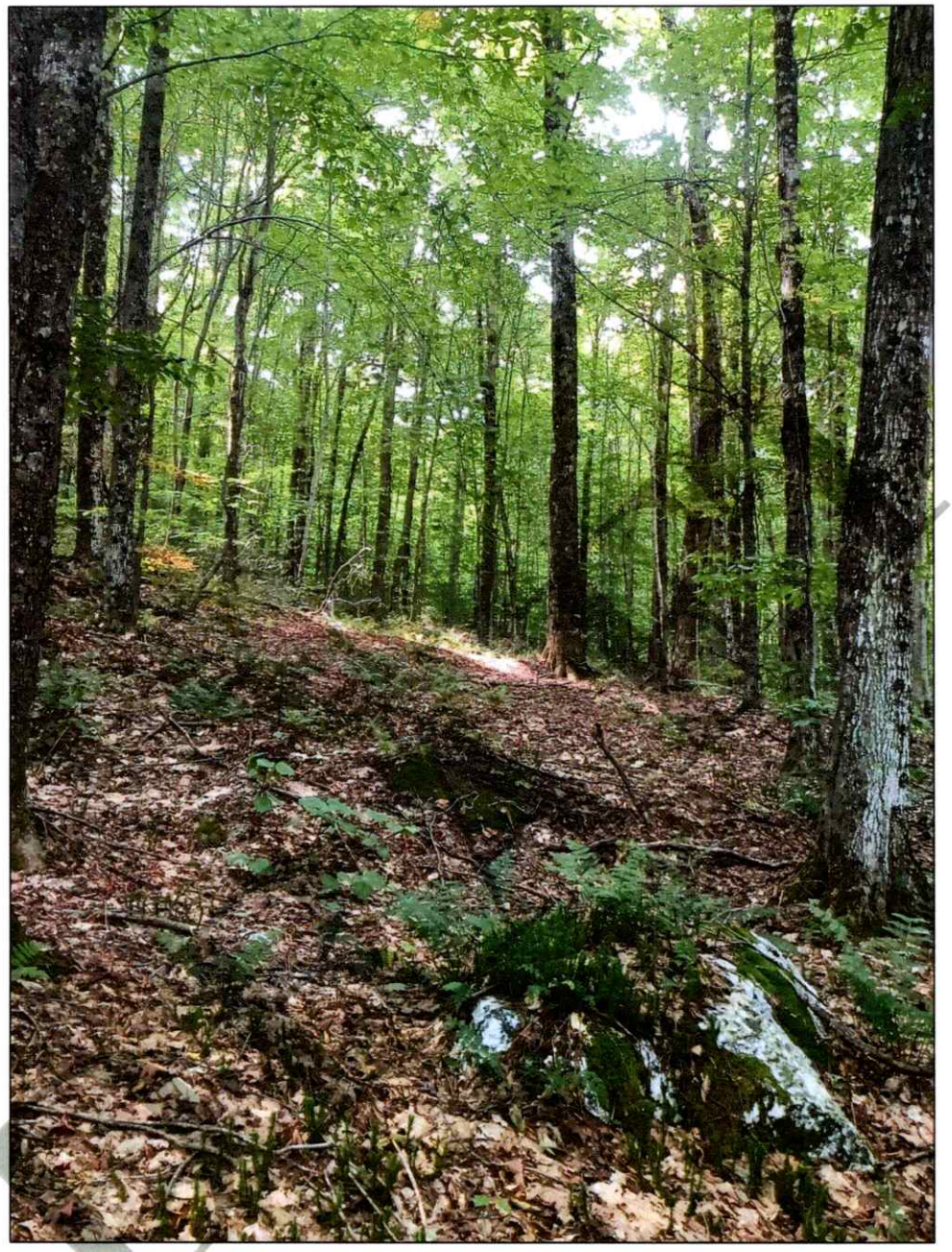

Forest Management Plan

BELVIDERE TOWN FOREST

Emily Potter | County Forester | VT Licensed Forester 148.0125340

Forest Management Plan Approval

This forest management plan was prepared by Emily Potter, County Forester, at the request of the Town of Belvidere.

Printed Name	**Signature**	**Date**

We certify that we have read and approve of the 2025 Forest Management Plan for the Belvidere Town Forest and agree to implement this plan to the best of our abilities. This Forest Management Plan includes the application of silvicultural practices and best available applied ecological research as well as full implementation of the "Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont" to control stream siltation and soil erosion.

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Purpose of Forest Management Plan

The following forest management plan is intended to provide information and guidance to the Town of Belvidere's Selectboard for the management of the approximately 90-acre forest owned by the Town of Belvidere. This plan will provide management guidance for a 10-year period beginning in 2025. The plan should be updated on a 10-year cycle starting in 2035, and a new forest inventory should be completed at that time. This forest management plan contains information collected from a forest inventory completed in the summer and fall of 2024. The information contained in this plan includes ecological, economic, and social considerations to help the Town of Belvidere Selectboard make informed decisions based on long-term management objectives for this land.

This forest management plan is a compilation of information from soil and water quality considerations to forest cover types and wildlife habitat features. The intent of this plan is to guide forest management on the property to be consistent with the State of Vermont's Stewardship Ethic which states:

> *"Stewardship is an ethic recognizing that the land and its natural inhabitants have an inherent worth and that we have a responsibility to manage our actions as part of that. It guides us to manage our activities to the utmost of our abilities, to ensure the future health, productivity, and wellbeing of the land, its natural communities, and species, and to allow our successors opportunities at least equal to ours to use the land and its resources."*

General Property Description

Location

One way to better understand the complexity of landscapes in Vermont is to think about our State's *biophysical regions* (Figure 1). There are eight distinct regions in Vermont based on differences in elevation, vegetation, climate, geology, topography, land-use history, and hydrology. Lamoille County (and therefore the Belvidere Town Forest) is in the Northern Green Mountains biophysical region. The Green Mountains are part of the Appalachian Mountain chain extending from Alabama to Quebec. The Northern Green Mountains include Vermont's highest mountain (Mount Mansfield), its coldest climate, and the greatest annual precipitation compared to anywhere else in the state. Bedrock in the Northern Green Mountains is primarily acidic, non-calcareous metamorphic rock. Northern hardwoods such as birch, beech and maple dominate the region on the mountain slopes up to about 2,500 feet, above which yellow birch and red spruce are dominant. Spruce-fir forests occupy the higher slopes and summits, with alpine meadows above 3,500 feet. Higher amounts of precipitation and deep snows in the mountains feed some of the state's largest rivers, including the Lamoille, Missisquoi, Winooski, and White. For more detailed descriptions of each biophysical region in Vermont, refer to the book *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont* (by Elizabeth Thompson, Eric Sorenson, and Robert Zaino).

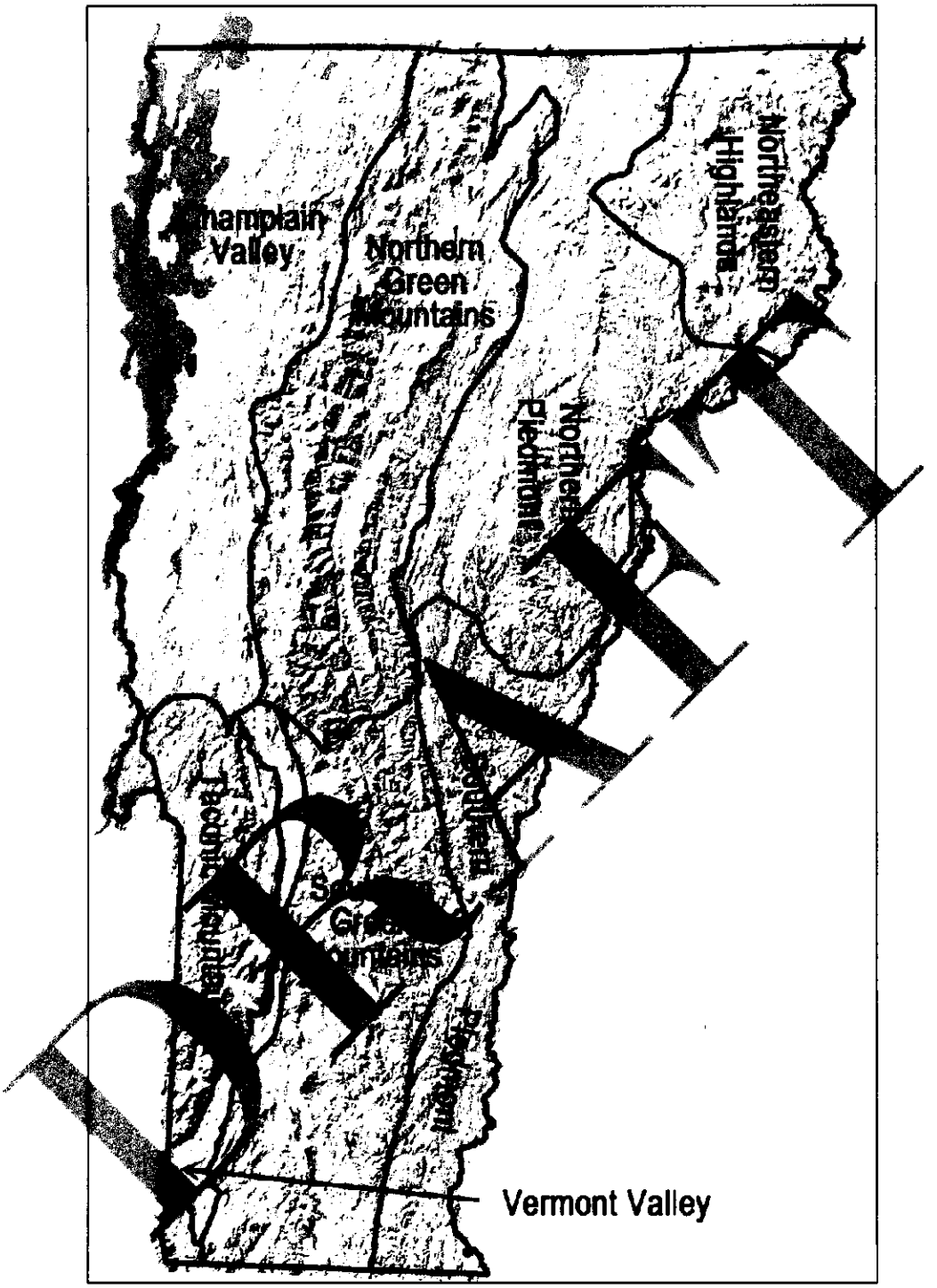


Figure 1: A map of the Biophysical Regions of Vermont. The Belvidere Town Forest is in the Northern Green Mountains.

The Belvidere Town Forest is in Belvidere Center, in the southwestern portion of the Town of Belvidere; south of and abutting VT Route 109, adjacent to the Belvidere School and the Belvidere Community Club property. Pedestrian access to the property is via the Belvidere School or across the Belvidere Community Club property. Potential for an access area on the northwestern corner of the property exists off Lost Meadows Road.

The Belvidere Town Forest is part of a 28,236-acre forest block in Belvidere, Eden, Johnson and Waterville (Figure 2).

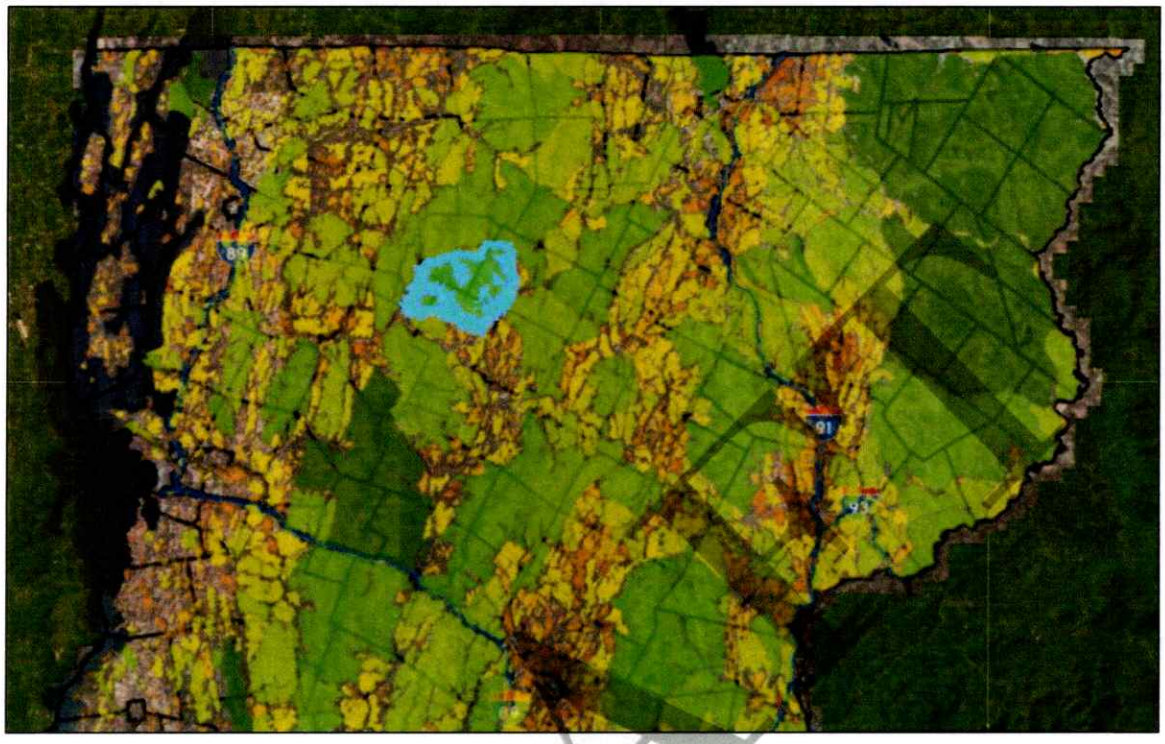


Figure 2: Map of forest blocks in northern Vermont. Darker greens represent large habitat blocks that are less fragmented by development and roads and therefore higher priority areas for protection than lighter-shaded areas. The Belvidere Town Forest is located within the blue highlighted area, an approximately 28,236-acre forest block.

It is important to note that our forests in Vermont, including the Belvidere Town Forest, are part of the largest, most intact, temperate broadleaf deciduous forest in the world (Figure 3). This forest provides connected habitat for a wide range of species that depend on large blocks of forest and is considered globally significant.

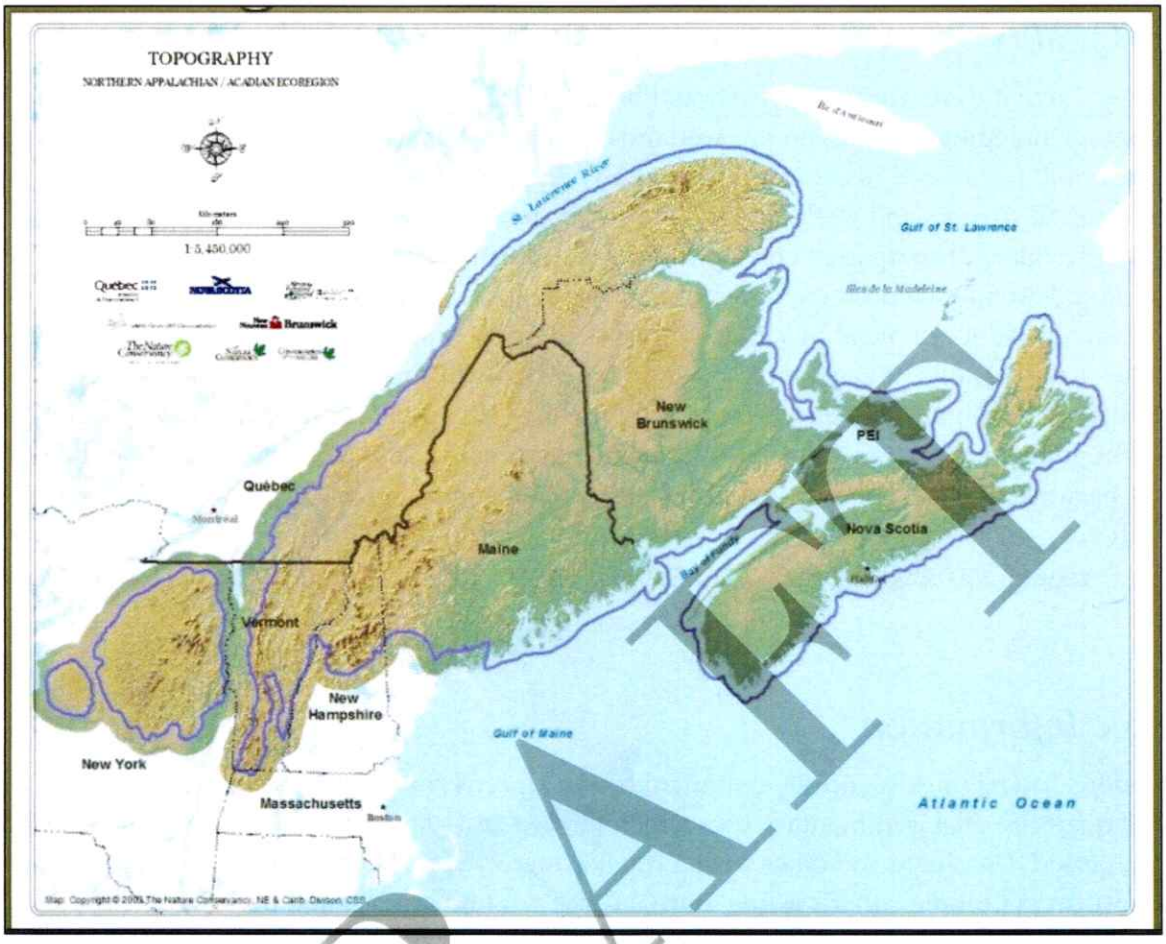


Figure 3: Map of the Northern Appalachian / Acadian Ecoregion, the largest, most intact, temperate broadleaf deciduous forest in the world. Viewed in this context, our forests in Vermont, including the Belvidere Town Forest, are globally significant.

Rivers, Streams, & Wetlands

The Belvidere Town Forest lies entirely within the Lamoille River Watershed. Two streams originate south of and flow north through the property and a third stream runs west along the northeastern boundary for a short distance. All three streams flow directly into the North Branch of the Lamoille River just north of the Belvidere Town Forest and continue westward to Lake Champlain.

There are no mapped wetlands on the property. Wetlands and riparian areas are essential for floodwater mitigation, wildlife habitat, and maintenance of water quality. Wetlands and riparian areas support a diverse array of wildlife species from birds and mammals to amphibians and reptiles. Many species of wildlife rely on wetland and river corridors for travel, breeding, and dispersal.

Water Quality

Management activities on this property should be carried out in a way that protects water quality for all surface waters including streams, ponds, wetlands, and vernal pools. Erosion and sediment control measures should be utilized to avoid and reduce any disturbance due to logging, trail construction, or maintenance. All streams and wetlands should be afforded operational buffers during harvesting activities. Particularly, the riparian corridors along the streams within the parcel and any sensitive areas with hydric soils should be protected to minimize erosion, sedimentation, and degradation. One of the simplest ways to reduce or avoid negative impacts is to restrict management activities to times of very dry soil conditions or, ideally, frozen winter ground. The Vermont Department of Forests, Parks & Recreation's publication to protect Vermont water quality, *Acceptable Management Practices* (AMPs), is an excellent guide for skid trail and landing design, maintenance, and close-out, and should be followed to reduce negative impacts due to logging. The *Acceptable Management Practices* (AMP) manual is available here:
https://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Management/Library/FullDocument-7.29.pdf

Geologic Information

The Belvidere Town Forest is entirely underlain by the Hazens Notch Formation, a bedrock comprised of schist and quartzite, metasedimentary rock which formed 480-500 million years ago in the Ordovician to Cambrian period. Dominant soil types within the Belvidere Town Forest include the very rocky Tunbridge-Lyman Complex; Marlow fine sandy loam; Peru fine sandy loam; Berkshire-Tunbridge Complex; and Berkshire fine sandy loam. These are all relatively deep, well-drained soils that are found on mountains and hills.

Regardless of soil types, forest management activities in the forest will strive to minimize erosion through winter harvesting and implementation of the *Acceptable Management Practices* (AMPs) to protect water quality. A soil type map with descriptions of soil types can be found in the Appendix of this document.

Native Biodiversity

Protecting native biodiversity is an essential part of maintaining a healthy forest ecosystem. Careful monitoring of the property for invasive species is critical to reducing their spread and limiting their negative impacts to the forest ecosystem. Invasive species, if allowed to persist, can out-compete native species, degrade habitat quality and impair ecosystem functions. When infestations of invasive species are noted and dealt with early on they can be controlled most efficiently and cost-effectively, their negative impacts will be reduced, and the chance of further spread can be eliminated.

Wildlife

Wildlife habitat diversity and quality should be encouraged. Deer wintering grounds, vernal pools, wildlife corridors, snags and den trees should be maintained and enhanced. The retention of hard mast

(nuts and seeds) and soft mast (fruit) trees should be applied to provide sources of food for various wildlife species.

The Belvidere Town Forest, situated within a 28,236-acre forest block, helps to provide wildlife habitat and travel corridors for a wide range of wildlife species. Species likely frequenting or passing through this forest include but are not limited to white-tailed deer, fisher, bobcat, moose, and black bear (as evidenced by beech trees with bear claw marks on their bark observed during the forest inventory), as well as a host of amphibians such as the red-backed salamander and spotted salamander, and perhaps a reptile or two. Songbirds such as the black-throated green warbler, black-throated blue warbler, black-and-white warbler, red-eyed vireo, ovenbird, hermit thrush, wood thrush, veery, scarlet tanager, and blackburnian warbler (to name a few of Vermont's summer migrants) could all potentially be seen nesting in or passing through the northern hardwood and hemlock stands of the Belvidere Town Forest.

The forest has an abundance of habitat characteristics that are used by several species of wildlife, including hardwood and softwood forest, riparian areas, rock outcrops and nearby open land. Multiple species of trees which produce soft mast and hard mast, including black cherry, beech, red spruce and yellow birch are also present on the property and provide a food source for birds and wildlife in the area.

Another habitat feature boasted by this property is the presence of large trees in varying stages of decay with the potential to develop into cavity trees (also known as den trees) which provide den and nest sites for many species. These decaying trees also provide an important food source for woodpeckers (such as the downy, hairy, or pileated woodpecker) that feed on the insects inside of them. When large cavity trees fall to the ground, they provide habitat for amphibians and small mammals and contribute to soil moisture and nutrient cycling.

Retention of five cavity trees per acre will provide habitat for forest mammals and birds. (One suggestion is to retain one cavity tree greater than 18 inches in diameter per acre and three cavity trees greater than 16 inches in diameter per acre). Retaining three snags (standing dead trees) per acre and two large, downed trees per acre will provide habitat for salamanders, small mammals, and invertebrates in the forest. This may not be the present condition throughout the property; however, establishing this structure property-wide can be achieved over the long term.

Based on information collected during the forest inventory of the property, there are currently approximately 13 snags per acre, the majority of which are 12" in diameter and smaller. There is approximately 1 snag per acre greater than 16" in diameter. The forest inventory did not include an assessment of downed trees.

Rare, Threatened & Endangered Species

A review of the Vermont Department of Fish and Wildlife's database revealed no occurrences of Rare, Threatened, or Endangered (RTE) species on the property, and no RTE species were observed or encountered during the forest inventory.

Forest Health

No significant forest health issues were observed or identified on the property during the 2024 forest inventory. Common forest pests and diseases were observed on the property including beech bark disease, *Eutypella* canker and maple borer damage on maple trees, and balsam woolly adelgid on balsam fir. During the forest inventory, no non-native, invasive plants were observed on the property. In general, it is very good practice to carry out annual monitoring of the forest and forest edges for the presence of non-native, invasive plants, including but not limited to honeysuckle, barberry, buckthorn, and Japanese knotweed. Non-native, invasive plants are relatively common in Lamoille County, making it even more important to monitor the forest for their presence before they become established and spread. Early detection and rapid response to invasions of these vigorous competitors is critical to maintaining forest health and biodiversity. More information on non-native, invasive plants and tips for identification can be found at www.vtinvasives.org. The County Forester is available to assist with identification and to provide suggestions and methods for control and eradication.

Recreation

The Belvidere Town Forest will provide a diversity of recreational opportunities to community members and visitors alike including hiking, bird watching, hunting, fishing, running, cross-country skiing and general enjoyment of nature in the forest. The existing forest roads on the property could be improved through grading, shaping, installing water bars or broad-based dips, and rerouting out of low, wet areas to enhance the recreational potential of the trails and help to reduce and prevent erosion. Maintaining access to forestland is essential for management activities and enjoyment of the resource.

Management Goals and Objectives

Below are the goals and objectives of the Town of Belvidere for the Belvidere Town Forest.

- Manage the land with an emphasis on forest health, wildlife habitat and connectivity, and maintenance and enhancement of existing sensitive sites, riparian areas and unique features or natural communities.
- Conduct forest management activities on the land in accordance with the best available science to improve forest health and resilience and provide the landowner with income through sale of sustainably harvested forest products.
- Provide opportunities for dispersed recreation including hiking, cross-country skiing, and snowshoeing.
- Provide forest-based educational opportunities and nature study for students and the Belvidere community.
- Identify areas for permanent protection where forest management activities will be limited to those that maintain and enhance old-forest characteristics.

Forest Resources

To measure, map and evaluate the forest resources of the Belvidere Town Forest, a forest inventory was conducted on the property in September of 2024. Thirty variable-radius (using a 10-factor prism) plots were systematically located throughout the forest (approximately 1 plot per 3 acres). Using ArcGIS Pro (a geographic information system (GIS) computer mapping program), sample points were located along a random grid which was overlaid on the property boundaries to create the field map for the inventory. The ArcGIS Pro map with the inventory grid and sample points was then loaded onto Avenza Maps (a mapping application which can be used on tablets and smartphones) and used to navigate to each point. Within each variable radius plot, trees are considered "in" the plot, and therefore measured, based on their cross-sectional area, measured at breast height (4.5' above the ground), and the factor of the prism used (in this case, a 10-basal-area-factor prism) used. Data was collected using a tablet and was then processed and stored using the State of Vermont's FOREX Inventory Database System. Three forest stands were identified, and over 370 trees measured for their diameter at breast height (DBH; measured at 4.5' above the ground), species, merchantable volume, and quality.

Each tree that fell within a plot and was therefore measured, was determined to be either Acceptable Growing Stock (AGS) or Unacceptable Growing Stock (UGS). Basal area (BA), which is the cross-sectional area of trees measured 4.5' above the ground, of Acceptable Growing Stock (AGS BA) trees consists of that portion of trees tallied as total basal area at each plot that are of commercial species and have the potential to produce sawlog-quality or better material now or in the future. Commercial species are those tree species that are commonly accepted as being commercially valuable. Unacceptable Growing Stock Basal Area (UGS BA) consists of that portion of trees tallied as total basal area at each plot that are not of commercial species, or do not have the potential to produce sawlog-quality or better material now or in the future. Examples of non-commercial species include species such as striped maple, hophornbeam, pin cherry and apple. AGS and UGS Basal Areas are used in the following pages to describe the stocking (or overall density) of overstory trees in each stand.

Recommendations for management of the forest stands described in this report are based on silviculture. **According to the U.S. Forest Service, *Silviculture*** *is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis. This is accomplished by applying different types of silvicultural treatments such as thinning, harvesting, planting, pruning, prescribed burning, and site preparation. Intermediate treatments (thinning) are designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest. Regeneration treatments (harvesting) are applied to mature stands in order to establish a new age class of trees.*

In this forest management plan, the prescriptions for managing each forest stand focus on improving forest health, enhancing wildlife habitat, maximizing carbon sequestration and storage, enhancing the forests' resilience in a changing climate and sustainably harvesting in a way that allows for repeated entries over a long timeframe, thereby providing (an admittedly infrequent) source of income to the Town of Belvidere. There is currently much interest in old forests in Vermont, and it may make sense to manage a portion of the Belvidere Town Forest to enhance old forest characteristics on the property. Accordingly, recommendations are made for growing large trees, retaining and recruiting snags (standing

dead trees), and coarse woody material (large logs and limbs) on the forest floor, and encouraging retention of both old "legacy trees" (big, old trees that will never be cut) and young trees of a diversity of species and size classes to accelerate the accumulation of old forest characteristics in this relatively young (in forest time) forest.

Silvicultural treatments are generally separated into two categories: even-aged management, and uneven-aged (or multi-aged) management. Even-aged treatments typically have a goal of creating large disturbances that will create favorable light conditions for shade-intolerant species such as pine, aspen, birch or oak. Even-aged treatments aim to replicate stand-replacing disturbances such as wind or insect defoliation, and in all even-aged treatment methods, the overstory is eventually removed.

Uneven-aged or multi-aged silviculture aims to mimic natural forest processes where trees live out their biological lifespans and die as individuals or in small groups due to natural disturbances such as windthrow. Uneven-aged management involves small, frequent disturbances that create small canopy gaps and eventually result in a diversity of age classes of trees and dominance of late-successional (generally shade-tolerant) species such as sugar maple, hemlock, and red spruce.

Uneven-aged silvicultural objectives are included in the following report and are generally in line with the goals and objectives for the forest identified by the Belvidere community. By utilizing ecological forestry techniques, forest managers can work to enhance old forest characteristics, to encourage and accelerate the growth of big trees, to create and improve wildlife habitat features, to ensure a diversity of tree species and size classes is present, to focus on maintaining and improving forest health, and to sequester and store carbon.

Figure 4, below, shows the species composition of trees in the Belvidere Town Forest based on the percentage of total basal area that they occupy.

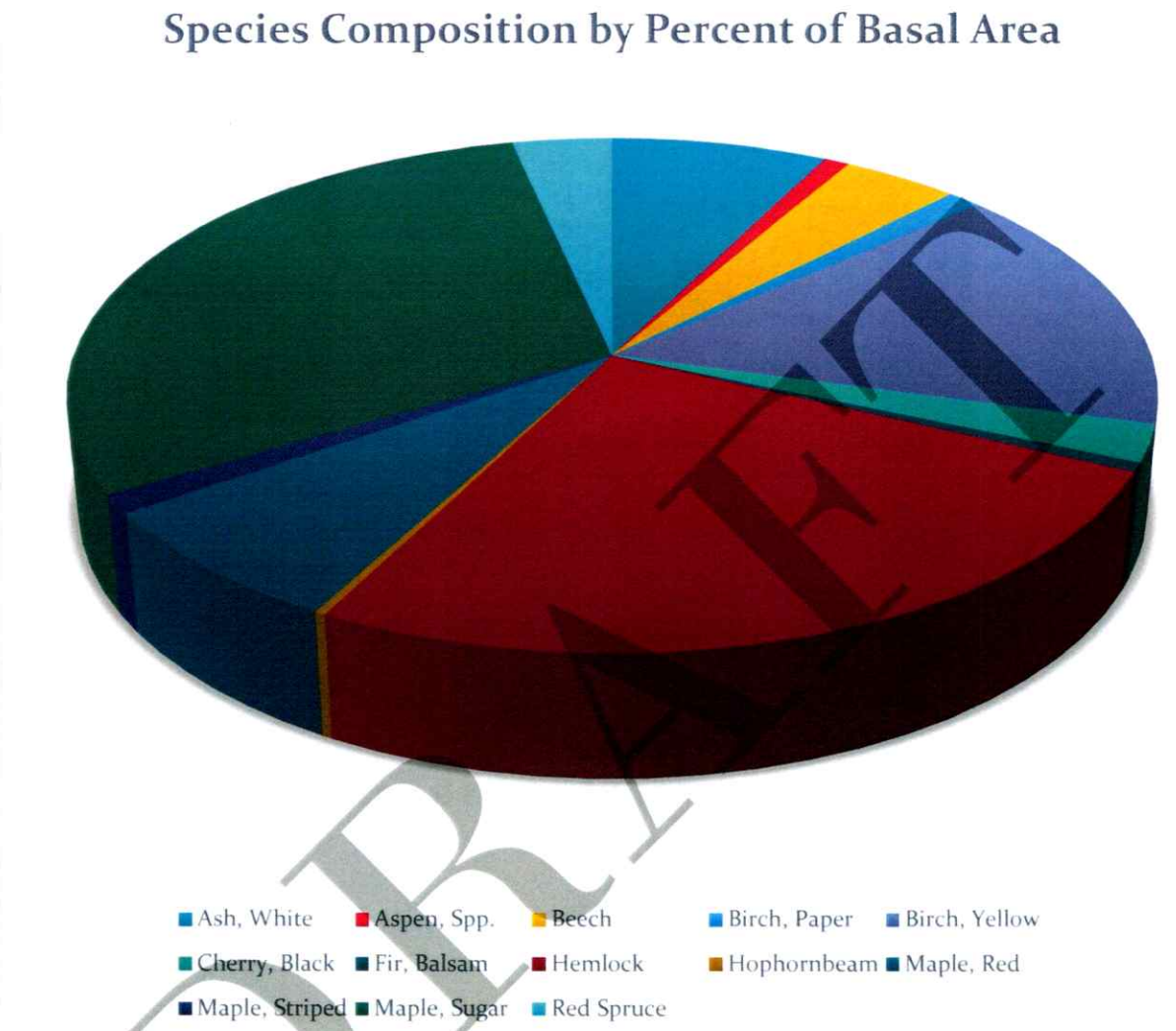


Figure 4: Species composition of the Belvidere Town Forest by percent of basal area.

Hardwoods account for approximately 71% of the trees measured, with 29% softwood. Sugar maple and hemlock are the most common species, accounting for 30% and 26% of the basal area, respectively. Yellow birch (16%), white ash (7%) and red maple (7%) were the next three most common species measured. Other species present (14%) include beech, red spruce, black cherry, paper birch, striped maple, aspen, balsam fir, and hophornbeam. The graph below shows trees per acre by DBH class and species.

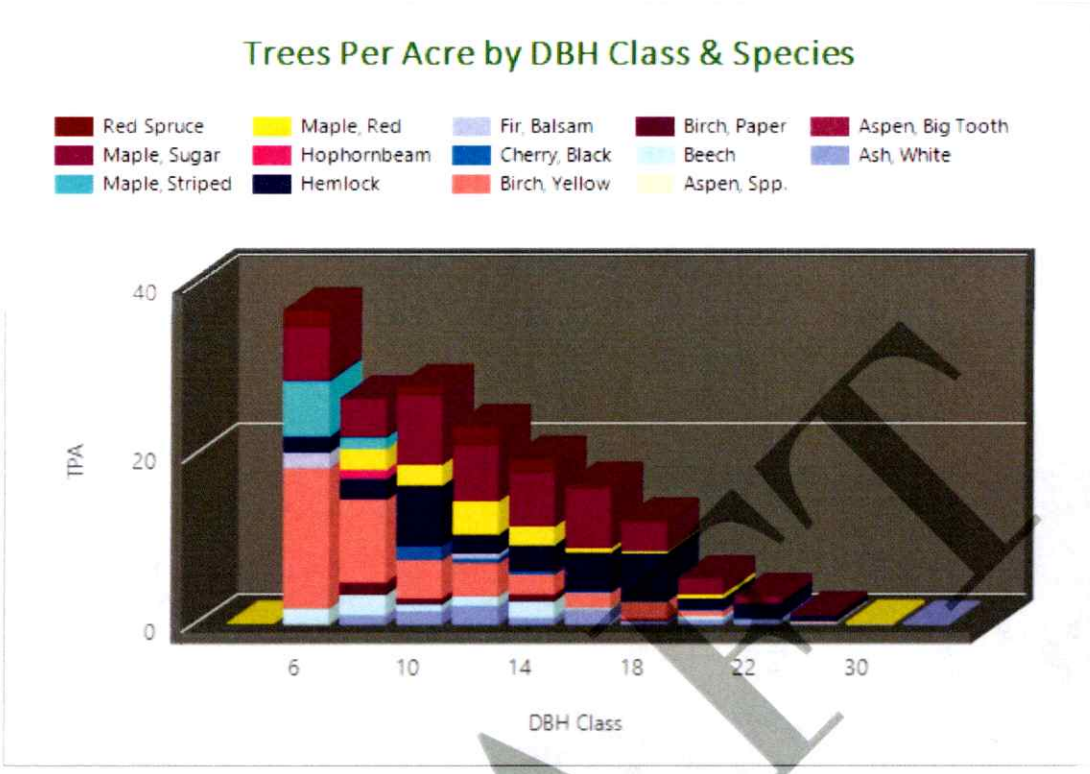


Figure 5: Trees per acre by DBH class and species in the Belvidere Town Forest.

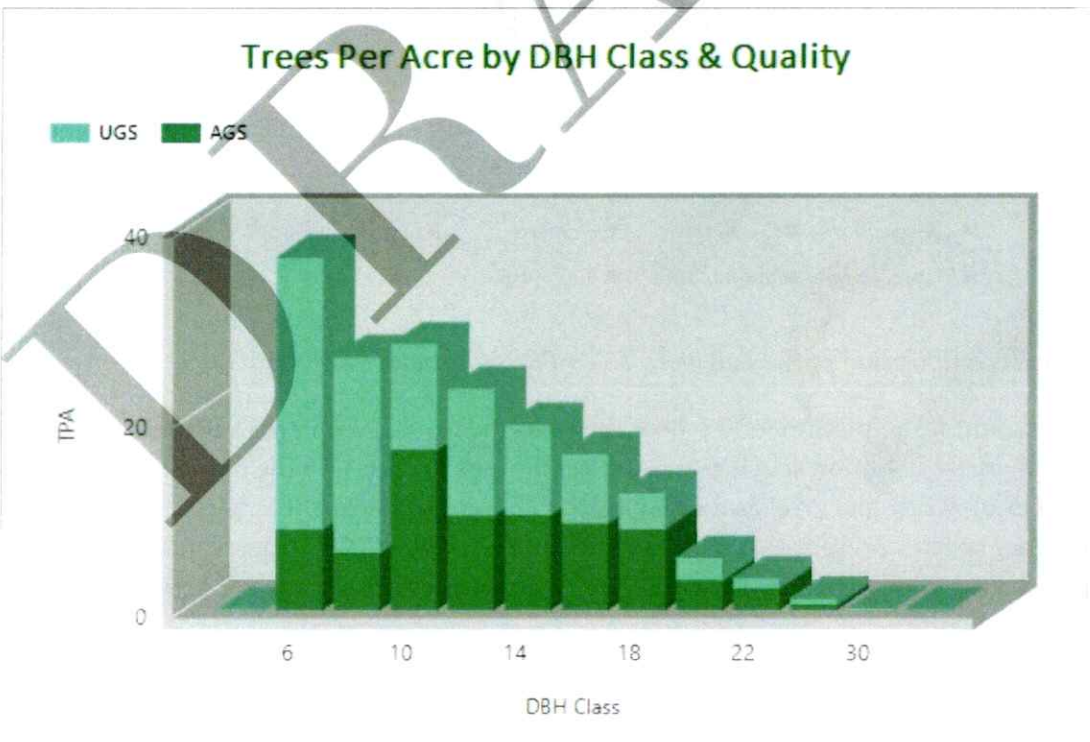


Figure 6: Trees per acre by DBH class and quality (Acceptable Growing Stock (AGS) or Unacceptable Growing Stock (UGS)) in the Belvidere Town Forest.

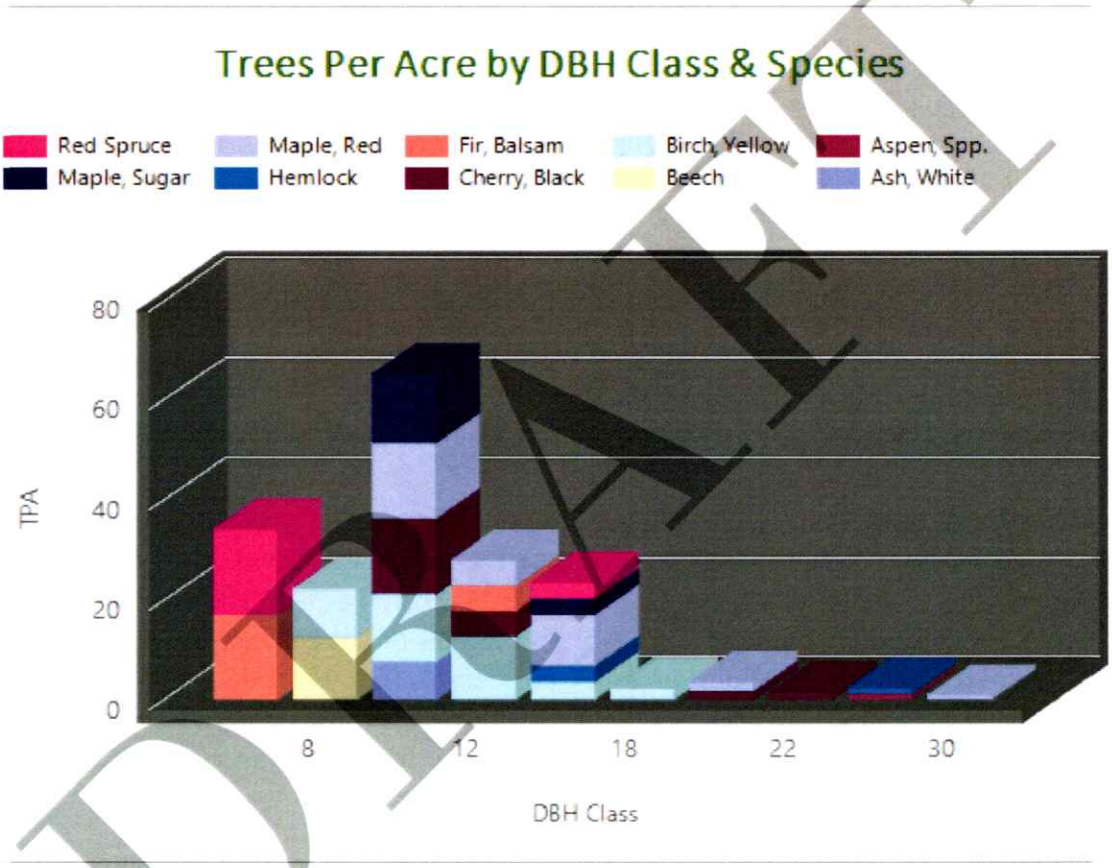
Forest Stand 1

Acreage: 11.7 acres

Forest Type: *Northern Hardwood*

Composition: Yellow birch (25%), red maple (24%), black cherry (15%), sugar maple (9%), red spruce (6%), balsam fir (6%), hemlock (6%), white ash (3%), beech (3%) and aspen (3%).

Understory Composition: beech, yellow birch, striped maple.



Stand Description: Stand 1 is characterized by an overstory dominated by yellow birch and red maple. Black cherry and sugar maple are the next most common species in this stand. Also present, though not abundant, are red spruce, balsam fir, hemlock, white ash, beech and aspen. The understory composition is dominated by beech saplings and ferns, with scattered yellow birch saplings and striped maple. This stand is situated in the northernmost portion of the property. Terrain is gentle and low-lying with a generally northern aspect. A stream originates south of the property and flows northward from the western boundary before bisecting this stand and flowing into the North Branch of the Lamoille River under VT Route 109.

Regeneration: Inadequate. Beech saplings and ferns are the dominant understory plants, both of which are competitors of more desirable tree species such as sugar maple and yellow birch. Forest understories with a predominance of beech and ferns are often the result of past over browsing by white-tailed deer that preferentially feed on sugar maple, yellow birch, white ash and other hardwoods over beech or ferns. Beech trees are also extremely shade-tolerant and a strong beech presence in the understory can inhibit growth of more desirable hardwoods due to the dense shade and competition for nutrients that beech trees create. Over time, as overstory trees die and fall over, other species may have opportunities to become established in canopy gaps; however, forest management activities can also be employed to speed this process through creation of openings in the forest where more light reaches the forest floor and allows for establishment of desirable species such as yellow birch, sugar maple and red maple. Sometimes during forest management activities, severing of sapling-sized beech in the understory is prescribed to help provide other species a better chance of becoming established.

Age Structure: Even-aged

Size Class: poles to large sawtimber

Stocking: Well-stocked; between the B-line and the A-line on the hardwood stocking guide.

Total Basal Area/Acre: 110ft²

AGS Basal Area/Acre: 67ft²

Quadratic Mean Stand Diameter: 10.53 inches

Trees Per Acre: 182

Approximate Stand Age: variable; overstory stems are approximately 80-100 years.

Stand Health: No significant forest health issues were observed. Beech bark disease is common in the beech component. Browsing by deer is apparent in the understory though not at alarming levels. Approximately 54 snags per acre are present in this stand, 85% of which are less than 12 inches in diameter. There are approximately 2 large snags (greater than 16 inches in diameter) per acre.

Invasive Species: No non-native, invasive plants were noted in this stand during the present inventory.

Site Index: 55 for sugar maple by soils

History/Previous Activity: Like many of our forests in Vermont, this stand likely developed from abandoned farmland around the 1940s to 1950s. Old forest roads are present on the property, indicating that some timber harvesting has occurred on this parcel in the past, though not within the last +/- 30 years.

Silvicultural Management Objectives: Over time, this forest will be managed for the development of multiple age classes. As a result of the land-use history of this forest and past harvesting activities, current stand conditions have limited structural diversity, and the forest is generally even-aged. Uneven-aged management techniques can be employed to establish new age classes of trees and increase structural diversity.

Silvicultural Prescription: It is recommended that a group selection harvest be carried out in the stand to reduce the basal area, diversify the forest structure to improve wildlife habitat, maintain vigor and enhance growth on quality yellow birch, red maple, sugar maple, hemlock and red spruce, and to capture the value of some of the large sawtimber nearing economic maturity. Groups of 0.25-1-acre in size may be harvested across 10% of the stand (for a total group area of about 1.5 acres). Groups should be situated to remove low-value, low-vigor and high-risk trees while avoiding sensitive sites, and to release advanced regeneration where present. Retaining desirable species along the edges of the openings will help to seed in the area, and large diameter trees may be retained within groups as legacy trees for both seed and structural diversity. No treatment will occur between groups. Residual basal area should be no lower than 75ft²/acre.

Cutting Cycle: 15 years

Target Diameter: 20-22 inches yellow birch

Rotation Age: 120 years

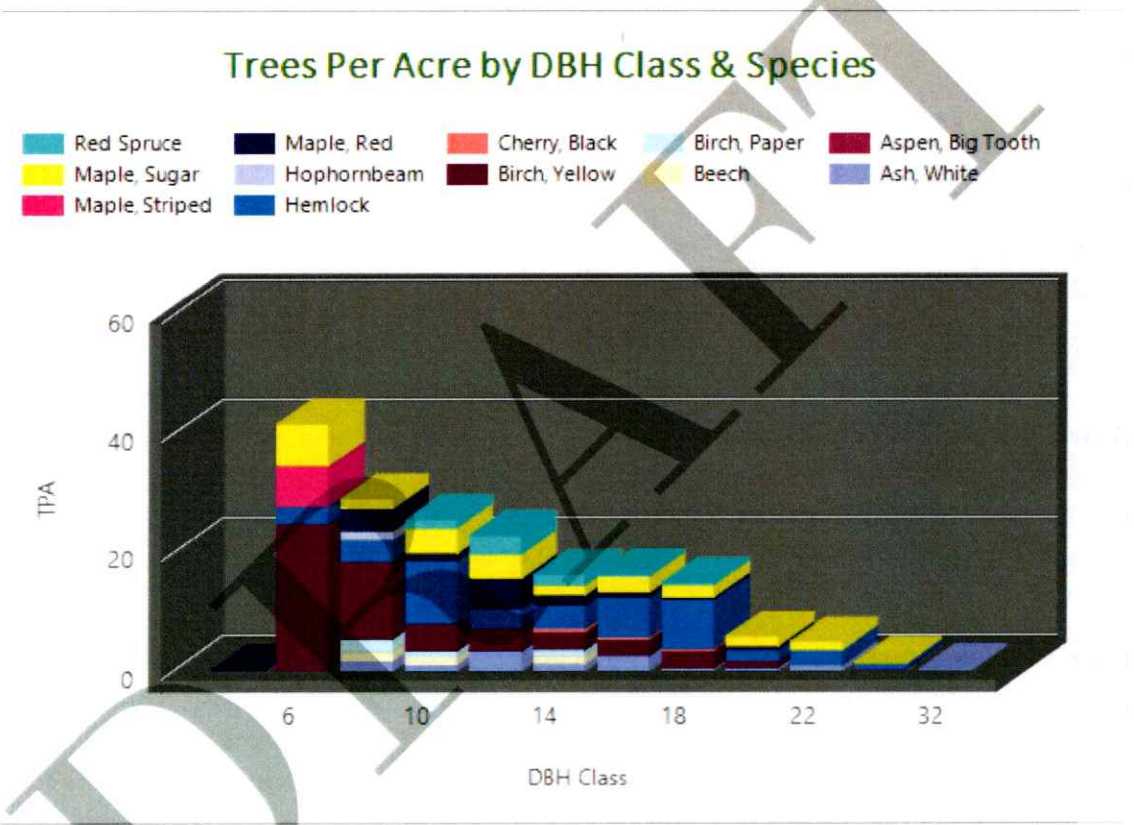
Forest Stand 2

Acreage: 53 acres

Forest Type: *Hemlock-Northern Hardwood*

Composition: Hemlock (36%), yellow birch (20%), sugar maple (17%), white ash (10%), red maple (8%), red spruce (4%), beech (2%), paper birch (2%). Other species (1%) include black cherry, aspen, striped maple and hophornbeam.

Understory Composition: Beech, red spruce and sugar maple.



Stand Description: Stand 2 is a mixedwood stand dominated by hemlock, with yellow birch and sugar maple also common in the overstory. White ash, red maple, and red spruce are scattered throughout the stand as well. Understory composition is variable; areas with dense shade lack regeneration, while areas of the stand with canopy gaps are home to beech, red spruce and sugar maple saplings. This stand is centrally located on the property and is bisected by a stream. Terrain is fairly gentle, and aspect is generally to the north.

Regeneration: Variable; beech, sugar maple and red spruce saplings are present in this stand at varying levels, with most regeneration located in small canopy gaps outside of dense hemlock cover. Forest management activities can help to establish and enhance regeneration in the understory by creating more canopy gaps and removing diseased, damaged and poorly formed trees.

Age Structure: Even-aged

Size Class: poles to large sawtimber

Stocking: Well-stocked, between the B-line and the A-line on the mixedwood stocking guide.

Total Basal Area/Acre: 133ft²

AGS Basal Area/Acre: 68ft²

Quadratic Mean Stand Diameter: 11.75 inches

Trees Per Acre: 177

Approximate Stand Age: variable; overstory stems are approximately 80-100 years.

Stand Health: No significant forest health issues were observed. As is common throughout Vermont, beech trees in this stand are susceptible to beech bark disease and many stems exhibit the pock-marked bark that indicates infection. There is likely some ring shake in the hemlock component. According to

the USDA Forest Service, *ring shake is the lengthwise separation of wood that occurs between and parallel to growth rings, diminishing lumber yields and values.*

Invasive Species: No non-native, invasive plants were noted in this stand during the present inventory.

Site Index: 58 for yellow birch by soils

History/Previous Activity: Like many of our forests in Vermont, this stand likely developed from abandoned farmland around the 1940s to 1950s. Forest roads on the property are remnants of past timber harvesting, though it appears (based on old stumps and age of trees) no harvesting has occurred here for +/- 30 years.

Silvicultural Management Objectives: Over time, this stand will be managed to develop as a multi-aged forest. Future management activities should strive to perpetuate long-lived species such as hemlock, sugar maple, yellow birch, and red spruce in this stand. The goal is to increase the percentage and species diversity of high-quality, well-formed, healthy trees, and to establish new age classes of trees.

Silvicultural Prescription: It is recommended that a small group selection harvest be carried out in the stand to reduce the basal area, diversify the forest structure to improve wildlife habitat, maintain vigor and enhance growth on quality hemlock, yellow birch, sugar maple, red spruce, and red maple, and to capture the value of some of the large sawtimber nearing economic maturity. Groups of 0.25-1-acre in size may be harvested across 15% of the stand (approximately 7 acres in total group area). Groups should be situated to remove low-value, low-vigor and high-risk trees while avoiding sensitive sites, and to release advanced regeneration where present. Retaining desirable species along the edges of the openings will help to seed in the area, and large diameter trees may be retained within groups as legacy trees for both seed and structural diversity. No treatment will occur between groups. Residual basal area should be no lower than 90ft²/acre.

Cutting Cycle: 15 years

Target Diameter: 20 inches hemlock

Rotation Age: 120 years

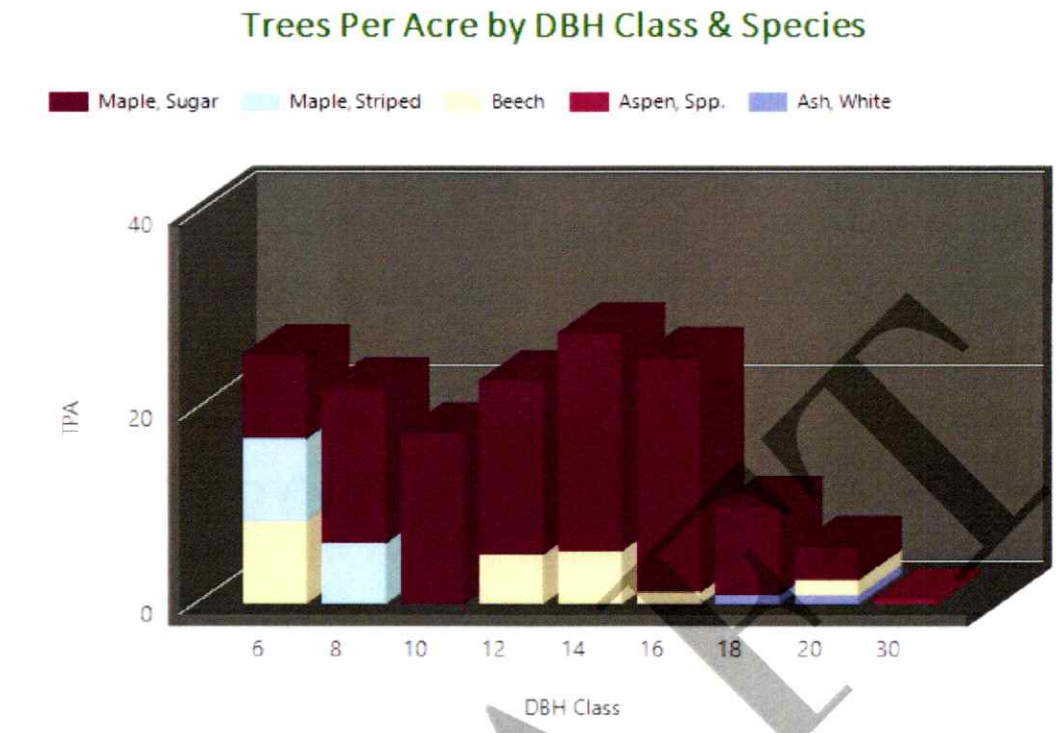
Forest Stand 3

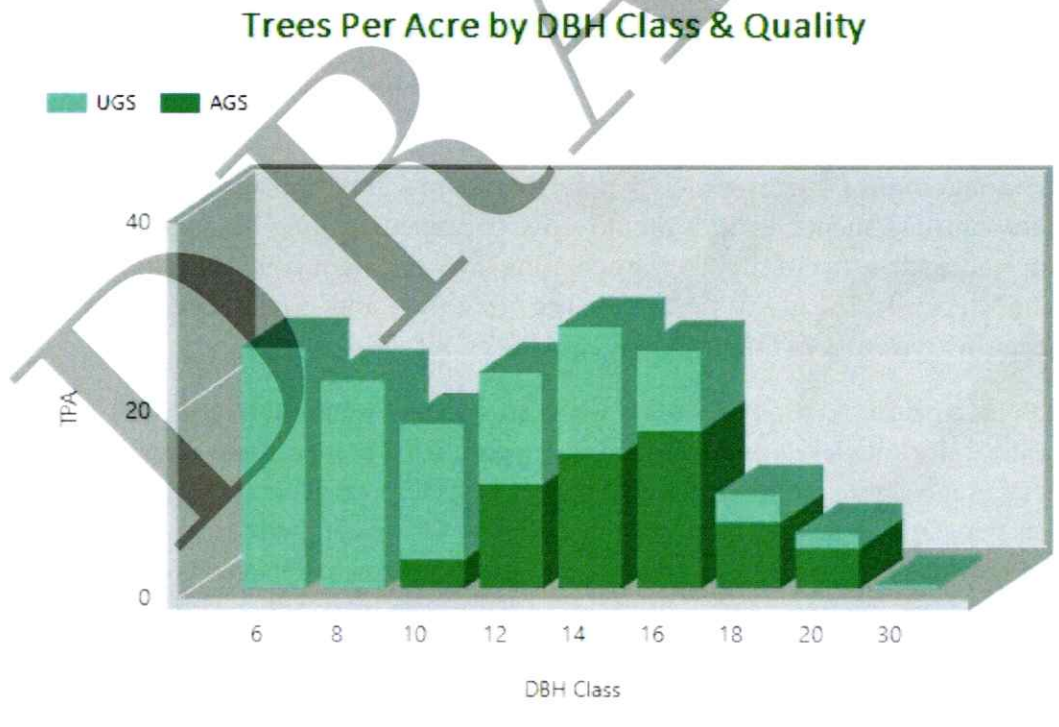
Acreage: 22 acres

Forest Type: Sugar Maple-Northern Hardwood

Composition: Sugar maple (82%), beech (12%). Other species (6%) include white ash, striped maple and aspen.

Understory Composition: Beech, red spruce and sugar maple.





Stand Description: Stand 3 is the southernmost stand on the property and is dominated by sugar maple. Bear scarred beech trees are present in this stand and indicate use of the area by bears for feeding. Aspect

is generally northerly. Understory composition is dominated by beech saplings with scattered red spruce saplings.

Regeneration: Variable; lacking. Beech saplings are dominant in the understory with only scattered red spruce saplings also present. Forest management activities can help to establish a more diverse understory composition by creating light conditions that allow species other than beech to thrive while removing diseased, damaged and poorly formed trees from the overstory.

Age Structure: Even-aged

Size Class: poles to large sawtimber

Stocking: Overstocked; above the A-line on the hardwood stocking guide.

Total Basal Area/Acre: 127ft²

AGS Basal Area/Acre: 65ft²

Quadratic Mean Stand Diameter: 12.18

Trees per Acre: 157

Approximate Stand Age: variable; overstory stems are approximately 80-100 years

Stand Health: No significant or uncommon forest health issues were observed during the present inventory. Beech bark disease in beech trees; likely some level of *Nectria* canker in maple.

Invasive Species: No non-native, invasive species were noted in this stand during the present inventory.

Site Index: 60 for sugar maple by soils

History/Previous Activity: Like many of our forests in Vermont, this stand likely developed from abandoned farmland around the 1940s-1950s. Forest roads on the property are remnants of past timber harvesting, though no activity has occurred in +/- 30 years.

Silvicultural Management Objectives: Overall, this stand will be managed to develop as a multi-aged forest. Future management activities should strive to perpetuate long-lived species such as sugar maple while increasing diversity of the stand by creating favorable light conditions for species such as yellow birch and white ash. The goal is to increase the percentage and species diversity of high-quality, well-formed, healthy trees, and to establish new age classes of trees.

Silvicultural Prescription: A crop tree release with canopy gap formation treatment is recommended in this stand to reduce stocking levels and provide quality pole-sized maples room to expand their crowns while creating favorable light conditions for a diversity of species to regenerate in canopy gaps. Between 40-50 crop trees per acre will be selected to be released – removing competing stems whose crowns are interfering with crowns of crop trees – releasing 2-3 sides of the crown. Between crop trees, canopy gaps approximately as wide as one tree-height (50-75' in diameter) can be established over 15% of the stand (about 3 acres in total gap area). Within gaps, poor quality stems greater than 1" diameter should be cut. Gaps should be situated to release advanced regeneration where it exists (red spruce), and remove groups of poor quality, diseased, high-risk, low-vigor or low-value trees while avoiding sensitive areas. Consider leaving some of the cut stems on the forest floor to serve as coarse woody material and retaining/protecting snags and cavity trees for wildlife habitat. Large diameter stems (no more than 10%

of the canopy) can also be retained as legacies within gaps to serve as a seed source and to provide structural diversity. The residual basal area should be no lower than 80ft²/acre.

Cutting Cycle: 15-20 years **Target Diameter:** 22 inches sugar maple

Appendix 1: Stocking Guides

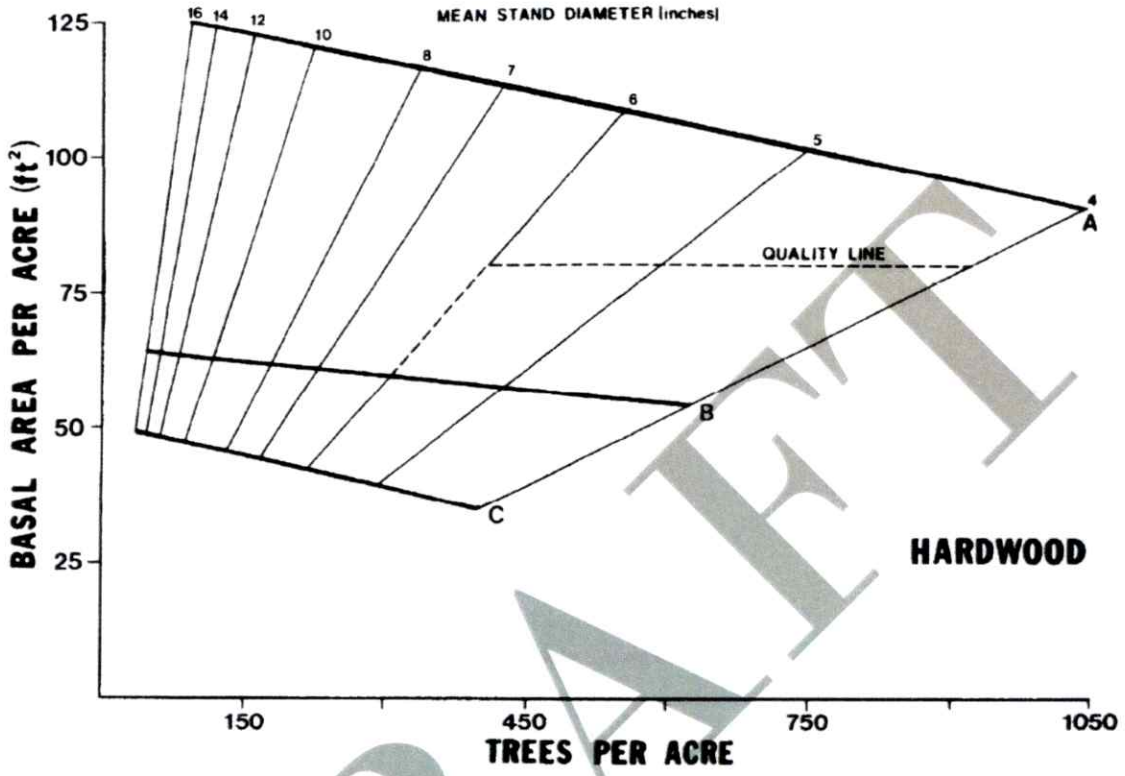


Figure 6.—Stocking guide for main crown canopy of even-aged hardwood stands (beech-red maple, beech-birch-maple) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual stocking. The C-line is minimum stocking. The quality line is the density required to produce high quality stems of beech, sugar maple, yellow birch, and red maple.

Source:

Leak, William B., Solomon, Dale S., Debald, Paul S. 1987. **Silvicultural guide for northern hardwood types in the Northeast (revised).** Res. Pap. NE-603. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 36 p.

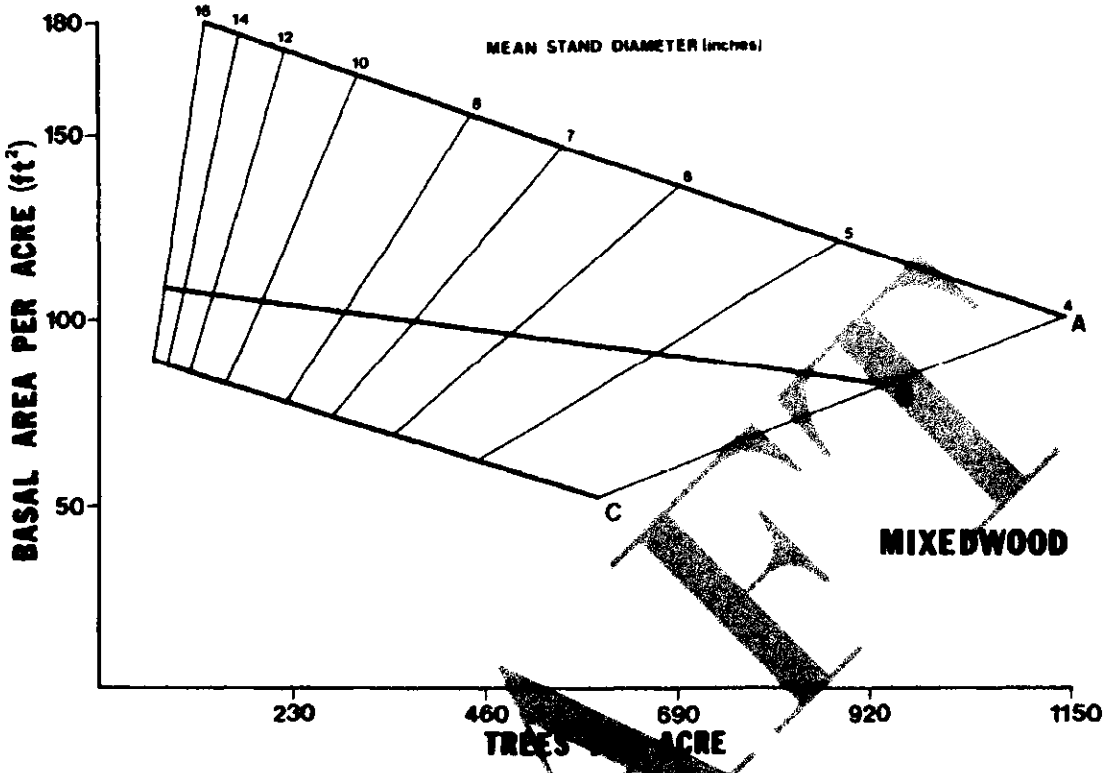


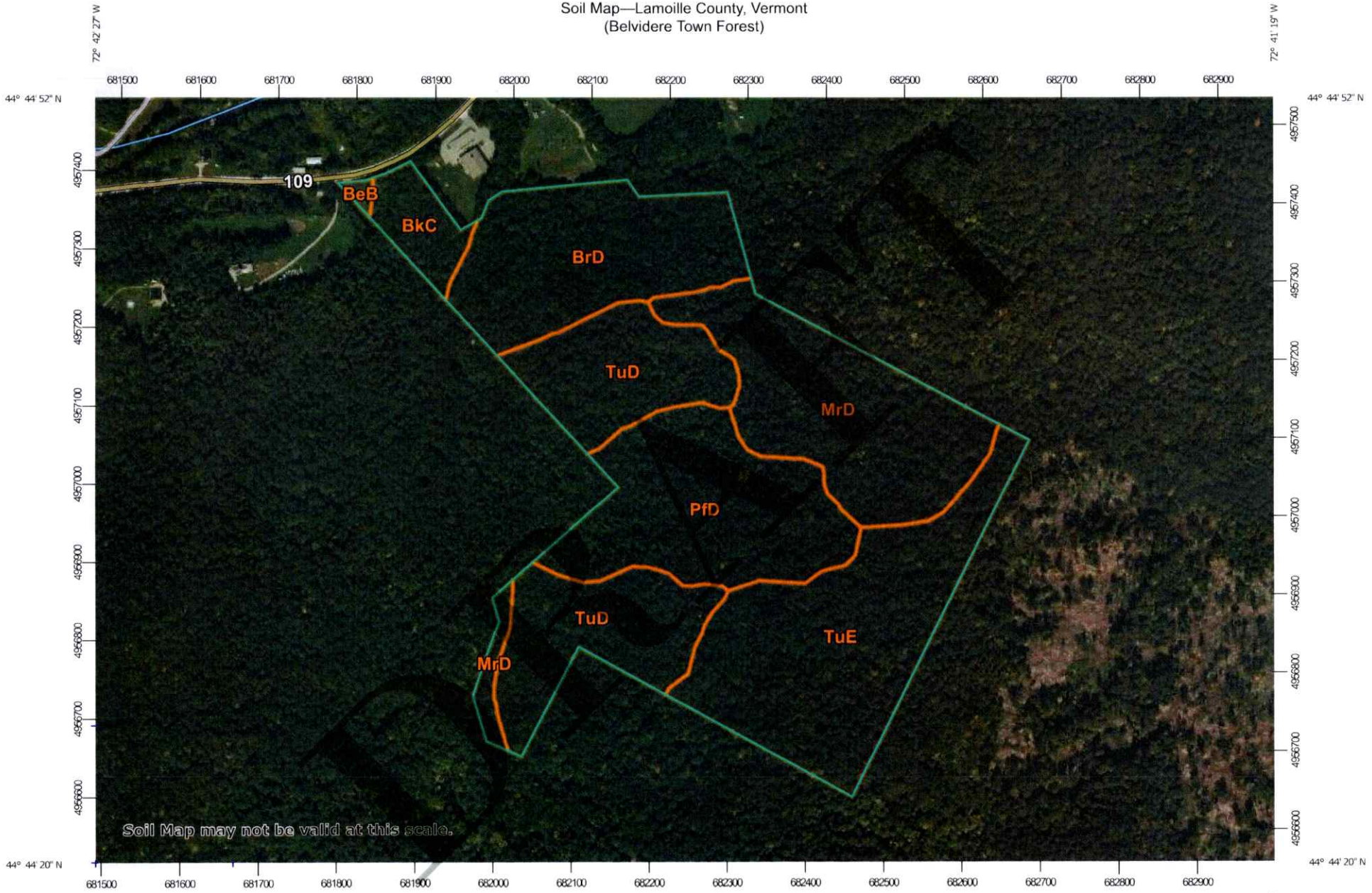
Figure 7.—Stocking guide for main crown canopy of mixedwood stands (35 to 65 percent softwoods) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual stocking, the C line is minimum stocking.

Source:

Leak, William B., Solomon Dale S., Del[illegible] Paul S. 1987. **Silvicultural guide for northern hardwood types in the Northeast (revised).** Res. Pap. NE-603. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 36 p.

Appendix 2: Soil Types and Descriptions

Soil Map—Lamoille County, Vermont
(Belvidere Town Forest)



Map Scale: 1:6,880 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lamoille County, Vermont
Survey Area Data: Version 29, Aug 28, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 1, 2020—Sep 21, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BeB	Berkshire fine sandy loam, 3 to 8 percent slopes	0.3	0.3%
BkC	Berkshire fine sandy loam, 8 to 15 percent slopes, very stony	2.9	3.4%
BrD	Berkshire-Tunbridge complex, 15 to 25 percent slopes, rocky	13.9	16.0%
MrD	Marlow fine sandy loam, 15 to 25 percent slopes, very stony	17.0	19.6%
PfD	Peru fine sandy loam, 15 to 25 percent slopes, very stony	15.3	17.6%
TuD	Tunbridge-Lyman complex, 15 to 25 percent slopes, very rocky	17.6	20.3%
TuE	Tunbridge-Lyman complex, 25 to 60 percent slopes, very rocky	19.8	22.8%
Totals for Area of Interest		**86.9**	**100.0%**