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WEARE – BARTLETT BROOK 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 as changes in the property condition or objectives change 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

Bartlett Brook Forest is a contiguous tract on 138.7 acres (113.5 forested)[1] and is managed by the Weare Conservation Commission as a working Town Forest. The property is located in the west central region of Weare, with frontage along the south side of Route 149, the Deering/Weare town line, and Sawyer Road.

The terrain is variable, ranging from inoperable cliff, steep rocky hillsides, to moderate slopes, flats, and wetland areas (both open water and forested). The open water wetland system is found in the southeast corner of the Forest. This open water wetland has some forested wetlands and wet meadow areas contiguous with it. There are some smaller forested wetlands elsewhere in

1 Mapped acres, 5/2010

the Forest, another open wet meadow, and vernal pools.

Inoperable cliff (l) and talus/boulders (r). Rich vegetative diversity associated with this microsite. Also good habitat for small mammals (porcupine). Approximately 1.5 acres in size.

The forestland is varied, but is dominated by hemlock, white pine, red maple and red oak, which combined account for more than 85% of the total timber volume in the Bartlett Brook Forest. White pine here was established immediately following the abandonment of agricultural land in the late 1800s and early 1900s. In places white pine is the dominant species; sometimes it shares dominance with hemlock; elsewhere it is a scattered but consistent component of the overstory in combination with mixed hardwoods. Hemlock appears throughout the Forest in similar fashion. Hemlock typically occupies the areas of shallow soil and ledge, and some of the low areas adjacent to the numerous vernal pools and small wetlands dotting the property. It is also a strong component of the understory because it is very shade tolerant, unlike white pine. Red maple is rarely dominant in the forest, rather it is an opportunistic generalist, and grows in most areas with moderate available sunlight. Red oak tends to occupy drier areas, or places subject to occasional droughty conditions. It is often found on ridgetops and hilltops. If it can become established, red oak can grow rapidly in enriched, mesic sites, and be the dominant species over large acreage.

Woodlot History

The land has a long history of agricultural and timberland use; the abundance of stone walls throughout the property, the numerous skid trails and narrow access roads suggest a fairly intense use. Weare itself had a prosperous agricultural history, which peaked in the mid to late 1800s. 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.

The Bartlett Brook Forest was at one time called the Schwaumburg Parcel Town Forest.

The majority of the tract acreage was once open agricultural land, a mix of pasture, hayfields, and croplands. The present forest is a mix of species, with the dominant trees approximately 90-130 years old. Immediately following farm abandonment, the open agricultural land tended to favor the establishment and growth of white pine. The resulting forest has been through several 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. Those harvests have further contributed to the structure and composition of the forests within the tract.

Evidence of a small mill site can be found in the middle of the tract, located adjacent to Bartlett Brook. A flat, squared-off area can still be discerned, with obvious earthwork. The site is now partially overgrown, and some machinery artifacts were noted at the site. It was probably a sawmill, given its somewhat remote location and proximity to old skid trails and truck access roads.

Machinery artifacts (l), access road (c), and mill site (r). Note size of vegetation.

Not far from the mill site, and just west of the open water beaver pond, is more direct evidence of timber harvesting – a stack of 4-foot pulpwood. The wood is now mostly decayed, but remains in a narrow, straight row.

Pulpwood pile remains, along length of pile (l) and view of face of pile (r)

A stone cellar hole, and other stone framework associated with a farm can be found adjacent to Sawyer Road, south of the intersection with Toby Hill Road. It once supported a large house, and is still in decent condition. Large trees are now growing within its perimeter, providing some information on how long ago the house disappeared.

Above: views of the stone foundation next to Sawyer Road

3 LANDOWNER GOALS AND OBJECTIVES

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

1. Maintain the diversity of plant and animal life so as to sustain ecological processes.
2. Maintain a healthy and vigorous forest that can sustainably yield forest products.
3. Allow hunting, fishing, hiking, botanical observation, wildlife observation, and other recreational activities. The town forests will be managed to maintain and enhance these opportunities.
4. Maintain Tree Farm status.

4 GEOLOGIC ATTRIBUTES

Topography and Aspect

The Bartlett Brook Forest ranges from 700 feet elevation along Route 149 to just over 1020 feet in the southwest corner of the property. It includes a rocky hill in the northwest portion of the property, and relatively rolling terrain throughout.

The property generally has a northerly aspect, with variation associated with hills and drainages.

Brooks, Ponds, and Wetlands

Bartlett Brook flows northwest through the southern half of the property, entering the property through the open water (beaver flowage) in the southeast corner, continuing along a relatively narrow, rocky channel, passing through another small wetland (open emergent marsh/aquatic bed), and eventually exiting along the town line with Deering.

Forested wetland (l) and open water beaver flow (r)

Emergent marsh/aquatic bed (l) and stream channel (r)

There are other smaller forested wetlands within the Bartlett Brook Forest, and there are a few vernal woodland pools. These are not associated directly with a perennial stream channel, but some are associated with intermittent stream channels.

Recommended Actions to Improve and Manage the Wetland and Water Resource of the

Bartlett Brook Forest[2]:

Riparian and Stream Ecosystems:

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

Springs and seeps:

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

Soils

The upland soils were derived from glacial till and are primarily moderately well drained stony silt loam soils. The major soil units present (over 60% of the land) include Tunbridge-Lyman-Monadnock complex, stony (160B, 160C, 160D), and Borohemists, ponded (197). Other minor soils include Monadnock stony fine sandy loam, Becket fine sandy loam, Lyme stony loam, Marlow stony loam, Peru stony loam, Skerry stony fine sandy loam, and Pillsbury stony loam.

While the majority of the soils are well drained and generally productive, most have limitations due to rockiness and to a lesser degree slope; some are poorly drained or are wetlands (Borohemists, Pillsbury, Lyme). For further details see soils map in Appendix A.

Recommended Actions to Improve and Manage the Soil Resource of the Bartlett Brook Forest[3]:

Forest soils, forest floor and Site Productivity:

- Avoid whole-tree removal, particularly on low-fertility sites (i.e., shallow to bedrock soils,

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

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

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

5 NATURAL COMMUNITIES[4]

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 activities, the physical conditions of the site, and the plant communities currently found there and

4 All information on Natural Communities referenced from the publication: Natural Communities of New Hampshire, Daniel Sperduto and William Nichols, New Hampshire Natural Heritage Bureau and The Nature Conservancy, 2004.

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. A more comprehensive and detailed study by an ecologist would be required to determine natural community types on a more fine-grained and certain basis.

The dominant natural community type found on the Bartlett Brook Forest is hemlock-beech-oak-pine forest. Hemlock-beech-oak-pine is a common, broadly defined community occupying glacial till and terrace soils of low to mid elevations in central and southern New Hampshire. Other natural communities are imbedded within the hemlock-beech-oak-pine forest, usually in relatively small clusters, including: hemlock forest; hemlock-cinnamon fern forest; hemlock-beech-northern hardwood forest, and sugar maple-beech-yellow birch forest. There are several wetland communities within Bartlett Brook Forest, but the specific natural community for each has not been identified.

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* conducted by Bill Nichols made no mention of any natural communities or plant species considered rare/endangered/threatened located on the Bartlett Brook property; however that does not mean there are not any.

Integrating the varied habitat conditions found on Bartlett Brook 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 Bartlett Brook Forest, some areas may be designated as “Ecological Reserve”, meaning there will be no active management allowing the area to progress and change naturally without human influence in terms of active management. “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 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

Bartlett Brook Forest provides a variety of habitats for wildlife, including dense conifer forestland, hardwood forestland, and mixed conifer/hardwoods. Evidence of deer and moose activity is fairly abundant. Bear sign, most notably claw marks on beech trees, was noted in the higher elevations in the southwest corner area. Bear likely frequent the adjacent wetlands areas. Red oak, also fairly abundant throughout the property with many large individual stems, provides a source of hard mast (acorns) that is eaten by a variety of birds and many mammals including, turkey and deer.

Mature red oak stem near open wetland (l). Dense softwood cover with oak component (r).

There aren't many upland open areas or agricultural fields that have recently been abandoned. Most open habitat is limited to differing wetland communities, which 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 frequent visitors to these wetlands systems. The beaver meadows and flowage associated with the Bartlett Brook drainage provides habitat for riverine associated animals, including mink and otters.

An open-water system associated with beaver activity (note beaver lodge)

The forestland does vary and offers some structural diversity. Previous timber harvesting has created pockets of young seedlings and saplings surrounded by mature (and sometimes intermediate aged) trees. Large snags near these openings offer perching sites for raptors. Residual woody material created by logging has contributed some woody debris. 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. Because of their importance as habitat components, snags and down logs will be managed for throughout the property.

Large woody debris and large standing snags (both) with cavities

Releasing existing understory trees, especially mast producers, will improve the wildlife habitat. Early successional habitat is minimal here; creating more will be one goal of silviculture. Ideally, locations having a few larger aspen stems 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.

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 Bartlett Brook and on adjacent lands. Hemlock-Hardwood-Pine dominates the site. A small amount of marsh land and some peat wetland can be found on Bartlett Brook Forest and on adjacent lands.

Recommended actions to improve and manage the wildlife habitat of Bartlett Brook Forest[5]:

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

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

create a minimum of 4 secure cavity or snag trees per acre, with one exceeding 24" dbh and three exceeding 14" dbh. In areas lacking cavity trees, retain live trees of these diameters with defects likely to lead to cavity formation.
- Retain as many live trees with existing cavities and large unmerchantable trees as possible.
- When possible, avoid disturbing cavity trees, snags, and upturned trees roots from April to July to avoid disrupting nesting birds and denning mammals.
- Retain trees with cavities standing dead trees, downed logs, large trees, and large super canopy trees in the riparian management zone to the greatest extent possible.

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 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

Bartlett Brook Forest provides ample recreational opportunities. An extensive trail network exists throughout the forest, used moderately by motorized recreation such as ATV's and

snowmobiles. The presence of a tree stand noted during the timber cruise indicates the property is also likely hunted during deer season in the fall. Other recreation opportunities include snowshoeing and cross country skiing during winter months, and hiking in the summer. The beaver pond would also offer a chance for kayaking or canoeing.

The trails on Bartlett Brook are in need of additional maintenance, especially regarding preventing soil erosion and "trail braiding" around wet spots. *Best Management Practices* provide trail construction and maintenance guidelines that will help prevent soil erosion. Additional signage outlining proper trail use and respect of the land would also benefit the condition of the trails and surrounding forest, as well as provide educational opportunities. Regular upkeep of signs and trail maintenance is important as it demonstrates integrity of the leadership and clubs involved.

Recommended Actions to Improve and Manage the Recreational Resource of the Bartlett Brook Forest:

- **Improve existing signage.**
  - Post a Welcome sign to the land that identifies the owner and what is allowed or encouraged on the land. This is not the best place to detail what is not allowed.
  - Post signs at all property corners and at intervals along the boundary identifying the landowner.
  - Improve informational signage about use of trails, explaining what is allowed and what is not allowed. For example:
    - Stay on the trail
    - Carry in and Carry out
    - Avoid trails if conditions are muddy
- **Clearly identify what trails are open to motorized and non-motorized use**
  - Post a map of the trails and allowed uses.
- **Locate and maintain trails to prevent erosion**[6]
- **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

Education

Educational opportunities are limitless on Bartlett Brook. 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

6 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

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 Hillsborough County forester is an excellent resource for public education needs and is usually willing to participate in workshops or provide educational resources.

Further opportunities are presented through interpretation of cultural history and past land use within the property. Specifics might include determining the history and extent of the mill site operation, or when the farm was built and abandoned. There are many creative ways to educate; opportunities are not limited to those listed here.

Suggested opportunities to utilize the public education potential of Bartlett Brook 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 Bartlett Brook Forest.
- Create and **post educational signage** about Bartlett Brook 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 ≥ 75% dominant & co-dominant trees are hardwood
S ≥ 65% 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 June and July, 2010 consisting of 35 sample points. Data was collected as outlined in the Weare master plan.

Age and Age Class Distribution

As with most forests in New England, Bartlett Brook Forest is largely even-aged when dominant canopy trees are considered, with the bulk 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. Beech and sugar maple take longer to reach maturity, and accrue volume at lower rates. Multiple timber harvests conducted in the interim have contributed to the age structure, too, using different silvicultural methods. Those harvests that were not clearcuts of the entire property (to be sure, there appears to be no evidence of the entire tract having been clearcut at one time since its reversion to forestland) have added to the age classes found in Bartlett Brook Forest, even if the actual logging was an even-aged practice for a specific location. Thus, the forest is transitioning from an even-age forest to one with more uneven-age characteristics.

Variability exists within an even-age 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. Bartlett Brook Forest has canopy trees ranging from 90-130 years old, including white pine, hemlock and red oak. Younger trees, often clusters of medium sawtimber and pole-sized hardwood species, can be found in pockets where past harvesting or natural disturbances, such as blow down, created openings. Bartlett Brook Forest lacks stems in the zero to 30 year age class, a reflection on the absence of large-scale disturbance (including logging) on the property in that time frame.

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 Bartlett Brook Forest falls within this range.

Tree Quality and Tree Health

Overall tree quality on the Bartlett Brook Forest is average to above average. White pine (400,000 bf) represents about one-half the total sawtimber volume on the forest, but a high percentage of it includes economically maturing and over-mature trees. The quality of the pine varies; previous harvests removed some of the "wolf pine" that are crooked, multi-stemmed, and branchy, but many still remain. Other pine are decent quality, straight stemmed individuals but growing in overcrowded conditions that could lead 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 common. Hemlock, having the highest total timber volume (1,200 cords) in Bartlett Brook Forest, is actually decent quality for hemlock in the region, and is estimated to contribute 125,000 bf of sawtimber. Red maple, ranking third in total volume (775 cords), is low quality, with over 90% classified as pulpwood. Red oak, fourth in total volume on Bartlett Brook Forest (600 cords), is of good to excellent quality, with only 30% of volume classified as pulpwood. Red oak appears to do well on these sites and should be favored, especially intermediate and young stems that exhibit strong growth and quality characteristics. The remaining volume is a mix of species, including decent quality black and yellow birch.

The most pressing health concern involves the mature and over-mature white pine, likely with red rot and some white pine blister rust. These diseases are widespread and common to pine of this age and initiation, and their presence typically indicates a timber harvest is overdue. Other commonly occurring tree diseases and damage were noted on the forest; including weevil damage 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 or other forms of damage, including prior logging injury. The soils on Bartlett Brook Forest are relatively productive, and should contribute to high tree vigor and volume production.

Forest Management Approach

Management on the Bartlett Brook forest will utilize a combination of silvicultural techniques that typically are separated into two general categories, even-age and uneven-age management. Even-age 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. Uneven-age 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 (uneven-age management) as a small clear-cut (even-age 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 uneven-aged 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 even-aged management is specifically called for, management typically will fall in the uneven-aged category.

Even-aged stand (l) and multi-aged stand (r). Note lack of understory or midstory vegetation in even-aged stand, a common condition in older (50+ years) even-aged stands.

Further discussion of uneven-age management is required. Traditionally, the intent of uneven-age management is to attain forest stocking conditions that mimic a specific diameter/age distribution. But, practicably speaking, uneven-age 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 Bartlett Brook 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. Target diameters 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		

Hemlock/Hardwood Silviculture

The hemlock and hardwood community on Bartlett Brook 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 110-160 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.

White Pine Silviculture

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 (incident sunlight) 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 even-age. 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 even-age structure. Timing of treatments is most effective during the snow-less season, where adequate soil scarification is attained. The species composition that resulted from earlier

harvests within Bartlett Brook Forest seem to indicate a lack of scarification (winter logging), a poor pine seed year at the time of those harvests, or both.

Another variable in obtaining sufficient pine regeneration is the overall ability of the soil to grow hardwood trees. A soil with a high site index for hardwoods is best suited to grow hardwood. In these soils there is a high level of available nutrients that will undoubtedly permit a layer of hardwood regeneration so thick that whatever pine is established will be readily overgrown. This hardwood competition is favored due to the fact that once pine seed germinates, it has a slow growth rate for approximately 5 years before more rapid growth begins. On these better-nutrient sites, precommercial weeding of the hardwoods is required to perpetuate white pine. This hardwood competition is often present in lower density on the nutrient poor sites as well, but such soils are better suited for pine. Site wise, well-drained sandy soils with low cation exchange capability are favorable for white pine. Timing, silvicultural technique and soil type is critical to promote the continuity of the pine resource.

The soils on Bartlett Brook are generally suited for vigorous white pine growth; however, seedling establishment is challenging, as most of the soils favor hardwood competition. If established and released from hardwood competition, white pine saplings should experience decent growth. White pine might be established in large groups, along skid trails, and below the more open canopy conditions created by a shelterwood, which would help to perpetuate white pine as a significant component in the natural communities found here.

Red Oak Silviculture

The art and science of growing red oak is equally as tricky as for 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 USDA Forest Service 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, viable acorns are naturally scarce.

To successfully germinate, the acorn requires exposed mineral soil, ideally in well-drained, deep loams. Scarifying the duff layer during logging operations in snowless seasons best accomplishes 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. 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 focus on root growth contributes to another challenge of oak management, whereby there is 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 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 16-24 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 adventitious (hidden) buds that respond readily 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 southern and western sides, will ensure less opportunity for epicormic branching.

Access

Road access to the Bartlett Brook Forest is generally good, and is provided by frontage along Route 149, Toby Hill Road, and Sawyer Road. At present, there is no access point along the Route 149 frontage. Old log landings are located along Sawyer Road. Both Toby Hill Road and Sawyer Road will need upgrades to facilitate timber harvesting, primarily grading, installing water bars or culverts, and adding some roadbed material/stone. The previous landing sites could be reused with similar upgrading.

Operability

The terrain and ground conditions on this tract in general do not limit operability, although seasonal restrictions should be observed in some places. The undulating terrain has some low areas with the water table near the surface, but is generally driew along the hillsides and hilltops. 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, including a cut-to length system that creates a mat of slash to drive over, therefore protecting wet ground from rutting and mitigating negative impacts.

Property Boundary

The Bartlett Brook Forest boundary is in variable condition and includes approximately 8,200 feet of maintainable boundary line. This includes some lengths across open water, and doesn't include boundary in common with road frontage, such as along Route 149, Sawyer Road, or Toby Hill Road. A combination of stonewalls, wire fencing, corner monumentation and painted blazes make up the boundary (yellow blazes along the Deering town line, red and older yellow blazes along the southern boundary line). The 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, along road frontage, and at trail entrances and access roads.

There are a few instances of "trespass" by abutters and others, with cutting of tress, dumping of garbage, disposal of construction and site work debris, ATV encroachments, permanent tree stands, and other issues. By clearly delineating the boundary lines, future encroachments may be reduced, and any that occur would be willful.

FOREST DATA

Stand 1 **S4A** 47.3 acres


Stand Structure


Stand Structure


Forest Canopy

GENERAL ATTRIBUTES

Natural Community Type:	hemlock-beech-oak-pine; hemlock; hemlock-cinnamon fern
Past Management History:	cut ca1945; 1975
Approximate Age of Dominant Trees:	90-120
Stand Health:	average to above average
Insects/Damage/Disease:	weevil; blister rust; pine coleopsis; birch canker

SITE CONDITIONS

Determined by:	soils map & field observation
Tree vigor:	average
Soils:	Tunbridge-Lyman-Monadnock Complex; Lyme stony loam; Peru stony loam; Marlow stony loam; Becket stony fine sandy loam; Skerry stony fine sandy loam
Drainage:	well-drained, except for the Lyme unit (poorly drained)
Terrain:	rolling; rocky; shallow ledge; moderate slopes
Aspect:	all, but generally north

Snags Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	12.6	2.4	5.0	20.1
12-18"	2.7	1.6		4.3
>18"		0.5		0.5
Grand Total	**15.3**	**4.5**	**5.0**	**24.8**

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

Down Logs Per Acre

DBH Class	Cavity/Hollow	Moderately punky	Punky throughout	Sound	Grand Total
<12"		5.0	24.4	3.0	32.4
12-18"	1.1	1.0	6.4		8.4
>18"	1.1				1.1
Grand Total	**2.1**	**5.9**	**30.8**	**3.0**	**41.9**

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

WILDLIFE HABITAT

Forest type:	softwood forest
Vertical diversity:	ok, lacking strong understory component
Vegetative diversity:	ok; rattlesnake plantain noted near intersection of Toby Hill Road and Sawyer Road.
Hard mast:	red oak, white oak (minor)
Soft mast:	maple, witch hazel
Special habitat features:	ledge; crevice areas in talus-like slope
Snag trees:	numerous, but deficient in large diameter class
Down logs:	numerous; some larger diameter present
Special wildlife practices:	favor white oak acorn production by releasing individuals; retain hemlock/softwood cover; create 2 large snags/acre

RECREATION

Recreational features:	unmaintained skid trails
Recreational infrastructure:	minimal
Aesthetic resources:	potential views from hilltops; cellar hole/foundation
Public access:	available with plenty of frontage; lacking defined parking

SILVICULTURE

Structural and Silvicultural Attributes

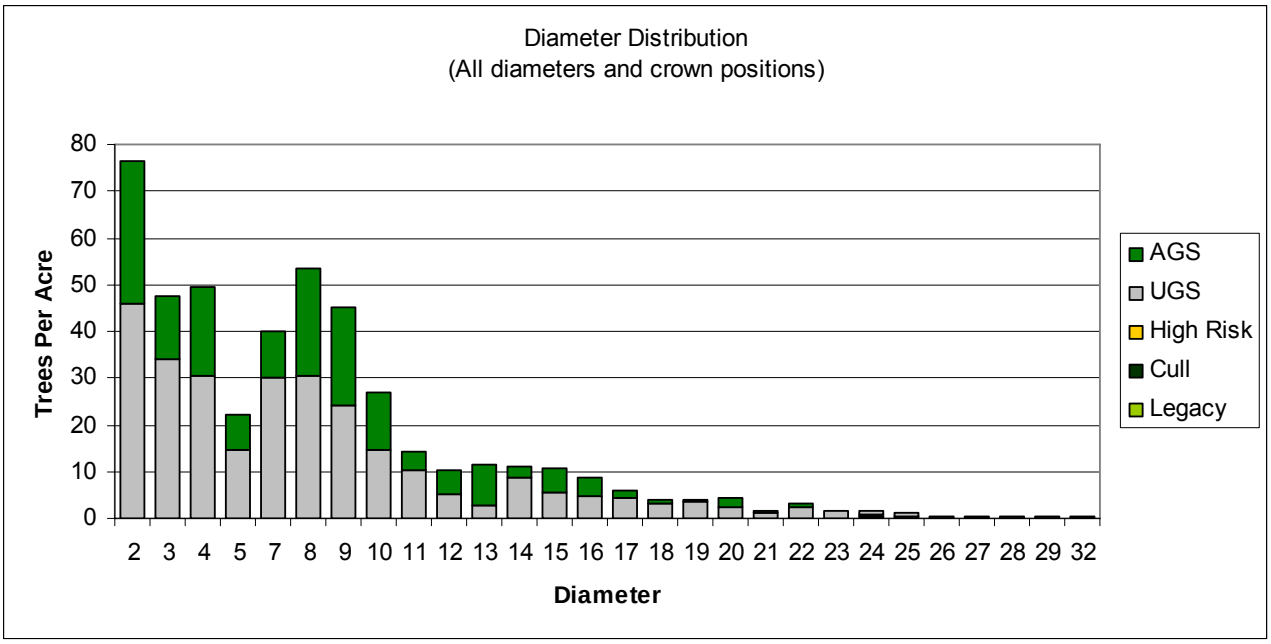
Broad Forest Type:	S4A
Size Class:	medium to large sawtimber
Stand Structure:	even-aged; some variation
Crown Closure:	90%
Total Basal Area Per Acre:	206
Total Merchantable Basal Area Per Acre:	198
Total Acceptable Basal Area Per Acre:	72
Trees Per Acre:	456
Quadratic Mean Stand Diameter:	9.1
Percent AGS Sawtimber:	51.0%
Basal Area of AGS Sawlogs:	41
Timber Quality:	average to above average

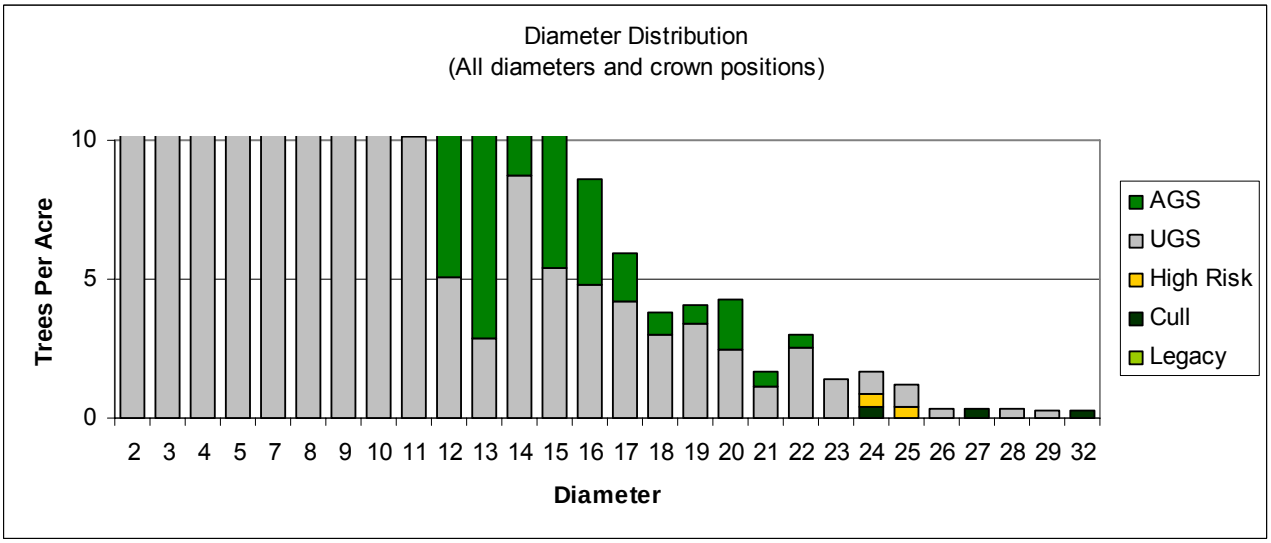
Forest Composition and volume

Species	% TPA	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Legacy (cd)	Total Volume in Cords	High Risk	AGS Saw	% AGS Saw
Black Birch	7.8%	411	81	1.5	0.3	0.0	2.7	0.0	282	57%
Red Maple	15.0%	0	0	3.9	0.0	0.0	3.9	0.0	0	0%
Red Oak	8.9%	1,138	453	2.0	0.2	0.0	5.0	0.0	977	61%
White Birch	1.2%	0	0	0.3	0.0	0.0	0.3	0.0	0	0%
White Oak	1.2%	0	0	0.2	0.0	0.0	0.2	0.0	0	0%
Yellow Birch	1.9%	112	0	0.6	0.0	0.0	0.8	0.0	0	0%
Total Hardwood Per Acre:	*35.9%*	*1,662*	*534*	*8.3*	*0.5*	*0.0*	*12.8*	*0.0*	*1,260*	57%
Hemlock	48.2%	1,420	0	13.0	0.0	0.0	15.5	0.0	1,313	92%
White Pine	15.9%	4,880	905	4.6	0.3	0.0	14.9	509.7	2,225	38%
Total Softwood Per Acre:	*64.1%*	*6,300*	*905*	*17.7*	*0.3*	*0.0*	*30.4*	*509.7*	*3,537*	49%
Total Volume Per Acre:	100.0%	7,962	1,438	26	1	0	43	510	4,797	51%
Stand Volume:		376,264	67,980	1,230	38	0	2,039	24,088	226,710	

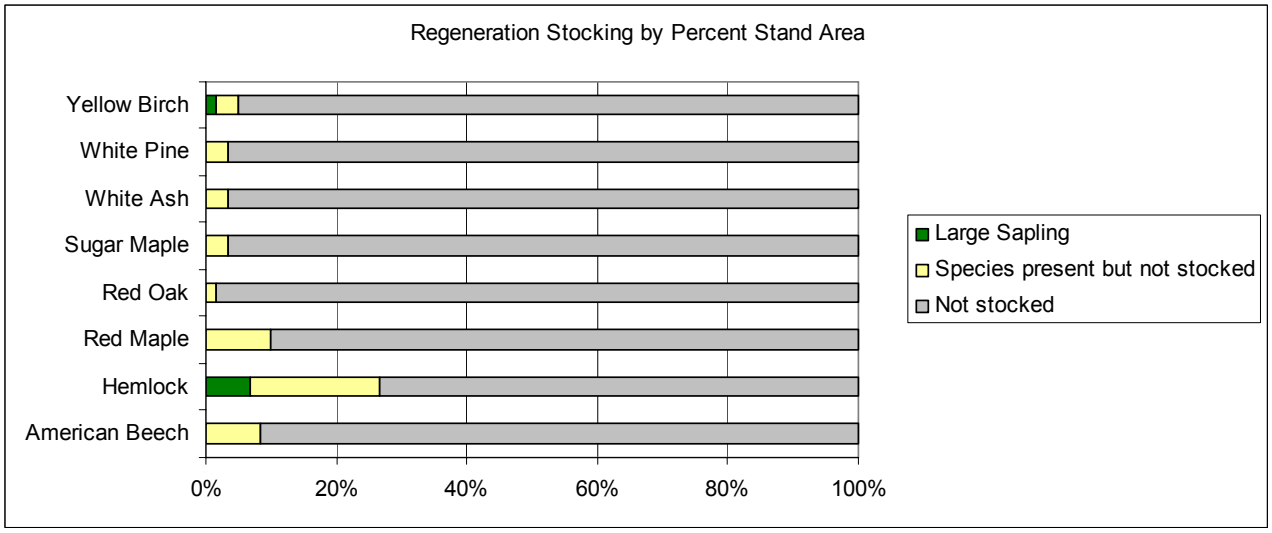
Table 1.3: Stand volume by species and product per acre values.

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.

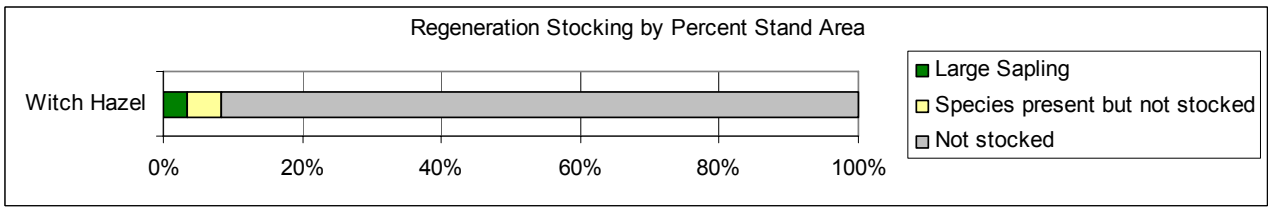




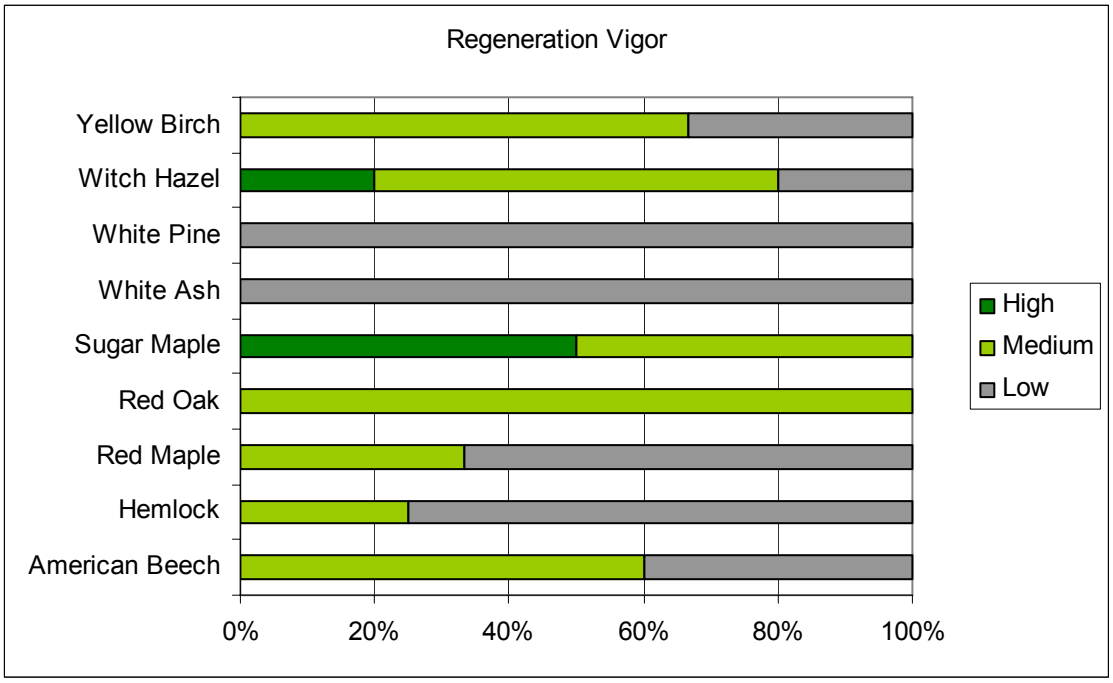
Graph 1.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less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



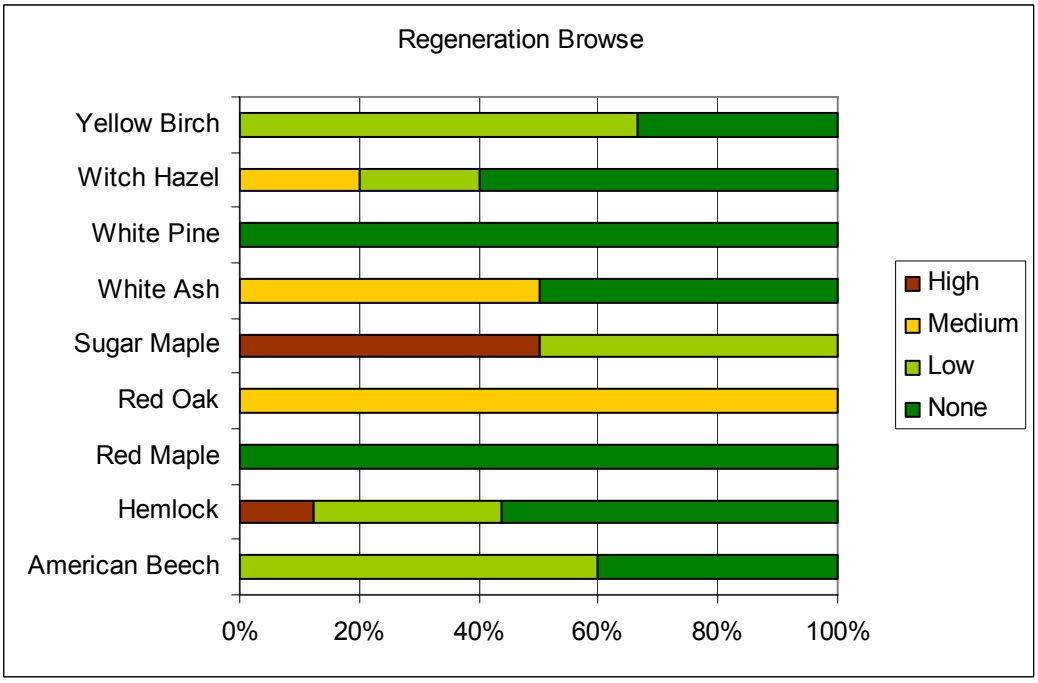
Graph 1.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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:	group selection; single tree release	
Harvest Entry:	within 10 years	
Products:	sawtimber; pulpwood	
Desired Composition:	favor softwood where possible; otherwise grow high quality hardwoods; develop multi-age class	
Crop tree target diameter:	WP – 22	HE – 16
	RO – 22	BB/YB - 18

Operational Considerations

Operability:	average; some steep/ledge/rocky areas
Seasonal limitations:	limit spring/fall mud season operations
Terrain:	rolling, some steep areas & ledge
Access and landing area:	need upgrades to use existing landings, could also create new landings
Access distance:	1/2-mile or less, but uphill to existing landings
General maintenance:	roads need upgrades; landings need upgrades
Brook-wetland crossings/buffer requirements:	crossings for intermittent streams; limit work in riparian area along Bartlett Brook

STAND SUMMARY AND 10-YEAR MANAGEMENT SCHEDULE

Type 1 is a single contiguous stand of white pine and hemlock, with a minor component of mixed hardwood. White pine and hemlock dominate the product volumes, while hemlock accounts for nearly 50% of the total stem count (pine and red maple account for about 15% each). The canopy is relatively closed in most parts of the type, averaging 90% closure. Total type basal area is high, at over 205 square feet per acre. The type approximates a two-aged stand, with a patchy midstory surrounded by significantly older trees.

Regeneration is scarce. Only hemlock (about 22%) is represented in at least 10% of the type area. Establishing new seedlings should be a consideration during the next harvest entry.

There are many intermediate stems (poletimber and small sawtimber) scattered in the type, having decent quality and growth characteristics. These size stems are the immediate replacements for larger sawtimber trees that will be removed at some point, although many sawtimber stems will not be harvested. Red oak, black birch, hemlock and white pine should be favored during group selection treatments.

The long-term goal of management in this stand is to develop several age classes of quality sawtimber trees of species well suited to the site, particularly red oak, yellow birch, black birch, hemlock, and white pine. 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 does not reflect the natural species mix and will likely change over time, especially a decrease in the white pine component, unless it can be successfully regenerated.

Silviculture: The focus of management here will be to harvest mature white pine and hemlock,

especially lower quality stems, and attempt to create conditions conducive to regenerating white pine. These goals will be accomplished 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.

2013: Harvest significant white pine and hemlock volume, removing the poorest quality wood as a priority, but also include high-quality mature stems. Release groups and individual intermediate and regeneration stems, especially black birch, red oak and white pine. Reduce basal area to approximately 130-145 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.
- **Shelterwood:** In areas with limited existing regeneration, remove most of the understory and 40 to 60% of the overstory, leaving a somewhat well distributed overstory of average to above average quality white pine to serve as a seed source and protective cover for new seedlings. The remaining overstory within the shelterwood should be removed following successful establishment of new seedlings and saplings, approximately 10-15 years following the first stage harvest. This can be modified by removing only half of the remaining overstory at the 10-15 year mark, and removing most of the remaining original overstory 25 year after the first stage harvest.

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 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 2 trees >18” in diameter per acre.
- Maintain existing snags and large down logs.
- Maintain 1/4-acre to 1/2-acre areas with dense hemlock in the overstory for winter cover.
- Favor individual white oak stems by releasing from vegetative competition.

Stand 2 **SH3A** 66.2 acres


Stand Structure


Stand Structure


Forest Canopy

GENERAL ATTRIBUTES

Natural Community Type:	hemlock-beech-oak-pine; hemlock-beech-northern hardwoods; sugar maple-beech-yellow-birch
Past Management History:	cut ca1950, 1980
Approximate Age of Dominant Trees:	80 to 110
Stand Health:	decent
Insects/Damage/Disease:	blister rust; white pine weevil; birch canker; beech bark disease

SITE CONDITIONS

Determined by:	soils map & field observation
Tree vigor:	good
Soils:	Tunbridge-Lyman-Monadnock Complex; Becket stony fine sandy loam; Marlow stony loam; Lyme stony loam; Monadnock stony fine sandy loam; Pillsbury stony loam; Borohemists, ponded; Skerry stony fine sandy loam; Peru stony loam
Drainage:	poor – Lyme, Pillsbury, and Borohemists all others well-drained
Terrain:	rolling, smooth
Aspect:	all, but primarily north

Snags Per Acre

DBH Class	Moderately punky	Punky throughout	Sound	Grand Total
<12"	13.3	8.8	12.0	34.1
12-18"	1.8		1.1	2.9
>18"			0.3	0.3
Grand Total	**15.1**	**8.8**	**13.5**	**37.3**

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

Down Logs Per Acre

DBH Class	Cavity/Hollow	Moderately punky	Punky throughout	Sound	Grand Total
<12"		76.6	63.8	46.2	186.6
12-18"		1.3	0.8	0.7	2.8
>18"					
Grand Total		**77.9**	**64.6**	**46.9**	**189.4**

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

WILDLIFE HABITAT

Forest type:	softwood forest
Vertical diversity:	canopy; sub-canopy; understory; ground
Vegetative diversity:	moderately high
Hard mast:	red oak, white oak, beech
Soft mast:	maple, ash, hemlock
Special habitat features:	wetlands; vernal pools; upland adjacent to beaver pond
Snag trees:	numerous, but few larger than 18”
Down logs:	numerous, but few larger than 18”
Special wildlife practices:	maintain/create patch openings next to beaver pond to allow hardwood vegetative growth

RECREATION

Recreational features:	remote access canoeing/kayaking
Recreational infrastructure:	minimal; unmaintained skid trails/log landing access road
Aesthetic resources:	mill site; beaver pond
Public access:	frontage on class 6 town road; parking area not developed

SILVICULTURE

Structural and Silvicultural Attributes

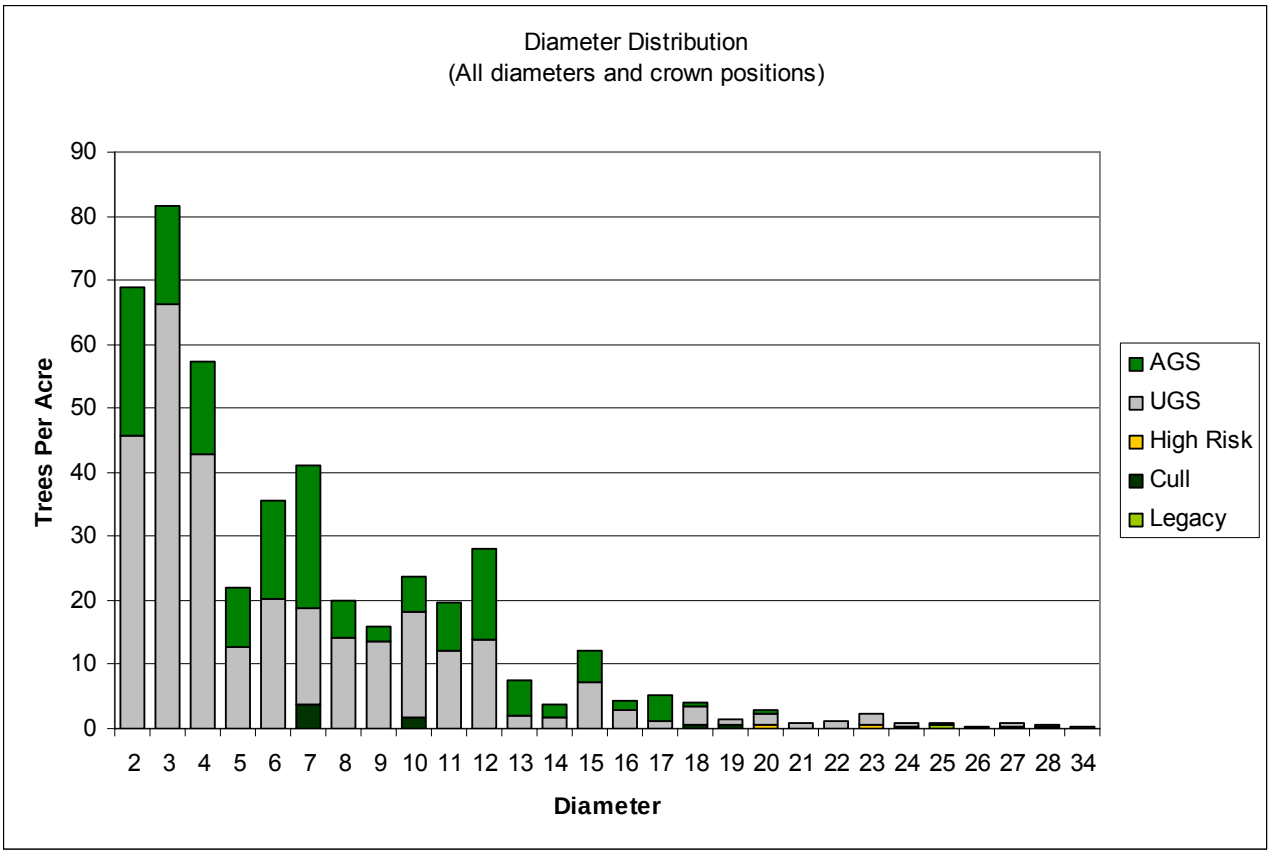
Broad Forest Type:	SH3A
Size Class:	most sizes represented
Stand Structure:	mult-aged
Crown Closure:	90%
Total Basal Area Per Acre:	176
Total Merchantable Basal Area Per Acre:	165
Total Acceptable Basal Area Per Acre:	58
Trees Per Acre:	463
Quadratic Mean Stand Diameter:	8.3
Percent AGS Sawtimber:	48.4%
Basal Area of AGS Sawlogs:	39
Timber Quality:	slightly better than average

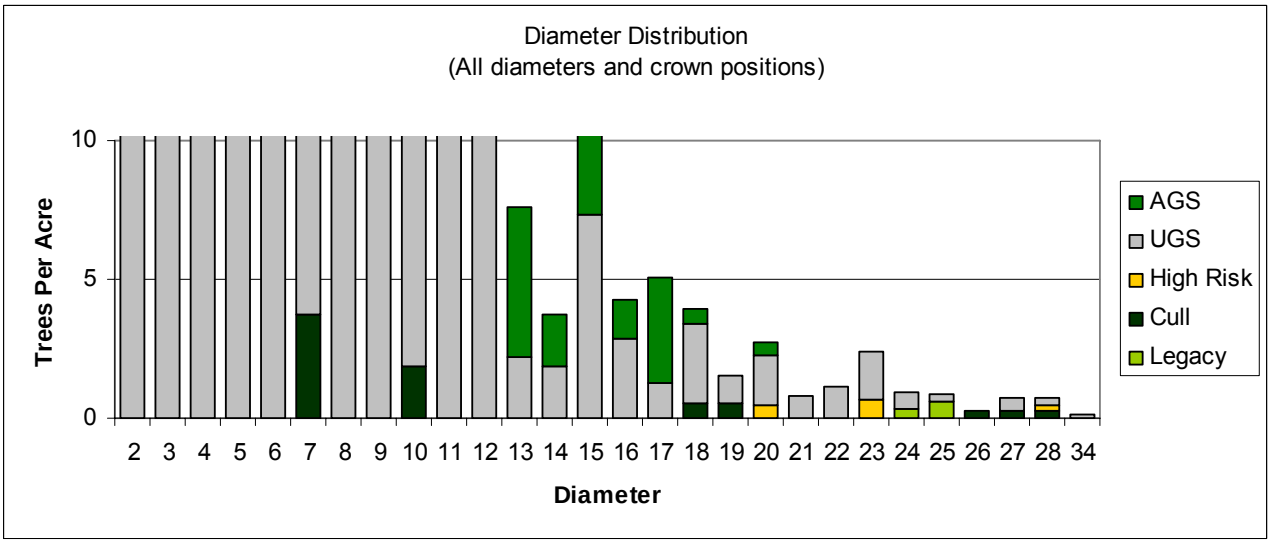
Forest Composition and volume

Species	% TPA	Sawlog (bf)	Pallet/Tie (bf)	Pulp (cd)	Growing Stock (cd)	Legacy (cd)	Total Volume in Cords	High Risk	AGS Saw	% AGS Saw
American Beech	4.8%	0	0	0.6	0.0	0.0	0.6	0.0	0	0%
Black Birch	13.7%	260	75	1.5	0.6	0.0	2.8	0.0	218	65%
Red Maple	30.7%	391	30	8.3	0.0	0.0	8.9	88.9	170	40%
Red Oak	10.3%	1,507	588	1.5	0.5	0.0	5.6	154.3	1,341	64%
Sugar Maple	1.3%	40	30	0.2	0.0	0.0	0.4	0.0	70	100%
White Ash	1.2%	0	0	0.5	0.0	0.0	0.5	0.0	0	0%
White Birch	1.2%	0	0	0.2	0.0	0.0	0.2	0.0	0	0%
Yellow Birch	3.6%	94	58	0.9	0.0	0.0	1.1	0.0	0	0%
Total Hardwood Per Acre:	*66.9%*	*2,291*	*781*	*13.8*	*1.1*	*0.0*	*20.1*	*243.2*	*1,800*	59%
Hemlock	26.2%	877	0	5.3	0.0	0.0	7.0	0.0	877	100%
White Pine	6.9%	1,536	466	1.3	0.0	0.0	4.8	361.4	206	10%
Total Softwood Per Acre:	*33.1%*	*2,413*	*466*	*6.6*	*0.0*	*0.0*	*11.8*	*361.4*	*1,083*	38%
Total Volume Per Acre:	100.0%	4,704	1,248	20	1	0	32	605	2,882	48%
Stand Volume:		311,579	82,666	1,351	71	0	2,111	40,047	190,926	

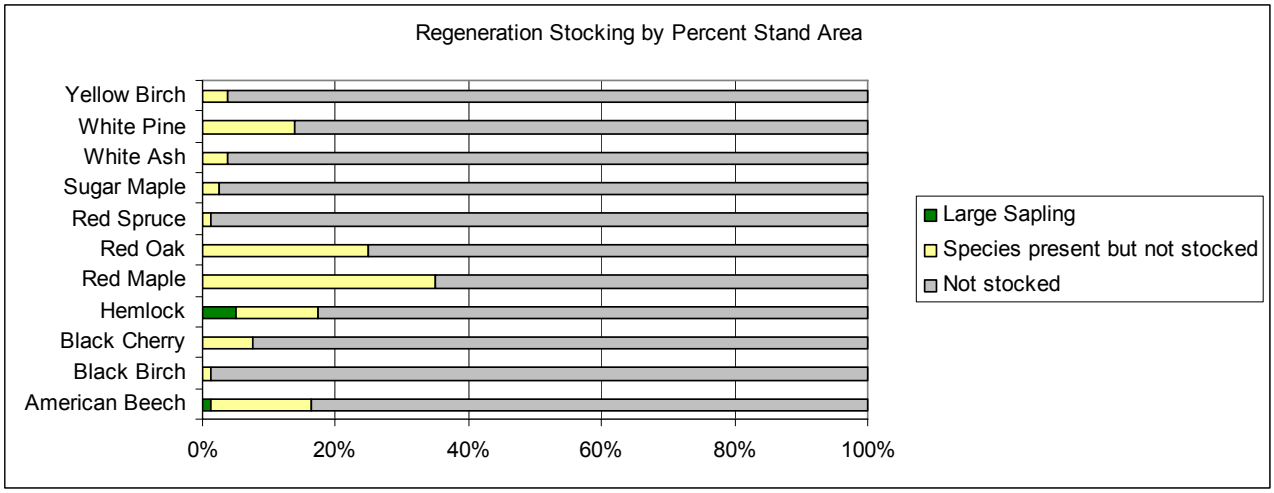
Table 2.3: Stand volume by species and product per acre values.

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

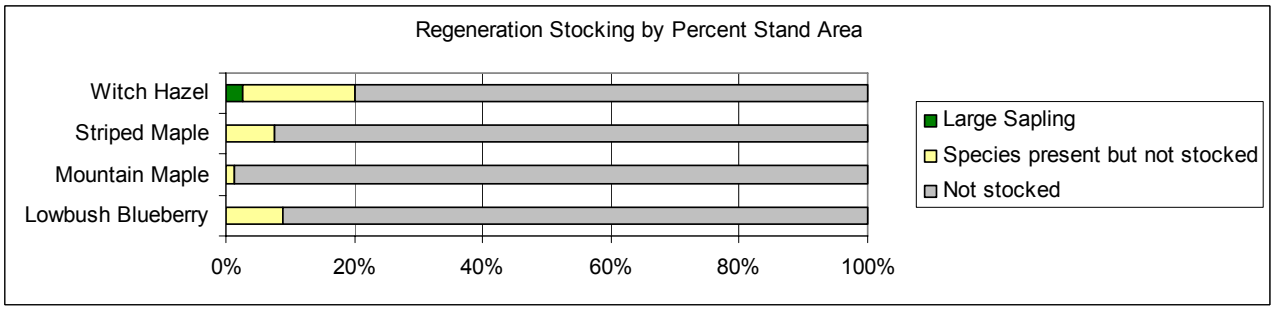




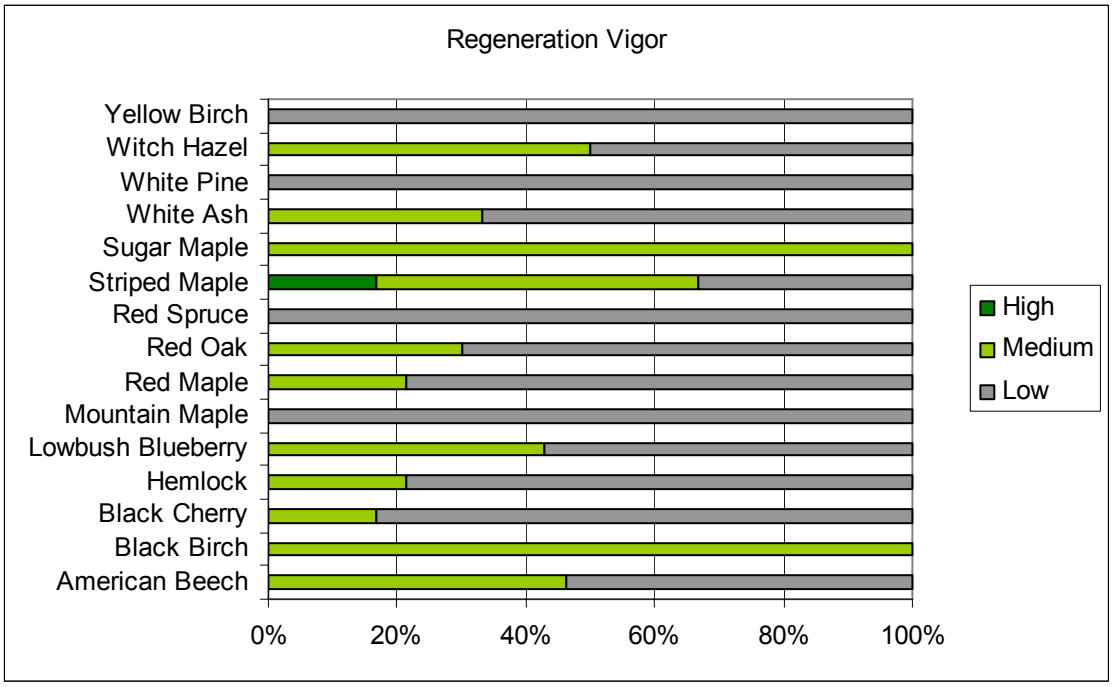
Graph 2.2: Regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), or 25 seedlings less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



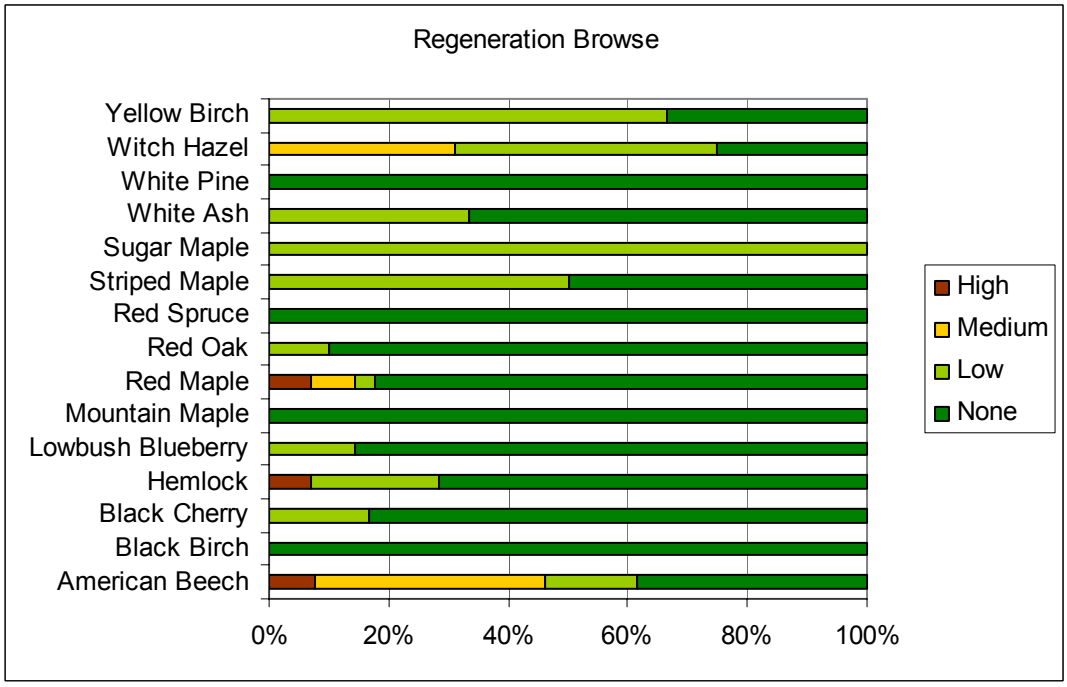
2.3: Shrub and competing species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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:	uneven-aged	
Harvest Entry:	within 10 years	
Products:	sawtimber, pulpwood, cordwood	
Desired Composition:	mulit-aged; mixed conifer/hardwoods;	
Crop tree target diameter:	RO – 22	BB/YB – 18
	HE – 16	WP – 20
	RM - 16	

Operational Considerations

Operability:	mostly operable
Seasonal limitations:	frozen ground or snow for harvests in Pillsbury and Lyme soil units
Terrain:	rolling; smooth; some rocks/boulders/ledge; generally not steep
Access and landing area:	need upgrades/maintennance to use – road repairs, drainage, brush removal, bridge/culvert to reach old landing
Access distance:	moderate, up to 1/2-mile
General maintenance:	road surface eroded; water diversion structures in need of repair/replacement/installation, brush encroaching
Brook-wetland crossings/buffer requirements:	several – crossing needed over perennial stream; type has border with several wetlands, includes some poorly drained soils; minimize removals from riparian corridor and from around forested wetlands; harvest to edge of beaver pond area to encourage hardwood vegetation

STAND SUMMARY AND 10-YEAR MANAGEMENT SCHEDULE

Type 2 includes 3 non-contiguous stands dominated by hemlock and red maple, which account for almost 60% of the total stem count and 50% of the total product volume in the stand. Black birch and red oak each represent more than 10% of total stems within the type, with the rest consisting of a mix of white pine and other hardwoods. The canopy is closed in most parts of the type, averaging 90% closure, while basal area is medium for the type, around 175 square feet per acre. Current stand structure and characteristics indicate the type is uneven-aged, having multiple age and size classes.

Advanced regeneration (large saplings/small poletimber) is decent in the understory, although seedling population is somewhat low. Red maple and red oak regeneration can be found in more than 20% of the area, while pine, beech, and hemlock can be found in over 10% of the area.

Intermediate stems (poletimber and small sawtimber) are well-represented, with many quality examples within the type. These intermediates should be released during overstory removals and at the edges of more group selections. Intermediates to favor are white pine, red oak and black birch, which appear to have the best quality and highest potential in this type.

Sawtimber opportunities are good in this type, with an estimated 6,000 board feet per acre,

about evenly divided between softwoods and hardwoods. The long term goal of management in this type is to produce high quality hardwood sawtimber, varied wildlife habitat needs, and perpetuate the white pine component to the extent possible by utilizing even-aged strategies within the broader uneven-aged structure of the type. The resulting pattern of harvesting will maintain a multi-aged stand that 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, although beech may be more present in the overstory and white pine less so.

Silviculture: The focus of management in this stand will be to harvest white pine, hemlock, red maple, and red oak sawtimber, especially high-risk individuals and low quality stems. Release existing groups of advanced regeneration, especially red oak and black birch, but also work with quality white pine and hemlock examples. Create conditions to regenerate white pine seedlings where success is likely.

2013: Harvest modest red maple, white pine, hemlock , and red oak volume, removing the poorest quality wood as a priority, but also include high-risk mature stems. Release groups and individual intermediate and regeneration stems, especially black birch, red oak and white pine. Reduce basal area to approximately 110 to 130 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.

Wildlife: Wildlife habitat here will remain diverse while the multiple-age structure is perpetuated. White-tailed deer and moose browse the 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 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; augmenting beaver habitat by using small patch cuts or large group openings adjacent to the beaver pond.

- Create additional snags by girdling 1 or 2 trees > 18” in diameter per acre.
- Maintain existing snags and large down logs.
- Maintain areas with dense hemlock overstory for winter cover.

Bartlett Brook
TOTAL FOREST TIMBER AND PULP VOLUME
August, 2010
113.5 Forested Acres

Species	Sawlog (bf)	Tielog (bf)	Total BF	Pulp (cds)	Growing Stock (cds)	Cull (cds)	Total Volume in Cords	% Cords
Hardwood								
American Beech	0	0	*0*	37	0	0	*37*	*0.9%*
Black Birch	36,638	8,795	*45,433*	171	55	0	*309*	*7.5%*
Red Maple	25,905	1,960	*27,865*	733	0	44	*776*	*18.7%*
Red Oak	153,589	60,389	*213,978*	195	38	0	*612*	*14.7%*
Sugar Maple	2,622	2,011	*4,633*	15	0	0	*23*	*0.6%*
White Ash	0	0	*0*	35	0	0	*35*	*0.9%*
White Birch	0	0	*0*	24	0	0	*24*	*0.6%*
White Oak	0	0	*0*	8	0	0	*8*	*0.2%*
Yellow Birch	11,514	3,842	*15,356*	88	0	10	*109*	*2.6%*
Total Hardwood:	230,268	76,997	307,265	1,306	93	54	*1,933*	
Softwood								
Hemlock	125,184	0	*125,184*	970	0	44	*1,198*	*28.9%*
White Pine	332,390	73,649	*406,039*	305	14	28	*1,018*	*24.5%*
Total Softwood:	457,574	73,649	531,223	1,275	14	72	*2,216*	
Total Volume:	687,842	150,646	838,488	2,581	107	126	*4,149*	

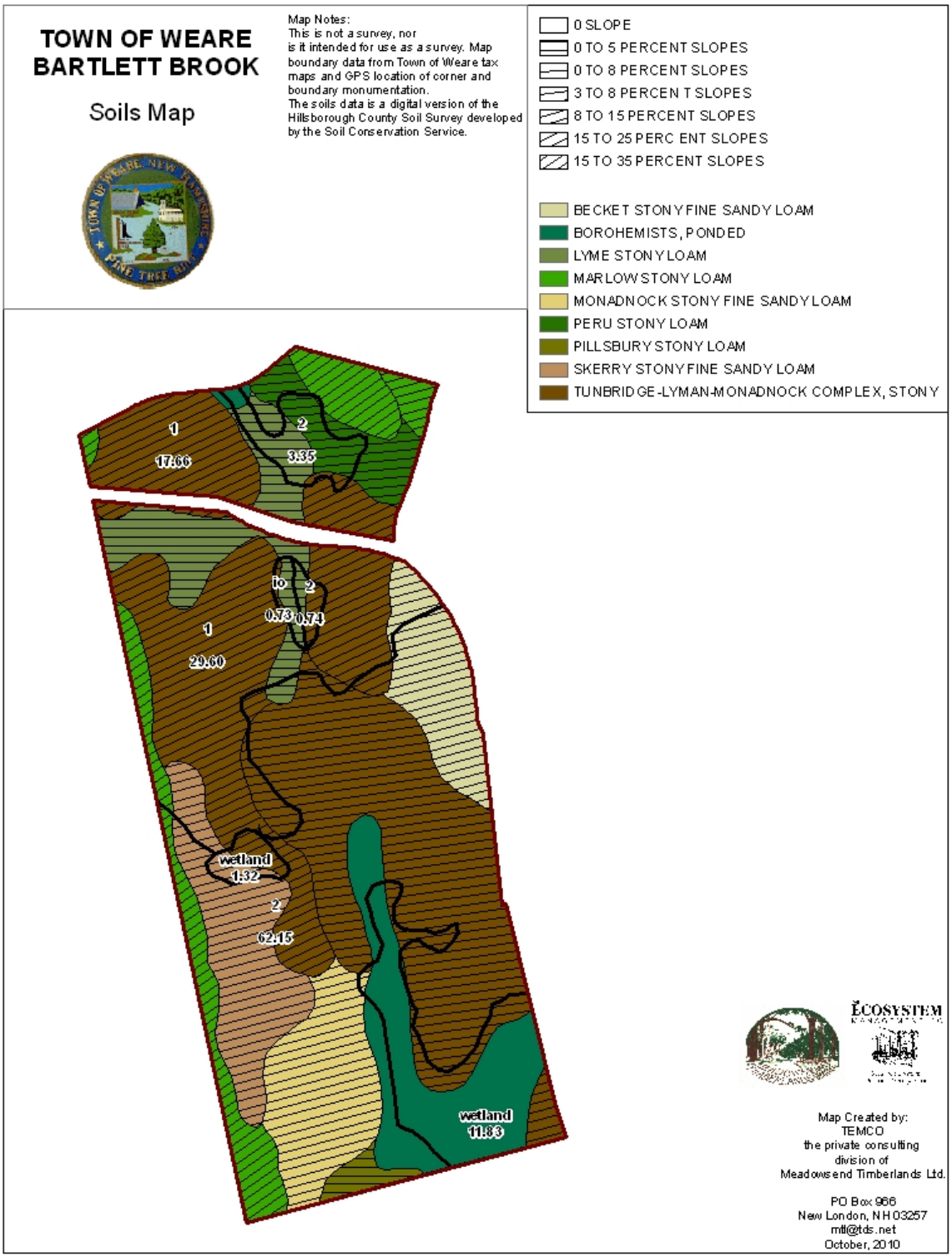
BARTLETT BROOK FOREST

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 #	Acres	Treatment	Priority	Year
1	**30**	group selection, some shelterwood	**high**	**2013**
2	**40**	group selection; single stem releas	**mod**	**2013**
2	**10**	small patch cuts next to beaver pond	**mod**	**2013**
		Paint boundary lines	**med**	**2011-2012**
all		Reevaluate and update management plan		**2020**

APPENDIX A: SOILS MAP


TOWN OF WEARE
BARTLETT BROOK
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.
0 SLOPE
0 TO 5 PERCENT SLOPES
0 TO 8 PERCENT SLOPES
3 TO 8 PERCEN T SLOPES
8 TO 15 PERCENT SLOPES
15 TO 25 PERC ENT SLOPES
15 TO 35 PERCENT SLOPES
BECKET STONY FINE SANDY LOAM
BOROHEMISTS, PONDED
LYME STONY LOAM
MARLOW STONY LOAM
MONADNOCK STONY FINE SANDY LOAM
PERU STONY LOAM
PILLSBURY STONY LOAM
SKERRY STONY FINE SANDY LOAM
TUNBRIDGE-LYMAN-MONADNOCK COMPLEX, STONY
1
17.66
2
3.35
io
2
0.73
0.74
1
29.60
wetland
1.32
2
62.15
wetland
11.83
ECOSYSTEM
Map Created by:
TEMCO
the private consulting
division of
Meadowsend Timberlands Ltd.
PO Box 966
New London, NH 03257
mtl@tds.net
October, 2010