Forest Management Plan
and Breeding Bird Survey
for
YMCA Camp Coniston

Croydon, Springfield, and Sunapee, NH

1,177+/- Mapped Acres

View to the west from opening on Sugar Hill, Camp Coniston.

Prepared for:
YMCA Camp Coniston
John Tilley
24 Camp Road
Croydon, NH

January, 2021

Prepared by:
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In collaboration with:
Phil Brown
NH Audubon

FOREST INFORMATION SUMMARY

YMCA Camp Coniston Forest

Acres: 1,179

Tax Map and Lot:

Croydon:

Map 8, Lot 221- Pine Hill Rd
Map 8, Lot 366- Pine Hill Rd
Map 8, Lot 367- Pine Hill Rd
Map 8, Lot 585- Pine Hill Rd

Springfield:

Map 5, Lot 82.512- Hogg Hill Rd
Map 10, Lot 146.175- Hogg Hill Rd
Map 15, Lot 697.2- Stoney Brook Rd
Map 15, Lot 700.1- Pine Hill Rd

Sunapee:

Map 201, Lot 1- off North Rd.
Map 202, Lot 1- North Rd.

Survey:

Croydon: “Property of Interlaken Camps” by Walter Breckenridge, dated May, 1954.
Springfield: “Hogg Hill Subdivision” by James H. Neil, dated 1973.
Sunapee: n/a

Conserved Status: Not conserved

Tree Farm Status: Enrolled, good standing.

ROW:

+/- .9 miles frontage Pine Hill Road, both sides
+/- 500 feet frontage on Stoney Brook Road
+/- 60 feet and +/- 500 feet on Hogg Hill Road
+/- 1,700 feet on West Road

Contact Information:

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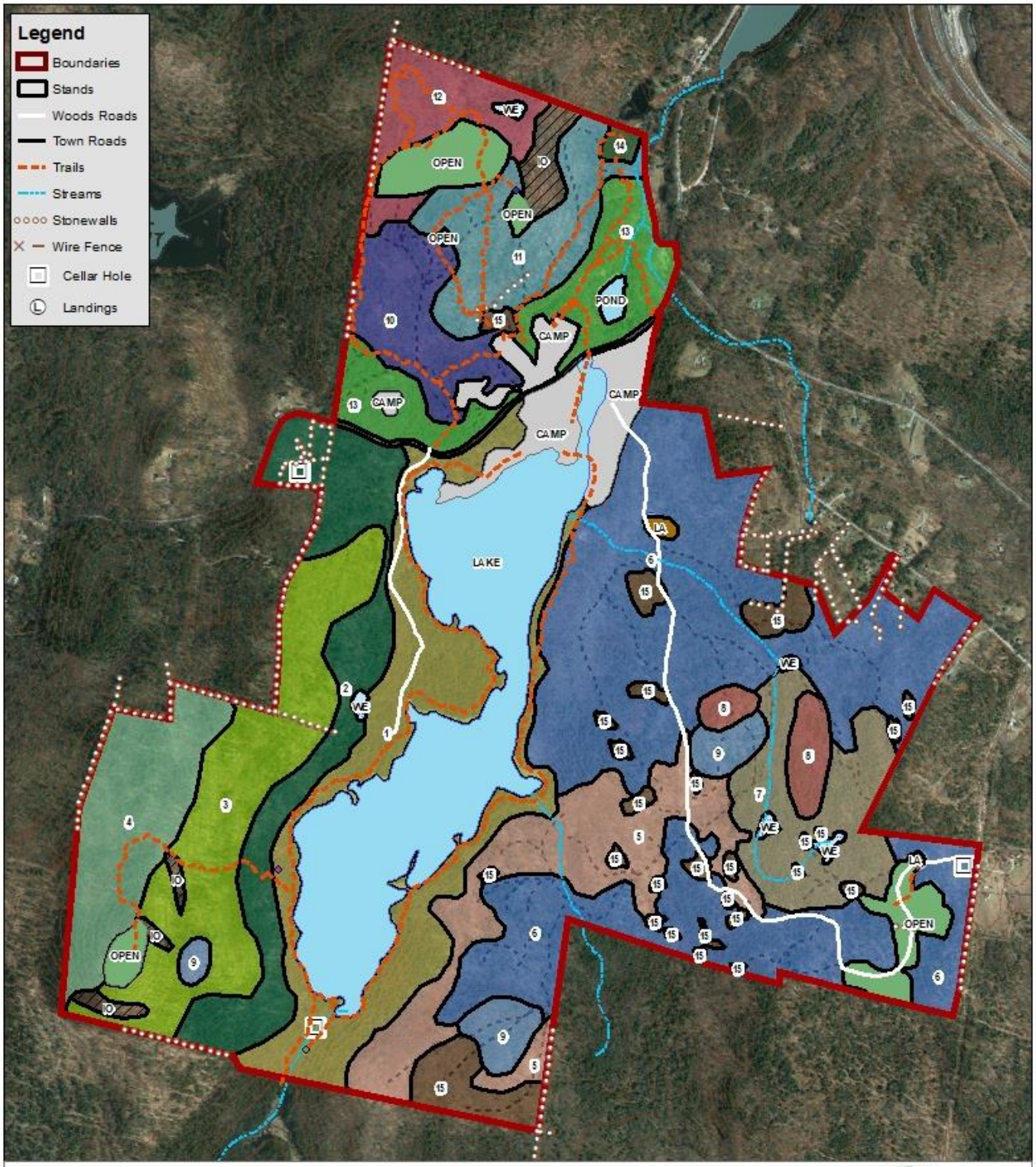

YMCA Camp Coniston

FOREST MANAGEMENT MAP

Croydon, Springfield, and Sunapee NH
1,177 mapped acres

This map is not a survey, nor is it intended to be used as a survey.

1:15,000
0 500 1,000 2,000 Feet
N

MEADOWSEND

Map created by: Laura French
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January, 2020

PLAN INTRODUCTION AND PURPOSE

The purpose of this forest management plan is to provide the landowner, YMCA Camp Coniston, with a comprehensive description of the land and proposed management activities. It is meant to be a "User's Guide" that reflects the landowner's objectives and will remain flexible as changes in the property condition or objectives change through time. This plan is unique, in that it was created in part through collaboration with New Hampshire Audubon's land manager, Phil Brown, who performed a breeding bird survey of the land. His findings helped shape the management recommendations found within, practicing silviculture with 'birds in mind'. This plan is an update older plans, one prepared in 2009 by MCC and an older one in 1994 by Brooks McCandlish, and actively covers a 10-year period, though it will remain useful for a far longer period of time and may be updated and amended as needed. This plan meets and exceeds the requirements of the Tree Farm program and . It has been prepared by licensed New Hampshire forester Laura French, #405.

CAMP CONISTON LAND MANAGEMENT OBJECTIVES:

- Be responsible stewards of the land;
- Maintain and improve aesthetics of the property particularly in areas visible from the lake, camp and roads;
- Maintain and improve recreational opportunities;
- Study, improve and protect quality breeding bird habitat;
- Protect water quality;
- Maintain and improve habitat for wildlife;
- Improve forest health and vigor;
- Produce high quality timber.

PROPERTY LOCATION AND BRIEF DESCRIPTION

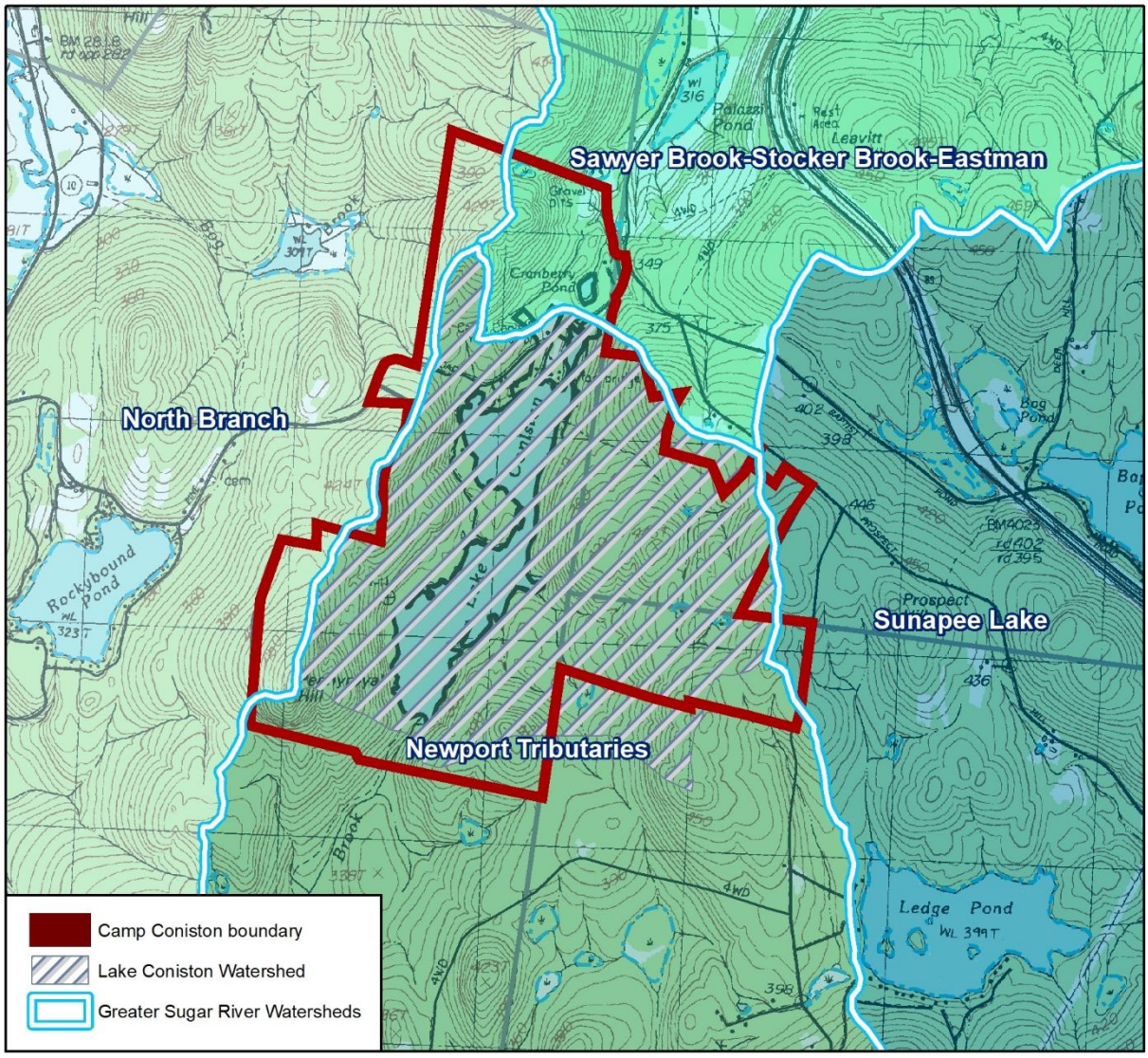
The YMCA Camp Coniston land is located in Croydon, Springfield and Sunapee, New Hampshire and hosts the entire 120+-acre Lake Coniston, also known as Long Pond. The camp is primarily active in the summer season, offering outdoor recreational camping programs to both boys and girls. It is a long-running camp, established here in 1923. Prior to establishment as a camp, the property was primarily woodland and farmland. Stonewalls make up the majority of the boundary lines and can be found throughout the woodlands suggesting a fairly extensive agricultural use, not uncommon for the time period when these farms were active, likely dating back to the 1700's and peaking in the 1800's.

The ownership is one lot, totaling approximately 1,179 acres. Since the previous forest management plan the camp purchased an additional contiguous house lot on Stoney Brook Road. The current ownership includes the

entire 132 +/- acre Lake Coniston and the much smaller 2+/- acre Cranberry Pond. It covers just over 90% of the Lake Coniston watershed, and is part of 4 greater watersheds of the Sugar River including the North Branch, Sawyer Brook-Stocker Brook-Eastman, Lake Sunapee, and Newport Tributaries. The Lake Coniston Watershed falls within the Newport Tributaries watershed.

Shoreline of Lake Coniston during foliage season, 2020.

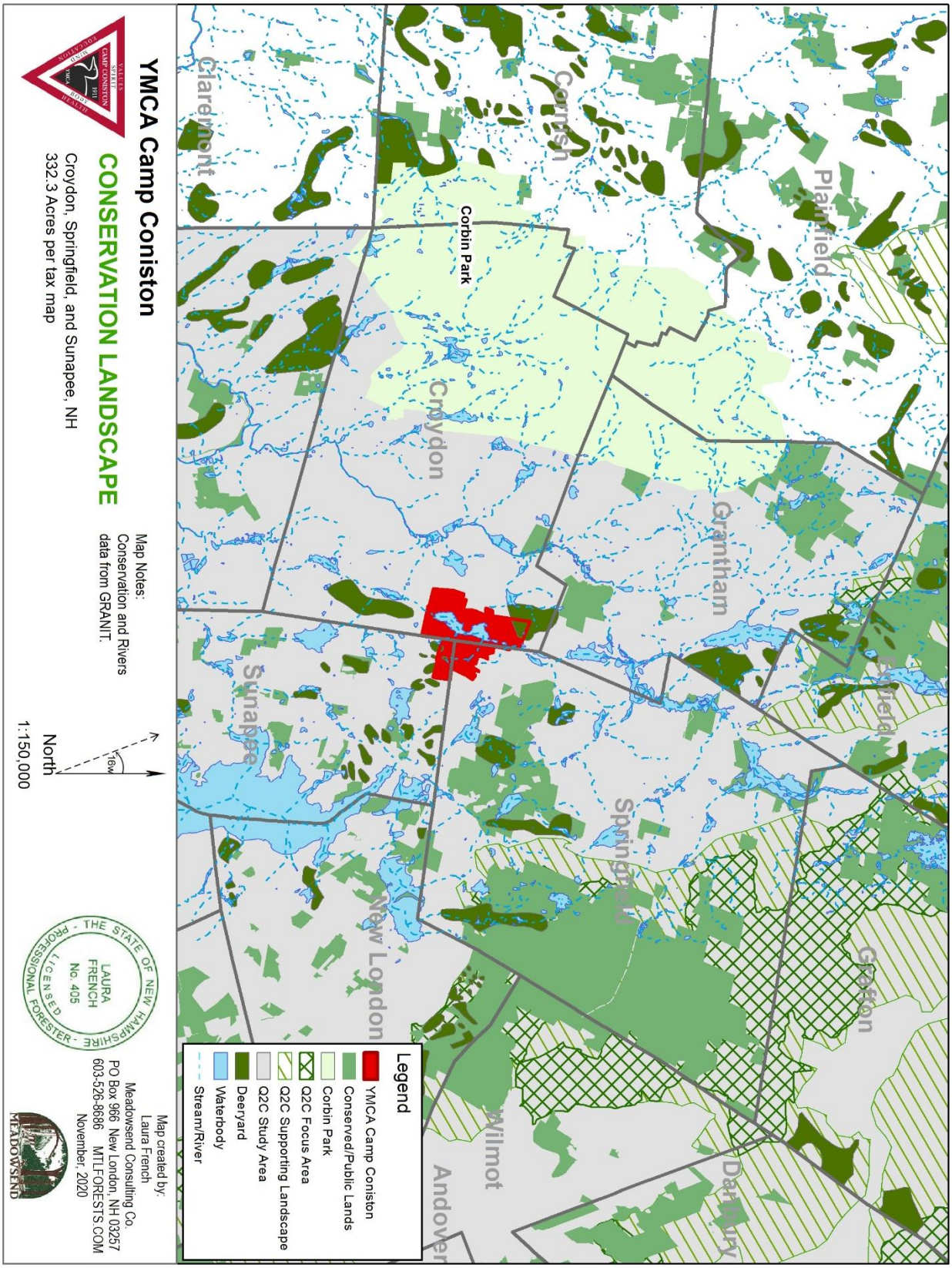
The watershed is defined in part by several heights land on Camp Coniston, the best known are Pennyroyal Hill in the southwest corner with an elevation of 1,580 feet and Sugar Hill height of land, at 1,391 feet in elevation located at the northern extent of the ownership. The forest is a primarily a mix of hemlock and white pine with red oak, white ash, sugar maple, red maple, white birch and beech. Other species are here as well, but in lesser amounts, including red spruce, balsam fir, black cherry, aspen, yellow birch, black birch, hophornbeam and red pine which can be found in a small plantation and growing naturally with white pine. Multiple open areas occur within the forest, and approximately 37 acres have been developed by the camp, though much of that acreage is relatively forested. The ownership also includes approximately 4,000 feet of frontage on both sides of Pine Hill Road in the town of Croydon and a 50-foot right of way and approximately 550 feet of frontage on Hogg Hill in the town of Springfield. There is an additional 1,700+/- feet of frontage on unmaintained, class VI West Road in Springfield.



Map depicting the Greater Sugar River Watersheds (North Branch, Sawyer Brook-Stocker Pond-Eastman, Sunapee Lake and Newport Tributaries) and the Lake Coniston Watershed which falls within the Newport Tributaries Watershed.

LANDSCAPE PERSPECTIVE

Camp Coniston is located amongst a variety of conserved lands, notable waterbodies, important habitat, and some large blocks of unfragmented land. The portion of the ownership north of Pine Hill Road is a 2,000-acre unfragmented block, and the portion south of the road sits on a 4,300-acre unfragmented block. It is located about 2 miles northwest of Lake Sunapee and roughly 5.5 miles east of the Blue Mountains, also known as Corbin Park, a 26,000-acre fenced in private hunting park and wildlife preserve. Also notable, is the 6,675 acre Gile State Forest, located about 4.5 miles to the northeast. Additionally, the northern portion of the tract is part of a 275-acre deer yard, known as the Bog Brook Yard.


YMCA Camp Coniston
CONSERVATION LANDSCAPE
Croydon, Springfield, and Sunapee, NH
332.3 Acres per tax map
Map Notes:
Conservation and Rivers data from GRANIT.
North
16w
1:150,000
Legend
YMCA Camp Coniston
Conserved/Public Lands
Corbin Park
Q2C Focus Area
Q2C Supporting Landscape
Q2C Study Area
Deeryard
Waterbody
Stream/River
Corbin Park
Claremont
Cornish
Plainfield
Croydon
Grantham
Sunapee
Springfield
New London
Wilmot
Andover
Enfield
Grafton
Danbury
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November, 2020
LAURA FRENCH No. 405 LICENSED PROFESSIONAL FORESTER - THE STATE OF NEW HAMPSHIRE
MEADOWSEND

WOODLOT HISTORY

Prior to agricultural development in the 1700's, this land likely was entirely forested by what is considered to be "late successional" tree species well suited to the soils and land here, likely a mix of northern hardwoods including sugar maple, beech, and yellow birch, and hemlock on the majority of the parcel. Given the climate and aspect of the soils here it is also likely white pine and red oak could be found on the warmer and drier slopes areas with less nutrient rich soils. It is reasonable to expect there were American chestnut in the forest as well. The chestnut has since succumbed to and exotic disease, called "Chestnut Blight" introduced here through arboriculture in the early 1900's. Chestnut was an important lumber and wildlife tree, though it did not dominate forests here as it did in the Appalachian Mountains.

Native American use of the land here likely was largely hunting grounds. Native Americans did clear land, but generally that was closer to large rivers and the shore. Agricultural practices of the Native Americans often consisted of a rotational system where they periodically cleared new patches of forest for cropland, taking advantage of the loose, moist, and high level of nutrients found in forest soils, especially under Northern hardwoods. This reasoning is evident especially when one looks at the more intense practices utilized today to maintain open cropland. Pastured and tilled fields continually lose nutrients to weathering, both by wind and rain, but also are impacted by the drying heat of the sun. The effects of this can be seen in the forests that have grown on abandoned pasture and farmland; often, the soils are compacted and lower in nutrient availability than forestland that has never been cleared.

According to Paul W. Pouliot, Sagmo and THPO Cowasuck Band of the Pennacook-Abenaki People COWASS North America, Inc. Abenaki Nation of Vermont, Inc. "YMCA Camp Coniston is Croydon is located on the lands within the Lake Sunapee watershed in N'dakinna, the traditional lands and waterways of the Abenaki, Pennecook and other related Wabanaki Peoples past and present, we acknowledge and honor with gratitude the land itself and the people who have stewarded it throughout the generations for thousands of years from the beginning of time" (Quote referenced from the YMCA Camp Coniston website).

After settlement, agrarian use of the land began in the late 1700's and early 1800's by multiple farmsteads; the first is a complex of cellar holes and barn foundations off West Road in Sunapee shown as owned by S. Bartlett on an 1860 Walling Map. A second complex of old foundations is located on Pine Hill Road near the current camp buildings at the north end of the lake. An 1892 map shows this as the O. C. Barton place. Three other homesteads were located along the stretch of Pine Hill Road that bisects the camp land, noted as C. Patten and Mrs. E. Powers on the north side and H. Currier on the south side. The overall rugged, rocky terrain of Camp Coniston suggests the bulk of the agricultural use was pasture or possibly hayland with very little cultivated crop land. But, like so much land in New England, this agrarian lifestyle peaked in the 1800's and was abandoned by the early 1900's and the open land was allowed to become reforested. Since that widespread disturbance the forest was once again allowed to regrow and has been harvested in various areas and at various times, but has not been in agricultural use for roughly 100 years.

A noteworthy mill site exists at the south end of the lake that was made bobbins for the woolen mills in

Newport and Guild. A small cellar hole can also be found at this mill site. Stonewalls make up the majority of the boundary lines and can be found throughout the woodlands suggesting a fairly extensive agricultural use, not uncommon for the time period when these farms were active, likely dating back to the 1700's and peaking in the 1800's.

The land was purchased by YMCA in 1923 In 1923 YMCA purchased the land, initially called Camp Interlaken for Girls, started by the Dudley family of Hanover, New Hampshire. Since then, it has been operated as an award-winning YMCA camp for both boys and girls.

The remains of a stone sawmill foundation can be found at the southern end of Lake Coniston on Long Brook.

The mill was built in 1850 to make bobbins for the woolen mills in both Newport and Guild. A small cellar hole is located nearby and housed the owner of the mill, David G. Fowler.

According to historical records, the house was moved to the site on the frozen lake.

GEOLOGICAL ATTRIBUTES

Physiographic Regions

Northern New England can be broken down into different physiographic regions, also called eco-regions. The regions are separated from one another based on a combination of climate regimes, topography, surficial geology, and soils. This in turn influences the plant and animal distribution in those regions.

YMCA Camp Coniston Physiographic Regions:

Camp Coniston Forest is located in the one of three distinct regions found in the state, called the

Vermont-New Hampshire Upland Section. According to the book Natural Communities of New Hampshire (Sperduto, 2011.) this section covers the southwestern portion of the state. From maximum elevations of 2200 feet, it slopes southeastward to its boundary with the Gulf of Maine Coastal Plain. It is a sloping plateau dissected by steep, narrow valleys and underlain by granite, gneiss, and schist. This region is divided into four subsections: (1) Sunapee Uplands, (2) Hillsboro Inland Hills and Plains, (3) Vermont Piedmont, and (4) Northern Connecticut River Valley.

Camp Coniston Forest occurs in the Sunapee Uplands, characterized by isolated hills and peaks of hard, resistant rock (mostly granite) commonly referred to as Monadnocks. Numerous small lakes and narrow valley streams are scattered through the area. Drumlins are also distinctive glacial features. Soils are typically shallow and stony and less fertile, which is reflected in the composition and distribution of plant communities.

Topography and Aspect

The present land formations of New England were shaped by the latest glaciation during the Pleistocene Era, which began approximately two million years ago. At that time New England was covered by ice approximately 1 mile thick. The glaciers receded 10,000 to 12,000 years ago leaving behind the mountains, hills, gullies and valleys we are familiar with today. Following primary succession where pioneer species including lichen, algae and fungi in combination with abiotic factors like wind and water slowly built up soils, the forest began to re-grow. Over long periods of the forest has evolved to the mix of species found here today largely determined by soils type, topography, and aspect but also shaped by more recent land use history.

YMCA Camp Coniston Topography and Aspect:

The forestland ranges from approximately 1,120 feet in elevation at its lowest point (the lake) to 1,580 feet at the height of land on Pennyroyal Hill the southwest corner of the tract. Sugar Hill rises in the northwest to an elevation of 1,360 feet. The tract includes almost the entire Lake Coniston watershed, encompassing all aspects. The terrain is variable, but the bulk of it is dominated by moderate to steep slopes with areas of exposed ledge. The heights of land tend to be relatively level pinnacles and incorporate semi-open brushy vegetation. The lower elevations surrounding the lake to the north is more gently sloping and hilly terrain. There is very little level land, the bulk of which houses the camp buildings.

Soils

Soils are the substrate upon which all trees grow. Soil productivity is influenced by the rock from which the soil is derived. For example, soils derived from limestone, or calcium-rich bedrock, tend to be more nutrient rich because of a higher pH. As pH increases more nutrients become available. On the other hand, soils derived from granite, or more acidic bedrock, tend to have a lower pH which locks up nutrients. Not only do different soil types largely drive the mix of vegetation found on a site, soil is critical to productive tree growth, one of the primary objectives of forest management. Sound forest management strives to grow the tree species best

suited for the site. Fighting the site, for example trying to grow high quality sugar maple on acidic soils, will result in poorly formed, low vigor trees with a higher susceptibility to insect and disease problems. Hence, it is important to consider your soil types when determining landowner and management objectives. Additionally, maintenance and consideration of the long-term productivity of the soil resource is critical to the sustainable forest management. Protecting soil quality is often more about what not to do, following good management practices is typically enough for protection and maintenance.

New Hampshire soils have been organized into different "Important Soils Groups" by the NRCS that allow managers to evaluate the relative productivity of soils and to better understand patterns of plant succession and how soil and site interactions influence management decisions. The soil groups are described below:

Group IA consists of the deeper, loamy, moderately well-drained and well-drained soils. Generally, these soils are more fertile and have the most favorable soil-moisture conditions. Successional trends are toward climax stands of shade-tolerant hardwoods such as sugar maple and beech. Early successional stands frequently contain a variety of hardwoods such as sugar maple, beech, red maple, yellow, gray, and white birch, aspen, white ash, and northern red oak in varying combinations with red and white spruce, balsam fir, hemlock, and white pine. The soils in this group are well-suited for growing high-quality hardwood veneer and sawtimber, especially, sugar maple, white ash, yellow birch, and northern red oak. Softwoods are usually less abundant and are best managed as a minor component of predominantly hardwood stands. Hardwood competition is severe on these soils. Successful natural regeneration of softwoods and the establishment of softwood plantations requires intensive management.

Group IB generally consists of soils that are moderately well-drained and well-drained, sandy or loamy-over-sandy, and slightly less fertile than those in group 1A. Soil moisture is adequate for good tree growth but may not be quite as abundant as in group 1A. Successional trends and the trees common in early successional stands are similar to those in group IA. However, beech is usually more abundant on group IB and is the dominant species in climax stands. Group IB soils are well-suited for growing less-nutrient-and-moisture-demanding hardwoods such as white birch and northern red oak. Softwoods generally are scarce to moderately abundant and managed in groups or as part of a mixed stand. Hardwood competition is moderate to severe on these soils. Successful regeneration of softwoods and the establishment of softwood plantations are dependent upon intensive management. The deeper, coarser-textured, and better-drained soils in this group are generally suitable for conversion to intensive softwood production.

Group IC soils are derived from glacial outwash sand and gravel. The soils are coarse textured and are somewhat excessively drained to excessively drained and moderately well-drained. Soil moisture and fertility are adequate for good softwood growth but are limiting for hardwoods. Successional trends on these soils are toward stands of shade-tolerant softwoods, such as red spruce and hemlock. White pine, northern red oak, red maple, aspen, gray birch, and paper birch are common in early successional stands. These soils

are well-suited for high quality softwood sawtimber, especially white pine, in nearly pure stands. Less site-demanding hardwoods such as northern red oak and white birch have fair to good growth on sites where soil moisture is more abundant. Hardwood competition is moderate to slight. With modest levels of management, white pine can be maintained and reproduced. Although chemical control of woody and herbaceous vegetation may be desirable in some situations, softwood production is possible without it.

Group IIA consists of diverse soils and includes many of the soils that are in groups IA and IB. The soils in IIA, however, have limitations such as steep slopes, bedrock outcrops, erodibility, surface boulders, and extreme stoniness. Productivity of these soils isn't greatly affected by those limitations, but management activities such as tree planting, thinning, and harvesting are more difficult and costlier.

Group IIB soils are poorly drained. The seasonal high water table is generally at a depth of 12 inches or less. Productivity is lower than in IA, IB, or IC. Fertility is adequate for softwoods but is a limitation for hardwoods. Successional trends are toward climax stands of shade-tolerant softwoods, such as red spruce and hemlock. Balsam fir is a persistent component in nearly all stands. Early successional stands frequently contain a variety of hardwoods such as red maple, yellow, gray, and paper birch, aspen, and white and black ash in varying mixtures with red spruce, hemlock, balsam fir, and white pine. These soils are well-suited for spruce and balsam fir pulpwood and sawtimber. Advanced regeneration is usually adequate to fully stock a stand. Hardwood competition isn't usually a major limitation, but intensive management by chemical control of competing woody and herbaceous vegetation may be desirable.

YMCA Camp Coniston Soils:

The upland soils of the forest were derived from glacial till and are primarily stony loams and sandy loams. They can be broken into four major categories, one that supports best growth of hardwoods such as Northern hardwoods species, Soils Group IA (*Lyman-Monadnock rock outcrop complex, Marlow loam, Marlow stony loam, Peru stony loam, Sunapee stony fine sandy loam*), one that supports best growth of less nutrient and moisture demanding hardwood such as oak and white birch, Soils Group IB (*Hermon stony fine sandy loam, Monadnock stony fine sandy loam, Monadnock-Hermon Association, Monadnock-Lyman stony fine sandy loams, Monadnock-Lyman rock outcrop complex*), one that supports best growth of pine and oak, Soils Group IC (Adams loamy sand, Colton sandy loam), and one that supports best growth of softwoods such as spruce, fir and hemlock on less well-drained and less nutrient rich, colder sites, Soils Group IIB (*Lyme-Moosilauke loams, Lyme-Moosilauke stony loams, Naumberg loamy sand, Pillsbury stony loam, Rumney loam*). A map of the soils types is included as Appendix A.

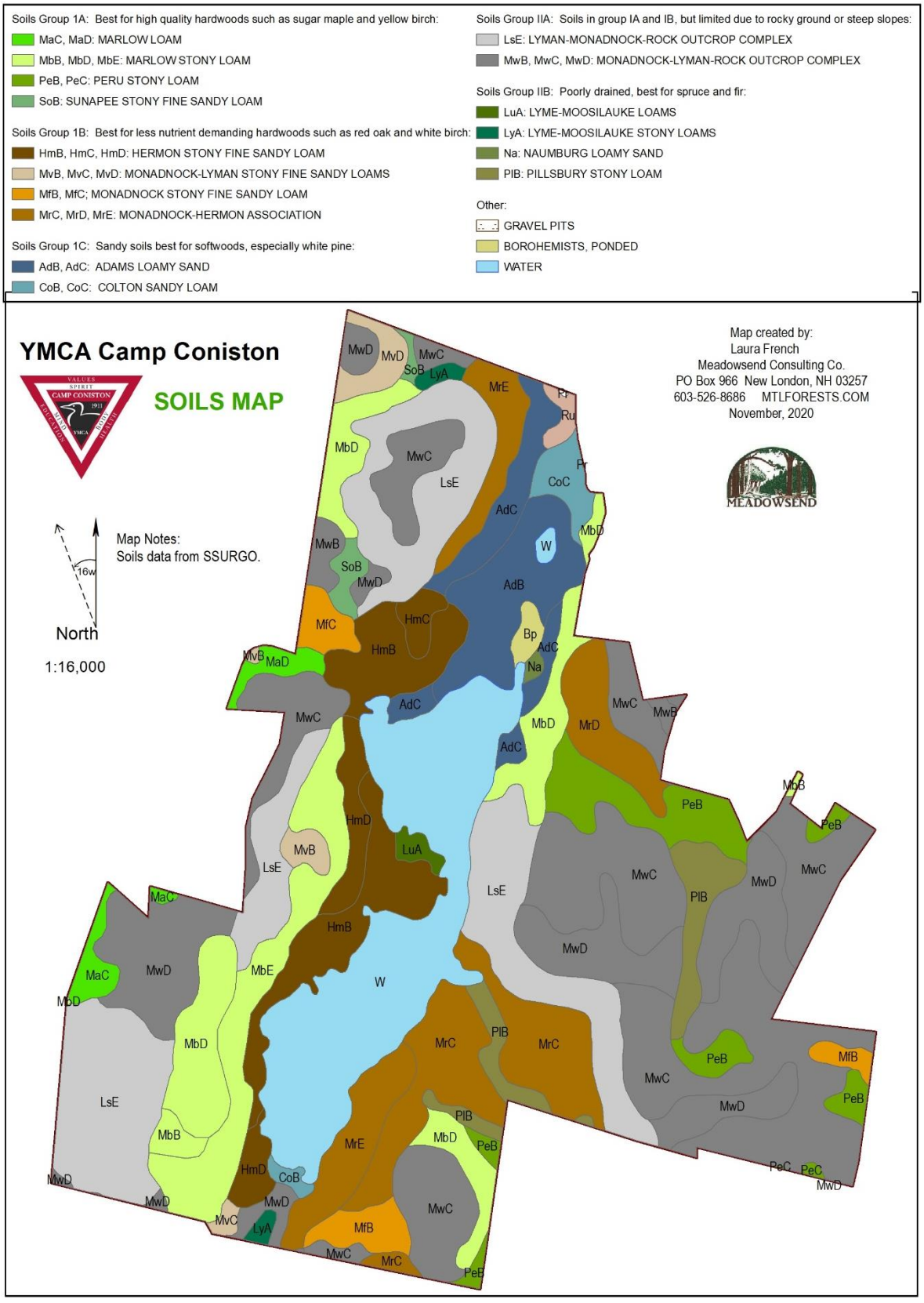
The forest types found on the Camp Coniston Forests are for the most part indicative of these forest soil characteristics. Since successful ecological silviculture manages for tree species that are best adapted for the site, understanding soil types and their capabilities is imperative in ecological forest management. It must be

understood that soils are only one part of the equation and that sometimes other factors influence the site and what trees will grow best there. For example, the hemlock growing on the west side of the lake is growing on Hermon stony fine sandy loam. The description of this type is that it supports best growth of less nutrient demanding hardwoods such as white birch and red oak, when in fact a heavily hemlock dominated stand is occupying that site. The overriding factor is the adjacency the lake. Lake shores and steep river ravines typically grow hemlock, and in this case, despite the soil type.

The threats to the soil resource include the loss of soil through erosion, compaction of the soil from heavy equipment traffic, and nutrient loss through both leaching and timber harvesting. Erosion results in the direct loss of soil. Compaction reduces soil productivity. Most soil types include about 50% space between particles and soil compaction, which eliminates this space, directly reduces the amount of air and water soil can hold which is required for most soil processes. Nutrient leaching increases when soil is exposed during a timber harvest and when intensive timber repeatedly harvesting occurs.

Measures to avoid these threats found in *Biodiversity in the Forests of Maine* (Flatebo, 1999.):

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


Soils Group 1A: Best for high quality hardwoods such as sugar maple and yellow birch:
MaC, MaD: MARLOW LOAM
MbB, MbD, MbE: MARLOW STONY LOAM
PeB, PeC: PERU STONY LOAM
SoB: SUNAPEE STONY FINE SANDY LOAM
Soils Group 1B: Best for less nutrient demanding hardwoods such as red oak and white birch:
HmB, HmC, HmD: HERMON STONY FINE SANDY LOAM
MvB, MvC, MvD: MONADNOCK-LYMAN STONY FINE SANDY LOAMS
MfB, MfC; MONADNOCK STONY FINE SANDY LOAM
MrC, MrD, MrE: MONADNOCK-HERMON ASSOCIATION
Soils Group 1C: Sandy soils best for softwoods, especially white pine:
AdB, AdC: ADAMS LOAMY SAND
CoB, CoC: COLTON SANDY LOAM
Soils Group IIA: Soils in group IA and IB, but limited due to rocky ground or steep slopes:
LsE: LYMAN-MONADNOCK-ROCK OUTCROP COMPLEX
MwB, MwC, MwD: MONADNOCK-LYMAN-ROCK OUTCROP COMPLEX
Soils Group IIB: Poorly drained, best for spruce and fir:
LuA: LYME-MOOSILAUKE LOAMS
LyA: LYME-MOOSILAUKE STONY LOAMS
Na: NAUMBURG LOAMY SAND
PIB: PILLSBURY STONY LOAM
Other:
GRAVEL PITS
BOROHEMISTS, PONDED
WATER
YMCA Camp Coniston
SOILS MAP
Map Notes:
Soils data from SSURGO.
North
1:16,000
Map created by:
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November, 2020
MEADOWSEND

Wetland and Water Resource in Forested Ecosystems

Water features are an integral part of the forest ecosystem. Brooks, streams, ponds and wetlands all provide essential riparian habitat and functions. According to the publication Good Forestry in the Granite State (Bennett, 2010), riparian areas provide flood control, regulate streamflow and protect water quality by filtering and retaining sediment, nutrients, and other pollutants from upslope areas. Riparian areas also regulate temperature of aquatic habitat by shading streams, provide large, woody material to create pools, riffles, debris-jams, and related aquatic habitat, and provide leaves, twigs, fruit and insects which contribute energy to drive aquatic food webs.

Riparian areas also provide habitat for feeding, cover, and travel for many amphibians, birds, furbearers, and reptiles. Tall trees within riparian areas provide primary nesting sites for bald eagles, osprey, and colonial water birds. Topography, elevation, bedrock, and soils dictate the water features found on a particular tract of land. The protection of water quality is an integral part of sound, sustainable forest management.

YMCA Camp Coniston Wetland and Water Resource:

The main feature of the camp is notably Lake Coniston, with the ownership including much of the watershed feeding the lake providing a great opportunity to help protect the water quality there through good management. This 129-acre cold water lake is relatively shallow, with an average depth of 12 feet, and a maximum depth of 27 feet and steep forested slopes leading down into it. Lake Coniston drains to the south through Long Pond Brook and a series of wetlands before entering Sugar River. North of Pine Hill Road the small Cranberry Pond drains north into Palazzi Pond and then into Stocker Pond and Stocker Brook and eventually into the Sugar River as well. There are several small brooks that feed into Lake Coniston from the east that drain out of perched wetland systems. These wetlands occur in fairly level plateaus of shallow to bedrock or shallow to hardpan soils with a perched water table. The wetlands are a mix of forested and shrub wetlands commonly with black alder and/or winterberry.

An interior wetland with standing dead spruce on the east side of Lake Coniston provides excellent wildlife habitat, as well as a source of water for the lake.

The north end of the parcel, near the northern boundary line hosts as especially nice shrub wetland perched at the top of the steep, rocky slope that makes up the eastern slopes of Sugar Hill. Additional small brooks flow to the west off Sugar Hill and feed down into Bog Brook and eventually into Sugar River. The characteristics and importance of wetland systems and brooks will be discussed in greater detail in several of the following sections of this plan.

NATURAL PROCESSES

One of the objectives of sustainable management is to mimic natural processes occurring on both forest and open land. Certain natural processes can be sped up, slowed down, or enhanced through management. Some processes in which nature sets the precedent cannot be "managed" at all. To consider the role these processes play in management activities, it is important to identify and explore the major ones.

Succession

Succession is a process which takes place naturally on any piece of land, be it forest, wetland, open land, or even developed land. The temporal scale on which this is viewed is important. On a geologic time scale processes such as glaciation, global temperature, and plate tectonics all play a role. In the life of an individual, land-use patterns play the biggest role, but natural disturbances, insect and disease infestations, fire, and natural aging processes all contribute to succession. The process of succession heavily influences silvicultural prescriptions and management objectives.

Different trees species are predisposed to grow in certain conditions and in terms of forest succession this is dictated by the amount of sunlight available to the seedling - expressed as a plant's shade tolerance. In general, if allowed to develop naturally, a forest will develop from fast growing, short lived early successional species that generally require full sunlight to develop, such as white birch, aspen and white pine, to slow growing and long lived late successional trees like hemlock, red spruce, sugar maple, beech, and yellow birch that can regenerate in their own shade.

As early successional species develop shade increases on the forest floor as their crowns spread in the canopy, changing the growing conditions on the ground to favor late successional, more shade tolerant species. Once a forest hits a late successional stage it will remain in that state until there is a disturbance, such as a wind storm, that changes the amount of sunlight hitting the forest floor and thereby bringing it back to an earlier stage of succession. Wildlife habitat and the species that use a particular habitat change as succession progresses. Silvicultural management in part can dictate successional stages by re-allocating sunlight to the forest floor when overstory trees are harvested.

Wetland areas undergo change over time as well. Areas of open water become filled in over long periods of time, a process known as eutrophication. Bogs generally exhibit patterns of zonation: on the fringes they are wooded, there is then a zone of partially decomposed peat, and towards the middle there may be open water. Streams change course over time, forming oxbows and new channels. They also erode deep ravines and

change the topography over time.

While every management decision cannot possibly be analyzed on every level, it is important to consider what the possible outcomes might be. Through prudent consideration, management can be designed to achieve a set of desired results, including accelerating or retarding successional trends.

Water & Nutrient Cycling

Water and nutrient cycling is crucial in maintaining the long-term stability of a forested ecosystem. All types of vegetation, including trees, are involved in nutrient and water cycling. The removal of all trees and other vegetation from a site will lead to less water uptake and thus more runoff and erosion. Increased runoff often leads to the leaching of nutrients in the soil which changes down-stream water chemistry. Many nutrients are sequestered in trees and vegetation. The inevitable result of the removal of vegetation from a site is a loss of some nutrients. Therefore, how water and nutrients are “managed” have important implications for forest productivity.

Most of a tree’s nutrients are concentrated in the leaves, limbs and branches. The bole of the tree has relatively few reserve nutrients. There is some concern that whole-tree harvesting can deplete nutrients from a site because the entire tree is removed. In a thinning situation on productive soils where only a portion of the trees are removed, this is probably not a concern. In clear-cuts, or when whole-tree methods are employed on the same area repeatedly, the potential for nutrient loss can be and must be considered. Soils and sites influence nutrient status and leaching as much as the vegetation. Dry sandy soils or thin soils on high elevations and ridgelines are inherently low in fertility and are prone to rapid leaching.

Adaptation

A plant’s ability to adapt over time helps it to survive in a changing world. Furthermore, the passing of genes from one generation to the next allows the best adapted to thrive. Trees that are expressing themselves well are usually well-adapted to their environment. An example is red spruce’s ability to withstand the harsh growing conditions of the area in which it lives- high elevation and with thin, dry soils. Red spruce has adapted to its environment over thousands of years. Well adapted trees should be encouraged through management decisions favorable to them. While the genetic makeup (genotype) of individual trees or stands of trees is not practical to determine, forest management should encourage trees of superior appearance (phenotype) and high vigor that are free from obvious defects.

Disturbance

All natural systems are prone to disturbance, and forests are no exception. Ice storms, fire, micro-bursts of high winds, hurricanes, floods, long-term weather patterns, and insect and disease outbreaks all affect forests. Approximately 12,000 years ago, New England was covered by ice perhaps a mile thick. When the glacier first retreated, the landscape resembled the arctic tundra. It has changed dramatically since then and is now a fairly

complex forest system. More recent disturbances are often responsible for creating a multiple age structure to a natural forest. For example, a small area of blow-down created by a high wind will often regenerate to shade-intolerant species, thereby setting back succession.

As with the majority of forestland in New Hampshire this forest saw widespread destruction from the great hurricane of 1938. It is still possible to see the “pit and mound” structures created when tree roots are pulled from the ground as the trees were blown down. The root ball eventually decays but leaves a mound of soil next to the pit where the roots once were. These pit and mound structures resulting from the ’38 hurricane can be found throughout New England. New Hampshire sustained some of the highest winds from that storm and as a result lost a record amount of timber, mostly pine.

The 1938 hurricane and the more recent 1998 ice storm which affected millions of acres of forestland in New England are examples of natural disturbances that had wide spread effects. If allowed to recover without human influence, the forest will, over time, grow back usually with a more complex structure than it had before.

A more diverse forest has many more niches for biological development. This increased complexity leads to a wide variety of species. In areas of significant disturbance, the most severely damaged trees will begin to decay and rot. As the dead and dying trees decompose, the abundance of snags will dramatically increase. An increase in wood boring insects will be followed by an increase in woodpeckers and other insectivores that will excavate cavities for other birds and small mammals. As limbs and broken tops of the trees begin to decompose, nutrients will leave the wood and leach into the soil. Some nutrients will be recycled further as the snags begin to fall and decompose. The cycle of the forest is thus a continuum consisting of many inter-relationships.

No discussion about disturbances would be complete without considering human impacts. Human disturbances in recent history have done more to influence the present state of our forests than any natural events. Human disturbances of the forest include clearing, logging, fire, pollution, and the introduction of exotic species. In the 300 years since European settlement, virtually all of the forests in New England have been cut; some areas have been cut more than five times. Much of the land was stumped and used for agricultural purposes. Soils were depleted by a lack of attention to water and nutrient cycling. Intensive development and subsequent paving of former forest land eliminates natural processes for the foreseeable future. Air pollution and climate change pose real threats to our forests. The introduction of chestnut blight and Dutch elm disease essentially extirpated those species from our forests. The introduction of invasive exotic species poses similar threats. Invasive exotic species are a cause of great concern because of their prolific nature and exotic characteristics enable them to vastly out-compete native plants, having a drastic impact on biodiversity.

Adaptive management is necessary when faced with any large-scale disturbance, natural or human-caused.

CLIMATE CHANGE

The effects of climate change on our forest and wetland ecosystems is a growing concern for land

owners and land managers across the Northeast and beyond. Ongoing research and studies are providing us with important tools for evaluating risk and vulnerability, adaptive management techniques, and information on what to expect our future forests to look like in the upcoming century. Though much of this information is based on models, there are a few generalizations we can expect to occur in varying degrees of intensity provided in the USDA publication New England and Northern New York Forest Ecosystem Vulnerability Assessment and Synthesis: A Report from the New England Climate Change Response Framework Project (Janowiak, 2018):

- Temperatures will increase. Annual increases in temperature represent the broadest possible stressor, strongly influencing other stressors and ecosystem responses.
- Growing seasons will lengthen. Longer growing seasons have the potential to affect the timing and duration of ecosystem and plant physiological processes. Longer growing seasons may also result in greater growth and productivity of trees and other vegetation, by only if balanced by available water and nutrients.
- Temperatures will increase more in winter than in other seasons, leading to changes in snowfall, soil frost, and other winter processes including microbial activity, nutrient cycling, and the onset of the growing season.
- Total precipitation is generally expected to increase during winter and spring, but summer and fall projections are more variable.
- Intense precipitation events will continue to become more frequent, with resulting increase in damage from flooding and severity of soil erosion.
- Increased risk of moisture deficit and drought during the growing season will reduce tree vigor and increase tree mortality.
- Certain insect pests and pathogens will increase in occurrence or become more damaging. Forest impacts from insect pests and pathogens are generally more severe in ecosystems that are affected by drought and other stressors.
- Many invasive plants will increase in extent or abundance.
- Many northern and boreal tree species will face increasing stress from climate change.
- Habitat will become more suitable for southern species.
- Forest composition will change across the landscape but will take at least several decades to occur in the absence of major disturbance.
- `Conditions affecting tree regeneration and recruitment will change. Evidence of climate change impacts on forest ecosystems is more likely to be seen in seedlings and early growth than in mature individuals.
- Forest productivity will increase during the next several decades in the absence of significant stressors but are likely to be spatially variable.
- Lower-diversity systems are at greater risk.
- Tree species in isolated or fragmented landscapes will have reduced ability to migrate to new areas in response to clime change.

- Species or systems that are limited to particular environments will have less opportunity to migrate in response to clime change.
- Ecosystems that have greater tolerance to disturbance have less risk of declining on the landscape.

YMCA Camp Coniston Climate Change Vulnerability and Adaptive Management:

The YMCA Camp Coniston Forest is for the most part a Transition Hardwood Forest, dominated by a hemlock-white pine-oak-hardwood forest. Located in southern New Hampshire, this type is rated as having a Low to Moderate Vulnerability to climate change. According to Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers, 2nd edition (Swanaton, 2016.), the following climate change effects specific to YMCA Camp Coniston can be expected:

- Potential Impacts, Positive and Negative:
  - Longer growing season resulting in greater productivity where there is adequate moisture;
  - Increased potential for drier summer conditions;
  - Changes in soil temperature, moisture, nutrient availability, freeze-thaw cycles, or below ground processes could have substantial effects on dominant species;
  - Disturbances such as ice storm and blowdowns may become more frequent and severe;
  - Impacts will be highly variable due to the widespread and diverse nature of this forest type.
- Species Composition:
  - Decline is expected in many species common to this type including eastern white pine, sugar maple, and hemlock
  - Red maple occurrence may increase;
  - Future conditions may transition to an oak-pine dominated forest;
  - Species at the middle to northern extent of their range, such as black cherry, that is present in lower abundance may increase.
- Stressors:
  - Stressors, such as forest pests, including beech bark disease, gypsy moth, and hemlock wooly adelgid, are expected to be amplified.
  - Invasives may increase due to warmer temperatures and exacerbated disturbance.
  - Browse pressure by white tailed deer may increase if populations expand under less severe winters.

Adaptive management strategies and associated tactics will support a combination of resistance, resilience and transition options to manage for landowner objectives. Resistance strategy is specifically applied to retaining hemlock as long as possible for diversity, structure, and deer wintering areas. Resilience and transition

strategies are geared more for adapting the current forest towards future conditions. Tactics listed below each Adaptive Management Strategy will drive much of the recommended management activities in association with meeting landowner objectives.

- Sustain fundamental ecological functions
    - Use BMPs designed for more intensive rain events
    - Establish RMZs to protect riparian areas
- Reduce the impact of biological stressors
    - Manage for increased tree vigor
    - Control/reduce invasive exotic population
- Maintain or create refugia
    - Manage for increased vigor of hemlock
    - Protect DWA
- Maintain and enhance species and structural diversity
    - Manage for multiple age classes
    - Manage for standing dead trees, down logs, and legacy trees
- Increase ecosystem redundancy across the landscape
    - Establish reserve areas
- Promote landscape connectivity
    - Maintain forested landscape, especially in relation to Pisgah State Park, Ashuelot River, and other local conserved/public lands
- Facilitate community adjustments through species transitions (adapted species composition);
    - Favor oak as a target species (red, black, white, other oaks as found)
    - Encourage establishment of other adapted species, including cherry, black birch, hickory
    - Increase vigor on species only minimally impacted by climate change (beech, aspen, service berry, sugar maple, white pine)
    - Consider planting species expected to do well under climate change conditions that benefit wildlife objectives (black walnut, Eastern red cedar)

NATURAL COMMUNITIES

As written in the book Natural Communities of New Hampshire (Sperduto, 2011.), “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 determining to the best of our ability what community would occupy that site without human intervention. Natural community types found here have 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.

YMCA Camp Coniston Natural Communities:

On the Camp Coniston Forest natural communities are largely dictated by aspect and moisture. Hemlock-white pine forest surrounds the lake and occupies steep slopes. In general north-facing or cooler areas are Hemlock-spruce-Northern hardwood forest. South facing, warmer slopes are either hemlock-beech-Northern hardwood forest or Hemlock-beech-oak-pine. Hardwood dominated areas tend to be Sugar maple-beech-yellow birch forest. The heights of land are different, generally being Dry red oak-white pine forests and the type directly surrounding the lake is Hemlock-white pine. The mix of hardwood types vary depending also on soils, with richer types on the better soils, and less rich on generally rockier and less fertile soils. These types were identified mainly because of the species of regeneration that have developed, since the overstory is dominated by a combination of early to mid-successional species, not typically represented in the late successional natural community type. Descriptions of these natural community types can be found below, taken from the publication Natural Communities of New Hampshire (Sperduto, 2011.).

Hemlock-white pine is a conifer forest on dry-mesic and infertile till or glacio-fluvial soils characterized by the co-dominance of *Tsuga canadensis* (hemlock) and *Pinus strobus* (white pine). It is narrowly distinguished from hemlock - beech - oak - pine forests, but classified as its own community due to strong conifer dominance, its correspondingly poorly developed herbaceous understory, and the apparent longevity of the association (200+ year old pine and hemlock occur at several sites). It is also distinguished from hemlock - spruce - northern hardwoods by the rarity or lack of red spruce, balsam fir, and sugar maple.

Soils are acidic, moderately to extremely well drained, dry-mesic to mesic, coarse loamy sands and sandy loams of varying degrees of stoniness. Soils are derived from glacial till, river terraces, and ice-contact deposits (eskers, kames, and outwash).

Hemlock and white pine are the primary dominants in this community. *Betula lenta* (black birch), *Quercus rubra* (red oak), and *Betula papyrifera* var. *papyrifera* (paper birch) are occasional, but these and other hardwoods are not abundant (generally <5–10% total cover).

Shrubs and herbs are typically sparse but may include *Hamamelis virginiana* (witch hazel), *Gaultheria procumbens* (wintergreen), *Viburnum acerifolium* (maple-leaved viburnum), *Dryopteris intermedia* (intermediate wood fern), *Medeola virginiana* (Indian cucumber-root), *Lycopodium* spp. (clubmosses, other than *Huperzia lucidula*), *Thelypteris noveboracensis* (New York fern), *Aralia nudicaulis* (wild sarsaparilla), *Mitchella repens* (partridge-berry), *Trientalis borealis* (starflower), *Monotropa uniflora* (Indian pipes), and *Maianthemum canadense* (Canada mayflower).

Hemlock-beech-oak-pine is a very common, broadly defined community found on glacial till and terrace soils of low to mid elevations in central and southern New Hampshire with extensions into the White Mountains. It is latitudinally, elevationally, and floristically transitional between northern hardwood forests and Appalachian oak - hickory forests. As with most upland forests of the region, single-tree windthrow is the primary natural disturbance, with occasional larger blowdown from hurricanes. Both soil and disturbance related variation is apparent.

Soils are moderately to extremely well drained, dry-mesic to mesic loamy sands and sandy loams of varying degrees of stoniness and seasonal water availability. Source bedrock tends to be igneous or siliceous metamorphic rock producing acidic soils with low nutrient availability.

This community grades into oak - pine forest on more droughty soils, to northern hardwoods (sugar maple -beech - yellow birch forest) in the mountains and at higher elevations, and to mesic Appalachian oak – hickory forest in southern New Hampshire. The low abundance and frequency of sugar maple and yellow birch help distinguish this community from hemlock - beech - northern hardwood forests.

Characteristic vegetation includes *Tsuga canadensis* (hemlock), *Fagus grandifolia* (American beech), *Quercus rubra* (red oak), and *Pinus strobus* (white pine) are the primary mid to late successional tree species, and each is present in fully intergrading degrees of prominence. Since most examples in the state are early to mid-successional, hemlock and beech may be present primarily in the understory or otherwise increase in prominence over time. At the extreme ends of the canopy-gradient, either hemlock or beech dominates to the exclusion of nearly all other tree species (these types are described as separate types). Other abundant or frequent early to mid- successional tree species include *Betula papyrifera* var. *papyrifera* (paper birch), *Acer rubrum* (red maple), and *A. pensylvanicum* (striped maple). Other occasional species that can be present in low abundance may include *Prunus serotina* (black cherry), *Betula lenta* (black birch), *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *B. alleghaniensis* (yellow birch), and *B. populifolia* (gray birch). Red spruce and balsam fir are uncommon or absent.

Canopy dominance combinations vary and may yield hardwood, hardwood - conifer or mostly conifer dominated stands. To some extent, variation may reflect several factors including 1) the preference of hemlock for more mesic to wet-mesic, coarse or infertile soils, or those with distant fire histories (Davis et al. 1996); 2) the tendency of beech to occur on drier to mesic coarse soils (e.g., washed tills); and 3) the success of white pine on early to mid-successional sites of all types (particularly those with an agricultural history) and longer term on drier, coarse soils or those with fire histories. Black birch reaches its best development on mesic sites, but may be present on somewhat drier sites.

The understory woody and herbaceous plant association is reasonably distinct from northern hardwood and spruce - fir types. Reasonably good differential species that are found primarily in this type include *Hamamelis virginiana* (witch hazel) and *Gaultheria procumbens* (wintergreen). Species that are less frequent or abundant than in northern hardwoods include *Oxalis acetosella* (northern wood sorrel), *Huperzia lucidula* (shining clubmoss), *Lonicera canadensis* (Canadian honeysuckle), *Dryopteris campyloptera* (mountain wood fern), *Clintonia borealis* (blue-bead lily), and *Streptopus* spp. (twisted stalks). Other characteristic species, many of which also occur in northern hardwood forests, include *Aralia nudicaulis* (wild sarsaparilla), *Uvularia sessilifolia* (sessile-leaved bellwort), *Dryopteris intermedia* (intermediate wood fern), *Epifagus virginiana* (beech-drops), *Mitchella repens* (partridge-berry), *Trientalis borealis* (starflower), *Monotropa uniflora* (Indian pipes), and *Maianthemum canadense* (Canada mayflower).

The globally rare *Isotria medeoloides* (small whorled pogonia)* is preferential to this forest type, and seems to prefer compact till sites with a shallow hardpan (densipan) and seasonally (temporarily) elevated water table, sometimes producing shallow, vernal, surface-drainage channels (M. Sperduto 1993; Sperduto and Congalton 1996). These densipan soils tend to occur on lower slopes of hills or low mountains, including drumlins, where glacial ice often produced compact basal tills.

Hemlock-beech-Northern hardwood forest is a mixed coniferous - deciduous forest community characterized by *Tsuga canadensis* (hemlock) and northern hardwood tree species [*Acer saccharum* (sugar maple), *Betula alleghaniensis* (yellow birch), and *Fagus grandifolia* (American beech)]. It is found in low to mid elevations till landscapes and some valley bottom soils from 800-2000 ft. elevation (at the same elevation range or below northern hardwood forests and below northern hardwood - spruce forest). This community is fairly distinct but to hemlock - beech - oak - pine at lower elevations and south of the mountains, where sugar maple and yellow
birch drop out of the mix.

This community is found primarily on moderately well to well drained soils (occasionally somewhat poorly drained) of coarser parent materials, particularly compact till and firm ablation tills and sometimes on outwash, kame-terraces, and shallow-to-bedrock soils. Soils are generally acidic and moderately nutrient-poor.

Tsuga canadensis (hemlock) and *Fagus grandifolia* (American beech) are the primary late-successional tree species. *Betula alleghaniensis* (yellow birch) is often present as an associate. Hemlock and/or beech may only be present in the understory in successional examples. Other trees are less constant and more variable in

prominence including *Acer saccharum* (sugar maple) (although it tends not to dominate in New Hampshire examples), *Fraxinus americana* (white ash), *Acer rubrum* (red maple), *Picea rubens* (red spruce), and *Abies balsamea* (balsam fir). Red oak, white pine, and other transitional hardwoods are sparse or absent. The most consistent plants in the shrub layer are *Acer pensylvanicum* (striped maple) and *Viburnum alnifolium* (hobblebush) but they are typically somewhat sparse. Herbs that are more abundant or frequent than in typical northern hardwoods include *Medeola virginiana* (Indian cucumber-root), *Mitchella repens* (partridge-berry), and *Coptis trifolia* (goldthread). Herbs that are more abundant than in most hemlock -beech - oak - pine forests include *Dryopteris intermedia* (intermediate wood fern), *Oxalis acetosella* (northern wood sorrel), and *Huperzia lucidula* (shining clubmoss).

Hemlock-spruce-Northern hardwood forest is characterized by *Tsuga canadensis* (hemlock) and *Picea rubens* (red *alleghaniensis* (yellow birch), and *Fagus grandifolia* (American beech). It is found at moderate elevations between spruce - fir and transition hardwood - conifer forests, ranging from less than 1000 ft. up to 2000 ft. It also occurs on river and kame terrace sites where former and current stream channels cut through terraces of variable elevations, moisture levels, and sediment textures.

Soils are typically mesic, moderately well to well drained, and generally more nutrient poor soils than northern hardwoods. Soils range from wet to dry compact tills to sandy sediments and outwash, and less frequently on rocky outcrop sites. Corresponding soil series include Adams, Colton, Au Gres, Salmon, Nicholville, Pillsbury, and Cabot. This type occurs on several of Leak's (1982) habitat types, including wet compact till, dry compact till, sandy sediment, softwood washed till, outwash, and lake sediment types.

Tsuga canadensis (hemlock) and *Picea rubens* (red spruce) are dominant, in contrast to hemlock - northern hardwood forests that have little or no spruce and considerably more beech. Birches, particularly *Betula alleghaniensis* (yellow birch) more than *B. papyrifera* var. *papyrifera* (paper birch) and *B. populifolia* (gray birch), are frequent and sometimes abundant. The dominant trees are typically found reproducing in the understory. *Abies balsamea* (balsam fir) may be present but is usually not prominent other than on the terrace flat variant described below. Yellow birch is frequent in both the over and understory while *Fagus grandifolia* (American beech) is occasional but not prominent. The woody understory frequently contains *Viburnum alnifolium* (hobblebush) and *Acer pensylvanicum* (striped maple). Herbaceous plant composition is variable, with few or no herbs being present in all known examples of this community. However, northern plants such as *Oxalis acetosella* (northern wood sorrel), *Huperzia lucidula* (shining clubmoss), *Clintonia borealis* (blue-bead lily), *Streptopus roseus* (rosey twisted stalk), and *Dryopteris campyloptera* (mountain wood fern) tend to be more abundant than in hemlock - hardwood forests without spruce. Other common acidic-flora species are frequent including *Aralia nudicaulis* (wild sarsaparilla), *Trillium undulatum* (painted trillium), *Dryopteris intermedia* (intermediate wood fern), *Lycopodium* spp. (clubmosses), *Trientalis borealis* (starflower), *Viburnum nudum* (witherod), and various mosses.

Sugar maple-beech-yellow birch forest is the most common hardwood forest type in northern New Hampshire, dominated by *Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech), and *Betula*

alleghaniensis (yellow birch). It is transitional to high-elevation spruce - fir forests at higher elevations and lowland spruce – fir forests, hemlock - spruce - northern hardwood forests, or hemlock - beech - oak - pine forests at lower elevations. Small windthrow gaps of one to many trees are the primary disturbance in these forests. Although yellow birch is not as shade tolerant as beech and sugar maple, it is long-lived and consequently is an important late successional dominant (approximately 200-380 years). It is successful in establishing itself in single tree gaps. Rapid and high-density growth of *Prunus pensylvanica* (pin cherry) can occur from buried seeds in clearcut and other large-gap disturbance patches. Pin cherry is an important nutrient-sink on these sites, effectively retaining nutrients and organic matter within the system.

Soils are from generally moderately well drained fine tills (fine sandy loams) of moderately low productivity. This includes compact basal till and firm or loose ablational tills. Till is typically derived from crystalline igneous rocks and metamorphic schists and gneiss yielding soils with relatively low base-saturation. Soils are generally drier than in rich mesic forests and high elevation spruce - fir forests, but more mesic than at some sites dominated by more beech.

Sugar maple and beech are the primary mid and late successional dominants, with yellow birch next in importance. Other seral hardwood species are common or occasional and include *Betula papyrifera* var. *papyrifera* (paper birch), *Acer pensylvanicum* (striped maple), *A. spicatum* (mountain maple), and *Fraxinus americana* (white ash). *Viburnum alnifolium* (hobblebush) is frequent and often abundant in the shrub layer. *Lonicera canadensis* (Canadian honeysuckle) may be present but is infrequent and more likely to be encountered in more enriched and/or moist forests. *Dryopteris intermedia* (intermediate wood fern) is frequent and often abundant in the herbaceous layer, particularly at higher elevations. *Dryopteris campyloptera* (mountain wood fern), largely absent from lower elevation forests, is frequent but usually less abundant than intermediate wood fern. *Huperzia lucidula* (shining clubmoss) is frequent and generally more abundant than in lower elevation forests. Other characteristic species with high constancy include *Clintonia borealis* (blue-bead lily), *Maianthemum canadense* (Canada mayflower), *Oxalis acetosella* (northern wood sorrel), *Trientalis borealis* (starflower), *Aster acuminatus* (whorled aster), and *Uvularia sessilifolia* (sessileleaved bellwort). Occasional (low constancy) species include *Aralia nudicaulis* (wild sarsaparilla), *Trillium erectum* (wakerobin), *T. undulatum* (painted trillium), *Streptopus roseus* (rosey twisted stalk), *Cinna latifolia* (drooping woodreed), *Thelypteris noveboracensis* (New York fern), *Solidago macrophylla* (large-leaved goldenrod), and *Medeola virginiana* (Indian cucumber-root). Species that are generally more abundant in either higher elevation spruce - fir or lower elevation hemlock and/or hardwood forests include *Mitchella repens* (partridge-berry), *Cornus canadensis* (bunchberry), *Coptis trifolia* (goldthread), *Monotropa uniflora* (Indian pipes), *Cypripedium acaule* (pink lady's-slipper), and *Gaultheria procumbens* (wintergreen).

Dry red oak-white pine forests with considerable red oak and/or white pine are common in the region. Many are classic old-field situations, successional to hemlock or beech dominance over time. These communities typically occur on mesic sites and are successional examples of the hemlock - beech - oak - pine community. However, some red oak - white pine forests on coarse, sandy or rocky till or shallow-to-bedrock soils appear to perpetuate red oak and pine for extended periods due to draughty soils or recurring fire regimes.

These forests typically have a “thin woods” aspect to them, created by a somewhat sparse canopy cover transitional to a woodland structure and a sparse tall woody layer in the understory. The draughty soils and increased light on the forest floor allow dry-site species to help distinguish this community from more mesic early successional examples of hemlock - beech - oak - pine. White pine is sparse or absent in some examples, particularly on ridges in the White Mountains; in contrast, abandoned pastures are often strong to white pine.

The ability of many oak species to root or stump sprout contributes to their perpetuation under regular fire regimes. Oak forests appear to be fire-dependant over long periods in other regions of the country. Some of these forests may succeed to other overstory species in time due to lack of adequate red oak regeneration, and increases in beech on drier sites and sugar maple and beech on more mesic sites. Repeated fire would tend to knock back fire-sensitive beech and sugar maple. Barton and Schmelz (1987) showed a loss of dominance from oak - hickory towards sugar maple and beech in an older oak - hickory forest in Indiana over a thirty-year period (soil moisture regime not known). Blowdown gaps may also play a role in creating openings for red oak regeneration, but the relative importance compared to other factors in the region is unknown.

Soils are typically dry, well to excessively drained and derived from various parent materials. These include shallow tills over bedrock, coarse washed tills, outwash, river and kame terraces, and other ice-contact deposits. They are generally derived from siliceous (silica rich) bedrock and are therefore acidic and low in available nutrients.

This community is reasonably distinct, but can be difficult to distinguish from early- to mid-successional red oak - white pine stands on mesic sites. The type of woody regeneration, soil drainage and texture, the prominence of dry-site species, and site history may be important in classifying examples of this community correctly.

This community is often associated with red oak rocky ridge woodlands. Return of natural, semi-natural, and/or controlled fire regimes may be necessary for the long-term maintenance of red oak on some sites. This community is more widespread in the state than other types of dry forest, and may succeed to late successional species such as *Fagus grandifolia* (American beech) and/or *Tsuga canadensis* (hemlock) in the absence of fire.

This community includes forests on acidic dry sites dominated by either red oak or white pine, or both. In northern examples (White Mountain region), red oak is often more prominent than white pine on southern or western exposures, particularly on shallow-to-bedrock sites. Pine may be relatively more prominent and successful on the deeper, generally coarser soils of eskers, other glacial outwash features, and dry river terraces, as well as on former agricultural soils. This community may grade into oak – pine woodlands. It shares numerous species with other oak - pine forests, but lacks the rich-site indicators of dry rich forests. Characteristic dry-site species include *Vaccinium angustifolium* (lowbush blueberry), *Gaylussacia baccata* (black huckleberry) and other heaths, *Pteridium aquilinum* (bracken), *Viburnum acerifolium* (mapleleaved viburnum), *Comptonia peregrina* (sweet fern), *Carex pensylvanica/lucorum* (Pennsylvania and woodland sedges), and *Oryzopsis asperifolia* (rough-leaved rice-grass) (see more complete list under general discussion of dry oak - pine forests above). Other trees may include *Acer rubrum* (red maple), *Betula papyrifera* var. *papyrifera* (paper birch), *B.*

populifolia (gray birch), and *B. lenta* (black birch). *Quercus ilicifolia* (scrub oak), *Pinus resinosa* (red pine), and *P. rigida* (pitch pine) are sparse or absent. Beech and hemlock may be present, but are in low abundance and/or found with the dry-site herbaceous and shrub species absent or infrequent in mesic hemlock - beech - oak - pine forests.

Rare Species and Unique Natural Communities

The Natural Heritage Inventory, in Concord, New Hampshire, has been contacted and shows an active record of Common Loon on the property. Latest data shows in 2019 there were 2 nesting attempts, with 1 surviving chick. In 2018, there were 2 surviving chicks. More data is included in the Natural Heritage report included in the appendix.

Additionally, though not listed in the Natural Heritage Bureau database, American ginseng (*Panax quinquefolius)*, a state listed threatened plant, is located on ownership at the in an area of enriched soils on the at the base of steep ledge on the east-facing toe slopes of Sugar Hill. During the fall 2020 inventory process several plants were identified, some still bearing fruit.

American ginseng can be found at the base of some steep ledge on the east-facing toe slopes of Sugar Hill. This is a small area of enrichment is naturally protected due to slope and large rocks.

It is possible other species exist, and close adherence to conservation practices discussed in New Hampshire's Good Forestry in the Granite State (Bennett, 2010) and Best Management Practices (Moesswilde, 2005.), in addition to recommendations from the book Biodiversity in the Forests of Maine (Flatebo, 1999.) will help to protect any unknown occurrences.

In addition, the Northern Long-Eared Bat is a newly listed as threatened. Northern long-eared bats use their maternity roost trees and hibernacula repeatedly for many years. Unless a survey or other information indicates otherwise, if the habitat around a roost is intact and the tree is suitable, we would conclude that the

tree is likely an occupied maternity roost during the pup season (June 1 - July 31). Similarly, we would assume that a hibernaculum remains occupied unless a survey or other information indicates otherwise.

Therefore, if you have a northern long-eared bat roost tree or hibernacula documented on or near your project area, any incidental take of bats will be exempted by the 4(d) rule if you follow these conservation measures:

- Do not conduct any activities within ¼ mile of known, occupied hibernacula;
- Do not cut or destroy a known, occupied roost tree from June 1 to July 31 (the pup season);
- Do not clearcut (and similar harvest methods that cut most or essentially all trees from an area, *e.g.*, seed tree, shelterwood, and coppice) within a ¼ mile of known, occupied roost trees from June 1 to July 31.

INVASIVE EXOTIC SHRUBS

Invasive exotic shrubs and vines, such as barberry, Asiatic bittersweet, Japanese honeysuckle, multifora rose, and both glossy and common buckthorn, well established throughout much of New England are causing a new realm of problems for landowners because they are able to out-compete what native trees and shrub regeneration we do have. These shrubs are responsible for a decline in biodiversity and are capable of greatly impeding the regeneration of native trees as they die or are harvested. Most invasives were introduced as landscaping plants. Their great popularity and success are due to their prolific growing characteristics. Buckthorn was often planted as a hedgerow because of its fast and dense growth. Barberry is a common landscape shrub because of its attractive form and very hardy growing characteristics. Honeysuckle, ironically, was introduced as a wildlife conservation plant because of the great amount of soft mast, or berries, it produces. All three produce great quantities of berries, which are all eaten by songbirds, turkeys, and many other wildlife species which then spread their seeds through their excrement.

The characteristics that made these shrubs successful as introduced plants are the very reasons they are such a problem in the natural landscape. They are prolific, hardy, produce vast quantities of seeds, and virtually are able to out-compete all native vegetation. They typically leaf out earlier in the spring and keep their leaves longer into the fall, providing them a much longer growing season and competitive advantage. Their seeds last many years in the soils and can build up to great quantities that germinate when conditions are favorable, such as an increase in sunlight on the forest floor after a harvest.

The problem doesn't end there. Controlling invasive exotic shrubs is nearly impossible after they have become established. Even if you eradicate them completely from your land, a daunting task at that, their seed will continue to be distributed from neighboring land by birds and other wildlife. Still, putting an effort into controlling them will have short term benefits which may be enough to give native plants a chance to get established. The control techniques will be described in detail in Appendix C, but briefly they consist of manual, mechanical, and chemical means. Knocking these plants back prior to a timber harvest will produce the greatest benefit. Ignoring them and opening up the forest through a harvest gives them the greatest advantage.

Camp Coniston Invasive Species:

Fortunately, invasives on Camp Coniston are limited, but they do exist. Buckthorn is highly scattered, but more prevalent near open lands and wetlands. This provides an opportunity to control the spread, or at the least limit the spread, through monitoring and manual pulling when found. There are a variety of ways to accomplish this, but in general it includes walking the land during the early spring and late fall when invasives are the only woody plant with leaves (they have a longer growing season than native plants which gives them a competitive boost). The shrubs should be pulled when found, getting as much of the root system as possible. This is most easily done after a heavy rain when the ground is saturated. If left unmanaged the increase in the presence of invasives will increase over time, and is likely to occur more rapidly with natural and human-caused disturbance.

Knotweed is also present near areas in the camp that have seen site work, likely brought in with the fill. Knot week is harder to get rid of, requiring either repeated mowing or chemical use. Specific recommendations for treatment should be made by a licensed pesticide applicator. MCC is able to provide this service if desired.

WILDLIFE ECOLOGY

Habitats

The American Heritage Dictionary defines habitat as "the area or type of environment in which an organism or ecological community normally lives or occurs". Wildlife habitat takes on many different forms. The components of habitat -- *food*, *water*, *cover* and *spatial relationships* -- are all interrelated.

Food for animals varies widely. Herbaceous plants, woody plants, mast or nuts, fruits and berries, insects and grubs, prey, and carrion are all eaten by wildlife. The location and abundance of food sources plays a primary role in determining the quality of the habitat for any species.

Water is required by all living things. Standing water, running water, seeps, and springs are all used. Some animals use water only periodically, while others live in and around it.

Cover is analogous to protective shelter. Cavities in trees, brush piles, nests, ledge outcrops, dense softwood cover and holes in the ground are used to provide cover for different animals.

Spatial relationships, or patterns, tie the habitat components together. If all the habitat requirements of a particular species are found within its "home range", the animal will probably remain in the vicinity. Creating the proper juxtaposition of food, cover, and water is important for wildlife to be attracted to and remain in a particular area. Travel corridors are used by many species to move from one habitat type to another. Ridgelines, streams, and other riparian areas commonly serve as travel corridors.

Habitat Types

Forested Habitat

Forest habitats can be classified in several different ways. One is by species composition, another is through age-class or successional stage, and a third is the vertical diversity or the distribution of canopy layers

within a forest. The more diverse a property is in these three areas typically increases the diversity, or “richness”, of wildlife that can be found there. Different wildlife species use different tree species, different layers of the forest structure, and different size or age class trees. Some songbirds can only be found in the upper canopy of hardwood trees for example, while other songbirds prefer specific species of tree, such as the pine siskin. Snags and down logs are important parts of forest structure as well. A large number of songbirds and small mammals require tree cavities for nesting, and standing dead trees provide important feeding sites as well.

The upland hardwood areas attract species which browse and/or feed on hard mast, notably white-tailed deer, turkeys, and black bear. Many resident and neo-tropical birds also use these upland areas. Birds such as the red-eyed vireo, white breasted nuthatch, chickadee, hermit thrush, and various woodpeckers are likely visitors to these areas. Softwood areas, especially those along riparian zones are used by many species. Furbearers, such as mink, beaver, otter, fisher, raccoon, and ermine could all be expected. Some of the dense softwood areas could be used both as deer yard and as a corridor for wildlife movement.

According to Good Forestry in the Granite State (Bennett, 2010), deer wintering areas are important for the survival of deer in New Hampshire because it is near the northern limit of their geographic range. Special habitat characteristics of deer wintering areas allow deer to maximize their daily food intake and minimize the amount of energy they expend to move, keep warm, and avoid predators. Most deer wintering areas occur at elevations below 2,000 feet in lowland softwood stands, such as eastern hemlock in the southern part of the state. Deer wintering areas are often associated with watercourses and riparian areas. Only about 3% of New Hampshire's land base meets the habitat requirements for deer wintering. Deer use of wintering areas varies within and between winters, based mainly on differences in snow depth. Deer move into wintering areas when snow depth exceeds 10 to 12 inches. During mild winters deer may range far from softwood shelter or not use a wintering area at all.

Wetland Habitat

In terms of resource value and diversity, riparian areas exceed all others in importance. The areas around streams and other wetland areas provide critical habitat including breeding and nesting sites for many species. Riparian areas also filter runoff thereby keeping the water clean. Riparian areas also are used as travel corridors for animals and fish moving to different habitats and from property to property. Characteristics of good corridors include softwood for cover and steep stream banks which aid in allowing the animals a sense of protection.

Openland and Edge Habitat

According to Good Forestry in the Granite State (Bennett, 2010), "Nonforested uplands and wetlands ... provide necessary habitat for about 22 percent of new England's wildlife species and seasonally important habitat to nearly 70 percent, including ‘species of greatest conservation need’ such as eastern towhee and New England cottontail. The value of these openings depends on the surrounding landscape. They are more beneficial in large areas of continuous forest cover than in areas with a mixture of forest and nonforest habitats."

The size of the opening is important as well. In general, openings less than 2 acres usually don't attract wildlife species that don't already occur in the vicinity. But, small openings will increase the amount and type of foraging and cover available to species already present.

The edge of openings is important as well. Edges occur at the boundary of two habitats and have their own distinct characteristics and often high levels of biodiversity. Maximizing edge is generally a good way to increase diversity and quality of habitat.

Habitat Management Approach

Two approaches to wildlife habitat management are commonly applied. The *featured species* approach caters to one or two chosen species. Management specifically for white tailed deer or for ruffed grouse is an example. The species richness approach focuses on creating and improving a variety of habitat types to maximize benefit to wildlife.

The *species richness* approach to habitat management is generally the most applicable technique; however, some practices are aimed at specific species. Birds of all types are of special interest to the landowners. Fortunately, managing for a diversity of wildlife species will in fact improve bird habitat as well since different birds use different species mixes, canopy layers, and different types of opening sizes, and communities. Managing for species richness attempts to provide habitats for as many different species as the property can support. The species richness approach encourages a diverse, healthy ecosystem.

Another common goal for management is to maintain a forest structure typical of a natural forest and to encourage natural forest processes. Manipulation of the forest to benefit a particular species will be discouraged on a large scale. While certain management practices will be beneficial to some species and detrimental to others, the overall goal of management is to create a rich and diverse habitat for wildlife.

Certain wildlife practices should be routinely followed during logging operations, or as separate wildlife habitat enhancement activities. An example is the practice of leaving or creating dead or dying snags where they do not endanger people or aesthetic values. Snags are very important to many species, especially birds and insects. Another practice is to leave or create some coarse woody debris on the ground for use by insects, invertebrates, and fungi. Course woody debris should include large diameter low-value trees, which are cut or fall naturally and left in place in the woods. These large pieces of decomposing wood are important for nutrient cycling, water retention, carbon sequestering and microbial activities. Black bears often work these logs over looking for grubs and ants. Several reptiles and amphibians utilize the moist cover provided by these decaying logs. Coarse woody debris is a component of the natural forest and contributes to ecosystem function.

YMCA Camp Coniston Wildlife Sanctuary Wildlife Habitat:

The Camp Coniston Forest has a fair variety of habitat types for wildlife, from large and small mammals to birds and amphibians. Hemlock and pine forest, spruce-fir forest, northern hardwood and mid-successional hardwood, mid-slope moderate and steep terrain, ledgy rock outcroppings, red oak for hard mast, shrubby heights of land, open land, streams, pond, lake and wetland habitats all occur here in relatively balanced amounts. The

diversity of the forest cover is fairly high. Hard mast is fairly abundant with oak, beech, pine, spruce, and fir throughout the parcel. Soft mast is less abundant, with only scattered raspberry and blackberry, some blueberry and black cherry. Minimal browse is available. The size of the ownership is conducive to supporting breeding habitats for a number of small mammals, as well as songbirds and amphibians. Larger mammals such as deer, moose, bear, coyotes, and fox use the ownership but also travel beyond the property lines. The southern section of the ownership, below Camp Road, is part of a 4,300-acre unfragmented block, and the northern section is part of a 2,000-acre unfragmented block.

Forested habitats are described on a stand-by-stand basis in the data section of this plan. Vegetation can be manipulated to provide or create certain habitat components. When vegetation is cut or planted to improve or create certain habitat types, some species will benefit, and others will not. Both hardwood and softwood forest types are present, and it will be important to maintain this important mix. Often, habitats not found within the boundaries of an owner's land can be found on adjacent properties.

There are so many components to wildlife habitat it is difficult to even begin to address all possible management activities. Given that complexity, management recommendations at this planning level will be limited to those that are high priority, generalized, and practical. Wildlife management on the Camp Conistion should strive to accomplish the following general recommendations:

- Monitor for Hemlock Wooley adelgid;
- Manage for healthy and vigorous hemlock population;
- Maintain large areas of intact, healthy, interior forest;
- Create additional snags, cavity tree candidates and down logs when possible;
- Protect wetlands and streams with a riparian buffer;
- Avoid disturbing wet depressions that could host vernal pools;
- Protect travel corridors;
- Create early successional openings to increase diversity and quality of habitat;
- Monitor and manage invasive exotic shrub populations;
- Maintain and improve existing open/grass land.

Recommendations for wildlife habitat management from Biodiversity in the Forests of Maine (Flatebo, 1999.):

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.
- Throughout the remainder of the DWA, maintain forage areas that provide a steady, abundant source of accessible browse b y clearcutting 1 to 5 acre openings using a 40-year rotation and 10 year cutting cycle. Locate browse cuts within 100 feet of core shelter areas (dense, mature softwood that provides cover).

Beaver influenced ecosystems:

- To the extent possible, locate new roads where they will not be at risk from flooding by beavers, or provide a base for the construction of new dams.

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 rough is frozen or snow covered.

BIRD HABITAT

Breeding Bird Survey

As mentioned in the introduction, this plan was prepared in collaboration with Phil Brown, land manager for New Hampshire Audubon. Phil performed a breeding bird survey during two consecutive years, the results are included in an extensive report in the Appendix. In short, 87 bird species were recorded on the ownership. The findings of these surveys helped guide both the broad management goals of the ownership as well as

helped customize stand specific silvicultural and habitat enhancement recommendations, as well as provide targeted bird species. Bird species that were identified in the breeding bird survey were targeted for management recommendations when they would specifically benefit from the recommended treatment. It is a given that many other species not specifically targeted will also benefit from management recommendations, but were not listed since it would be nearly impossible and impractical to list all possible users.

In addition, general habitat management guidelines from Vermont Audubon are listed below to help guide management here.

Special Considerations for Bird Habitat*:

Silviculture

- **Retain, release, and regenerate soft mast species** such as black cherry, serviceberry, and apple that produce food sources in late summer which are critical for preparing for successful migration. Rubus spp that dominate openings are also important sources of soft mast for birds;
- **Retain, release, and regenerate yellow birch** (*Betula alleghaniensis*) whenever possible since the branches and foliage of this species are preferentially chosen foraging substrates for many insect-eating bird species including blackburnian warbler, black-throated green warbler, and scarlet tanager;
- **Retain softwood inclusions in hardwood stands** and hardwood inclusions in softwood stands. Overstory inclusions resulting from site conditions are more practical to maintain than those that are a result of disturbance history;
- **Control and monitor invasive plants.** Migratory songbirds will eat buckthorn, autumn olive, barberry, and honeysuckle berries during the post-breeding season when they are fueling up for fall migration, but the berries are not nutritious. When non-native invasive plants are present, strive to locate larger groups/patches near already disturbed areas (e.g. agricultural lands) and away from interior sections;
- **Maintain closed-canopy buffers along beaver ponds, wetlands, and riparian areas.** Layout riparian buffers to have variable widths based on stream morphology; avoid abrupt edges;
- **Retain a minimum of six snags per acre** with one tree > 18” DBH and three > 12” DBH and designate 3-5% of total stocking as potential cavity trees and source of future snags. Where lacking, actively recruit snags through girdling. Birch and aspen are preferred species;
- **Use snags and potential cavity trees as nuclei for retained patches during larger cuttings.** Retained patches may be islands or peninsulas extending from adjacent stands.

Use woodland seeps and springs, which are early season sources of insects, green vegetation, and earthworms as nuclei for uncut patches to retain snags, cavity trees, and other site-specific features. Retained patches may be islands or peninsulas extending from adjacent stands;

- **Recognize that vertical structure is naturally limited in early and mid-successional stages.** Look for opportunities to enhance vertical structure over time;
- **Consider and protect vernal pools and riparian buffers** when laying out extent and location of openings;
- **Cluster intermediate treatments** conducted in the matrix in between groups along trails, and away from openings and sensitive sites;
- **Manage for age-class diversity** over larger ownerships (>200 acres) where opportunities exist.

Operations

- **Keep woods roads and skid trails <20 feet wide** to avoid creating fragmenting barriers for interior
- forest species, such as the wood thrush and ovenbird;
- **Incorporate bends and twists into woods roads** and skid trails when laying out a new network. Nest parasites such as brown-headed cowbirds will travel into forest interiors along straight openings, but will avoid bends;
- **When feasible, avoid operating during peak breeding season** (15 May to 15 August). See table of breeding dates in the companion document *Birds with Silviculture in Mind* for individual species;
- **Operate during winter** under frozen conditions when appropriate to protect habitat features such as understory layers, leaf litter, forest floor topography, soils, and woody debris;
- **Leave as much woody debris on site as possible**. Avoid whole-tree harvesting when feasible. When appropriate, return landing debris to the woods;
- **Leave several large downed logs** well-distributed throughout the stand to serve as drumming sites for ruffed grouse and important habitat for man life forms;
- **Avoid disturbing existing tip-ups, stumps, and logs** during harvest and operations;
- **Create scattered slash piles** of fine woody debris where possible post-harvest to enhance songbird cover and foraging opportunities;
- **Protect shrub patches as well as tree seedlings and saplings during harvesting.** Avoid damage to understory layers during harvest and skidding operations by:
    - Using directional felling techniques;

- Carefully laying out skid trails to avoid patches of advance regeneration;
- Winching instead of skidding from each stump, when feasible;
- Harvesting when a heavy snowpack is present.

*Recommendations from Vermont Audubon

FOREST INVENTORY PROCEDURES

A forest inventory is conducted to evaluate the timber types, wildlife and bird habitats, recreational and cultural resources found on the property. The forest inventory is also used to evaluate the stocking and composition of the forest and the volume of the merchantable timber on the woodlot. Data is collected at points established on a systematic grid.

For the cruise a 20-BAF prism was used to sample trees 5.5 inches and larger at each point. The trees which fell within the sample at each point were recorded by species, diameters tallied to the nearest inch, growing stock status, and crown position. The trees were also tallied as sawlogs, pulpwood, or a combination of the two. A 5-BAF prism was used to collect data including species, diameter, status, and crown position on trees between 2 and 6 inches in diameter. Information on snags, cavity trees, and regeneration was also collected. Photographs were taken at each point and at other points of interest. Products estimated in tallied trees greater than 6 inches in diameter were graded in multiples of eight feet. Hardwood sawlogs were estimated to a 10-inch small-end diameter while spruce and fir softwood logs were estimated to a 6-inch small-end diameter and pine to an 8-inch small-end diameter. Pulpwood was estimated in eight-foot lengths up to a minimum 4-inch top.

To determine the volume more accurately and make forest management and wildlife habitat recommendations, the property was broken into separate management areas called forest stands. Stands were differentiated from each other primarily on the basis of natural community type and past land use, but soils, tree size, species composition, and density are also considered. As with any large piece of land, there are many micro-stands on the property (small areas within a larger stand that are distinct, such as a small pocket of rocky ground or a forested seep) but these variations are too subtle to map and too numerous to describe. These subtleties are best left to the intuitive forester to sort out when applying any sort of silvicultural treatment.

The computer program Forest Metrix was used to process the data collected at the sample points to the entire forest. The detailed computer program output is not included as part of this plan but is available, if needed, from Meadowsend Consulting Company. Often to simplify operations on a large tract, forest stands are compiled to make up operational compartments. Compartments are helpful to identify sections of the property that utilize the same access system.

Stand type abbreviations often include primary species, size class, and density. Primary species can be generalized in different ways. Often, we used H, S, or M where H is hardwood, S is softwood, and M is mixedwood. Sometimes to clarify, a stand may be labeled as HS, meaning a mix of hardwood and softwood

where hardwood is dominant. Or, to further specify, we might use a 2-letter abbreviation representing a specific species (for example SM is Sugar Maple). Size class ranges from 1-4, and crown closure/density ranges from A-D as defined below:

Size Class:

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

2: Saplings or small poles 3” to 8” DBH;

3: Large poles and/or small sawtimber 9” to 12” DBH;

4: Sawtimber 13” DBH 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: 25-49% crown closure of co-dominant or dominant trees;

D: 0-24% crown closure of co-dominant or dominant trees.

YMCA Camp Coniston Inventory:

A forest inventory was completed during the summer of 2020. Forest data was collected at points on a systematic grid providing approximately 1 point for every 7 acres of forest land. The same plot locations were used as the 2009 inventory. It’s hard to say how closely the plots lined up, but in several cases the old plot flags can still be found and those plots landed in the exact same spot. The forestland was delineated into 15 separate management stands, slightly modified from the 2009 design.

FOREST STRUCTURE and MANAGEMENT APPROACH

Structure and Age Class Distribution

The size and distribution of vegetation layers make up the structure of the forest including vertical spacing and horizontal layers. Vertical spacing is simply the density of individual plants, shrubs and trees. The horizontal layers are usually described in four levels including ground cover, understory, mid-story, and overstory. The ground cover includes herbaceous plants and small woody plants. The understory includes trees seedlings and small saplings and woody shrubs. The mid-story includes pole size trees and tall saplings, topped by the overstory of the largest trees. Often the different horizontal layers with the exception of ground cover are associated with different age classes of trees, but this is not always the case. A slow, growing shade tolerant trees species, such as Eastern hemlock, can remain in the understory for many years biding time until an opening above is created. Age structure in a forest system can be simple, with one distinct age class called even-aged. Two-aged forests are just as they sound, two distinct age classes. And forest with more complex age structure are called un-even aged.

Understanding forest structure conditions is important for management. It determines the general type of silviculture to be applied and is closely related to biological diversity and wildlife habitat.

YMCA Camp Coniston Structure and Age Class Distribution:

The age of the overstory trees ranges from some much older pine and hemlock around the perimeter of the lake, some old legacy sugar maples on the east facing slope, and scattered older oak in the northern section of the ownership. These older trees are likely 80-100+ years. The age of the majority of the trees is younger, closer to 60-80 years. The bulk of the trees got their start after the abandonment of agriculture here in the early 1900s, while younger trees have grown in areas that have been logged over the decades as well as where natural disturbances have occurred. Regeneration exists throughout the stands dominated by older trees, but in general is sparsely stocked and dominated by shade tolerant species, such as beech. The exception is the large number of patch openings that were created during the 2016 and 2019 harvested ranging in size from a little over a tenth of an acre to 1.5 acres. These openings have regenerated largely to raspberry and blackberry, with a fair amount of beech and red maple. Oak regeneration has not become well established at this point in large part due to predation by squirrels, turkeys and deer. Oak can also be challenging to successfully regenerate when there is a lack of adequate moisture during the growing season.

A mix of age classes is beneficial to forest health and function for several reasons. The more diverse a forest is, the better it will withstand disturbances and the greater variety of wildlife habitat it will offer. In addition, the juxtaposition of trees of different age classes has important implications for long-term forest and wildlife management. Forest managers generally divide a well-balanced forest into four different size classes: seedlings, saplings, poletimber, and sawtimber. A balance of age classes is desirable for a diverse forest structure and the sustained yield of forest products

Stocking, Timber Quality, and Volumes

Stocking is a term used by foresters to describe the relative density of the trees in a stand. Stands may be under stocked, over stocked, or fully stocked. Stands which are fully stocked have trees which are wholly utilizing the growing space available to them. Volume refers to the quantity of merchantable timber found on the property. Timber quality specifically relates to the products found in a tree. A poor-quality timber tree may be an excellent quality wildlife tree, and vice versa.

YMCA Camp Coniston Stocking, Timber Quality, and Volumes:

Tree stocking on the YMCA Camp Coniston varies, largely dependent upon recent timber harvesting. Patch cuts and areas of overstory removal have very low stocking, primarily just scattered residual trees. Harvested areas surrounding the patch cuts are generally adequately stocked for growth, and those areas not recently treated are overstocked. Details of stocking conditions are listed in the stand sections below.

Timber quality varies. With the exception of some high-quality red oak, in general it is average. In general stands located on the better sites, resulting in better growing conditions, have better quality trees, but

this is not always the case. The bulk of the volume is pine, which varies greatly in quality. Red oak follows pine in volume, and in general is good quality. Hemlock and red maple are average quality, as well as the other remaining other species, in general. Recent harvesting focused on capturing value on mature trees, regenerating areas of poor-quality trees, and in general leaving behind a residual stand of overall higher quality.

On average there is 3,200 feet of sawtimber per acre, with an additional 900 feet of low grade. This is somewhat low, but not unexpected. Over time the amount of sawtimber per acre will increase with good management. As mentioned above, pine leads with 26% of the total sawtimber volume while making up 16% of the total volume. Hemlock is almost reverse of this, making up 20% of the overall volume, but only 16% of the sawtimber volume. Red oak holds 13% of the total volume, but 18% of the sawtimber volume.

The remainder of the volume is a mix of spruce and hardwoods. The hardwood volume is dominated by red maple and sugar maple. Several tables and graphs will depict this data in the Tract Level Data and Stand Data section below.

Forest Health

Forest health can be discussed on an individual tree or disease, or it may refer to the functioning of the complete forest ecosystem. Many forest diseases and pests are ubiquitous and found on a landscape level. At times their presence can signify the forest as a whole is unhealthy, or they can signify more isolated, individual health issues. Health concerns include a whole host of issues, such as tree diseases, insect pests, invasive exotic shrubs, pollution, and soil acidification. Sound forest management can reduce the negative impacts of health issues and often improves overall forest health, where poor management often exacerbates health problems.

YMCA Camp Coniston Forest Health:

Generally speaking, the forest is free of widespread disease. Most of the diseases found here are common, and a natural part of a well-functioning forest ecosystem. Diseases present include red rot and blister rust in some of the pine. Red rot is a decay fungus that typically infects trees through a wound or branch scar and rots the tree from the inside out. White pine blister rust is an interesting disease. It requires 2 hosts to complete its life cycle, white pine and a shrub from the Ribes family, such as Current or Gooseberry. The fungus spends half its life on the Ribes and the other half on the pine, typically creating sunken cankers near the base of the tree. When working in the pine, trees showing the presence of either of these diseases should be targeted for removal.

Beech bark disease, another common problem in northeast forests, is present as well and is infecting the majority of the beech found here. This disease has an interesting story as well. It is caused by a fungus that is disseminated by the wind. It enters its host, the American beech, through holes made by the beech scale for depositing eggs. Presence of scale insects is easily detected by inspecting the bark. The scale insects overwinter under a white, felty coating which appears like tiny white speckles on the bark. The fungus can also be seen, especially well with a magnifying glad, and looks like clumps of red-orange waxy material oozing out of tiny cracks or holes in the bark. These infected holes turn into cankers which eventually girdle the tree, killing it

by cutting off its food supply from the roots.

Other common diseases include sterile conk of birch, which is not present in large amounts here. Sterile conk appears as a large black growth protruding from the trunk of white and yellow birch. The conk itself is sterile while the tree is alive. But, once the tree dies, the conk then emits spores that are spread on the wind. Eutypella canker, a common canker affecting sugar maple is present, but in low amounts. Also here is sugar maple borer. This is an insect that spends two years as a grub boring its way under the bark, girdling the portion of the tree it travels through.

Threats to forest health that were not yet noted here, but likely to arrive at some point include Hemlock Woolly Adelgid (HWA) and Emerald Ash Borer (EAB). HWA is found throughout southern New Hampshire, and slowly spreading northward. If left untreated, HWA can kill a tree in 4 to 10 years. Adelgids are small, wingless insects that use sharp mouth parts to pierce and feed on hemlock twigs. Damage from HWA makes the host tree more susceptible to other diseases, such as elongate hemlock scale and hemlock borer. Not only is the impact of HWA on wildlife habitat devastating, it affects the surrounding ecosystem as well as soil health and potentially water quality. The best defense against HWA is to manage for vigorous populations of hemlock.

Emerald ash borer (EAB), a non-native wood-boring beetle wreaking havoc on urban forests and ash populations was first detected in 2013 in Concord, New Hampshire and has since spread to about 70 other towns. Once detected it is too late to save the host tree, and it can be assumed to be widespread throughout the area. It is considered generally infested in Croydon, Springfield and Sunapee. Management generally includes salvage to some degree, combined with leaving healthy, vigorous individuals widely spaced out.

Growth Rates and Allowable Cut

An in-depth growth study was beyond the scope of this management plan; some rules-of-thumb do apply. A tree's growth is directly related to the substrate (soil) 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 woodlot in New England grows at a rate of .42 cords per acre per year. Additionally, the average managed woodlot in New Hampshire grows at a rate of 2 to 4 percent per year.

Allowable cut is the volume that can be sustainably harvested from a defined area. Typically, allowable cut is equal to or less than growth, and is calculated by multiplying the growth rate times the area times the years between harvest entries.

YMCA Camp Coniston Growth Rates and Allowable Cut:

It is likely the growth rates on the YMCA Camp Coniston fall within the average range of 2 to 4 percent per year. The total operable and accessible acreage is about 846 acres, resulting in a conservative estimate of 355 cords of growth per year. Silviculture will be geared towards improving wildlife habitat by creating multiple age classes to support the resilience of the forest, removing diseased, damaged and low-quality trees, and

overall improving the quality and health of the forest. In some areas of low quality and disease a higher cut may be required to “restart” sections of the forest. The ultimate goal is to improve the quality and stocking of the forest to sustain long term management in line with the allowable cut.

Management History

The recent harvest history of individual tracts of land is ideally garnered though records kept by the landowner, but often this is not the case. When no records exist, the history is gleaned through field evidence including age and distribution of stumps, existing or historical access infrastructure, and through forest structure.

Much of the land in New England has a similar history when looking back a hundred years or more. Agricultural use peaked in the mid 1800's and declined through the beginning of last century. Around 1900, about 80% of the land in New England was open for agricultural use and only 20% was forested. By the late 1900's the inverse was true, with only 20% open and 80% forested. This means the average overstory tree is likely to be around 80 years old. And the average forest has been cut at least twice in that time period. Assessing the history of harvesting on a piece of land is an important component of management planning.

YMCA Camp Coniston Management History:

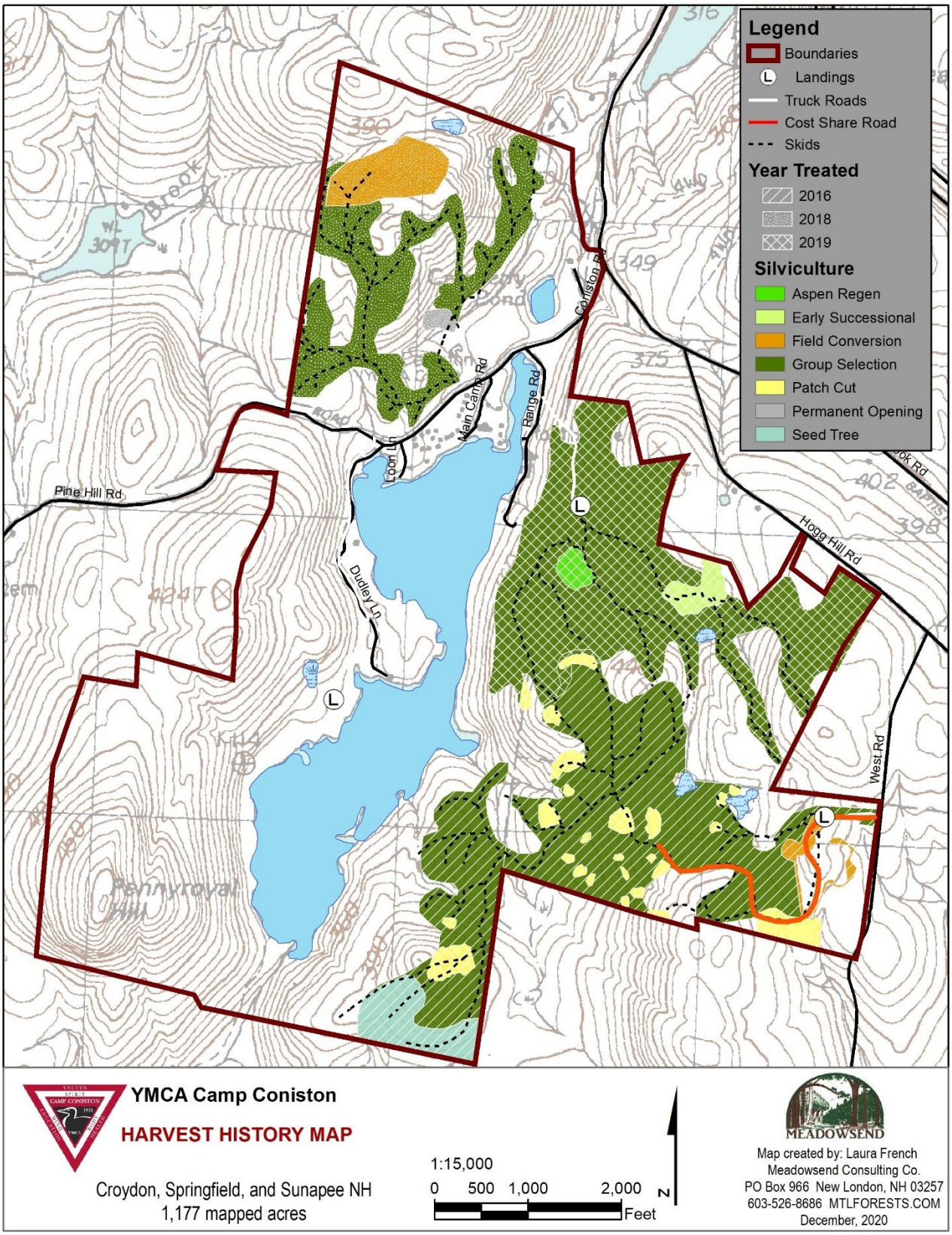
The previous forest management plan suggests some four-acre block cutting was carried out in the 1970’s on the east side of the lake as well as harvesting on the bulk of the land in Springfield followed by various entries south of Pine Hill Road.

Under MCC management, there have been several harvests since the 2009 plan. See map below.

2016: Treated approximately 250 acres on southern portion of tract on the east side of the lake. Built a new access road in from West Road (off Hogg Hill Road). Harvest included about 140 acres of group selection/thinning, 90 acres of patch cuts, a 15-acre seed tree cut, and a field conversion.

2018: Worked north of Camp Road. Treated approximately 70 acres using group selection, created a 14-acre field, and made a small permanent opening near the camp infrastructure. Landing site was converted to horse paddock following harvest.

2019: Treated about 140 acres on the east side of the lake, north of the 2016 harvest. A new landing was established here accessible from a short road past the maintenance building. The bulk of this was group selection, with some early successional work and aspen regeneration harvesting.


Legend
Boundaries
Landings
Truck Roads
Cost Share Road
Skids
Year Treated
2016
2018
2019
Silviculture
Aspen Regen
Early Successional
Field Conversion
Group Selection
Patch Cut
Permanent Opening
Seed Tree
Pine Hill Rd
Main Camp Rd
Range Rd
Coniston Rd
Loon Ln
Dudley Ln
Hogg Hill Rd
West Rd
Pennyroyal Hill
YMCA Camp Coniston
HARVEST HISTORY MAP
Croydon, Springfield, and Sunapee NH
1,177 mapped acres
1:15,000
0 500 1,000 2,000
Feet
N
MEADOWSEND
Map created by: Laura French
Meadowsend Consulting Co.
PO Box 966 New London, NH 03257
603-526-8686 MTLFORESTS.COM
December, 2020

Forest Management Approach

Forest management utilizes a combination of silvicultural techniques that typically are separated into two general categories, even-age and unevenaged management. Evenaged management methods include clearcut (removal off all trees within a designated area), seed tree (similar to a clearcut but with residual trees for seed source), shelterwood (removal of most overstory trees leaving enough to create sufficient shade to create a micro-environment for regeneration; once regeneration is established the residual overstory trees are removed in either one or two further entries) , overstory removal (removal of the overstory to release established regeneration) and patch cut (a small clearcut, usually less than 2 or 3 acres in size) applications and may be used to regenerate a new stand when deemed necessary. Unevenaged management methods generally include single tree (removal of single trees to regenerate shade tolerant species) and group selection (removal of groups of trees to regenerate shade tolerant species) 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.

Meadowsend uses a combination of evenage and unevenage silviculture, depending on the existing forest conditions. Evenage silviculture tends to be more straightforward, where unevenage practices are more complicated. Traditionally, the intent of unevenage management is to attain forest stocking conditions that mimic a specific diameter/age distribution represented graphically as in inverse J curve. But, practically speaking this is not only difficult to attain, it often can't be applied on the typical forest conditions found today. Instead, 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 with the goal of having a balance of age classes present on any given ownership. 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. Management strategies typically fall into three categories: even-age, transition to multiple-age, and multiple-age.

Definitions of Silvicultural Treatments

Definitions of specific silvicultural treatments are listed below and are largely taken from The Dictionary of Forestry (Helms, 1998.). Deviations from these treatments will be specified in stand prescriptions.

Crown Thinning (Evenage management): the removal of trees from the dominant and codominant crown classes in order to favor the best trees of those same crown classes;

Free Thinning (Evenage or Multiple-Age management): the removal of trees to control stand spacing and favor desired trees, using a combination of thinning criteria without regard to crown position;

Low Thinning (Evenage or Multiple-Age management): the removal of trees from the lower crown classes to favor those in the upper crown classes;

Selection Thinning (Evenage or Multiple-Age management): the removal of trees in the dominant crown class in order to favor the lower crown classes;

Patch Cut (Evenage or Multiple-Age management): the cutting of essentially all trees, producing a fully exposed microclimate for the development of a new age class (typically all Patch Cuts are laid out by delineating the boundary with marking paint; Patch Cut size will be specified in Silvicultural Prescription);

Strip Cut (Evenage management): the cutting of essentially all trees in a strip, producing a fully exposed microclimate for the development of a new age class (all Strip Cuts laid out by delineating the boundary with marking paint; Strip Cut dimensions will be specified in Silvicultural Prescription);

Clear Cut (Evenage management): the cutting of essentially all trees, producing a fully exposed microclimate for the development of a new age class (all Clear Cuts laid out by delineating the boundary with marking paint; Clear Cut size will be specified in Silvicultural Prescription);

Seed Tree (Evenage management): the cutting of all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class in fully exposed microenvironment; (seed trees may or may not be removed after regeneration is established depending on 1: harvest opportunity 2: protection of established regeneration 3: long term success of regeneration);

Shelterwood (Evenage or Multiple-Age management): the cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment —note the sequence of treatments can include three types of cuttings: (a) an optional preparatory cut to enhance conditions for seed production, (b) an establishment cut to prepare the seed bed and to create a new age class, and (c) a removal cut to release established regeneration from competition with the overwood; cutting may be done uniformly throughout the stand (uniform shelterwood), in groups or patches (group shelterwood), or in strips (strip shelterwood); in a strip shelterwood, regeneration cuttings may progress against the prevailing wind;

Single Tree Selection (Multiple-Age management): individual trees of all size classes are removed

more or less uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration;

Group Selection (Multiple-Age management): trees are removed and new age classes are established in small groups; the width of groups is commonly approximately twice the height of the mature trees with smaller openings providing microenvironments suitable for tolerant regeneration and larger openings providing conditions suitable for more intolerant regeneration (Patch Cutting differentiated from Group Selection in that Group boundaries are not delineated with marking paint where Patch Cut boundaries are; Group Selection size will be specified in Silvicultural Prescription);

Crop Tree Release (Evenage and Multiple-Age management): the crown release of selected trees on two to preferably three sides (Number of Crop Trees to be released per acre will be specified in Silvicultural Prescription).

Sustainability

It is recognized that from a social, economic, and wildlife habitat standpoint, forests must be managed in a sustainable, long-term way. Because trees can either naturally regenerate or be replanted in an area from which they have been harvested, trees are considered a renewable resource. For this reason, it is possible to harvest trees in a forest, repeatedly, in a way that is sustainable. This implies that portions of the forest may be clear-cut or regenerated at certain times. A balanced age class distribution, as previously discussed, is typically utilized for sustainable forest management. But, on smaller tracts often there isn't enough acreage to efficiently manage for balanced age classes, so sustainable forest management is accomplished though managing for multiple age classes of trees in relation to allowable cut rates, health, vigor, diversity, and soil/water quality. This type of management allows for sustained periodic harvesting on a regular basis. The scale of sustainability varies with the size of the ownership. The treatments prescribed in this plan are designed to be sustainable over the long term. All of the stands which call for multiple-age management should be able to be re-visited every 15 to 20 years (the "cutting cycle"). Stands which call for even-age management will ultimately have to be regenerated at the end of their rotation age (60 to 120 years, depending on species and forest type), though interim thinning can be applied at 10 to 20-year intervals in most timber types.

The modern view of sustainability recognizes the need for the entire ecosystem to be sustained, not just one component of the system like timber. If all of the components of the forest are considered, the entire system can function in a sustainable fashion. The Northern Forest Lands Council has identified the following benchmarks of sustainability:

- Maintenance of soil productivity;
- Conservation of water quality, wetlands, and riparian zones;
- Maintenance or creation of a healthy balance of forest size and age classes;
- Protection of unique or fragile natural areas;

- Conservation and enhancement of habitats that support a full range of native flora and fauna;
- A continuous flow of forest products;
- The improvement of the overall quality of the timber resource;
- The consideration of aesthetic concerns during timber harvesting;
- The continuation of opportunities for recreation.

Forest Economics

Economics, while often not an overriding management goal, is an essential part of the management objectives. The carrying costs of owning land alone are expensive. In addition, forestry services critical to proper long-term management involves some expense. In well-managed forests these costs are often viewed as necessary capital investments or annual expenses to achieve owner objectives. Timber management is a primary way for landowners to generate modest income from a naturally renewable resource through careful, thoughtful, and forward-thinking management.

Forests add in value in three ways. *Physical growth* accounts for the gains in volume over time. The faster an individual tree grows, the faster the tree increases in value if it is of sufficient quality. Whatever the product, additional volume increases value.

The second way forests increase in value is through *product development*. As a sapling, a tree has no merchantable value. Pole timber can often be marketed as firewood or pulpwood. Once a tree grows into the sawtimber size class (and if it is of sufficient quality) it can be sold for sawlogs or even veneer. The per-unit value increase from pulpwood to sawlogs to veneer is very large, in some cases 1000% or more. It would be unwise from an economic standpoint to cut a pulpwood size tree that could eventually grow into a valuable saw log. Furthermore, an individual tree growing rapidly into sawtimber size is a tree which will have a high rate of return, as will a stand of such trees.

The third way forests add -- or possibly lose -- value is through *relative price changes* in the value of various forest products. The demand for forest products is cyclical, especially for low-value, bulk commodity items such as pulpwood and chip wood.

Thoughtful forest management can positively influence growth rates, quality of growing stock and thus product development, and will incorporate an educated awareness of market trends. This “value-growth” approach is a key part of sustainable management which ideally allows for periodic economic returns.

OPERATIONAL CONSIDERATIONS

Boundaries and Property Survey

Identification and monumentation of property boundaries is one of the first management tasks every landowner should undergo, regardless of their interest in active harvesting. The old idiom is true, good fences make good neighbors. Clearly marked boundary lines prevent a multitude of problems, not the least of which is timber trespass, and also provide benefits such as outreach to neighbors and other users of the land.

Property boundaries often include a mix of stone walls and sections of barbed wire fence, but this isn't always the case. Boundary lines should be monumented with permanent blazes which are cut into trees using an ax and then painted with a long-lasting paint. Proper blazing techniques are specific, with rules about location and size of the blaze depending on its location along the line. To protect the historical integrity of a line, new blazes should not be made over old blazes. The blazes should be painted every 10 to 15 years. If monumentation doesn't exist or has been lost over time, a survey may be required to establish the location of the boundary lines. Regular maintenance of your boundary is a worthwhile endeavor.

YMCA Camp Coniston Boundary and Survey:

A portion of Camp Coniston Forest in Croydon is depicted in a survey entitled “Property of Interlaken Camps” by Walter Breckenridge, dated May 1954. The area in Springfield is outlined in a survey entitled “Hogg Hill Subdivision” by James H. Neil dated 1973. The portions of the boundary occurring in Croydon and Springfield were reportedly blazed and painted in the summer of 1993. Currently, most of the lines have been recently blazed and painted by camp staff. A small area on the eastern boundary above the maintenance buildings at the height of land still needs to be painted. In all there is 7.8 miles of maintainable boundary line. It is recommended the entire boundary be repainted with long-lasting boundary paint every +/- 10 years.

The majority of the Camp Coniston boundary has been blazed and signed recently, with the exception of a small section along the eastern boundary above the maintenance building, where it has been blazed but not painted (left photo). Most corners are monumented with rebar or pipe (right photo).

Access, Operability, and Water Quality Protection

Most management requires a network of skid trails, truck roads and wood landings. Efficient and sound layout of this important infrastructure is an art in itself. There are a whole host of requirements, rules, and recommendations for forest roads and trails and location of landings. In most states a reference of Best Management Practices exists outlining regulations to prevent erosion and protect water quality during timber operations. General rules of thumb apply, roads and skid trails should not be too steep, should neither be located on sensitive sites nor too close to water, wetland and riparian areas, should be appropriately sized, and should utilize proper water diversion structures. Often the access network is the most expensive component of land management, but when properly laid out they not only facilitate timber harvesting, they can enhance landowner access, improve wildlife habitat, and provide recreational assets.

Any time heavy equipment is used in the woods there is the potential for water quality problems. Skid trails in the wrong place or used during the wrong time of the year can cause soil erosion and sedimentation. To avoid water quality problems, proper planning is critical. The timing of the job is an important factor in maintaining water quality, for example some jobs are scheduled for frozen, winter conditions while others can be operated during dry summer months. Access roads and skid trails should be properly laid out initially. Soil compaction, rutting, and erosion are the most eminent dangers where the ground is wet. Knowledge of specific soil characteristics, drainage location and proper timing of jobs can minimize impacts.

Buffer strips along wetland areas and other riparian zones should not be encroached upon. Standard buffer widths can be somewhat impractical for planning purposes, but do offer general guidelines. Combining recommendations with on-site indicators, such as soil types and steepness of slope, help determine appropriate individualized buffer widths. Both recommended and required buffer widths are presented on Brooks, Water and Wetlands section of this plan providing a general outline of buffer guidelines. Other factors such as topography, a distinctive change in forest cover type, evidence of travel corridors and concentration areas for wildlife, recreational use, and aesthetic concerns should all be used to determine appropriate buffer widths and locations. Additionally, not all buffers are “No-Cut”. Most have management recommendations that limit cutting and recommend actions to improve the quality of the buffer.

After, and often during, logging operations water bars and other drainage-control structures should be installed. In addition, close-out procedures often include seeding and mulching landing areas or places of exposed soil. All brook crossings should be properly restored with the banks mulched and seeded. The most effective safeguard of water quality is a careful equipment operator with common sense and proper supervision from the forester. All access roads and interior skid roads should be maintained according to the publication Best Management Practices For Forestry (Moesswilde, 2005.) by the State of New Hampshire Department of Resources and Economic Development. Another good resource for roads is Good Forestry in the Granite State (Bennett, 2010).

Water Quality Protection Practices from Good Forestry in the Granite State (Bennett, 2010):

Riparian and Stream Ecosystem Management Recommendations[1]:

- Establish Riparian Management Zones (RMZs) along streams, rivers, wetlands, ponds, and lakes;
- Include maintaining or restoring riparian functions and values as a silvicultural objective in RMZs;
    - Retain trees with cavities, standing dead trees, downed logs, and large supracanopy trees (especially white pine);
    - Leave wind firm trees that are well-distributed. Leave other vegetation, including existing groundcover;
    - Choose a regeneration system most likely to maintain riparian functions and values and rapidly regenerate the site with the desired trees. Choosing a method is complicated by wet soils and the desire to maintain forest structure that contributes to wildlife habitat and other ecological values;
        - Use uneven-aged techniques such as single tree or small group selection, maintaining 60 to 70 percent crown closure or full stocking as recommended in silvicultural guides;
        - Use even-aged techniques such as shelterwood or patch cuts to achieve regeneration goals when rapid regeneration is likely;
- Locate new truck roads and log landings outside RMZs, except where doing so would result in greater overall adverse environmental impacts;
- Design roads and skid trails within RMZs to minimize the long-term impacts of water quality and wildlife habitat. Apply BMPs. Put roads to bed using BMPs to stabilize the soil, control run-off, and control unwanted vehicular access at the end of the harvest;
- Minimize ground disturbance. Operate ground-based equipment when the ground is dry or frozen.
- Time harvesting to avoid disturbance to nesting birds and other sensitive species;
- Leave the area closest to the stream, pond or wetland unharvested to provide increased protection to aquatic habitat, protect wildlife trails, and allow a reliable long-term supply of cavity trees, snags, and down woody material. Larger zones increase the protection of nontimber values; however, no-harvest zones may not always be consistent with ecological or silvicultural objectives;
- Keep trees along banks to stabilize shorelines;
- Avoid leaving isolated riparian management zones with long distances of abrupt edge. Riparian forests next to heavy cuts, agricultural, or urban land uses may be subject to increased edge effects (e.g. invasives, nest predation) and risk of blowdowns. Practices that minimize these risks include limiting harvest within the riparian management zone, increasing the width of the zone, or feathering the edges of a heavy cut.

- Legal and recommended RMZs are given in the table below. The zone extends upland from the top of the stream bank or from the upland edge of any steam, pond, or lake-side wetland.

	Legally Required[1]		Recommended	
	Riparian Management Zone (feet)	**No Harvest Zone[2] (feet)**	**Riparian Management Zone (feet)**	**No Harvest Zone[2] (feet)**
Intermittent Streams	None	None	75	None
1st and 2nd order streams	50[1]	None	100	25
3rd order streams[5]	50[1]	None	300[4]	50[3]
4th order and larger streams[5]	150[1]	None	300[4]	25
Pond <10 acres	50[1]	None	100	None
Lake or Great Pond (>10 acres)	150[1]	None	300	25

1 Width required under RSA 227-J:9 (basal area law). Within a 12-month period, no more than 50 percent of the basal area may be cut in these areas. Includes ponds less than 10 acres associated with a stream or brook that flows throughout the year.
2 Portion directly adjacent to the water body in which no cutting is recommended. It may be desirable to expand it if there are steep slopes (>25%), unstable soils, sensitive wetlands, or exemplary natural communities. Increasing the width of the no-harvest zone will provide greater protection of nontimber values, but will also encumber a larger amount of timber. There may be valid ecological and silvicultural reasons to harvest in the no-harvest zone.
3 A 50-foot, no-harvest zone is recommended for 3rd order streams because of the importance of large woody material on streams of this size.
4 RMZ width on 3rd and 4th order and larger streams and rivers may expand to encompass known wildlife travel corridors, drinking water supply considerations, and the full extent of the 100-year floodplain.
5 For a list of 4th order and higher streams see NH DES Consolidated list of Waterbodies Subject to RSA 483-B.

Wetland Ecosystems:

- A wetland buffer is the vegetated upland area adjacent to a wetland. Deciding on the width and management actions in wetland buffers depends on what functions and values you want to preserve. It is difficult to generalize about wetland buffer widths because of the many types of wetlands and the diversity of wildlife.

- Designate a wetland buffer adjacent to forested and non-forested wetlands. Include steep slopes, highly erodible soils, known threatened and endangered species habitat, rare plants and exemplary natural communities, and heron, eagle or osprey nests. A buffer's effectiveness increases with its width. Sensitive wetlands require larger areas of upland to reduce the risk of disturbance.
- Different wildlife species require different widths for breeding, nesting, and overwintering. Leaving the understory adjacent to wetlands intact will provide many wildlife and water-quality services. Timber harvesting within a wetland buffer can provide benefits to wildlife habitat. The size of a buffer is influenced by, among other things, the type of wetland, steepness of slope surrounding the wetland, the erodibility of soils, the size and type of vegetation within the wetland, and the landowner's objectives.
- Leave the area closest to the stream, pond, or wetland unharvested to provide increased protection to aquatic habitats and to allow a reliable long-term supply of cavity trees, snags, and downed woody material. Larger zones will increase the protection of nontimber values, however, no-harvest zones may not always align with ecological or silvicultural objectives.
- Retain trees with cavities, standing dead trees, downed logs, and large supracanopy trees.

YMCA Camp Coniston Access and Operability:

Access to the Camp Coniston Forest is variable; some areas have good access and others are more challenging. The importance of well-laid out and well-maintained access cannot be overstated. Good access enables good work to be done on the land. Poor access inhibits the ability to carry out good work. Existing town roads provide access to the bulk of the parcel, though some access distances are long and most require maintenance and/or upgrade. The northern section can be accessed by Pine Hill Road and existing woods trails. A well-established hiking trail system has been laid out utilizing portions of old woods and/or farm roads. The portion of the property south of Pine Hill Road and west of the lake has more challenging access. Dudley Road, a private road, provides access to various camps and extends about halfway to the southern boundary line and stops at an old landing site. Because of the high aesthetic value and sense of place along Dudley Road, it will not be used for access to this section of the tract. It may be possible to access this section of the tract from Camp Road near the western boundary corner on an old town road that accessed the Barton cellar hole. A landing could be established here, with access to the forest along the mid-slope below Penny Royal Hill.

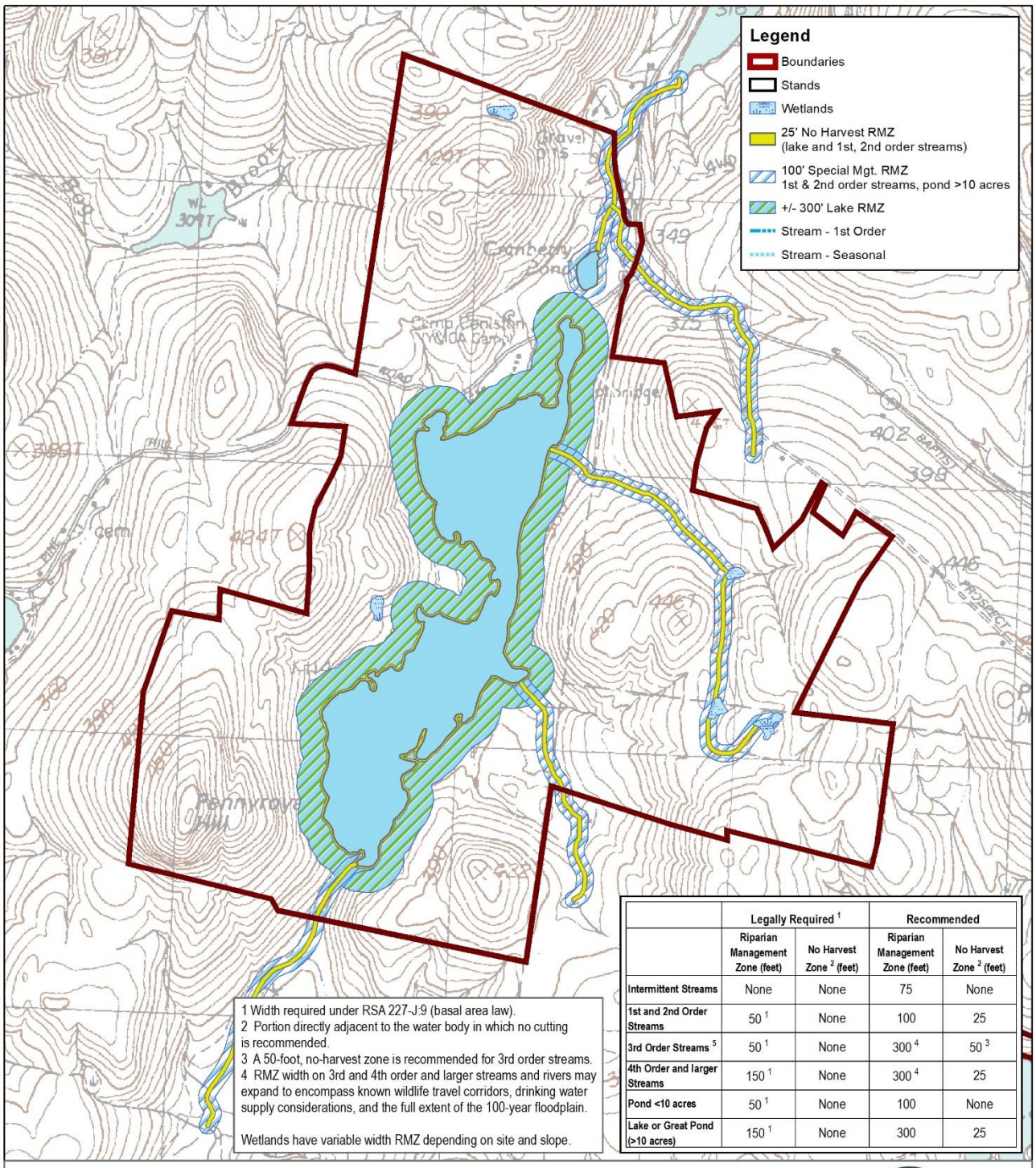
East of the lake a portion of the land can be access from West Road along a recently built road. Additionally, a road was built to a new landing in from the camp maintenance shop to access this section from the north.

It is worth noting that recent harvesting north of Pine Hill Road utilized landing areas which were then converted for camp activities. Good landing sites are not always easily found, and once established should be maintained for use in the future for a number of reasons: there are limited options for landing sites given the site,

creating landings in less-than-ideal conditions may be cost prohibitive, landing sites are an imperative component of timber sales, maintaining quality landing sites help to ensure continued long-term, sustainable management of the land.

As with most things on this parcel, operability is variable. There are sections that are simply inoperable due to steep rocky slopes. These areas have been delineated on the map. Other sections are marginally operable due to steep slope or rocky terrain.

Seasonally wet areas require being worked at the appropriate time of the year (either frozen winter or dry summer conditions) when logging is an objective, and jobs will need to be carefully laid out to avoid causing any damage to these important wetlands. Soils and riparian systems will be protected by following riparian buffer guidelines and practices outlined in Best Management Practices For Forestry (Moesswilde, 2005.) by the State of New Hampshire Department of Resources and Economic Development and the publication Good Forestry in the Granite State (Bennett, 2010). A map of the Riparian Management Zones is shown below.



	Legally Required [1]		Recommended	
	Riparian Management Zone (feet)	No Harvest Zone [2] (feet)	Riparian Management Zone (feet)	No Harvest Zone [2] (feet)
Intermittent Streams	None	None	75	None
1st and 2nd Order Streams	50 [1]	None	100	25
3rd Order Streams [5]	50 [1]	None	300 [4]	50 [3]
4th Order and larger Streams	150 [1]	None	300 [4]	25
Pond <10 acres	50 [1]	None	100	None
Lake or Great Pond (>10 acres)	150 [1]	None	300	25

1 Width required under RSA 227-J:9 (basal area law).
2 Portion directly adjacent to the water body in which no cutting is recommended.
3 A 50-foot, no-harvest zone is recommended for 3rd order streams.
4 RMZ width on 3rd and 4th order and larger streams and rivers may expand to encompass known wildlife travel corridors, drinking water supply considerations, and the full extent of the 100-year floodplain.

Wetlands have variable width RMZ depending on site and slope.

YMCA Camp Coniston

RIPARIAN BUFFER MAP

Croydon, Springfield, and Sunapee NH
1,177 mapped acres

1:18,000
0 500 1,000 2,000 Feet
N

MEADOWSEND
Map created by: Laura French
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December, 2020

Local Markets

As of the last few years the markets have been so variable it is difficult, if not impossible to predict what they will be a year or even a month from now. Though in general conditions have slowly improved and are better than they were during the midst of the economic crisis of 2008.

Understanding wood markets is essential to a successful timber harvest and takes diligent attention. Global imports and exports, as well as local economics all influence wood markets. Establishing good, long lasting relationships with mills in the area and as far as Canada is an integral component to the economic viability of any timber sale. Given the variability of markets, successful timber harvest planning needs to be flexible to accommodate changing market conditions.

The local logging capacity and infrastructure in place to carry out the treatments prescribed in this plan are also dependent upon good market relations. However, due to the uncertainty in current markets and unstable weather patterns, many loggers are finding it difficult to make ends meet. Meadowsend foresters have established long term relationships with what we consider to be the best loggers out there. To maintain these relationships, we try our best to provide consistent work, but at certain times weather and market conditions prevent steady work. As a forestland-owner, you can help sustain the local capacity to manage our forests by carrying out sustainable active management. If we lose our local capacity the harvest and market wood, we lose our ability to manage our forestland, making it more susceptible to development pressures. Development pressure is perhaps the greatest threat to our local forestland, which in turn threatens global environmental health.

Local Logging Capacity

Currently, several different methods of logging are available to accomplish prescribed silvicultural treatments. There are positive and negative aspects to each method, and the type of equipment needs to be matched to the terrain and the objectives of the job.

Historically (at least in the last 50-60 years), the most common method of logging involved the use of rubber-tired cable ‘skidders’, which skid trees to the landing that are cut with chainsaws. This equipment is capable of working on steep rugged ground with little difficulty. Large diameter trees are not a problem for well-powered skidders. A well-planned job can leave the forest appropriately stocked as skidders can maneuver quite well. There are, however, some down sides to this method. The skidder operators have to be both highly trained and conscientious. Skidders can have an impact on soils if they are not operating at the right time of year or if they are not operated in a thoughtful, professional manner. Soil compaction and soil rutting can have detrimental impacts on long-term soil productivity.

Starting in the 1990’s, a mechanized form of logging became more common in this region. Mechanical tree harvesters cut the trees instead of a chainsaw. The harvester is commonly on tracks, similar to an excavator, which tends to decrease negative impacts to soils. The machine has a harvesting saw-head mounted on a boom, with a fifteen to twenty-foot reach. Trees are cut and placed in bunches in the woods and are then

either dragged to the landing area by a grapple or cable skidders or carried in log-length to the landing on a forwarder. This logging system has several benefits, most of which involve the mechanical harvester. The harvester has the ability to cut a tree, carry it upright, and place it anywhere. The trees are generally placed in bundles along a skid trail, avoiding damage to the trees left behind. A good harvester operator can cut enough trees to keep two or more skidders busy. As long as the harvester operator is skilled, the skidder operators can do their job with minimal damage to the residual trees. This system of logging is capable of producing a high volume of wood in a short amount of time. This may or may not be good, depending on the objectives. All the soil compaction issues raised above are valid here as well.

Logging with horses is an alternative option for some landowners, though horse loggers are few and far between and require specific harvest conditions to operate effectively. In general, horse logging is more expensive than other methods, requires gentle slopes, or at least a down-slope to the landing, and requires generally higher quality timber. A horse-logger cannot afford to bring low-quality products out of the forest, but that doesn't mean the logger cannot perform non-commercial improvement work at the same time. The light-tough of a horse logging operation often provides excellent results, light impact, improved growth, and a high aesthetic value despite not being able to bring low quality material and tree tops out of the woods. It is also a joy to watch.

Forest Products Utilization

Any time a tree is cut, it is important that it is utilized in such a way that the most value is derived from it. The first step in proper utilization is to know the markets. Specifications for forest products can vary widely from one mill to the next and over time. Once a destination for a particular product is chosen, each tree needs to be carefully evaluated before it is cut. A mistake that turns a veneer log into a saw log can be very costly, especially if it recurs throughout the job.

With the exception of cut-to-length systems, most utilization decisions are made on the landing by the logger. A piece of equipment called the loader-slasher has become very commonplace with the advent of mechanized logging. The slasher portion is a circular saw which cuts the trees to a specific product length. The loader handles the tree and is capable of loading trucks and piling the tops of the trees to be chipped. This is a quick, safe and economical way of processing the wood, but it does have some drawbacks. The loader operator is quite a distance from the wood that is being sawn, thus high value logs may not be carefully looked at and cut precisely enough to maximize return to the landowner.

The more traditional method of bucking trees into products involves the chainsaw. The trees are skidded to the landing, measured, and cut by hand. The logger has more of an opportunity to look the entire tree over carefully. After the wood is cut, it is important to properly sort the wood by grade and product so the trucker delivers to the designated mill or processing facility.

Accomplishing Treatments

Commercial treatments are those which involve the harvesting and selling of forest products. These treatments should be laid out and supervised by a forester. The most crucial part of good forest management takes place on the ground, not in this document. The science of forest management is still in its infancy, and the intuition of the forester on the ground is crucial to success. There are many components of a timber harvesting operation that need to fall into place if the treatment is to be successful. The two most important components are a knowledgeable, willing seller and a willing, competent buyer. A stable market for the product being sold is also important.

If an agreement can be made between the seller and buyer through a timber sale contract, the logistics of the operation need to be fully considered. Suitable access and landing areas need to be located; the timing of the operation, payment schedules, and other issues need to be addressed. Patience is often required, as well as good weather conditions. Market issues play an important role as well.

COMPLEMENTARY MANAGEMENT OBJECTIVES

Forest Reserve Area

Forest Reserve Areas are sections of the ownership that are not actively managed and allowed to develop naturally over time. They provide opportunities to capture elements of biodiversity, wilderness, aesthetics, and habitat, as well as recreational and educational opportunities that are missing from managed areas. They also can provide opportunity for higher levels of carbon sequestration. Reserve areas provide complexity to forest structure and are especially beneficial when juxtaposed to a diversely managed forest.

Protection of reserve areas can be done formally through a legal process or stated informally through a planning document such as this, depending on landowner objectives. For our planning purposes, the designation of a Reserve Area is informal. Areas that would make good reserves will be identified and left to develop naturally unless active management is needed to protect the area from effects of non-natural or non-native influences, such as invasive exotic species and introduced forest disease and pests.

YMCA Camp Coniston Forest Reserve Area:

The low-lying hemlock and pine forest that surrounds the lake (mapped as Stand 1) provides an excellent opportunity for a forest reserve area for many reasons. This area has high recreational and aesthetic values, as well as provides an important buffer for protecting water quality. It hosts a trail that circumnavigates the lake as well as several cabins and lean-tos. In addition, the forest here hosts a number of developing features of an “old forest” such as large down logs and snags. Management here should be geared towards hazard removals, or non-commercial work designed to enhance the abovementioned features of this area.

Recreation, Education and Aesthetics

There are numerous ways active forest management can enhance and complement recreational opportunities, not the least of which is the creation of trails and roads providing access into the forest. Depending on landowner interests this access network can be used for motorized and non-motorized recreation opportunities. Activities a landowner is interested in, such as bird watching and photography, can often be worked into the management objectives or can become a driving principle of management.

In human terms the woods are inherently a messy place; trees are often blown down or losing limbs and natural mortality creates snags. Slash reduction following logging operations, an ice storm or crop tree release operations is important to maintain the visual quality of an area. Brush piles for wildlife cover could be built in areas which are not visually sensitive. Coarse woody debris or large pieces of trees can be left in areas not readily visible. Roads and trails should be designed so they are pleasing to the eye and fit into the natural landscape: poorly planned and constructed trails may lead to future eyesores. Waterbars and other erosion control methods should be in place at the end of any job. Proper cleanup of log landing areas is also very important. Debris left from logging operations can be very unsightly; it can be brought back into the woods or buried following landing use. After the landing is pushed off it should be limed fertilized and seeded. Following tips and recommendations in the publication A Guide to Logging Aesthetics (Jones, 1993.) collaboratively produced by NRAES, NH Cooperative Extension, and SPNHF.

While all of the approaches to aesthetic management take extra time, hence extra cost, it is well worth it in the long run as they conform to owner objectives and good forest stewardship. Monies should be set aside for putting a logging job “to bed”. If the logging contractor is required to do this work it should be spelled out beforehand so that the cost can be determined and it is not left for the logger to do as an additional practice.

Numerous opportunities exist for education on a managed woodlot from hosting forestry workshops to providing research opportunities, the possibilities are numerous and varied. Should the landowners be interested in hosting an educational workshop Meadowsend foresters would be happy to help organize and facilitate such an event.

YMCA Camp Coniston Recreation, Education and Aesthetics:

Aesthetics are an important objective of the landowner and have highest priority along trails, around the lake edge, camp grounds and buildings, and along roads especially on the direct approach to camp along Pine Hill Road. Aesthetic buffer zones shall be applied around these areas, as well as utilizing the “Reserve” area around the lake where no commercial management will occur. The width of the aesthetic buffer zones will be variable according to each site and will be wide enough to buffer all areas visually. In these areas, harvesting should be minimal and all slash reduced to below 1 foot in height or removed from the site completely. Trees with high aesthetic value may be targeted for release in these areas. Elsewhere, balancing aesthetic concerns with economics and ecology is an important task in land management. Trees blow down and lose limbs. Natural mortality has created or will create snags. Slash reduction following logging and crop tree release operations are

important to maintain the visual quality of an area and to reduce risk of fire. However, slash is important for soil building and nutrient cycling. Brush piles for wildlife cover are an important component of habitat and could be built in areas that are not visually sensitive. Coarse woody debris or large pieces of trees can be left in areas not readily visible. Roads and trails should be designed so that they are pleasing to the eye and fit into the natural landscape; poorly planned and constructed trails may lead to future eyesores. Proper cleanup of log landing areas is also important, as debris left from logging operations can be very unsightly. It can be brought back into the woods or buried following landing use. After the landing is cleared off it should be limed, fertilized, and seeded.

While all of the approaches to aesthetic management take extra time-- and, hence, extra cost -- it is well worth it in the long run to conform to owner objectives, public perception of management, and good forest stewardship. Monies should be set aside for putting a logging job “to bed”. Any logging contract should spell out who is responsible for doing the work. In addition, the management objectives for each stand have been prioritized that dictate how important aesthetics are that area.

Being a YMCA camp, recreation is a high priority for the landowners, though like aesthetics, not on every acre. The camp has a well-established trail system that extends though the bulk of the property and likely will be expanded over time. Additional trails could be created in time for the purpose of accessing particular unique areas found on the property. Such trails and openings can facilitate the viewing of wildlife. While there is usually a cost to trail development and maintenance it can often be minimized by properly planning the trails and access used during any logging operation. Skid trails can be converted to trails for other uses at a minimal cost. There is a need for horse trails as well. Logging practices should be scheduled in winter to avoid conflict with the busy camp season. Other recreational infrastructure has been put in place close to the camp buildings including a ropes course and rifle range. There are lean-tos for overnight camping at the south end of the lake and up on the Sugar Hill height of land. Other shelters exist around the lake.

Being a camp, recreation is obviously a high priority of the owner. The individual features are too numerous to mention, but includes an extensive trail system with interpretive signs (left photo) and numerous heights of land as destinations and vistas, such as the height of Pennyroyal Hill (right photo).

Education is another important component of the camp. The forest offers numerous opportunities for education, both passive and active. The forest management that occurs on the camp provides opportunities for workshops for both campers and the public to learn about timber harvesting. Demonstration sites provide the means for monitoring the effects of different silvicultural prescriptions geared to meet a variety of landowner objectives. Demonstration sites would best be set up in a variety of stands and should include descriptive signage. The possibilities are numerous.

Archaeological Attributes

Protection and enhancement of archaeological attributes should be an objective of every landowner. Stonewalls, cellar holes, and old wells are the most common features found on forestland. These cultural artifacts provide an important link to past land use and history. Guidelines exist to protect these features, and in general are obvious- don't damage or disrupt existing features. If a stonewall must be crossed, either create a permanent bar-way or be prepared to replace stones after the job has been completed.

YMCA Camp Coniston Archaeological Attributes:

As mentioned in the beginning of this plan there are several archaeological attributes present. The most interesting one is the old mill site at the south end of the lake on Long Pond Brook that was built for making bobbins to supply woolen mills in nearby Newport and Guild. The remaining stone infrastructure include tall, long stone walls on either side of the brook that likely housed a large water wheel. A small cellar hole also exists in the area, and was associated with the mill. It served as housing for the mill owner and later as office space for the mill.

Just off West road is an extensive old farmstead with barn foundations and a cellar hole and well known as the S. Bartlett place. These cultural sites are extremely important to maintain and protect and provide unique educational material for the camp. Stone walls are also abundant on the forest. Any management activity i.e. (logging, trail building, wildlife habitat management or aesthetic work) should be done without disturbing these features. In some cases, it is necessary to cross a stone wall. Ideal crossings are where barways already exist, but if a new opening needs to be made the wall should be repaired to its previous condition when the harvesting is complete.

Another cellar hole is located off the south side of Camp Road near the western boundary, described as the O. C. Barton place in the property description.

OTHER CONSIDERATIONS

Conservation Easement

The most powerful tool for ensuring the long-term existence of open green space is the conveying of conservation easements on part or all of the property. Precluding development on the property will do more to

protect wildlife and their habitat over the long run and provide the forestland required for recreation, education and timber production for the future.

YMCA Camp Coniston Conservation Status:

The YMCA Camp Coniston is not under a conservation easement.

Social Climate

There always have been mixed feelings among the general public concerning forest management and, in particular, timber harvesting. While many people use forest products, most do not fully understand how they are produced. People's perceptions of what may be happening and what is actually occurring are often quite different. A timber harvesting project designed for wildlife habitat improvement or salvage cutting due to wind storm damage or other natural disturbances may sometimes require patch clear cutting. The idea of any type of tree cutting may upset people unless they understand that it was thoughtfully planned and done purposefully with due consideration for the environment.

Tours of the property or signage for educational purposes can often stimulate interest in management and dispel negative assumptions. In addition to Meadowsend foresters, the Extension and County Foresters may be willing to assist owners with educational events.

Tree Farm

The American Tree Farm System is the largest and oldest woodland certification system in America. It specializes in certifying management of private forests as sustainable in ecological and economic terms. Tree Farm works "to give people the tools they need to be effective stewards of America's forests", provides recognition and validation of family forest owners commitment to sustainable stewardship, and helps protect the forest for future generations. In addition, Tree Farm Certification provides access to some better timber markets. Eligibility requirements are a woodlot with at least 10 acres that is under a forest management plan which meets Tree Farm Standards (this document meets trees farm standards). To enroll, the forest must be inspected to verify the Tree Farm Standards have been met.

YMCA Camp Coniston Tree Farm:

Camp Coniston is a in New Hampshire Tree Farm in good standing. This plan meets Tree Farm requirements for certification.

Taxes, Laws and Required Permits

New Hampshire:

Best Management Practices: BMP's are for protecting water quality during forest harvests. Some BMP's are mandatory and others are voluntary. All BMP's are documented in Best Management Practices for Forestry: Protecting New Hampshire's Water Quality;

Current Use: Current Use is an “open space” taxation program (RSA 79-A). It is a property taxing strategy designed to encourage landowners to keep their open space undeveloped. It taxes agricultural and forestland on its “current use” rather than its real estate market value. Minimum requirements are 10 acres in size and buildings and other improvements must be excluded. Landowners must apply to their town and commit their land to open space conservation. When land is developed it is charged a land use change tax. Current use tax rates are variable, with the lowest rates given to un-posted land under Stewardship Category. This plan meets the Stewardship Category of Current Use;

Timber Tax Law: Ten percent of the value of every timber sale is returned to towns where cutting takes place (RSA 227-J:5 and 79:10). The State of New Hampshire requires filing an “Intent to Cut” form for loggers, foresters and landowners who wish to harvest timber. The Intent to Cut form is for tax purposes since timber is only taxed once it is cut and is used to make municipal assessing officials aware of cutting operations. Once filed, a Report of Wood Cut form is filed with the town;

Wetlands Law: If harvesting is to occur in or near wetland areas, or which requires stream crossings, a Notification of Minimum Wetlands Impact must be filed with NH DES;

Driveway Permit: A driveway permit is required for vehicles entering a state road from the harvest site. The Driveway Permit application needs to be sent to and approved by the Dept. of Transportation;

Basal Area Law: This law (RSA 227:J:9) regulates cutting over 50% of the basal area adjacent to certain waters and along public highways and requires a Basal Area Variance Request;

Slash Law: The slash law (RSA 227-J:10) is intended to reduce fire danger caused by slash and to improve the aesthetics along roads and water bodies. It prohibits leaving slash in or near year-round streams, bodies of water, and along public roads, along railroad beds, on or within 25 feet of the property of another, in a cemetery, and within 100 feet of any occupied structure.

Shoreland Protection Act: This act (RSA 483-B) protects water quality in in lakes and ponds greater than 10 acres in size, 4th order and greater streams and rivers, and designated rivers. It applies to trees/vegetation management other than timber harvesting.

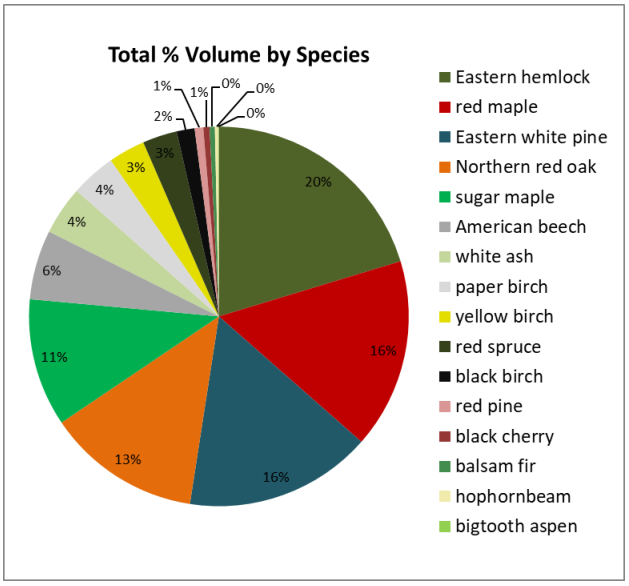
TRACT LEVEL DATA

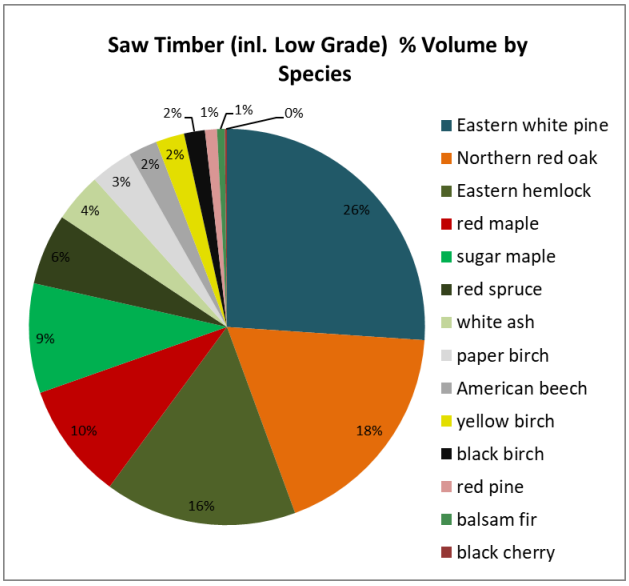
Table and Graph legend and explanation in Appendix A.

Total forest stocking of the YMCA Camp Coniston Forest

846 forested, operable, and actively managed acres

Species	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Total (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	% Cords
American beech	-	38,296	47,673	85,970	824	-	371	1,367	5.9%
bigtooth aspen	-	-	-	-	17	-	-	17	0.1%
black birch	-	55,699	6,448	62,147	215	13	-	353	1.5%
black cherry	-	6,289	-	6,289	110	-	-	122	0.5%
hophornbeam	-	-	-	-	62	-	-	62	0.3%
Northern red oak	82,157	488,409	97,931	668,497	1,353	175	160	3,025	13.1%
paper birch	-	100,705	25,765	126,470	609	26	-	888	3.8%
red maple	-	204,412	142,310	346,722	2,665	207	168	3,734	16.2%
sugar maple	-	207,995	117,706	325,701	1,352	101	410	2,515	10.9%
white ash	-	106,105	40,340	146,445	625	-	38	955	4.1%
yellow birch	-	49,729	34,928	84,657	366	37	146	718	3.1%
Total Hardwood:	82,157	1,257,638	513,101	1,852,897	8,198	558	1,293	13,755	59.6%
balsam fir	-	22,833	-	22,833	47	-	9	102	0.4%
Eastern hemlock	-	571,479	-	571,479	3,159	7	375	4,684	20.3%
Eastern white pine	-	648,728	300,806	949,534	1,282	-	501	3,682	16.0%
red pine	-	35,660	-	35,660	98	-	-	170	0.7%
red spruce	-	211,244	-	211,244	251	5	-	679	2.9%
Total Softwood:	-	1,489,943	300,806	1,790,750	4,838	12	886	9,317	40.4%
Total Volume:	82,157	2,747,582	813,908	3,643,646	13,035	570	2,179	23,072	100.0%
Volume Per Acre:	97.07	3,246.24	961.62	4,304.93	15.40	0.67	2.57	27.26	0.00





Ownership Wide Recommendations for YMCA Camp Coniston

General Recommendations	Priority	Timing
Monitor for Invasive Plants, manually pull when found.	High	Spring and fall
Maintain trail system: clearing, water crossings, signs.	High	Spring and as needed
Consider expanding the Interpretive signs	Medium	As needed
Finish painting boundary blazes.	High	ASAP
Repaint boundary blazes.	Medium	2030
Bird Habitat Improvement -- General:	**Priority**	**Timing**
Consider establishing permanent bird monitoring points	Medium	Prior to spring
Install nesting boxes for blue birds and tree swallows in all permanent openings, including around camp buildings	High	Prior to spring
Install 2 or 3 kestrel boxes in permanent openings on West Road and Sugar Hill	High	Prior to spring
Limit herbicide and pesticide use	High	All times
Landscape with native, mast producing plants and shrubs	High	All times
Limit additional development and activities around Cranberry Pond	High	All times
Protect possible belted kingfisher nesting site on sandy embankment behind maintenance buildings.	Medium	During breeding season
Create additional large and high-quality snags, down logs and brush piles.	High	During harvest activities
Maintain permanent openings on Sugar Hill. Okay to rotate clearing (brush hog and/or brush saw), must be maintained at least every 3 years.	High	Fall
Maintain permanent opening on West Road. Okay to rotate clearing (brush hog and/or brush saw), must be maintained at least every 3 years.	High	Fall

Treatment Schedule for YMCA Camp Coniston

Dates are flexible, and may change due to market and weather conditions.
It is of high priority to perform all active management outside of bird breeding season from late May to mid-July. See individual stand management recommendations for specific breeding bird habitat actions and target species.

Stand #	Stand Type	Acres	Treatment	Year
1	Reserve	107.2		
2	NH-WP-SF 34A	70.0	Group selection and small patches	2022
3	NH-RO-WP 34A	88.7	Small group selection, CTR, Free Thinning	2022
4	WP-H 34A	58.4	Modified overstory removal or Patch with retention; Group selection; Free thinning	2022
5	RO-NH 34B	75.6	Leave to grow	
6	H-HE 34AB	265.5	Gap expansion; Early successional opening	2030
7	HE-H 34A	50.5	Leave to grow	
8	RS-HE-WP 34A	14.1	Leave to grow	
9	RO-H 4AB	19.6	West side of lake: Small groups; Free thinning	2022
10	WP-RO-H 34B	37.4	Leave to grow	
11	RO-H 34AB	47.2	Leave to grow	
12	WP-RO-WB-H 34B	29.3	Early successional patch cut with retention; Group selection; CTR	2030
13	HE-WP-H 34A	48.6	Group selection possible when working in adjacent stands.	2030
14	RP 23A	2.5	Thin from below- low priority	ASAP
15	PA & Early Succ.	37.8	Consider gap expansion	See adjacent stands.

STAND DATA

Table and Graph legend and explanation in Appendix A.

Bird Habitat and Management Recommendations prepared in collaboration with Phil Brown, land manager from New Hampshire Audubon. Target bird species are from breeding bird survey and were targeted because they would specifically benefit from the recommended treatment. Many other species not specifically targeted will also benefit from management recommendations. Given that it is nearly impossible to list all possible users and targets, the target species that were identified in the breeding bird survey were listed when specific management recommendations would benefit them directly.

Stand 1 Hemlock-Pine Reserve 107.2 acres

Stand 1 is the hemlock-pine dominated zone around the lake. The trees here tend to be large and old, with a high aesthetic value as well as serving as an important buffer to the lake.
This area is to be managed as a reserve, with only limited removals based on hazard or safety needs.

This area also hosts a number of camp structures, such as cabins, lean-tos and gazebos, as well as a hiking trail that circumnavigates the lake. The hiking trail has a number of interpretive signs, mostly related to wildlife.

Stand 1 also hosts the old mill site on the outlet of the lake. This sawmill was built in 1850 and manufactured bobbins for the woolen mills in Newport and Guild.

General attributes

Natural Community Type:	Hemlock-white pine forest
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Forest Health:	Maturing pine and hemlock; typical for this type of stand.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	80+ years
Stocking Level:	Overstocked for growth; fine for a reserve.
Past Management History:	No recent management.
Timber Quality:	Largely overmature.

Wildlife Habitat

Habitat Characteristics:	Mature, dense, lakeside hemlock-pine forest. Shoreline with associated shrubby, wet zones.
Special Features:	Lake buffer; management reserve; large pine perch trees.
Threats:	Possible HWA threat.
Management Objectives:	Leave as reserve.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	Inlet and outlet to lake.
Other:	Stand buffers lake.

Recreation, Aesthetics and Education

Recreation Features:	Trail circumnavigates lake. Several cabins, lean-tos and other structures.
Aesthetic Resources:	Important aesthetics from water. Dense, mature hemlock pine on trails and surrounding camp infrastructure.
Education Features:	Camp infrastructure. Informational signs. Potential for interpretive trail.
Cultural Features:	Old sawmill site and sluice on lake outlet with small cellar hole; stonewalls.

Access and Terrain

Landing Sites and Truck Roads:	n/a
Access and operability:	n/a

STAND 1 DESCRIPTION

Stand 1 surrounds the lake and the Long Pond Brook outlet, a second-order stream that merges with Ledge Pond Brook and feeds into the Sugar River and eventually into the Connecticut. Stand 1 is a reserve area, supporting important ecological, aesthetic, and recreational objectives of the camp and the surrounding landscape. It serves as an important buffer to help protect water quality, ranging from about 100' at its narrowest width to over 500 feet at its widest. Special water quality protection practices, listed in the Access, Operability, and Water Quality Protection section above, are in place for a 300-foot zone around the lake. This stand also hosts a 3+/- mile trail that circumnavigates the lake, providing access to multiple camp infrastructures, including lean-tos, cabins and gazebos. The trails also extend up into other areas of the ownership, including heights of land and other areas of interest. The aesthetics and "sense of place" area important features of this area, and will be managed for. Stand 1 also hosts the old bobbin mill located on the outlet of the lake. Impressive stone structures and the sluice-way remain.

The forest here is a mix of relatively old and large white pine and hemlock, with some associated hardwoods including red maple and white birch, primarily. Some of the large pine and hemlock along the shoreline serve as quality perch trees. It is largely a closed canopy forest, with a deep-dark feel and little regeneration and understory growth except along the shoreline. This area, in addition to helping protect water quality, also provides important wildlife habitat, with over 3 miles of shoreline. Numerous bird and waterfowl species use this area, as well as numerous amphibians and mammals.

Management objectives here include protecting water quality, enhancing and protecting aesthetics and sense of place, and protecting and enhancing habitat values where possible. Commercial management will be largely excluded in this zone, unless required for hazard removal or other unexpected salvage needs.

STAND 1 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

As a reserve, no commercial management will be carried out in this stand. Non-commercial recommendations will be given to improve habitat. Other recommendations to manage salvage and hazard trees, and maintain the recreational trails and camp infrastructure are given in the "Ownership Wide Recommendations" table above, in the tract data section.

Silvicultural Objective:	**Action:**
No commercial management.	--

Bird Habitat Objective and Actions:	**Target Species:**
Create large snags for perch trees, preferably on multiple prominent pine away from disturbance.	• Eagle • Osprey • Common merganser
Build nest platform away from disturbance.	• Osprey
Consider installation of loon nest rafts, with guidance from Loon Protection Committee.	• Loon
Install wood duck nesting boxes to shoreline	• Wood duck
Maintain undisturbed shoreline gravel habitat.	• Spotted sandpiper
Protect islands and forested peninsulas along shorelines from disturbance during nesting season.	• Eastern kingbird
Maintain interior forest, especially pine and hemlock.	• Brown creeper
Retain hardwoods in openings along riparian areas.	• Baltimore oriole

Stand 2 Northern hardwood-White pine-Spruce/Fir 3/4A 70.0 acres

Stand 2 occupies the lower slope on the west side of the lake, the section of forest just up from the pine-hemlock lake buffer. The soils here are somewhat wetter than upslope and host a greater amount of spruce and fir mixed in with more transitional hardwoods such as red maple and white birch.

Spruce and fir are fairly well-represented in both the understory and mid-story sections of the stand.

The white birch here is largely overmature or already fallen out of the stand as shown by the scattered large, down birch. Down logs are an integral component of quality wildlife habitat.

This stand also hosts some scattered large boulders, also known as glacial erratics.

General attributes

Natural Community Type:	Hemlock-spruce-Northern hardwood forest
Historical Use:	Pasture into the early 1900s, then abandoned and transition to forest.
Forest Health:	Some red rot noted in spruce; sterile conk in birch.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked for growth		
Past Management History:	No recent management. Last entry 25+ years ago.		
Timber Quality:	Variable. Fair to poor.		
Total BA Per Acre:	136	Trees Per Acre:	382
Total AGS BA Per Acre:	48	% AGS Sawtimber:	49.1%
Quadratic MSD:	8.1	Site Quality:	Soils mix IA and IB, with some IIA. Variable.

Wildlife Habitat

Habitat Characteristics:	Mixed interior forest.
Special Features:	Scattered red pine. Some wet ground.
Threats:	HWA.
Management Objectives:	Maintain red pine. Release/create understory growth.

Wetland and Riparian Features

Wetland Features:	Small shrub wetland.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Hiking trail.
Aesthetic Resources:	Stand borders Reserve Area and Dudley Lane.
Education Features:	Part of overall camp ownership; potential for interpretive signs for ecology and cultural features.
Cultural Features:	Cellar Hole (O. C. Barton Place).

Access and Terrain

Landing Sites and Truck Roads:	Potential landing site off Pine Hill Road at western corner utilizing old access to the O. C. Barton cellar hole.
Access and operability:	Long access from northern end of trail. Operability fair, with some wet ground, ledge and rocky ground. Must travel across slope.

STAND 2 DESCRIPTION

Stand 2 occupies the low slope of Pennyroyal Hill, bordering the reserve area on the west side of the lake. It is a mixed stand, with sections of wet, seepy ground. The hardwood mix tends favor red maple and white birch, with some black birch and trending towards more sugar maple as it approaches Stand 3. The rest of the stand mix includes hemlock and pine, with some spruce and fir generally occupying the wetter ground. Small patches of spruce and fir regeneration exist here as well.

This stand is just overstocked, with about 136 square feet of basal area. Timber quality is average, with about 3,000 board feet of sawtimber per acre, dominated by white pine, red maple and black birch. The pine volume comes from scattered individuals. Some red rot was noted in the spruce, as well as scattered sterile conk in the birch.

Historic access to this area was via Dudley Lane, which had a small landing located about half way to the southern boundary. This access is no longer viable for harvesting because of the high aesthetic and recreational objectives near the lake. Given that, the best option for access, which comes with its own challenges, would be to come in from Pine Hill Road near the western boundary of the ownership using an old farm road that once provided access to the O. C. Barton cellar hole. A landing could be established here, with skid trails running across the slope to access harvest area, which also should include Stands 3 and 4. This is a long access, with some challenges to operability mainly because of its length and needing to occur across slope. There are some moderate to steep slopes and patches of wet, seepy ground.

STAND 2 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Silvicultural management objectives here include creating some small openings in the form of groups or small patches to capture value in mature overstory trees, remove patches of low vigor or poor quality, and to either release or create conditions to establish regeneration.

Silvicultural Objective:	**Action:**
• Capture value on mature overstory, improve stand quality and health. • Release or establish regeneration for patchy second age class. • Forest canopy will be somewhat patchy, with opportunity to establish small areas of early successional habitat. Residual canopy cover 50-80%.	• Combination of group selection and small patches up to an acre (+/-) in size. Larger patches may be created if warranted. • Reduce overall basal area to around 100 square feet. • Target red rot spruce for removal.

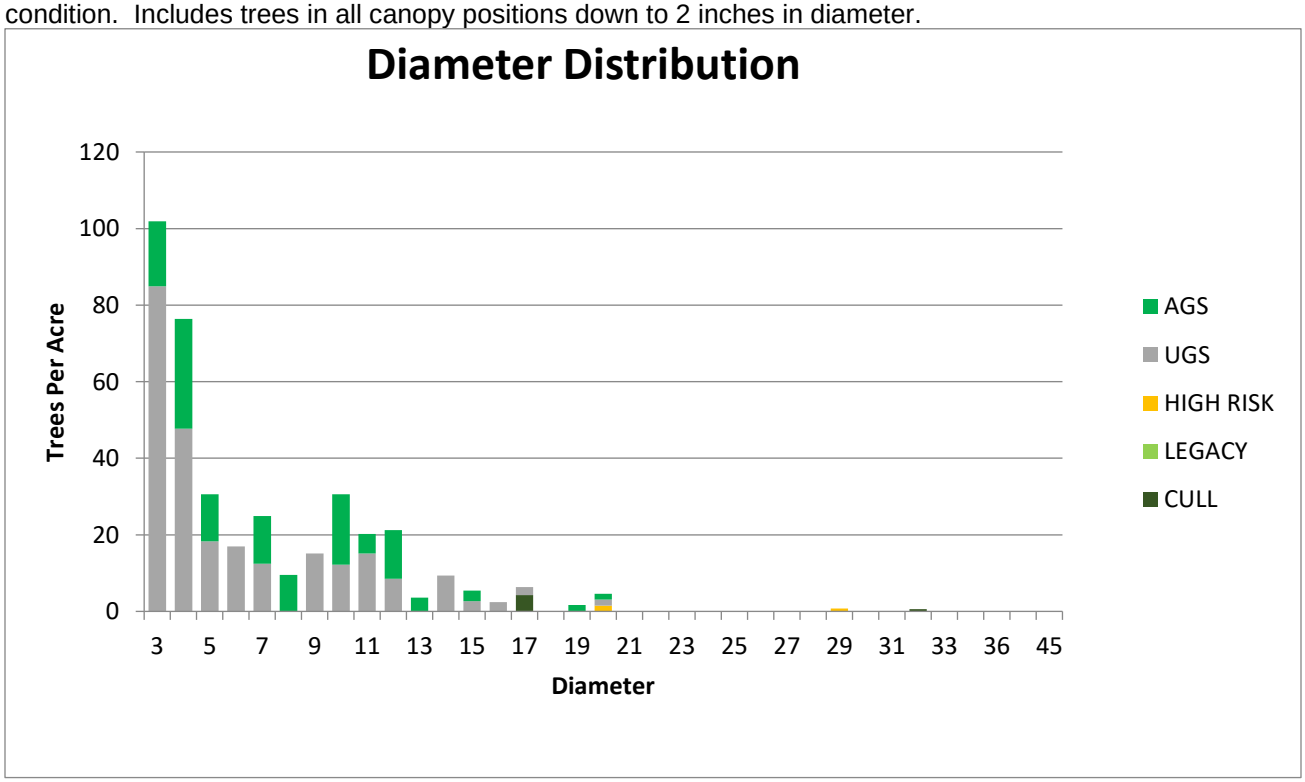
Bird Habitat Objective and Actions:	**Target Species:**
Create openings large enough to enhance development of patchy, softwood understory growth.	• Dark eyed junco • White throated sparrow • Nashville warbler
Retain interior forest habitat (50-80% canopy).	• Black throated green warbler • Scarlet tanager
Create snags in and around interior wetlands.	• Great Crested Flycatcher
Protect softwood wetland areas.	• Magnolia warbler • Purple finch

STAND 2 TABLES AND GRAPHS

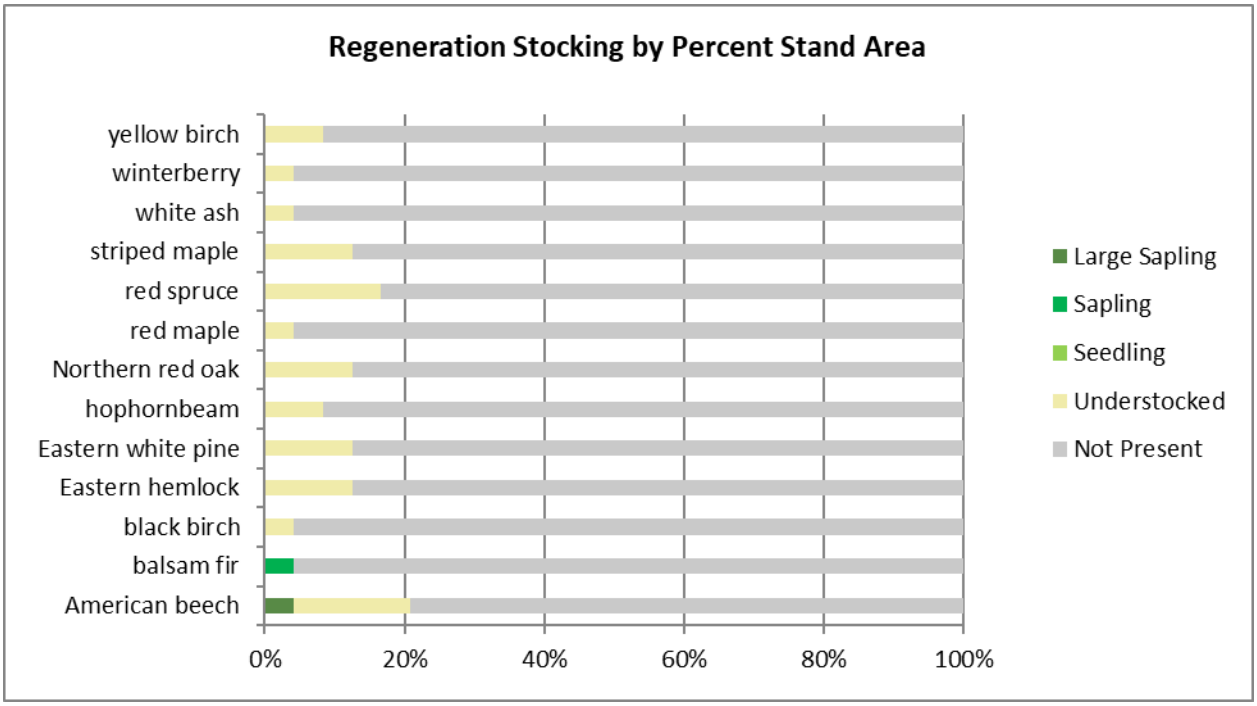
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	41.7%	53.7%	-	542	211	7	1.0	-	9.6	753		16.6%
sugar maple	11.1%	7.3%	-	249	189	1	-	1.7	3.3	438		7.3%
paper birch	8.3%	9.9%	-	152	122	2	-	-	2.1	274		0.0%
yellow birch	5.6%	4.5%	-	155	253	1	-	-	1.4	408		5.9%
black birch	5.6%	2.3%	-	402	92	1	-	-	1.8	494	287	0.0%
American beech	2.8%	1.2%	-	-	160	0	-	-	0.8	160		0.0%
Northern red oak	2.8%	0.9%	-	165	226	0	-	-	1.2	391		8.6%
Total Hardwood:	77.8%	79.8%	-	1,666	1,252	12	1.0	1.7	20.2	2,918	287	38.4%
Eastern white pine	11.1%	5.3%	-	1,250	191	1	-	1.5	5.0	1,440	726	10.7%
Eastern hemlock	5.6%	3.6%	-	-	-	1	-	-	1.4	-		0.0%
red spruce	2.8%	1.6%	-	189	-	1	-	-	1.1	189		0.0%
balsam fir	2.8%	9.8%	-	-	-	0	-	-	0.4	-		0.0%
Total Softwood:	22.2%	20.2%	-	1,439	191	3	-	1.5	7.9	1,630	726	10.7%
Total Volume:	100.0%	100.0%	-	3,105	1,443	15	1.0	3.1	28.1	4,548	1,013	49.1%
Volume Per Acre:			-	217,433	101,058	1,043	68	220	1,969	318,490	70,921	

Table 2.1: Forest Composition and Volume.

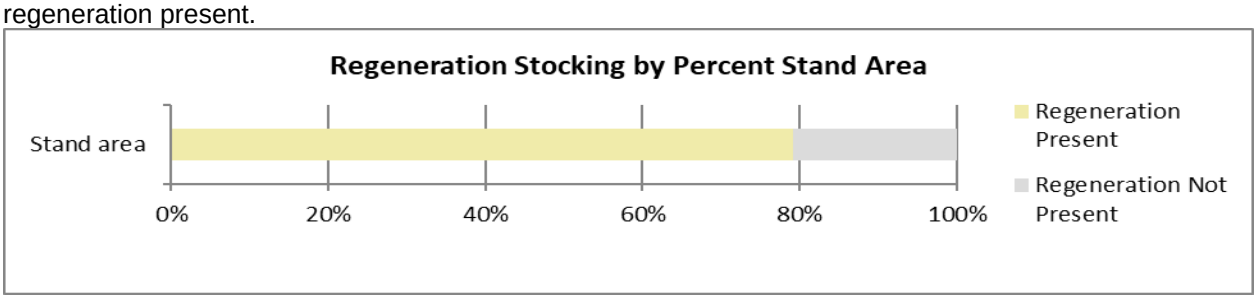
Graph 2.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



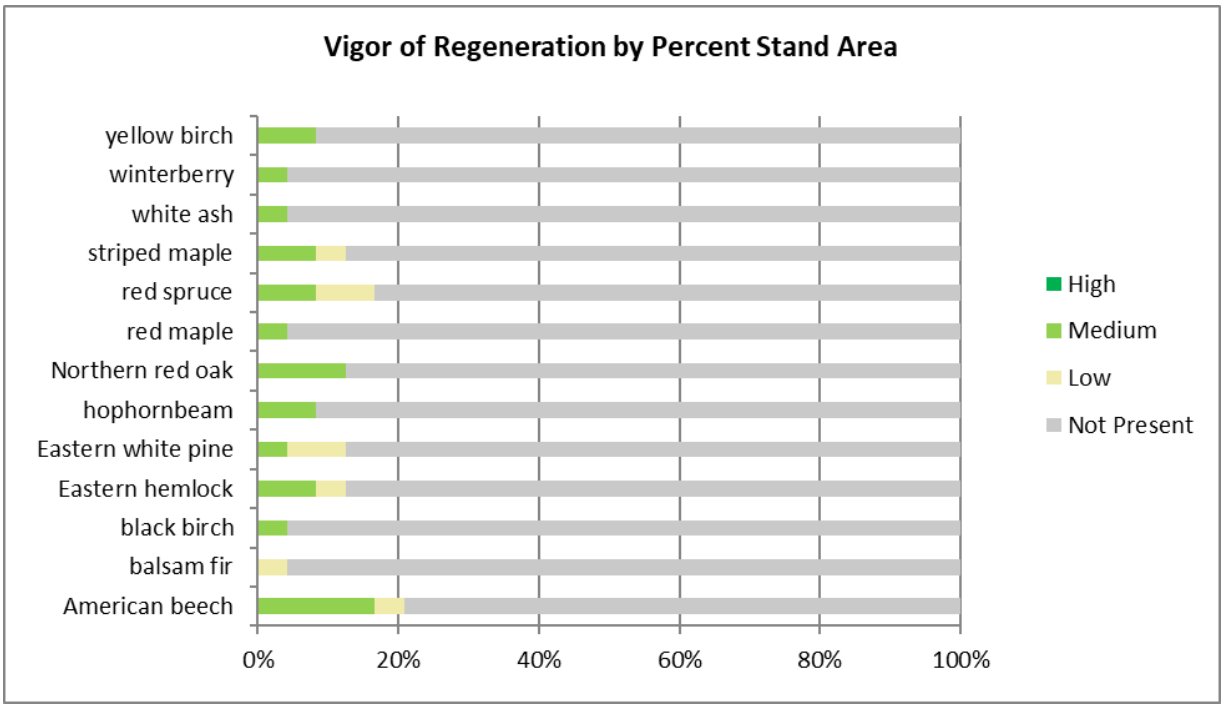
Graph 2.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 2.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 2.4: Vigor of regeneration and shrub species.



Graph 2.5: Browse level of regeneration and shrub species.

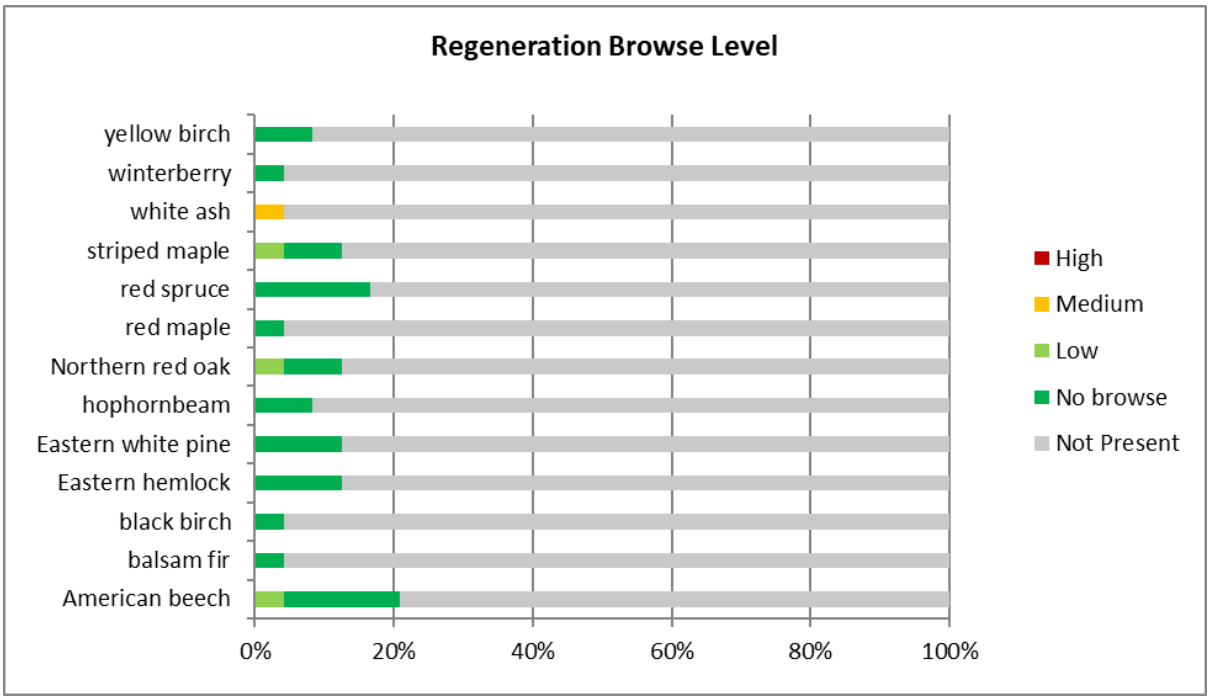


Table 2.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	4.6	-	4.6
12-18"	-	4.5	-	4.5
>18"	-	-	0.9	0.9
Grand Total	-	9.1	0.9	10.0

Table 2.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	31.8	-	31.8
12-18"	-	-	-	-
>18"	-	0.4	0.8	1.2
Grand Total	-	32.2	0.8	33.0

Table 2.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	-	-
12-18"	-	2.7	-	2.7
>18"	-	1.7	-	1.7
Grand Total	-	4.4	-	4.4

Stand 3 Northern hardwood-Red oak-White pine 3/4A 88.7 acres

Stand 3 is situated upslope from Stand 2. The site here has greater enrichment. The species composition shifts towards more nutrient demanding hardwoods, such as sugar maple and ash.

Scattered white pine can be found throughout Stand 3, as well as remnant large sugar maples from an old sugarbush.

Further upslope the stand becomes more ledgy, with some outcroppings.

Scattered large down logs can be found here providing quality wildlife habitat.

General attributes

Natural Community Type:	Sugar maple-beech-yellow birch forest
Historical Use:	Pasture into the early 1900s; sugarbush through mid-1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Generally good; scattered beech bark disease.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked for growth.		
Past Management History:	No recent management. Last entry 25+ years ago.		
Timber Quality:	Variable. Some scattered nice oak. Remainder fair.		
Total BA Per Acre:	129	Trees Per Acre:	615
Total AGS BA Per Acre:	42	% AGS Sawtimber:	63.7%
Quadratic MSD:	6.2	Site Quality:	Mix of IA and IIA, better site but some rocky, shallow areas.

Wildlife Habitat

Habitat Characteristics:	Hardwood, interior forest.
Special Features:	Scattered large, old sugar maples; some with cavities. Sections of ledge.
Threats:	No significant threats.
Management Objectives:	Maintain sugar maple legacies; release yellow birch where possible. Release/create understory growth.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Hiking trail to Pennyroyal Hill.
Aesthetic Resources:	Interior hardwood forest; ledge outcroppings.
Education Features:	Potential for interpretive trail.
Cultural Features:	Stonewalls.

Access and Terrain

Landing Sites and Truck Roads:	Potential landing site off Pine Hill Road at western corner utilizing old access to the O. C. Barton cellar hole.
Access and operability:	Long access from northern end of trail. Operability fair, with some steep slope, ledge and rocky ground. Must travel across slope.

STAND 3 DESCRIPTION

Stand 3 occupies the upper and mid, east facing slopes of Pennyroyal Hill. The soils here are somewhat more fertile than Stand 2, with sugar maple making up a much greater portion of the stocking. Old legacy sugar maples are scattered about, remnants of a once-managed sugar bush. The species mix trends towards Northern hardwoods with scattered pine. Beech makes about 18% of the stocking, while yellow birch is fairly uncommon. Oak becomes more common on the drier, warmer sites, ultimately dominating the high, dry knob on the eastern shoulder of Pennyroyal Hill (Stand 9).

Regeneration is somewhat light; dominated by beech, striped maple and ironwood, with some fir and spruce mixed throughout. Forest health is average. Beech bark disease is the primary concern, although there are clean beech scattered throughout.

This stand is overstocked, with about 129 square feet of basal area, with a fairly strong component of pole-size hardwood. Timber quality is average, with only about 2,700 feet of sawtimber per acre. The bulk of the sawtimber comes from scattered white pine with 1,300 feet. Sugar maple provides another 600 feet, and oak 400 feet per acre. The sugar maple is generally good quality, while oak in general provides high quality sawtimber.

Access issues are the same as for Stand 2, presenting some challenges. Historic access to this area was via Dudley Lane, which had a small landing located about half way to the southern boundary. This access is no longer viable for harvesting because of the high aesthetic and recreational objectives near the lake. Given that, the best option for access would be to come in from Pine Hill Road near the western boundary of the ownership using an old farm road that once provided access to the O. C. Barton cellar hole. A landing could be established here, with skid trails running across the slope to access harvest area, which also should include Stands 2 and 4. This is a long access, with some challenges to operability mainly because of its length and needing to occur across slope. There are some moderate to steep slopes, rocky ground, and exposed ledge.

STAND 3 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives here include creating some small openings in the form of groups to capture value in mature overstory trees, remove groups of low vigor or poor quality, release and improve growth on pole sized hardwoods, and to either release or create conditions to establish regeneration. Overall forest canopy will remain more uniform than in Stand 2.

Silvicultural Objective:	**Action:**
• Capture value on mature overstory, improve stand quality and health. • Release or establish regeneration. • Release and improve growth on pole-sized hardwoods. • Forest canopy will remain more uniform than in Stand 2. Retain >80% canopy cover. • Consider larger opening to enhance view from Pennyroyal Hill to the east. Possible lake view?	• Small group selection with crop tree release and general improvement thinning. • Reduce overall basal area to around 80-90 square feet. • One larger opening to open view to east from Pennyroyal Hill. Locate near ledge and semi-open area.

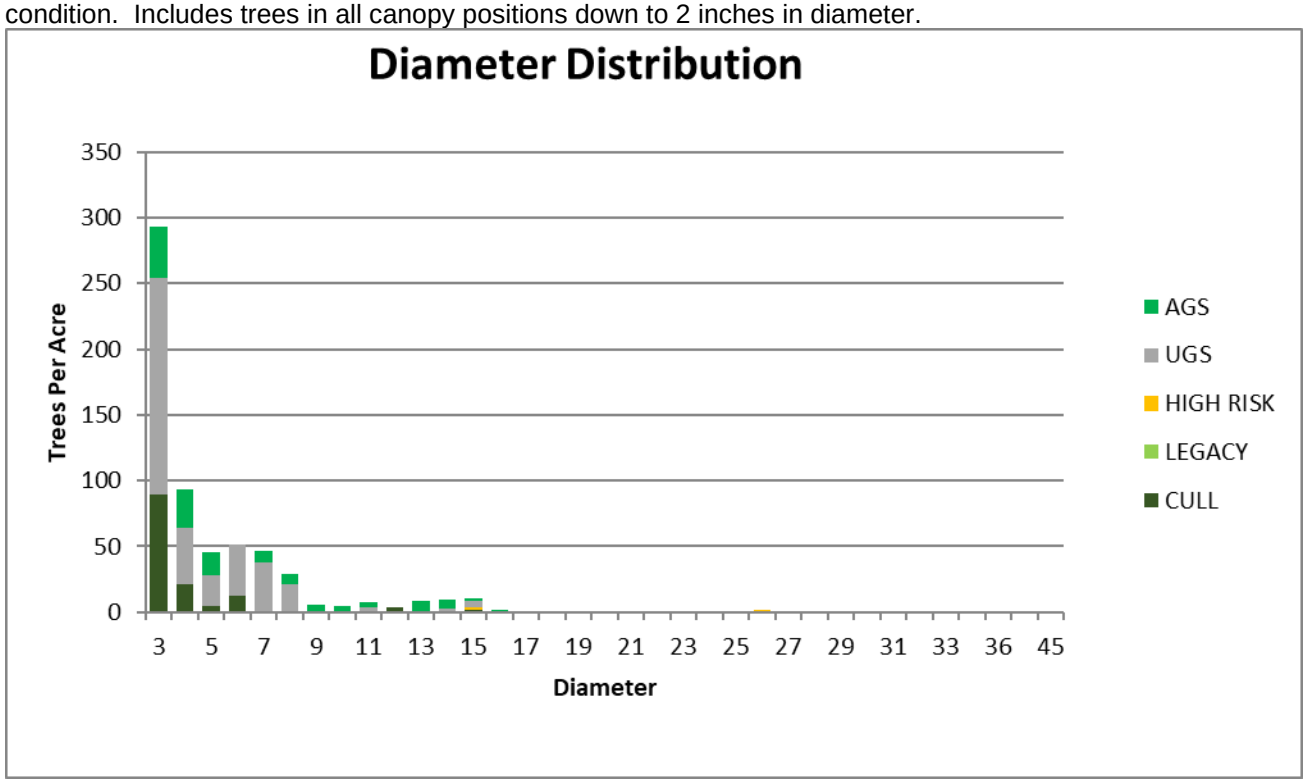
Bird Habitat Objective and Actions:	**Target Species:**
Create small openings to enhance development of hardwood understory growth, promote growth of mid-story hardwood.	• Black-throated blue warbler • Rose-breasted grosbeak • Eastern wood pewee
Retain interior forest habitat (>80% canopy).	• Black and white warbler • Blue headed vireo • Scarlet tanager
Retain portions of hardwoods as undisturbed, mature forest.	• Red-shouldered hawk • Barred owl
Selectively hand-fell to open up some of the ledge sites, ideally also providing a view of the lake to the east.	• Common raven • Turkey vulture • Eastern wood pewee • Dark-eyed junco

STAND 3 TABLES AND GRAPHS

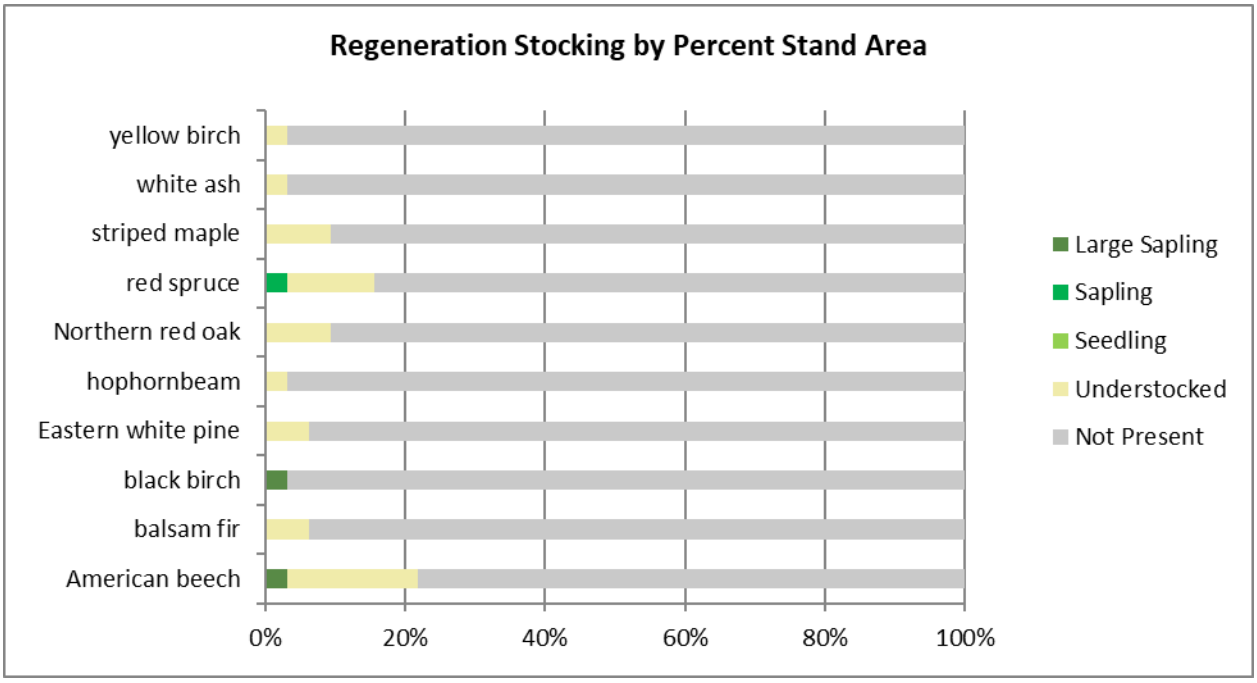
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
sugar maple	33.1%	32.6%	-	617	405	3.2	0.4	2.0	7.6	1,022		27.2%
American beech	17.8%	35.9%	-	-	-	1.6	-	0.3	1.9	-		0.0%
red maple	17.8%	12.2%	-	268	235	3.0	-	0.4	4.3	504		7.1%
Northern red oak	7.6%	2.5%	125	417	159	1.1	-	-	2.5	701	213	13.0%
hophornbeam	2.5%	5.3%	-	-	-	0.2	-	-	0.2	-		0.0%
yellow birch	2.5%	1.1%	-	-	-	-	-	0.5	0.5	-		0.0%
white ash	2.5%	1.1%	-	116	85	0.3	-	-	0.7	201		5.3%
Total Hardwood:	84.1%	90.7%	125	1,418	884	9.3	0.4	3.2	17.7	2,428	213	52.7%
Eastern white pine	12.7%	3.2%	-	1,262	69	1.3	-	1.0	5.0	1,331	915	11.1%
Eastern hemlock	2.5%	2.1%	-	-	-	0.4	-	-	0.4	-		0.0%
balsam fir	0.6%	4.0%	-	-	-	0.0	-	-	0.0	-		0.0%
Total Softwood:	15.9%	9.3%	-	1,262	69	1.8	-	1.0	5.5	1,331	915	11.1%
Total Volume:	100.0%	100.0%	125	2,680	953	11.1	0.4	4.2	23.2	3,759	1,128	63.7%
Volume Per Acre:			11,104	237,784	84,587	984	32	376	2,059	333,475	100,083	

Table 3.1: Forest Composition and Volume.

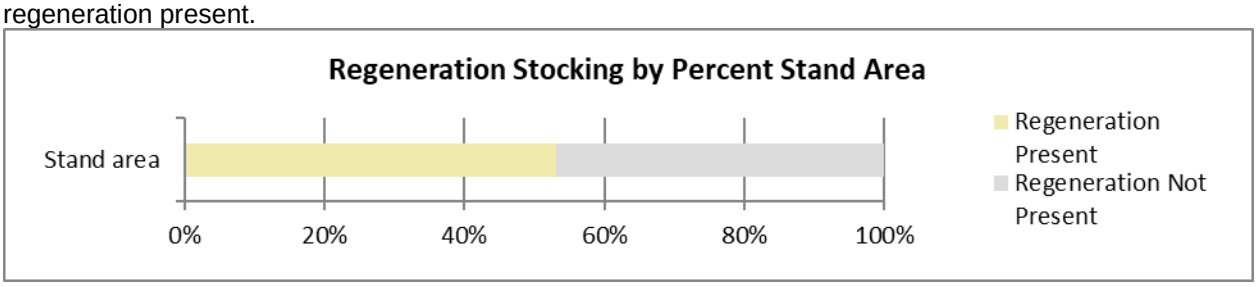
Graph 3.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



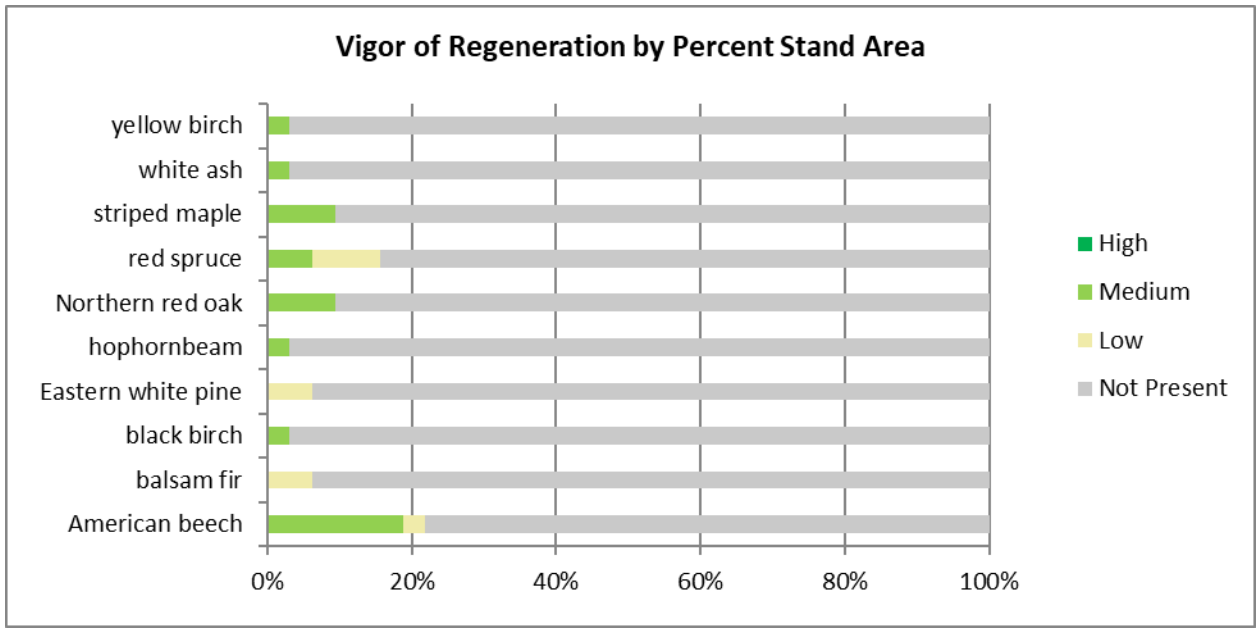
Graph 3.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 3.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 3.4: Vigor of regeneration and shrub species.



Graph 3.5: Browse level of regeneration and shrub species.

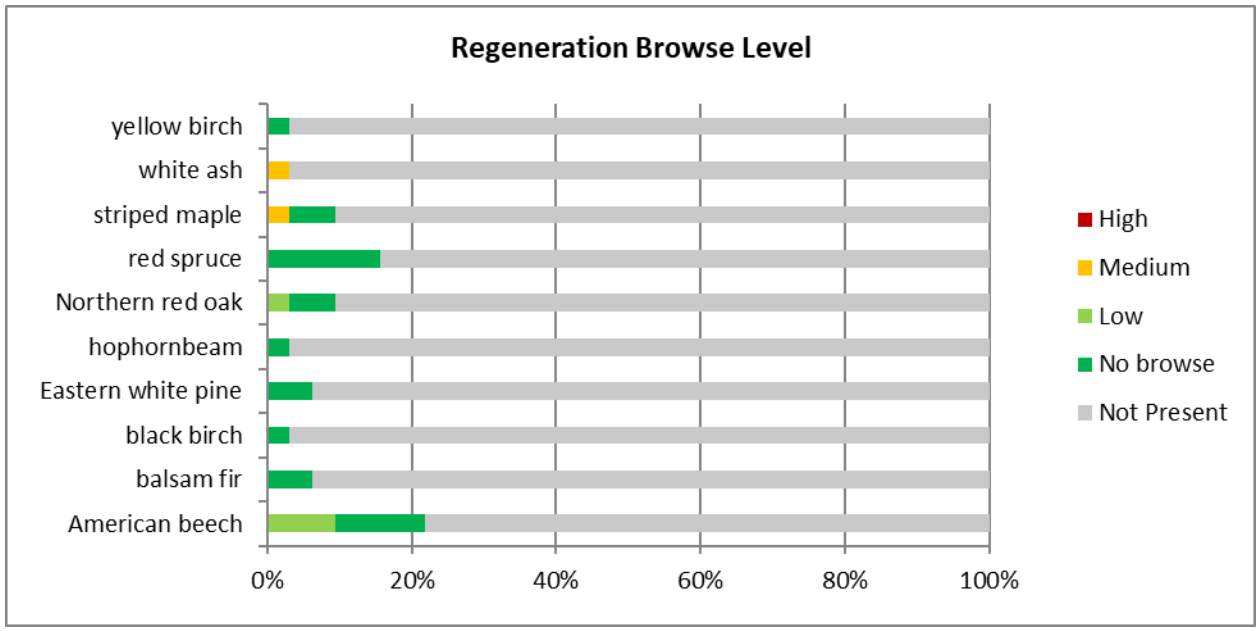


Table 3.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	4.6	-	4.6
12-18"	-	4.5	-	4.5
>18"	-	-	0.9	0.9
Grand Total	-	9.1	0.9	10.0

Table 3.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	31.8	-	31.8
12-18"	-	-	-	-
>18"	-	0.4	0.8	1.2
Grand Total	-	32.2	0.8	33.0

Table 3.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	4.6	-	4.6
12-18"	-	2.0	6.8	8.9
>18"	-	2.5	-	2.5
Grand Total	-	9.1	6.8	16.0

Stand 4 White Pine-Hardwood 3/4A 58.4 acres

Stand 4 occupies the northern shoulder and west facing slopes of Pennyroyal Hill.

White pine dominates the northern shoulder and is overdue for a harvest. The quality is degrading and growth is slowing over time.

As the stand wraps around the west facing slope of Pennyroyal Hill the composition shifts towards a greater mix of transitional hardwoods and spruce-fir.

The uppermost slopes of Stand 4 hosts shallower soils more prone to damage from windthrow.

General attributes

Natural Community Type:	Hemlock-spruce-Northern hardwood forest
Historical Use:	Pasture and hayland to early-mid 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Red rot in both pine and spruce; sterile conk in birch, some spider heart in oak; ash decline.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80 years		
Stocking Level:	Overstocked for growth.		
Past Management History:	No recent management. Last entry 25+ years ago.		
Timber Quality:	White pine overmature.		
Total BA Per Acre:	153	Trees Per Acre:	399
Total AGS BA Per Acre:	33	% AGS Sawtimber:	39.1%
Quadratic MSD:	8.4	Site Quality:	Mix of IA and IIA. Some better soils, but shallow and ledgy in areas.

Wildlife Habitat

Habitat Characteristics:	Mixed interior forest with pine and other early successional species, hemlock and spruce.
Special Features:	Stand borders open height of land; becomes shallow site at upper elevation.
Threats:	HWA.
Management Objectives:	Possible early successional habitat (transitional) in section of dense pine.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Hiking trail up to Pennyroyal Hill.
Aesthetic Resources:	Interior forest.
Education Features:	Potential for interpretive trail.
Cultural Features:	Stonewalls.

Access and Terrain

Landing Sites and Truck Roads:	Potential landing site off Pine Hill Road at western corner utilizing old access to the O. C. Barton cellar hole.
Access and operability:	Long access from northern end of trail. Operability fair, with some wet ground, ledge and rocky ground. Must travel across slope.

STAND 4 DESCRIPTION

Stand 4 occupies the northern shoulder and west facing slopes of Pennyroyal Hill. The northern shoulder is occupied by pine, one of the only old-field pine stands on the ownership. The soils area somewhat fertile here, with a fairly strong ash component. The pine here is largely overmature and ready for harvest, providing an opportunity to establish some early successional habitat on this western side of the lake. Heading south, on the western facing slope the stand transitions to more of a hemlock-hardwood mix.

Regeneration is somewhat light; dominated by striped maple with a mix of other hardwoods and scattered hemlock and fir. and ironwood, with some fir and spruce mixed throughout. Forest health is fair to poor, with general decline noted in both the pine and ash. Red rot is present in both the spruce and pine. Sterile conk was noted in the birch, and spider hearth in the oak.

This stand is overstocked, with about 153 square feet of basal area. Timber quality is average to poor, with only about 2,400 feet of sawtimber per acre, the bulk of which is pine. The pine is largely overmature and ready for harvest, as well as the white birch and ash.

Access issues are the same as for Stands 2 and 3. Historic access to this area was via Dudley Lane, which had a small landing located about half way to the southern boundary. This access is no longer viable for harvesting because of the high aesthetic and recreational objectives near the lake. Given that, the best option for access would be to come in from Pine Hill Road near the western boundary of the ownership using an old farm road that once provided access to the O. C. Barton cellar hole. A landing could be established here, with skid trails running across the slope to access harvest area, which also should include Stands 2 and 3. Operability is fair, with some moderate to steep slopes and some bony ground.

STAND 4 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives here include establishing early successional habitat on the pine-dominated north shoulder of the stand. This can be accomplished through several small or a few large patch cuts, with some retention depending on specific conditions. Elsewhere, the overall stand quality and health can be improve using a combination of groups, crop tree release and thinning.

Silvicultural Objective:	**Action:**
• Capture value on overmature pine/ash overstory. Establish or release early successional habitat. Retain pine and other seed trees, especially mast producing trees. • Improve stand quality and health.	• Modified overstory removal, using several small openings or one larger opening, as site dictates to remove pine/ash/other overstory and establish early successional habitat (north shoulder of Pennyroyal Hill). • Elsewhere, group selection with crop tree release and general improvement thinning. Retain spruce and fir component. • Reduce overall basal area to around 100 square feet.

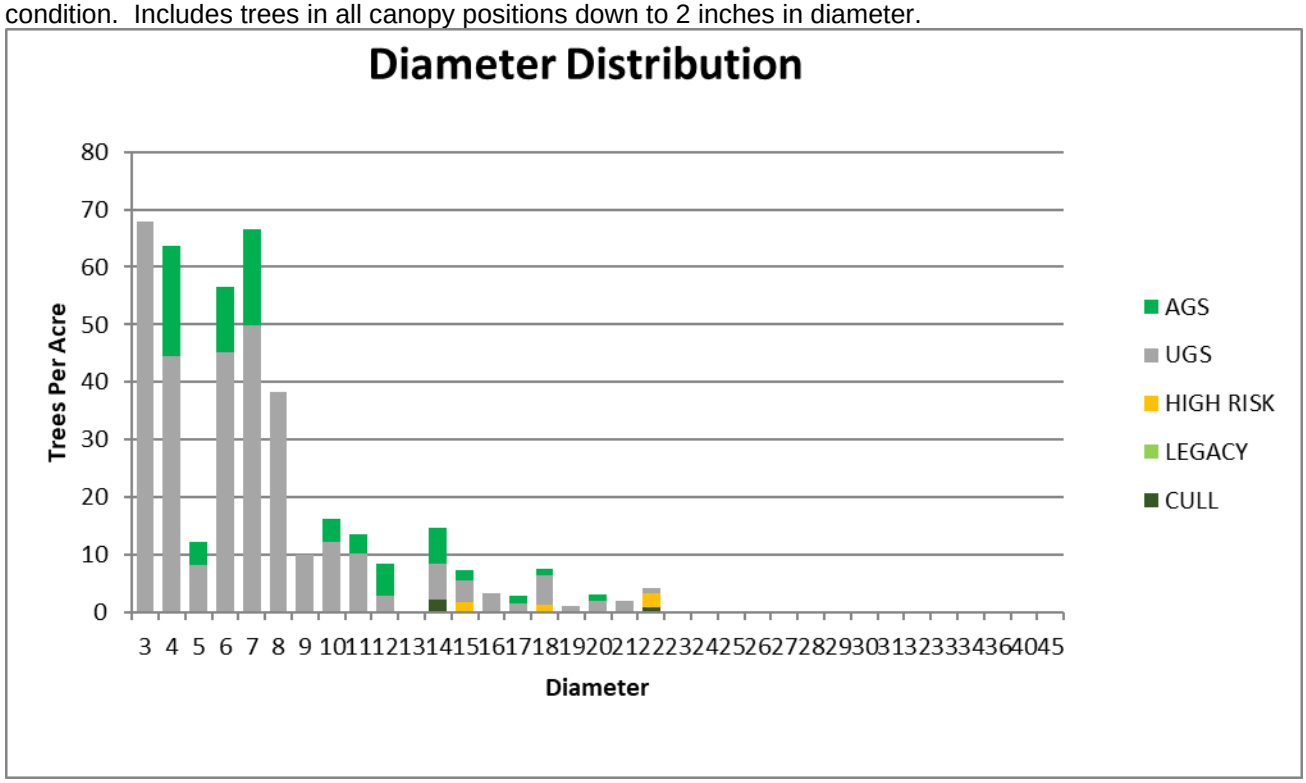
Bird Habitat Objective and Actions:	**Target Species:**
Establish early successional habitat with residual canopy structure, especially mast trees (cherry, yellow birch).	• Chestnut-sided warbler • Ruffed grouse • Eastern towhee
Protect snags and hardwood trees with interior decay, especially aspen.	• Yellow-bellied sapsucker • Northern flicker
Elsewhere, create small openings to establish or release regeneration, retain 80% canopy cover. Retain or promote spruce-fir components.	• Black-throated green warbler • Purple finch

STAND 4 TABLES AND GRAPHS

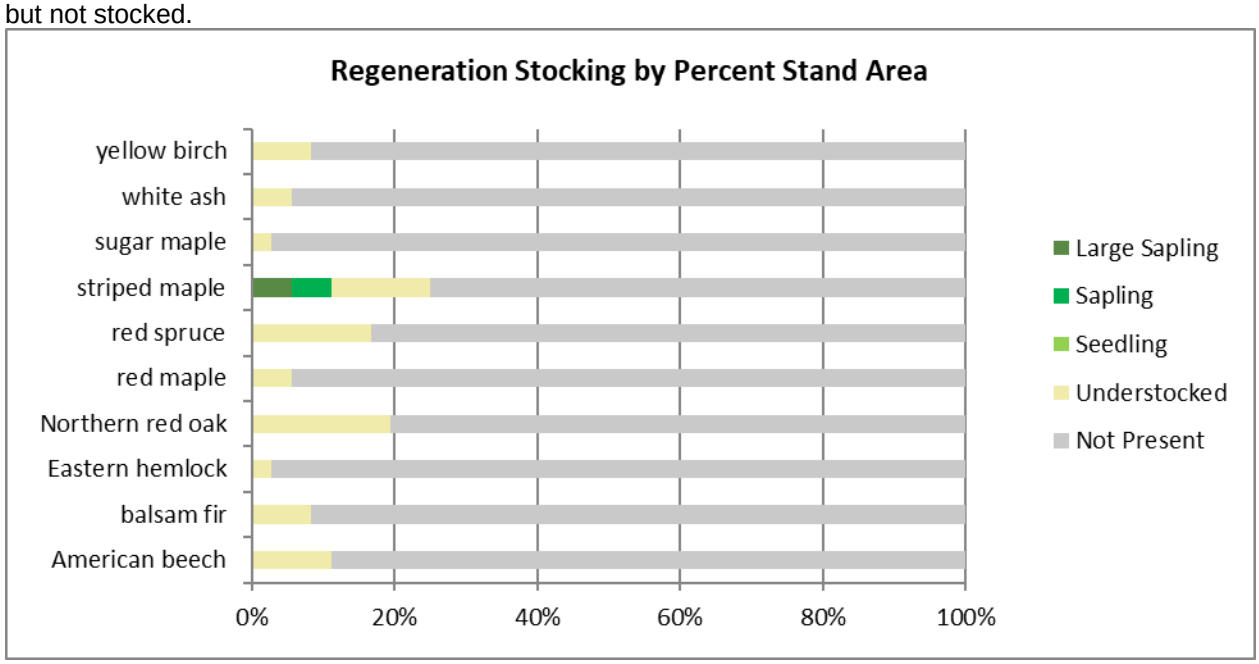
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	15.6%	18.4%	-	97	303	3.4	-	0.5	4.7	400		3.0%
white ash	14.1%	16.4%	-	93	-	4.0	-	-	4.2	93		1.7%
Northern red oak	7.8%	3.8%	-	475	239	1.2	0.3	0.1	3.0	714	300	7.5%
sugar maple	6.3%	14.2%	-	-	-	1.2	0.2	-	1.4	-		0.0%
paper birch	4.7%	4.2%	-	268	-	1.1	-	-	1.7	268		1.8%
hophornbeam	3.1%	6.5%	-	-	-	0.3	-	-	0.3	-		0.0%
yellow birch	1.6%	3.3%	-	-	-	0.3	-	-	0.3	-		0.0%
black cherry	1.6%	3.3%	-	-	-	0.5	-	-	0.5	-		0.0%
Total Hardwood:	54.7%	70.0%	-	932	542	12.1	0.4	0.6	16.1	1,475	300	14.0%
Eastern white pine	34.4%	14.8%	-	1,968	1,815	6.9	-	1.4	15.9	3,783	666	21.9%
red spruce	4.7%	6.4%	-	-	-	0.9	-	-	0.9	-		0.0%
balsam fir	3.1%	7.7%	-	61	-	0.2	-	0.2	0.5	61		0.0%
Eastern hemlock	3.1%	1.2%	-	175	-	0.5	-	0.2	1.0	175		3.2%
Total Softwood:	45.3%	30.0%	-	2,204	1,815	8.5	-	1.7	18.3	4,019	666	25.1%
Total Volume:	100.0%	100.0%	-	3,137	2,357	20.6	0.4	2.3	34.4	5,494	966	39.1%
Volume Per Acre:			-	183,049	137,557	1,203	26	137	2,007	320,607	56,371	

Table 4.1: Forest Composition and Volume.

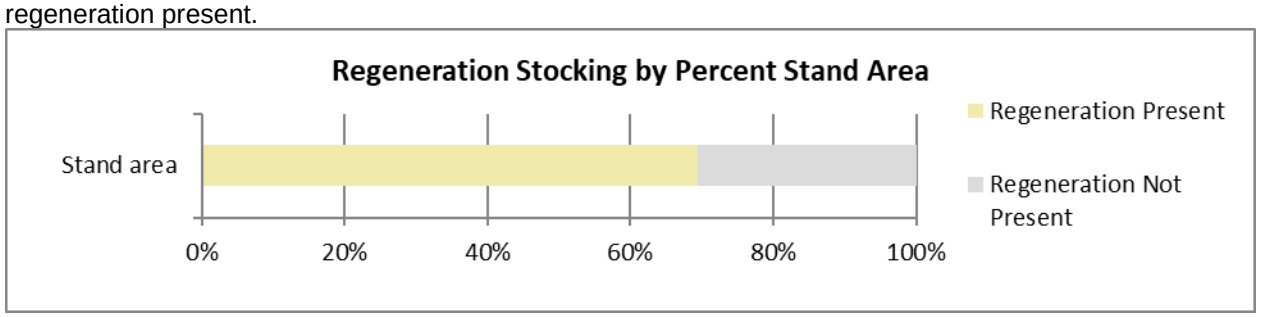
Graph 4.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



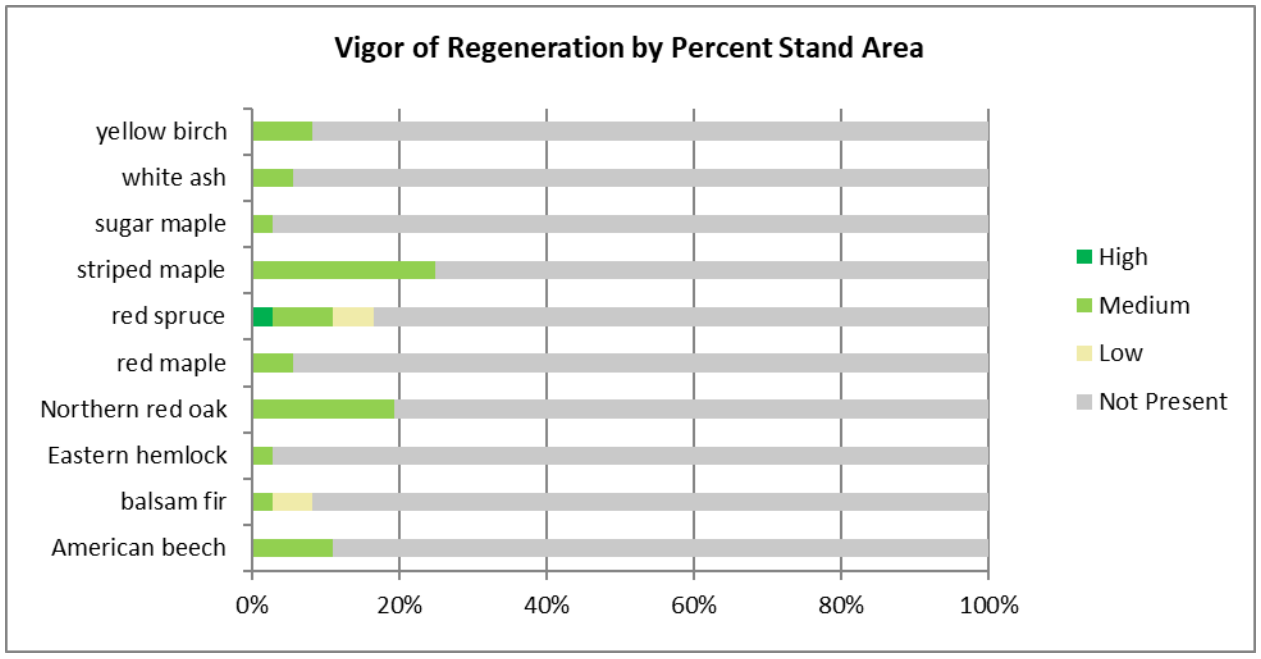
Graph 4.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 4.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 4.4: Vigor of regeneration and shrub species.



Graph 4.5: Browse level of regeneration and shrub species.

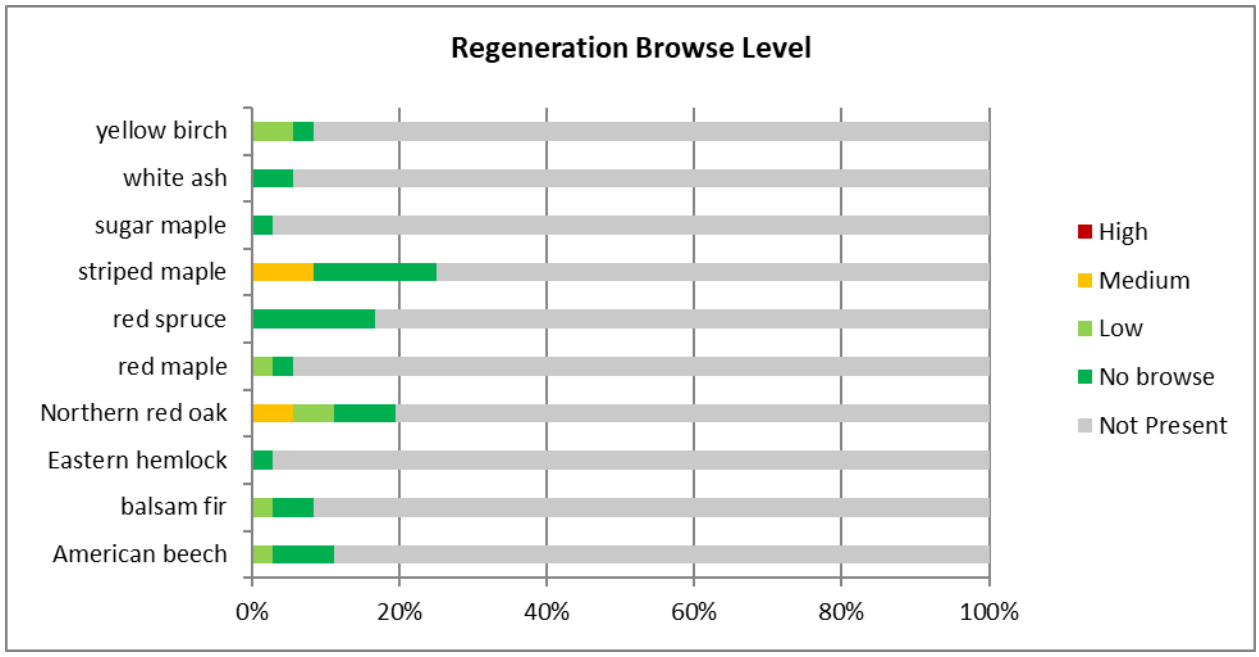


Table 4.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	4.1	6.7	-	10.8
12-18"	2.8	3.3	-	6.2
>18"	-	-	-	-
Grand Total	6.9	10.1	-	17.0

Table 4.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	13.9	5.7	3.7	23.3
12-18"	2.5	6.2	-	8.8
>18"	-	-	-	-
Grand Total	16.4	12.0	3.7	32.0

Table 4.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	11.7	11.7
12-18"	-	-	1.3	1.3
>18"	1.0	-	-	1.0
Grand Total	1.0	-	12.9	14.0

Stand 5 Red oak-Northern hardwood 34B 75.6 acres

Stand 5 hosts the east facing slope that mirrors Stand 3 on the opposite side of the lake. The soils here are somewhat enriched and greater moisture availability than higher, drier sites.

Stand 5 species composition includes Northern hardwoods and red oak with scattered spruce and hemlock.

Beech saplings, pole and overstory trees dominate in some sections.

Portions of Stand 5 were included in the 2016 harvest.

Scattered large down logs can be found here as well, including this down beech that is serving as a nurse log to some yellow birch seedlings.

General attributes

Natural Community Type:	Hemlock-beech-oak-pine forest and Sugar maple-beech-yellow birch forest
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Beech bark disease prominent; some decline in understory spruce.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Adequately stocked for growth.		
Past Management History:	Partial harvest, 2016 and 2018. Group selection.		
Timber Quality:	Variable. Fair.		
Total BA Per Acre:	84	Trees Per Acre:	228
Total AGS BA Per Acre:	29	% AGS Sawtimber:	60.7%
Quadratic MSD:	8.2	Site Quality:	Mix of IB and IIA. Best for oak and pine, some shallow soils.

Wildlife Habitat

Habitat Characteristics:	Hardwood interior forest.
Special Features:	Scattered large red oak cavity trees; heavy sapsucker use in hemlock.
Threats:	No significant threats.
Management Objectives:	Maintain oak legacy trees. Maintain scattered hemlock component.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	First order stream bisects stand to feed lake.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	None.
Aesthetic Resources:	Hardwood forest bordering Reserve area.
Education Features:	Nothing significant.
Cultural Features:	None.

Access and Terrain

Landing Sites and Truck Roads:	Landing site off West Road in permanent opening.
Access and operability:	Moderate slope with some wet seeps and rock outcropping.

STAND 5 DESCRIPTION

Stand 5 includes the Northern hardwood dominated sections of the ownership on the east side of the lake. The soils here are somewhat more fertile and with higher moisture content then surrounding uplands. Unfortunately, beech dominates much of the understory, outcompeting other hardwood species, while also making up a third of the overstory stocking. Sugar maple makes up about 20% of the overstory, and a mix of other hardwoods makes the rest, including oak, ash, red maple, and both white and yellow birch.

This area was treated in the 2016 and 2018 harvests, mostly group selection with some patch cuts. The patch cuts have been made into a separate stand.

The primary health concern is beech bark disease with some understory spruce decline. Heavy browse is also a concern.

This stand is adequately stocked for growth, with 84 square feet of basal area. Timber quality is fair to poor with the best potential in scattered red oak and some residual ash. This stand will be left to grow for this planning period with the exception of possible gap expansion around the existing patch cuts from the 2016 and 2018 harvests.

STAND 5 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives for this stand are to leave it to grow for this planning period.

Silvicultural Objective:	**Action:**
• Leave to grow.	• -

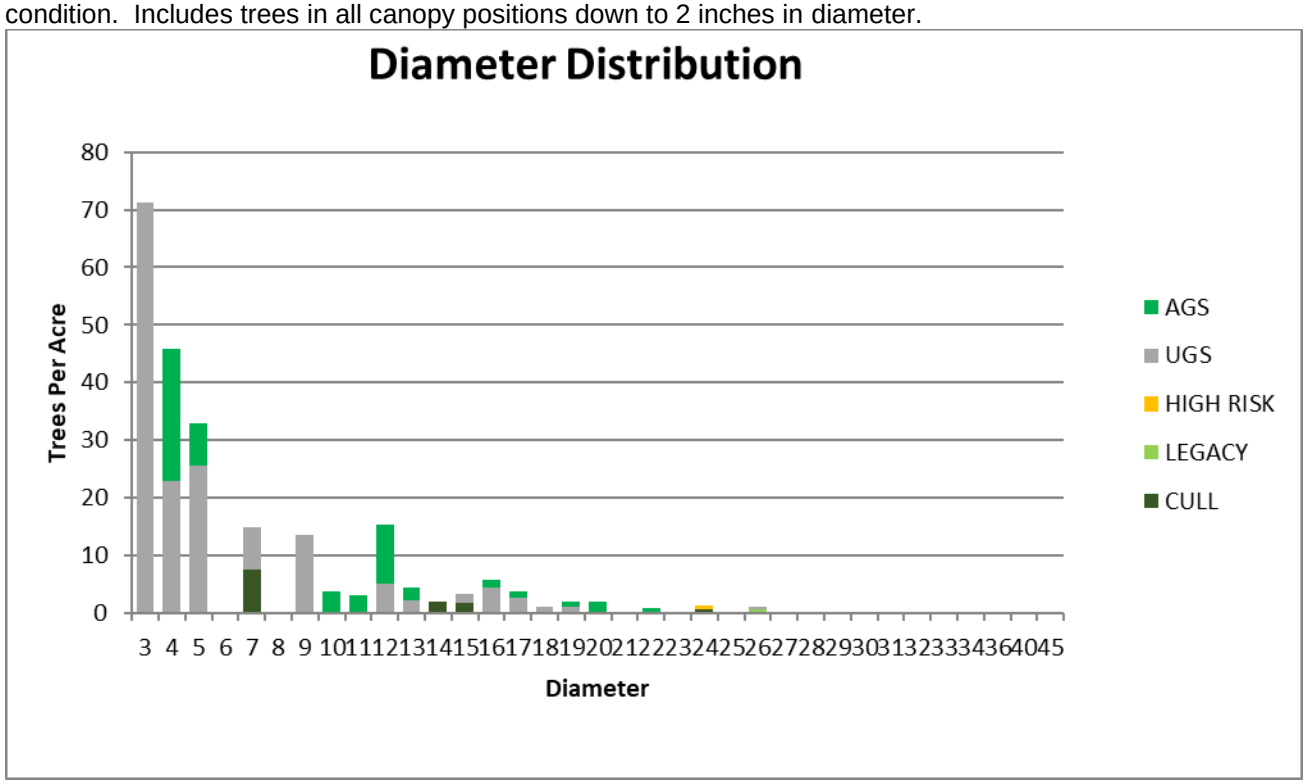
Bird Habitat Objective and Actions:	**Target Species:**
Retain interior, hardwood forest with continuous canopy.	• Scarlet tanager • Red shouldered hawk • Barred owl

STAND 5 TABLES AND GRAPHS

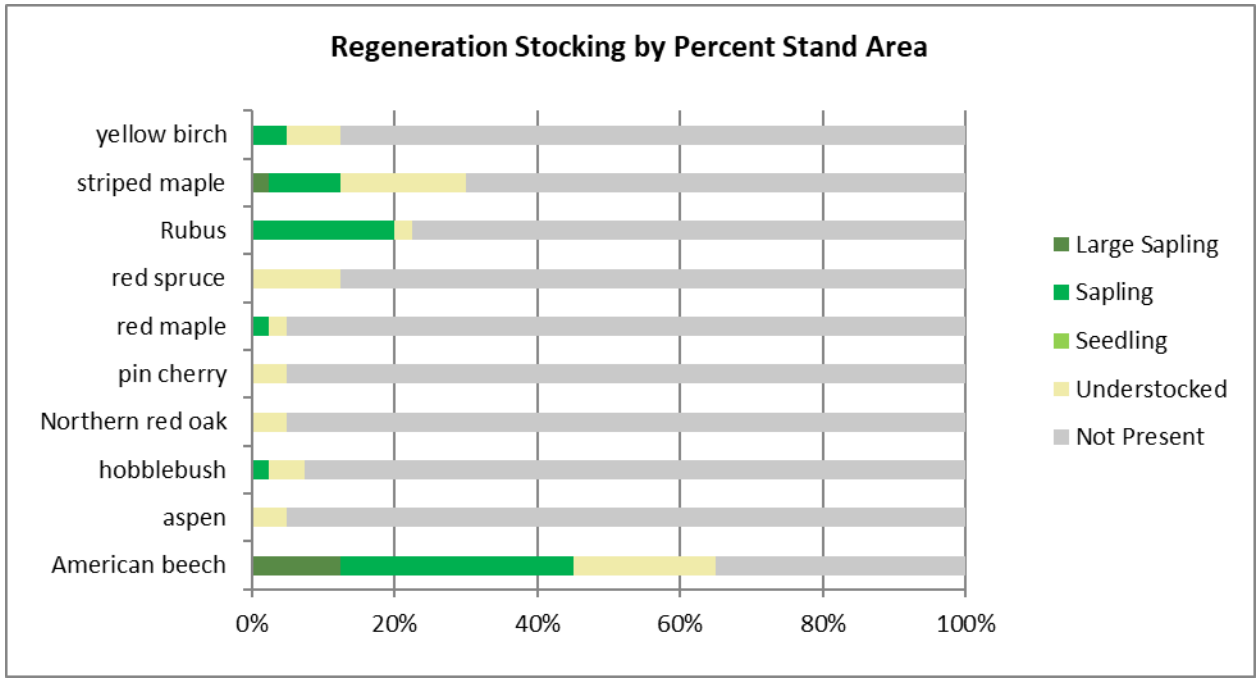
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
American beech	33.3%	37.7%	-	-	407	2.5	-	1.8	5.1	407		0.0%
sugar maple	19.4%	23.8%	-	247	230	2.6	-	-	3.6	476		11.4%
Northern red oak	16.7%	7.0%	99	778	96	1.2	-	0.8	3.9	973		24.5%
white ash	8.3%	4.1%	-	709	-	0.8	-	-	2.2	709	244	9.0%
paper birch	5.6%	15.4%	-	-	-	0.7	-	-	0.7	-		0.0%
red maple	5.6%	6.1%	-	241	-	0.7	-	-	1.2	241		7.9%
yellow birch	2.8%	0.7%	-	-	-	-	-	0.7	0.7	-		0.0%
Total Hardwood:	91.7%	94.7%	99	1,974	732	8.5	-	3.2	17.3	2,806	244	52.7%
Eastern hemlock	5.6%	2.0%	-	-	-	1.1	-	0.1	1.3	-		0.0%
red spruce	2.8%	3.3%	-	242	-	0.1	-	-	0.5	242		7.9%
Total Softwood:	8.3%	5.3%	-	242	-	1.2	-	0.1	1.8	242		7.9%
Total Volume:	100.0%	100.0%	99	2,216	732	9.7	-	3.3	19.2	3,048	244	60.7%
Volume Per Acre:			7,508	167,630	55,402	736	-	252	1,449	230,539	18,466	

Table 5.1: Forest Composition and Volume.

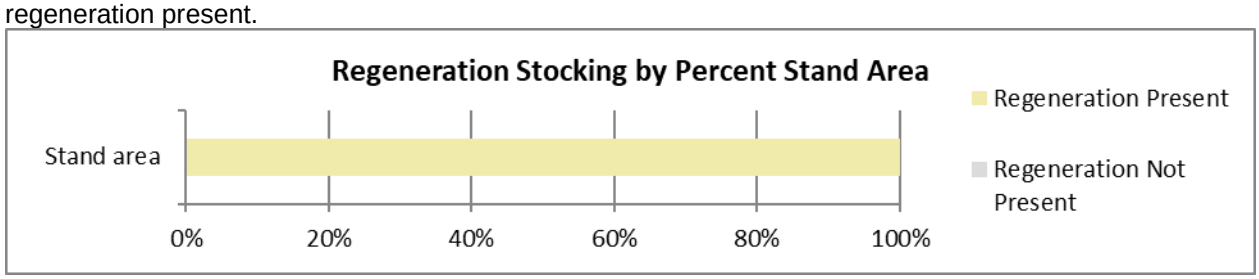
Graph 5.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



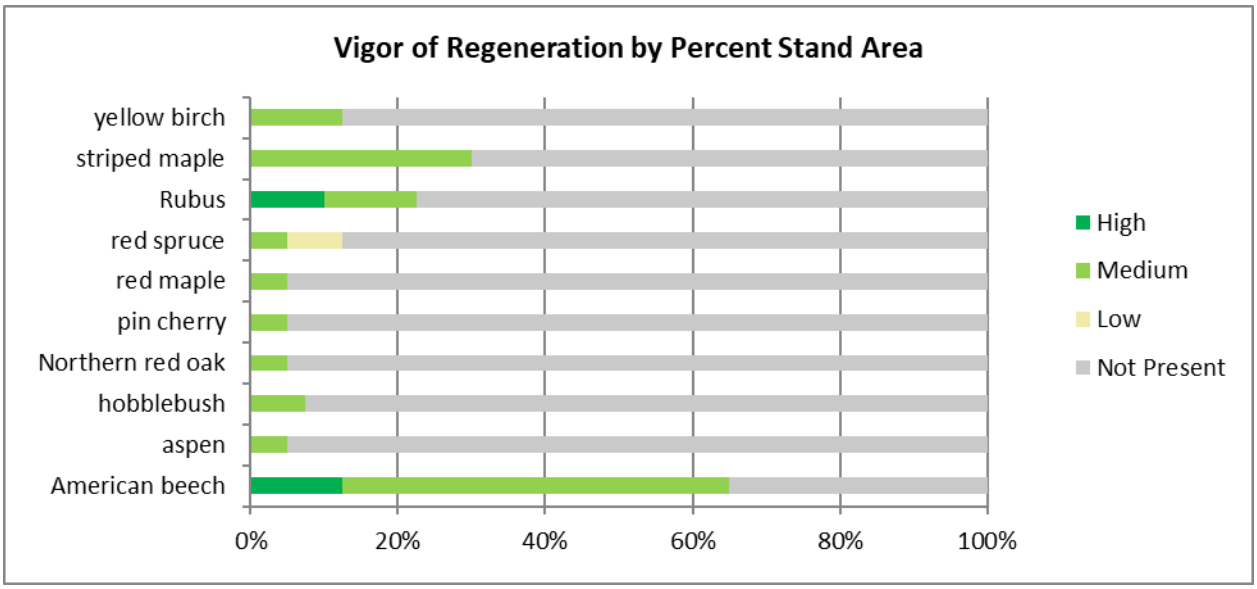
Graph 5.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 5.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 5.4: Vigor of regeneration and shrub species.



Graph 5.5: Browse level of regeneration and shrub species.

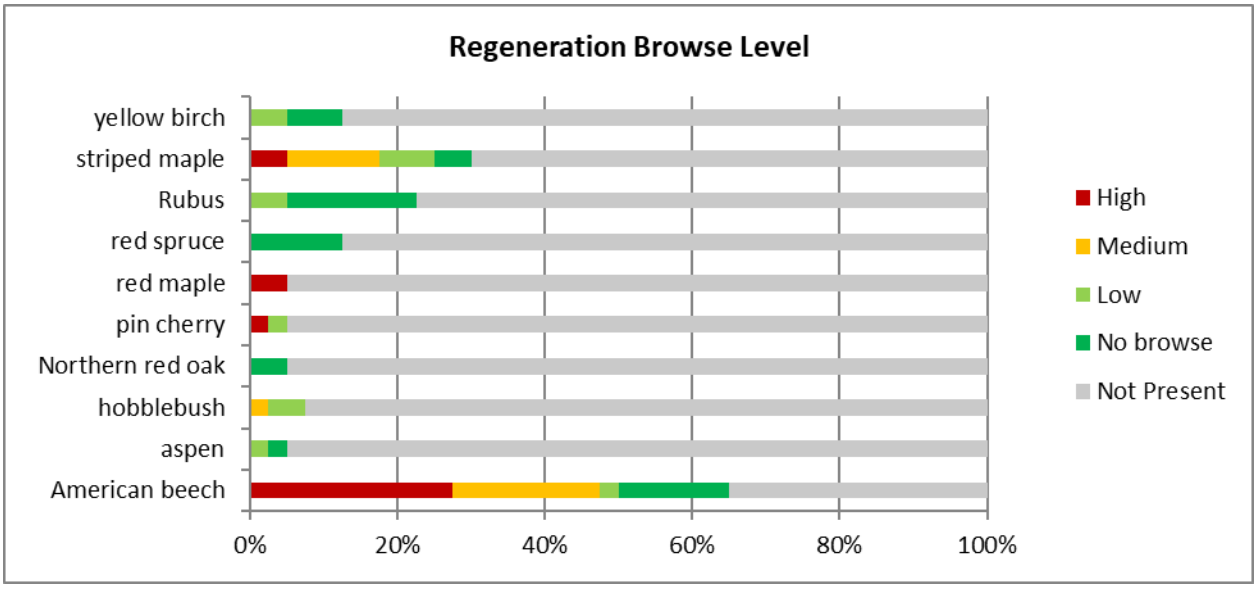


Table 5.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	9.2	9.2	8.9	27.3
12-18"	2.0	0.5	0.5	3.1
>18"	-	0.9	0.2	1.2
Grand Total	11.3	10.6	9.7	31.6

Table 5.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	15.7	10.3	41.0	67.0
12-18"	9.1	12.5	7.1	28.6
>18"	-	2.8	-	2.8
Grand Total	24.7	25.6	48.1	98.4

Table 5.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	14.1	14.1
12-18"	-	1.3	1.4	2.7
>18"	0.2	1.4	0.9	2.5
Grand Total	0.2	2.7	16.4	19.3

Stand 6 Hardwood-Hemlock 3/4AB 265.5 acres

Stand 6 is the largest stand on the property, hosting the bulk of the area on the east side of the lake.

It largely hosts a mix of hemlock and transitional hardwoods, but also includes scattered pine, some spruce, and a fair amount of sugar maple.

The bulk of this stand was treated during the 2016-19 harvest.

Some sections of Stand 6 were not part of the recent harvest, and hosting areas of more mature forest.

A recreational trail winds its way through Stand 6. This trail did not appear to be maintained in 2020 and would benefit from some clearing and maintenance.

Stand 6 also surrounds multiple patch cuts that were part of the 2016-19 harvest. These patch cuts are largely dominated by blackberry providing an excellent food source for wildlife, especially black bear as evidenced by a large amount of bear scat found in the surrounding areas.

General attributes

Natural Community Type:	Hemlock-beech-Northern hardwood forest
Historical Use:	Pasture and hayland to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Generally good with exception of beech bark disease.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked, on average.		
Past Management History:	Partial harvest, 2016 and 2018. Group selection and Patch cuts.		
Timber Quality:	Variable. Scattered nice red oak and white pine.		
Total BA Per Acre:	135	Trees Per Acre:	341
Total AGS BA Per Acre:	72	% AGS Sawtimber:	79.5%
Quadratic MSD:	8.5	Site Quality:	Mix of IB and IIA. Best for oak and pine, but some shallow soils.

Wildlife Habitat

Habitat Characteristics:	Large, interior mixed forest.
Special Features:	Strong hemlock component; inclusive of multiple .1-1.3-acre early successional openings (created 2016-2018) and large permanent opening (+/-15 acres). Oak mast. Bear beech. Patches of mapped deer yard near south boundary.
Threats:	HWA.
Management Objectives:	Maintain interior forest; release/establish understory growth. Consider planting mast producing shrubs in permanent opening.

Wetland and Riparian Features

Wetland Features:	Interior shrub wetlands.
Stream Features:	Two first order streams bisect stand to feed lake.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Hiking trails. “New road” extends through portion of stand.
Aesthetic Resources:	Interior mixed forest. Wetland features. View from permanent opening on height of land.
Education Features:	Potential for interpretive trail. Potential for kiosk or gazebo in permanent opening.
Cultural Features:	Cellar hole off West Road (S. Bartlett); stonewalls.

Access and Terrain

Landing Sites and Truck Roads:	One landing site in permanent opening off West Road, good truck access. Second landing site established on new road leading south from maintenance buildings. Truck access good, but steep.
Access and operability:	Variable, but generally good. Moderate to gentle slope. Some ledgy ground and rocky areas, seeps, and stream crossings required.

STAND 6 DESCRIPTION

Stand 6 is the largest stand on the ownership, comprising the bulk of the forest on the west side of the lake. It is a mixed stand, dominated by hemlock and red maple with a mix of other hardwoods and scattered spruce and white pine. A portion of this stand near the southern boundary has been mapped as a deer wintering area. The soils area generally shallow, with some bouldery sections and areas of exposed ledge and also including some small pockets of more fertile soils. Hemlock makes up 30% of the stocking, followed by red maple with 20%, and sugar maple with 12%.

Regeneration is sparse, and dominated by shade tolerant species such as beech and striped maple, with some spruce. In some sections aspen has regenerated, but likely won't have enough light under the current conditions to thrive.

This area was treated in the 2016 and 2018 harvests, mostly group selection and patch cuts. The patch cuts have been made into a separate stand. Most of the openings made have regenerated to a mix of beech and Rubus.

The primary health concern is beech bark disease with some understory spruce decline. Heavy browse is also a concern. Future threats include the possibility of hemlock wooley adelgid becoming established here.

This stand is just overstocked for growth, a result of varied harvest coverage. Given the wildlife use, especially as deer wintering area, maintaining this level of stocking for this planning period is a reasonable objective. The intermittent patch openings provide browse, while the surrounding forest provides shelter. Unfortunately, from the timber and stand composition stand point, over browse will continue to be a problem here. Timber quality is fair to good, with over half the residual stocking as acceptable growing stock. Hemlock makes up the bulk of the timber component with over 1,000 feet of sawtimber per acre, some of which is in nice, high quality stems. This stand will be left to grow for this planning period with the exception of possible gap expansion around the existing patch cuts from the 2016 and 2018 harvests.

STAND 6 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives during this planning period are to expand patches and establish at least 1 larger, new opening to sustain production of early successional habitat and improve growth and diversity of vegetation within established patches. This work should be done near the end of this planning period.

Silvicultural Objective:	Action:
• Expand patches to improve growth, vigor and diversity of established regeneration/	• Gap expansion on existing patches. Consider expanding by at least 1 tree length.
• Early successional opening located near aspen to capture value and create continuity of early successional habitat established in 2016-2019 harvest.	• Large patch with retention located north of landing; locate near aspen for sprouting. Can retain up to 30% canopy if opportunity exists. Retain mast trees, especially yellow birch and cherry.

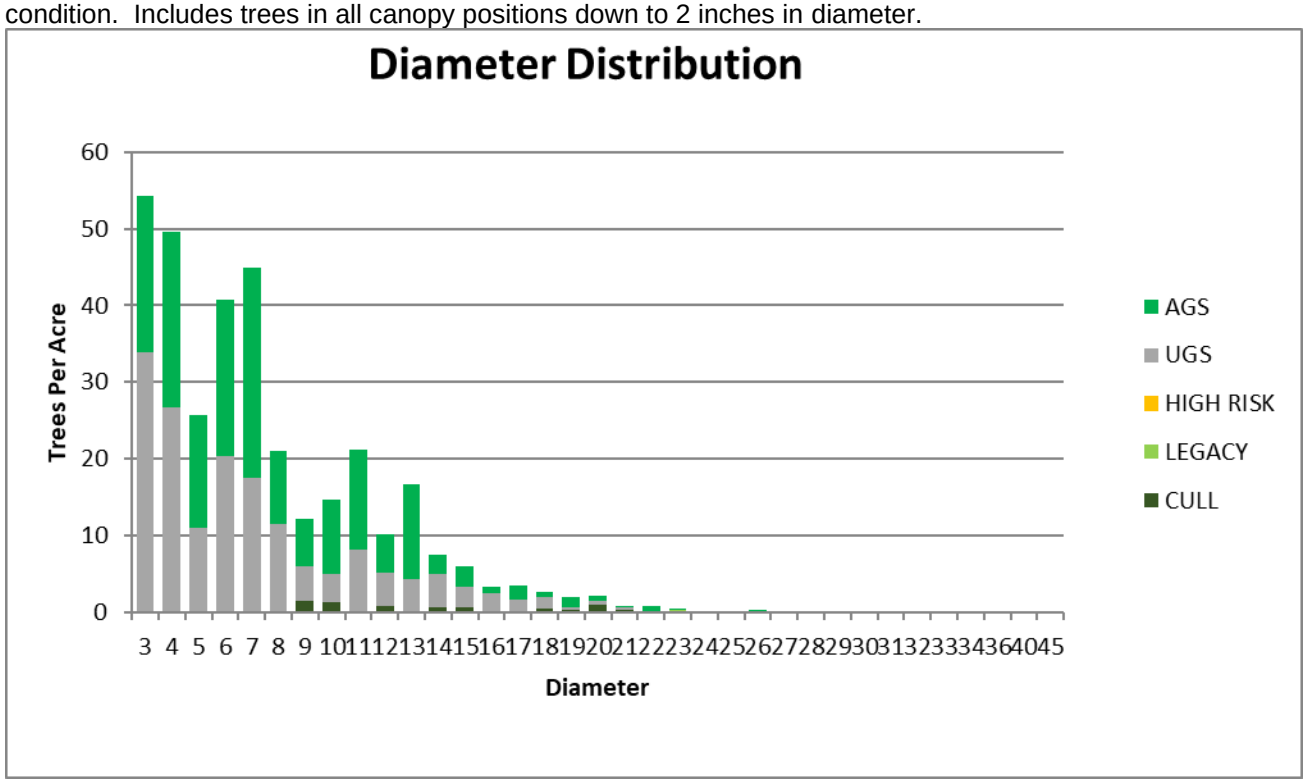
Bird Habitat Objective and Actions:	Target Species:
Create early successional opening with retained structure, snag and cavity trees. Create and/or maintain large down logs.	• Chestnut-sided warbler • Ruffed grouse • Northern flicker • Mourning warbler • Field sparrow • Indio bunting
Elsewhere, retain interior forest habitat (30-80% canopy).	• Veery • Yellow bellied sapsucker • Eastern wood-pewee • Hermit thrush

STAND 6 TABLES AND GRAPHS

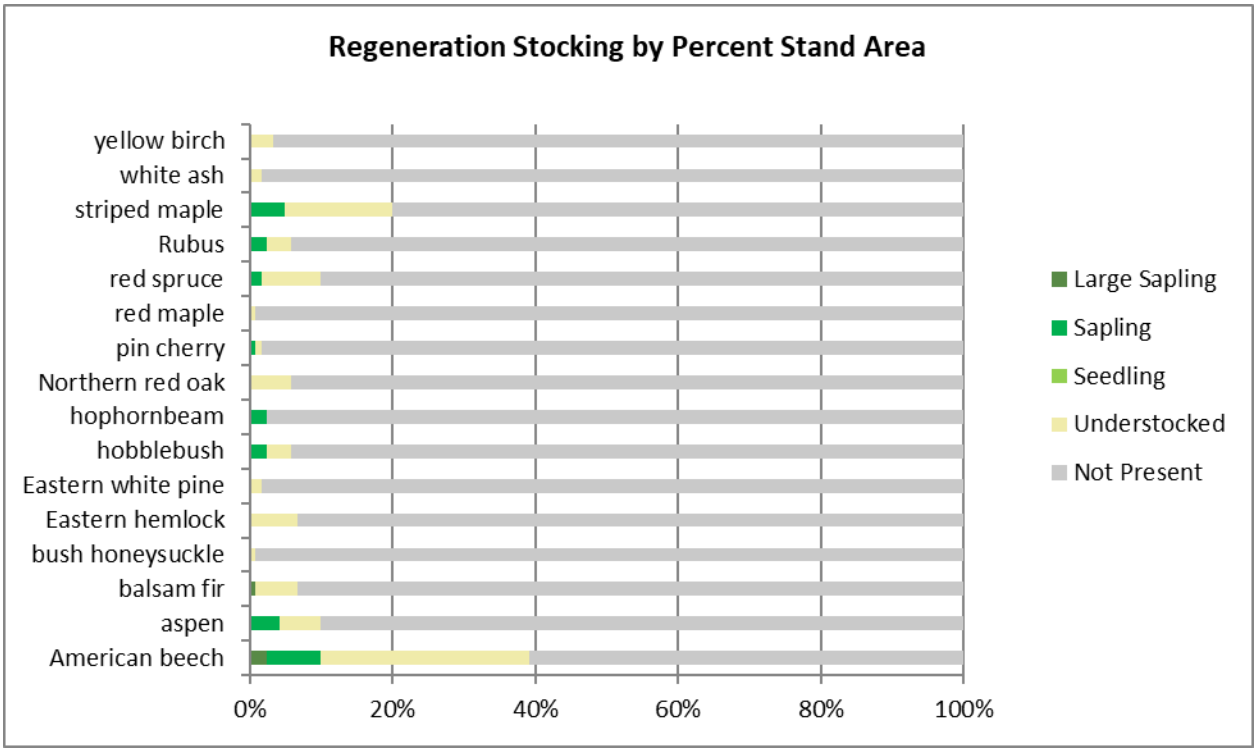
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	15.8%	20.9%	-	268	205	2.7	0.2	0.4	4.2	474	-	9.5%
sugar maple	12.0%	16.0%	-	228	107	2.2	0.1	0.1	3.1	334	-	4.9%
American beech	7.6%	7.1%	-	144	21	1.1	-	0.7	2.1	166	-	0.7%
Northern red oak	6.0%	4.1%	-	502	61	0.8	0.1	-	2.0	563	-	13.3%
paper birch	6.0%	4.5%	-	246	65	1.1	0.1	-	1.8	311	-	4.9%
yellow birch	4.9%	4.5%	-	80	49	0.9	0.1	0.0	1.3	129	-	3.0%
white ash	3.8%	4.7%	-	60	91	0.7	-	0.1	1.1	151	-	1.2%
black birch	2.7%	2.6%	-	104	-	0.6	0.0	-	0.9	104	-	1.9%
Total Hardwood:	58.7%	64.4%	-	1,633	598	10.1	0.7	1.2	16.4	2,231	-	39.5%
Eastern hemlock	31.0%	24.6%	-	1,092	-	5.5	-	1.0	8.6	1,092	-	23.6%
red spruce	4.9%	7.5%	-	388	-	0.4	-	-	1.1	388	-	7.4%
Eastern white pine	4.3%	1.3%	-	370	75	0.4	-	0.5	1.7	445	-	8.4%
balsam fir	1.1%	2.1%	-	73	-	-	-	-	0.1	73	-	0.5%
Total Softwood:	41.3%	35.6%	-	1,922	75	6.2	-	1.5	11.6	1,997	-	39.9%
Total Volume:	100.0%	100.0%	-	3,555	673	16	1	3	28	4,228	-	79.5%
Volume Per Acre:			-	943,832	178,787	4,309	181	714	7,450	1,122,620	-	

Table 6.1: Forest Composition and Volume.

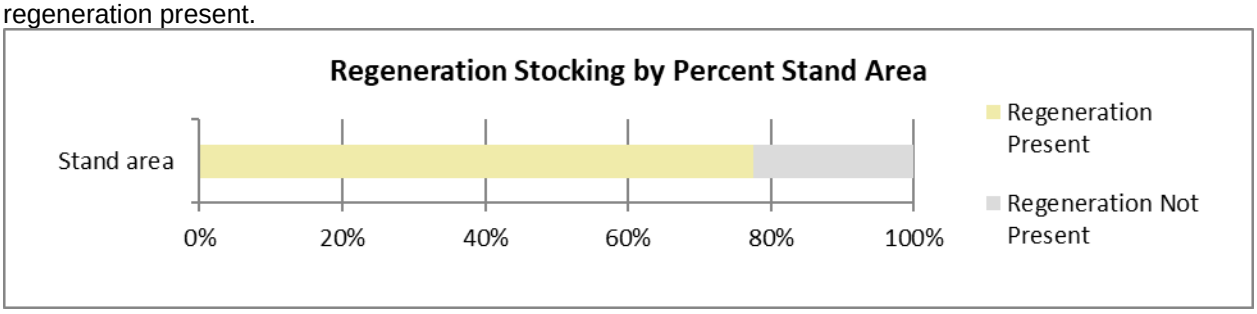
Graph 6.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



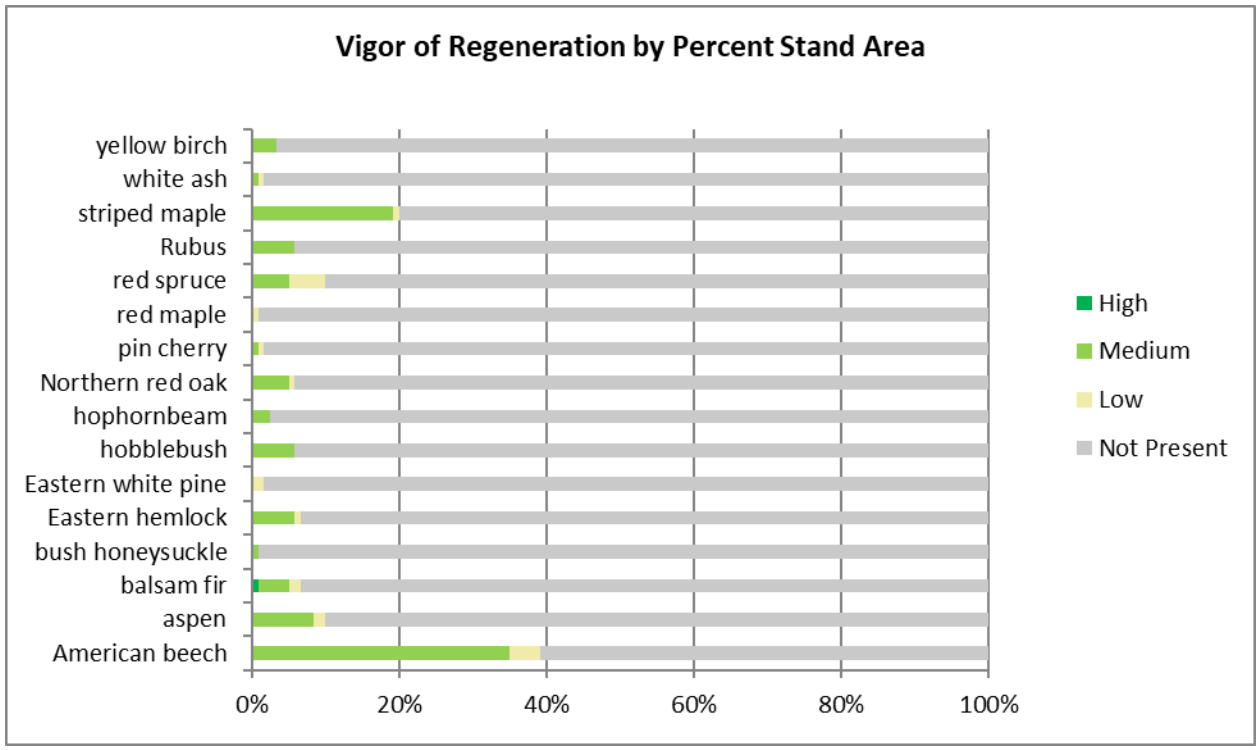
Graph 6.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 6.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 6.4: Vigor of regeneration and shrub species.



Graph 6.5: Browse level of regeneration and shrub species.

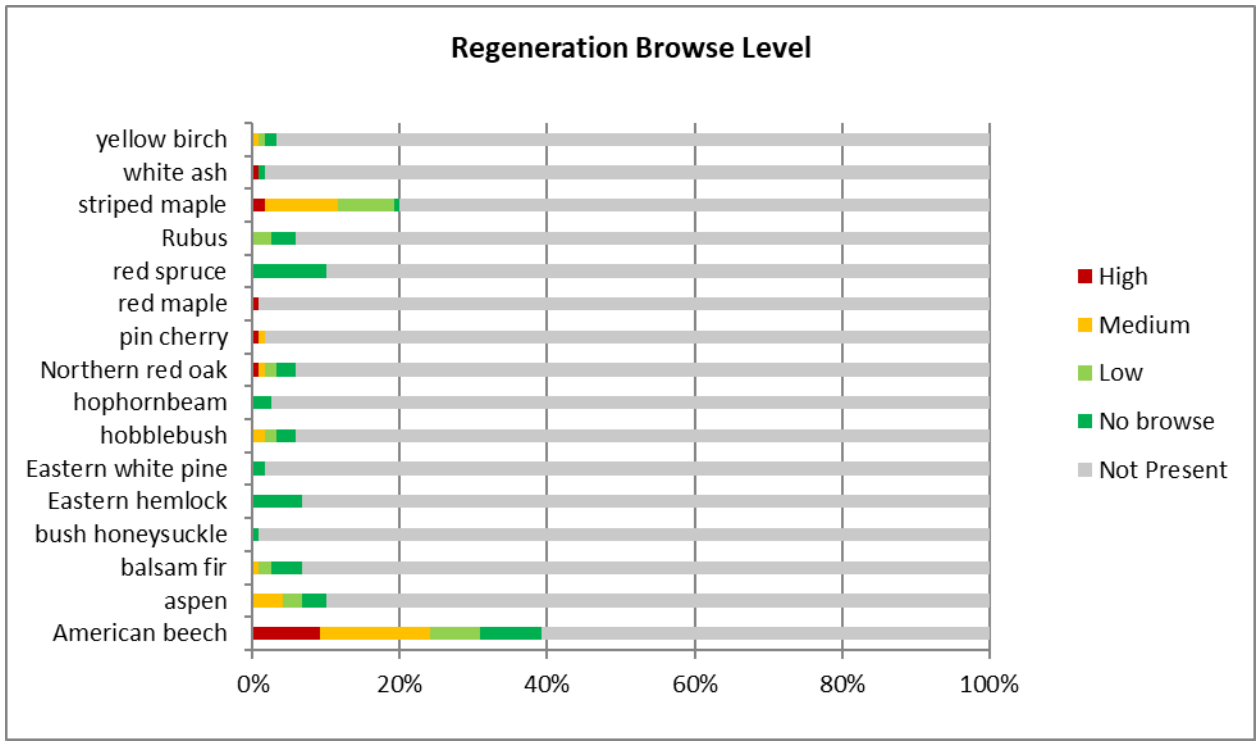


Table 6.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	9.2	9.2	8.9	27.3
12-18"	2.0	0.5	0.5	3.1
>18"	-	0.9	0.2-	1.2
Grand Total	11.3	10.6	9.7-	31.6

Table 6.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	15.7	10.3	14.0	67.0
12-18"	9.1	12.5	7.1	28.6
>18"	-	2.8	-	2.8
Grand Total	24.7	25.6	48.1	93.4

Table 6.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	14.1	14.1
12-18"	-	1.3	1.4	2.7
>18"	0.2	1.4	0.9	2.5
Grand Total	0.2	2.7	16.4	19.3

Stand 7 Hemlock-Hardwood 3/4A 50.5 acres

Stand 7 occupies a similar site to Stand 6, but with a much greater hemlock component due to shallower soils.

The hardwoods mixed in with the hemlock are largely transitional, dominated by red maple and white birch, but also some scattered oak.

Stand 7 borders a large wetland area that initially was a forested wetland, but has since transitioned to a shrub wetland.

Lowbush blueberry are abundant around the edge of the wetland and provide a quality soft mast food source utilized by many wildlife species.

General attributes

Natural Community Type:	Hemlock-beech-oak-pine (may be transitional to Hemlock-beech-Northern hardwood)
Historical Use:	Pasture and hayland to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Generally good with exception of some sterile conk in birch.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked for growth		
Past Management History:	Partial harvest, 2016 and 2018. Group selection and Patch cuts.		
Timber Quality:	Variable.		
Total BA Per Acre:	145	Trees Per Acre:	478
Total AGS BA Per Acre:	72	% AGS Sawtimber:	90.5%
Quadratic MSD:	7.5	Site Quality:	Mix and IIB and IIA. Shallow soils.

Wildlife Habitat

Habitat Characteristics:	Hemlock dominated stand.
Special Features:	Strong hemlock component; inclusive of multiple .1-1.3-acre early successional openings (created 2016-2018). Stand includes two open wetlands.
Threats:	HWA.
Management Objectives:	Maintain healthy hemlock component. Release/establish understory growth.

Wetland and Riparian Features

Wetland Features:	Two open, shrub wetlands.
Stream Features:	First order stream associated with wetlands, feeds into lake.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Portion of hiking trail. “New road” extends through portion of stand.
Aesthetic Resources:	Deep, interior hemlock forest. Open, shrub wetlands.
Education Features:	Potential for interpretive trail.
Cultural Features:	None.

Access and Terrain

Landing Sites and Truck Roads:	One landing site in permanent opening off West Road, good truck access. Second landing site established on new road leading south from maintenance buildings. Truck access good, but steep.
Access and operability:	Variable, but generally good. Moderate to gentle slope. Some ledgy ground and rocky areas, seeps, and stream crossings required.

STAND 7 DESCRIPTION

Stand 7 is similar to Stand 6, but with a much stronger hemlock component and in general shallower soils without the pockets of enrichment. Hemlock makes up almost 60% of the stocking, with red maple dominating the remainder. Regeneration is sparse, dominated by shade tolerant species such as scattered hemlock, beech and striped maple. A small section of this stand is mapped as a deer wintering area.

This area was treated in the 2016 and 2018 harvests, mostly group selection and patch cuts. The patch cuts have been made into a separate stand. Most of the openings made have regenerated to a mix of beech and Rubus.

No significant health concerns were noted. Future threats include the possibility of hemlock wooley adelgid becoming established here.

This stand is somewhat overstocked for growth, like Stand 6 this is a result of varied harvest coverage. Given the wildlife use, especially as deer wintering area, maintaining this level of stocking for this planning period is a reasonable objective. The intermittent patch openings provide browse, while the surrounding forest provides shelter. Unfortunately, from the timber and stand composition stand point, over browse will continue to be a problem here. Timber quality is fair to good, with about half the residual stocking as acceptable growing stock. Hemlock makes up the bulk of the timber component with over 1,400 feet of sawtimber per acre, some of which is in nice, high quality stems. This stand will be left to grow for this planning period with the exception of possible gap expansion around the existing patch cuts from the 2016 and 2018 harvests.

STAND 7 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives for this stand are to leave it to grow for this planning period.

Silvicultural Objective:	**Action:**
• Leave to grow.	• -

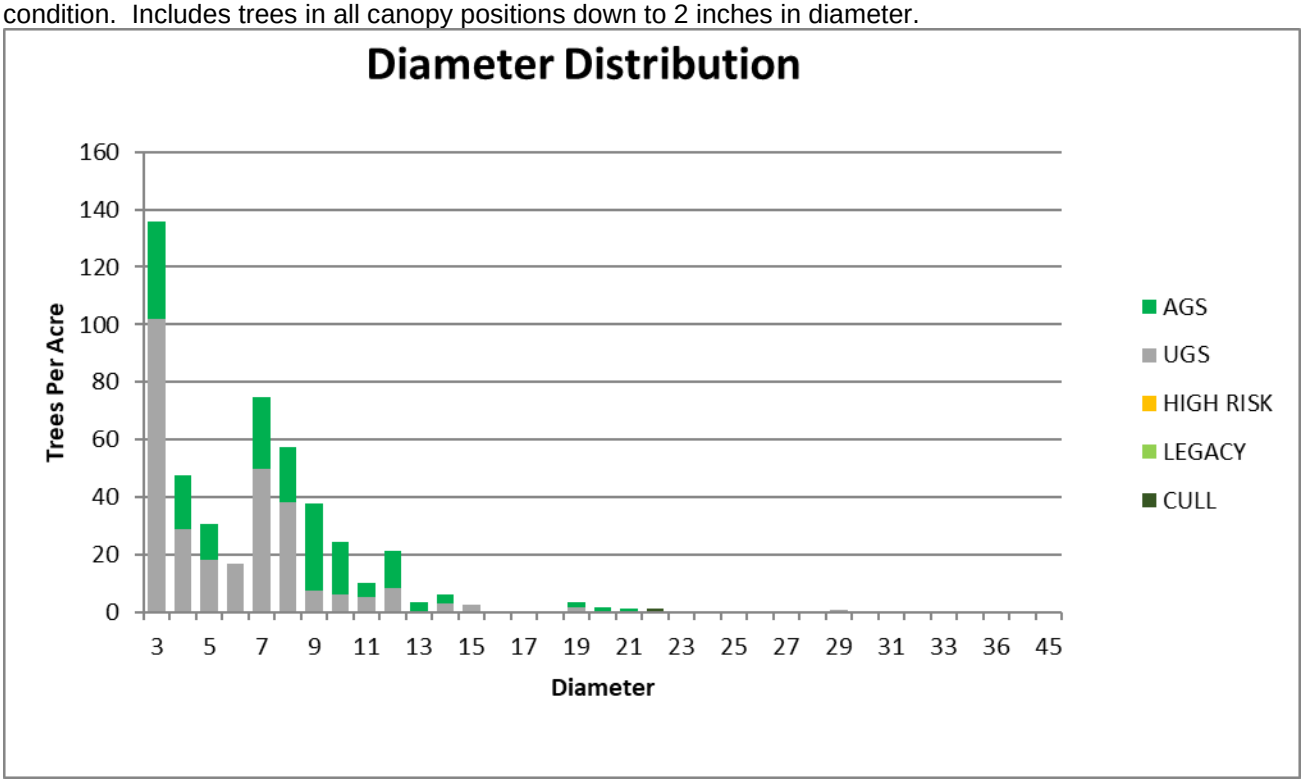
Bird Habitat Objective and Actions:	**Target Species:**
Retain mixed interior forest habitat (>80% canopy).	• Black throated green warbler • Brown creeper • Blue-headed vireo
Protect wetlands, retain spruce, retain snags	• Magnolia warbler • Nashville warbler • Great crested flycatcher • Purple finch

STAND 7 TABLES AND GRAPHS

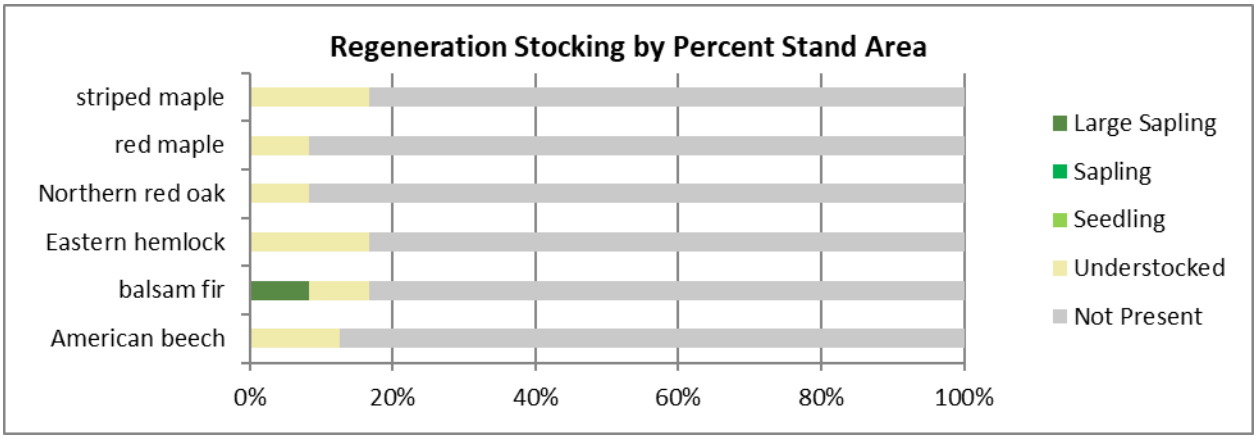
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	15.8%	15.9%	-	256	140	3.5	0.2	-	4.5	396	-	15.5%
Northern red oak	13.2%	11.4%	-	113	-	2.5	0.9	-	3.6	113	-	0.0%
paper birch	5.3%	9.8%	-	-	-	0.7	-	-	0.7	-	-	0.0%
yellow birch	2.6%	3.8%	-	-	-	0.4	-	-	0.4	-	-	0.0%
Total Hardwood:	36.8%	41.0%	-	369	140	7.1	1.2	-	9.3	509	-	15.5%
Eastern hemlock	57.9%	58.1%	-	1,414	-	11.1	-	1.1	15.0	1,414	-	55.4%
Eastern white pine	5.3%	0.9%	-	529	101	1.5	-	-	2.8	629	-	19.6%
Total Softwood:	63.2%	59.0%	-	1,943	101	12.7	-	1.1	17.9	2,044	-	75.0%
Total Volume:	100.0%	100.0%	-	2,312	241	20	1	1	27	2,553	-	90.5%
Volume Per Acre:			-	119,072	12,395	1,020	60	56	1,398	131,467	-	

Table 7.1: Forest Composition and Volume.

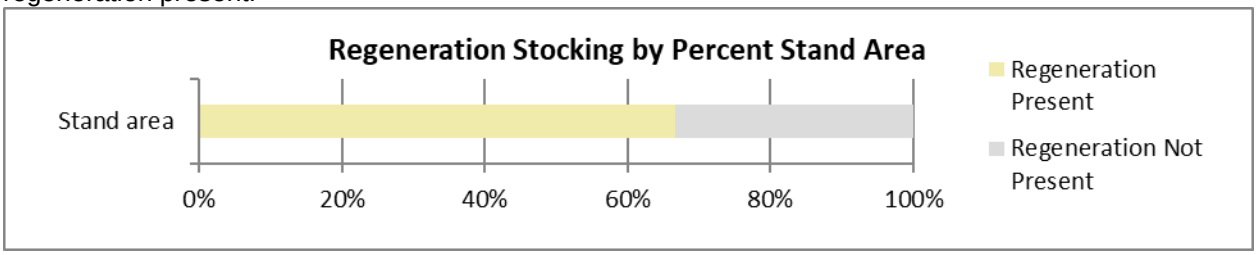
Graph 7.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



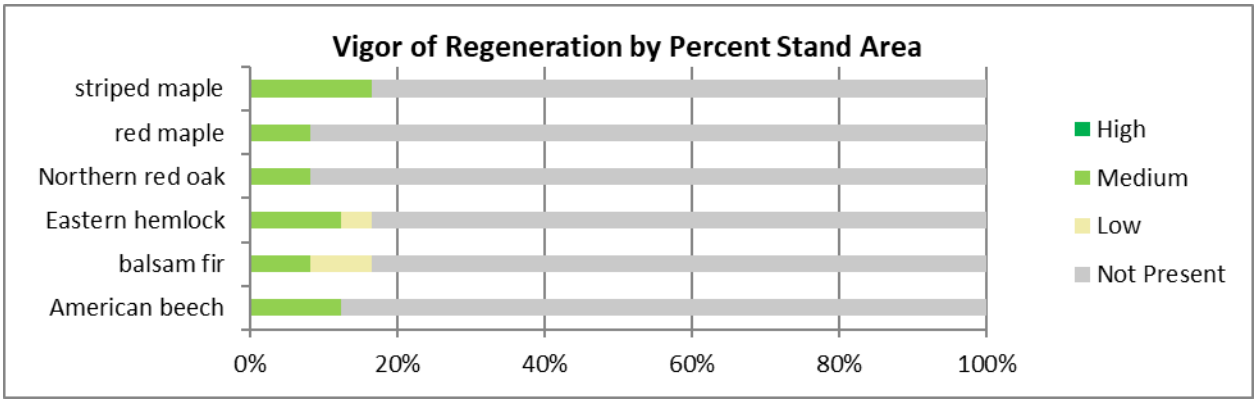
Graph 7.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 7.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 7.4: Vigor of regeneration and shrub species.



Graph 7.5: Browse level of regeneration and shrub species.

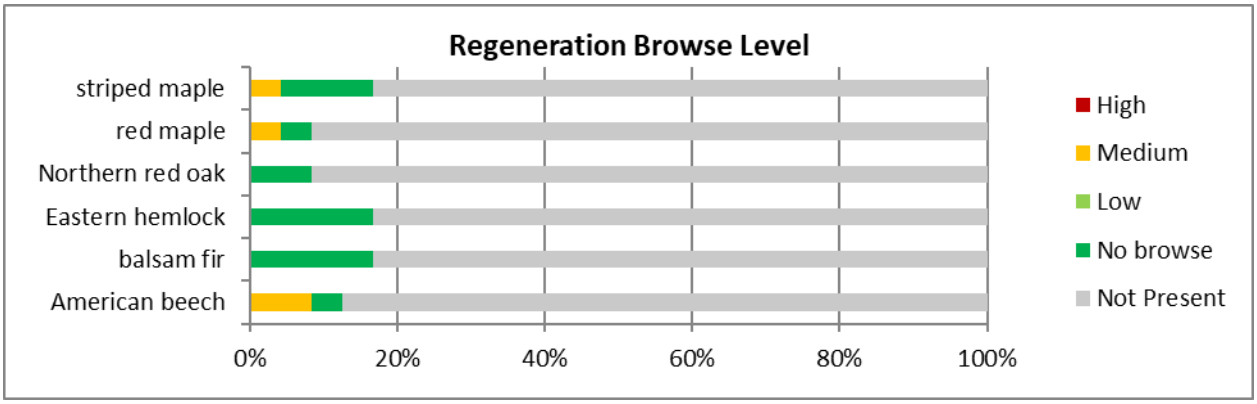


Table 7.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	14.6	17.1	31.7
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	14.6	17.1	31.7

Table 7.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	1.2	-	1.2
12-18"	-	-	0.5	0.5
>18"	-	-	-	-
Grand Total	-	1.2	0.5	1.7

Table 7.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	17.1	17.1
12-18"	-	-	4.2	4.2
>18"	-	1.3	-	1.3
Grand Total	-	1.3	21.3	22.6

Stand 8 Spruce-Hemlock-While Pine 3/4A 14.1 acres

Stand 8 includes 2 pockets of spruce dominated forest located on very shallow soils.

Stocking here is dense, with little to no sunlight hitting the forest floor resulting in essentially no existing regeneration.

General attributes

Natural Community Type:	Hemlock-spruce-Northern hardwood forest
Historical Use:	Pasture and hayland to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Some spruce decline.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked for growth		
Past Management History:	No recent management.		
Timber Quality:	Spruce decline. Fair to poor.		
Total BA Per Acre:	178	Trees Per Acre:	693
Total AGS BA Per Acre:	69	% AGS Sawtimber:	75.7%
Quadratic MSD:	6.9	Site Quality:	Mix of IIB and IIA. Best for spruce-fir. Shallow soils.

Wildlife Habitat

Habitat Characteristics:	Interior forest; spruce dominated stand.
Special Features:	Two small sections of spruce dominated forest add to habitat diversity. Porcupine rock dens.
Threats:	Spruce decline.
Management Objectives:	Maintain for health and vigor of spruce.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	None.
Aesthetic Resources:	Deep, spruce forest on shallow, mossy ledge.
Education Features:	Potential for interpretive trail.
Cultural Features:	None.

Access and Terrain

Landing Sites and Truck Roads:	Landing site established on new road leading south from maintenance buildings. Truck access good, but steep.
Access and operability:	Moderate to gentle slope, shallow soils with ledge.

STAND 8 DESCRIPTION

Stand 8 includes two relatively small, non-contiguous stands of spruce dominated forest on extremely shallow to ledge soils. Regeneration is sparse and becomes non-existent in the central, most dense portion of the stand. This stand could have been rolled in to Stand 7, but the habitat and forest type here is unique and worthy of separate consideration. According to the inventory data spruce makes up a quarter of the stocking, though in reality it is likely higher, the discrepancy due to plot location.

Neither of these two areas were treated in the 2016 and 2018 harvest. The higher stocking and strong spruce component here add greatly to the diversity of the habitat in the surrounding area and is recommended to be left as is, despite some decline present in the spruce.

STAND 8 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives for this stand are to leave it to grow for this planning period, retaining this forest type for habitat and diversity.

Silvicultural Objective:	**Action:**
• Leave to grow.	• -

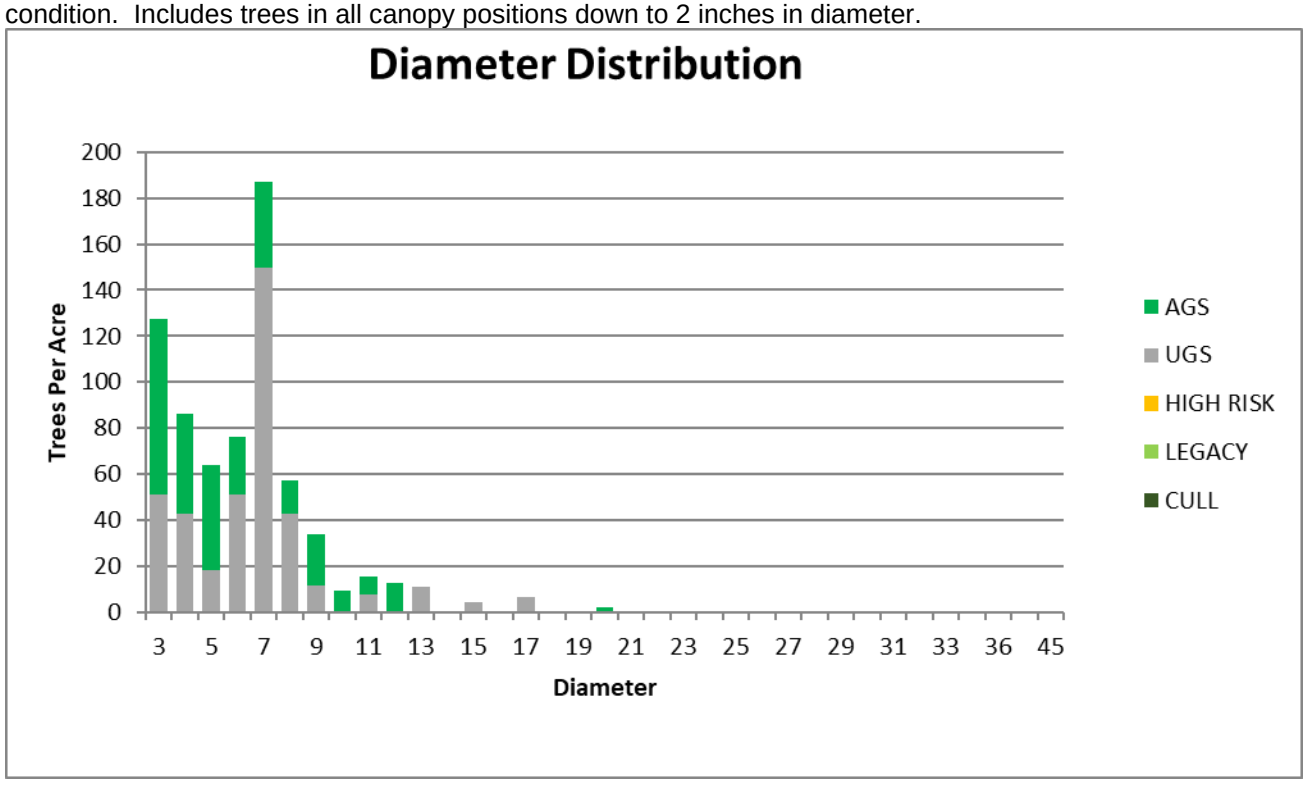
Bird Habitat Objective and Actions:	**Target Species:**
Retain spruce habitat for diversity.	• Purple finch

STAND 8 TABLES AND GRAPHS

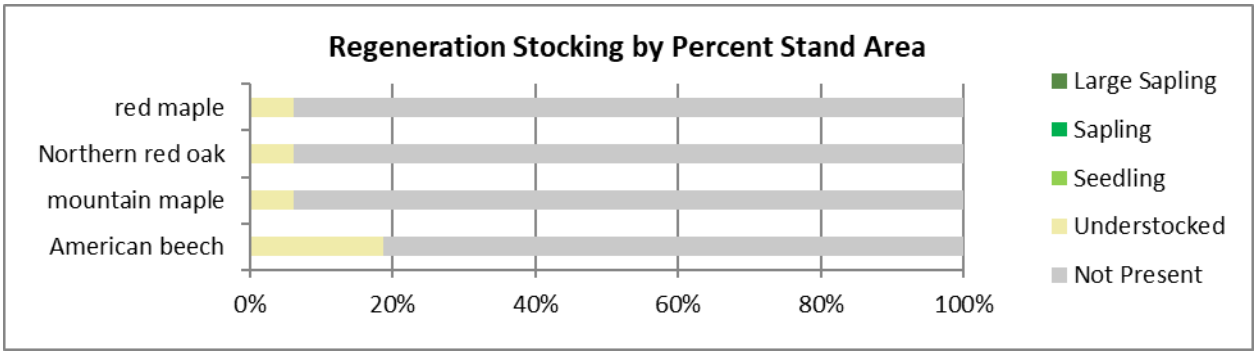
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	13.3%	18.4%	-	-	-	3.4	-	-	3.4	-	-	0.0%
bigtooth aspen	3.3%	2.9%	-	-	-	1.2	-	-	1.2	-	-	0.0%
Northern red oak	3.3%	4.7%	-	-	-	0.4	-	-	0.4	-	-	0.0%
Total Hardwood:	20.0%	25.9%	-	-	-	5.0	-	-	5.0	-	-	0.0%
Eastern hemlock	30.0%	36.7%	-	-	-	6.3	-	0.4	6.7	-	-	0.0%
Eastern white pine	26.7%	12.8%	-	1,347	1,264	5.8	-	-	11.1	2,611	-	22.1%
red spruce	23.3%	24.5%	-	2,077	-	1.9	0.4	-	6.4	2,077	-	40.9%
Total Softwood:	80.0%	74.1%	-	3,424	1,264	14.0	0.4	0.4	24.2	4,688	-	63.0%
Total Volume:	100.0%	100.0%	-	3,424	1,264	19.0	0.4	0.4	29.2	4,688	-	63.0%
Volume Per Acre:			-	48,348	17,846	269	5	5	412	66,193	-	

Table 8.1: Forest Composition and Volume.

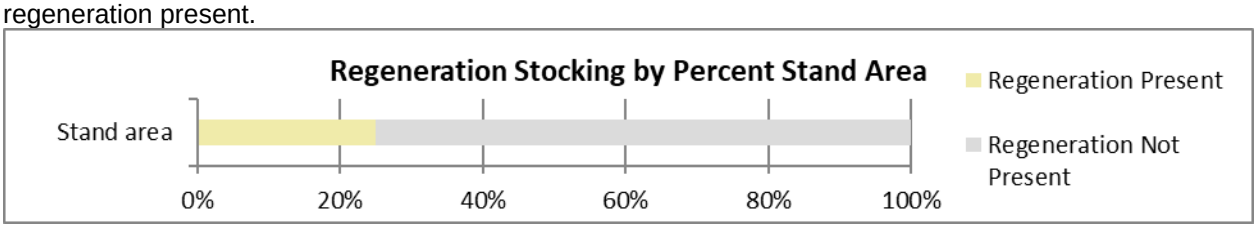
Graph 8.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



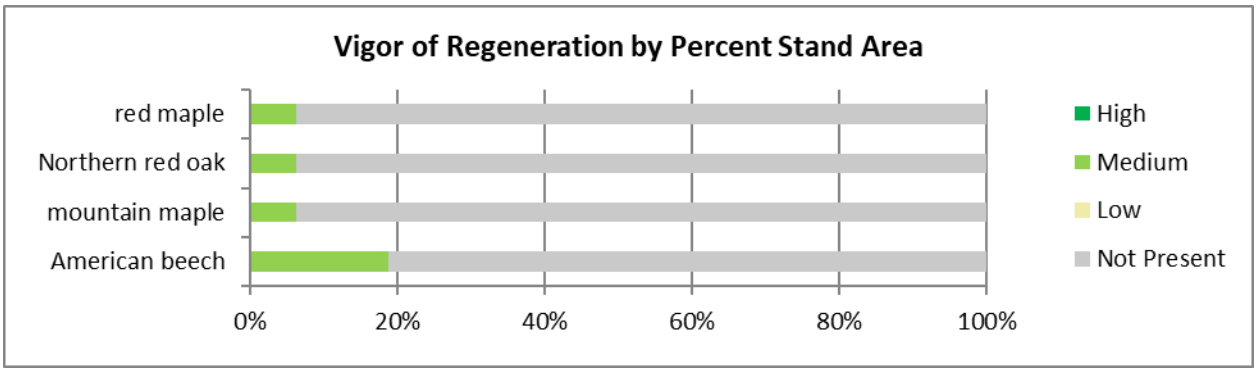
Graph 8.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 7.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 8.4: Vigor of regeneration and shrub species.



Graph 8.5: Browse level of regeneration and shrub species.

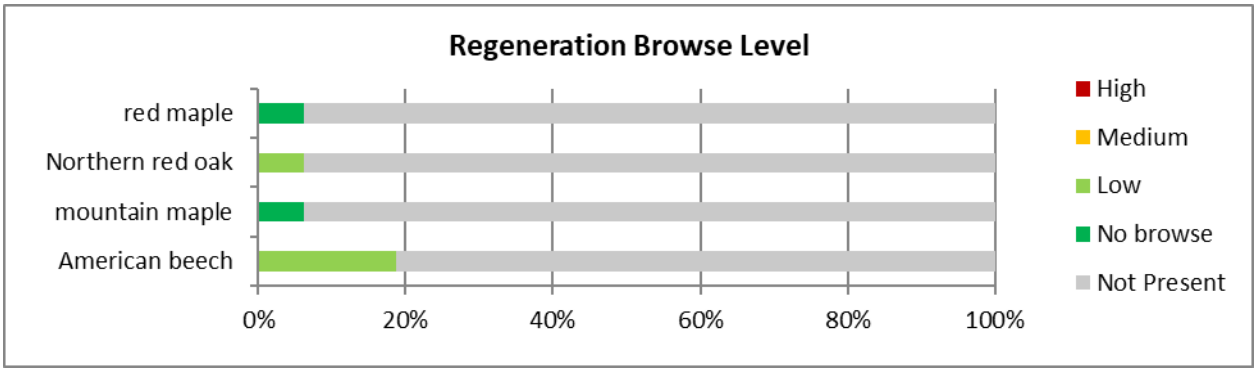


Table 8.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	14.3	25.5	39.8
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	14.3	25.5	39.8

Table 8.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	1.9	1.9	3.8
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	1.9	1.9	3.8

Table 8.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	25.5	25.5
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	25.5	25.5

Stand 9 Red oak-Hardwoods 4A/B 19.6 acres

Stand 9 includes 3 separate dry knobs of land hosting a oak dominated forest. Pockets of different forest types, such as Stands 8 and 9, greatly enhance the biodiversity of the ownership.

Large, old oak can be found on these sites, serving as biological legacies.

General attributes

Natural Community Type:	Dry red oak-white pine forest
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Generally good.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked for growth		
Past Management History:	Partial harvest, 2016 and 2018. Group and single tree selection.		
Timber Quality:	Variable. Some large, short oak. Edges better quality.		
Total BA Per Acre:	168	Trees Per Acre:	379
Total AGS BA Per Acre:	93	% AGS Sawtimber:	81.4%
Quadratic MSD:	9.0	Site Quality:	Mix of IB and IIA. Best for oak and pine. Some rocky and ledge outcrops, shallow soils.

Wildlife Habitat

Habitat Characteristics:	Oak dominated knobs.
Special Features:	Somewhat “open woodland” feel; oak mast; low-bush blueberry.
Threats:	No significant threats.
Management Objectives:	Maintain oak; release blueberry where exists.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	None.
Aesthetic Resources:	Oak forest; “open woodland” feel.
Education Features:	Potential for interpretive trail.
Cultural Features:	None.

Access and Terrain

Landing Sites and Truck Roads:	Variable, see adjacent stands.
Access and operability:	Shallow soils, height of land.

STAND 9 DESCRIPTION

Stand 9 is similar to Stand 8 in that it includes 3 relatively small, non-contiguous but distinct forest types located on both sides of the lake, which add greatly to the biodiversity of the ownership. The stand includes 3 knobs, or small heights of land, with dry, shallow soils dominated by an oak overstory that verges on a woodland feel. The oak here tends to be large and somewhat open grown, although the edges of the stand host some nice timber quality oak. The understory is somewhat shrubby, with areas of exposed ledge. Hophornbeam is a common co-species, along with a mix of other hardwoods and some spruce and hemlock primarily on the edges. Regeneration is mixed with hophornbeam, oak and striped maple dominating.

Inventory data shows the stand as highly overstocked, but that may be skewed due to plot placement since both sections of this stand on the east side of the lake were treated in the 2016-2018 harvest. Clearly oak is the dominant timber species here, with over 2,000 feet of sawtimber per acre.

Access to the western section will be the same as for Stand 2, 3 and 4 utilizing a landing off Pine Hill Road. Operability here is somewhat challenging, due to variable slope, shallow soils, boulders and sections of ledge. Harvest opportunity will include working operable and accessible sections of the stand from the edge while working in adjacent Stand 3.

STAND 9 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives for this stand are to leave the eastern sections to grow for this planning period, and capture value on high-risk oak on the western section during the next treatment.

Silvicultural Objective:	**Action:**
• Eastern sections: Leave to grow.	• -
• Western section: capture value on high-risk timber; improve growth on residual stocking.	• Single tree selection with possible small groups if needed.

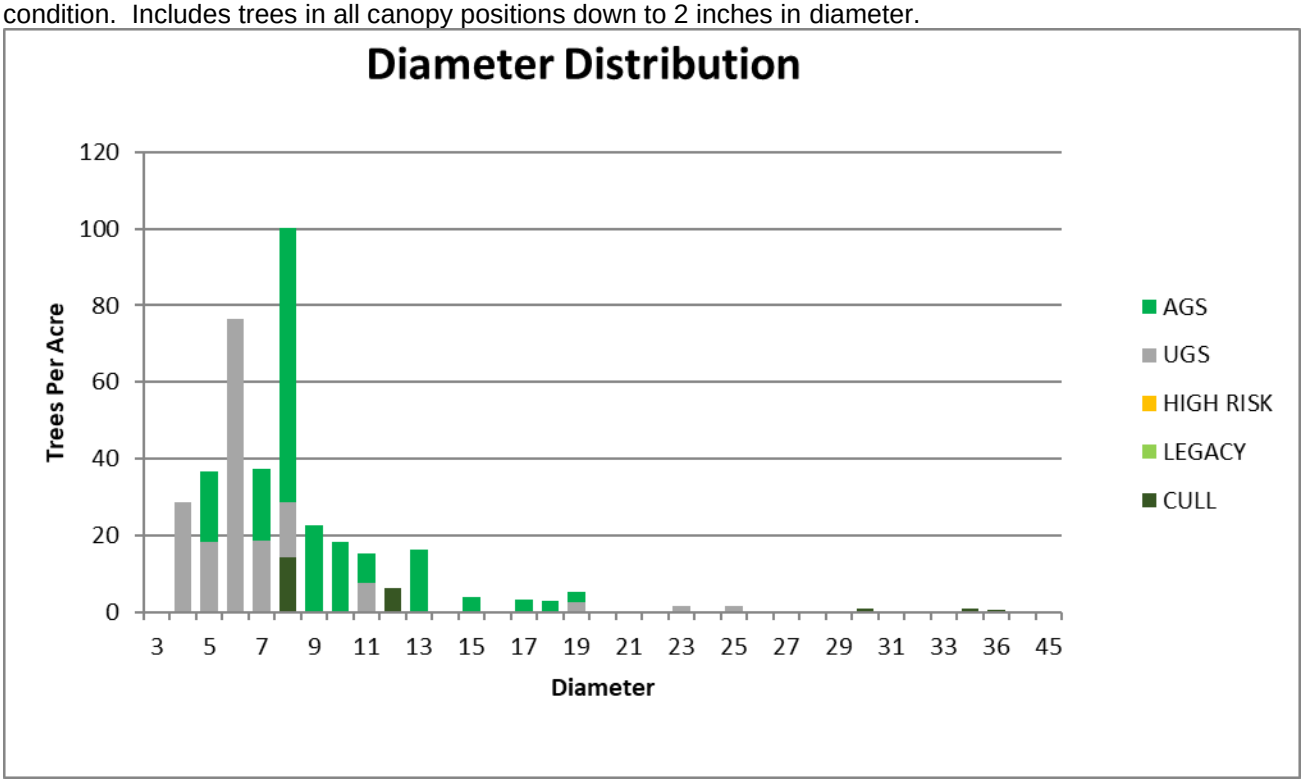
Bird Habitat Objective and Actions:	**Target Species:**
Retain hardwood forest habitat (30-80% canopy).	• Yellow bellied sapsucker • Veery • Black-throated blue warbler
Release or promote hardwood midstory, especially oak.	• Rose breasted grosbeak • Eastern wood-pewee

STAND 9 TABLES AND GRAPHS

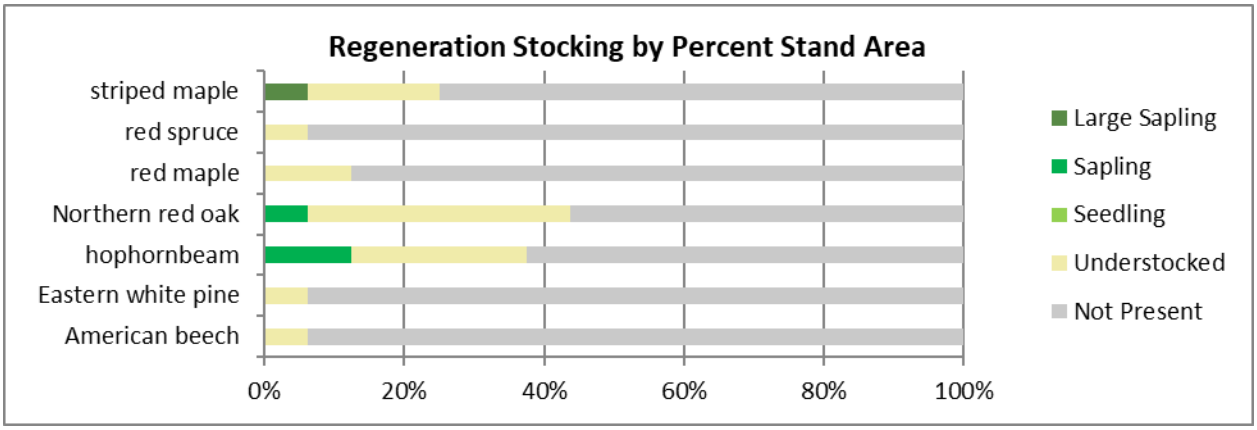
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
Northern red oak	56.3%	39.9%	-	2,146	430	9.0	0.7	4.5	19	2,575	-	52.8%
hophornbeam	9.4%	22.2%	-	-	-	1.4	-	-	1	-	-	0.0%
white ash	6.3%	9.1%	-	-	-	0.9	-	0.9	2	-	-	0.0%
red maple	6.3%	5.3%	-	384	-	1.5	-	-	2	384	-	9.3%
sugar maple	3.1%	2.0%	-	-	-	-	-	1.2	1	-	-	0.0%
Total Hardwood:	81.3%	78.6%	-	2,530	430	12.7	0.7	6.6	26	2,960	-	62.2%
Eastern hemlock	12.5%	17.7%	-	-	-	2.8	0.4	-	3	-	-	0.0%
Eastern white pine	6.3%	3.7%	-	1,002	149	0.8	-	-	3	1,152	-	19.3%
Total Softwood:	18.8%	21.4%	-	1,002	149	3.6	0.4	-	6	1,152	-	19.3%
Total Volume:	100.0%	100.0%	-	3,532	579	16.3	1.1	6.6	32	4,111	-	81.4%
Volume Per Acre:			-	69,378	11,372	321	22	130	634	80,750	-	

Table 9.1: Forest Composition and Volume.

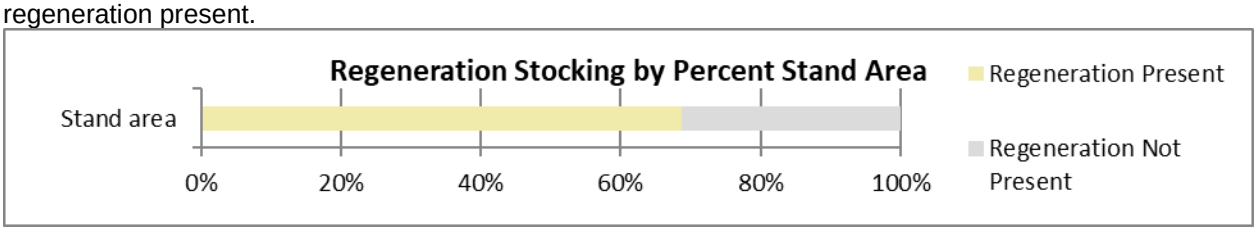
Graph 9.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



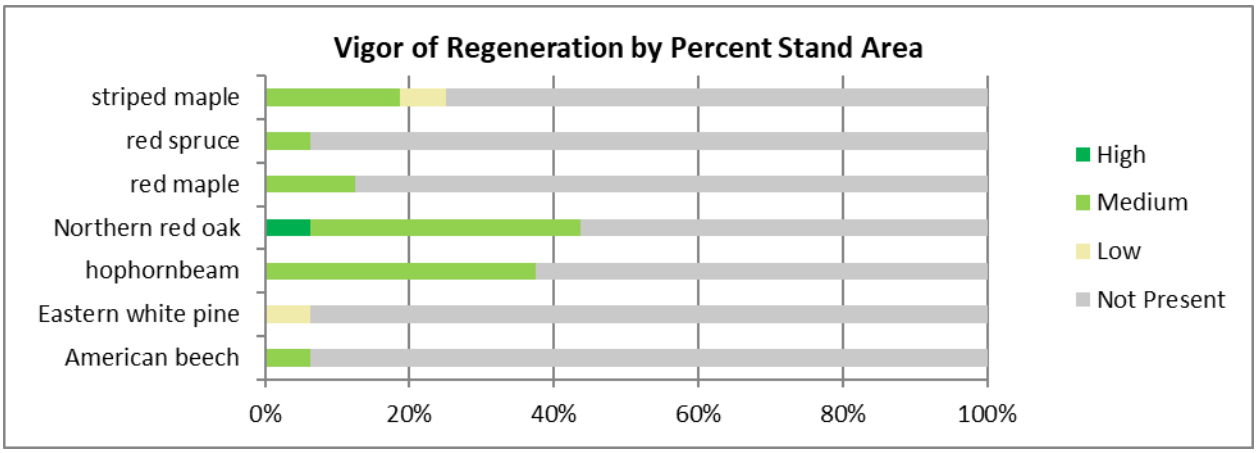
Graph 9.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 9.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 9.4: Vigor of regeneration and shrub species.



Graph 9.5: Browse level of regeneration and shrub species.

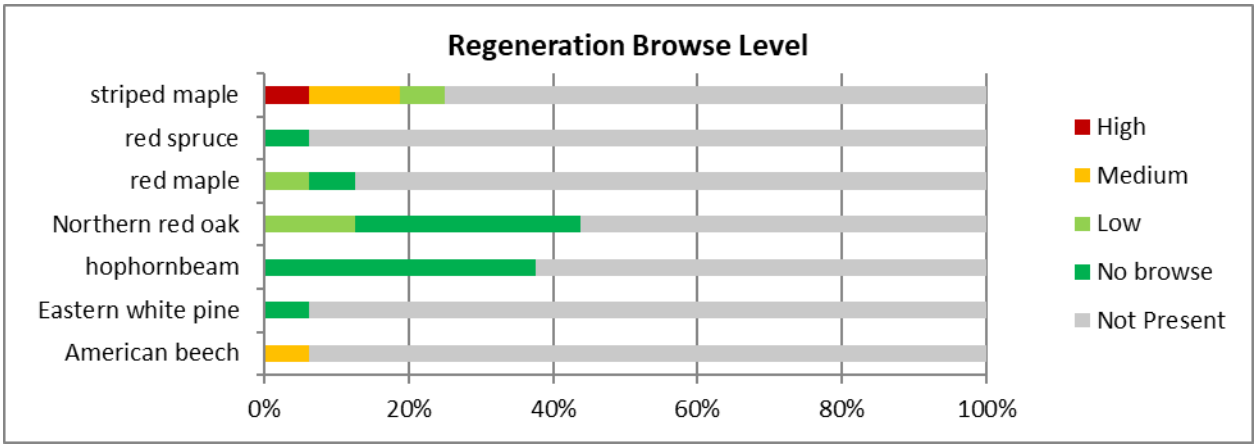


Table 9.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	-	-	-
12-18"	4.1	-	-	4.1
>18"	1.0	-	-	1.0
Grand Total	5.1	-	-	5.1

Table 9.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	-	3.8	3.8
12-18"	0.4	-	-	0.4
>18"	-	-	-	-
Grand Total	0.4	-	3.8	4.2

Table 9.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	-	-
12-18"	10.4	-	-	10.4
>18"	0.7	0.8	3.8	5.3
Grand Total	11.1	0.8	3.8	15.7

Stand 10 White Pine-Red oak-Hardwood 3/4B 37.4 acres

Stand 10 is dominated by a mix of pine, oak and other hardwoods.

Timber quality here is fairly good.

Much of Stand 10 was treated during the 2018 harvest. Large pockets of existing regeneration were released during this entry.

Stand 10 is situated on a fairly good site, with some scattered ash. It also hosts some of the only mature black cherry found on the tract. The cherry is not good timber quality, but does provide a periodic food source prized by both birds and bear.

General attributes

Natural Community Type:	Transitional to Hemlock-spruce-Northern hardwood
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	White pine blister rust noted.
Invasives:	Scattered buckthorn.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Adequately stocked for growth.		
Past Management History:	Partial harvest, 2019. Group selection.		
Timber Quality:	Good quality oak and pine.		
Total BA Per Acre:	84	Trees Per Acre:	181
Total AGS BA Per Acre:	36	% AGS Sawtimber:	50.6%
Quadratic MSD:	9.2	Site Quality:	Mix of IA and IIA. Better site.

Wildlife Habitat

Habitat Characteristics:	Mixed, interior forest.
Special Features:	Good patches of understory growth, especially spruce for shelter and cover. Scattered oak for mast.
Threats:	Buckthorn noted within stand.
Management Objectives:	Continue to release understory growth.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Hiking trail.
Aesthetic Resources:	Interior forest.
Education Features:	Potential for interpretive trail.
Cultural Features:	Stonewalls.

Access and Terrain

Landing Sites and Truck Roads:	None currently. Landing converted to camp use.
Access and operability:	Moderate slope, generally good access and operability.

STAND 10 DESCRIPTION

Stand 10 occupies the pine and hardwood dominated sections of the mid-slope of Sugar Hill. It is somewhat similar to Stand 3 in composition, but with a greater component of pine and oak and less Northern hardwood. The composition feels a bit more transitional here and may shift towards more Northern hardwoods in the future. According to the inventory data, red maple dominates with almost 50% of the stocking, followed by pine with 25%, and a mix of other hardwoods making up the rest. Oak is fairly common here.

Regeneration is mixed and patchy, but includes some of the best potential for oak (aside for adjacent stand 11) on the ownership. It is important to note this is one of the few stands where glossy buckthorn was tallied in the inventory process. It can be found scattered throughout this area. It is highly recommended that monitoring be done every spring and fall, and that invasive stems be pulled manually. This low level of infestation can be controlled. If left alone it is guaranteed to become a problem.

Stocking here is adequate for growth with 84 square feet of basal area per acre. Timber quality is variable, with some scattered high-quality oak and pine individuals, but with the stocking largely dominated by red maple the amounts per acre area relatively low. This area was treated during the 2019 harvest, utilizing primarily group selection silviculture.

Access to stands on the north side of Pine Hill Road, despite the large amount of road frontage, is challenging due to the conversion of the best landing sites to camp use. The landing that was utilized int he 2019 harvest, for example, has now been converted out of forestry use. For this planning period that won't be a major concern since most of this side of the road has been recently treated, but at some point, a new landing site will need to be configured.

STAND 10 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives here include leaving this area to grow during this planning period.

Silvicultural Objective:	**Action:**
• Leave to grow.	• -

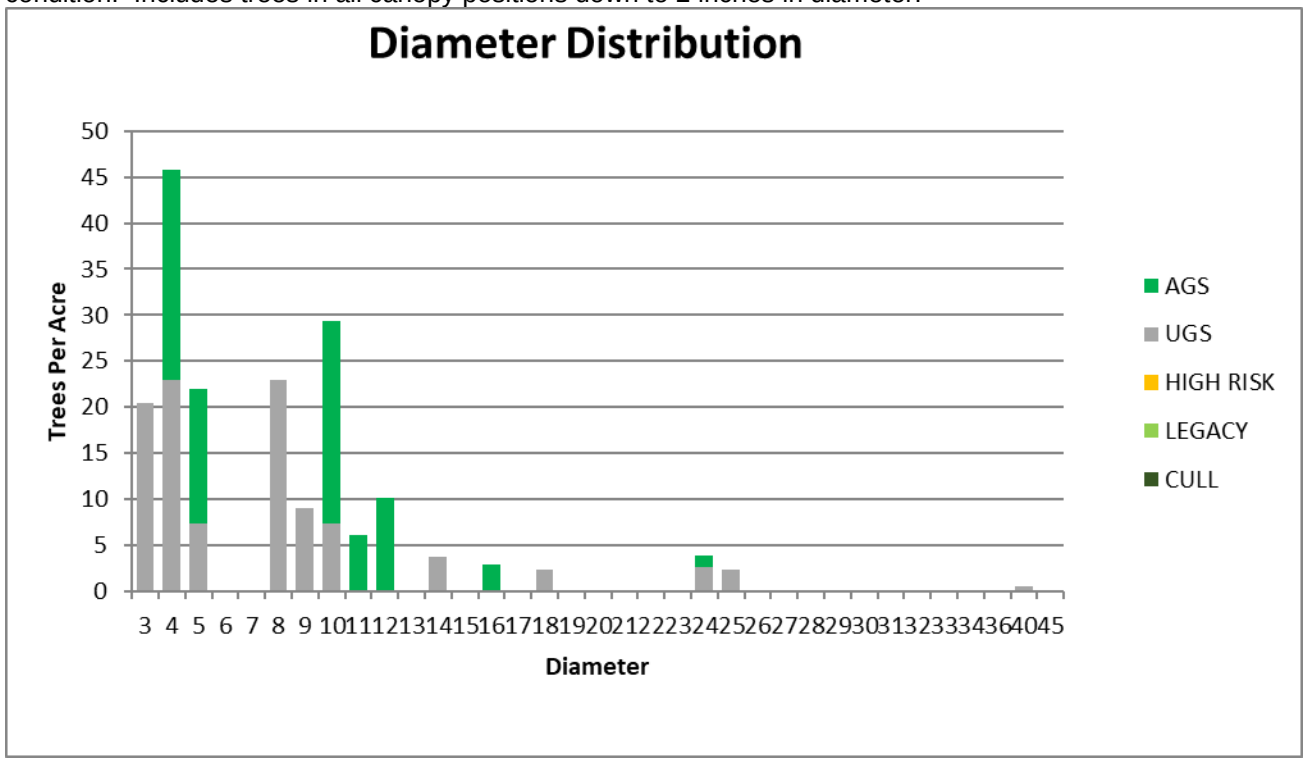
Bird Habitat Objective and Actions:	**Target Species:**
Retain mixed interior forest habitat (50-80% canopy).	• Hermit thrush • Dark-eyed junco • Black and white warbler • Yellow-bellied sapsucker

STAND 10 TABLES AND GRAPHS

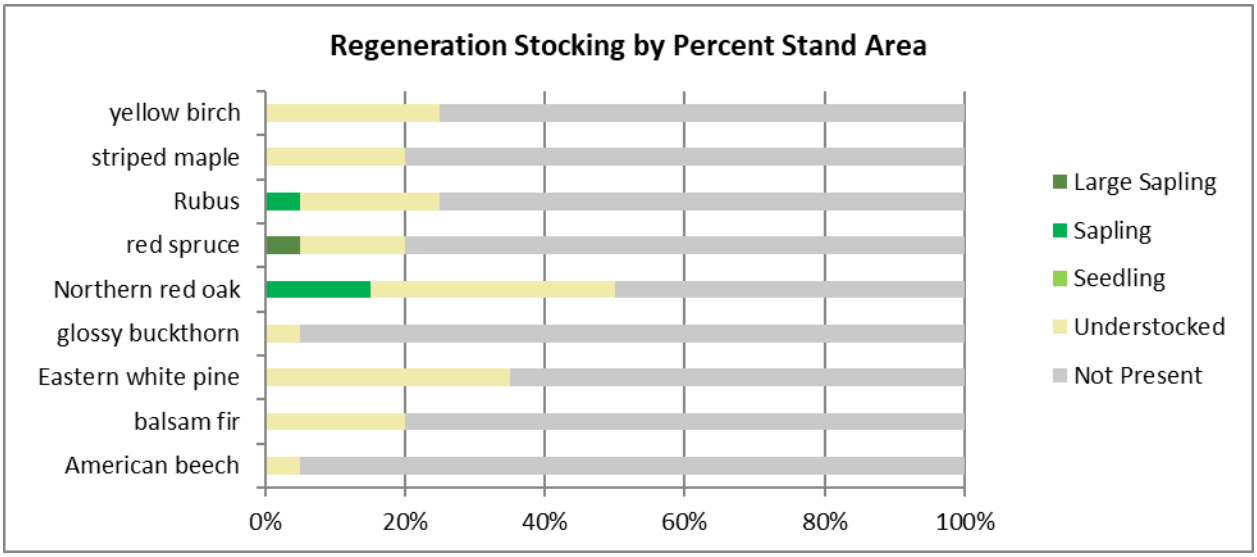
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	47.4%	60.4%	-	427	434	6.6	0.7	0.3	9	861	-	13.1%
black cherry	10.5%	18.8%	-	168	-	1.4	-	-	2	168	-	4.7%
Northern red oak	10.5%	11.0%	138	421	-	1.0	0.3	-	2	559	-	15.6%
white ash	5.3%	4.0%	-	-	-	1.1	-	-	1	-	-	0.0%
Total Hardwood:	73.7%	94.2%	138	1,016	434	10.2	1.0	0.3	15	1,588	-	33.4%
Eastern white pine	26.3%	5.8%	-	507	1,496	4.1	-	0.7	9	2,004	-	17.2%
Total Softwood:	26.3%	5.8%	-	507	1,496	4.1	-	0.7	9	2,004	-	17.2%
Total Volume:	100.0%	100.0%	138	1,523	1,931	14.3	1.0	1.0	23	3,592	-	50.6%
Volume Per Acre:			5,162	56,974	72,207	533	38	38	878	134,344	-	

Table 10.1: Forest Composition and Volume.

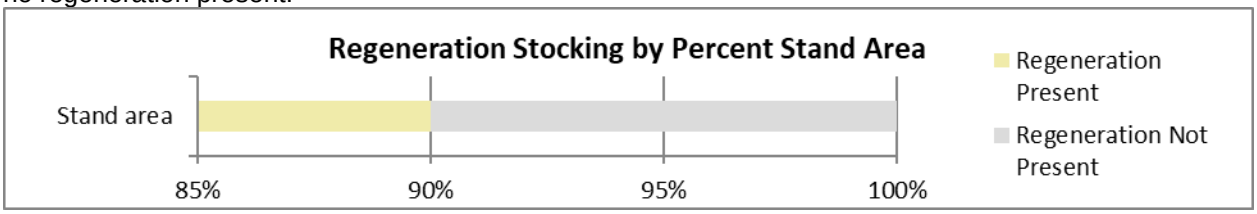
Graph 10.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



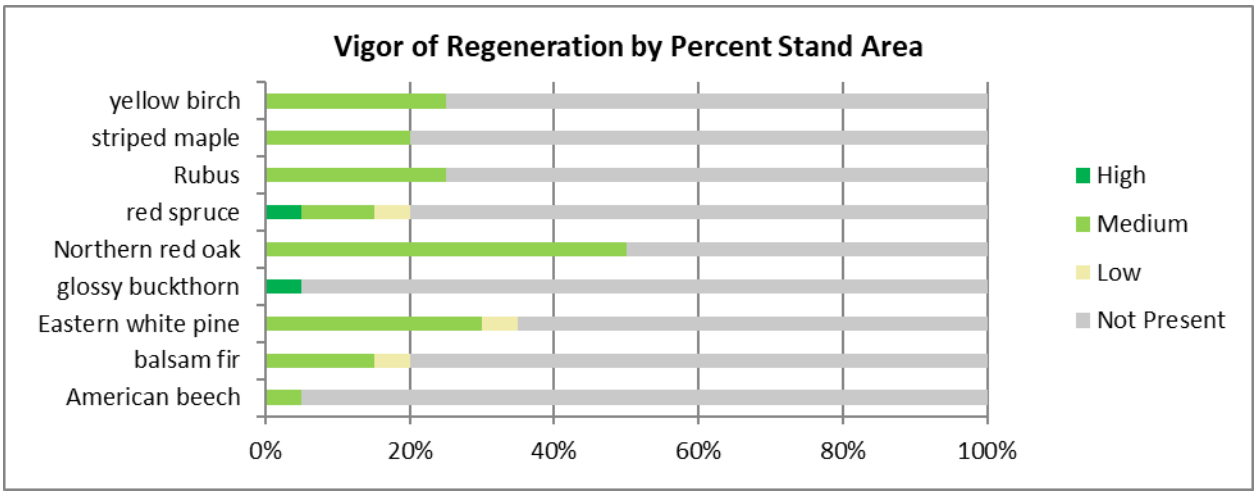
Graph 10.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 10.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 10.4: Vigor of regeneration and shrub species.



Graph 10.5: Browse level of regeneration and shrub species.

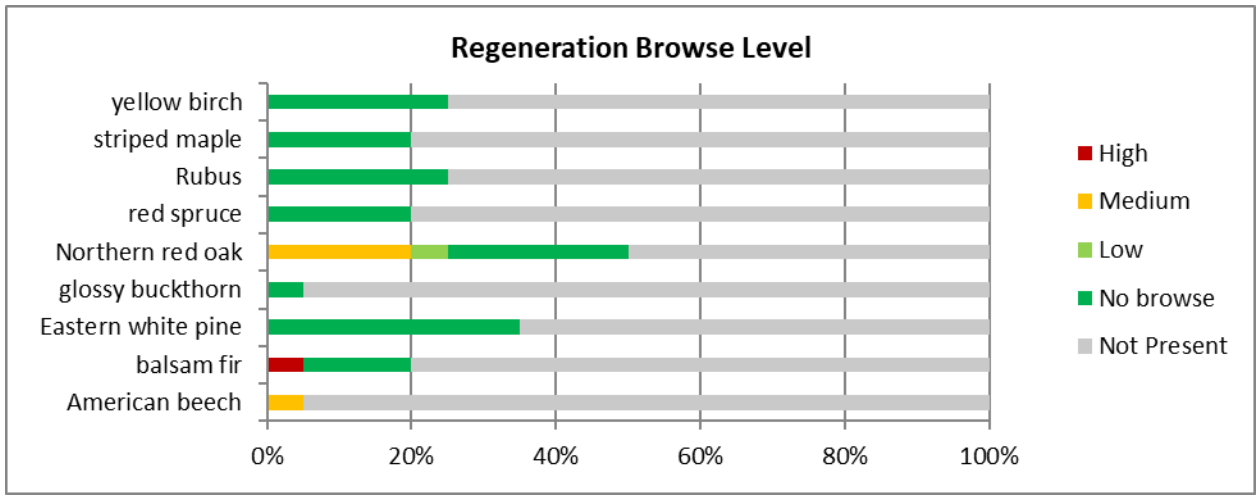


Table 10.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	-	-	-
12-18"	-	-	-	-
>18"	1.1	-	-	1.1
Grand Total	1.1	-	-	1.1

Table 10.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	7.8	-	-
12-18"	-	-	0.8	0.8
>18"	-	-	-	-
Grand Total	-	7.8	0.8	8.6

Table 10.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	-	-
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	-	-

Stand 11 Red oak-Hardwoods 3/4A/B 47.2 acres

Stand 11 clearly hosts the greatest amount of oak sawtimber on the tract averaging over 2,000 board feet of sawtimber and 700 feet of veneer per acre (according to sample inventory volumes).

This stand hosts a hardwood hollow, occupying the south facing slopes of Sugar Hill.

Stand 11 wraps around the bottom of a large ledge outcrop on the east facing aspect of Sugar Hill. A highly enriched pockets exists at the base of this ledge, hosting a small population of wild ginseng, a state listed threatened plant, indicative of very fertile soils.

General attributes

Natural Community Type:	Transitional to Hemlock-beech-Northern hardwood forest
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Beech bark disease; some sugar maple borer noted.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked for growth, average.		
Past Management History:	Partial harvest, 2019. Group selection.		
Timber Quality:	Excellent quality oak.		
Total BA Per Acre:	118	Trees Per Acre:	348
Total AGS BA Per Acre:	78	% AGS Sawtimber:	89.9%
Quadratic MSD:	7.9	Site Quality:	Mix IB and IIA. Good for oak.

Wildlife Habitat

Habitat Characteristics:	Interior hardwood forest, dominated by oak. Adjacent to openings on Sugar Hill.
Special Features:	Borders both early successional patch cut (transitional) and large permanent opening at height of land; high levels oak mast. Stand wraps around large area of exposed ledge with enriched site at base; wild ginseng at rich site.
Threats:	Buckthorn noted in adjacent Stand 10.
Management Objectives:	Maintain oak for mast. Release oak regeneration. Protect rich site.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Hiking trail.
Aesthetic Resources:	Adjacent to permanent opening with expansive views to north and west.
Education Features:	Potential for interpretive trail. Potential for kiosk/gazebo in opening.
Cultural Features:	Stonewalls.

Access and Terrain

Landing Sites and Truck Roads:	None currently. Landing converted to camp use.
Access and operability:	Moderate slope, generally good access and operability. Some exposed ledge and rocky ground.

STAND 11 DESCRIPTION

Stand 11 occupies the somewhat enriched, oak dominated south facing slopes of Sugar Hill. This stand has the best timber value and potential per acre on the ownership. Oak makes up over 40% of the stocking, and the stand retained almost 1,000 feet of oak veneer post-harvest per acre, according to inventory data. Stocking here is variable; on average it is overstocked with 118 square feet of basal area.

In some sections, oak seedlings covered the forest floor regenerating or released from the 2019 harvest. Oak regeneration is finicky though, and the eventual establishment of viable trees should be monitored over time.

Operability of Stand 11 is generally good, with moderate slopes. Some sections of steep slope can be worked around. Like with Stand 10, access here will be challenging in the future due to the conversion of the landing site to camp use. For this planning period that won't be a major concern since most of this side of the road has been recently treated, but at some point, a new landing site will need to be configured.

Stand 11 also hosts a highly enriched pocket at the base of the ledge which makes up the east facing aspect of Sugar Hill. A small pocket of wild ginseng, a state listed threatened plant, can be found here. The ginseng is naturally protected at the base of the ledge by large boulders and tall trees. The residual trees provide dappled shade, while the recent 2019 harvest increased sunlight to the area from the side which should increase growth.

STAND 11 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives here include leaving this area to grow during this planning period.

Silvicultural Objective:	**Action:**
• Leave to grow.	• -

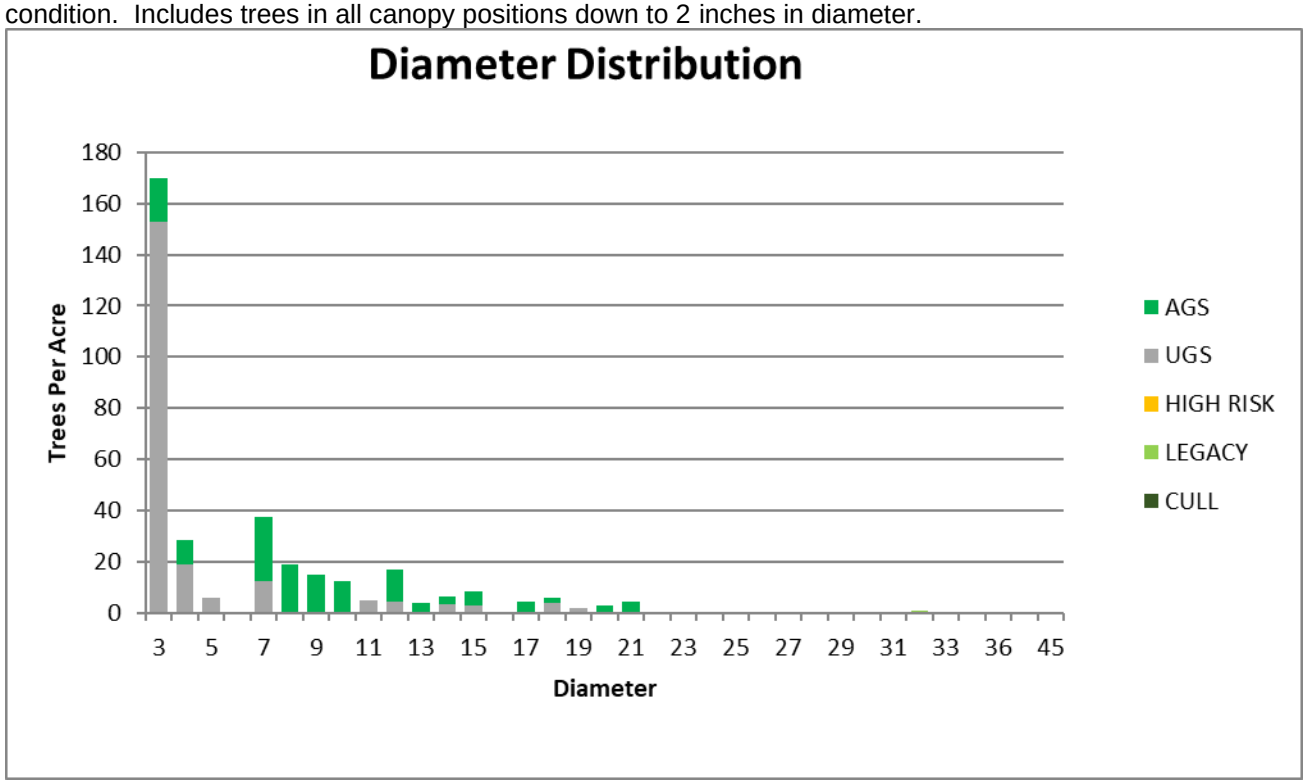
Bird Habitat Objective and Actions:	**Target Species:**
Retain interior, hardwood forest with >80% continuous canopy.	• Scarlet tanager • Red shouldered hawk • Barred owl • Eastern wood pewee • Black-throated blue warbler

STAND 11 TABLES AND GRAPHS

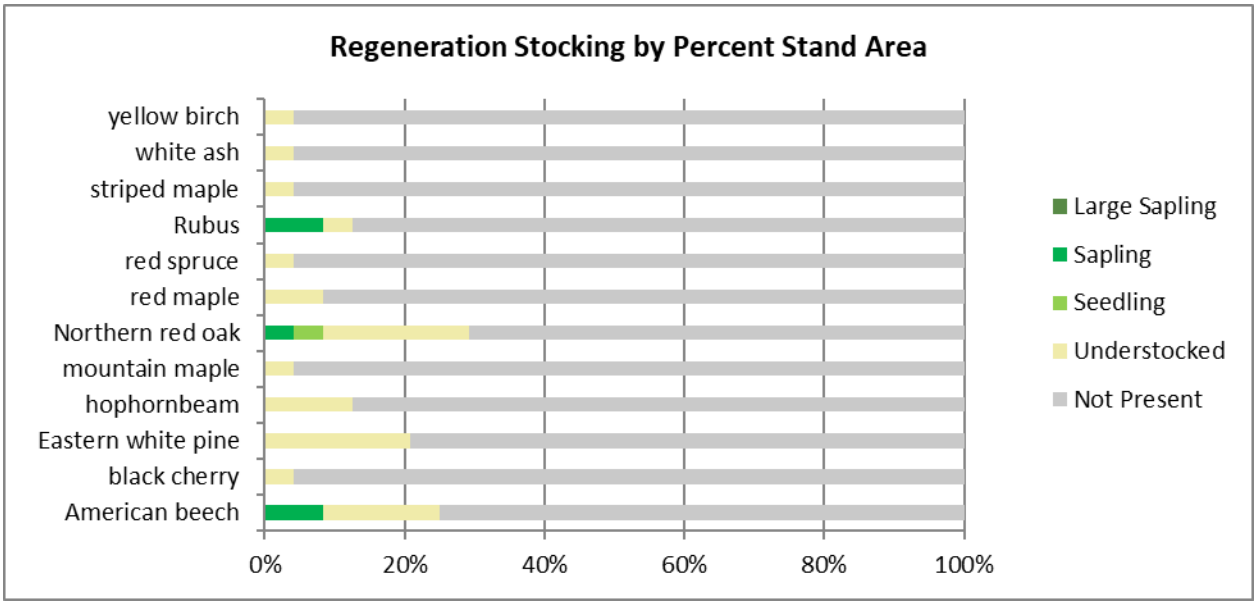
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
Northern red oak	43.8%	39.9%	742	2,002	93	6.8	0.5	-	13.0	2,838	-	57.7%
sugar maple	25.0%	16.0%	-	1,201	484	3.1	0.4	1.4	8.2	1,685	-	24.1%
American beech	9.4%	6.9%	-	-	-	2.7	-	-	2.7	-	-	0.0%
red maple	6.3%	13.0%	-	-	-	0.8	0.7	-	1.5	-	-	0.0%
yellow birch	3.1%	3.0%	-	249	-	0.4	-	-	0.9	249	-	5.1%
white ash	3.1%	8.7%	-	-	-	0.6	-	-	0.6	-	-	0.0%
Total Hardwood:	90.6%	87.4%	742	3,452	577	14.4	1.6	1.4	26.9	4,771	-	86.9%
Eastern hemlock	9.4%	12.6%	-	145	-	2.0	-	-	2.3	145	-	2.9%
Total Softwood:	9.4%	12.6%	-	145	-	2.0	-	-	2.3	145	-	2.9%
Total Volume:	100.0%	100.0%	742	3,597	577	16.4	1.6	1.4	29.1	4,916	-	89.9%
Volume Per Acre:			35,051	169,798	27,233	773	75	64	1,376	232,082	-	

Table 11.1: Forest Composition and Volume.

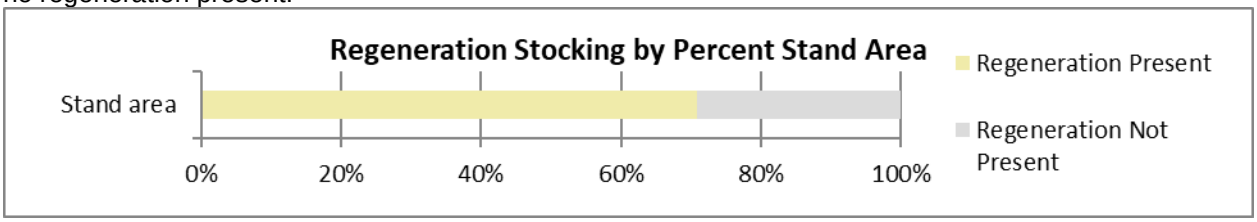
Graph 11.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



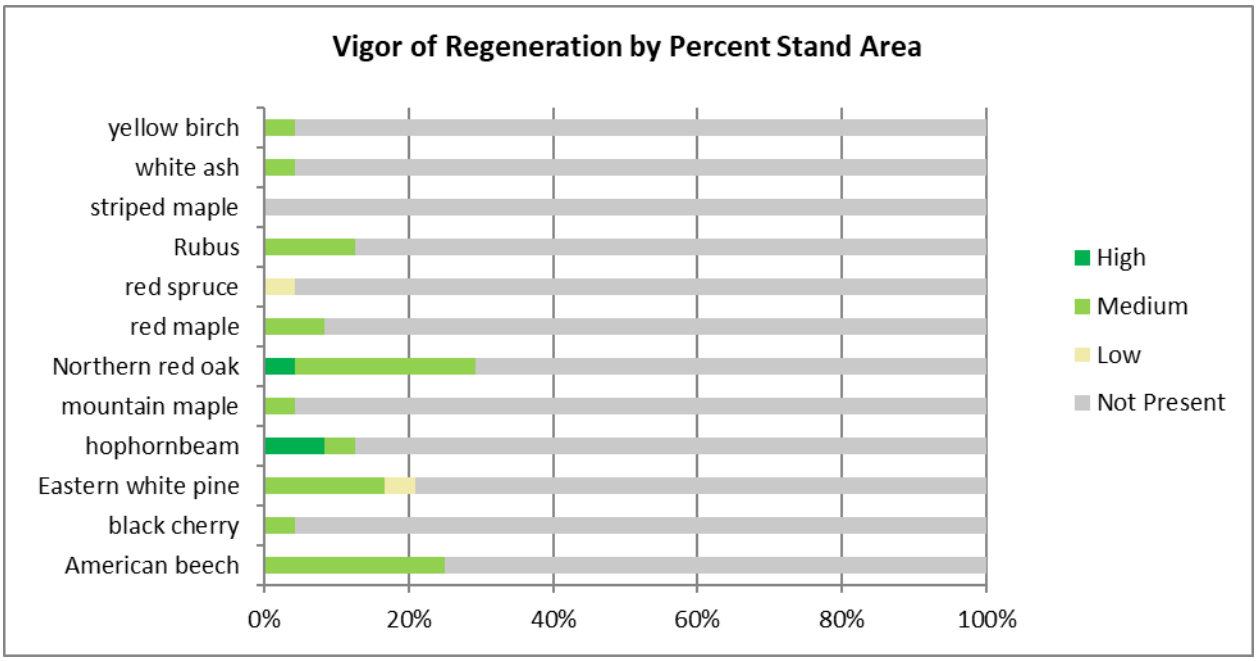
Graph 11.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 11.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 11.4: Vigor of regeneration and shrub species.



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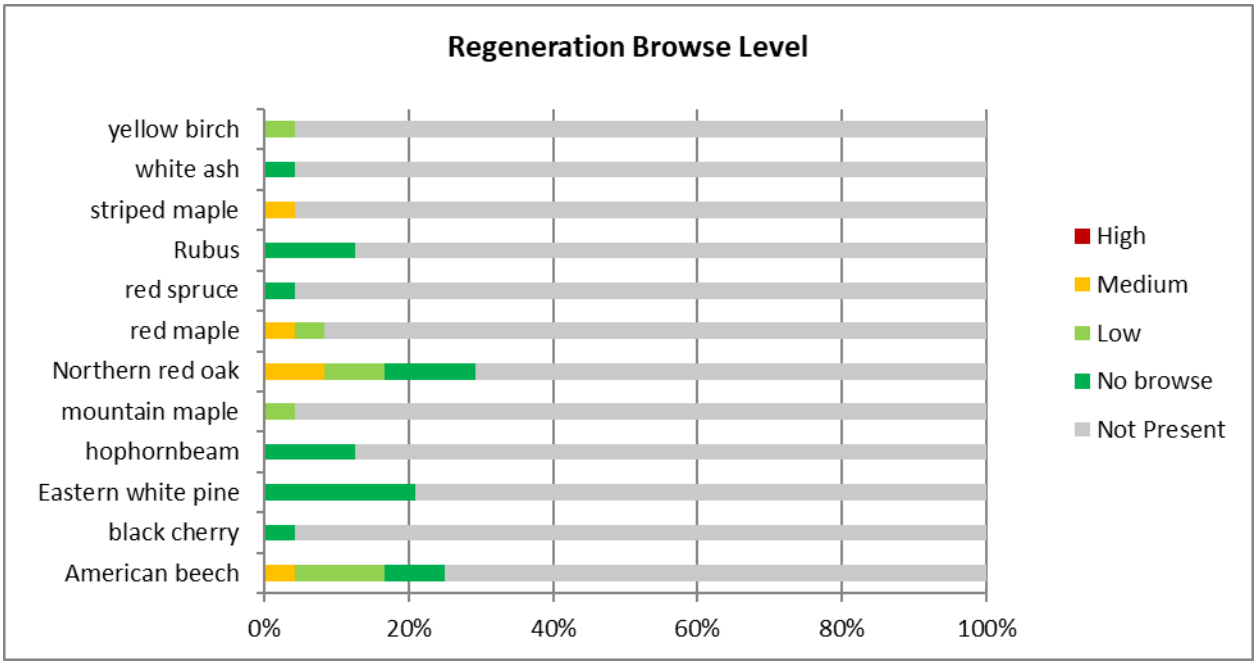


Table 11.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	-	-	-
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	-	-

Table 11.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	6.1	-	6.4
12-18"	-	5.1	9.7	14.8
>18"	-	-	-	-
Grand Total	-	11.2	9.7	21.0

Table 11.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	-	-
12-18"	2.7	-	-	2.7
>18"	0.6	1.7	-	2.3
Grand Total	3.3	1.7	-	5.0

Stand 12 White pine-Red oak-White birch-Hardwoods 3/4B 29.3 acres

Stand 12 is located at the northernmost extent of the ownership, wrapping around the large permanent opening at the height of Sugar Hill.
It hosts a mix pf pine and hardwoods, with pockets of well-established spruce regeneration.

The transitional hardwoods are dominated by a mix of red maple and white birch. This area was excluded from the 2018 harvest.

General attributes

Natural Community Type:	Transitional to Hemlock-spruce-Northern hardwood forest
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Some spruce decline noted.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Adequately stocked for growth.		
Past Management History:	No recent management. Last entry 20-25 years ago.		
Timber Quality:	Variable. Some good quality pine.		
Total BA Per Acre:	109	Trees Per Acre:	304
Total AGS BA Per Acre:	53	% AGS Sawtimber:	70.0%
Quadratic MSD:	8.1	Site Quality:	Variable. Mix of IA, IB, IIB, and IIA.

Wildlife Habitat

Habitat Characteristics:	Mixed, interior forest.
Special Features:	Somewhat remote to camp. Good understory growth, especially spruce.
Threats:	No significant threats.
Management Objectives:	Release understory spruce.

Wetland and Riparian Features

Wetland Features:	Small shrub wetland.
Stream Features:	Intermittent stream associated with wetland.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	None.
Aesthetic Resources:	Stand borders permanent opening.
Education Features:	None.
Cultural Features:	Stonewalls.

Access and Terrain

Landing Sites and Truck Roads:	None currently. Landing converted to camp use.
Access and operability:	Moderate slope, generally good access and operability.

STAND 12 DESCRIPTION

Stand 12 occupies the northernmost section of the ownership surrounding the 15-acre permanent opening at the height of Sugar Hill. It is a mixed stand of spruce, pine and hardwoods. The spruce component did not show up in the inventory data, but is present. This area was not treated during the 2019 harvest, but would have benefitted from group selection to capture value on mature and overmature trees, especially the birch and pine, as well as improving overall quality by removing low vigor, poor quality, and overall undesirable stocking. But, given the level of harvesting that has occurred on the ownership overall, and the adjacency to the permanent opening, leaving this area untreated has some benefits in terms of habitat and overall site diversity.

STAND 12 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives during this planning period are to establish at least 1 larger, new opening to sustain production of early successional habitat and capture value on mature and over-mature pine. This work should be done near the end of this planning period.

Silvicultural Objective:	Action:
• Capture value on mature and overmature pine; establish early successional habitat • Improve stand quality and health. Remove low quality, diseased or otherwise low vigor stems to favor better quality, health and higher vigor individuals.	• Patch cut with retention; retain mast trees; leave or create snags and down logs. • Elsewhere, group selection with crop tree release and general improvement thinning. Retain spruce and fir component.

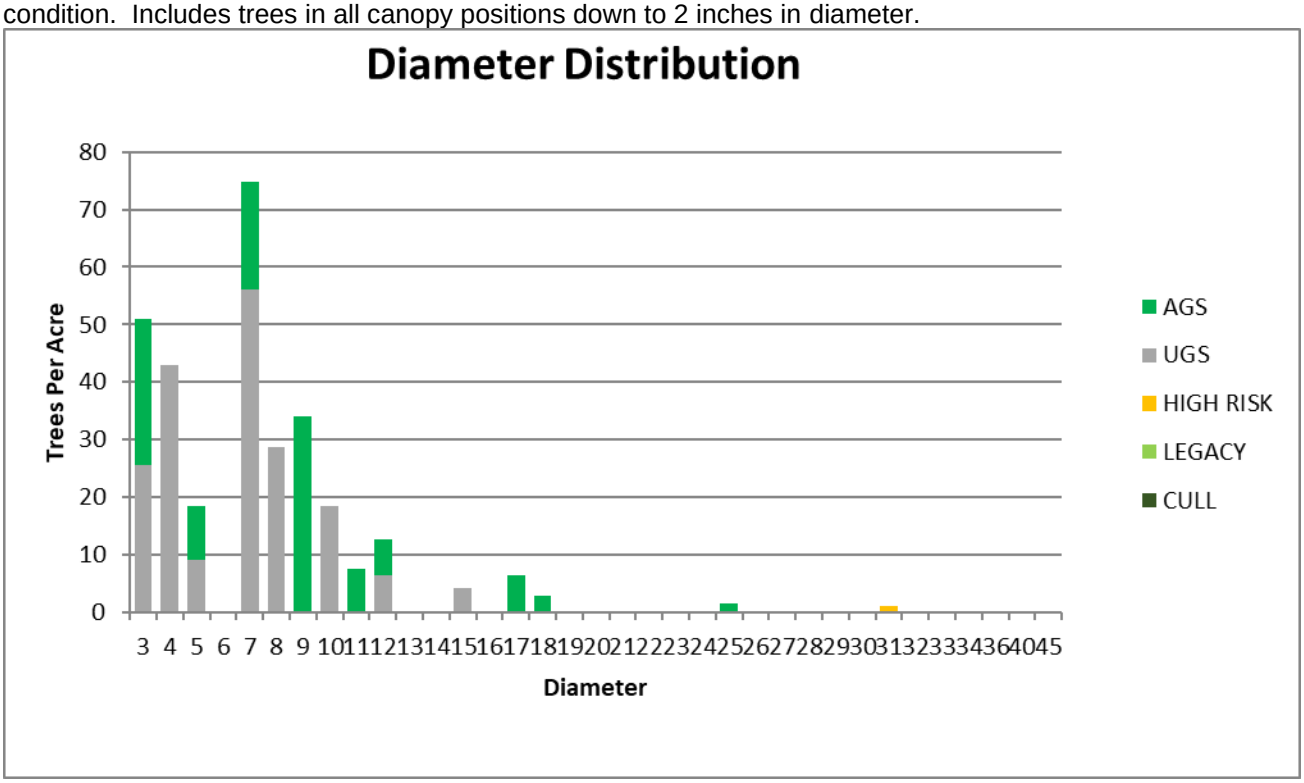
Bird Habitat Objective and Actions:	Target Species:
Establish early successional habitat with residual canopy structure, especially mast trees and snags; located adjacent to permanent opening on Sugar Hill.	• Chestnut-sided warbler • Ruffed grouse • Northern flicker • Mourning warbler • Field sparrow • Indigo bunting • Eastern towhee • Nashville warbler
Elsewhere, retain interior forest habitat (30-80% canopy).	• Canada warbler • Yellow bellied sapsucker • White throated sparrow • Eastern wood pewee
Leave buffer along ledge and breeding area for raven, retain pine perch trees.	• Common raven

STAND 12 TABLES AND GRAPHS

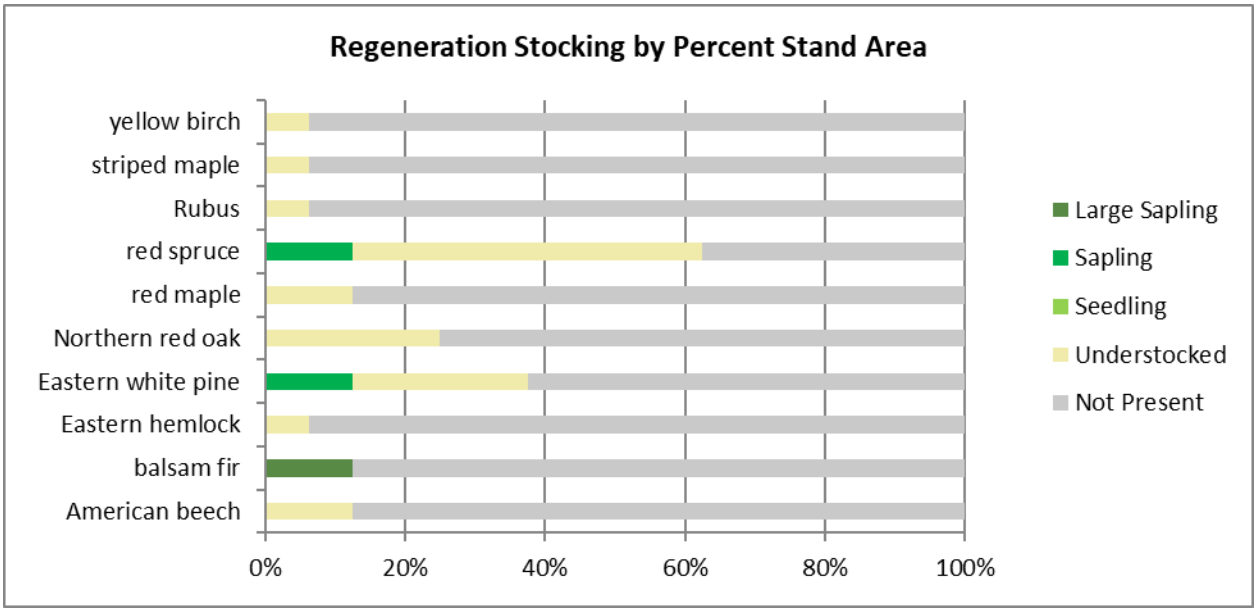
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	35.0%	44.3%	-	373	373	5.6	-	-	7.1	746		9.4%
Northern red oak	15.0%	9.0%	418	395	-	1.7	0.6	0.3	4.3	814		20.6%
sugar maple	10.0%	17.2%	-	-	-	0.7	-	-	0.7	-		0.0%
paper birch	10.0%	14.5%	-	-	-	1.7	-	-	1.7	-		0.0%
white ash	5.0%	1.7%	-	572	115	0.5	-	-	1.9	687		17.4%
yellow birch	5.0%	5.9%	-	-	-	0.7	0.4	-	1.0	-		0.0%
black cherry	5.0%	4.0%	-	-	-	1.1	-	-	1.1	-		0.0%
Total Hardwood:	85.0%	96.6%	418	1,340	488	12.0	1.0	0.3	17.8	2,247		47.5%
Eastern white pine	15.0%	3.4%	-	1,000	701	2.3	-	0.4	6.1	1,701	381	23.3%
Total Softwood:	15.0%	3.4%	-	1,000	701	2.3	-	0.4	6.1	1,701	381	23.3%
Total Volume:	100.0%	100.0%	418	2,341	1,189	14	1	1	24	3,948	381	70.7%
Volume Per Acre:			12,269	68,677	34,874	421	30	19	701	115,820	11,181	

Table 12.1: Forest Composition and Volume.

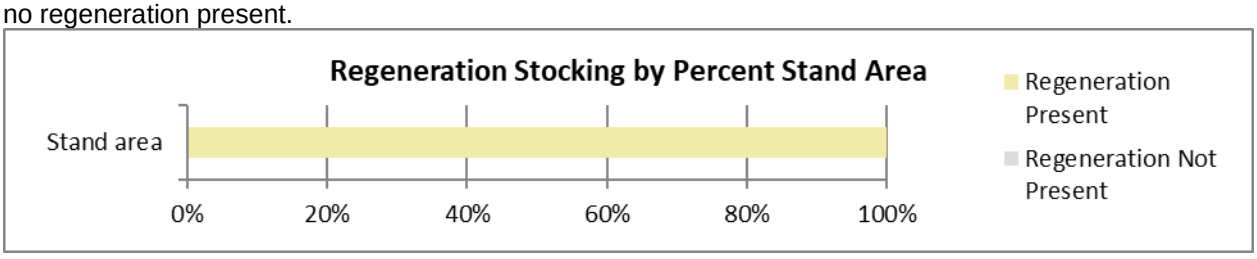
Graph 12.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



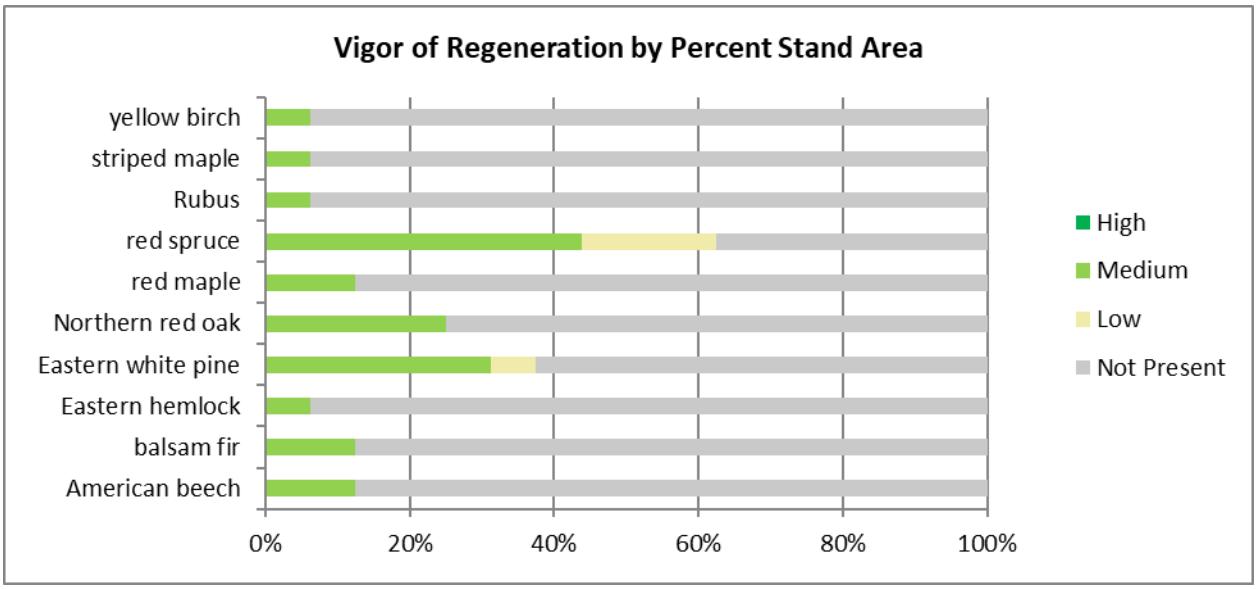
Graph 12.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 12.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 12.4: Vigor of regeneration and shrub species.



Graph 12.5: Browse level of regeneration and shrub species.

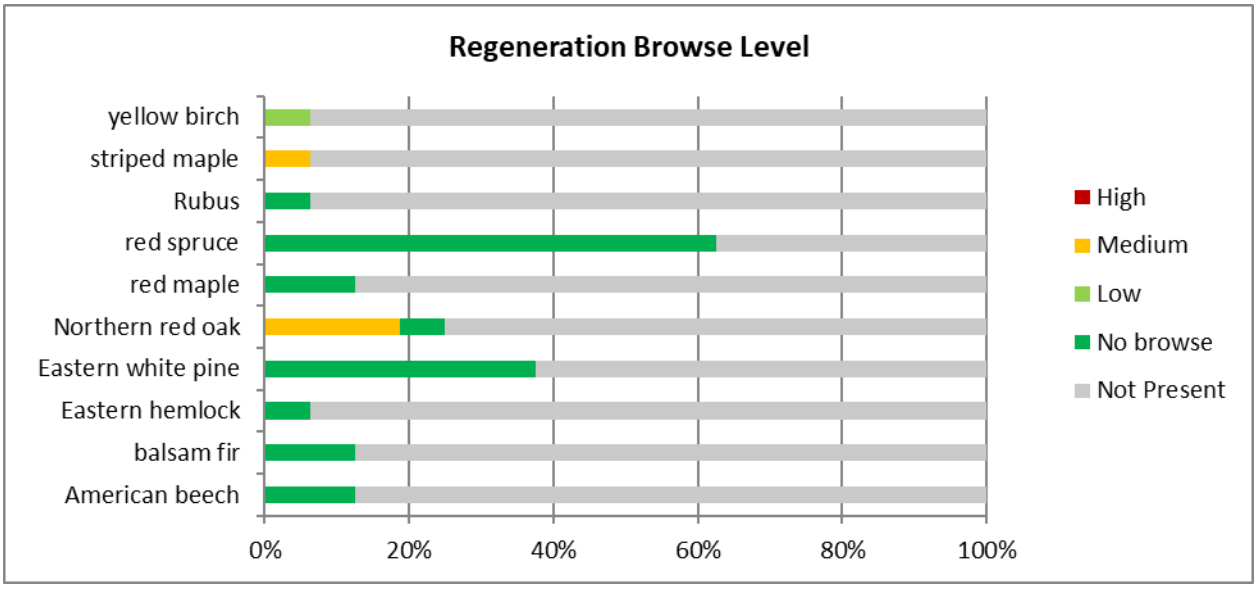


Table 12.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	18.7	-	18.7
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	18.7	-	18.7

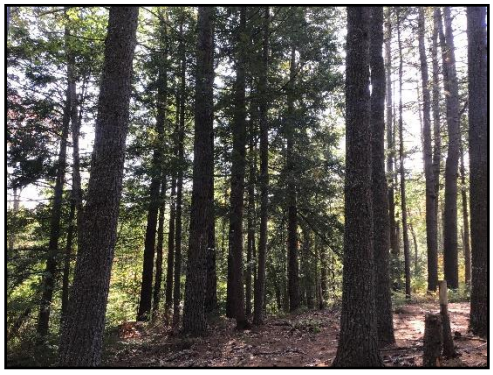
Table 12.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	4.6	1.9	6.5
12-18"	-	-	-	-
>18"	-	-	-	0.2
Grand Total	0.2	4.6	1.9	6.7

Table 2.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	18.7	18.7
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	18.7	18.7

Stand 13 Hemlock-White pine-Hardwood 3/4A 48.6 acres



Stand 13 largely borders the north side of Camp Road, and includes some of the camp infrastructure including the new loop road.

It is dominated by hemlock, but also includes white pine and transitional hardwoods.

The hemlock here tends to be dense, with a fair amount of large old trees.

Stand 13 enhances the “sense of place” as you approach the camp via Camp Road, serving as an important aesthetic buffer. The edges of this stand were treated in the 2018 harvest, but the remainder will largely be left as an aesthetic buffer.

General attributes

Natural Community Type:	Hemlock-beech-oak-pine forest
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	Pine showing thin tops, likely some red rot and Caliciopsis.
Invasives:	Japanese knotweed present, treated previous 2 years. Needs follow-up treatment.

Stocking and Stand Structure

Stand Age:	60-80+ years		
Stocking Level:	Overstocked for growth		
Past Management History:	Edge stand partial harvest, 2019. Group selection.		
Timber Quality:	Variable. Some good quality pine and oak.		
Total BA Per Acre:	187	Trees Per Acre:	315
Total AGS BA Per Acre:	86	% AGS Sawtimber:	68.6%
Quadratic MSD:	10.4	Site Quality:	Largely IC (good for pine) with some IA, IB, and IIA.

Wildlife Habitat

Habitat Characteristics:	Hemlock dominated interior and road-side forest; Cranberry Pond and Bog.
Special Features:	Dense hemlock. Scattered oak for mast. Some rock and ledge outcrops.
Threats:	HWA.
Management Objectives:	Manage for healthy hemlock.

Wetland and Riparian Features

Wetland Features:	Bog associated with Cranberry Pond
Stream Features:	First and second order streams.
Other:	Cranberry Pond.

Recreation, Aesthetics and Education

Recreation Features:	Stand hosts a number of camp activity features including trails and disc-golf course.
Aesthetic Resources:	Stand important aesthetic buffer both from town road and interior camp facitliy on north side of road.
Education Features:	Numerous.
Cultural Features:	None.

Access and Terrain

Landing Sites and Truck Roads:	None currently. Landing converted to camp use.
Access and operability:	Moderate to gentle slope, generally good access and operability.

STAND 13 DESCRIPTION

Stand 13 includes the bulk of the forest that borders the north side of Pine Hill Road. It is dominated by hemlock with a mix of pine and hardwoods. It hosts and surrounds a variety of camp infrastructure, including the disc golf course, horse paddocks, various camp buildings, roads and trails. It also provides a high aesthetic value and sense of place along Pine Hill Road which is an important objective to maintain for the camp ownership.

Stand 13 have very high stocking with 187 square feet of basal area on average. Despite this, the hemlock dominated overstory in general is healthy and retains healthy growth as demonstrated by full crowns. This dense stocking results in a largely open understory, which adds to the aesthetic value at you approach camp.

Portions of Stand 13 where it borders Stands 10 and 11 were entered during the 2019 harvest, but in general this area will be left to develop naturally over time. The edges may continue to be treated when working in adjacent stands in the future. High risk and hazard trees should be targeted for removal as needed.

STAND 13 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives here include allowing this stand to develop naturally over time, with minimal improvement harvest where it borders adjacent Stands 10 and 11. In these areas, capture value and improve growth and composition. Elsewhere, hazard tree removal is recommended where needed around camp infrastructure, as well as minor improvements if they benefit the aesthetics of the stand. Minimize additional disturbance and development to this area as it provides an exceptionally diverse and important bird habitat associated with Cranberry Pond and associated bog.

Silvicultural Objective:	**Action:**
• Capture value and release/establish regeneration	• Group selection and free thinning where stand borders active harvest areas.
• Hazard tree removal • Aesthetics	• Single tree selection as needed for hazard trees and aesthetics.

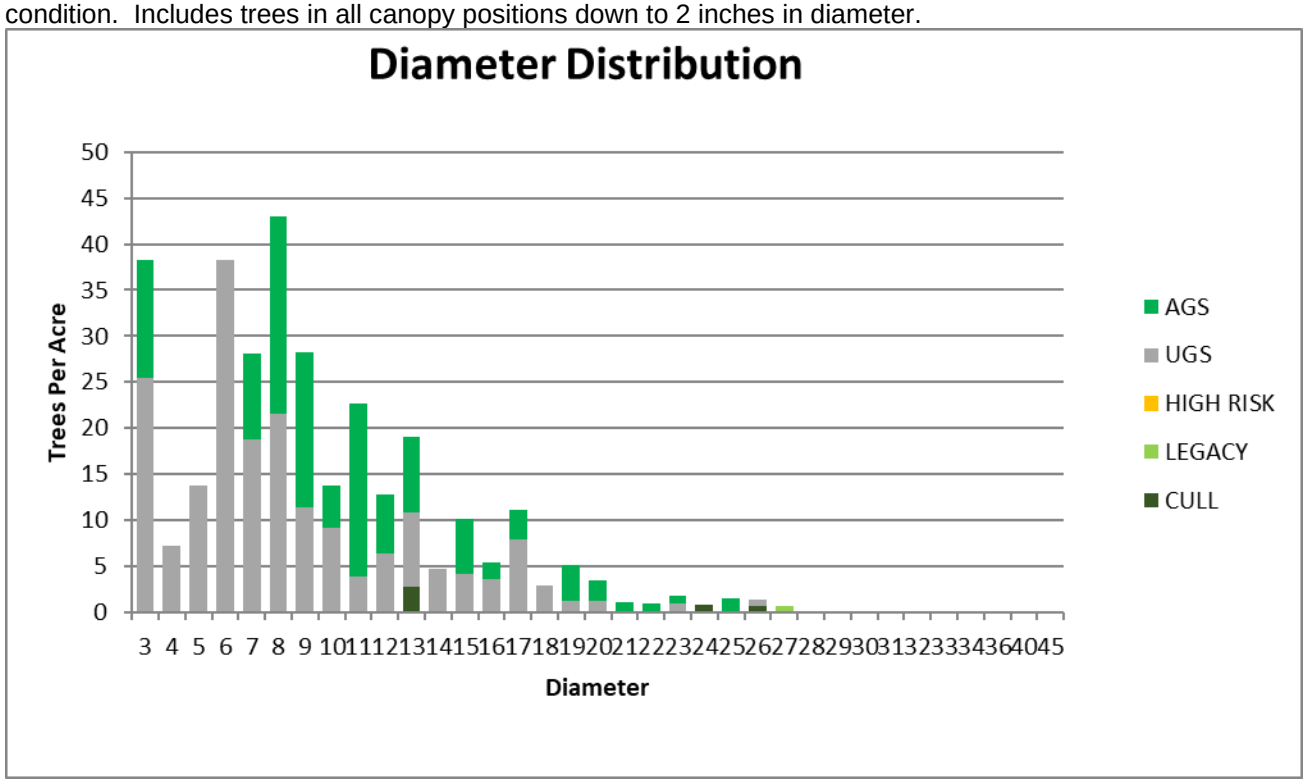
Bird Habitat Objective and Actions:	**Target Species:**
Protect nesting habitat in bog from human disturbance.	• American black duck (Species of concern)
Create snags along pond edge.	• Great crested flycatcher
Retain large hardwoods near wetlands	• Barred owl
Maintain interior forest, especially pine and hemlock.	• Broad-winged hawk • Brown creeper • Blue headed vireo • Black-throated green warbler
Retain forested buffer around Cranberry Pond	• Northern Parula

STAND 13 TABLES AND GRAPHS

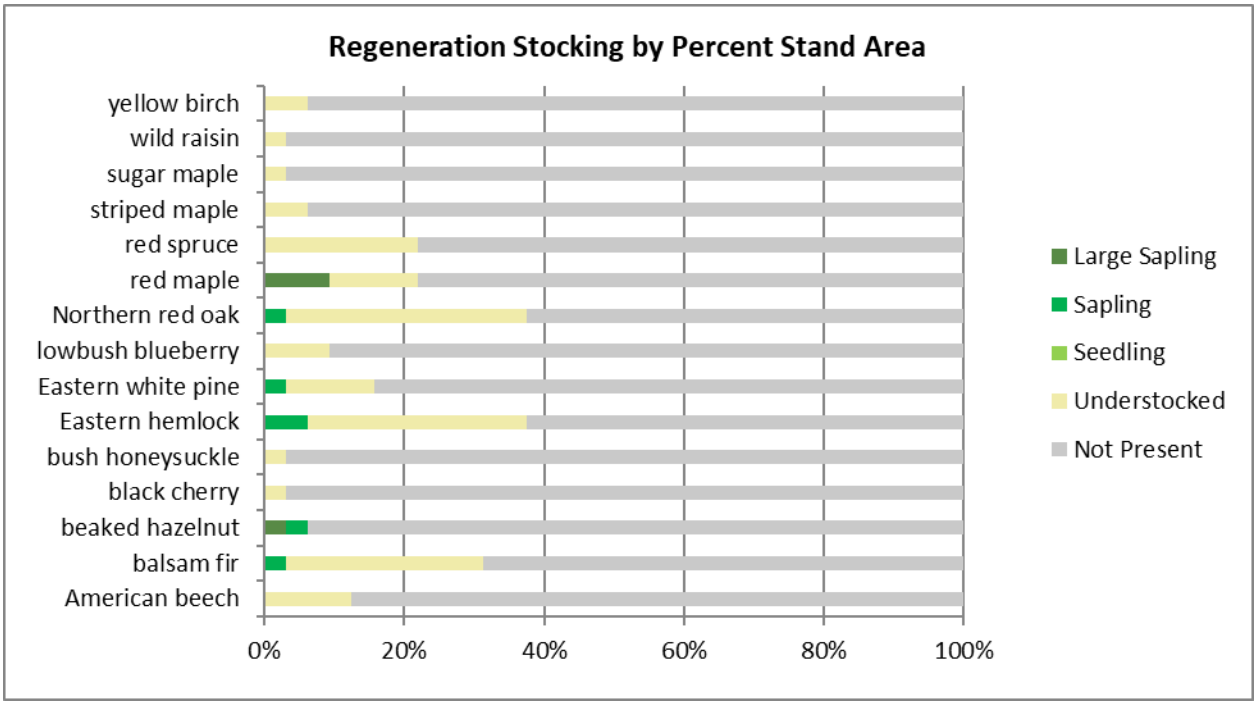
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	12.3%	30.2%	-	-	-	3.8	0.3	-	4.1	-	-	0.0%
Northern red oak	9.6%	9.6%	116	772	158	2.3	0.4	-	4.7	1,046	-	9.7%
American beech	5.5%	8.6%	-	-	-	1.0	-	0.7	1.7	-	-	0.0%
yellow birch	2.7%	0.9%	-	120	88	0.2	-	0.7	1.4	208	-	0.0%
white ash	1.4%	1.1%	-	80	112	0.2	-	-	0.6	192	-	1.8%
paper birch	1.4%	1.2%	-	186	-	0.3	-	-	0.7	186	-	1.7%
Total Hardwood:	32.9%	51.5%	116	1,158	358	7.8	0.7	1.5	13.2	1,633	-	13.1%
Eastern hemlock	38.4%	24.3%	-	3,943	-	13.3	-	0.7	21.9	3,943	-	32.8%
Eastern white pine	19.2%	11.9%	-	2,508	1,090	4.7	-	1.3	13.2	3,598	-	7.3%
red spruce	5.5%	7.5%	-	974	-	0.4	-	-	2.3	974	-	9.0%
red pine	4.1%	4.7%	-	692	-	1.0	-	-	2.4	692	-	6.4%
Total Softwood:	67.1%	48.5%	-	8,117	1,090	19.4	-	2.0	39.8	9,207	-	55.4%
Total Volume:	100.0%	100.0%	116	9,275	1,448	27.2	0.7	3.5	53.0	10,839	-	68.6%
Volume Per Acre:			5,659	450,951	70,396	1,322	33	168	2,577	527,006	-	

Table 13.1: Forest Composition and Volume.

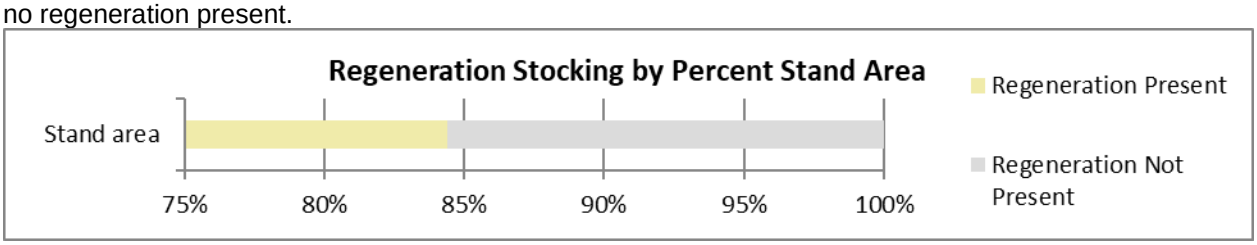
Graph 13.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



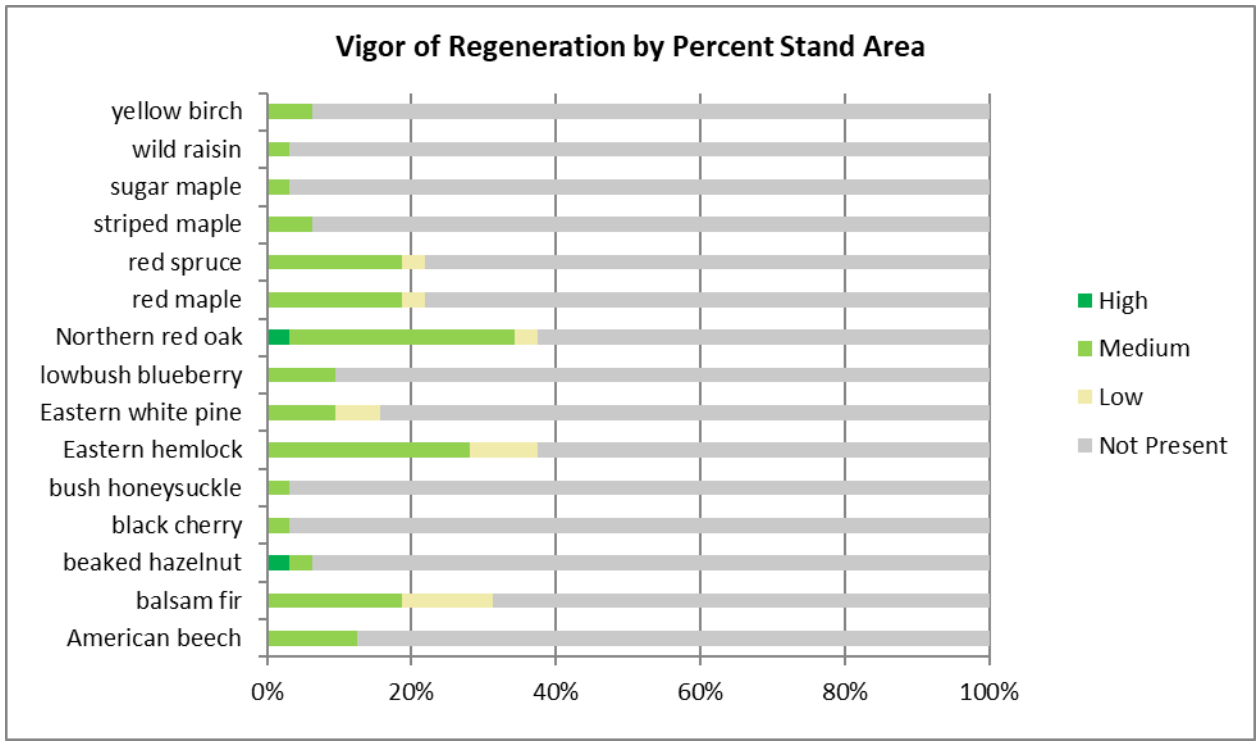
Graph 13.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered “stocked” if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 13.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 13.4: Vigor of regeneration and shrub species.



Graph 13.5: Browse level of regeneration and shrub species.

Table 13.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	33.5	-	-	33.5
12-18"	3.2	-	-	3.2
>18"	-	-	1.1	1.1
Grand Total	36.7	-	1.1	37.9

Table 13.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	11.5	15.7	-	27.1
12-18"	0.4	-	-	0.4
>18"	-	-	-	-
Grand Total	11.8	15.7	-	27.5

Table 13.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	-	-
12-18"	2.7	-	2.7	5.4
>18"	-	-	-	-
Grand Total	2.7	-	2.7	5.4

Stand 14 Red pine 2/3 A 2.5 acres

Stand 14 is a small pocket of planted red pine. It has not been thinned since being planted.

Since it is so small, there is no real urgency to managing this stand, as it provides a unique open forest habitat and sense of place.

An extremely large glacial erratic located on the edge of the pine plantation adds to the sense of place.

General attributes

Natural Community Type:	Transitional to Hemlock-spruce-Northern hardwood forest
Historical Use:	Crop or hay into mid-1900's. Planted to red pine.
Insects/Damage/Disease:	Generally good with some reduced vigor due to overcrowding.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	40+ years		
Stocking Level:	Overstocked for growth		
Past Management History:	No recent management.		
Timber Quality:	Fair. Straight.		
Total BA Per Acre:	170	Trees Per Acre:	510
Total AGS BA Per Acre:	165	% AGS Sawtimber:	%
Quadratic MSD:	7.8	Site Quality:	Soils group IB.

Wildlife Habitat

Habitat Characteristics:	Small red pine plantation.
Special Features:	Somewhat remote to camp infrastructure.
Threats:	No significant threats.
Management Objectives:	Maintain pine.

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	Hiking trail.
Aesthetic Resources:	Unique aesthetics compared to natural forest setting.
Education Features:	Potential for interpretive trail.
Cultural Features:	None.

Access and Terrain

Landing Sites and Truck Roads:	None currently. Landing converted to camp use.
Access and operability:	Excellent operability. Somewhat remote access.

STAND 14 DESCRIPTION

Stand 14 includes the small red pine plantation in the northwest corner of the ownership. At only 2.5 acres, it is a small fraction of the overall ownership, but provides a unique environment both ecologically and aesthetically. This small pine plantation, likely about 40+ years old, is accessed via one of the camp trails and hosts a very large glacial erratic, enhancing the aesthetic value.

The pine is overcrowded, and through not high priority, would benefit from non-commercial thinning to improve growth on the best stems. This could be done by hand. The stems could be used for benches or other camp trail infrastructure, such as sign posts. Thinning should be light, removing no more than 20% of the least vigorous stems. The goal is to improve growth while minimizing the increase of sunlight on the forest floor to retain this unique sense of place.

STAND 14 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives here include light thinning to improve growth and vigor of best stems. Retain sense of aesthetics.

Silvicultural Objective:	**Action:**
• Improve growth and vigor of best stems.	• Non-commercial thinning removing about 20% of the stems. The goal is to increase growth while minimizing the increase of sunlight on the forest floor.

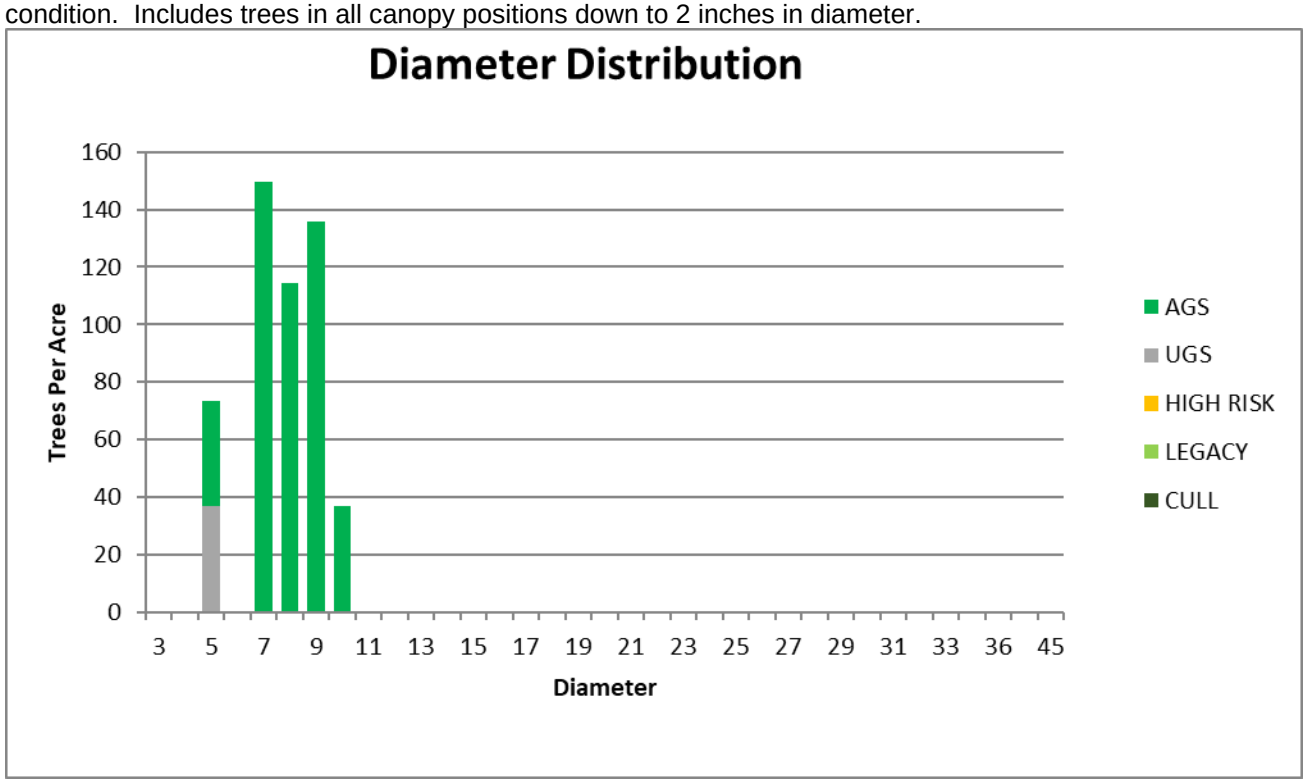
Bird Habitat Objective and Actions:	**Target Species:**
Retain red pine habitat for diversity.	• No targeted species

STAND 14 TABLES AND GRAPHS

Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
red maple	37.5%	44.6%	-	-	-	13.1	-	-	13.1	-	-	0.0%
Total Hardwood:	37.5%	44.6%	-	-	-	13.1	-	-	13.1	-	-	0.0%
red pine	62.5%	55.4%	-	807	-	19.5	-	-	21.1	807	-	100.0%
Total Softwood:	62.5%	55.4%	-	807	-	19.5	-	-	21.1	807	-	100.0%
Total Volume:	100.0%	100.0%	-	807	-	32.6	-	-	34.2	807	-	100.0%
Volume Per Acre:			-	2,033	-	82	-	-	86	2,033	-	

Table 14.1: Forest Composition and Volume.

Graph 14.1: 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 14.2: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.

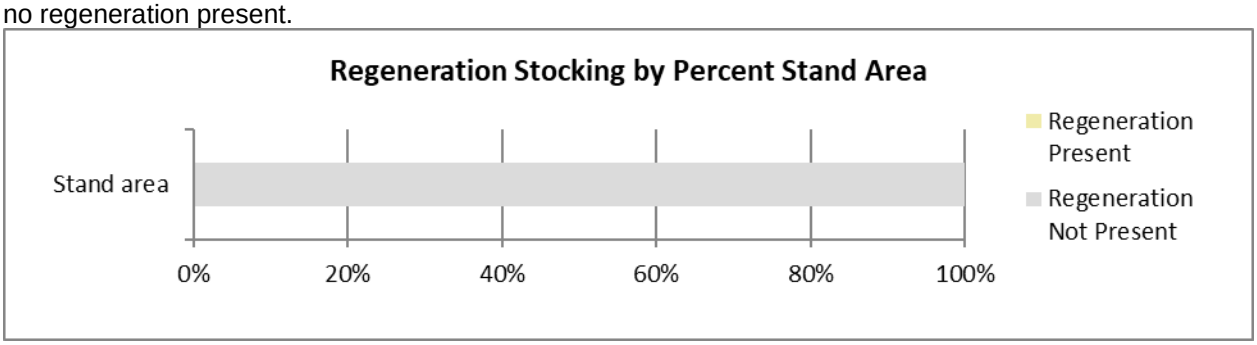


Table 14.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	-	-	-
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	-	-

Table 14.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	-	-	-	-
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	-	-

Table 14.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	-	-
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	-	-

Stand 15 Patch Cuts and Early Successional 37.8 acres

Stand 15 includes the patch cut and early successional treatment areas that were created during the 2016, 2018, and 2019 timber sales.

The patch cuts range in size from .13 acres to 1.3 acres.

Other early successional treatments included aspen regeneration and a 5+ acre early successional opening (basically a large patch cut).

The largest opening was a 15” acre oak seed tree cut on the southeastern corner of the tract.

General attributes

Natural Community Type:	Various—typic to surrounding landscape
Historical Use:	Pasture to early 1900s, then abandoned and transition to forest.
Insects/Damage/Disease:	No serious problems noted.
Invasives:	None noted.

Stocking and Stand Structure

Stand Age:	+/- 5 years		
Stocking Level:	Recently harvested.		
Past Management History:	Various harvest 2016, 2018, and 2019.		
Timber Quality:	n/a		
Total BA Per Acre:	6	Trees Per Acre:	3
Total AGS BA Per Acre:	6	% AGS Sawtimber:	100%
Quadratic MSD:	19.3	Site Quality:	Variable. Typic to surrounding area.

Wildlife Habitat

Habitat Characteristics:	Early successional forest. Transitional.
Special Features:	Variable depending on each cut: Rubus sp., cherry, aspen, beech, red maple. Excellent early successional habitat.
Threats:	Potential over browse.
Management Objectives:	Allow to develop. Consider gap expansion to enlarge openings and improve growth.
Bird Habitat Objectvies:	

Wetland and Riparian Features

Wetland Features:	None.
Stream Features:	None.
Other:	None.

Recreation, Aesthetics and Education

Recreation Features:	None.
Aesthetic Resources:	Potential wildlife viewing.
Education Features:	Potential for interpretive trail.

Access and Terrain

Landing Sites and Truck Roads:	Variable. See adjacent stands.
Access and operability:	Variable. See adjacent stands.

STAND 15 DESCRIPTION

Stand 15 includes the numerous patch cuts and early successional openings that were made during the 2016, 2018, and 2019 harvests. The primary reason for putting them in their own stand it to help establish better data for the surrounding residual forest.

In general, these openings have regenerated well, but largely by beech and Rubus. They provide excellent early successional habitat in terms of dense, low growth and a high level of soft mast from the copious blackberry and raspberry stems. Some diversity exists, with a few areas regenerating well with aspen sprouts, a bit of pin cherry and black cherry can be found, and black birch has come in in some places. Red oak seems to have regenerated best on the edges of the patches. Heavy browse is a problem, especially because oak and other desirable stems from a timber and management standpoint also happen to be highly desirable browse.

Consider gap expansion to increase the size of the smaller openings to help improve composition and vigor of the young growth. This may be impractical to carry out until the surrounding stands are ready for the next treatment likely occurring sometime in the next planning period.

Access is variable to all patches dependent on location. Operability for the patches and early successional openings in general is very good.

STAND 15 MANAGEMENT OBJECTIVES, RECOMMENDATIONS AND ACTIONS

Management objectives here include leaving this area to grow during this planning period unless an opportunity arises to expand the size of the smaller openings.

Silvicultural Objective:	**Action:**
• Leave to grow OR • Gap expansion to improve growth and help establish greater diversity. Prescriptions with associated adjacent stands.	• If possibility to treat arises, increase size of openings by gap expansion.

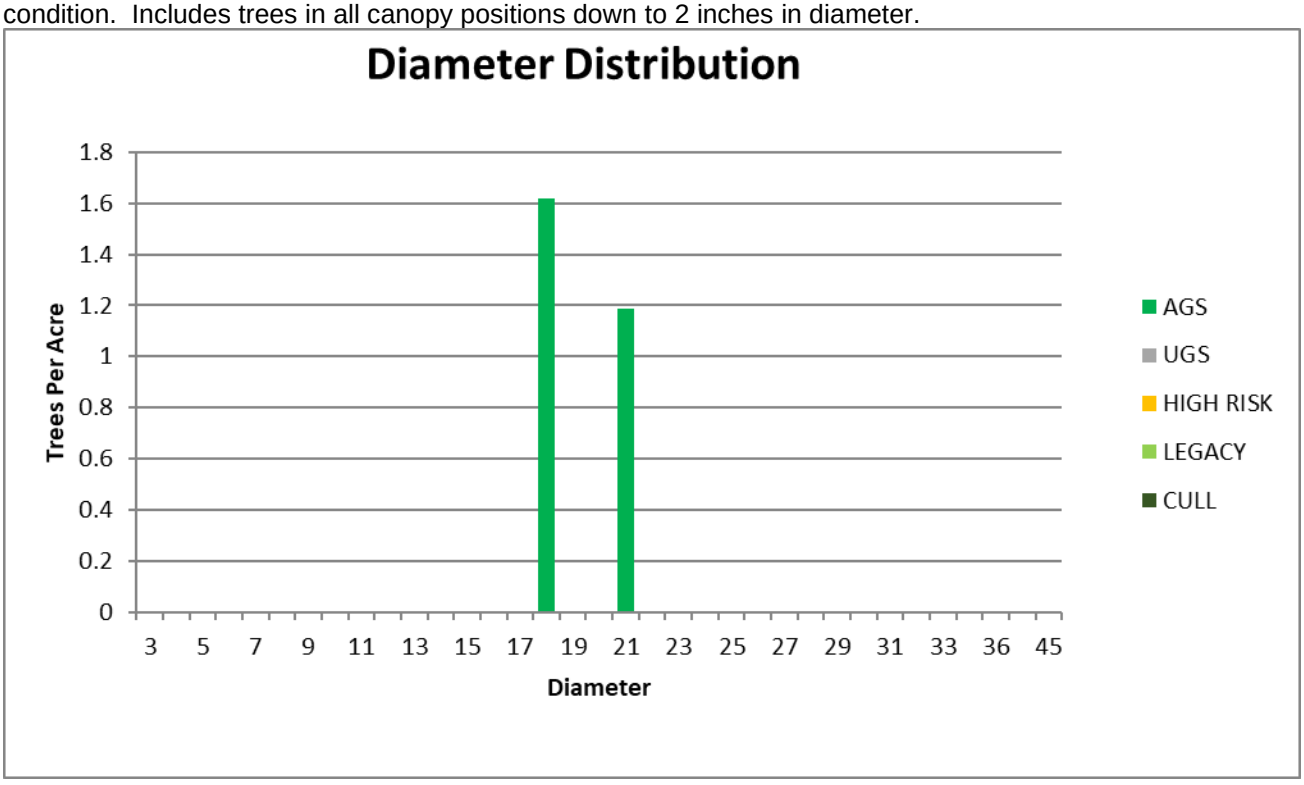
Bird Habitat Objective and Actions:	**Target Species:**
Early successional habitat. Improve through expansion where opportunities exist over time. Retain snags and mast trees, create and retain down logs. Retain overstory structure, up to 30% canopy.	• Ruffed grouse • Northern flicker • Field sparrow • White throated sparrow • Mourning warbler • Chestnut-sided warbler • Indigo bunting

STAND 15 TABLES AND GRAPHS

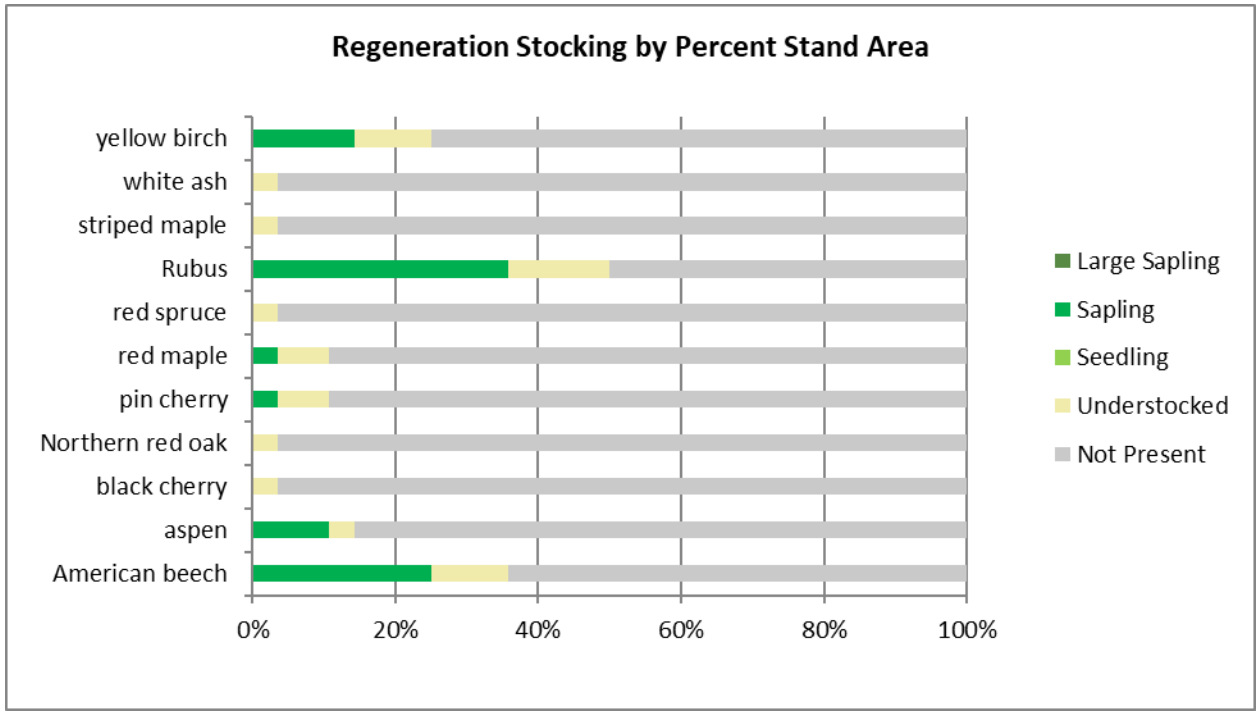
Species	% BA	% TPA	Veneer (BF)	Sawlog (BF)	Tielog (BF)	Pulp (Cords)	Growing Stock (Cords)	Cull (Cords)	Total Volume in Cords	Total BF	High Risk	% AGS Saw
Northern red oak	100.0%	100.0%	143	334	270	0.5	-	-	2.0	747	-	100.0%
Total Hardwood:	100.0%	100.0%	143	334	270	0.5	-	-	2.0	747	-	100.0%
Total Volume:	100.0%	100.0%	143	334	270	0.5	-	-	2.0	747	-	100.0%
Volume Per Acre:			5,404	12,623	10,194	20	-	-	76	28,221	-	

Table 15.1: Forest Composition and Volume.

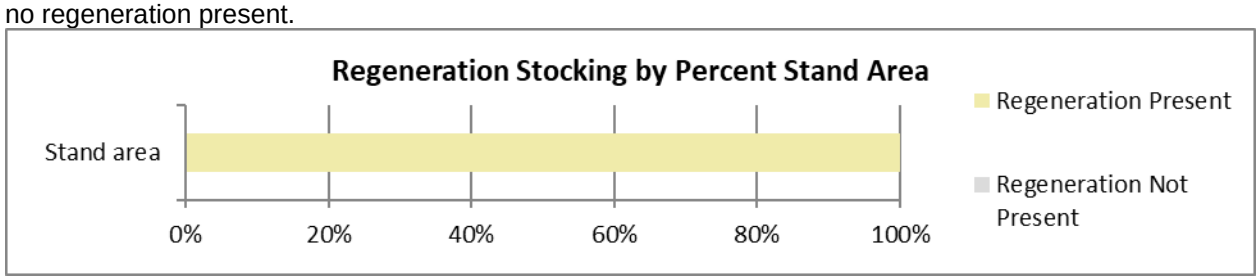
Graph 15.1: Diameter distribution showing trees per acre on the Y axis, diameter class on the X axis and tree condition. Includes trees in all canopy positions down to 2 inches in diameter.



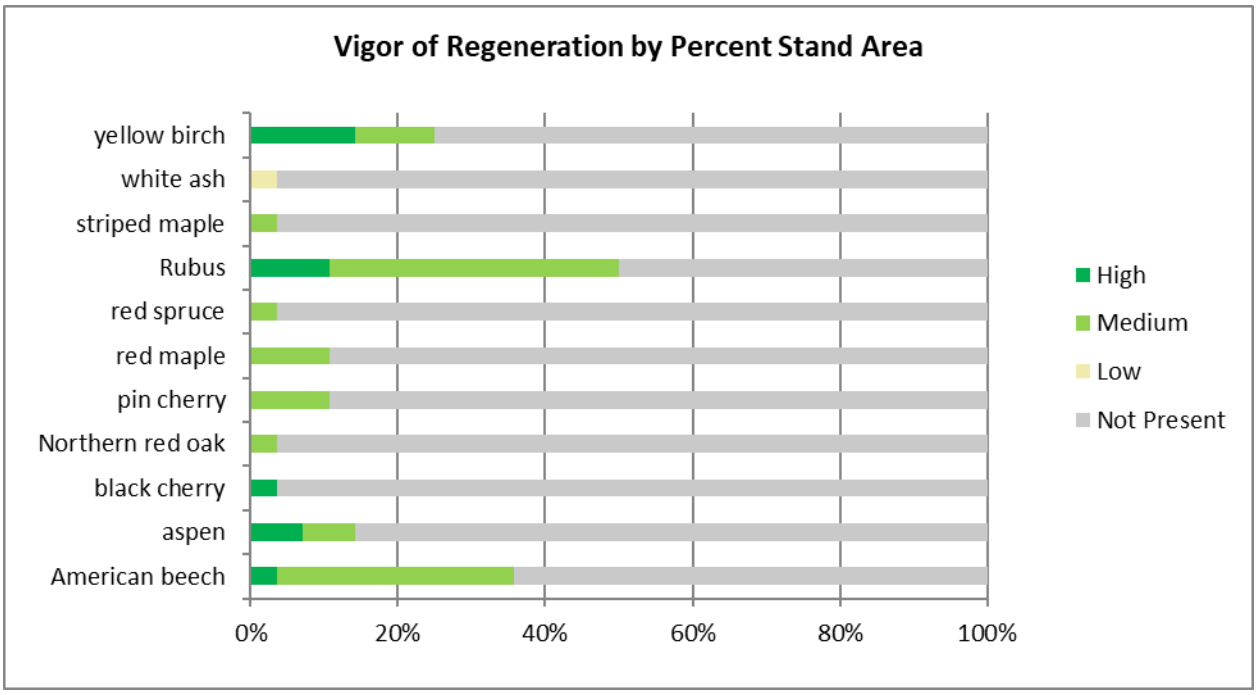
Graph 15.2: Tree and shrub species regeneration stocking by percent of stand, species and stocking class. The species is considered "stocked" if it meets at least one of three stocking levels including 2 stems between 0.5 and 1.5 inches diameter(Large Sapling), 5 stems between 3 and 5 feet tall (Sapling), 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 15.3: Percent of stand are with regeneration present in any category, versus percent of stand area with no regeneration present.



Graph 15.4: Vigor of regeneration and shrub species.



Graph 15.5: Browse level of regeneration and shrub species.

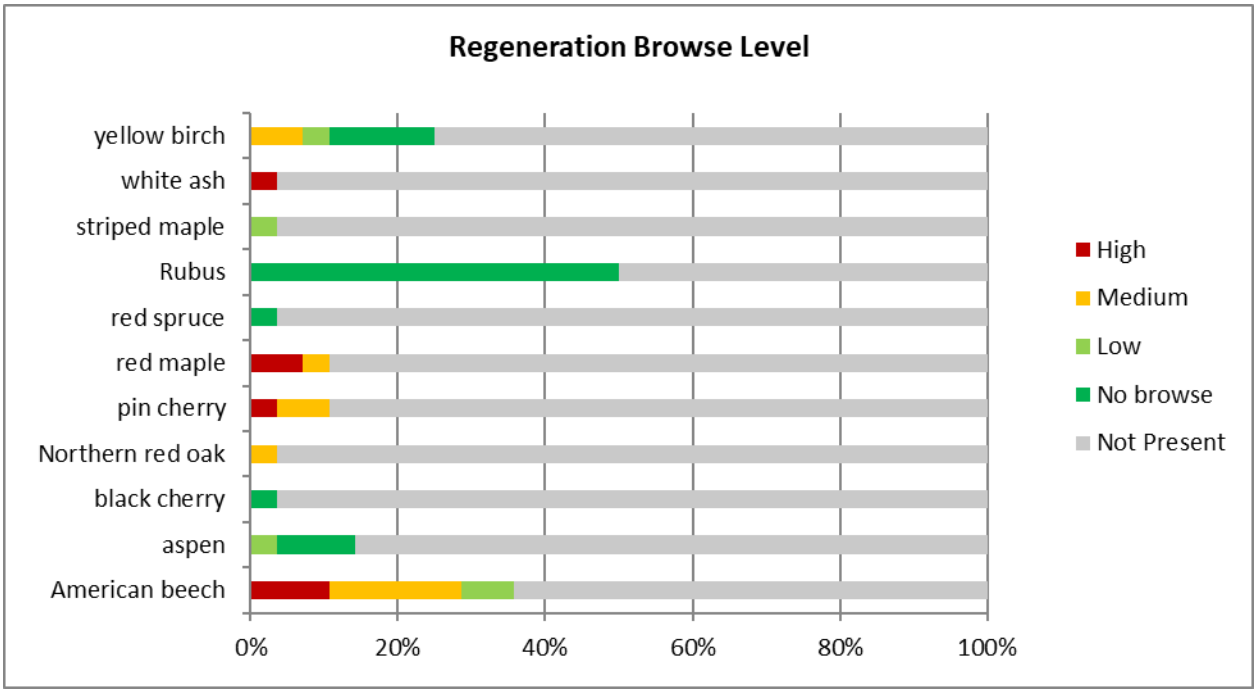


Table 15.2: Snags per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	10.7	-	-	10.7
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	10.7	-	-	10.7

Table 15.3: Down logs per acre by size and decay class.

DBH Class	Sound	Moderately Punky	Punky Throughout	Stand Total
<12"	3.4	-	-	3.4
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	3.4	-	-	3.4

Table 15.4: Cavity Trees per acre by size and decay class.

DBH Class	Large	Medium	Small	Stand Total
<12"	-	-	-	-
12-18"	-	-	-	-
>18"	-	-	-	-
Grand Total	-	-	-	-

APPENDIX – A

Breeding Bird Survey

Phil Brown

Camp Coniston Breeding Bird Assessment
by Phil Brown
January 2021

Introduction and Methodology:

Operating through a contract with YMCA Camp Coniston, I surveyed the Camp Coniston property on five dates during the late spring and early summer periods between May 9, 2019 and July 4, 2020, recording all birds encountered during these visits. The initial May 9 visit was made to familiarize myself with the property, establish survey points, and determine other areas of coverage. These visits (on May 30, June 7 and June 20, 2019) included three systematic replicates of a standardized Variable Circular Plot breeding bird survey (BBS) at 15 predetermined points identified during the initial visit and mapped with the Gaia GPS app.

The BBS points were chosen for ease of access and maximum coverage for a predominantly walking route around the lake, which would allow for surveying during the preferred temporal period of the early morning hours (beginning generally around sunrise and ending approximately four hours after sunrise) and during the breeding bird season for most local species (late May to early July). Points were strategically located along the property's trail system and can be easily used as future breeding bird survey points in order to measure changes, as well as serving as educational and interpretive opportunities for the camp. In addition, these points, though predominantly located in areas which, ultimately, will be left unmanaged and guided by natural processes, may serve as baseline data points and a control for areas of similar forest types and other characteristics that will be actively managed. The points were marked by GPS and described in Appendix I but have not been marked onsite as of present. Points were surveyed for five minutes, and all individual detections by sight and sound were tallied and marked by a distance and behavioral code based on this observation. Data analysis including the calculation of Relative Abundance for each species, as well as other calculations.

Table 1 – BBS survey dates and conditions

Visit	Date	Start/End	Time	Temp°C	Cloud Cover (%)	Wind Direction	Wind Speed (kmph)
1	5/30/2019	Start	5:40	8	100	0	0
1	5/30/2019	End	10:35	13	100	S	8
2	6/7/2019	Start	5:23	7	0	0	0
2	6/7/2019	End	9:28	17	0	W	3
3	6/20/2019	Start	5:24	18	100	0	0
3	6/20/2019	End	9:13	18	100	E	3

In addition to the core survey locations, which were concentrated around a loop of Lake Coniston and the more developed areas, I recorded all individual bird observations (species and number) across numerous additional forest stand and management types including in the more 'remote' parts of the property (Appendix 4). A final visit was made on 7/4/20 in order to cover additional areas and to assess conditions one year later and at a slightly later date, which would allow for documenting additional breeding evidence. While this component was conducted in a manner far from a comprehensive survey, these visits allowed for determining the presence/absence of target species and for identifying management opportunities in specific forest stands and management types. I attempted to and succeeded in visiting all of the large openings created under the guidance of Meadowsend between

2016-19, and all of the natural community types as identified by the 2020 NH Wildlife Action Plan (NHWAP), as well as other features. These included rocky summits, major wetland features (primarily Cranberry Pond and the small bog located near the camp offices), major landings, and a handful of smaller patch cuts. Due to constraints of time and the vast size of the property, this part of the survey should serve as a representative sampling of bird habitats present and associated bird species, as well as one that samples the breadth of the management opportunities that exist on the property.

According to the NHWAP, the Camp Property contains a range of natural community types, the predominant one being Hemlock-Hardwood-Pine. Other mapped communities include Rocky Ridge (Pennyroyal and Sugar Hill summits); Wet Meadow/Shrub Wetland (the 'bog' by the camp buildings, a large interior vernal pool, and a feature just off-property near the southern boundary by the outlet); Cliff and Talus (south side of Pennyroyal summit); Grassland (primarily camp fields, but also new fields created by recent management at southeastern access); Temperate Swamp (northern end of Cranberry Pond); Northern Hardwood Conifer (mainly along lakeshore); and Peatland (interior, east of lake). All of these could harbor specific bird species and/or representative bird community associations. Survey visits included at least one visit to all of the features and locations listed above.

Ground-truthing the Camp property allowed me to gauge the real expression of these natural communities in terms of bird habitat, and I was able to further refine these categories to the following: Hardwood-Mixed Forest; Shrublands; Grasslands; Wetlands; Lakes and Rivers; and Developed Areas. In terms of assessing bird habitat and suggesting management, this categorization is most useful and aligned with bird conservation goals and is how I present the management recommendations below.

I also collaborated with forester, Laura French of Meadowsend Consulting Company, in order to provide bird habitat management suggestions based on our these findings.

A stand managed for Aspen regeneration with wildlife in mind.

Results:

During five overall visits to the property, I surveyed 54.6 miles by foot and by vehicle over a period of 36 hours, 13 hours of which were spent conducting the formal Breeding Bird Survey (BBS). Of the points surveyed, those located within Forest Stand 13 and in Wetland areas saw both the greatest number of species (23-29) and individual birds (51-64) detected during the three surveys (see Table 2). Points located within Stand 1 saw lower species diversity (9-21) and number (17-45), while the few points located within openings, Stands 2, 3, 4, and 6 also yielded lower numbers of both of these measures.

Table 2 – BBS Point by Total Number of Species and Individuals

BBS Point	Total Species	Total Individ.	Stand #
1	23	51	13
2	24	52	13
3	23	53	13, RO
4	29	64	Wetland
5	17	38	1
6	15	36	1
7	14	37	2
8	12	30	4, 3
9	10	22	Open
10	9	17	1
11	16	38	1
12	17	37	1
13	22	45	1
14	21	37	1
15	10	29	6

In all, 586 individual detections of 53 total species were made over the course of three BBS survey days (see Appendix IV). The most abundant species at BBS points (see Table 3) were Red-eyed Vireo (13.48%), Ovenbird (11.26%), Black-throated Green Warbler (7%), Blackburnian Warbler (5.63%), Song Sparrow (4.78%), Blue-headed Vireo (4.10%), Yellow-rumped Warbler (3.92%), Scarlet Tanager (3.58%), Blue Jay (3.41%), and Winter Wren and Pine Warbler (both at 2.73% of total detections).

A family of American Black Ducks in the 'Bog'.

Table 3 – Top 10 Species by Relative Abundance at BBS Points

Species	% of total detections
Red-eyed Vireo	0.1348
Ovenbird	0.1126
Black-throated Green Warbler	0.0700
Blackburnian Warbler	0.0563
Song Sparrow	0.0478
Blue-headed Vireo	0.0410
Yellow-rumped Warbler	0.0392
Scarlet Tanager	0.0358
Blue Jay	0.0341
Winter Wren	0.0273
Pine Warbler	0.0273

Table 4 – Top 10 Species by # BBS Points Total Detections

Species	# Pts
Ovenbird	15
Red-eyed Vireo	15
Blackburnian Warbler	13
Black-throated Green Warbler	13
Blue-headed Vireo	13
Scarlet Tanager	12
Blue Jay	11
Yellow-bellied Sapsucker	11
Winter Wren	10
American Robin	8
Yellow-rumped Warbler	8

Red-eyed Vireo and Ovenbird were the only species detected at each point on at least one visit (Table 4). These were followed by Black-throated Green Warbler, Blackburnian Warbler and Blue-headed Vireo with detections at 13 points, Scarlet Tanager (12 points), Blue Jay and Yellow-bellied Sapsucker (11 points), Winter Wren (10 points), and American Robin and Yellow-rumped Warbler (8 points).

A total of 1578 individual detections of 87 species were made during the overall time on the entire Camp Property, including between BBS point counts and across the remainder of the property (Table 5). The most abundant species at BBS points were Red-eyed Vireo (11.28%), Ovenbird (7.86%), Blackburnian Warbler (5.26%), Black-throated Green Warbler (5.07%), Blue-headed Vireo (4.06%), Black-capped Chickadee (3.68%), Yellow-rumped Warbler (3.68%), Song Sparrow (3.36%), Pine Warbler (3.11%), and Yellow-bellied Sapsucker (2.60%).

Table 5 – Top 10 Species by Relative Abundance on Camp Property

Species	% of total detections
Red-eyed Vireo	0.1128
Ovenbird	0.0786
Blackburnian Warbler	0.0526
Black-throated Green Warbler	0.0507
Blue-headed Vireo	0.0406
Black-capped Chickadee	0.0368
Yellow-rumped Warbler	0.0368
Song Sparrow	0.0336
Pine Warbler	0.0311
Yellow-bellied Sapsucker	0.0260

Of the 87 total bird species observed on the Camp Property, many are assumed to be breeding within the ownership. Of those recorded, 21 species were confirmed as breeding, 42 were deemed 'probable' breeders, 14 were deemed 'possible' breeders, seven were assumed to be migrants, and three were presumed to be breeding locally (but likely off-property) and utilizing the property during the breeding season (Table 6). This total includes 20 species identified as Species of Greatest Conservation Need.

Nestling Broad-winged Hawks at Camp Coniston.

Discussion:

Though 87 species of birds were observed during the course of surveys during 2019 and 2020, it is likely that, of the course of an entire year, many more bird species may be utilizing the property including those only present during the non-breeding season, and breeding species present in low numbers or with distinct temporal/seasonal patterns that this effort did not detect. Thus, it can be safely said that well over bird 100 species utilize the Camp Coniston property over the course of a year, and a large component of these are likely breed on the property.

A breeding bird survey is a snapshot in time and however representative of forest stands at each point, there are numerous known and unknown variables that may influence bird distribution and density at any particular point. In addition, forest regeneration and its impacts on bird populations is happening in a dynamic way, as are other processes that will influence forest composition and stand dynamics presently and in the future. Stands managed in 2016 had had three years of regeneration before the 2019 breeding season survey. As a result, ground cover and the beginnings of a shrub layer were present in most of these treated areas. Thus, the responding birdlife will reflect species typical of young forests in these areas, as well as those that benefit from canopy openings. Stands managed in 2019, on the other hand, had very limited (if any) regeneration. Numerous bird species, including many of the Priority Species listed below, will respond best to conditions between three and 15 years following treatments. Thus, the bird response here could not be fully measured during this initial round of surveying.

As expected, Red-eyed Vireo and Ovenbird were the most widely detected species, both in terms of overall detections (relative abundance) and how widespread these species were across all points. These are forest generalists, and thanks to the largely forested nature of the property (both at BBS points and elsewhere) these species were widespread and abundant. The following three species, Black-throated Green Warbler, Blue-headed Vireo, and Blackburnian Warbler, also showed high levels of relative abundance at both BBS point and overall, and this is very likely due to the strong hemlock component present on the property. Other most common species on the property included were mainly closed-canopy woodland species and included Scarlet Tanager, Winter Wren, Yellow-bellied Sapsucker, Pine Warbler, Yellow-rumped Warbler, Black-capped Chickadee, Blue Jay, and Song Sparrow (shoreline edge).

Bird Conservation and Management:

Many of NH's estimated 193 breeding bird species are thought to have declining populations. According to the *State of New Hampshire's Birds* (2021), 42% have declining trends and 10% have unknown trends.

Songbirds are the largest group of birds in this region and were, by far, the most abundant. Within this broad category fall the flycatchers, vireos, warblers, thrushes, tanagers, woodpeckers, sparrows, and many more subgroups. Several species fall into categories that warrant special attention due to their respective conservation status, and that their presence can be indicators of a healthy ecosystem for other species. The bulk of this report focuses on this guild, including management opportunities that benefit species and groups, which can be found in Appendix 3.

Significant declines have been seen in shrubland and grassland-dependent bird species, and this group may be the most imperiled of all landbirds regionally, and the vast majority of those breeding in NH show declining populations. Intentional habitat management is often needed to benefit this group of species as their habitat is so ephemeral, and there are specific habitat requirements related to acreage, forest type, and other factors. Of the 43 species of shrubland (or young forest) dependent bird species in NH, 26 are declining (Hunt 2021). When managing for this suite of bird species, the question of baseline population always arises as it is likely the habitats supporting shrubland species were always far less common prior to the past century of farmland abandonment and ensuing succession. Thus, decisions to manage for large populations of shrubland bird species should be carefully weighed against the potential risks to forest interior species, in particular.

Small clearings increase bird species diversity and provide benefits to some interior forest species.

Forest-dependent bird species have also seen significant declines. According to the recent *State of New Hampshire's Birds* (2021), about a third of all NH breeding species dependent on hardwood – mixed forests showed a downward trend. Many of these are ground-nesting and canopy-nesting birds, among them several of the Species of Greatest Conservation Need (SGCN) such as Veery, Purple Finch, Ruffed Grouse, Black-throated Green Warbler, Scarlet Tanager, and Ovenbird. Perhaps due to its abundance across the landscape, both on the state and local scale, the Hardwood – Mixed Forest type typical of much of the Camp Property supports more bird species than any other habitat type. Thus, its management can yield some of the greatest bird conservation impact if practiced in the appropriate locations and at the appropriate scale. Timber management should occur outside of the breeding bird season (late May-mid July) as much as to the extent possible so as to not directly impact breeding bird efforts and to set an educational example to other landowners. There are ample opportunities to continue to integration timber and songbird habitat management goals on the Camp Coniston property, and this should remain a top priority as a conservation objective in the years to come.

Priority Bird Species:

There are several ways to measure and rank conservation priorities in terms of bird species. Of the 87 observed species on the Camp Property, 20 are deemed to have a higher level of conservation concern within the State of New Hampshire and/or the Bird Conservation Region 14, in which the property falls. Of the 20 species that fall into these categories, one is listed as State-threatened and eight are considered Species of Greatest Conservation Need as identified by the NH Wildlife Action Plan. Within the bird conservation region, two are listed as highest priority, three as high priority, and 11 as medium priority as conservation targets, and all are considered Priority Bird Species (Table 6).

Table 6 – Observed Priority Bird Species and Breeding Status

SPECIES	BREEDING HABITAT	PRIORITY LEVEL	BREEDING CODE
Common Loon	Lake	ST; SGCN; BCR14 med priority	Probable
Ruffed Grouse	Shrubland/Forest	SGCN; BCR14 med priority	Confirmed
American Black Duck	Wetland	SGCN; BCR14 highest priority	Confirmed
Purple Finch	Forest	SGCN; BCR14 highest priority	Probable
Veery	Forest	SGCN	Probable
Field Sparrow	Shrubland	SGCN	Probable
Eastern Towhee	Shrubland	SGCN	Probable
Scarlet Tanager	Forest	SGCN	Probable
Wood Duck	Wetland	BCR14 med priority	Confirmed
Northern Flicker	Forest	BCR14 med priority	Probable
Yellow-bellied Flycatcher	Forest	BCR14 med priority	
Barn Swallow	Developed	BCR14 med priority	
Brown Creeper	Forest	BCR14 med priority	Probable
Ovenbird	Forest	BCR14 med priority	Probable
Northern Parula	Forest	BCR14 med priority	Probable
Black-throated Green Warbler	Forest	BCR14 med priority	Confirmed
Rose-breasted Grosbeak	Shrubland/Forest	BCR14 med priority	Probable
Eastern Wood-Pewee	Forest	BCR14 high priority	Probable
Chestnut-sided Warbler	Shrubland	BCR14 high priority	Probable
Black-throated Blue Warbler	Forest	BCR14 high priority	Probable

ST = Threatened in NH
SGCN = Species of Greatest Conservation Need
BCR14 medium/high/highest = Priority within Bird Conservation Region 14

Due to its large acreage and breadth of management possibilities, it is possible to manage for both forest interior and shrubland-dependent bird species on the Camp Coniston property. Through careful and deliberate management, and through both general and specific management actions, many of the bird species listed as SGCN can benefit and thrive. The implementation of harvests through well-timed rotations of shrubland, shelterwood and gap expansion, should be planned to maximize the benefit to the suites of species that depend on them, to the extent possible. It may not be possible to manage beneficially for every species, however, so some difficult decisions will need to be made. Further, it will be essential to reassess as bird populations change, due to both onsite and offsite factors.

A rocky outcrop at the Pennyroyal summit.

In addition to the necessity of future monitoring to measure how bird populations are responding to past treatments and current conditions, there is considerable educational value in future breeding bird monitoring on the Camp Property. The establishment of breeding bird survey points (1-15) have established baseline levels of bird populations in relatively unmanaged stands at a point in time, and can be replicated to see how bird populations may be faring in the future. In addition, future monitoring points have been suggested (16-28) and can be incorporated into the Camp's educational programming.

Future surveys and efforts should also keep an eye out for several species not detected during the 2019-20 surveys. These include NH Watch List and other SGCN species that may be breeding on the property American Kestrel (special concern), Common Nighthawk (state-endangered), Eastern Whip-poor-will (SGCN), Chimney Swift (SGCN), Northern Goshawk (SGCN), Bald Eagle (SGCN), Black-billed Cuckoo (SGCN), Wood Thrush (SGCN), American Woodcock (SGCN), and Prairie Warbler (SGCN).

The Nighthawk and Whip-poor-will are crepuscular or nocturnal species that would only likely be detected by specific surveys and which may be very limited on the Camp Property, if present at all. The rocky ridgetops could support Nighthawks. In addition, the Cerulean Warbler (state-endangered) is another potential target which is extremely rare in NH currently, but which may increase with the chance of range expansion propelled by the pressures of climate change. While the closest known location in NH for this species are floodplain forests along the Blackwater River in nearby Merrimack County, there is adequate suitable habitat for this species including the oak communities seen in Stand 9. Favored habitat for this southern songbird includes hardwood habitat (particularly oak) in north or east facing slopes with scattered large trees, canopy gaps and a relatively open mid-story (NHWAP). Likewise, several other southern forest songbird species which may expand their range northward should have opportunities to thrive in this largely forested setting with a mix of other supporting habitat types. Goshawk may be present in mature forests with dense canopy and relatively open understory. Black-billed Cuckoo and Prairie Warbler are species of early successional hardwoods. Woodcock may be present in openings in proximity to the wetland areas in the northern tip of the property. Wood Thrush is a declining species of dense woodland habitats with well-developed shrub and sub-canopy layers.

Bird Habitat Type and Specific Management Strategies:

Hardwood – Mixed Forest

A steep hillside dominated by Hemlock and northern hardwoods.

SGCN Species: Ruffed Grouse, Scarlet Tanager, Veery, Purple Finch
Other high priority species: Eastern Wood-Pewee, Black-throated Blue Warbler

There is significant potential to manage for a wide diversity of forest species in this habitat type. Actions should include the reduction of forest fragmentation and conversion to other habitat types, particularly, development. This is the single greatest action that will benefit the Species of Greatest Conservation Need (SGCN) within this habitat type. Conservation of the land through a conservation easement is a tool that could help provide these assurances. Other actions include continued vigilance for forest pathogens and invasive insect species, as well as monitoring and management of invasive plant species. Any recent openings including in landings, patch cuts and along skid trails, are likely locations where invasive plant species might become more easily established.

The Hemlock-Hardwood dominated forest stand that dominates much of the Camp Property should be retained. Maintain a large component of these hemlock-dominated stands and consider setting some aside as permanent reserves – both along the lakeshore and on some of the steeper slopes surrounding the lake. Consider small gap openings along the trail on eastern side of lake (northern portion) to promote hardwood regeneration for foraging for breeding and migrant species. In addition, this should benefit breeding for several species including Ruffed Grouse, Eastern Wood-Pewee, and several others.

Shelterwood cuts may be beneficial management strategies in some forest stands and may increase the species richness and diversity of this habitat type. Scarlet Tanager, Eastern Wood-Pewee, and Black-

throated Blue Warbler, in particular, may benefit from this management, and larger-sized shelterwood openings with less canopy, additional shrubland birds may benefit. These might include Chestnut-sided, Mourning, and Prairie Warblers, Indigo Bunting, Common Yellowthroat, Ruffed Grouse, and others. Consider small openings (paired with view enhancement) near the summit of Pennyroyal Mt. and other outcrops where species such as Dark-eyed Junco, Turkey Vulture, and Common Raven may benefit.

Enhancement of this habitat is well underway from the past five years of management, specifically, on the eastern side of the property. While some of these recently-managed areas (2019) were too young to survey for expected early successional species, other smaller patches and skid trails (2015-16) have expressed a strong vegetative response from within the past few years. Large gap openings and small patches within this landscape enhance the diversity of species present within this general habitat type. These small openings increase the understory, providing benefit to species that require a dense understory for nesting like Veery and Ruffed Grouse. The addition of course woody material and large brush piles benefits several other species. A Winter Wren brood was discovered utilizing large brush piles in a large landing east of the lake. This managed area with its strong softwood component hosted noticeably higher densities of Hermit Thrush and Dark-eyed Junco than the unmanaged hemlock-hardwood forested communities around the lake. Small openings in a variety of forest stands may yield benefits to individual species as long as these openings don't compromise limited habitat types.

Smaller clearings in the interior eastern portion of the property continued to be more productive for Hermit Thrush and Dark-eyed Junco, as well as Eastern Wood-Pewee, Yellow-bellied Sapsucker, and Black-throated Blue Warbler than the unmanaged hemlock-hardwood forested communities around the lake. This management type is replicated and well-represented in the eastern portion of the property in between larger clearings, and though doesn't appear to host any unique species, is an important complementary component to these sites.

Raptors were generally scarcely observed during the surveys. This predominantly speaks to their own secretive nature during breeding season, as well as a slightly earlier inception of breeding for several of the expected species. Based on the forest types and extent of a large forested area, it is quite likely that the property hosts relatively healthy populations of several species such as Broad-winged Hawk (one active nest was observed), Sharp-shinned Hawk, and possibly, others, as well as more limited numbers of scarce breeders such as Northern Goshawk (not observed). Efforts to protect large intact areas of mature forest should be in place as a general conservation strategy for this family of birds.

Porcupine in a Red Oak on Sugar Hill.

Shrublands

Succession from the seed tree cut (2016) is a boost to shrubland bird populations on the property.

SGCN Species: Ruffed Grouse, Field Sparrow, Eastern Towhee
Other high priority species: Chestnut-sided Warbler

There is strong potential to impact management of new and/or ephemeral populations of early successional bird species on the Camp Property. Many of the initial steps are already in place with regeneration reaching peak productivity for this guild of species in the coming several years and decade. Continued management of existing patches will be essential in maintaining these bird communities. According to the *NH Wildlife Action Plan*, these young forest habitats 'rarely retain early succession characteristics beyond 15-20 years', and forest maturation is considered the primary threat to the suite of birds that depend upon them.

The size of two main shrub openings is large enough to attract Field Sparrow and Indigo Bunting, but perhaps too small to attract Mourning and Prairie Warblers. Consider expanding where possible to replicate the opening in adjacent forest, and consider a long-term rotation of patches to retain it.

The fairly recent Sugar Hill clearcut already supports some level of shrubland bird population at this early stage, and it will be interesting to monitor this area in future years. Its value to this suite of bird species may be expanded by creating additional habitat in adjacent areas as this patch begins to age. A slightly large patch of high-quality regeneration might support significant levels of existing species such as Chestnut-sided Warbler, Eastern Towhee, and Field Sparrow, in addition to species not yet detected here such as Mourning and Prairie Warbler, and Black-billed Cuckoo.

I explored several large openings and associated heavily-managed areas north and east of the eastern landing, accessible via the road past the Maintenance building. These areas were too young to survey for expected early successional species presence as no or limited vegetation was established (no

Common Yellowthroats or Chestnut-sided Warblers, etc.), but should begin to see a strong response in two to three years. Fragmentation impacts to adjacent woodland species should be surveyed here and may then be compared to unmanaged 'control' areas in similar forest types.

During my final visit, I explored more of the recently-managed eastern portion of the property, I surveyed along skid trails and off-trail into wooded areas, through small and larger clearcuts, and finally, into the seed tree release, which was impressive. Mourning Warbler was detected almost immediately upon approaching the northwestern corner of the seed tree cut, and upon playback, a second male sang. Considering my inability to survey the entirety of this vast and thick terrain (I stayed only on the western edge), and the apparent homogeneity of this habitat over large acreage, it is possible a fairly robust population of this limited northern species occurs here. The age class of the hardwood regeneration is ideal for their breeding and will only begin to decline in a few years. It is well worth attempting to replicate the success of this cut on another part of the property in close proximity, or to maintain this opening, so the population can continue for years to come. This site also had some number of Chestnut-sided Warbler, Indigo Bunting, and Common Yellowthroat, all more common species typical of this age and size of regeneration – all of which have only been detected in small number on the remainder of the property, and in limited areas. Other species may also be present here.

The aspen regeneration patch is still young and a bit sparse, in places, to draw in similar target species, but the proximity to the new landing and size makes it an attractive location for early successional species in the coming years. Aspen will benefit bird species throughout its entire lifespan, even in lower densities, and a large patch of it has potential to add significantly in terms of forage, cover, and cavity potential for many species of birds from Ruffed Grouse to several species of woodpeckers. Ruffed Grouse, in particular, depend upon even-aged deciduous stands and are most numerous at years 6-15, rapidly decreasing as stem densities decline. Future surveys in these stands would be valuable, and permanent survey plots could be added to the landing and aspen regeneration clearing.

Advanced regeneration in early successional openings is an important component of maintaining shrubland bird populations.

Grasslands

Small patches of field enhance the diversity of habitat offerings on the property and can benefit birds.

There is limited potential to manage for grassland birds due to small acreage in two isolated patches on the Camp Property. However, nest boxes for Tree Swallow and Eastern Bluebird are suggested for the open Camp Field area, and nest boxes for American Kestrel are suggested for the newly-created field (as well as within larger patch cuts) on the eastern access point of the property (North Road).

Wetlands

Wetlands on the property, though limited, are vital to bird populations of many species.

SGCN Species: American Black Duck

There is limited potential to manage for wetland bird species on the Camp Property due to the presence of only small and isolated features. The continued provision of nest boxes for Wood Ducks and Hooded Mergansers is suggested for the 'Bog' and Cranberry Pond, though, and nest boxes for Tree Swallows are recommended for the 'Bog'. These wetlands, though small, seem to offer enough habitat to host a variety of wetland-dependent birds species such as the American Black Duck, a SGCN species. There is also a recent breeding record of a state-endangered Pied-billed Grebe here (Tilley, personal communication), a rather surprising location for such a limited species.

Lakes and Rivers

The scenic shoreline of Lake Coniston provides great value to waterbirds and other species.

SGCN Species: Common Loon

There is limited potential to increase waterfowl use and breeding success through recreation management along the edge and on Lake Coniston, and to increase breeding potential for shoreline raptors here through snag creation (girdling select trees such as prominent pines).

Waterfowl were well represented earlier in the season, but were seen to a lesser degree during the peak of the breeding bird season. This likely indicates that some were likely migratory or utilized the property only for foraging/resting, but it may also speak to the secretive breeding nature of this group of birds. Nest boxes should be placed along the shoreline for cavity-nesting ducks including Wood Duck, Hooded Merganser, and possibly Common Merganser. Additionally, consider a waterfowl protection zone, where an area might remain free of human disturbance (boat traffic, hiker impact, etc.), especially around loon nesting areas. Common Loons, a state-Threatened species, were observed on every visit, but a nest was not seen, nor were young. Consider seeking guidance from the Loon Protection

Committee about how to manage potential loon nesting habitat, including the possibility of an artificial nest raft.

The future breeding of Bald Eagle or Osprey along the lakeshore should be anticipated at some point in the near future. Consider a plan that addresses the recreational impacts to these sensitive species from both hikers and boaters, and other forms of recreation. A limiting factor in Osprey taking up residence on the lake may be the absence of adequate snag trees along the shoreline. Consider girdling several perch trees in areas far enough from the trail to make the habitat more conducive for both eagle and Osprey. Further, consider the placement of an Osprey nesting platform in a tall shoreline trees or on a structure such as a utility pole in a more secluded wetland setting.

Developed Areas

Buildings on the Camp Coniston have potential to positively impact bird species.

There is some potential to improve existing compatibility with human-adapted bird species on the Camp Property. Reduction of threats including accidental window strikes, entrapment, or nest failure due to human-made causes should be considered a high priority for these areas. In addition, nesting platforms can be constructed and attached to camp buildings for Eastern Phoebe and American Robin.

Other actions can be taken to conserve birds around developed areas. These include the avoidance of chemicals and pesticides; bird-friendly landscaping and use of native plants; reducing the presence of any invasive species. In addition there are many other steps that can be taken to reduce threats to birds and maximize their conservation on the local and global landscape. For more details and information on these items, please see the soon-to-be-released State of New Hampshire's Birds report.

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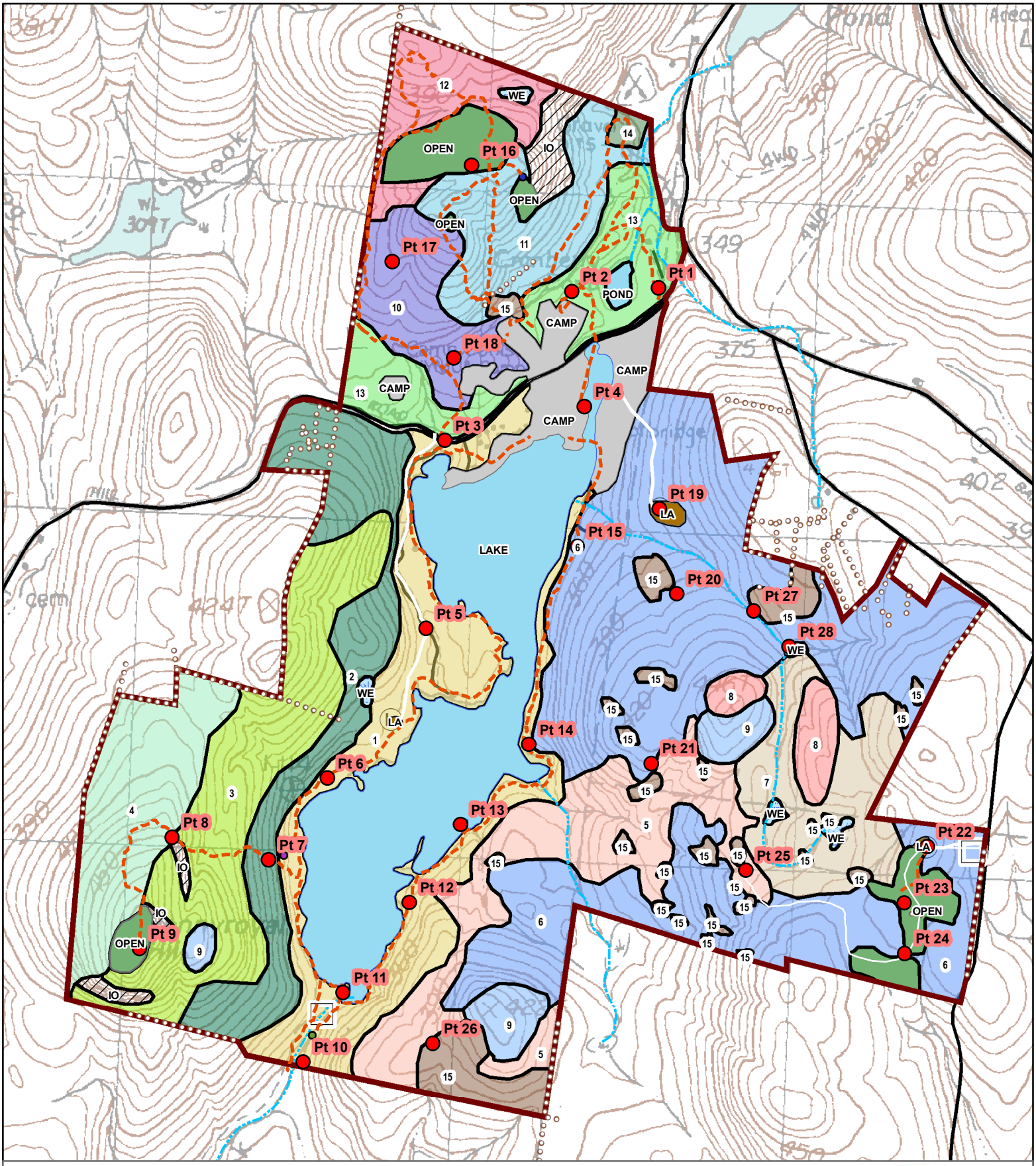

YMCA Camp Coniston

BREEDING BIRD SURVEY POINTS

Croydon, Springfield, and Sunapee NH
1,177 mapped acres

Map includes stand delineation in reference to 2021 Forest Management Plan.

1:15,000

0 500 1,000 2,000 Feet

N

Map created by: Laura French
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December, 2020

Appendix I – BBS Points and Long-term Bird Monitoring Points

POINT	STAND	Stand Type1	Features/Description	Harvest	Lat	Long
Point 1	13	Hem-WP-Hardwood	Cranberry Pond, Red Pine		43.46009	-72.11300
Point 2	13	Hem-WP-Hardwood	Cranberry Pond, Open		43.45991	-72.11626
Point 3	13, RO	Hem-WP-Hardwood	Wetland cove, Road		43.4559	-72.12083
Point 4	Wetland	Fen type	Bog, Camp area		43.45687	-72.11566
Point 5	1	Hemlock-Pine RES	Spruce swamp		43.45078	-72.12139
Point 6	1	Hemlock-Pine RES	Lake		43.44687	-72.12506
Point 7	2	NH-WP-Spruce-Fir			43.4446	-72.12731
Point 8	4, 3	WP-NH			43.44517	-72.13091
Point 9	Open	Rocky ridge	Pennyroyal summit		43.44219	-72.13206
Point 10	1	Hemlock-Pine RES	Wetland off property		43.43916	-72.12598
Point 11	1	Hemlock-Pine RES	Lake		43.44123	-72.12437
Point 12	1	Hemlock-Pine RES	Lake		43.44348	-72.12210
Point 13	1	Hemlock-Pine RES	Lake		43.44559	-72.12010
Point 14	1	Hemlock-Pine RES	Lake		43.44774	-72.11779
Point 15	6				43.45304	-72.11594
Point 16	Open	Patch cut	15-acre clearing	2018	43.46336	-72.11993
Point 17	10	WP-RO-H		2018	43.46075	-72.12285
Point 18	10	WP-RO-H	Horse corral	2018	43.45816	-72.12057
Point 19	Landing	Patch cut	1.5-acre opening	2019	43.45413	-72.11292
Point 20	6, Landing	Hardwood-Hemlock	3-acre opening	2019	43.45184	-72.11226
Point 21	6, 5	Hardwood-Hemlock	1-acre patch	2016	43.44726	-72.11317
Point 22	Landing	Patch cut	New field	2016	43.44506	-72.10294
Point 23	Open	Field	New field	2016	43.44354	-72.10378
Point 24	Open, 6	Field	5-acre patch	2016	43.44217	-72.10375
Point 25	5, 15	Red Oak-NH		2016	43.44439	-72.10964
Point 26	15, 5	Patch cut	Seed tree cut	2016	43.43968	-72.12119
Point 27	6, 15	Hardwood-Hemlock	Early successional cut	2019	43.45139	-72.10940
Point 28	Wetland, 6	Wooded pond	Wooded vernal pool	2019	43.45043	-72.10809

Appendix III – Special Management Considerations

SPECIES	SPECIAL MANAGEMENT CONSIDERATIONS
Canada Goose	
*Wood Duck	add nest boxes to lake shoreline and maintain boxes in other wetlands
Mallard	
*American Black Duck	species of concern; protect nesting habitat in Bog from human disturbance
Hooded Merganser	continue to maintain nest boxes on Cranberry Pond and Bog
Common Merganser	promote dead shoreline trees and protect from disturbance
*Ruffed Grouse	continue to create patch cuts as regeneration occurs
Wild Turkey	
Mourning Dove	
Ruby-throated Hummingbird	
Spotted Sandpiper	maintain undisturbed gravel shoreline habitat
*Common Loon	consult with Loon Preservation Committee for recommendations to promote nest success
Double-crested Cormorant	
Great Blue Heron	
Turkey Vulture	
Osprey	create snags along shoreline; consider erecting a nest platform away from disturbance
Sharp-shinned Hawk	
Red-shouldered Hawk	retain undisturbed mature pockets of hardwoods
Broad-winged Hawk	
Red-tailed Hawk	
Barred Owl	retain large hardwoods near wetlands and undisturbed areas of mature hardwoods
Belted Kingfisher	protect possible nest site behind Maintenance Shed; create sandy embankment for breeding
Yellow-bellied Sapsucker	Maintain or create hardwood and mixedwood sawtimber stands with 30-80% canopy cover and some dead and dry, or live hardwood trees with central decay for nest sites
Downy Woodpecker	
Hairy Woodpecker	
Pileated Woodpecker	
*Northern Flicker	promote snag trees within clearings and ES habitat/fields
*Eastern Wood-Pewee	Maintain or create hardwood pole/sawtimber stands with >80% canopy cover, gaps, and open midstory (6-30' layer) near forest openings and edges
*Yellow-bellied Flycatcher	
Least Flycatcher	
Eastern Phoebe	protect nesting sites on buildings from human disturbance
Great Crested Flycatcher	create snags in and around interior wetlands
Eastern Kingbird	protect islands and forested peninsulas along shoreline from disturbance for nesting
Blue-headed Vireo	Maintain or create well-stocked, uneven-aged mixedwood and softwood sawtimber stands with >80% canopy cover
Red-eyed Vireo	
Blue Jay	
American Crow	
Common Raven	protect breeding area on Sugar Hill
Black-capped Chickadee	
Tufted Titmouse	
Northern Rough-winged Swallow	protect nesting sites from human disturbance; possible nest site near Maintenance Shed
Tree Swallow	install nest boxes in fields and other open areas
*Barn Swallow	monitor structures for breeding activity and protect accordingly
Golden-crowned Kinglet	
Ruby-crowned Kinglet	
Red-breasted Nuthatch	
White-breasted Nuthatch	
*Brown Creeper	maintain large areas of mixed pine and hemlock stands

Winter Wren	create large brush and woody debris piles throughout
Gray Catbird	
*Veery	Maintain or create hardwood stands with 30-80% canopy cover and a dense understory (0-5' layer) proximate to wetlands and/or riparian areas
Hermit Thrush	
American Robin	
Cedar Waxwing	
*Purple Finch	protect spruce stands and promote spruce succession
Red Crossbill	
American Goldfinch	
Chipping Sparrow	
*Field Sparrow	promote hardwood regeneration along field edges and early successional in a short rotation
Dark-eyed Junco	probable breeder at Pt. 9 & elsewhere on property; create openings in conifer stands & ledge
White-throated Sparrow	Maintain or create uneven-aged mixedwood and softwood sawtimber stands containing openings with <50% canopy cover and dense understory (0-5' layer)
Song Sparrow	
Swamp Sparrow	
*Eastern Towhee	promote hardwood regeneration along field edges and early successional in a short rotation
Baltimore Oriole	Probable breeder at Pt. 14; retain hardwoods in openings along riparian areas
Red-winged Blackbird	
Brown-headed Cowbird	
Common Grackle	
*Ovenbird	
Northern Waterthrush	
Black-and-white Warbler	
Tennessee Warbler	
Nashville Warbler	probable breeder at Pt. 9 & elsewhere on property; create openings in wet conifer stands
Mourning Warbler	promote large patches of dense early successional regeneration in short rotations
Common Yellowthroat	
*Northern Parula	maintain forested buffer around Cranberry Pond
Magnolia Warbler	Probable breeder at Pt. 6 in spruce swamp & elsewhere on Property
Blackburnian Warbler	
*Chestnut-sided Warbler	Maintain or create well-stocked hardwood seedling/sapling stands ≥ 1 acre in size with < 30% canopy cover
*Black-throated Blue Warbler	Maintain or create hardwood and mixedwood stands with 50-80% canopy cover and a dense understory (0-5' layer)
Pine Warbler	
Yellow-rumped Warbler	
*Black-throated Green Warbler	Maintain or create well-stocked, uneven-aged mixedwood and softwood sawtimber stands with >80% canopy cover
Canada Warbler	Maintain or create mixedwood stands with 50-70% canopy cover, a dense understory (0-5') and midstory (6-30'), and an uneven forest floor
*Scarlet Tanager	Maintain or create well-stocked, uneven-aged, hardwood sawtimber stands with >80% canopy cover
*Rose-breasted Grosbeak	promote mid-story in hardwood stands with oak component
Indigo Bunting	promote hardwood regeneration along field edges and early successional in a short rotation

**denotes priority species*

Forest stand specific recommendations are included in the Forest Management Plan.

Appendix IV – Species List by Date of Observations and Numbers

SPECIES	5/9/2019	5/30/2019	6/7/2019	6/20/2019	7/4/2020	CC Total	BBS Total
Canada Goose	2					2	
Wood Duck	2		8		2	12	
Mallard	4	1		1		6	2
American Black Duck	1				1	2	
Hooded Merganser	2	4	1	2	2	11	2
Common Merganser	4					4	
Ruffed Grouse				1		1	
Wild Turkey	2				3	5	
Mourning Dove			2	2	2	6	3
Ruby-throated Hummingbird		1	2			3	1
Spotted Sandpiper	1					1	
Common Loon	4	4	5	2	3	18	12
Double-crested Cormorant			1		1	2	1
Great Blue Heron		1	3		1	5	3
Turkey Vulture	2	4			3	9	
Osprey	1					1	
Sharp-shinned Hawk	1					1	
Red-shouldered Hawk	1					1	
Broad-winged Hawk	3	4	2	1	5	15	
Red-tailed Hawk	2		1			3	
Barred Owl	2					2	
Belted Kingfisher	1	1	1	1		4	2
Yellow-bellied Sapsucker	4	8	7	14	8	41	14
Downy Woodpecker				1	2	3	
Hairy Woodpecker	1	3	1	3	2	10	2
Pileated Woodpecker		2	2	1	1	6	4
Northern Flicker		1	1			2	
Eastern Wood-Pewee		6	9	5	7	27	8
Yellow-bellied Flycatcher		1				1	
Least Flycatcher	2	4	8	4	7	25	7
Eastern Phoebe	3	6	12	5	6	32	13
Great Crested Flycatcher		6	1	1	2	10	6
Eastern Kingbird		1	1	3	2	7	4
Blue-headed Vireo	12	7	21	18	6	64	24
Red-eyed Vireo		35	52	53	38	178	79
Blue Jay	8	16	8	5	5	42	20
American Crow	2	8	9	2	3	24	12
Common Raven	1	3	2	2	3	11	6
Black-capped Chickadee	7	13	6	14	18	58	12
Tufted Titmouse	3	2	4			9	3
Northern Rough-winged Swallow		2				2	2
Tree Swallow		2				2	1
Barn Swallow	1	3				4	
Golden-crowned Kinglet	1				1	2	
Ruby-crowned Kinglet	1					1	
Red-breasted Nuthatch	2	3	4	3	9	21	4
White-breasted Nuthatch	3	3	1	1	9	17	

Brown Creeper	2	4	6	5	4	21	9
Winter Wren	5	11	6	7	3	32	16
Gray Catbird					1	1	
Veery		4	2	3	1	10	7
Hermit Thrush	3	7	8	10	8	36	6
American Robin	6	4	10	5	9	34	11
Cedar Waxwing		2	5	4	9	20	2
Purple Finch	2	1		4	1	8	4
Red Crossbill					6	6	
American Goldfinch		5	6	2		13	10
Chipping Sparrow	3	4	4	4	6	21	6
Field Sparrow		3	2			5	
Dark-eyed Junco		4	4	4	12	24	2
White-throated Sparrow	6					6	
Song Sparrow	3	8	15	18	9	53	28
Swamp Sparrow	2					2	
Eastern Towhee		1			2	3	
Baltimore Oriole		1		1		2	1
Red-winged Blackbird		1		1		2	1
Brown-headed Cowbird					1	1	
Common Grackle		2	1	3	1	7	5
Ovenbird	5	42	33	27	17	124	66
Northern Waterthrush	1					1	
Black-and-white Warbler	3	7	6	3	2	21	7
Tennessee Warbler		1				1	
Nashville Warbler	1	5	2			8	1
Mourning Warbler					2	2	
Common Yellowthroat		10	3	1	8	22	6
Northern Parula		2		3	4	9	4
Magnolia Warbler		5				5	1
Blackburnian Warbler	4	21	21	22	15	83	33
Chestnut-sided Warbler		13	6		5	24	
Black-throated Blue Warbler	4	12	12	7		35	10
Pine Warbler	16	12	11	10		49	16
Yellow-rumped Warbler	30	17	7	4		58	23
Black-throated Green Warbler	18	25	22	15		80	41
Canada Warbler		1				1	
Scarlet Tanager		6	19	5		30	21
Rose-breasted Grosbeak		1		1		2	2
Indigo Bunting		2	1			3	
Total Birds	200	399	387	314	278	**1578**	**586**
Total Species						**87**	**53**

APPENDIX – B

Table and Graph

Data Keys and Explanation

Tables:

Tract Level Total Forest Stocking

This table shows the total of all products tallied on the tract. The header rows include:

- **Veneer:** Board feet of veneer volume by species. Veneer is the highest value product, sold as either sliced or rotary.
- **Sawlog:** Board feet of sawlog volume by species. Sawlog is the second highest value product, and is sawn into dimensional lumber.
- **Pallet/Tielog:** Board feet of Pallet or Tie logs. Pallet/Tie are low grade sawtimber, often sold as pallet material, historically sold as ties for the railroad.
- **Total BF:** Total of all Veneer, sawtimber and pallet products, computed into board feet.
- **Pulp:** Total of pulp volume by species in cords. Cords are piles of round wood measuring 4x8'. This is a low value product, can also include volume that would be used as chips for paper or pellets.
- **Growing Stock:** Measured in cords, growing stock is volume of trees that are too small to be a commercial product but have the quality to become sawtimber in the future. It is helpful to differentiate valuable growing stock from low value pulpwood, but measured in cords.
- **Cull:** Measured in cords, cull is non-commercial volume. It's quality is so low it has no commercial value, but often has high wildlife or diversity value as standing trees.
- **Total Volume in Cords:** This is the total volume on the tract converted to cords. It is useful for determining allowable cut and growth rates.
- **% Cords:** This shows the percent of volume by species calculated in cords.

Stand Level Forest Composition and Volume

These tables show the volume and composition at a stand level. The header rows include:

- **Species:** Species found in stand separated into hardwood and softwood groups.
- **% TPA:** This is the percent trees per acre by species. Useful for determining stand composition.
- **Veneer:** Board feet of veneer volume by species. Veneer is the highest value product, sold as either sliced or rotary.
- **Sawlog:** Board feet of sawlog volume by species. Sawlog is the second highest value product, and is sawn into dimensional lumber.
- **Pallet/Tielog:** Board feet of Pallet or Tie logs. Pallet/Tie are low grade sawtimber, often sold as pallet material, historically sold as ties for the railroad.
- **Total BF:** Total of all Veneer, sawtimber and pallet products, computed into board feet.

- **Pulp:** Total of pulp volume by species in cords. Cords are piles of round wood measuring 4x8'. This is a low value product, can also include volume that would be used as chips for paper or pellets.
- **Growing Stock:** Measured in cords, growing stock is volume of trees that are too small to be a commercial product but have the quality to become sawtimber in the future. It is helpful to differentiate valuable growing stock from low value pulpwood, but measured in cords.
- **Legacy:** Calculated in cords, legacy trees have some sort of exception biological or other value, often called biological legacies. They might include large old trees that are often non-commercial or they might be an uncommon species. They are trees that typically would not be harvested during a timber sale.
- **Total Volume in Cords:** This is the total volume on the stand converted to cords. It is useful for determining allowable cut and growth rates.
- **High Risk:** Calculated in board feet, this is high value sawtimber volume found in a tree that has been identified as high risk, meaning there is risk of losing this product if left to grow much longer. For example, it might be in a tree that is structurally unsound such as having a split fork, or is in significant decline. High levels of high risk volume is a signal that a timber sale should be evaluated soon.
- **AGS Saw:** This is the amount of sawtimber that is found in Acceptable Growing Stock trees, meaning it has the health, quality and vigor to continue to grow through this planning period. A high level of AGS Sawtimber volume suggests this stand can be left to grow for the time being.
- **% AGS Sawtimber:** This shows the percent of the sawtimber by species that is found in the AGS trees. Low percent means that species in general is of poor quality, health and/or vigor and would likely be targeted for harvest in a timber sale. High percent means that species would not be targeted for harvest.

Snags Per Acre and Down Logs Per Acre

These tables are fairly self-explanatory. They show numbers of Snags (standing dead trees) and Down Logs per acre by class, including Sound, Moderately Punky, and Punky Throughout. Snags and Down Logs are important for many types of wildlife and forest functions. Generally, the more and larger per acre the better.

Graphs:

Diameter Distribution

This grapy shows Trees Per Acre on the Y axis, and diameter on the X axis. The Trees Per Acre are further categorized into Status Codes, shown it the legend, typically including AGS (Acceptable Growing Stock), UGS (Unacceptable Growing Stock), High Risk, Legacy, and Cull.

Regeneration Stocking by Percent Stand Area

This graph shows species on the Y axis and percent stand area on the X axis. The species are further broken into status categories shown in the legend. Each category represents the number and size per area required to ultimately generate 1 successful tree. For example, to be considered “Stocked” in the “Large Sapling” category, there must be at least 2 stems between .5 and 1.5 inches in diameter in 1/400th acre. To be stocked in the “Sapling” category, there must be 5 stems between 3 and 5 feet tall, and “Seedling” requires at least 25 seedings present. The value of this type of regeneration data goes beyond just numbers of stems per acre, it sets thresholds that must be met to safely say that species will successfully regenerate. The last category of “Not Stocked” means the species was present but did not meet the threshold to be considered stocked.

Vigor and Browse Levels of Regeneration

These graphs are fairly self-explanatory. They show both the vigor and browse level of regeneration. This is important for determining is the species is doing well on the site (vigor) or if it is being browsed. Both of these are important considerations for determining “Success” of existing regeneration.

APPENDIX – C

Forestry Terms For The Woodland Owner

Forestry terms for the woodland owner

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Updated by Jeffrey Smith

As a woodland owner, you may hear or see unfamiliar terms used by foresters or in your forest management plan or timber sale contract. Forestry is a specialized field with its own terms and abbreviations. This guide will define many of the terms commonly used in forestry and woodland management.

Acre - An area of land containing 43,560 square feet.
Advanced Reproduction - Young trees established before a regeneration cutting.
Aspect - The direction that a slope faces (north, south, etc).
Basal Area - The cross-sectional area of a tree, in square feet, at 4.5 feet from the ground (breast height). When the basal area of all trees in a stand are summed, the result is expressed as square feet of basal area per acre, which is a measure of a stand's density.
Biltmore Stick - A graduated stick used to estimate tree diameters by holding it against the tree at breast height.
Board Foot - A unit for measuring wood volumes. It is commonly used to express the amount of wood in a tree, sawlog or individual piece of lumber. A piece of wood one foot long, one foot wide and one inch thick (144 cubic inches).
Bolt - A short log or a squared timber cut from a log, usually less than 8 feet long.
Browse - Twigs and buds of small shrubs and trees eaten by deer and livestock.
Buck - To saw felled trees into shorter lengths.
Buffer Strip - A protective strip of land or timber adjacent to an area requiring attention or protection. For example, a protective strip of unharvested timber along a stream.
Cambium - The growing layer of cells beneath bark of a tree from which new wood and bark develop.
Canopy - The more or less continuous cover of branches and foliage formed collectively by the tops (crowns) of adjacent trees.
Cavity Tree - See Den Tree.
Chain - A unit of linear measurement; 66 feet.
Clearcut - A harvest and regeneration technique that removes all trees from an area. Also called a regeneration cut.
Clinometer - An instrument for measuring vertical angles or slopes.
Co-Dominant Tree - Trees whose crowns form the general level of the forest canopy and receive full sunlight only from above.
Conifer - A cone-bearing tree with needles, such as pines, spruces and firs that produces wood commonly known as softwood.
Cord - A stack of wood containing 128 cubic feet. A standard cord measures 4 feet X 4 feet X 8 feet of wood and air.
Crop Tree - A tree identified to be grown to maturity for the final harvest cut, usually on the basis of its location with respect to other trees and its timber quality.
Crown - The branches and foliage of a tree.
Cruise - A survey of forest land to locate timber and estimate its quantity by species, products, size, quality or other characteristics; the estimate obtained in such a survey.
Cruiser Stick - See Biltmore.
Cull - A tree or log of merchantable size that, because of a defect, is useless for its intended purpose.
DBH - See Diameter Breast Height.
Defect - That portion of a tree or log which makes it unusable for the intended product. Defects

include rot, crookedness, cavities and cracks.
Den Tree - A living tree with a hollow cavity in the top large enough to shelter wildlife. Also called cavity tree.
Dendrology - The study of the identification of trees.
Diameter Breast Height (DBH) - The diameter of a tree at 4.5 feet above the ground.
Diameter Inside Bark (DIB) - The diameter inside the bark; used in log scaling.
Diameter Tape - A specially graduated tape used to directly determine tree diameter when stretched around the circumference of the tree stem.
Dibble Bar - A flat or round metal tool used to make holes for planting seedlings.
Dominant Tree - Tree with its crown above the general level of the canopy that receives full sunlight from above and partial light from the sides.
Edge - In wildlife management, the area where the variety of types of food, cover, water or terrain required by a particular species come together.
Even-Aged Management - Forest management with periodic harvest of all trees on part of the forest at one time, or over a short period to produce stands containing trees all the same or nearly the same age or size.
Face Cord - A stack of wood 4 feet high and 8 feet long, composed of logs of varying length.
Felling - The process of cutting standing trees.
Firebreak - A natural or constructed barrier utilized to stop or check fires.
Firsts and Seconds (FAS) - The highest standard grade for hardwood lumber.
Forest - A plant community dominated by trees and other wood plants.
Forest Inventory - See Cruise.
Forest Type - A group of tree species that, because of their environmental requirements, commonly grow together. Example - the oak-hickory type.
Forester - A person who has been professionally educated in forestry at a college or university.
Girdling - Completely encircling the trunk of a tree with a cut that severs the bark and cambium of the tree, usually resulting in the death of the tree.
Grading - Evaluating and sorting trees, logs or lumber according to quality.
Habitat - The type of place in which the plant or animal lives, such as forest habitat, grassland habitat and marsh habitat.
Hardwood - A term describing broadleaf trees, usually deciduous, such as oaks, maples, ashes, etc.
Harvest - In general use, removing all or portions of the trees on an area. It can mean removing trees on an area to 1) obtain income, 2) develop the environment necessary to regenerate the forest, and on occasions, 3) to achieve special objectives such as development of special wildlife habitat needs, in contrast with intermediate cuttings.
Heel-In - To store young trees before planting by placing in trench and covering roots with soil.
Height, Merchantable - Tree height up to which a particular product may be obtained. For example, if 8-inch minimum diameter sawlogs were being cut from a tree, its merchantable height would be its height up to a diameter of 8 inches.
Height, Total - Tree height from ground level to top.
High-Grading - Cutting only the high value trees from a forest property.
Hypsometer - A graduated stick used to estimate tree height. It is often combined with a Biltmore stick.
Increment Borer - An auger-like instrument with a hollow bit, used to extract cores from trees for growth and age determination.
Intermediate Cut - Removing immature trees from the forest sometime between establishment and stand harvest to improve the quality of the remaining forest stand. Contrast with a harvest cut.
Intermediate Trees - Trees with crowns below the general level of the canopy, receiving some sunlight from above but none from the sides.

Landing - A place where logs are taken to and loaded on trucks for transport to mill.
Log Rule - A table showing estimated amount of lumber that can be sawed from logs of given lengths and diameters. Commonly used in Missouri are:
1. Doyle Rule is a simple formula used in the eastern and southern United States; it underestimates the amount of lumber in small logs and overestimates large logs.
2. International 1/4" Rule is a formula rule allowing 1/2" taper for each 4 feet of length and 1/16" shrinkage for each one-inch board; closely approximates the actual sawmill lumber tally.
Logger - An individual whose occupation is harvesting timber.
Lump Sum Timber Sale - Standing timber is sold for a fixed amount agreed upon in advance; the sale may cover a given acreage, tracts, certain species or diameter classes of trees. Distinguished from a scale or unit sale in which payment is based on the amount harvested (e.g. so much per thousand board feet).
Mast - Nuts of such trees such as oak, walnut and hickory that serve as food for many species of wildlife.
Mature Tree - A tree that has reached the desired size or age for its intended use.
MBF - Abbreviation for One Thousand Board Feet.
Merchantable - The part of a tree or stand of trees that can be manufactured into a salable product.
Multiple Use - Land management for more than one purpose, such as wood production, water, wildlife, recreation, forage and aesthetics.
Overstocked - Forest or stand condition where more trees are present than at normal or full stocking.
Overstory - That portion of the trees in a stand forming the upper crown cover.
Overtopped - See Suppressed Trees.
Pallet - Tray constructed from wood used to store, load and unload various materials.
Planting Bar - A hand tool used to plant seedlings. (See Dibble Bar)
Plot Sample Cruise - A method of estimating standing timber, stocking or volume whereby all trees above a minimum diameter are tallied on plots with fixed boundaries.
Point Sample Cruise - A method for estimating standing timber, stocking or volume without establishing sample plot boundaries. An instrument such as a prism is used to make a 360º sweep from a series of sampling points, counting at each the number of stems that breast-height diameters appear larger than the fixed angle of the instrument. The average stem number multiplied by a factor appropriate to both the fixed angle and the units of measurement chosen gives the basal area per unit area of stand. (Also called variable plot sampling, prism cruising)
Pole Saw - A saw attached to a long pole for pruning tree limbs without using a ladder.
Pole Timber - Trees from 6" to 12" in diameter at breast height.
Prescribed Burning - Use of controlled fire to dispose of unwanted material, following a planned prescription of fuel, weather or other conditions.
Props - In mining, a round, squared or split timber that supports the roof.
Prism, Wedge - An instrument that incorporates a fixed angle and can be used to determine basal area. See Point Sample Cruise.
Pruning - Removing live or dead branches from standing trees to improve wood quality.
Pulpwood - Wood cut primarily for manufacture of paper, fiberboard or other wood fiber products.
Regeneration Cut - See Clearcut.
Release - To free trees from competition by cutting, removing or killing nearby vegetation.
Reproduction - Young trees. The process by which a forest is renewed; either artificially by direct seeding or planting or naturally by self-sown seeds and sprouts.
Riparian Zone - The area adjacent to, or on the bank of, rivers and streams. Identified by vegetation, wildlife, and other characteristics unique to these locations.
Rotation - The number of years required to establish and grow trees to a specified size, product or condition of maturity. For example, oaks may have an 80-year rotation for sawlogs and Scotch pine a

10-year rotation for Christmas trees.
Salvage Cut - Harvesting damaged or defective trees for their economic value.
Sapling - Trees from 2" to 6" in diameter at breast height.
Sawtimber - Trees 12" diameter breast height and larger, from which a sawn product can be produced.
Scale Stick - A flat stick calibrated so log volumes can be read directly when the stick is placed on the small end of a standard log.
Scaling - Estimating usable wood volume in a log.
Seed Tree Harvest - Removing nearly all trees from the harvest area at one time, but leaving a few scattered trees to provide seed for a new forest. Sometimes used in Missouri to regenerate pine.
Seedlings - New trees growing from seeds or sprouts less than 2" in diameter at breast height. Also, trees grown in a nursery for one or more years.
Selection Harvest - Harvesting of trees in small groups or as individual trees at periodic intervals to maintain an uneven-age stand. May be described as single tree or group selection system.
Shade Tolerance - The capacity of a tree to develop and grow in the shade of and in competition with other trees. An example of high shade tolerance is sugar maple.
Shearing - To trim back and shape tree branches, making foliage dense and giving the tree a conical form. Used to produce Christmas trees.
Shelterwood Harvest - A harvesting method that entails a series of partial cuttings over a period of years in the mature stand. Early cuttings improve the vigor and seed production of the remaining trees. The trees that are retained produce seed and also shelter the young seedlings. Subsequent cuttings harvest shelterwood trees and allow the regeneration to develop as an even-aged stand.
Silviculture - The art and science of producing and tending a forest.
Site - 1) A tract of land with reasonably uniform soil and climatic factors; 2) an area evaluated for its ability to produce a particular forest or other vegetation based on the combination of biological, climatic and soil factors.
Site Index - An expression of forest site quality based on the height of a free-growing dominant tree at age 50. (or age 100 in western United States).
Site Preparation - Preparing an area of land for forest establishment. May include clearing, chemical vegetation control or burning.
Skid Trail - A road or trail over which equipment or horses drag logs from the stump to a landing.
Skidding - Pulling logs from where they are cut to a landing or mill.
Slash - Debris left after logging, pruning, thinning or brush cutting. May include tree tops, branches, bark or debris left after wind or fire damage.
Snag - A standing dead tree from which leaves and most of branches have fallen. Used for wildlife.
Softwoods - See Conifer.
Stand - A grouping of trees with similar characteristics (such as species, age, or condition) that can be distinguished from adjacent groups. A stand is usually treated as single unit in management plan.
Stave Bolts - Material cut from the white oak group and used in the manufacture of wooden barrels.
Stocking - An indication of the number of trees in a stand as compared to the desirable number of trees for best growth and management. See Overstocked, Understocked.
Stumpage - The value of timber as it stands uncut in the woods (on the stump).
Succession - The replacement of one plant community by another until ecological stability is achieved.
Suppressed Trees - Trees with small crowns that are entirely below the level of the canopy, receiving no direct sunlight. Also called overtopped trees.
Thinning - Generally, a cutting or killing of trees in an immature stand to reduce the tree density and concentrate the growth potential on fewer, higher quality trees resulting in larger trees with faster growth.

Timber Stand Improvement (TSI) - All thinnings made during life of a forest stand for the purpose of improving the composition or productivity of the stand. TSI methods may include removing vines, thinning, cull tree removal and pruning.
Tree Farm - A privately owned forest or woodland in which producing timber crops is a major management goal, certified as a "Tree Farm" by the American Tree Farm System, an organization sponsored by the American Forest Foundation, Washington, D.C. Tree Farm is a registered trademark of the American Forest Foundation.
Undesirable Growing Stock - Trees of low quality or less valuable species that should be removed in a thinning.
Understocked - Insufficiently stocked with trees.
Understory - That portion of the trees and shrubs in a forest forming lower layer of vegetative growth.
Uneven-Aged Management or Stand - A stand of trees containing at least three age classes intermingled on the same area.
Veneer/Veneer Log - A thin sheet of wood sliced or peeled on a veneer machine and often used for plywood or surfacing furniture; veneer logs are the large (usually more than 18 inches in diameter), knot-free, high-quality logs from which veneer is obtained.
Volume - The amount of wood in a tree, stand of trees or log according to some unit of measurement (board foot, cubic foot, etc.)
Volume Table - A table estimating volume of wood in a standing tree based on measurements of tree, most commonly DBH and merchantable height.
Wolf Tree - An overmature tree of very large size.

APPENDIX – D

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