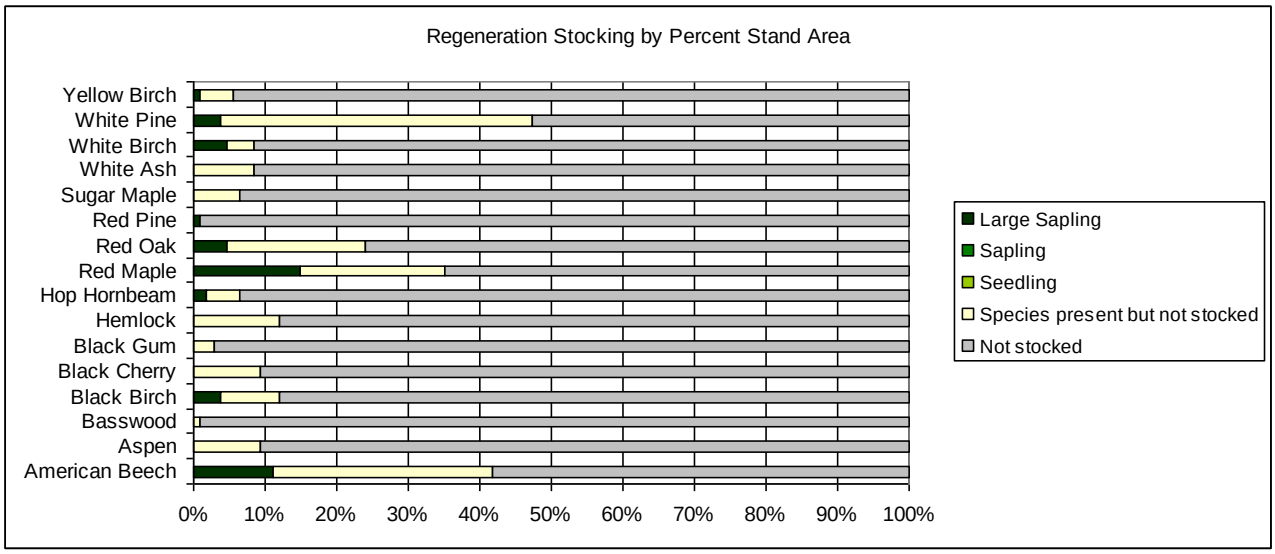
Table 1.3: Stand volume by species and product per acre values.

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.

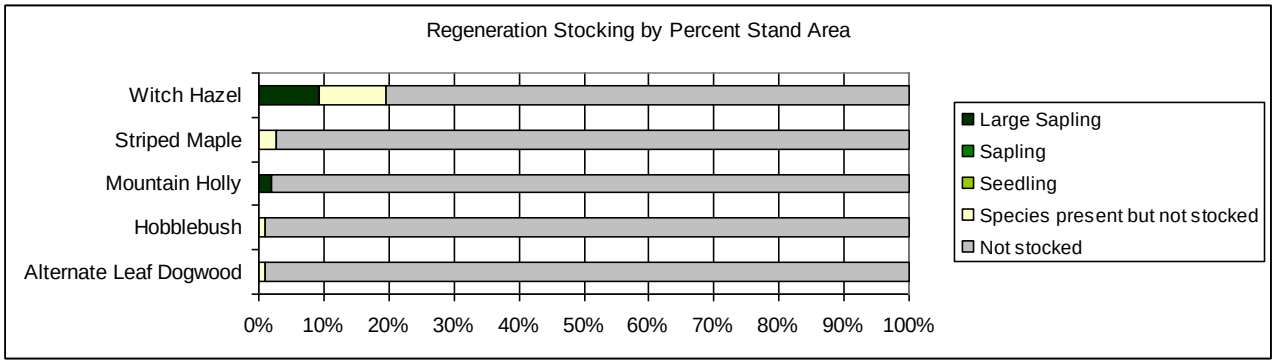




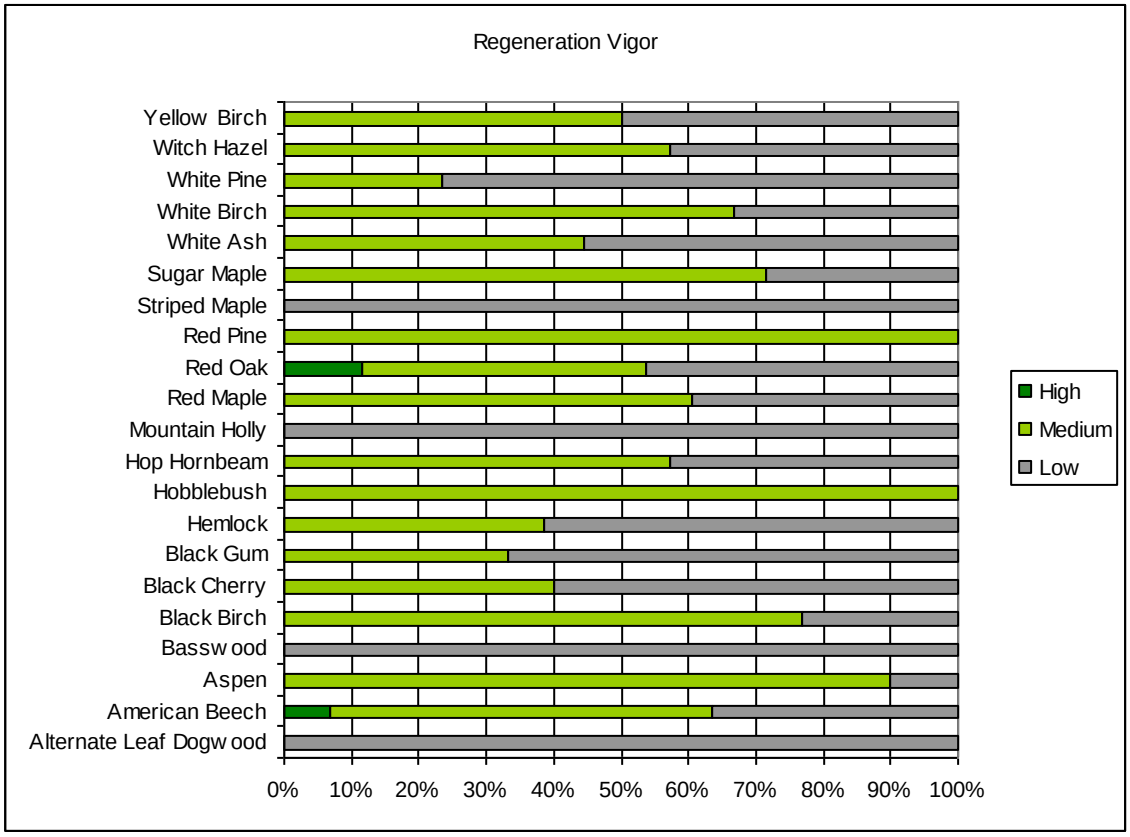
Graph 1.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less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



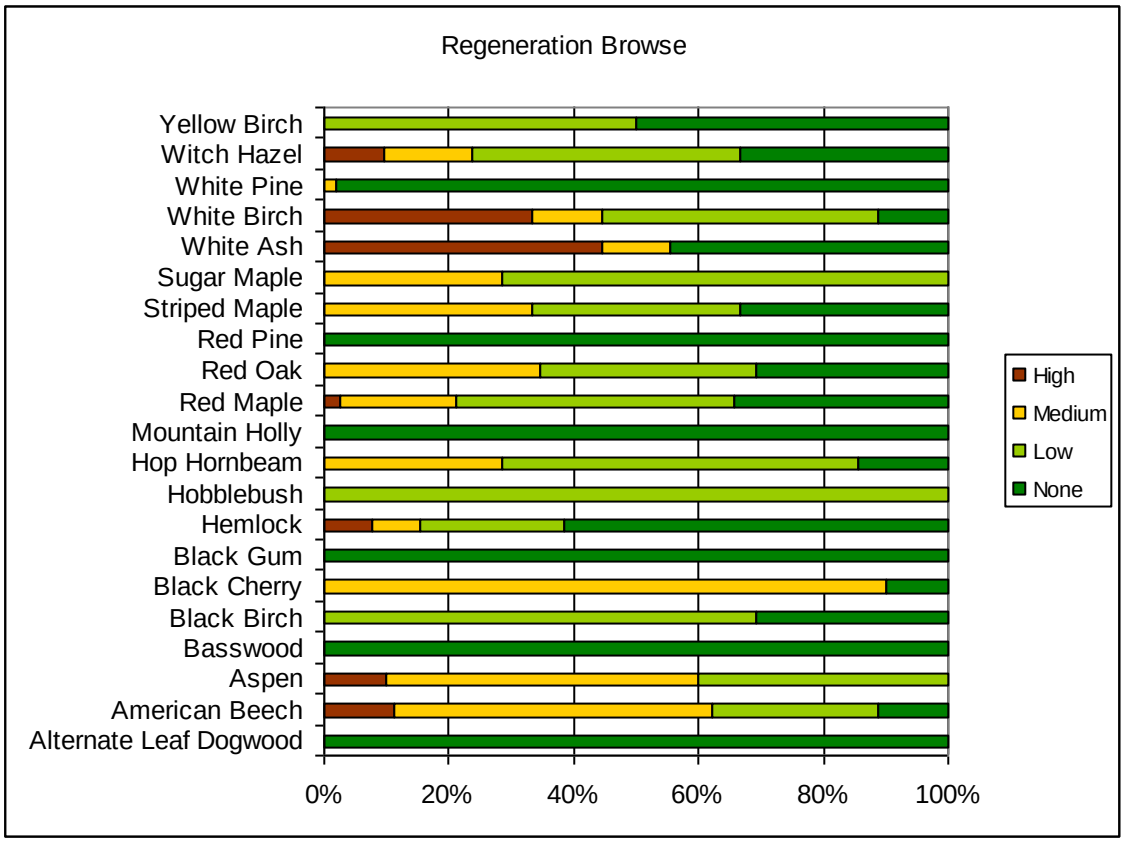
Graph 1.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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:	individual stem release for high quality trees, trending towards uneven aged; allow some group selection where quality of existing stems is poor
Harvest Entry:	TSI appropriate on many acres 2008; otherwise, next entry should be beyond 2018. longer cutting cycle where black gum poles/saplings exist
Products:	sawtimber, pulpwood, cordwood
Desired Composition:	favor RO/BB/WP, retain some larger trees for structural elements, retain beech capable of nut production
Crop tree target diameter:	WP - 20” RO – 22”

RM – 16”

Operational Considerations

Operability:	virtually entire type is operable; avoid forested wetlands during spring/summer/fall
Seasonal limitations:	best in winter; could happen in summer/fall
Terrain:	some steep areas, but generally not limiting keep equipment out of forested wetland inclusions
Access and landing area:	ok for the three south/central stands – two landings available, one landing is located within Stand 1c; poor for the northeast stand between the NHCRR grade and Rattlesnake Hill, historic landing to access stand 1a no longer usable – beaver flowage has flooded RR grade, which was used as a truck road
Access distance:	less than 1/4 mile for Stands 1b, 1c, and 1d greater than 3/4 mile for Stand 1a
General maintenance:	former Town road would need some updating/widening
Brook-wetland crossings/buffer requirements:	crossing needed to access Stand 1d; buffer potentially needed along northwestern edge of Stand 1b (for black gum-red maple basin swamp); several crossings needed to access Stand 1a and internally for Stands 1a and 1b

STAND SUMMARY AND 10-YEAR MANAGEMENT SCHEDULE

Type 1 includes 4 non-contiguous stands (1a-1d) of mixed hardwood and white pine and is one of the largest types on the property. Hardwoods comprise over 75% of the trees, dominated by red oak and red maple, while white pine comprises about 17% of the trees in the Type. The canopy is relatively closed in most parts of the Type, averaging 85% closure, although Stands 1b and 1c are more open following harvesting in the late 1980’s. Current stand structure and characteristics indicate the Type lends itself to uneven- or multi-aged management strategies (see Graphs 1.1a and 1.1b).

Regeneration is spotty, with higher densities and more species in the more recently harvested areas. Red maple, beech and white pine are the most common seedlings/saplings, with each appearing in roughly 40% of the Type acreage, although most areas are “not stocked”. This shouldn’t be an issue at present, as there are many desirable intermediate stems found in the four stands. The distribution of other herbaceous vegetation mimics the distribution of regeneration, with higher densities and greater diversity present in the more recently treated areas.

Intermediate stems (poletimber and small sawtimber) have the best quality and highest potential in this Type. Favored species include red oak, black birch, white pine and red maple. Many areas would benefit from intermediate stand treatments, including TSI where practical, and should release the favored intermediate stems from direct competition with either overhead stems or other, less vigorous intermediate stems.

The long-term goal of management in this stand is to develop multiple age classes of quality sawtimber trees of species well suited to the site. The 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. The current species composition reflects the natural species mix and likely will not significantly change over time with the exception of an increase in the tolerant softwood (hemlock) component.

Silviculture: The focus of management here will be to work with the existing intermediate stems in such a manner as to promote the production of high-quality red oak, black birch, white pine and red maple sawtimber; retain a modest component of hard-mast producing larger overstory trees; and to maintain desired site-suited species regeneration by utilizing different silvicultural methods. These goals will be accomplished either through TSI (if practical) or by removing about 1/3 of the overstory in groups, focusing on removing those individuals of poor quality and retaining the individuals that are of high quality and vigor.

2012: Apply TSI to those areas where practical. Approximately 40 acres. Favor red oak, black birch, white pine, red maple. Some microsites will allow favoring sugar maple and white ash.

2024: Absent TSI, treat most areas of the Type upon 95% closure of the canopy. Reduce overall basal area to approximately 85-105 square feet through:

- **Group Selection:** Create openings of 5-10 trees to establish intermediate shade tolerant and intolerant regeneration. If harvest is to be done in the summer, scarifying areas with no regeneration or areas of undesirable seedlings/saplings will help promote the regeneration of light seeded individuals such as birch, hemlock, and pine.
- **Crop Tree Release:** In between groups release crop trees of high quality and vigor. Release selected crop trees on at least 2 but preferably 3 sides. This will also promote regeneration of tolerant hardwoods and hemlock.

*****This type would benefit from TSI treatment if beneficial market conditions arise. However, if unable to implement TSI, treatment should be delayed for 15 years.

Wildlife: Wildlife habitat here will become more diverse as a multiple age structure is developed. There is abundant evidence of black bear activity, primarily through markings found on larger beech trees. White-tailed deer and moose browse the limited areas with hardwood and hemlock saplings. Any treatments that promote hardwood regeneration will likely benefit deer, moose and rabbits by providing better browse opportunities. Multiple age classes help to ensure there is always a level of browse for wildlife. Specific wildlife habitat improvements will include retaining hard mast producing hardwoods; retaining beech trees with evidence of heavy bear use; creating hardwood browse especially in areas with low-valued or poor vigor trees; creating standing snag trees by girdling some large white pine with no commercial value; creating down woody debris by felling and leaving some large white pine on the forest floor.

- Create additional large snag trees by girdling up to 5 trees >18” in diameter per acre.
- Create additional down logs by felling up to 5 trees > 18” in diameter per acre.
- Maintain existing snags and large down logs.

Stand 2 White Pine 3A 63.5 acres


Stand Structure


Stand Structure


Forest Canopy

GENERAL ATTRIBUTES

Natural Community Type:	hemlock-beech-oak-pine forest vernal woodland pool red maple-sphagnum basin swamp
Past Management History:	heavily cut ca 1965; large group selection ca 1988
Approximate Age of Dominant Trees:	70
Stand Health:	average
Insects/Damage/Disease:	minimal, some logging damage to lower boles along skid trails

SITE CONDITIONS

Determined by:	soils map & field observation
Tree vigor:	low for older WP, moderate to high for intermediate stems and advanced regeneration
Soils:	Tunbridge-Lyman-Monadnock complex, stony Monadnock stony fine sandy loam Colton loamy sand
Drainage:	poorly drained to well drained
Terrain:	rolling, some steep areas
Aspect:	north and west
Elevation:	580-800’

Snags Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"		10.1		10.1
12-18"	1.5			1.5
>18"				
Grand Total	**1.5**	**10.1**		**11.6**

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

Down Logs Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	64.3	12.1		76.3
12-18"				
>18"				
Grand Total	**64.3**	**12.1**		**76.3**

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

WILDLIFE HABITAT

Forest type:	forestland
Vertical diversity:	low
Vegetative diversity:	low
Hard mast:	oak
Soft mast:	cherry
Special habitat features:	none
Snag trees:	not many large diameter stems
Down logs:	small diameter
Special wildlife practices:	none

RECREATION

Recreational features:	wildlife viewing; bird watching; possible hunting
Recreational infrastructure:	limited to skid trails
Aesthetic resources:	fieldstone surface quarry located in northwest stand (2c), on west side of hill
Public access:	good for stand in south part of easement (2e), remote for other four stands – via skid trails

SILVICULTURE

Structural and Silvicultural Attributes

Broad Forest Type:	S3A
Size Class:	Small Sawlog
Stand Structure:	Evenaged
Crown Closure:	85%
Total Basal Area Per Acre:	127
Total Merchantable Basal Area Per Acre:	118
Total Acceptable Basal Area Per Acre:	39
Trees Per Acre:	454
Quadratic Mean Stand Diameter:	7.2
Percent AGS Sawtimber:	35.8

Basal Area of AGS Sawlogs: 16

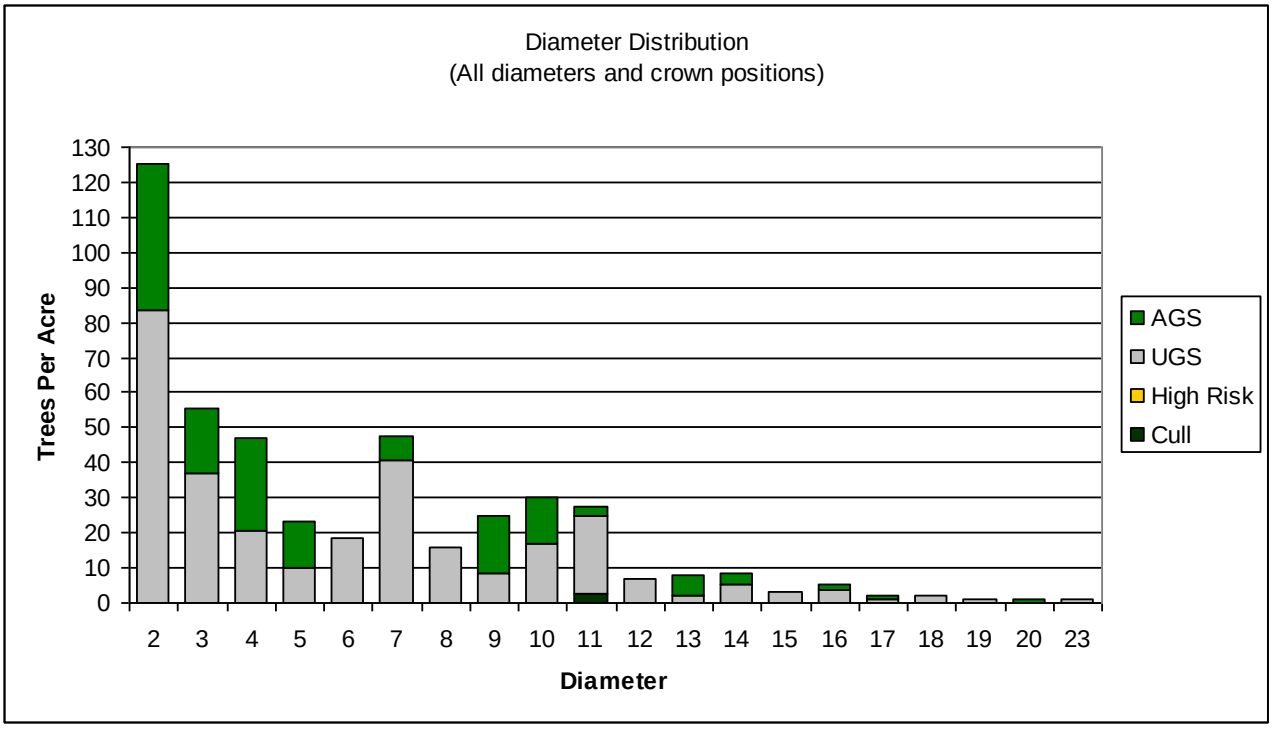
Timber Quality: low

Forest Composition and volume

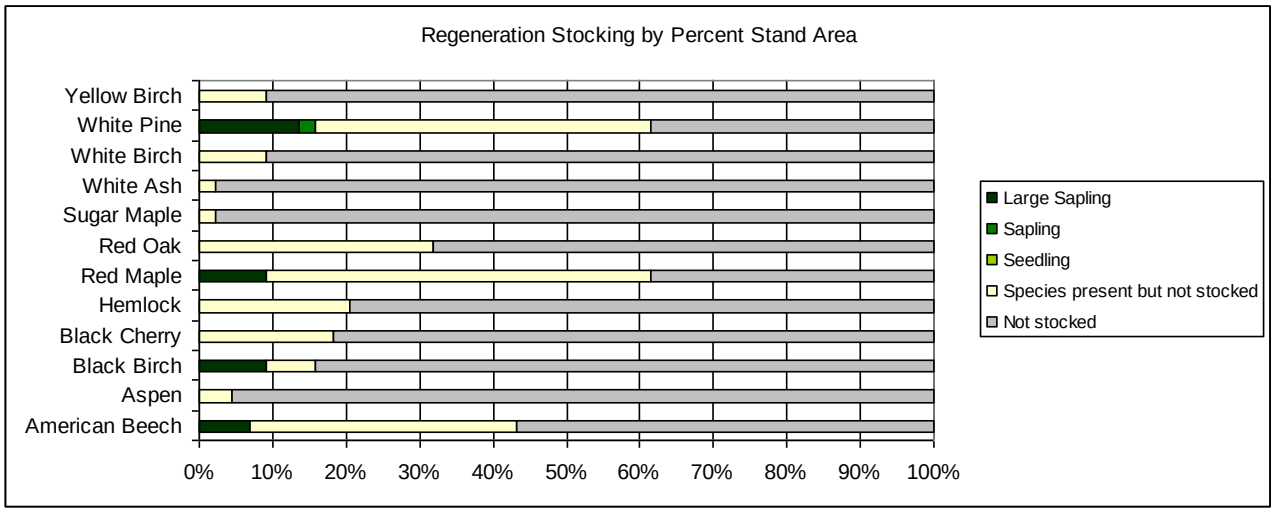
Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Cords	High Risk	AGS Saw	% AGS Saw
American Beech	3.4%	0	0	0	0.1	0.0	0.1	0.0	0.0	0%
Black Birch	5.0%	0	0	0	0.5	0.0	0.5	0.0	0.0	0%
Red Maple	27.3%	0	0	0	3.2	0.0	3.2	0.0	0.0	0%
Red Oak	14.0%	0	247	301	1.8	0.3	3.2	0.0	360.9	66%
Sugar Maple	2.0%	0	0	0	0.2	0.0	0.2	0.0	0.0	0%
White Ash	2.0%	0	0	0	0.4	0.0	0.4	0.0	0.0	0%
White Birch	5.7%	0	77	0	0.8	0.0	1.0	0.0	0.0	0%
Total Hardwood Per Acre:	***59.4%***	***0***	***324***	***301***	***7.2***	***0.3***	***8.7***	***0.0***	***360.9***	66%
Hemlock	2.4%	0	637	0	0.2	0.0	1.3	0.0	514.3	81%
White Pine	38.2%	0	2,896	461	5.2	0.0	11.4	0.0	778.4	23%
Total Softwood Per Acre:	***40.6%***	***0***	***3,534***	***461***	***5.3***	***0.0***	***12.7***	***0.0***	***1,292.7***	32%
Total Volume Per Acre:	**100.0%**	**0**	**3,857**	**762**	**13**	**0**	**21**	**0**	**1,654**	36%
Stand Volume:		**0**	**244,940**	**48,364**	**796**	**21**	**1,362**	**0**	**105,001**	

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

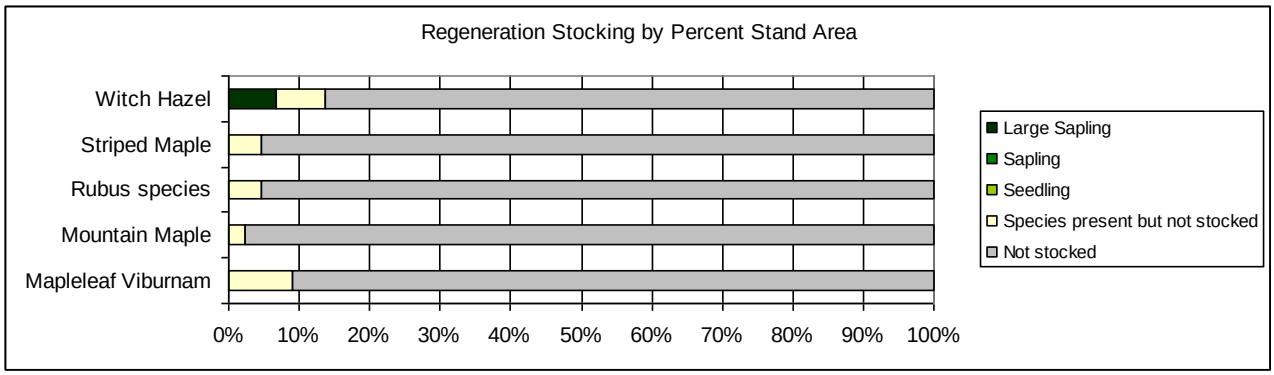
Graph 2.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



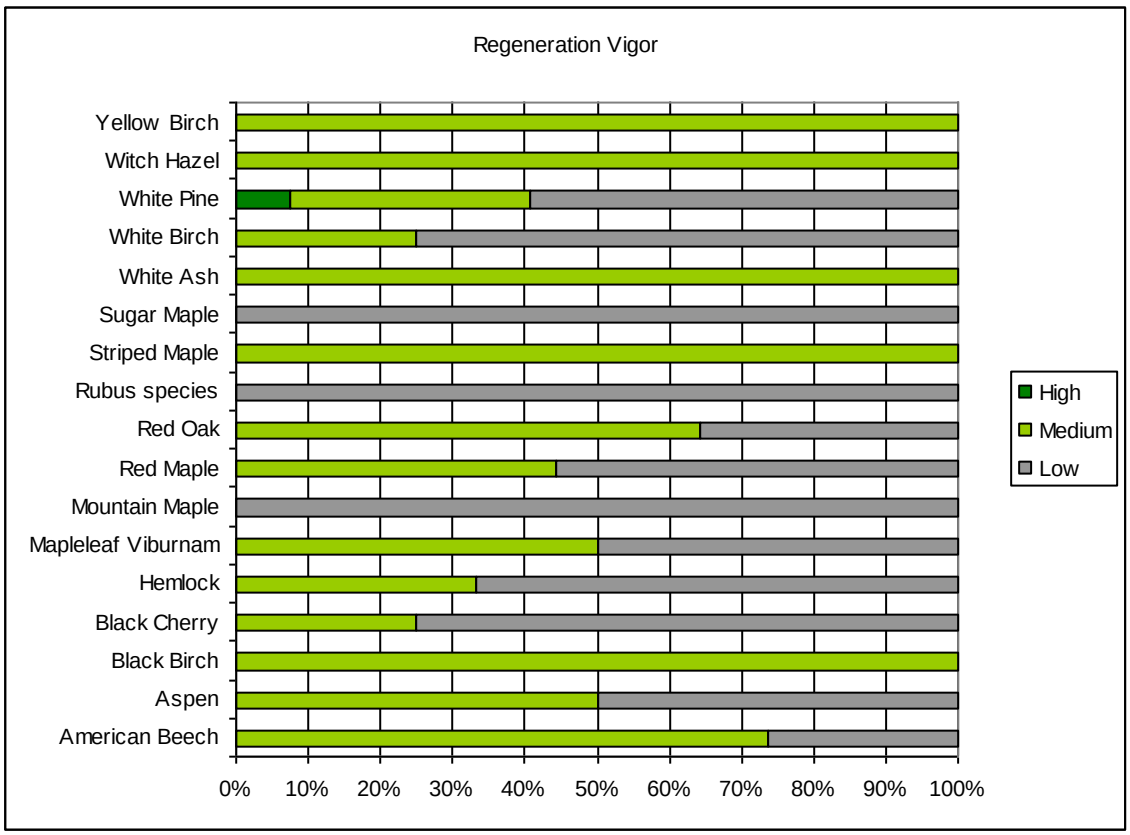
Graph 2.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less 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.



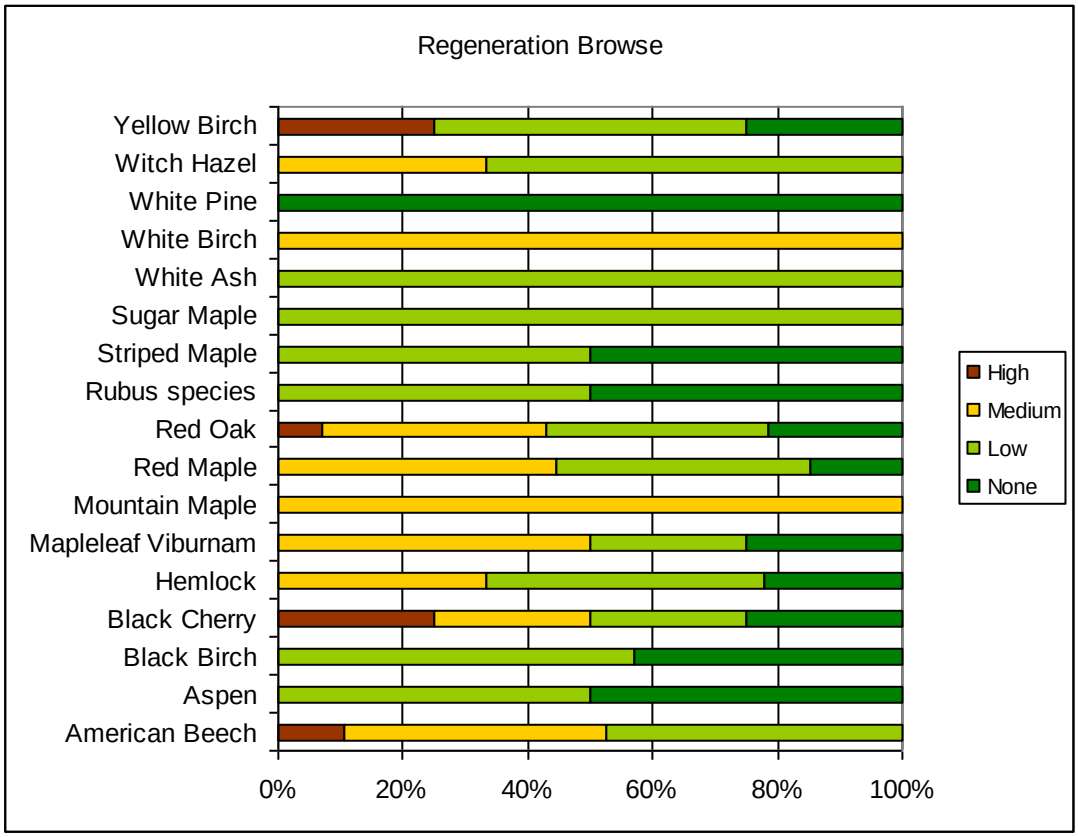
2.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 2.4: Vigor of all regeneration and shrub species.



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



Silvicultural Objectives

Management system:	multiple age; small groups and single tree release
Harvest Entry:	within 5 years
Products:	sawtimber, pulpwood, cordwood
Desired Composition:	multi-aged, mixed stand
Crop tree target diameter:	WP – 20 RO – 20

Operational Considerations

Operability:	highly operable
Seasonal limitations:	few
Terrain:	some ledge outcrops; not steep
Access and landing area:	remote, except for Stand 2e
Access distance:	greater than 1/4 mile for all stands except 2e
General maintenance:	skid trails need work for water management
Brook-wetland crossings/buffer requirements:	crossings required to access stands 2a and 2b, probably needed to access 2c and 2d buffer recommended by NHNHB in "Weare Town Lands Inventory" by Nichols, 2008, for area adjacent to black gum-red maple basin swamp, near stand 2d

STAND SUMMARY
AND
10-YEAR MANAGEMENT SCHEDULE

Type 2 includes 5 non-contiguous stands (2a-2e) of white pine small sawtimber covering about 65 acres. Hardwoods comprise almost 60% of the trees, dominated by red oak and red maple, while white pine alone comprises nearly 40% of the trees in the Type. The canopy is relatively closed in most parts of the Type, averaging 85% closure. Current stand structure and characteristics indicate the Type could be classified as evenaged (Graph 2.1).

Regeneration is spotty, with higher densities and more species in the more recently harvested areas. Red maple and white pine are the most common seedlings/saplings, with each appearing in roughly 60% of the Type acreage, although most areas are "not stocked". Red oak and beech both appear in 40% of the Type acreage, and are also primarily not stocked. There are some nice areas with dense groups of white pine regeneration, illustrating a method needed to successfully regenerate white pine.

Intermediate stems (poletimber and small sawtimber) have the best quality and highest potential in this Type. Favored species include red oak, black birch, white pine and red maple. Many areas would benefit from removal of the relatively poor quality overstory white pine, which would release the favored intermediate stems from competition with either overhead stems or other, less vigorous intermediate stems.

Most of the larger white pine sawtimber is poor quality, exhibiting multi-stems and large lower branches. Very few of the large white pine in this type are good quality, and are taking up canopy space and nutrients that could otherwise benefit better quality trees.

The long-term goal of management in this stand is to develop multiple age classes of quality sawtimber trees of species well suited to the site. The 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. The current species composition reflects the natural species mix and likely will not significantly change over time with the exception of an increase in the tolerant softwood (hemlock) component.

Silviculture: The focus of management here will be to work with the existing intermediate stems in such a manner as to promote the production of high-quality red oak, black birch, white pine and red maple sawtimber; retain a modest component of hard-mast producing larger overstory trees; and to maintain desired site-suited species regeneration by utilizing different silvicultural methods. These goals will be accomplished by removing about 1/2 of the overstory in groups, focusing on removing those individuals of poor quality and retaining the individuals that are of high quality and vigor.

2013: Remove poor quality white pine sawtimber, and other low quality stems as pulp and sawtimber. Favor red oak, black birch, white pine, red maple. Reduce overall basal area to approximately 60-100 square feet through:

- **Group Selection:** Create openings of 5-10 trees to establish intermediate shade tolerant and intolerant regeneration. If harvest is to be done in the summer, scarifying areas with no regeneration or areas of undesirable seedlings/saplings will help promote the regeneration of light seeded individuals such as birch, hemlock, and pine.
- **Crop Tree Release:** In between groups release crop trees of high quality and vigor. Release selected crop trees on at least 2 but preferably 3 sides. This will also promote regeneration of tolerant hardwoods and hemlock.

Wildlife: Wildlife habitat here will become more diverse as a multiple age structure is developed. White-tailed deer and moose browse the limited areas with hardwood and hemlock saplings. Any treatments that promote hardwood regeneration will likely benefit deer, moose and rabbits by providing better browse opportunities. Multiple age classes help to ensure there is always a level of browse for wildlife. Specific wildlife habitat improvements will include retaining hard mast producing hardwoods; retaining beech trees with evidence of heavy bear use; creating hardwood browse especially in areas with low-valued or poor vigor trees; creating standing snag trees by girdling some large white pine with no commercial value; creating down woody debris by felling and leaving some large white pine on the forest floor.

- Create additional large snag trees by girdling up to 5 trees >18” in diameter per acre.
- Create additional down logs by felling up to 5 trees > 18” in diameter per acre.
- Maintain existing snags and large down logs.

Stand 3 Hemlock/White Pine/Hardwood 4B 160.2 acres


Stand Structure


Stand Structure


Forest Canopy

GENERAL ATTRIBUTES

Natural Community Type:	hemlock-beech-oak-pine forest
Past Management History:	heavily cut ca 1965, group selection ca 1995; excessive soil rutting from 1995
Approximate Age of Dominant Trees:	70-80
Stand Health:	vigorous
Insects/Damage/Disease:	logging damage to lower boles

SITE CONDITIONS

Determined by:	soils map & field observation
Tree vigor:	good
Soils:	Tunbridge-Lyman-Monadnock complex, stony Monadnock stony fine sandy loam Skerry stony fine sandy loam Naumberg fine sandy loam
Drainage:	well-drained to somewhat poorly drained (low areas)
Terrain:	rolling, not steep, some areas flat
Aspect:	south
Elevation:	540-800’

Snags Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	1.4	2.9	5.1	9.4
12-18"		0.8	0.7	1.6
>18"				
Grand Total	**1.4**	**3.7**	**5.8**	**10.9**

Table 3.1: Standing dead trees per acre by size and decay class.

Down Logs Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	26.6	32.9	1.7	61.2
12-18"	2.7	2.4		5.2
>18"				
Grand Total	**29.4**	**35.3**	**1.7**	**66.4**

Table 3.2: Standing down logs per acre by size and decay class.

WILDLIFE HABITAT

Forest type:	forestland
Vertical diversity:	moderate
Vegetative diversity:	moderate
Hard mast:	red oak, beech, white oak
Soft mast:	cherry
Special habitat features:	bear marks on beech; beaver activity within/near some stands; porcupine evidence; hemlock component could provide winter cover for deer and other wildlife
Snag trees:	minor, lacking large diameter snags
Down logs:	numerous, but lacking large diameter logs
Special wildlife practices:	retain bear beech and other mast producing trees; retain sufficient hemlock/softwood to provide winter cover

RECREATION

Recreational features:	wildlife viewing; bird watching, possible views from Rattlesnake Hill
Recreational infrastructure:	minimal; limited to old skid trails
Aesthetic resources:	unique foundation and stone walls (3g) described earlier
Public access:	ok for stands 3g-3i; limited/inadequate for stands 3a-3f

SILVICULTURE

Structural and Silvicultural Attributes

Broad Forest Type:	SH4B
Size Class:	Large Sawlog
Stand Structure:	Evenaged
Crown Closure:	75%
Total Basal Area Per Acre:	143
Total Merchantable Basal Area Per Acre:	128
Total Acceptable Basal Area Per Acre:	49
Trees Per Acre:	579
Quadratic Mean Stand Diameter:	6.9
Percent AGS Sawtimber:	46.7
Basal Area of AGS Sawlogs:	25
Timber Quality:	poor w. pine overstory; better quality mixed understory – esp. red oak

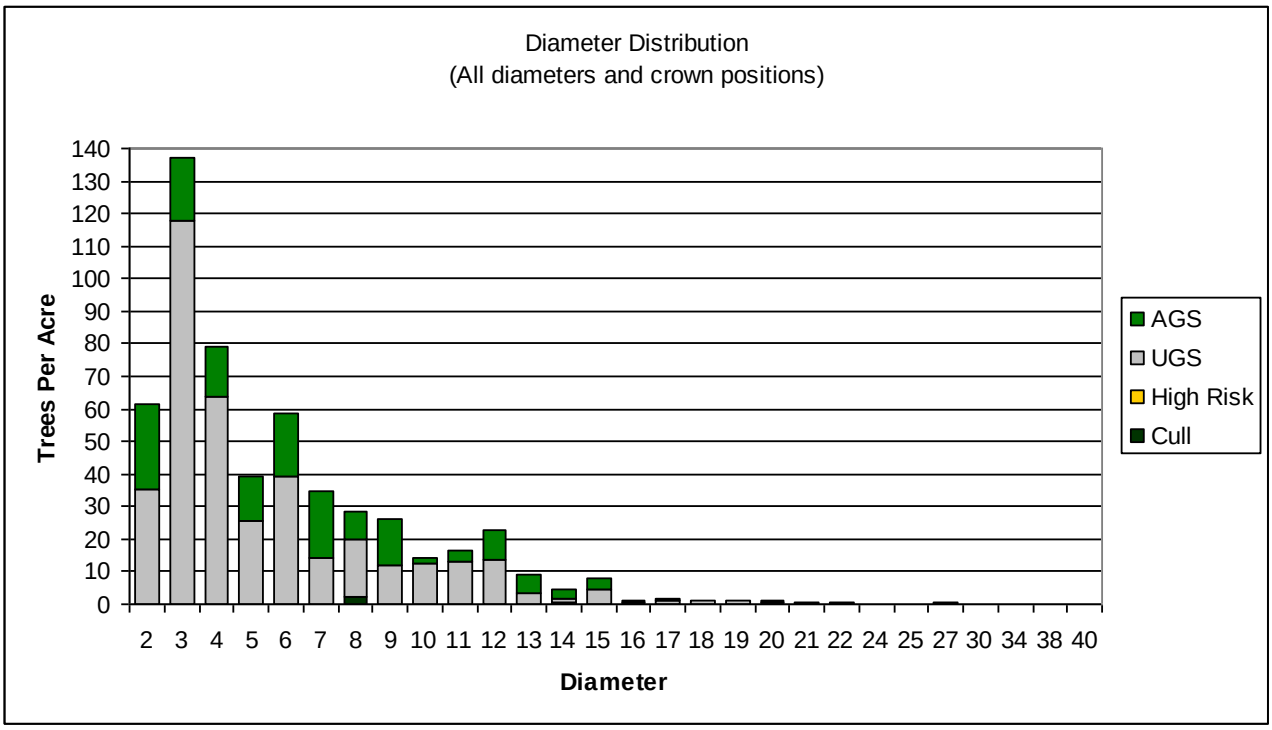
Forest Composition and volume

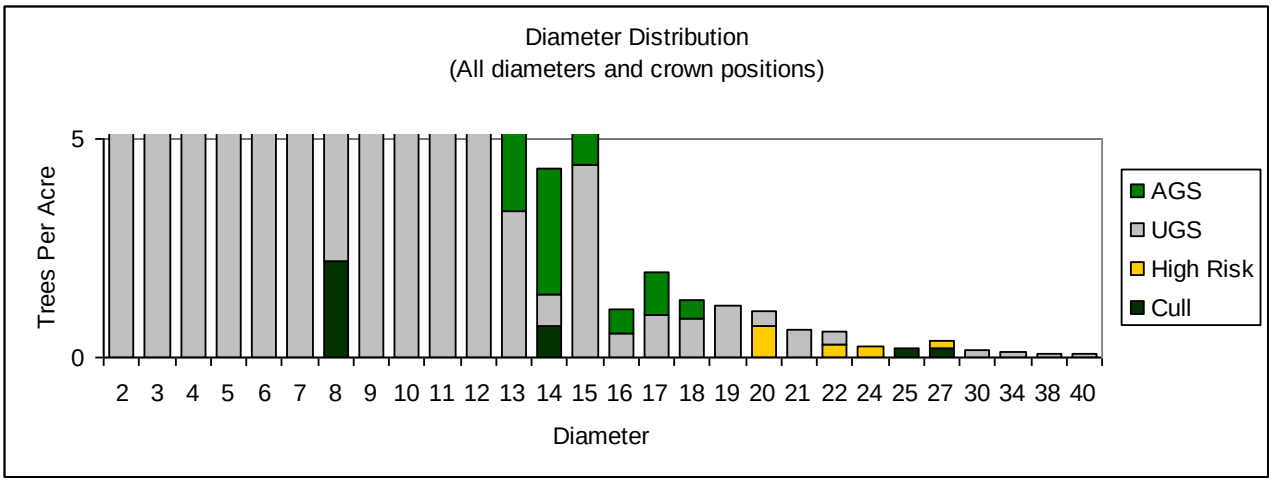
Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Cords	High Risk	AGS Saw	% AGS Saw
American Beech	1.1%	0	0	0	0.4	0.0	0.4	0.0	0.0	0%
American Elm	0.8%	0	0	0	0.2	0.0	0.2	0.0	0.0	0%
Aspen	2.3%	0	36	0	0.6	0.0	0.7	0.0	0.0	0%
Black Birch	2.0%	0	52	0	0.3	0.0	0.4	0.0	52.0	100%
Black Cherry	1.2%	0	0	0	0.1	0.0	0.1	0.0	0.0	9%
Red Maple	22.1%	0	229	21	2.6	0.0	3.1	0.0	128.4	51%
Red Oak	21.8%	0	720	294	2.2	0.2	4.6	70.7	784.0	77%
Sugar Maple	3.7%	0	180	208	0.8	0.0	1.6	0.0	259.1	67%
White Ash	3.5%	0	0	0	0.5	0.0	0.5	0.0	0.0	0%
White Birch	2.9%	0	0	0	0.1	0.0	0.1	0.0	0.0	0%
White Oak	1.0%	0	0	74	0.1	0.0	0.2	0.0	0.0	0%
Yellow Birch	0.3%	0	64	0	0.1	0.0	0.2	0.0	63.7	100%
Total Hardwood Per Acre:	***62.5%***	***0***	***1,281***	***596***	***8.0***	***0.2***	***12.1***	***70.7***	***1,287.2***	69%
Hemlock	28.2%	0	582	0	4.1	0.0	5.4	0.0	490.2	84%
Red Spruce	0.4%	0	72	0	0.0	0.0	0.2	0.0	71.8	100%
White Pine	8.8%	0	1,655	94	1.2	0.0	4.3	577.3	150.1	9%
Total Softwood Per Acre:	***37.5%***	***0***	***2,309***	***94***	***5.3***	***0.0***	***9.9***	***577.3***	***712.1***	30%
Total Volume Per Acre:	**100.0%**	**0**	**3,589**	**690**	**13**	**0**	**22**	**648**	**1,999**	47%

Stand Volume:		0	575,014	110,569	2,133	39	3,510	103,809	320,297	

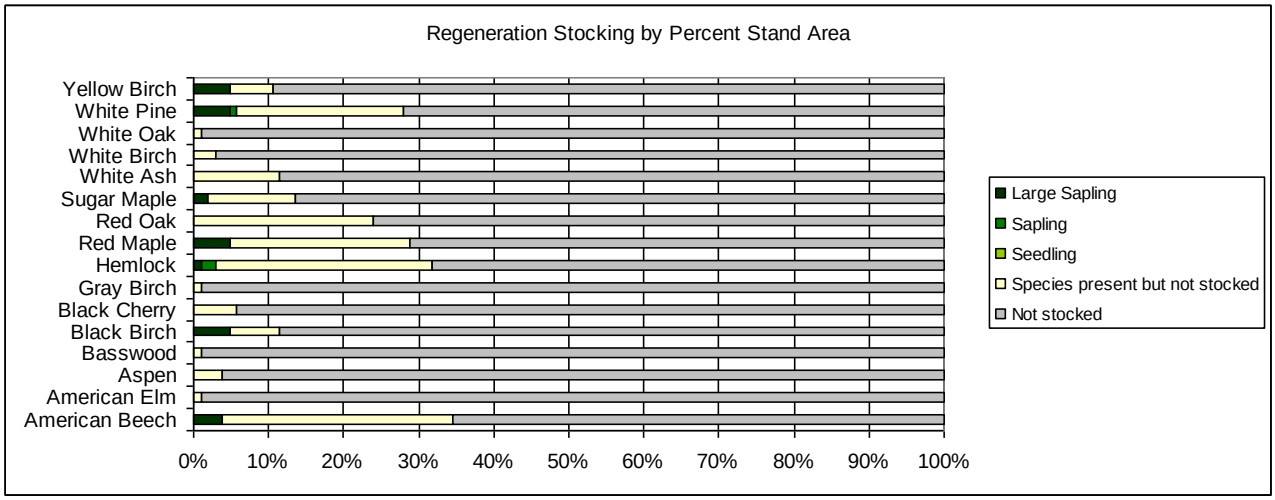
Table 3.3: Stand volume by species and product per acre values.

Graph 3.1a and 3.1b: 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. 3.1b provides a close-up of the breakdown in the larger diameter classes.

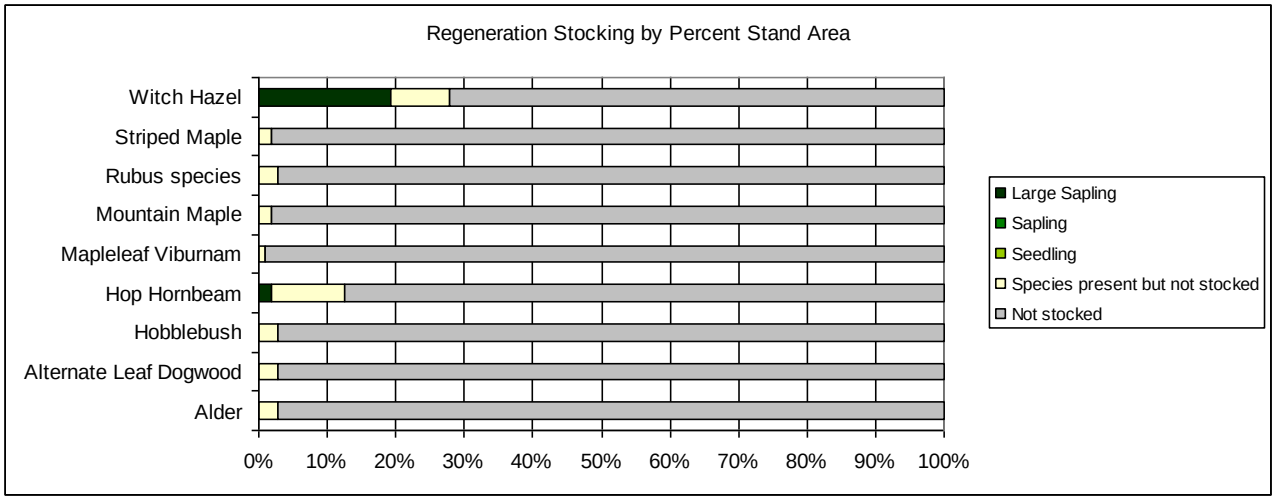




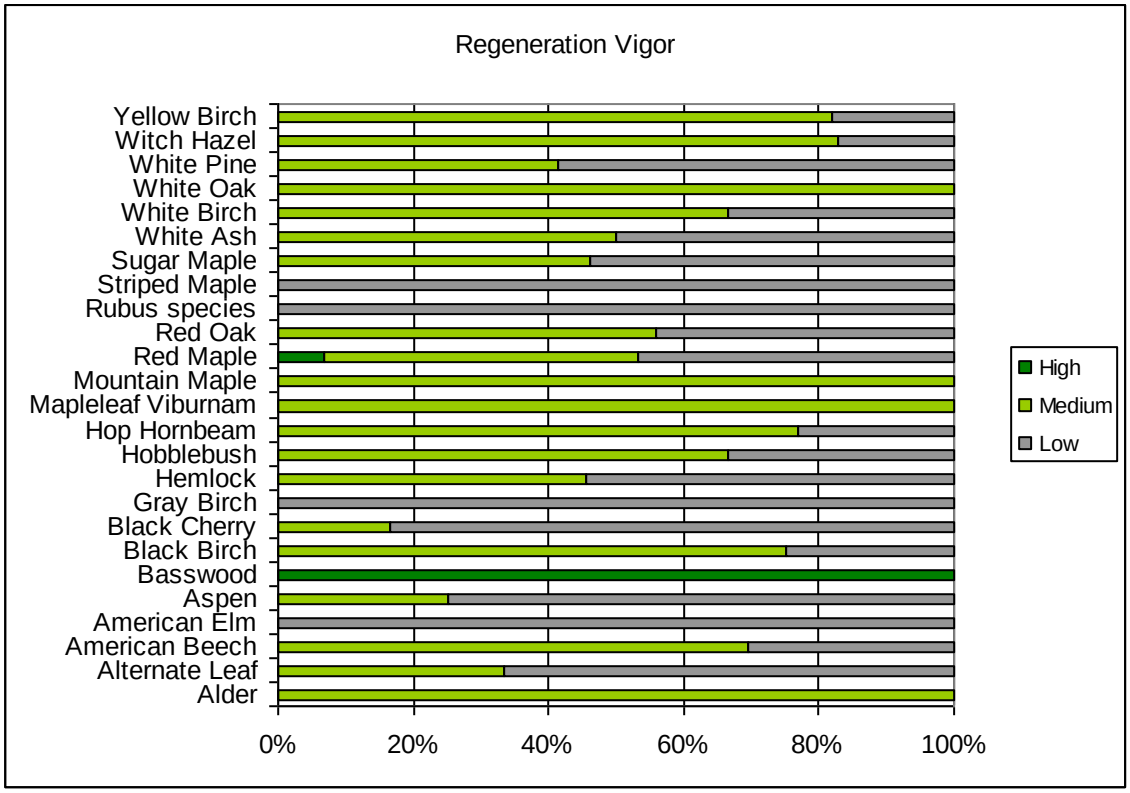
Graph 3.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less 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.



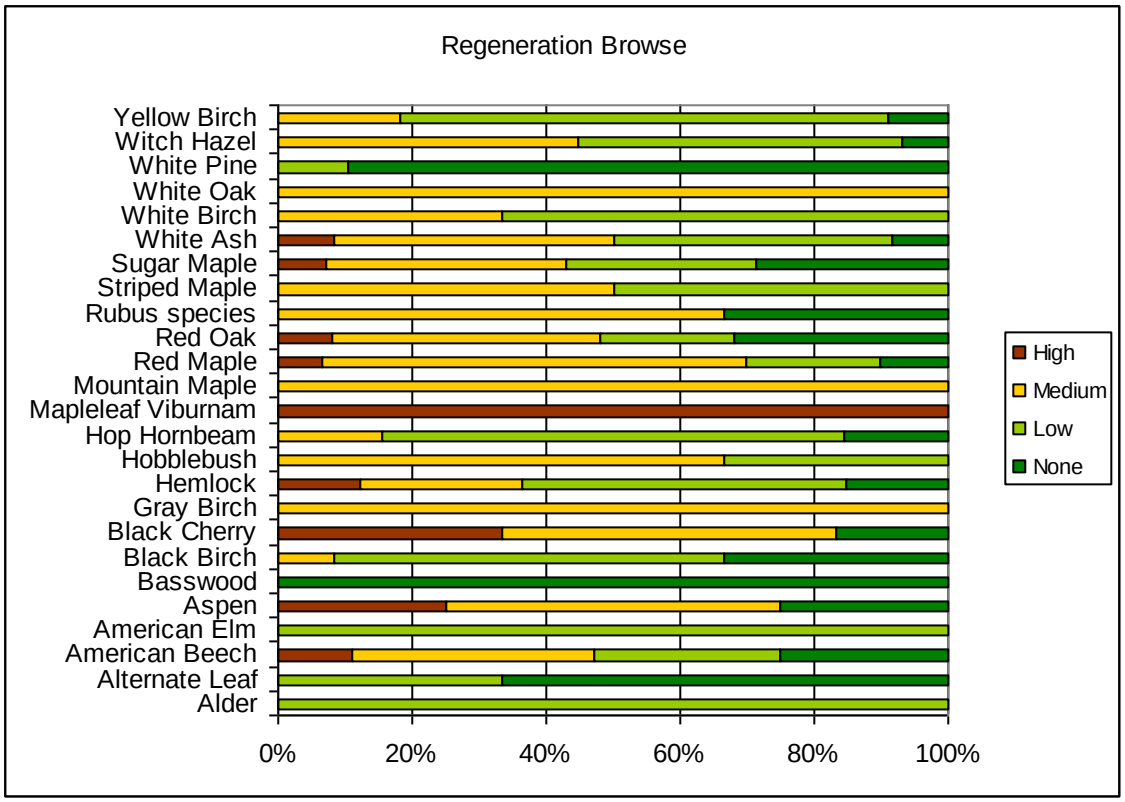
Graph 3.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 3.4: Vigor of all regeneration and shrub species.



Graph 3.5: Browse level of all regeneration and shrub species.



Silvicultural Objectives

Management system:	large group selection; single tree release; TSI	
Harvest Entry:	within 10 years	
Products:	TSI; low-quality sawtimber; pulpwood; cordwood	
Desired Composition:	maintain ~50% softwood BA; maintain at least 3 distinct age classes	
Crop tree target diameter:	WP - 22	RO - 20
	RM - 16	HE - 20

Operational Considerations

Operability:	highly operable
Seasonal limitations:	minor; avoid during saturated periods, esp stand 3g
Terrain:	rolling; steep within stand 3a
Access and landing area:	decent for stands 3g-3i; inadequate for stands 3a-3h
Access distance:	1/2 or longer skids for 3a-3h
General maintenance:	skid trails from most recent harvest need rut repair; truck road to landings needs some updating
Brook-wetland crossings/buffer requirements:	many stream/wetland crossings required to get to the different stands; stand 3g would require 2 to 3 crossings if accessed by the existing landings

STAND SUMMARY
AND
10-YEAR MANAGEMENT SCHEDULE

Type 3 includes 9 non-contiguous stands (3a-3i) of hemlock, white pine and mixed hardwoods and is the largest type on the property, containing 160 acres. Hardwoods comprise about two-thirds of the trees, but only about one-half of the basal area, dominated by red oak and red maple, while softwoods comprise about one-third of the trees and about one-half of the basal area in the Type. Hemlock represents the highest number of stems per acre, followed closely by red maple and red oak, with white pine a distant fourth. Still, white pine represents nearly one-half of the total sawtimber volume in this type. The canopy is somewhat closed in most parts of the Type, averaging 75% closure. Current stand structure and characteristics indicate the Type is somewhat evenaged, but that it could be transitioned into a three-aged or multi-aged type (see Graphs 3.1a and 3.1b). There are some areas in this type that could be classified as northern hardwoods, but they are limited in area, and were included with the surrounding broad type. Treatment in the northern hardwood-like areas lends itself to single tree release, which has the effect of favoring shade-tolerant regeneration – sugar maple, beech, hemlock.

Regeneration is limited, with higher densities and more species in the more recently harvested areas. Red maple, beech, hemlock and white pine are the most common seedlings/saplings, with each appearing in roughly 30% of the Type acreage, although most areas are “not stocked”. Yellow birch, black birch, red oak and sugar maple large saplings can also be found in some places that were treated by partial overstory removals in the 1960’s. There are numerous high-quality hardwood saplings and poles in the type, especially in the stands located in the northern half of the property. Stand 3g, in the south-central portion of the property, also contains a strong component of red oak poles that appear to be high quality and vigorous.

The distribution of other herbaceous vegetation mimics the distribution of regeneration, with higher densities and greater diversity present in the more recently treated areas. In parts of the type with high softwood density, there is very little herbaceous growth or understory vegetation. In areas where hardwood represents more than 65% of the trees, there is more corresponding herbaceous growth and understory vegetation.

Intermediate stems (poletimber and small sawtimber) have the best quality and highest potential in this Type, which tends to be a common theme within this particular property. Favored species include red oak, black birch, white pine, yellow birch and red maple. Many areas would benefit from intermediate stand treatments, including TSI where practical, and should release the favored intermediate stems from direct competition with either overhead stems or other, less vigorous intermediate stems.

Sawtimber opportunities are better in this type than in the other types. The red oak in this type is vigorous and appears to be above average quality, and the white pine is growing well and is average to above average quality. The long-term goal of management in this stand is to develop and maintain at least three distinct age classes of quality trees of species well suited to the site. The 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. The current species composition reflects the natural species mix and likely will not significantly change over time with the exception of an increase in the tolerant hardwood (sugar maple, beech) component.

Silviculture: The focus of management here will be to work with the existing intermediate and overstory stems in such a manner as to promote the production of high-quality red oak, black birch, yellow birch, white pine and red maple sawtimber; retain a modest component of hard-mast

producing larger overstory trees; and to maintain desired site-suited species regeneration by utilizing different silvicultural methods. These goals will be accomplished either through TSI (if practical) or by removing about 1/2 of the overstory in groups, focusing on removing those individuals of poor quality and retaining the individuals that are of high quality and vigor.

2013: Apply TSI to those areas where practical. Approximately 30 acres. Favor red oak, yellow birch, black birch, white pine, red maple. Some microsites will allow favoring sugar maple and white ash, especially in the northern stands (3c and 3d).

2018: Absent TSI, treat most areas of the Type upon 95% closure of the canopy. Reduce overall basal area to approximately 80-110 square feet through:

- **Group Selection:** Create openings of 5-10 trees to establish intermediate shade tolerant and intolerant regeneration. If harvest is to be done in the summer, scarifying areas with no regeneration or areas of undesirable seedlings/saplings will help promote the regeneration of light seeded individuals such as birch, hemlock, and pine.
- **Crop Tree Release:** In between groups release crop trees of high quality and vigor. Release selected crop trees on at least 2 but preferably 3 sides. This will also promote regeneration of tolerant hardwoods and hemlock.

*****This type would benefit from TSI treatment if beneficial market conditions arise. However, if unable to implement TSI, treatment should be delayed for 15 years.

Wildlife: Wildlife habitat is already diverse, offering areas of dense softwood cover, decent hard mast production, browse opportunities where adjacent to beaver bogs, and a fairly high total number of down woody debris (66 logs/acre). There is moose and deer sign and browse evidence, porcupine activity, beaver activity, and some bear activity (beech tree markings). Any treatments that promote hardwood regeneration will likely benefit deer, moose and rabbits by providing better browse opportunities. Specific wildlife habitat improvements will include retaining hard mast producing hardwoods; retaining beech trees with evidence of heavy bear use; and maintaining the strong softwood overstory component to provide cover.

- Maintain existing snags and large down logs.
- Release intermediate red oak to encourage acorn production
- Use group selection to regenerate hemlock and white pine for future cover

Stand 4 Hardwood/Hemlock/White Pine 4B/Hardwood 1B 109.1 acres


Stand Structure


Stand Structure


Forest Canopy

GENERAL ATTRIBUTES

Natural Community Type:	hemlock-beech-oak-pine forest black gum-red maple basin swamp
Past Management History:	varied; areas cut ca 1960, 1970, 1980, 1990
Approximate Age of Dominant Trees:	80
Stand Health:	average
Insects/Damage/Disease:	logging damage; excessive skidder rutting; some sugar maple borer

SITE CONDITIONS

Determined by:	soils map & field observation
Tree vigor:	moderate to high
Soils:	Tunbridge-Lyman-Monadnock complex, stony Monadnock stony fine sandy loam Skerry stony fine sandy loam Naumberg fine sandy loam Ossipee peat
Drainage:	well-drained to poorly drained
Terrain:	flat to rolling, except stand 4e - steep
Aspect:	varies
Elevation:	540-720’

Snags Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	10.8	12.2	8.1	31.1
12-18"			1.3	1.3
>18"				
Grand Total	**10.8**	**12.2**	**9.4**	**32.4**

Table 4.1: Standing dead trees per acre by size and decay class.

Down Logs Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	123.8	37.2	4.4	165.5
12-18"	1.8			1.8
>18"				
Grand Total	**125.7**	**37.2**	**4.4**	**167.3**

Table 4.2: Standing down logs per acre by size and decay class.

WILDLIFE HABITAT

Forest type:	forestland; forested wetland
Vertical diversity:	moderate, high canopy with established saplings
Vegetative diversity:	moderate to high
Hard mast:	red oak, beech
Soft mast:	black cherry, pin cherry, ash
Special habitat features:	bear beech
Snag trees:	low
Down logs:	high per acre – many cut & left behind from previous harvest
Special wildlife practices:	none

RECREATION

Recreational features:	hiking; bird watching
Recreational infrastructure:	limited to old skid trails
Aesthetic resources:	fieldstone quarry in stand 4i
Public access:	ok for stands 4g, 4h, and 4i, limited for 4a-4f

SILVICULTURE

Structural and Silvicultural Attributes

Broad Forest Type:	HS4B/H1A
Size Class:	Large Sawlog/Saplings
Stand Structure:	Two-age
Crown Closure:	85%
Total Basal Area Per Acre:	118
Total Merchantable Basal Area Per Acre:	105
Total Acceptable Basal Area Per Acre:	48
Trees Per Acre:	502
Quadratic Mean Stand Diameter:	6.6
Percent AGS Sawtimber:	54.4
Basal Area of AGS Sawlogs:	21

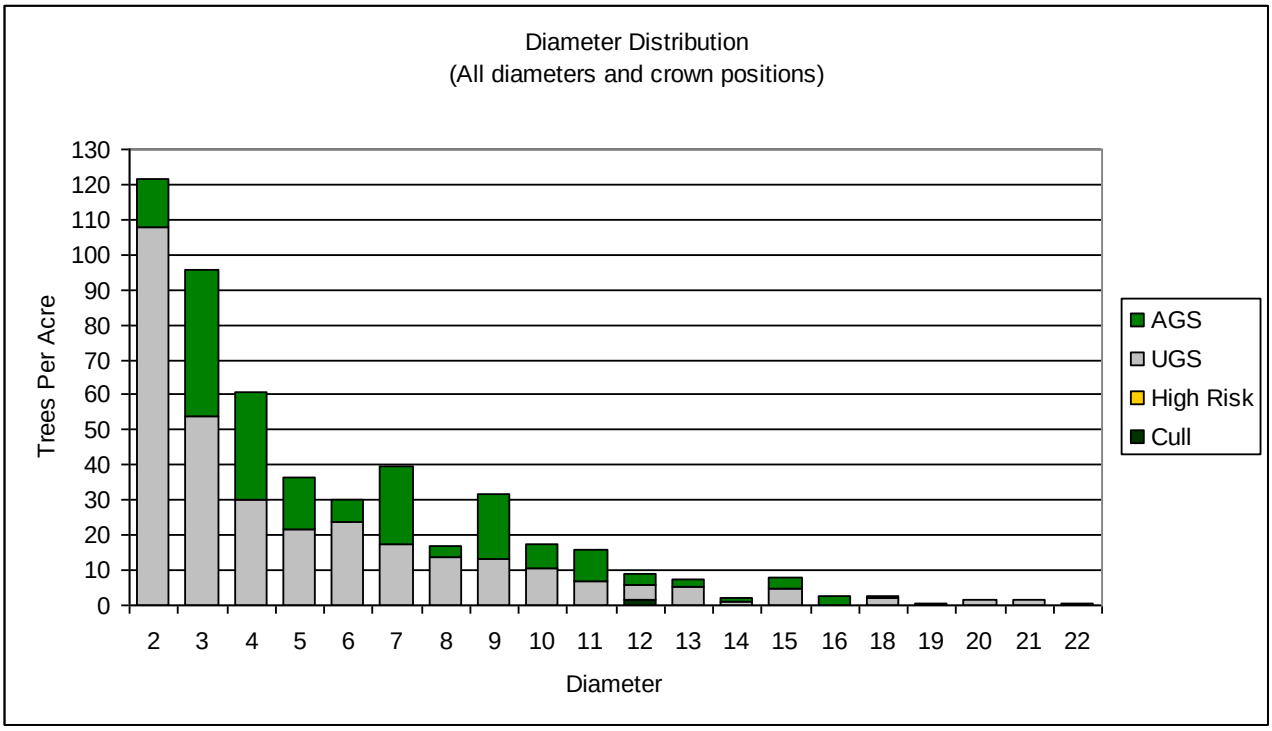
Timber Quality: average

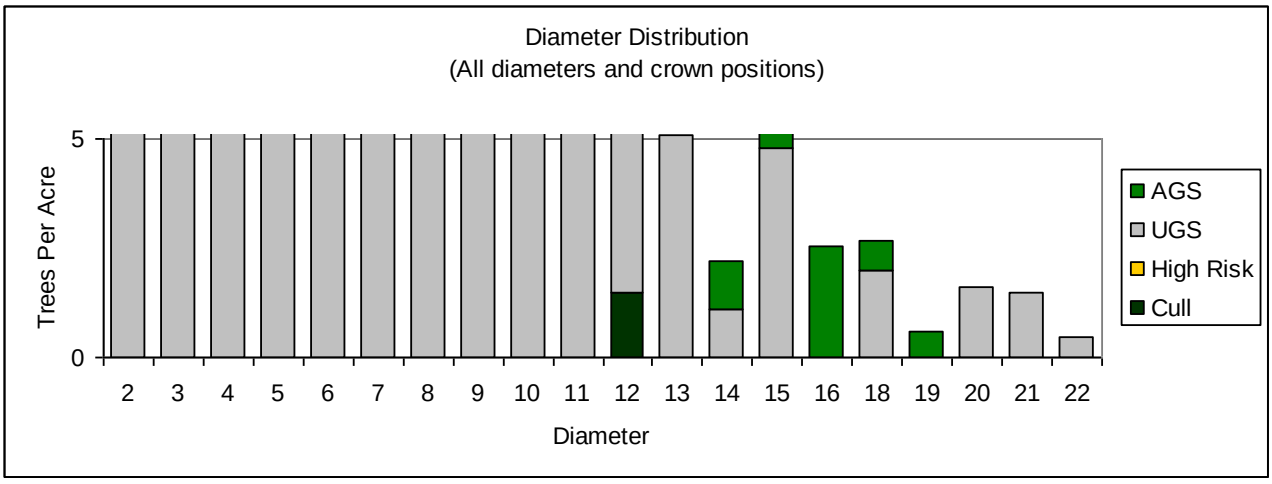
Forest Composition and volume

Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Cords	High Risk	AGS Saw	% AGS Saw
American Beech	7.2%	0	170	225	1.7	0.0	2.3	0.0	51	13%
Aspen	1.0%	0	0	0	0.4	0.0	0.4	0.0	0	0%
Black Birch	3.5%	0	0	0	0.2	0.1	0.4	0.0	0	0%
Red Maple	34.1%	0	206	42	5.5	0.0	6.0	0.0	0	0%
Red Oak	16.1%	58	714	334	1.5	0.2	3.8	0.0	920	83%
Sugar Maple	8.6%	0	232	207	1.0	0.0	1.9	0.0	150	34%
White Ash	11.1%	0	100	63	1.2	0.0	1.3	0.0	162	100%
White Birch	2.7%	0	101	0	0.7	0.0	0.8	0.0	0	0%
Yellow Birch	3.2%	0	0	0	0.1	0.0	0.1	0.0	0	0%
Total Hardwood Per Acre:	***87.4%***	***58***	***1,522***	***872***	***12.3***	***0.4***	***17.0***	***0.0***	***1,283***	52%
Hemlock	5.7%	0	202	0	0.6	0.0	1.1	0.0	149	74%
Red Pine	0.3%	0	82	0	0.1	0.0	0.3	0.0	0	0%
White Pine	6.7%	0	510	0	0.7	0.0	1.7	0.0	333	65%
Total Softwood Per Acre:	***12.6%***	***0***	***794***	***0***	***1.4***	***0.0***	***3.0***	***0.0***	***481***	61%
Total Volume Per Acre:	**100.0%**	**58**	**2,316**	**872**	**14**	**0**	**20**	**0**	**1,765**	54%
Stand Volume:		**6,342**	**252,650**	**95,127**	**1,492**	**40**	**2,182**	**0**	**192,525**	

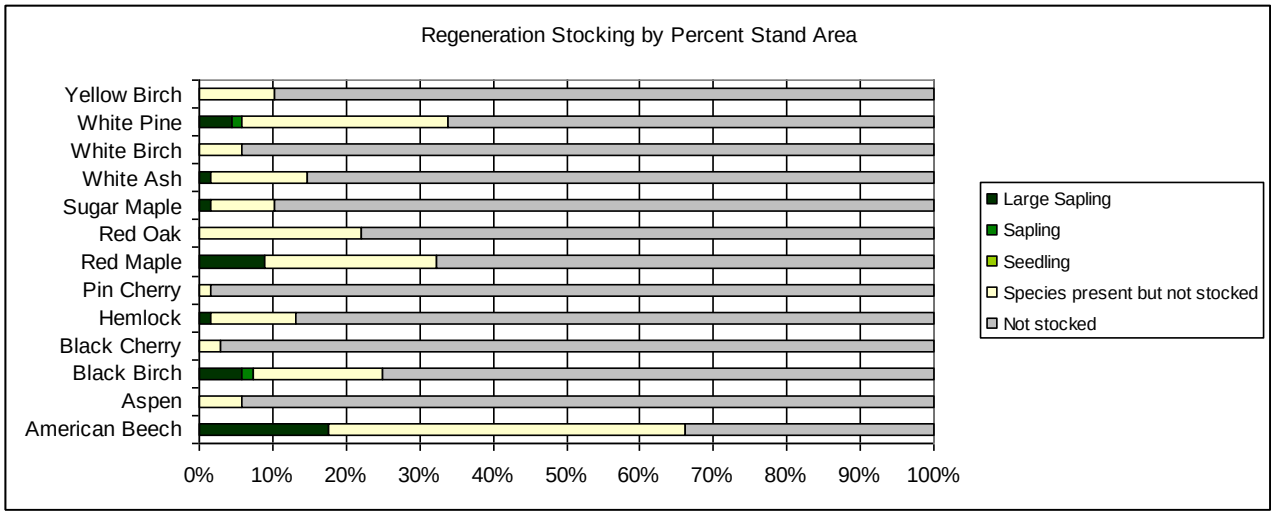
Table 4.3: Stand volume by species and product per acre values.

Graph 4.1a and 4.1b: 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. 4.1b provides a close-up of the breakdown in the larger diameter classes.

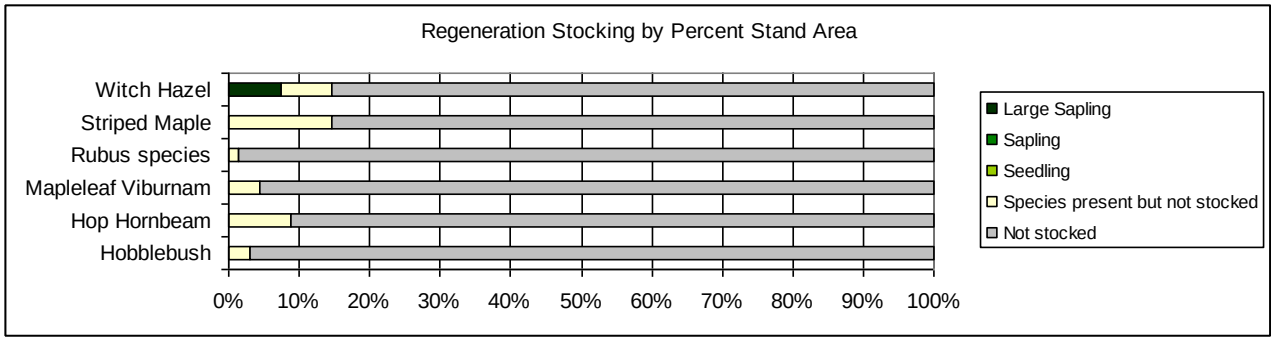




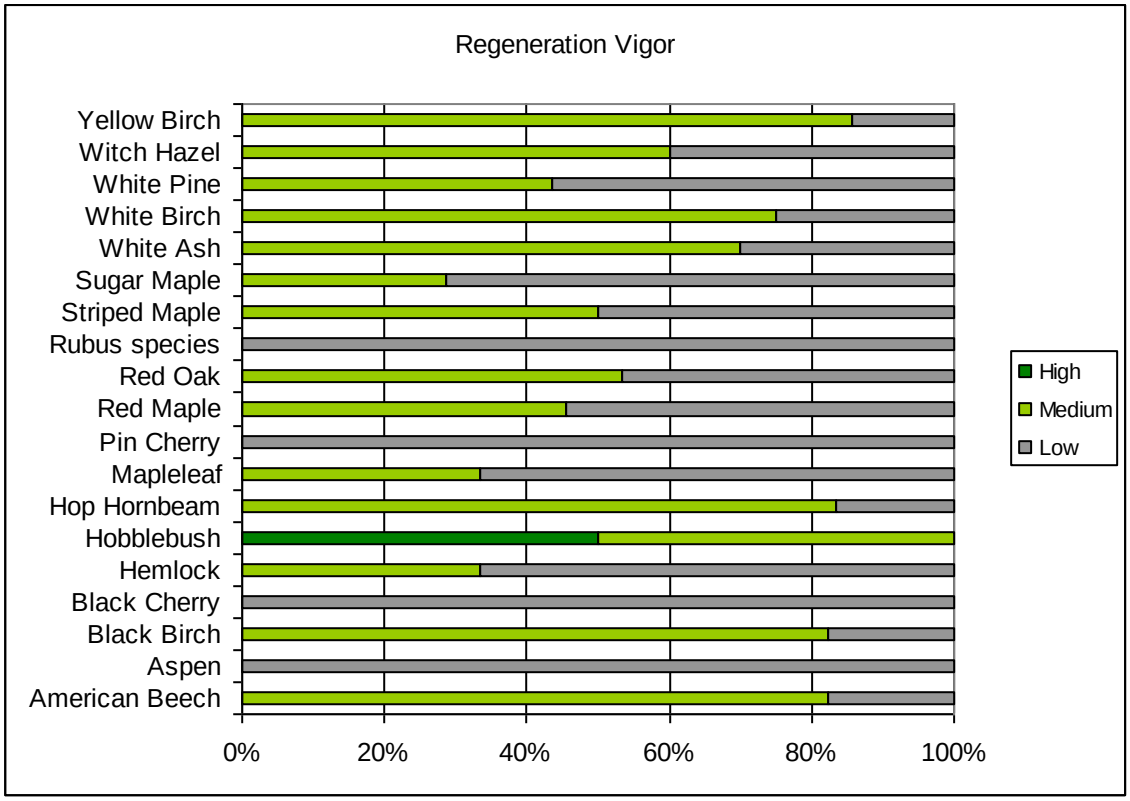
Graph 4.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter (Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less 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.



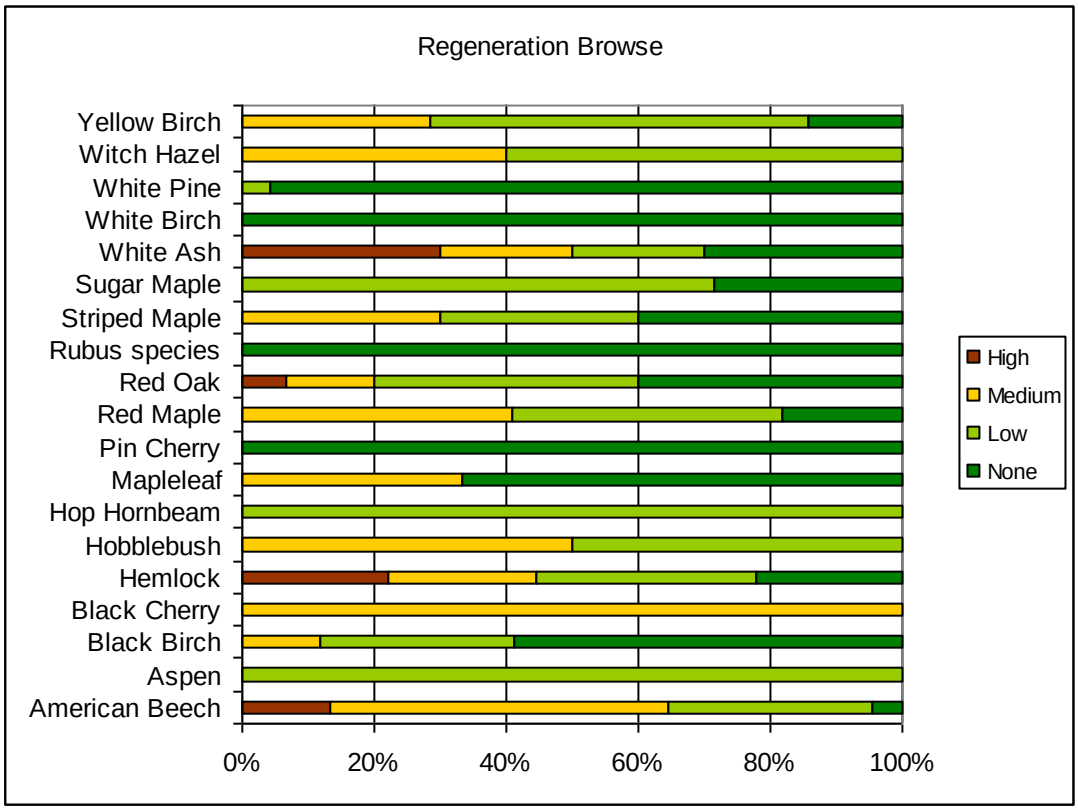
Graph 4.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 4.4: Vigor of all regeneration and shrub species.



Graph 4.5: Browse level of all regeneration and shrub species.



Silvicultural Objectives

Management system:	multi-aged; transition from 2-aged
Harvest Entry:	moderate priority, thin stands 10-15 years
Products:	sawtimber, pulpwood, cordwood
Desired Composition:	high quality hardwoods
Crop tree target diameter:	SM – 20 RO - 20

Operational Considerations

Operability:	operable
Seasonal limitations:	summer/winter preferable
Terrain:	mostly flat to rolling; steep for stand 4e
Access and landing area:	ok for stands 4g-4i, poor for stands 4a-4f
Access distance:	long for 4a-4f

General maintenance:	upgrade truck road, extend truck road north, create new landing north
Brook-wetland crossings/buffer requirements:	use minimum harvest adjacent to black gum-red maple basin swamp; crossings needed within several stands

STAND SUMMARY
AND
10-YEAR MANAGEMENT SCHEDULE

Type 4 includes 9 non-contiguous stands (4a-4i) of mixed hardwood and is one of the largest types on the property. Hardwoods comprise over 80% of the trees, dominated by red oak, red maple, beech and sugar maple. The canopy is relatively closed in most parts of the Type, averaging 85% closure. Current stand structure and characteristics indicate the Type lends itself to uneven- or multi-aged management strategies. Presently, the type has two dominant age-classes; an overstory with 75-85 year trees, and an understory sapling component of about 25 year stems.

Regeneration is established, along with advanced regeneration (small poletimber). Beech is found in greater than 60% of the type, while red maple, red oak, white pine and black birch are found in over 20% of the area.

The distribution of other herbaceous vegetation varies, with less diversity in the parts of the stand dominated by beech, and more variation in the areas dominated by red oak and sugar maple.

Intermediate stems (poletimber) also have good quality in this Type. Favored species include red oak, black birch, white pine and red maple.

The black gum-red maple basin swamp, associated with stand 4f, contains pole-sized black gum. Timber harvesting took place in this forested wetland ca 1970, resulting in tremendous black gum regeneration, a somewhat unique situation in the area, as there are very few young stands of black gum developed elsewhere. This stand deserves some protection, but management shouldn't be excluded from it or adjacent areas. However, the treatment cycle should probably be extended to 40-60 year entries, rather than 15-25 year entries, and only during periods of frozen soil. The specific goal is to promote the existence of this natural community, rather than growing timber.

The long-term goal of management elsewhere in this stand is to develop multiple age classes of quality hardwood sawtimber tree species well suited to the site. The 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. The current species composition reflects the natural species mix and likely will not significantly change over time with the exception of an increase in the tolerant softwood (hemlock) component.

Silviculture: The focus of management here will be to work with the existing overstory and understory stems in such a manner as to promote the production of high-quality red oak, black birch, sugar maple and red maple sawtimber; retain a modest component of hard-mast producing larger overstory trees; and to maintain desired site-suited species regeneration by utilizing different silvicultural methods. These goals will be accomplished primarily through single stem release and small group selection, although some areas could be treated with larger group selection and completion of part 2 of a shelterwood cut. Larger groups will encourage early successional

hardwoods, and finishing the 2-part shelterwood will remove the low-quality overstory, releasing the already established understory.

2018: Thin overstory using group selection. Thin between group openings as appropriate using individual stem release. Favor red oak, black birch, sugar maple, red maple. Attempt to restrict beech regeneration on drier sites. Reduce basal area to 60-85, retaining high quality stems from numerous size classes. Release groups of vigorous understory trees, especially those that can outcompete beech.

Wildlife: Wildlife habitat here will become more diverse as a multiple age structure is developed. There is abundant evidence of black bear activity, primarily through markings found on larger beech trees. White-tailed deer and moose browse throughout the type. Any treatments that promote hardwood regeneration will likely continue to benefit deer, moose and rabbits by providing better browse opportunities. Multiple age classes help to ensure there is always a level of browse for wildlife. Specific wildlife habitat improvements will include retaining hard mast producing hardwoods; retaining beech trees with evidence of heavy bear use; creating early successional hardwood browse especially in areas with low-valued or poor vigor trees; and creating standing snag trees by girdling some large beech trees.

- Create additional large snag trees by girdling up to 5 trees >18” in diameter per acre.
- Maintain existing snags and large down logs.

Stand 5 Hardwood 3-4D/Hardwood 1A-B 75.5 acres


Stand Structure


Stand Structure


Forest Canopy

GENERAL ATTRIBUTES

Natural Community Type:	hemlock-beech-oak-pine forest open wetland (various) – beaver bog
Past Management History:	highgraded ca 1965 and clearcut ca 1990
Approximate Age of Dominant Trees:	80
Stand Health:	average
Insects/Damage/Disease:	beech bark disease; skid trails deeply rutted

SITE CONDITIONS

Determined by:	soils map & field observation
Tree vigor:	average to above average
Soils:	Monadnock stony fine sandy loam Tunbridge-Lyman-Monadnock complex stony
Drainage:	well-drained to somewhat poorly drained
Terrain:	flat to rolling
Aspect:	varies
Elevation:	640-780’

Snags Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"			4.4	4.4
12-18"				
>18"				
Grand Total			**4.4**	**4.4**

Table 5.1: Standing dead trees per acre by size and decay class.

Down Logs Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	33.7	29.3		62.9
12-18"	1.3			1.3
>18"				
Grand Total	**34.9**	**29.3**		**64.2**

Table 5.2: Standing down logs per acre by size and decay class.

WILDLIFE HABITAT

Forest type:	forestland; forested wetland
Vertical diversity:	low; young trees, most 40 years or younger
Vegetative diversity:	low; heavy beech understory
Hard mast:	red oak, beech
Soft mast:	black cherry, Rubus spp.
Special habitat features:	beaver bog in center of stand
Snag trees:	very few; young overstory
Down logs:	limited, mostly small diameter
Special wildlife practices:	extensive browse; wetland/riparian habitat with beaver bog

RECREATION

Recreational features:	bird and animal observation at beaver bog; overgrown skid trails limit use for hiking/access
Recreational infrastructure:	minimal; trails choked with saplings
Aesthetic resources:	bog area visually appealing
Public access:	limited; long distance from parking; no open trails

SILVICULTURE

Structural and Silvicultural Attributes

Broad Forest Type:	H3-4D/H1A-B
Size Class:	Large Sawtimber/Sapling
Stand Structure:	Two-age
Crown Closure:	70%
Total Basal Area Per Acre:	112
Total Merchantable Basal Area Per Acre:	34
Total Acceptable Basal Area Per Acre:	38
Trees Per Acre:	609
Quadratic Mean Stand Diameter:	5.8
Percent AGS Sawtimber:	38.0

Basal Area of AGS Sawlogs: 8

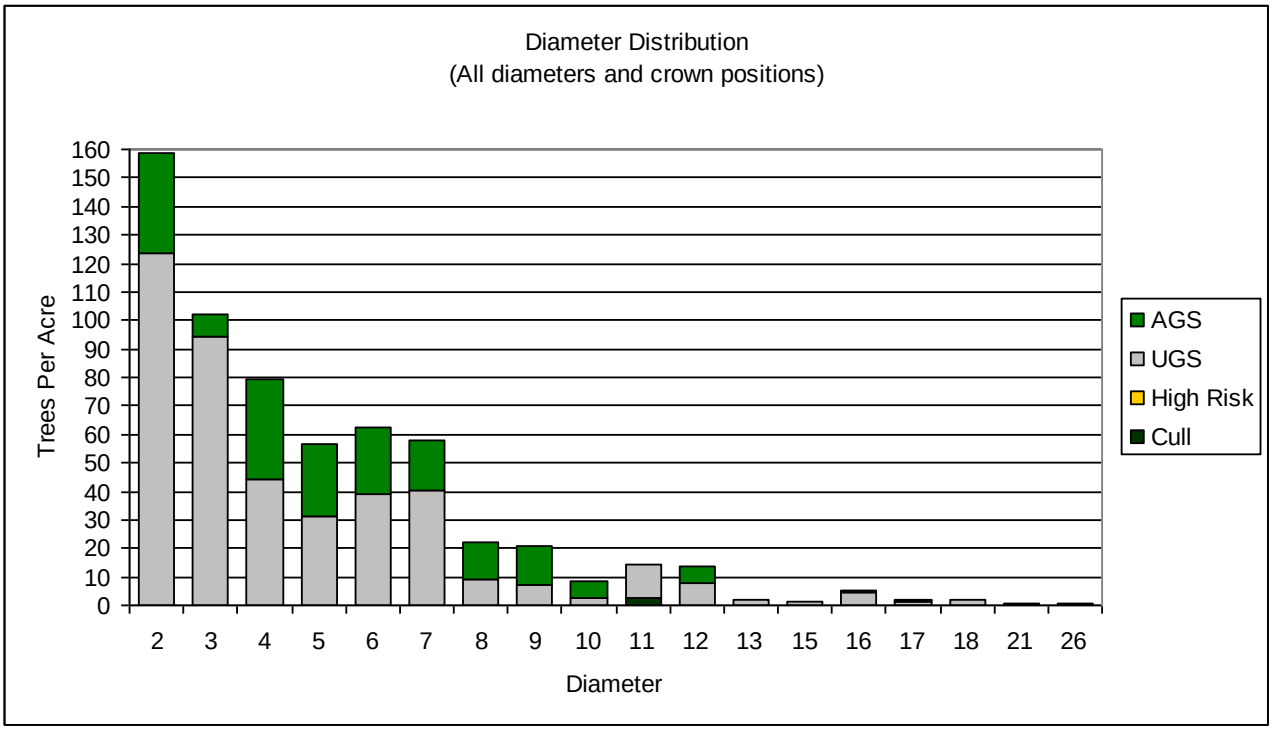
Timber Quality: low

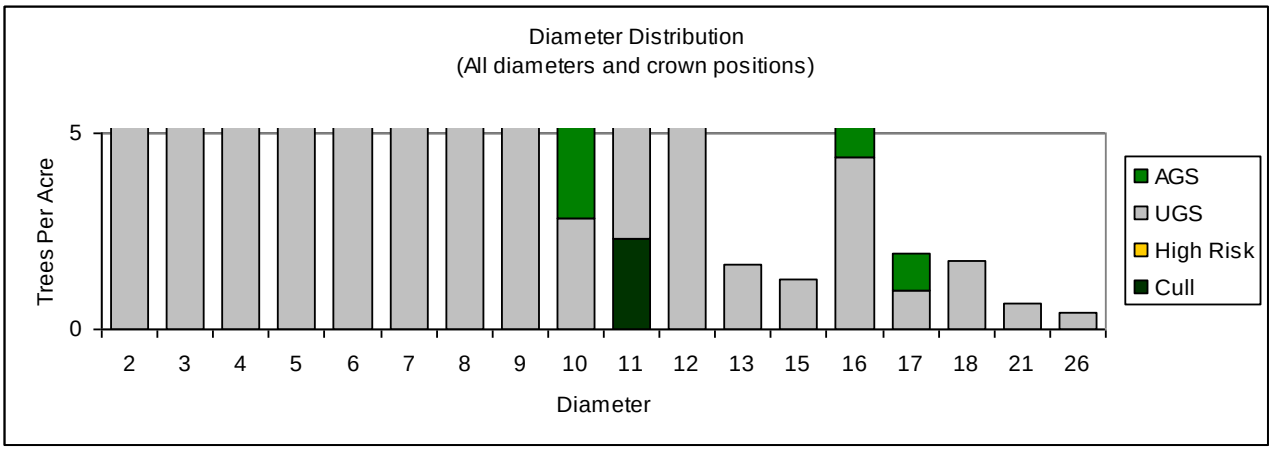
Forest Composition and volume

Species	% TPA	Veneer (bf)	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Total Cords	High Risk	AGS Saw	% AGS Saw
American Beech	26.4%	0	130	181	3.9	0.0	4.5	0.0	177	57%
Black Birch	10.4%	0	0	0	0.8	0.0	0.8	0.0	0	0%
Red Maple	32.4%	0	77	107	2.6	0.0	2.9	0.0	0	0%
Red Oak	7.8%	0	399	459	1.3	0.0	2.9	0.0	237	28%
Sugar Maple	4.1%	0	221	114	0.7	0.0	1.3	0.0	178	53%
White Birch	5.7%	0	0	0	0.8	0.0	0.8	0.0	0	0%
Total Hardwood Per Acre:	***86.8%***	***0***	***828***	***860***	***10.0***	***0.0***	***13.1***	***0.0***	***592***	35%
Cedar	2.7%	0	0	0	0.1	0.0	0.2	0.0	0	0%
Hemlock	4.8%	0	150	0	0.4	0.0	0.8	0.0	150	100%
White Pine	5.7%	0	117	0	0.9	0.0	1.2	0.0	0	0%
Total Softwood Per Acre:	***13.2%***	***0***	***268***	***0***	***1.5***	***0.0***	***2.1***	***0.0***	***150***	100%
Total Volume Per Acre:	**100.0%**	**0**	**1,095**	**860**	**12**	**0**	**15**	**0**	**742**	38%
Stand Volume:		**0**	**82,684**	**64,947**	**869**	**0**	**1,151**	**0**	**56,058**	

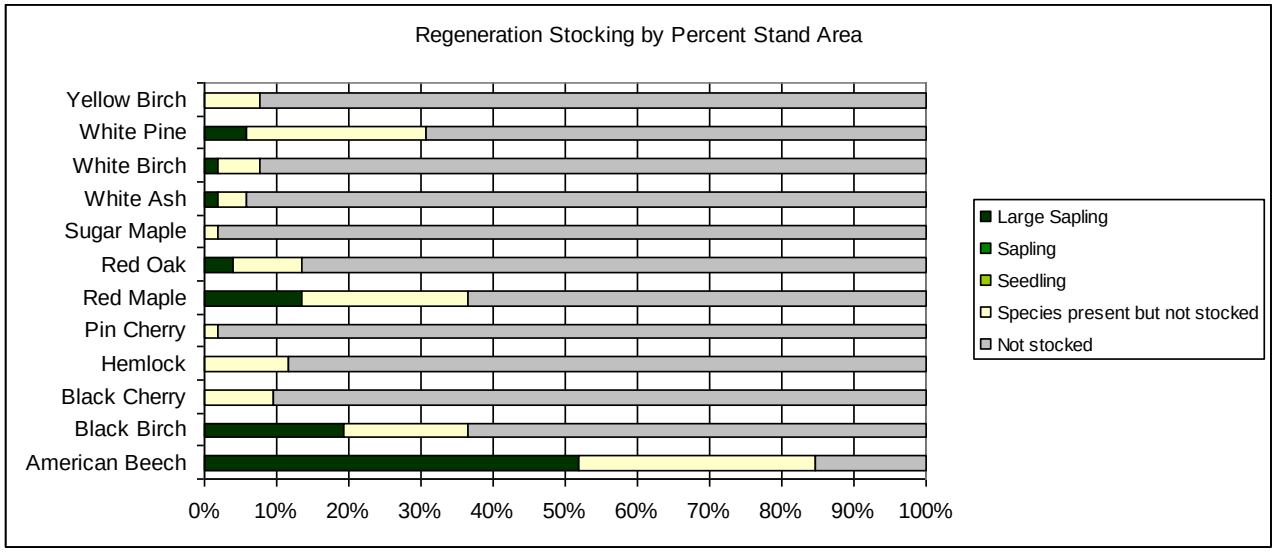
Table 5.3: Stand volume by species and product per acre values.

Graph 5.1a and 5.1b: 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. 5.1b provides a close-up of the breakdown in the larger diameter classes.

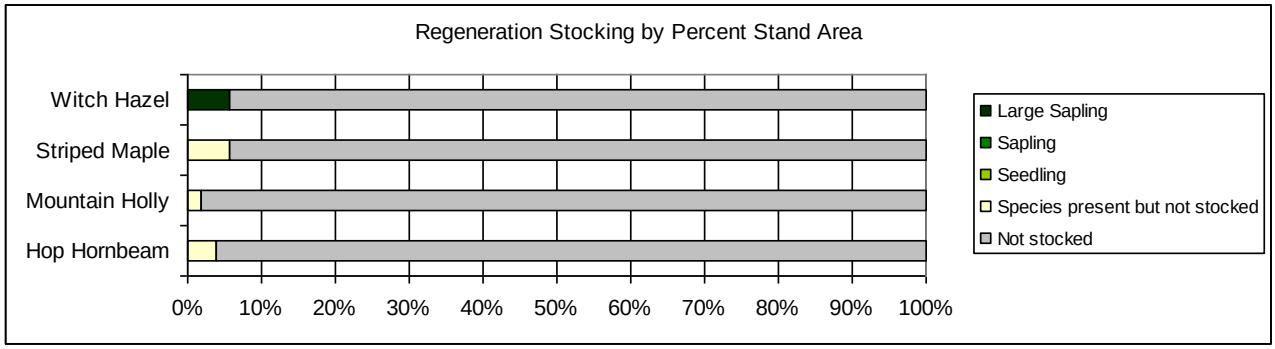




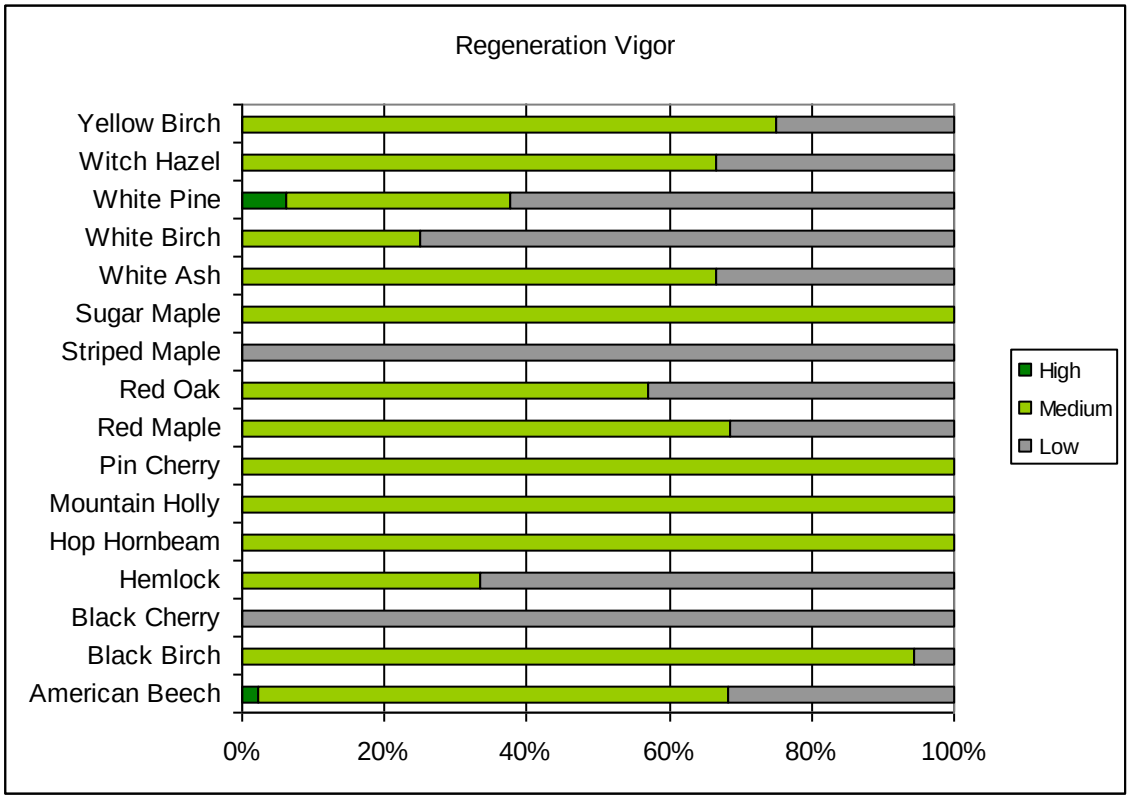
Graph 5.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less 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.



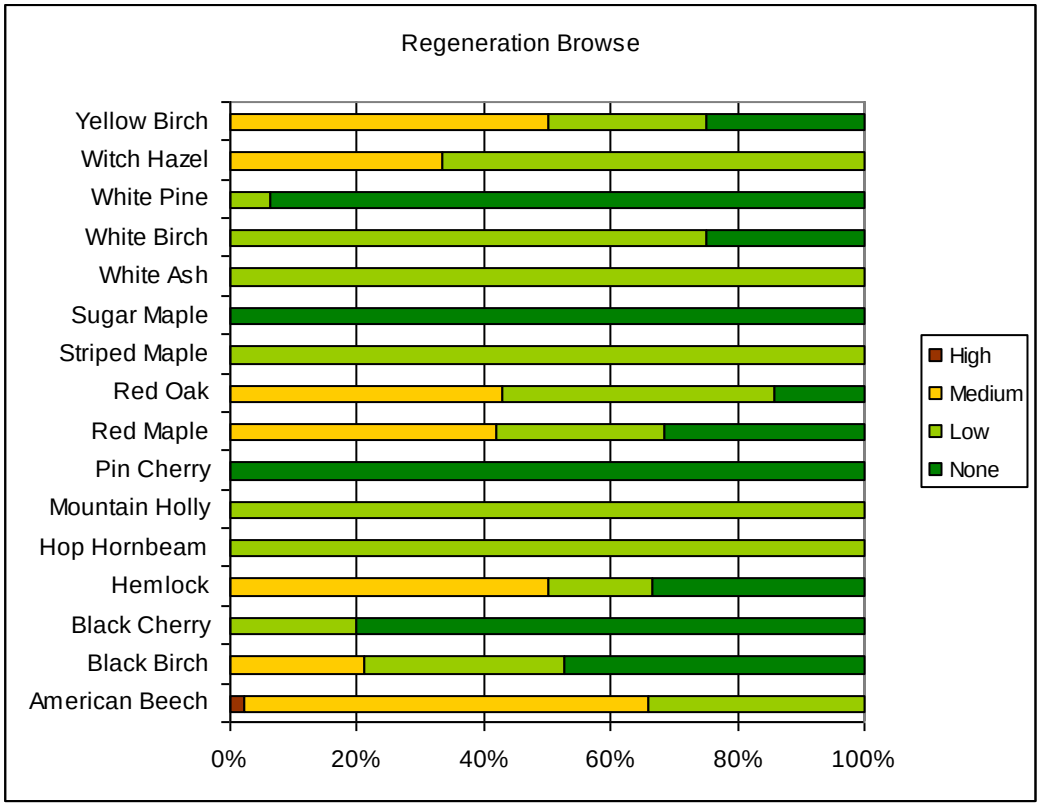
Graph 5.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 5.4: Vigor of all regeneration and shrub species.



Graph 5.5: Browse level of all regeneration and shrub species.



Silvicultural Objectives

Management system:	transition from 2-aged to multi-aged
Harvest Entry:	low priority, 10-20 years in the future
Products:	small sawtimber, cordwood, pulpwood
Desired Composition:	decent quality hardwood sawtimber
Crop tree target diameter:	RO – 22 SM - 18

Operational Considerations

Operability:	highly operable, except for included small wetlands and bog
Seasonal limitations:	dry season or winter
Terrain:	flat
Access and landing area:	none; 1/4 mile to nearest old landing/truck road

Access distance:	see above
General maintenance:	extend truck road north; create new landing north
Brook-wetland crossings/buffer requirements:	minor crossings; avoid small wetlands and bog area.

STAND SUMMARY AND 10-YEAR MANAGEMENT SCHEDULE

Type 5 is a single contiguous stand of mixed hardwood covering 75 acres. Hardwoods comprise over 85% of the trees, dominated by beech and red maple, with red oak and black birch also common. The canopy is relatively open in most parts of the stand, averaging 70% closure. Presently, the stand is 2-aged, with a sparse 80 year old overstory, and dense 20-40 year old understory.

Regeneration is abundant, and dominated by beech, which appears in over 80% of the stand. Red maple and black birch are also well-established, appearing in over 40% of the stand. Other hardwoods can be found sporadically, sometimes in dense pockets.

Intermediate stems exhibit good quality, especially red oak and black birch. Many of these stems are competing with each other, which has forced them to grow straight and branch-free, a high quality characteristic. As these stems get larger, many of them should provide high quality hardwood sawlogs. Many areas would benefit from TSI where practical, which should release the favored intermediate stems from competition with other, less vigorous intermediate stems.

Quality sawtimber trees are somewhat lacking. The larger stems are leftovers from previous timber harvests and are generally less vigorous, poorly formed, or both.

The long-term goal of management in this stand is to develop multiple age classes of quality sawtimber trees of species well suited to the site. The 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. The current species composition reflects the natural species mix and likely will not significantly change over time with the exception of an increase in the tolerant softwood (hemlock) component.

Silviculture: The focus of management here will be to work with the existing intermediate stems in such a manner as to promote the production of high-quality red oak, black birch, and red maple sawtimber; retain a modest component of hard-mast producing larger overstory trees; and to maintain desired site-suited species regeneration by utilizing different silvicultural methods. These goals will be accomplished either through TSI (if practical) or by removing about 1/3 of the intermediate stems in groups, focusing on removing those individuals of poor quality and retaining the individuals that are of high quality and vigor.

2009-2015: Apply TSI to those areas where practical. Approximately 40 acres. Favor red oak, black birch, white pine, red maple. Some microsites will allow favoring sugar maple and white ash.

2018: Absent TSI, treat most areas of the stand to improve residual quality. Reduce overall basal area to approximately 80-90 square feet through:

- **Crop Tree Release:** Favor individual intermediate stems and groups of saplings exhibiting high quality characteristics and high vigor.

*****This type would benefit from TSI treatment if beneficial market conditions arise. However, if unable to

implement TSI, treatment should be delayed for 10-20 years.

Wildlife: Wildlife habitat here will become more diverse as a multiple age structure is developed. There is abundant evidence of black bear activity, primarily through markings found on larger beech trees. White-tailed deer and moose browse the extensive areas with hardwood and hemlock saplings. Multiple age classes help to ensure there is always a level of browse for wildlife. Specific wildlife habitat improvements will include retaining hard mast producing hardwoods; retaining beech trees with evidence of heavy bear use; creating standing snag trees by girdling some large sugar maple and beech with no commercial value; creating down woody debris by felling and leaving some large hardwoods on the forest floor.

- Create additional large snag trees by girdling up to 5 trees >18" in diameter per acre.
- Create additional down logs by felling up to 5 trees > 18" in diameter per acre.
- Maintain existing snags and large down logs.

EASTMAN FOREST
TOTAL FOREST TIMBER AND PULP VOLUME
August, 2008
563.8 Forested Acres

Species	Sawlog (mbf)	Tielog (mbf)	Total BF	Pulp (cds)	Growing Stock (cds)	Cull (cds)	Total Volume in Cords	Percent Cords
Hardwood								
American Beech	38,700	38,234	*76,934*	829	0	6	*968*	*9.3%*
American Elm	0	0	*0*	26	0	0	*26*	*0.2%*
Aspen	15,504	0	*15,504*	316	0	0	*343*	*3.3%*
Black Birch	8,334	0	*8,334*	201	16	0	*234*	*2.2%*
Black Cherry	0	0	*0*	46	0	0	*46*	*0.4%*
Hop Hornbeam	0	4,769	*4,769*	4	0	0	*13*	*0.1%*
Red Maple	75,023	20,941	*95,965*	1,671	0	77	*1,897*	*18.3%*
Red Oak	284,087	187,580	*478,009*	1,118	166	68	*2,214*	*21.3%*
Sugar Maple	75,124	64,495	*139,619*	346	0	16	*625*	*6.0%*
White Ash	10,861	6,837	*17,699*	293	0	33	*293*	*2.8%*
White Birch	15,920	0	*15,920*	337	0	0	*367*	*3.5%*
White Oak	0	11,799	*11,799*	18	0	0	*37*	*0.4%*
Yellow Birch	10,209	0	*10,209*	19	0	0	*38*	*0.4%*
	533,762	**334,655**	**874,761**	**5,224**	**182**	**200**	***7,101***	
Softwood								
Cedar	0	0	*0*	9	0	6	*16*	*0.2%*
Hemlock	167,019	0	*167,019*	818	0	70	*1,183*	*11.4%*
Red Pine	8,924	0	*8,924*	12	0	0	*31*	*0.3%*
Red Spruce	11,497	0	*11,497*	2	0	0	*29*	*0.3%*
White Pine	589,092	51,290	*640,382*	884	0	26	*2,037*	*19.6%*
	776,532	**51,290**	**827,822**	**1,725**	**0**	**102**	***3,296***	
	1,310,294	**385,945**	**1,702,583**	**6,949**	**182**	**302**	***10,397***	

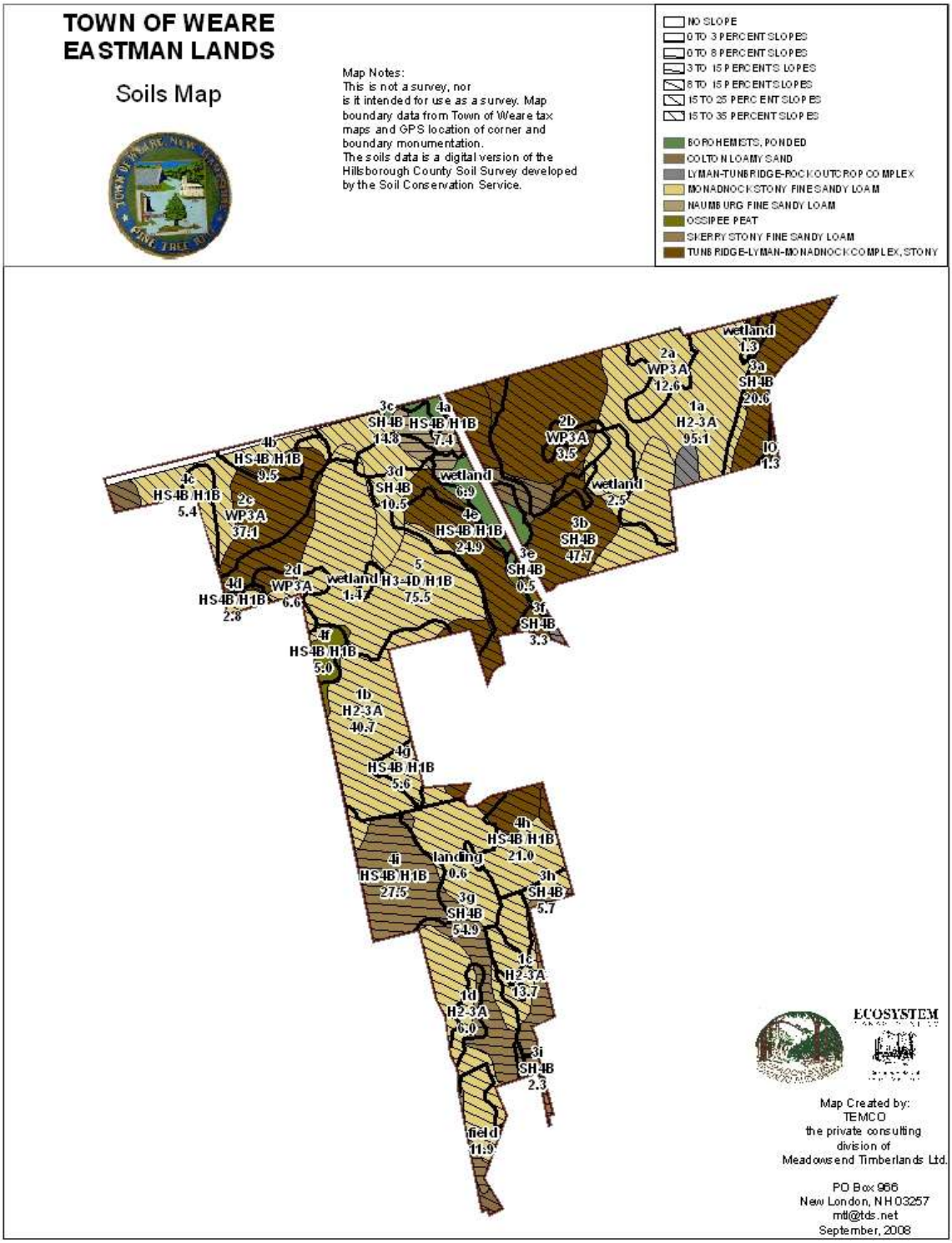
EASTMAN FOREST

10-YEAR TREATMENT SCHEDULE

The dates given in this treatment schedule are meant to help prioritize work on the entire Weare 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.

Stand #	Type	Acres	Treatment	Priority	Year
1	**H2/3A**	**156**	TSI 40 acres	**low**	**2012**
2	**S3A**	**64**	group selection/crop tree release	**moderate**	**2013**
3	**SH4B**	**160**	TSI 30 acres; group selection	**moderate**	**2013**
4	**HS4B/H1A**	**109**	group selection/single tree release	**moderate**	**2018**
5	**H3-4D/H1B**	**76**	TSI 25 acres; crop tree release	**low**	**2018**
all		**As required**	Establish and paint boundary lines	**high**	**2009**
field		**11.9**	Brush-Hog. Follow with delayed mowing every 3 to 5 years.	**High**	**2009**
all			Reevaluate and update management plan		**2018**

APPENDIX A: SOILS MAP


TOWN OF WEARE
EASTMAN LANDS
Soils Map
Map Notes:
This is not a survey, nor
is it intended for use as a survey. Map
boundary data from Town of Weare tax
maps and GPS location of corner and
boundary monumentation.
The soils data is a digital version of the
Hillsborough County Soil Survey developed
by the Soil Conservation Service.
NO SLOPE
0 TO 3 PERCENT SLOPES
0 TO 8 PERCENT SLOPES
3 TO 15 PERCENT SLOPES
8 TO 15 PERCENT SLOPES
15 TO 25 PERCENT SLOPES
15 TO 35 PERCENT SLOPES
BOROHEMISTS, PONDED
COLTON LOAMY SAND
LYMAN-TUNBRIDGE-ROCK OUTCROP COMPLEX
MONADNOCK STONY FINE SANDY LOAM
NAUMBURG FINE SANDY LOAM
OSSIPEE PEAT
SHERRY STONY FINE SANDY LOAM
TUNBRIDGE-LYMAN-MONADNOCK COMPLEX, STONY
wetland 1.3
2a WP3A 12.6
3a SH4B 20.6
1a H2-3A 95.1
10 1.3
2b WP3A 3.5
wetland 2.5
3c SH4B 14.8
4a HS4B H1B 7.4
4b HS4B H1B 9.5
4c HS4B H1B 5.4
2c WP3A 37.1
3d SH4B 10.5
wetland 6.9
4e HS4B H1B 24.9
3b SH4B 47.7
3e SH4B 0.5
3f SH4B 3.3
5 H3-4D H1B 75.5
wetland 1.47
2d WP3A 6.6
4d HS4B H1B 2.8
4f HS4B H1B 5.0
1b H2-3A 40.7
4g HS4B H1B 5.6
4h HS4B H1B 21.0
landing 20.6
4i HS4B H1B 27.5
3h SH4B 5.7
3g SH4B 54.9
1c H2-3A 13.7
1d H2-3A 6.0
3i SH4B 2.3
field 11.9
ECOSYSTEM
Map Created by:
TEMCO
the private consulting
division of
Meadowsend Timberlands Ltd.
PO Box 966
New London, NH 03257
mtl@tds.net
September, 2008