

**Brookfield Town Forest
Resource Assessment
and
Forest Management Plan
Brookfield, VT**

January 10, 2023



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Table of Contents

| | |
|---|----|
| Introduction and Purpose | 4 |
| Property Description | 4 |
| Forest Block | 5 |
| Terrain | 6 |
| Operations | 7 |
| Trails and Recreation | 8 |
| History | 8 |
| Wildlife | 11 |
| Invasive Plants | 14 |
| Forest Health | 14 |
| Regional Forest Health Problems | 16 |
| Goals | 17 |
| Forest Inventory Design | 17 |
| Management Tactics & Objectives | 18 |
| Stand 1 | 21 |
| <i>Silvicultural Management</i> | 25 |
| Stand 2 | 26 |
| <i>Silvicultural management</i> | 29 |
| Stand 3 | 30 |
| <i>Silvicultural management</i> | 33 |
| Stand 4 | 34 |
| <i>Silvicultural management</i> | 38 |
| Reserve Lands | 40 |
| <i>Stand 5 Northern Hardwood Old Forest Reserve</i> | 40 |
| <i>Stand 6 Riparian Reserve</i> | 43 |
| <i>Stand 7 Old Forest Reserve</i> | 45 |
| <i>Stand 8 Forested Wetland</i> | 47 |
| Schedule of Management Activities | 50 |
| Works Referenced | 51 |
| Glossary | 52 |

Introduction and Purpose

This forest management plan was developed for the town of Brookfield at the request of the Brookfield Conservation Commission, by AJ Follensbee the Northern Windsor County Forester. The intention of this plan is to describe the resources of the property, inform residents, the Conservation Commission, and the Select Board in making decisions about the management of the property. This assessment starts with a broad overview of the landscape level resources and then examines specific details about the property. The plan will also serve as a guide to forest management activities on the property and should be reviewed and approved by the Brookfield Conservation Commission, with input from the public and the Selectboard. Before management is implemented, input from the community should be gathered. When forest management activities are scheduled, they should be organized and supervised by a Vermont Licensed Forester, working in close coordination with the Brookfield Conservation Commission.

Property Description

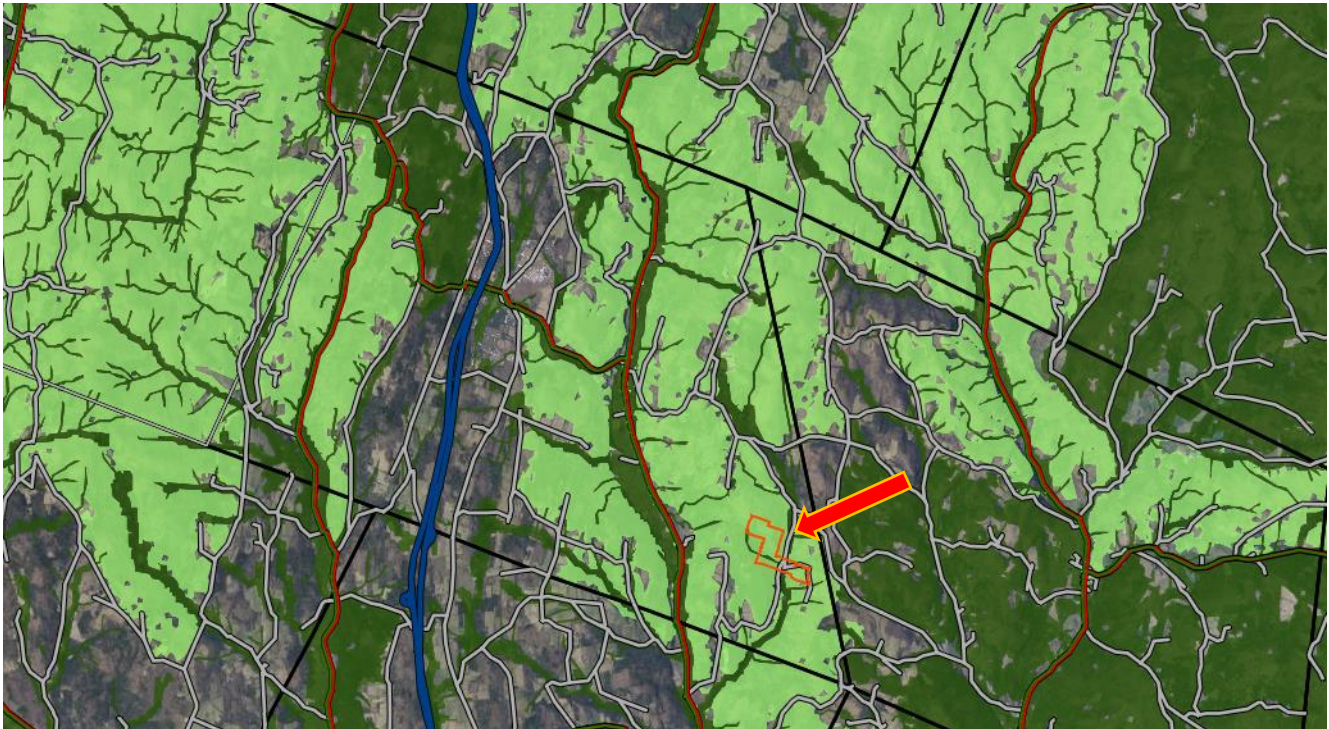
The Brookfield Town Forest is in the southeastern corner of Brookfield, just west of the Brookfield- Chelsea town line. The forest is approximately 166 acres in size. The town acquired this parcel in 1955. The forest is accessed from two parking lots that were created during the last harvesting operation, one off Halfway Brook Rd. and the other is off Parker Dr. This forest is not widely used by the community, so these parking lots have become overgrown with vegetation since the last harvest. The Brookfield Town Forest has been well managed for forest products and wildlife habitat for many years. It is a great example of a working forest.

This parcel is entirely forested. The main forest type in the Brookfield Town Forest are variations of northern hardwood types. The dominant species found in these forest types are sugar maple, beech, red maple, white ash, and yellow birch. The quality of the trees for timber varies stand to stand, as does the age of these hardwood forests. There is a 5ac white pine plantation located in the center of the property. This plantation was planted around 1970 and has been thinned 3 times since the 1990's. Because of this work the plantation is full of high-quality stems. An additional 16ac of softwood plantations were planted around the same time as the white pine plantations. Due to small crowns and health related issues these plantations were removed in 2014. These plantations were mostly red pine plantations. The areas where the plantations were removed are now full of young hardwoods. These hardwoods are the natural forest type that should be growing on these sites. The young hardwoods are providing great early successional or young forest habitat. Something that is lacking in Central Vermont. Much of the forests regionally are generally 50-120 years old. More details about the forest are in the stand description section of the plan.

Vernal pools, seeps, and a forested wetland can be found in the Brookfield Town Forest. These areas provide vital ecological functions and need to be protected. Halfway Brook flows through the center of the property along with two tributaries flowing into to the brook from the east and west. Halfway Brook flows into the Second Branch of the White River. Protecting the streams that flow through the property are vital to the health of the watershed downstream.

The parcel is located within Vermont's Northern Piedmont Biophysical Region. This is an area described in Wetland, Woodland, Wildland A guide to the Natural Communities of Vermont as: *A hilly region bisected by many rivers. The climate is moderate to cool. It has rich soils derived from calcareous bedrock. The most common forest type found in the region is Northern Hardwood. With hemlock-Northern Hardwoods and Hemlock Forests Commonly found on shallower soils. Both types were likely more common prior to European settlement. Because of the rich soils found in this region much of the forests were cleared for agricultural purposes in the 1800's. The forests have now regenerated, but the structure and species composition of the forest in this region have been altered due to the past land use. This region is one of the most densely roaded regions in Vermont. The high amount of roads and fragmentation has an adverse impact on wildlife that require large blocks of continuous forests. However, common mammal species can be found in abundance in this region. Species like white-tailed deer, beaver, coyote, fox, otter, mink and squirrels. Turkeys are increasing in number and thriving here. The greatest concentration of nesting common loons in Vermont are found in remote lakes in this region.*

Forest Block



Map of forest blocks in Brookfield. Light green blocks are priority blocks, dark green blocks are high priority

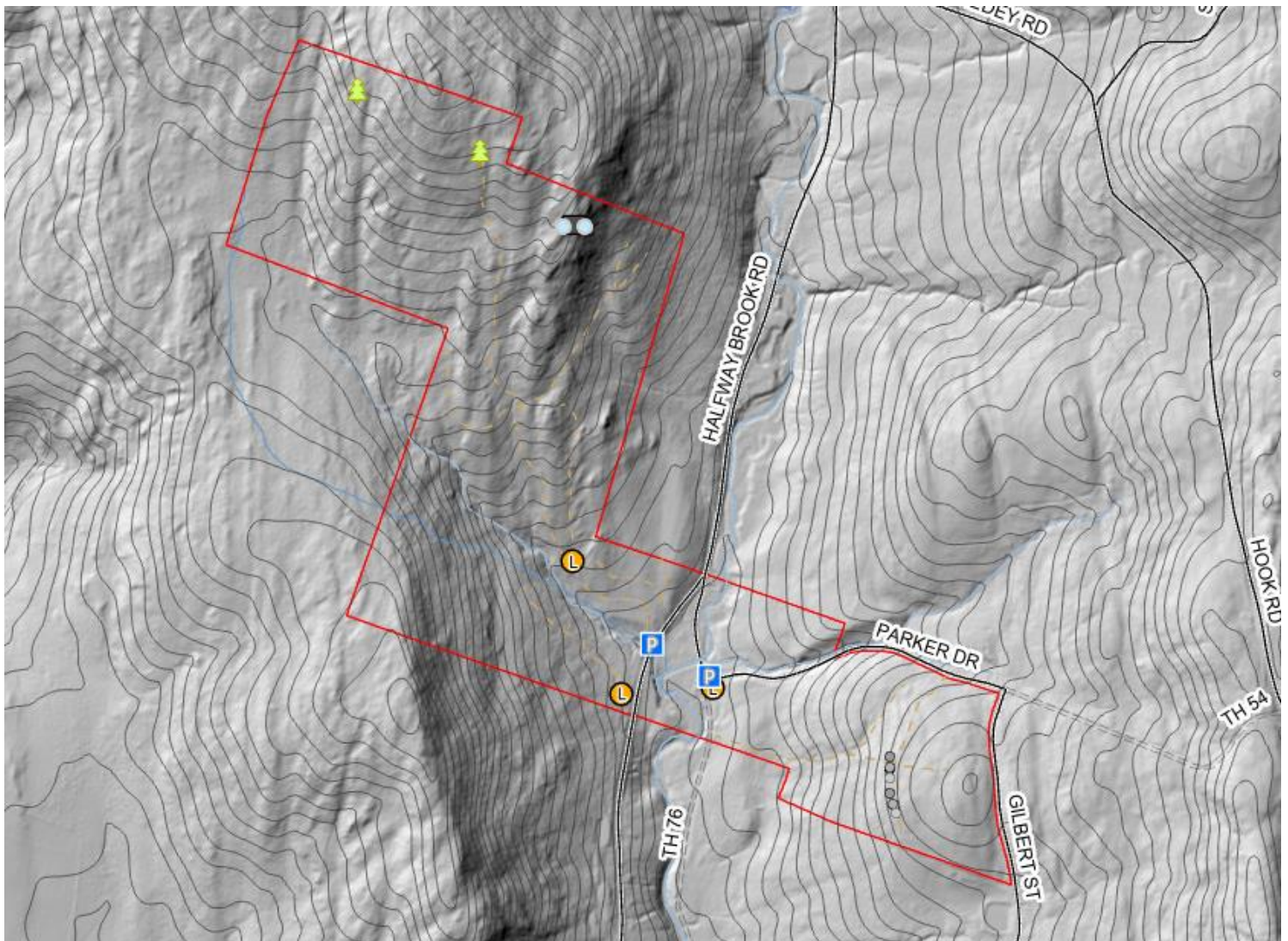
When zooming out and looking at how this parcel fits in with the surrounding landscape you will find this parcel is part of a 2,201 acre forest block. When looking at this block through the lens of Vermont Conservation Design, a tool developed by VT Fish and Wildlife to help protect Vermont's ecological functions, this block is providing [Interior Forest Habitat](#), [Surface Water and Riparian Areas](#), [Riparian and Wildlife Connectivity](#) and [Landscape Diversity](#). It is important to keep large blocks of forests unfragmented. A road, house, agricultural field, or other development splits forest blocks into smaller and smaller pieces. The smaller a block gets, the less beneficial they are ecologically. Every parcel in the forest block matters. The Brookfield

Town Forest is an important piece of a larger forest block. More information on forest blocks can be found at [Vermont Bio Finder](#).

Terrain

The elevation of the Brookfield Town Forest ranges from 1,100'-1,620'. East of Halfway Brook the terrain is generally moderate with a few areas that are inoperable. The terrain west of Halfway Brook Road is much more variable. The property almost encompasses 3 hill tops, one in the north one in the south and one in the east. These hill tops make the terrain variable throughout the property. There is one defined ridge line in the center of the property which leads to the northern hilltop just off the property. Here there are exposed ledges and large boulders.

Below is a figure showing the elevation of the property with LIDAR imagery and contour lines. LIDAR imagery strips the ground of vegetation, showing what ground conditions look like.



Boundary Lines

The boundary lines of the property are generally not well defined. There is some evidence marking the boundary line, but there are sections of the line that need to be located. The boundary evidence that is present includes blazes, flagging, stone walls, and wire fencing. Efforts should be made to locate and mark all parts of the boundary. A well-marked boundary is the best way to stop mistakes from happening on either side of the line. The boundary should be investigated further to identify what section has little to no evidence. Areas where the boundary is marked should be re-blazed as the paint is fading.

Operations

This forest has been actively managed for many years. Because of this, the forest has established infrastructure that can support logging operations. There are two landings located on either side of Halfway Brook Road. Each landing supports a network of well-built skid trails. Little to no investments will be needed to improve the logging infrastructure on the town forests. Building skid trails and landings can soak up the proceeds from logging. If what is installed at the Brookfield Town Forest is maintained, no new investments in logging infrastructure will be needed and timber sale proceeds can be used for other conservation efforts in the forest or elsewhere in Brookfield.



Blazed tree along western boundary line



Log landing on the west side of the Halfway Brook

Trails and Recreation

There are well established skid trails throughout the property. These trails are great for forest management but are not well suited for recreation in their current state. These trails were closed out very well post-harvest, with large drainages installed. These drainages are doing a great job of stopping erosion from happening. They do however make it hard to walk these trails. These trails are also overgrown with vegetation. Which can make using these trails tough to follow in some sections. With some work these trails can be improved for recreation. A loop trail could be built to connect some of the skid trails. Currently all the trails are

out and back. This type of trail is not as appealing as a loop trail. There is also the potential to cut a vista along the ridge in the center of the property. This would give users a destination when hiking. There is also potential to establish a low impact trail in the riparian forest found on the property. These areas are beautiful and could be made more accessible with some low impact trails.



Potential Vista in stand 4

History

1955 The town purchase a piece of land that would become the Brookfield Town Forest with approval of the community during Town Meeting. It was purchased to promote reforestation, water conservation and good forestry practices.

1956-1957 Two additional parcels, each 85ac were acquired by the town and added to the town forest. During this same year the Town Forester reported 3,000 white and red pine seedlings were planted. An addition 3,000 seedling were planted the following year.

1960's Four more plantings were done during the late 50's and into the 60's. These planting were done in abandon agricultural fields in the center of the property along Halfway Brook Road and Parker Road. Planting trees on abandon agricultural fields was a common practice throughout Vermont during this time.

1993-1994 A cable skidder logging operation with hand felling was done by Bob Steward. This operation took place in about half of the parcel. The timber sale focused on improvement of spacing, species composition and quality throughout the areas harvested. Low-grade hardwood logs, aspen, stagnant spruce, and rough white pine were removed during this harvest.

Volumes Harvested and Income Received:

56.582 MBF of sawlogs and 305 cords. Town received \$4,870 from timber sale.

1994 A horse logger, Brian Avery, thinned the white pine plantation. Suppressed trees and rough, short logs were targeted for removal during this operation. Some of the red pine plantations were also worked during this operation. This treatment was more of a timber stand improvement project that generated some logs.

Volumes Harvested and Income Received:

25 MBF white pine and red pine saw logs and 35 cords pine pulp.

No payment was expected or received by the town.

1995-1997 A timber trespass took place in the northern part of the forest, described in this plan as stand 4. This was done by Don Conger.

Volumes Harvested and Income Received:

Harvested 28.918 MBF and 82.4 cords valued at \$6,417. No payment received by the town.

2003 – Logging operation done by Don Ferland using a small bulldozer and hand felling. This timber sale focused on cutting straight, small diameter white pine out of the plantation. These were trees with good stem quality but were suppressed and would never become crop trees. This worked increased the growing space for the residual trees.

Volumes Harvested and Income Received:

17.335 MBF white pine for which the town received \$788.82.

2012-2014 A major logging operation was done at this time which worked the entire parcel. This was done by Richard Riendeau using a feller buncher and grapple skidders. During this harvest the red pine plantations were liquidated, while the white pine plantations were thinned. The remaining stands were treated using a combination of individual tree selection and small group selection. The goal in the mixed wood and hardwood areas was to improve species composition and quality. In addition to the harvesting that occurred, a new landing and new skid trails were constructed. Two small parking areas were constructed during the close out of this sale as well.

Volumes Harvested and Income Received:

300.68 MBF of sawlogs and 610.5 cords of pulpwood were removed. The town received \$33,973.20 for this work.

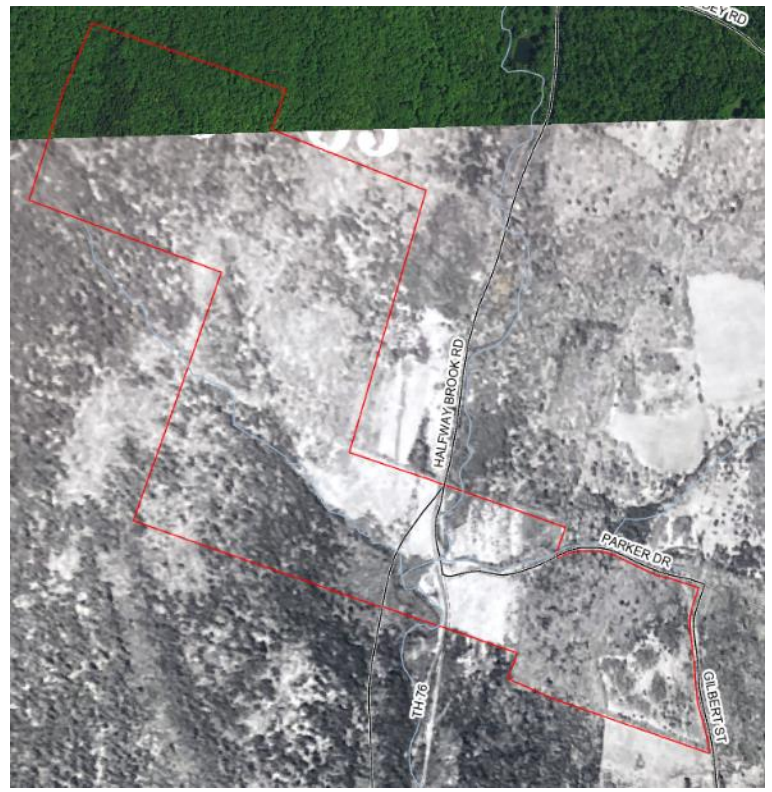
Total harvests since 1993 from approximately 166 ac:

428.515 MBF sawtimber, 1,033 cords, \$46,049

Brookfield Town Forest 1939



Brookfield Town Forest 1962



Brookfield Town Forest 1975



These three maps/aerial photographs show the forest cover of the Brookfield Town Forest in November 1939, in May of 1962 and June of 1975. The grey colors on these maps are hardwood trees, the whites and light greys are open fields or areas of disturbance. The dark greys and blacks are softwood cover.

Wildlife

Throughout the forest there are mast bearing trees. These trees provide an important food source for birds and mammals. Mast trees are trees like red oak, beech, and black cherry. Maintaining a variety of mast bearing trees will increase the amount of wildlife on the property that rely on this food source. In this forest the most common mast bearing tree is beech.

There are several old, large trees on the property, many of which have holes and cracks. These cavity trees are very important to different species of birds and mammals. Northern Long Eared Bat, a federally listed threatened species rely on trees with cracks and cavities to roost in during the summer months.

Interior forest songbirds can be heard throughout the spring and summer. They are often neotropical migrants that rely on larger, diverse forest blocks in Vermont for their breeding habitat. Oven birds, red eyed vireos, scarlet tanagers and both black-throated green and black-throated blue warblers are just some of the birds that use interior forest habitats in the Town Forest.

Some of Vermont's forest songbird populations are declining due to development in their Caribbean and Central and South American winter habitats. Making sure their summer breeding habitat is the best it can be is an important way to help these species. Improvements to forest structure, including keeping tall older trees, providing mid-story and understory layers of vegetation, and even creating patches of dense young trees are all activities that provide habitats for these often-very habitat-specific forest birds. Removing invasive plants and reducing forest fragmentation are also important ways to help our forest songbirds. More information on forest songbirds can be found at [Vermont Audubon](#).

There are sections of the forest with thick softwood cover. These areas are often important winter deer habitat. Softwood stands help keep relatively warm air from radiating out on frigid nights and keep snow from falling to the ground. Deer wintering areas are so important to winter deer survival that The Vermont Fish and Wildlife Dept. has mapped deer wintering areas statewide. Parts of the southern half and a portion of the northwestern corner of the Brookfield Town Forest are mapped as critical deer wintering area. The deer use is prevalent throughout the property, especially in the softwood stands and the areas of young forest.



Example of winter deer beds

The Brookfield Town Forest has great bear habitat. It is part of a large, remote forest block. It has a variety of available food, from mast bearing beech to the black berries in the young forest stands. Bear have a large range, females have a home range of 10-25 miles, while males can roam up to 50 miles. Sign of bear can be found throughout the forest and particularly in the western part of the forest. Bear scarred beech can be found here. These are beech trees that have been climbed by bear to get at beech nuts to eat. These trees are either now providing mast or did at some point. Either way any bear scarred beech trees should be retained and promoted by releasing their crown where appropriate. A “marking tree” was also found during the inventory. These are trees used by bear to mark their territory and communicate with other bears.



Balsam fir marking tree in stand 4



One of the bear clawed beech at the Brookfield Town Forest



The Brookfield Town Forest is currently providing great early successional habitat in the areas where the plantations were removed during the last harvest. These areas are now full of thousands of woody stems/acre. This type of young forest habitat provides nesting and brood rearing areas for woodcock and grouse and are important nesting areas for chestnut-sided warblers, turkeys, sparrows, and other early successional dependent species. Woody browse is abundant here. This benefits species such as deer, moose, and snowshoe hare all of which eat the buds of young trees. The plants that can be found in these areas include aspen, birch and pin cherry, choke and black cherry, serviceberry, raspberry or blackberry, dogwood, viburnums such as nannyberry, and certain forbs and grasses. Many of these species provide food in the form of soft mast fruits which are fed on by a wide range of wildlife from black bears and fisher to turkey and songbirds. In addition, insect biomass in these rapidly growing forest areas is generally high and provides a critical, protein-rich food source for nestling and juvenile birds. This area 16ac in size. Large areas of early successional habitat like this are uncommon in Central Vermont. The larger these areas are the better they become for wildlife. As this area develops and mature its early successional habitat benefits will diminish. It will transition to providing interior forest habitat, but for now and at least 10 more years this area will continue to provide great early successional habitat.



Early successional habitat in area 5-C

Invasive Plants

Non-native invasive plants are plants not native to the ecology of an ecosystem. They were generally brought into our region from Europe or Asia and used as ornamental plants. These plants do not have any of their native competitors or pathogens here, so they grow really well. They can quickly outcompete native plants species for sun light and nutrients. Some can even alter the soil chemistry of an area making it impossible for other plants to grow creating a monoculture.

During the inventory common buckthorn was found. This plant was found in stands 3 and 5. The plants that were found were small to medium in size. The infestation level where these plants can be found is light to moderate. Mechanical removal of these plants is a viable option to achieve control. The property should be monitored annually for invasive plants. Any plants found should be dealt with promptly.

Harvesting done in the forest will increase the sunlight available to the understory. This could increase the likelihood of invasive plants becoming established. Any harvesting done in the forest will have to be mindful of this. Areas harvested should be monitored annually for invasive plants. If any plants are found, they should be dealt with immediately through hand pulling. It is very important to the health and ecology of the forest that invasive plant levels remain low.

Forest Health

Overall, the forests of The Brookfield Town Forest are healthy. There were a few common forest health issues that occur throughout Vermont found in the forest. The following is a list of the forest health issues found in the Brookfield Town Forest.

Beech Bark Disease

Beech Bark Disease is unfortunately a common occurrence in the forests of Vermont. It was introduced in Nova Scotia in the early 1900's from Europe. It has worked its way west from there. The pathogen effects the vigor of beech and will eventually lead to mortality. Beech Bark Disease is caused by an attack of a beech scale insect and an associated fungus in the *nectria* genus. Beech trees infected with Beech Bark Disease will have cankers on the bark. Some beech trees are resistant to this disease and should be protected and managed for. Genetic resistance is the best way to manage for this disease.

Ash Yellows and Ash Decline

Ash trees in the region are experiencing decline. The decline is due to ash yellows and to some extent site and environmental issues. Ash yellows is a disease caused by *Candidatus Phytoplasma fraxini*, a microorganism. This disease can kill infected ash trees within 5-10 years, some trees can survive the disease with only their growth being affected. Decline in ash can also come from environmental factors such as drought, poor soils, fungus and other factors.

Red Rot

Red rot is a fungal disease caused by *Phellinus pini*. Red rot is a common disease in temperate forests, affecting softwood trees. This disease leads to decay within the stem of a tree. The fungus is introduced through wounds or dead stems. It can greatly affect the quality of trees when they are sold for lumber. Highly stocked stands are more susceptible due to competition for resources. Reducing the density softwood stands is one way to manage for this pathogen.

Sugar Maple Borer

Sugar Maple Borer damage is caused by the larva of long-horned wood boring beetle, *Glycobius speciosus*. This beetle is 25mm in length and has yellow and black coloring, with a distinctive “W” design on the wing cover. Sugar Maple Borer is a native beetle. It rarely causes mortality on its own. The damage is done by the larva of the beetle once the eggs hatch. The larva bores it’s way through the cambium layer. This damage reduces the value of the tree as well as its structural integrity.

White Pine Needle cast

White pine needle cast is a relatively new pathogen. This disease was first noticed throughout the northeast in 2010 and has been affecting white pines year after year since. This is a fungal pathogen caused by three different fungi. A healthy white pine has three years’ worth of needles. This fungal pathogen effects the second-year needles of pine turning the needles brown in June when these needles are dropped. This leaves the infected trees with only one set of needles. The lack of viable needles decreases the growth and vigor of trees affected.

White pine weevil

White pine weevil is an insect, *Pissodes strobi* that attacks the top leaders of conifers. It lays it’s eggs in the previous year’s leader. Once the eggs hatch the grubs tunnel inwards towards the center of the leader, feeding on it. The leader is eventually girdled by the feeding of the grubs, killing the leader. The response of the tree is to develop multiple leaders to replace the dead leader. This ruins the form and quality of the attacked tree and gives the tree a bush like appearance. A weevil infestation rarely results in mortality. Norway spruce, Colorado blue spruce, jack pine, red pine, Scotch pine, mugho pine and native spruces are susceptible to white pine weevil.

Regional Forest Health Problems

The following forest health issues are currently found in the state but were **not** found in the Brookfield Town Forest. These are significant issues that should be monitored for. If found their impact will be significant.

Emerald Ash Borer

Emerald ash borer (EAB) is a beetle native to northern Asia. This insect was first discovered in Detroit in 2002. It has spread rapidly east since then, mostly being moved by humans. EAB will kill infected ash trees by effectively girdling the tree. The larva of EAB feed over the winter in the cambium layer of ash trees. Infested trees will normally die within 5 years. EAB kills 95-99% of the trees it infects. Native ash trees have very little resistance. EAB was found in Vermont in February of 2018 in the town of Orange. Since then, it has been found in more and more towns in Vermont. It was found in Brookfield in 2021 near Allis State Park, which is roughly 6 miles away from the Brookfield Town Forest.

Hemlock Woolly Adelgid

Hemlock Woolly Adelgid (HWA) is an introduced insect from Asia. It was first found in the Pacific Northwest in the 1920's, then found in northern Virginia in the 1950's. It is currently in southern Vermont, slowly spreading north. HWA can be identified by the cotton like frass at the bottom of hemlock needles. HWA feeds on young twigs causing needles to dry out and fall off the tree prematurely. If infested, a hemlock tree can die within 4 to 6 years. Some trees can survive but have reduced live crowns making the tree less valuable to wildlife that depend on hemlock.

Oak Wilt

Oak Wilt is a fungal pathogen caused by *Bretziella fagacearum*. This fungus grows in the sap wood of an infected tree. This causes a reaction from the infected tree which clogs conductive tissue further. Eventually the tree can no longer translocate water which causes the tree to wilt. This pathogen often leads to mortality. For a tree to become infected the stem must first become damaged. Something as simple as a small saw cut or axe graze is enough for the fungus to enter the tree. Oak Wilt has become a major pest in the central and eastern United States. No known occurrence has been found in Vermont or New England, the closest infestation is in New York state.

Goals

The principal management goals of the Brookfield Town Forest are to maintain a healthy, diverse, and resilient forest that can be used for outdoor recreation, natural resource education, natural beauty and to enrich the Brookfield community. Timber management is a tool that can be used to achieve these goals but is not a principal goal in itself.

During this planning cycle priority will be given to the following goals.

- Increase public access to parcel
- Education through demonstration
- Increase and maintain old growth forest
- Increase climate change resiliency by managing for warmer climate adapted species

Forest Inventory Design

The forests on the property have been split up into stands. Stands are groups of trees. The trees in these stand normally have something in common, like species composition, age, topography and operability. Lumping groups of trees together makes it easier to assess the forest and to make management decisions. The Brookfield Town Forest has been split into 8 different forest stands. These stands were separated mostly based on forest type and operability.

A forest resource inventory was done in the early spring of 2022 by AJ Follensbee, David Paganelli and Robert Nelson. A total of 57 randomly assigned points were set using Arc Pro. The data was gathered using a 10-factor prism. Basal area, diameters, merchantable heights, tree regeneration coverage, species and coarse woody debris information were gathered at each point. The data was then processed in the State of Vermont's FOREX forest inventory analysis program. Downed woody material information was gathered ocularly and given a rating based on the amount at each point, low 1-3 pieces, moderate 3-5 pieces and high 6 + pieces. Tree regeneration information was gathered at each point in fix radius plots that were 1/500 of an acre in size.



Cruise map developed for the spring of 2022 cruise

Management Tactics & Objectives

Before each stand is described in detail and prescriptions for each stand are recommended, it is important to discuss what the overarching management philosophy and desired future conditions will be for the property. Any prescribed treatments will take the following into consideration.

Carbon Management

Trees and plants sequester carbon from the atmosphere, storing it in biomass (wood and plant material). This carbon is found in both living and dead biomass in the forest, and a large portion of it can be found in forest soils. Globally, forests are a major carbon “sink,” absorbing and storing large amounts of carbon. Forests can be managed to maximize their carbon sequestration and storage by avoiding large-scale disturbances (such as clearcutting), encouraging the accumulation of dead biomass in the forest, and performing management activities that support the increased health and resilience of the forest, such as the encouragement of structural diversity.

The Brookfield Town Forest should be managed to support and improve carbon sequestration and storage in the forest whenever possible. Carbon sequestration and storage priorities:

- Avoid creating large-scale disturbances (openings larger than 5 acres).
- Minimize soil disturbance in the course of forest management activities to an extent dictated by responsible silvicultural practices.
- Retain dead biomass in the form of dead-standing and fallen trees and as much coarse and fine woody debris as possible during forest management.
- Retain biological legacy trees of a variety of species throughout the forest.
- Employ uneven-aged and low-impact silvicultural techniques as much as possible to encourage a healthy, diverse, resilient forest.
- Encourage the development of large trees throughout the forest. Allow for some of these large trees to naturally live out their life cycle in the forest.
- Managed for high quality timber that can be turned into durable wood products when removed from the forest.

Species and age diversity

Forests are complex. The forest management done in the Brookfield Town Forest will embrace these complexities and enhance them. Not just one or a group of certain species will be managed for, instead all native plants species will be managed for and promoted where appropriate. This will make the forest more resilient.

Attaining a natural forest structure will be a long-term management objective. This will be accomplished through use of uneven aged management techniques. Uneven aged management strives to maintain a minimum of 3 age cohorts of trees in a stand. The forest will be managed in a way that very old trees can be found in a stand along with very young trees. This will create a diverse and complex structure throughout the forest.

Old Forests

Most of the forest in Vermont are considered second growth forests. These are forests which became established after intensive human disturbance. The age of most of the forests in Vermont are 50-120 years. Vermont has very little true old growth forests. This condition is extremely rare, about 0.10% of all the forests in New England are considered true old growth forests. These are forests that were never influenced by intensive human land use. These old growth forests are extremely important ecologically. They take thousands of years to develop and cannot be recreated. We can promote and create old forests. Old forests are forests that have many of the characteristics of old growth forests. These forests can be just as ecologically beneficial as old growth forests.

Time can be an important factor when determining when a forest becomes an old forest. Just as important are the significant ecological characteristics that can be restored and managed for in a forest. These traits are generally lacking from second growth forests. The characteristics of an old forest include:

- Having large trees (>20") that are also old trees throughout a forest
- Variable tree densities and tree size throughout a forest
- Abundant downed deadwood in different sizes and stages of decay. A northern hardwood forest should have 7-9 cords per acre of downed dead wood on the forest floor
- Large dead standing trees throughout a forest. A northern hardwood forest should have 12-20 standing dead trees > 20" in diameter per acre.
- An abundance of new tree growth in various stages of development
- Abundant native plant communities
- Thick multi-layered canopies that diffuse the light reaching plants below

Achieving these characteristics can be achieved through passive management or through active management. Passive management involves reserving sections of forest as areas where no significant management will take place. These forest reserves would be allowed to develop naturally and achieve old forest characteristics on their own. Not all forests are good candidates for passive management. There are forests which have been heavily influenced by humans which currently may not be able achieve the goals of old forests without some intervention. Forests with high densities of invasive plants, forest with health issues and plantations are examples of forests that may need some intervention before they are set aside as reserves. In the Brookfield Town Forest 1/3 of the forest is being set aside as a reserve. These 52ac of forest will be allowed to mature and develop naturally into an old forest. See the map for the location of these reserves.

The other approach to achieving old growth forests is through thoughtful active management. This approach develops the structure and values associated with old forests quicker than a passive approach. This is because active manage does not rely on natural disturbances to make changes to the composition of a forest. Instead, those disturbances are introduced into a stand purposely, mimicking natural disturbances. This approach allows trees to increase in size more quickly by increasing the growing space within a forest. There are a variety of management decisions that can be made to increase old forest characteristics depending on the current conditions of the forest. In the Brookfield Town Forest this approach will be taken in stand 4,

which is 63.5ac in size. See the Silvicultural Management section of Stand 4 for more details on what management approaches will be taken to achieve old forest characteristics here.

Legacy Trees

Legacy trees will be retained in any treatment done. These are trees that will be left to complete their life cycle naturally. Trees that will be retained for this purpose will be long lived trees that are healthy and vigorous or ecologically significant. This will ensure large trees can be found in the future in Brookfield Town Forest. These large trees will provide many important ecological functions as they remain in the forest. A process for identifying and marking these trees will have to developed to protect these trees when management is done. This could in the form of tags, paint, or GPS points. In the Brookfield Town Forest legacy trees will be mark with a red “L”.

Invasive plant management

Prescribed forest management will be mindful of the risks of invasive plants. Following logging activities, areas treated will be monitored for new infestations of invasive plants. Any plants found will be dealt with promptly. In areas where established plants are present prior to harvest, invasive plant control, either through mechanical or chemical methods must be part of any larger silvicultural treatment. In areas where herbicide treatment is necessary to achieve control, a licensed pesticide applicator should be contracted.

Water quality

There are many water resources on the property. These include wetlands, streams, vernal pools and seeps. All the water resources on the property will be protected during forest management activities. This will be done through logging in only frozen conditions or very dry summer conditions, buffering water resources and following Vermont Acceptable Management Practices (AMPs). The Vermont Water Quality Acceptable Management Practices Manual for Logging Professionals will be followed. All roads and trails used during logging operations will be closed out to the standard of the AMP manual.

Ash Management

In the fall of 2021 Emerald Ash Borer was found in the center of Brookfield, about 6 miles away from the Brookfield Town Forest. The assumption must be made that either EAB is already in the ash trees at the Brookfield Town Forest or will find its way there shortly. White ash makes up about 7.5% of the composition of the forest overall. When EAB starts to kill trees in the forest it will have an impact on the composition of the forest. The management of ash going forward will adhere to the following management goals:

- **Maintain ash as a component throughout the forest.**
- **Promote a diverse mix of native species.**
- **Conserve the economic value of ash (see diameter objectives for ash)**
- **Slow the spread of EAB in the region.**

Stand 1

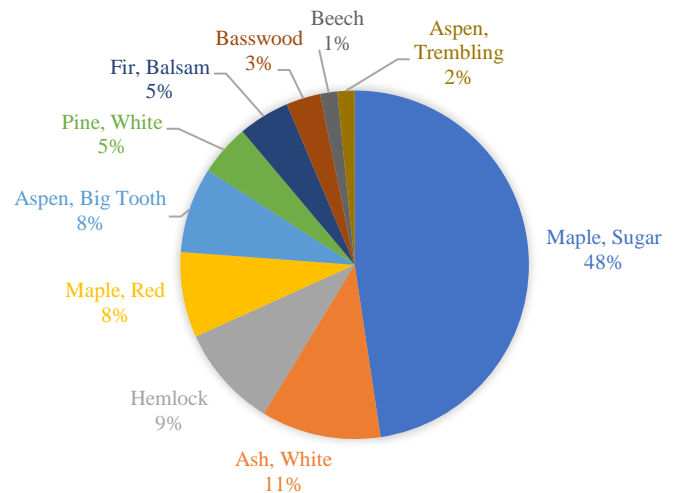
21 acres

Points Sampled: 7

Description

This stand is located east of Halfway Brook rd. It is a northern hardwood forest with the dominant species being sugar maple, white ash, and hemlock. In general, the trees in this stand are small in size. The sugar maple here are generally of good form and quality. These trees tend to be smaller in size, with the average size of the maple being 7.5" in diameter. White ash makes up 11% of the basal area. These trees are of good form and quality. The ash tends to be larger than the maple with the average ash tree being 12.5" in diameter. This stand was logged during the 2012-2014 harvest. A mix of treatments were implemented during this harvest and not all areas treated. Which has left the stand with variable structure and density.

SPECIES COMPOSITION



Stand statistics

Quadratic Mean Stand Diameter: 9"

Volume: 2,727bf/ac 7.3 cords/ac

Basal Area: 90 ft²/ac

AGS BA: 66 ft²/ac

UGS BA: 24 ft²/ac

Trees per Acre: 205

Snag:

| Snags < 12" | Snags 12-16" | Snags > 16" | Total |
|-------------|--------------|-------------|----------|
| 7.28/ac | 4.97/ac | 0/ac | 12.25/ac |

Terrain

The terrain in stand 1 is gently to moderately sloping and the operability of the stand is not affected by the terrain. The terrain slopes towards the west. There are skid trails throughout most of the stand. These trails are not conducive to recreational use because they are overgrown, with large drainages installed.

Downed Woody Material

The amount of downed woody material (DWM) found in this stand is moderate to high. Out of the 7 points sampled in this stand, all 7 points reported DWM. Most of the points with DWM reported moderate amounts. As this stand develops more DWM will accrue throughout the stand. Downed woody material are pieces of trees or whole trees on the forest floor. This material is very important for wildlife, erosion control, carbon storage and soil health. It also helps to protect tree regeneration. Down woody material is an important feature of our forests.



Trail in stand 1 heading towards area 2-D

Regeneration

| Seedlings | Stems/ac | | Saplings | Stems/ac |
|---------------|------------|--|--------------|-------------|
| Beech | 357 | | Beech | 1142 |
| Striped maple | 214 | | Balsam fir | 928 |
| Aspen | 143 | | Str. Maple | 500 |
| White pine | 71 | | | |
| White spruce | 71 | | | |
| Total | 571 | | Total | 2570 |

This stand has a good mix of well-established regeneration. Species not tallied but were noted in the stand included sugar maple, white ash, red oak, and yellow birch. This regeneration has created great vertical structure throughout this stand.

History

This stand was harvested in 2012-2014. This harvest implemented a single tree and group selection treatment in most parts of the stand. The southeastern section of the stand received a shelterwood treatment.

Soils

There are two soil complexes found in this stand. Buckland loam complex, 8-25% slopes very stony and Buckland loam complex 25-50% slopes very stony. These soils are deep, moderately well drained, and productive. The site class of these soils is a 2 out of 4, with 1 being the most productive and 4 the least productive. (see soil report for more details)



Uncut area of stand 1

Forest Health

This stand is relatively healthy with few pathogens noticed. Beech Bark Disease is present in this stand. With most of the beech showing little resistance to the disease. The ash in this stand are threatened by Emerald Ash Borer.

Invasive plants

Common buckthorn was noted in this stand in light to moderate amounts. Daphne, a flowering shrub was also noticed in this stand. This flowering shrub is considered by some to be an invasive plant. Daphne is an ornamental shrub imported from Asia and Europe. The daphne is in a small patch in the southwest of the stand.



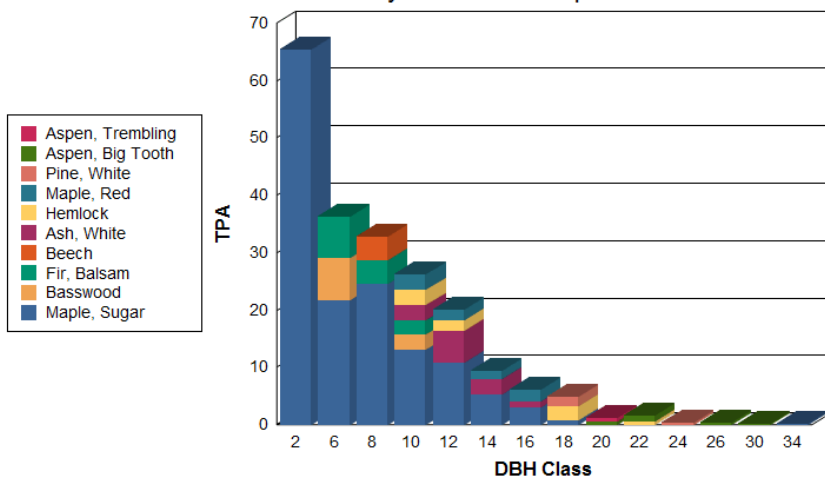
Daphne in stand 1

Species Composition and Volume Table

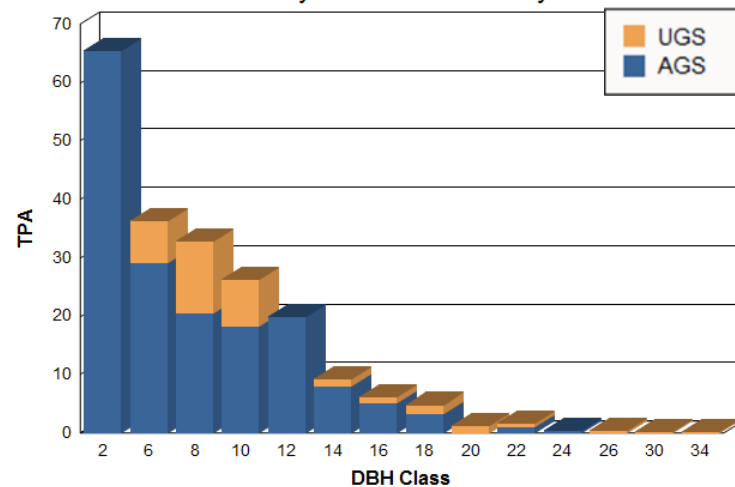
| Species | Basal Area | Basal Area Percentage | Trees Per Acre | Quadratic Mean Stand Diameter (inches) | Relative Density | Precent AGS | Board foot Volume | Pulp Volume (Cords) |
|------------------|------------|-----------------------|----------------|--|------------------|-------------|-------------------|---------------------|
| Maple, Sugar | 42.86 | 47.62 | 145.33 | 7.35 | 36.78 | 86.67 | 876.08 | 3.1 |
| Ash, White | 10 | 11.11 | 11.77 | 12.48 | 8.05 | 85.71 | 507.03 | 0.27 |
| Hemlock | 8.57 | 9.52 | 7.41 | 14.56 | 4.06 | 83.33 | 363.5 | 0.39 |
| Maple, Red | 7.14 | 7.93 | 7.82 | 12.94 | 5.72 | 100 | 376.64 | 0.34 |
| Aspen, Big Tooth | 7.14 | 7.93 | 2.42 | 23.26 | 3.19 | 20 | 123.49 | 1.78 |
| Pine, White | 4.29 | 4.77 | 2.07 | 19.49 | 1.51 | 66.67 | 480.87 | 0.62 |
| Fir, Balsam | 4.29 | 4.77 | 13.99 | 7.5 | 2.19 | 33.33 | | 0.27 |
| Basswood | 2.86 | 3.18 | 9.9 | 7.28 | 1.51 | | | 0 |
| Beech | 1.43 | 1.59 | 4.09 | 8.01 | 1.24 | | | 0.13 |
| Aspen, Trembling | 1.43 | 1.59 | 0.65 | 20.08 | 0.64 | | | 0.39 |
| [TOTAL] | 90 | 100 | 205.44 | 8.96 | 64.9 | 72.22 | 2727.62 | 7.29 |

Stand Structure

Trees Per Acre by DBH Class & Species



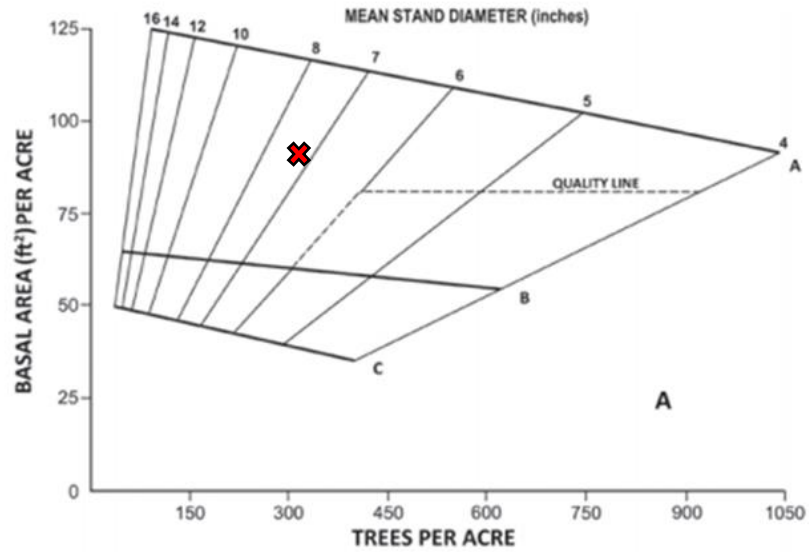
Trees Per Acre by DBH Class & Quality



This stand is an uneven aged stand. Meaning this stand has three or more distinct age classes. This is a more natural stand structure. The recent harvest helped to push this stand towards it current structure.

Stand density

This stand is at the mid A-B line of the hardwood stocking chart. This means the overstory trees in this stand have enough growing and are growing freely.



The “X” show where the stand density charted out on the hardwood stocking guide according to Silvicultural Guide for Northern Hardwood Types in the Northeast.

Silvicultural Management

This stand was harvested 10 years ago. It is about halfway through the cutting cycle. The density of this stand is at a level where the trees growing here have room to grow. There is a good mix of regeneration that has become established since the harvest. The majority of this regeneration is free to grow.

This stand should be monitored for EAB during this planning period. The second most common species in this stand is white ash, making up 11% of the composition. With EAB confirmed in Brookfield 6 miles from the forest, the ash in this stand is under threat. Some of these trees could be harvested to reduce the impact of EAB in this stand. It also would be fine to leave this stand alone and let EAB enter this stand. This would likely lead to a lot of ash mortality, but some of these trees may be resistant or resilient and survive. If it is decided to do some pre-salvage work before EAB enters the stand, the treatment below should be implemented. Otherwise, no work is necessary in this stand.



Treatment

Single Tree Selection and Group Expansion

Implement a single tree selection and group expansion that will focus on expanding groups that are already established, while releasing overstory trees to increase their growth and vigor. Group expansion will increase established groups to no larger than 0.5ac and will focus on releasing ash regeneration.

In-between the groups, implement a single tree selection harvest that will reduce the basal area to 80ft². The selection cut should focus on releasing desirable growing stock by removing poor quality trees and commercially viable ash that are at least 14" in size. Primary trees to be managed for in this stand are sugar maple, red maple, resistant beech, white pine, and white ash, though all species should be considered for retention to promote species diversity.

Stand 2

16 acres

Description

Stand are the plantations that were removed during the 2014 harvest. These areas have been mapped A-E. Only area A has trees remaining in the overstory. Here a white pine plantation remains. This plantation is full of high-quality white pines. Like stand 3, some of the pines are being affected by white pine needle cast. There is well established hardwood regeneration underneath these pines.

The remaining parts of this stand, B-E are regenerating to a mix of different species. Some are more advanced than others. Below the Stand Statistics are pictures of each area.

Stand statistics

Quadratic Mean Stand Diameter: 19"

Volume: 2,438bf/ac 0.8 cords/ac

Basal Area: 28ft²/ac

AGS BA: 26ft²/ac

UGS BA: 2ft²/ac

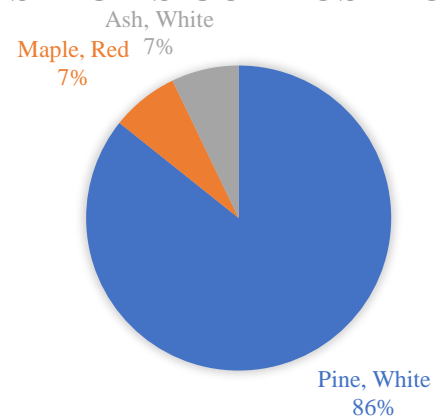
Trees per Acre: 13

Snags:

| Snags < 12" | Snags 12-16" | Snags > 16" | Total |
|-------------|--------------|-------------|---------|
| 0/ac | 2.55/ac | 0.92/ac | 3.47/ac |

Points Sampled: 5

SPECIES COMPOSITION



Area 2-A



Area 2-B



Area 2-C



Area 2-D



Area 2-E

Terrain

The terrain in all parts of stand 2 is gently rolling. These plantations were planted on agricultural fields, so there are very little boulders or uneven ground in this stand. Like other stands, skid trails can be found throughout. None of the trails are suitable for recreation as they are overgrown and have large water bars installed for drainage.

Regeneration

Regeneration was not measured in this stand. All sections of this stand are flush with regeneration. Most of the regeneration is around 5-15 years old. Young trees in the stand include, red maple, sugar maple, white ash, aspen, paper birch, beech, yellow birch, white pine and red spruce.

Downed Woody Material

Downed woody material was not measured in this stand. Qualitatively, the DWM in this stand is low.

History

This stand was originated on agricultural fields. These fields were planted to red and white pine 60-70 years ago. The white pine plantations have been thinned twice since the 1990's. Most recently during the 2012-2014 harvest. The red pine plantations were removed during the 2012-2014 harvest.

Soils

There is one soil complexes found in this stand. Buckland loam complex, 8-25% slopes very stony. These soils are deep, moderately well drained, and productive. The site class of these soils is a 2 out of 4, with 1 being the most productive and 4 the least productive. (see soil report for more details)

Forest Health

This stand is full of young vigorous trees. Area 2-A does have a white pine overstory. These pines are being affected by white pine needled cast which appears to be affecting the vigor of these trees.

Invasive plants

Buckthorn is scattered throughout all sections of this stand. Area 2-A has a number of large buckthorns established in the understory

Silvicultural management

This stand has responded well to the plantation removal. The forest is dominated by young vigorous trees. Even area 2-A where white pine remain in the overstory is full of vigorous young trees.

These trees are providing great young forest habitat. This kind of forest is generally lacking in Vermont. It is important habitat for a wide variety of wildlife.

This stand will eventually be suitable for crop tree release work as the regenerating trees enter the stem exclusion stage of development. This will be 10-20 years from now. The pine in the overstory of area 2-A can be removed at any point. These trees have some health issues and have reached financial maturity. They could also be left in place to

provide some structural diversity to stand 2. If the overstory is remove it can be included with work done in stand 1.



Treatment

2023-2033-Overstory Removal of White Pine in area 2-A

This work can be done at any time during the next 10 years. The overstory removal will focus on removing the white pine overstory in area 2-A. A careful operator should be chosen for this work to protect the hardwood understory. A whole tree operation might be a good choice. Some white pine can be retained long term in this stand to provide structural diversity to this stand.

2023-2033-Plant Warmer Climate Adapted Species in areas 2C, 2B and 2D

In areas where plantations were completely removed consider planting warmer climate adapted species, like red oak, hickory, and red spruce. This will increase the stands resilience to climate change and will increase diversity. It may be necessary to protect the trees planted from deer. If funds allow consider protecting trees with tree tubes. The best time to plant trees would be in the spring once the ground thaws.

Stand 3

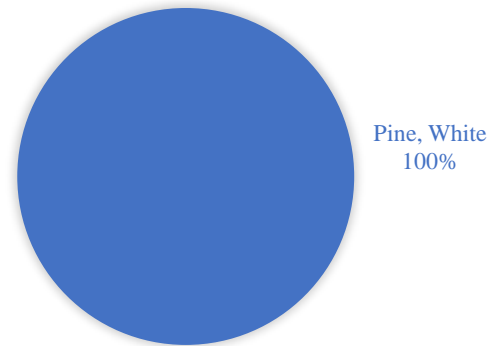
5 acres

Points Sampled: 3

Description

Stand 3 is a white pine plantation planted about 60 -70 years ago. This plantation has been thinned a few times, once in 1994, again in 2003 and again in 2012-2014. The plantation is entirely made up of white pines. The average size of the pine in this stand is 14". The quality of the pine in this stand is good. Most of the trees here have at least 32 feet of merchantable height. There are some health concerns with the pine. They are being affected by white pine needle cast, caliciopsis and small crowns. All of these health concerns are leading to some mortality. The understory is full of a mix of northern hardwoods. These young trees are well established. Trees in the understory include white ash, sugar maple, beech, birch, red maple and striped maple. These hardwoods are the future of this stand.

SPECIES COMPOSITION



Stand statistics:

Quadratic Mean Stand Diameter: 14"

Volume: 16,036bf/ac 11.0 cord/ac

Basal Area: 167 ft²/ac

AGS BA: 130 ft²/ac

UGS BA: 37 ft²/ac

Trees per Acre: 149

Snags: None Tallied

Terrain

The terrain in this stand is gently sloping and will not affect the operability of this stand. There are established trails throughout this stand. Most of these trails are overgrown and not suitable for recreation in their current state. A landing and truck road are in this stand. Both are in great shape and can be used in future logging operations.

Regeneration

The regeneration in this stand is well establish and made up of a good mix of different species. Trees that can be found in the understory include sugar maple, red maple, beech, white ash, birch, hophornbeam and striped maple



Figure 1 Hardwood regeneration in stand 3

Downed Woody Material

Downed woody material was not measured in this stand. Qualitatively, the DWM in this stand is low to moderate.

History

The white pine plantation was planted in the 70's. Since the 90's this plantation has been thinned 3 times. The most recent thinning was done in 2013.

Soils

There are two different soil complexes found in this stand. Buckland loam 8-15% slopes. These soils are moderately deep, moderately well drained, and productive. This complex is located in the north of the stand. The other complex, which is located in the south of the stand is Cabot silt loam, 3-15% slopes very stony. These soils are shallow, poorly drained and not very productive. The site class of these soils is a 2-3 out of 4, with 1 being the most productive and 4 the least productive. (See soil report for more details)

Forest Health

The white pine in this stand has a few health concerns. White pine needle cast is reducing the number of needles in the crowns of the pines. Caliciopsis canker is affecting some of the pines in this stand. The crowns of some these pines are suppressed, making these trees have less vigor to deal with pathogens. All these factors are leading to mortality.

Invasive plants

There are scattered, medium to large buckthorn established in this stand.



Thin crowned pine

Species Composition and Volume Table

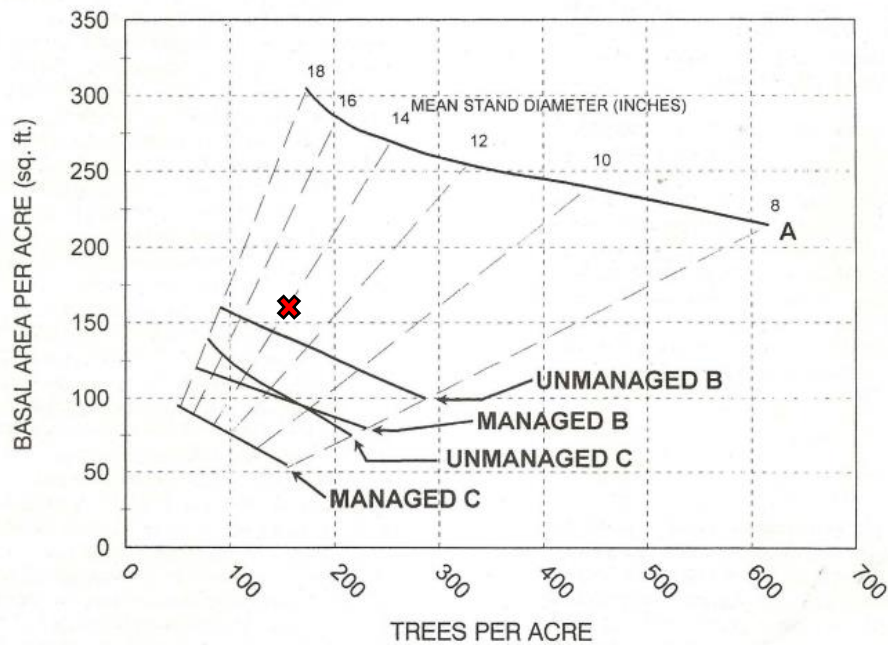
| Species | Basal Area | Basal Area Percentage | Trees Per Acre | Quadratic Mean Stand Diameter (inches) | Relative Density | Percent AGS | Boardfoot Volume | Pulp Volume (Cords) |
|-------------|------------|-----------------------|----------------|--|------------------|-------------|------------------|---------------------|
| Pine, White | 166.67 | 100 | 149.45 | 14.3 | 65.2 | 34.21 | 16036.4 | 10.92 |
| [TOTAL] | 166.67 | 100 | 149.45 | 14.3 | 65.2 | 78 | 16036.4 | 10.92 |

Stand Structure

This stand is a two-aged stand. Meaning this stand has two distinct age classes, the planted white pine and the established hardwood regeneration.

Stand density

When comparing the stand density to the white pine stocking guideline the stand is above the B line. Which according to the chart means this stand is adequately stocked.



The "X" shows where the stand density charted out on the white pine stocking guide according to Revised white pine stocking guide for managed stands

Silvicultural management

The pine in this stand have some health concerns as mentioned in the Forest Health section. Which is leading to mortality. These pines are not a long-term option for this stand. The natural community here is more suited for a northern hardwood mix. Northern hardwoods are well established in the understory of this stand. Any treatment done in the stand should have the goal of growing and promoting these hardwoods. The soils reports have two different type of soil complexes, Buckland loam and Cabot silt. Due to the depth of the Cabot silt work done in this stand may lead to trees blowing over post-harvest. Any treatment done in this stand will have to take this into consideration.



Treatment

2023: Two stage shelterwood with reserves

Remove 30-40% of the overstory in the first stage of a two shelterwood, residual basal area of 120-100ft². Trees that are suppressed and showing signs of decline should be targeted for removal. High quality dominant tree with healthy crowns should be retained. Southern parts of the stand should have a higher residual basal as the soils here are shallower then in the north.

2032: Implement the second and final stage of the shelterwood. This treatment will release the established hardwoods further. Traditionally this cut would normally be a complete removal of the overstory. This cut will remove 50-60% of the overstory. To keep pine as part of the landscape and increase the structural diversity in this stand, this final cut of the shelterwood will implement reserve trees. This will leave the stand with roughly 50-40ft² of basal area post-harvest. Trees left as reserves should be healthy and vigorous with live crown ratios of at least 30%. These remaining white pine trees will be retained long term and allowed to live out their life cycle. The treatment following this second cut will be focused on the developing hardwood stand.

Stand 4

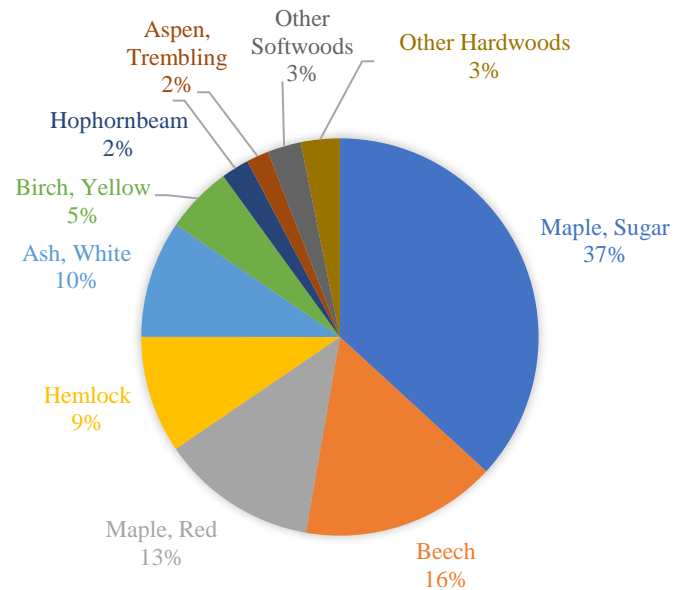
63.5 acres

Points Sampled: 21

Description

Stand 4 is the largest in the Brookfield Town Forest. This stand is a northern hardwood forest, with the most common species being sugar maple, red maple, beech, and white ash. The quality of the trees in this stand is not great. About two thirds of the trees in stand 4 are consider poor quality. This is not due to lack of management; this stand has been actively managed since the 90's. with two major treatments done here. This stand is a second growth forest that became established on old agricultural land. This has likely played a big role in the quality of the trees in this stand. The quality of the trees is variable, not all parts of the stand have poor quality trees. The northeastern part of the stand is a beautiful grove of high-quality sugar maple.

SPECIES COMPOSITION



Stand statistics

Quadratic Mean Stand Diameter: 10"

Volume: 2829bf/ac 13.5 cords/ac

Basal Area: 104ft²/ac

AGS BA: 39ft²/ac

UGS BA: 65ft²/ac

Trees per Acre: 196

Snags:

| Snags < 12" | Snags 12-16" | Snags > 16" | Total |
|-------------|--------------|-------------|--------|
| 3.60/ac | 3.48/ac | 1.05/ac | 8.1/ac |

Terrain

The terrain in this stand is variable. Some sections are gently rolling to moderately steep, other areas are very steep. There is a ridge in the north central part of the stand. The ridge runs north south. There are established skid trails through this stand. None of the trails are suitable for recreation as they are overgrown and have large water bars installed for drainage. There is a potential place for a vista in the center of the stand along the ridge



Skid trail in stand 4

Regeneration

| Seedlings | Stems/ac | Saplings | Stems/ac |
|---------------|------------|--------------|-------------|
| Striped maple | 146 | Beech | 604 |
| Beech | 125 | Str. Maple | 333 |
| Aspen | 104 | Red Spruce | 166 |
| Red Spruce | 83 | Sugar Maple | 83 |
| Hophornbeam | 21 | Basswood | 42 |
| | | Balsam Fir | 21 |
| Total | 479 | Total | 1249 |

The trees established in the understory are mostly shade tolerant species. There is a general lack of more desirable species established in the understory, trees like sugar maple, yellow birch and ash. The absence of desirable regeneration in the understory can be attributed to high tree density and deer browse. Stands with higher densities have closed canopy, which means little to no sunlight reaches the forest floor.

Downed Woody Material

The amount of downed woody material (DWM) found in this stand is low. Out of the 24 points sampled in this stand, 9 had DWM. Of those 9 points that had DWM, 8 had low levels and 1 had moderate levels of DWM. The lack of woody debris on the forest floor can be attributed to type of equipment used during the last harvest. The last harvest was done using whole tree methods, where the entire tree was cut and dragged out of woods. This method leaves little residual woody material on the forest floor. Efforts should be made to increase the amount of DWM found in this stand. This will occur naturally through stand succession.



Downed woody material in stand 4

History

This stand has been harvested twice since the early 90's. Each harvest focused on removing poor quality trees. The latest harvest implemented a single trees and small group selection.

Soils

There is one soil complex found in this stand. That complex is Vershire-Glover-Rock outcrop complex, 8 to 25 percent slopes. These soils are deep, well drained, and very productive. This soil complex gives this stand a forest site class of 1 out of 4, with 1 being the best and 4 being the poorest. (See soil report for more details)

Forest Health

Beech bark disease is affecting most of the beech trees in this stand with little resistance to the disease evident. Paper birch is beginning to decline due to age. Sugar maple has old Sugar Maple Borer damage.

Invasive plants

No invasive plants were noted.

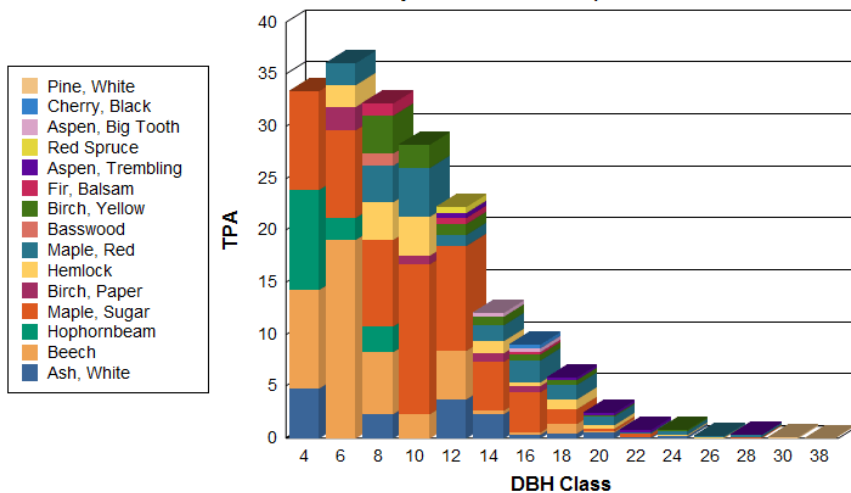
Species Composition and Volume Table

| Species | Basal Area | Basal Area Percentage | Trees Per Acre | Quadratic Mean Stand Diameter (inches) | Relative Density | Percent AGS | Board foot Volume | Pulp Volume (Cords) |
|------------------|------------|-----------------------|----------------|--|------------------|-------------|-------------------|---------------------|
| Maple, Sugar | 38.57 | 36.82 | 66.95 | 10.28 | 31.7 | 36.67 | 1292.65 | 3.76 |
| Beech | 16.67 | 15.91 | 49.72 | 7.84 | 14.37 | 4.65 | 108.27 | 1.87 |
| Maple, Red | 13.33 | 12.72 | 16.76 | 12.08 | 10.71 | 15.71 | 393.97 | 2.61 |
| Hemlock | 10 | 9.55 | 14.36 | 11.3 | 4.7 | 4.3 | 117.26 | 1.93 |
| Ash, White | 10 | 9.55 | 15.24 | 10.97 | 8.09 | 28.95 | 569.72 | 1.06 |
| Birch, Yellow | 5.71 | 5.45 | 7.22 | 12.04 | 4.6 | 11.9 | 159.04 | 0.61 |
| Hophornbeam | 2.38 | 2.27 | 16.07 | 5.21 | 2.3 | | | |
| Aspen, Trembling | 1.9 | 1.81 | 1.27 | 16.56 | 0.86 | | | 0.73 |
| Fir, Balsam | 1.43 | 1.37 | 2.31 | 10.65 | 0.55 | 20 | | 0.37 |
| Birch, Paper | 1.43 | 1.37 | 3.21 | 9.04 | 1.34 | 9.09 | 39.17 | 0.13 |
| Pine, White | 0.95 | 0.91 | 0.16 | 32.99 | 0.3 | 0.88 | 73.88 | 0.23 |
| Aspen, Big Tooth | 0.95 | 0.91 | 0.79 | 14.85 | 0.43 | | | 0.24 |
| Red Spruce | 0.48 | 0.46 | 0.61 | 12.01 | 0.17 | 14.29 | 36.62 | 0 |
| Cherry, Black | 0.48 | 0.46 | 0.34 | 16.09 | 0.37 | 12.5 | 39.17 | 0 |
| Basswood | 0.48 | 0.46 | 1.36 | 8.04 | 0.25 | 100 | | 0.1 |
| [TOTAL] | 104.76 | 100 | 196.37 | 9.89 | 80.75 | 37.23 | 2829.75 | 13.65 |

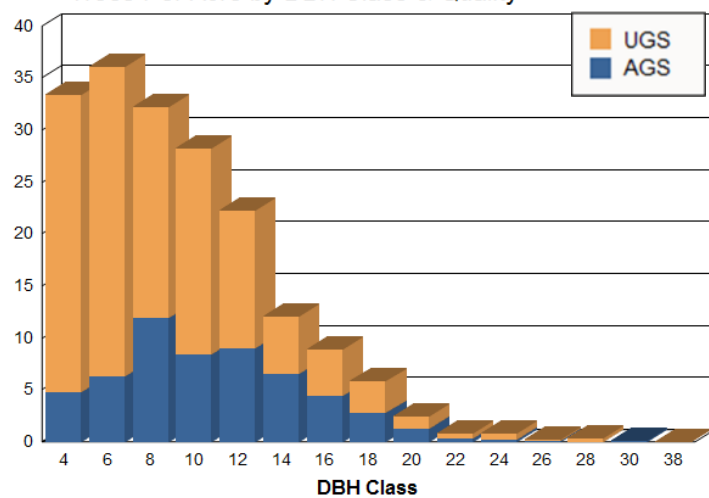
Stand Structure

This stand is an uneven aged stand. Meaning this stand has three distinct age class. Maintaining larger trees scattered in the stand will continue to keep this stand in uneven aged state

Trees Per Acre by DBH Class & Species

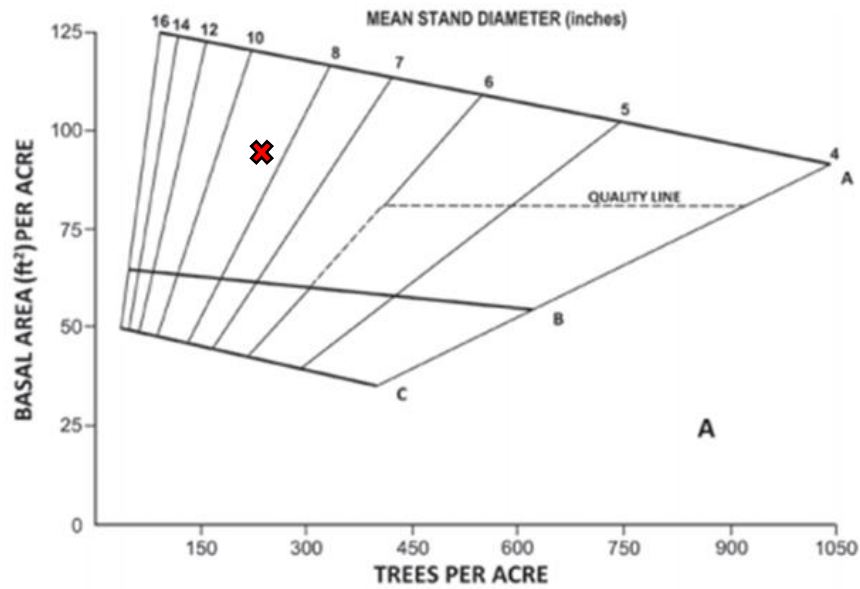


Trees Per Acre by DBH Class & Quality



Stand density

When comparing the density to the hardwood stocking guideline the stand is below the A-line. Which according to the chart means this stand is nearing a fully stocked condition.



The “X” show where the stand density charted out on the hardwood stocking guide according to Silvicultural Guide for Northern Hardwood Types in the Northeast.

Silvicultural management

Stand 4 is the Brookfield Town Forests largest stand and has the largest timber resource. This stand has a high percentage of poor-quality stems. This is after 2 harvests in 30 years focused on removing poor quality from the stand. The regeneration here is also lacking a desirable mix of species. About 70% of the regeneration in this stand is made up of beech or striped maple. Establishing a more diverse mix of young trees in this stand will be key in making this stand more resilient in the future. The best way to stimulate regeneration is to get sunlight hitting the forest floor. This requires removing trees from the overstory. To overcome the more shade tolerant species that are established in the understory, large groups are needed to stimulate the growth of more sun loving species.

There is the potential to cut in a vista near the ridge that runs along the center of the stand. This would give users of the forest a place to sit and take in the view. There are skid trails throughout this stand that could be upgraded and connected to create a nice recreational trail network.

This stand provides connectivity to areas being managed passively for old forest conditions. Because of this connectivity there is an opportunity to manage this stand actively for old growth characteristics. In its current state this stand is lacking old forest traits which are important ecologically. This stand lacks downed deadwood, large snags, an abundance of viable regeneration and large trees >20" in diameter.

These traits can be added to this stand through active management. Trees will be cut and dropped or pushed over to increase down deadwood. Large trees will be griddled to increase large snags. Because it is important to have a variety of down wood and snags at different stages of decay some trees with low vigor will be retained and not cut or removed from the stand. Legacy trees and legacy patches will be implemented throughout the stand. Roughly 20% of stand will be in legacy patches. These legacy patches will be in areas that are ecologically sensitive and areas with groups of large trees with habitat features like crack and cavities. Legacy trees will be retained throughout the stand. Roughly 30% of canopy trees will be retained as legacy trees. Long lived trees should be chosen as legacy trees. These trees will be released through a crown thinning to increase their growth. With increased growth these trees will reach the diameter objective of 20" in diameter or higher quicker. Increasing the structure and viable regeneration is important for the long-term resilience of the stand. Groups will be cut throughout the stand to



encourage the establishment new trees growth. These groups should be cut a way that mimics natural disturbances. About 20% of the stand will be cut in groups. These groups should have retention with in them. These trees will provide structure and a seed source within the group. About 20-30% of the trees within the groups should be retained. The groups should also have trees cut and dropped with in them to increase down deadwood with in them.

Treatment

2022: Groups Selection and crop tree release

Implement a group selection harvest and crown thinning. The total area that should be regenerated using groups should not exceed 20% or approximately 14 acres. The size of the groups should be at least 0.75 acres in size and no bigger than 2 acres. Groups should be in areas of poor quality, mature trees that have met their diameter objectives or areas of desirable regeneration. Groups should have about 20-30% of trees with in them retained. These trees will provide a seed source and will increase the structural diversity of these groups.

This treatment will also implement patch reserves. These will be areas that will be held in reserve from the group selection treatment. These patch reserves will account for 20% of the stand, or 17ac and will be at least 1ac in size. These reserves will be plotted and mapped out so the location can be identified in the future. Areas to be considered for retention patches are areas with sensitive ecological features or groups or areas large trees with habitat features like crack and cavities.

Outside the group patches and retention patches implement a light crown thinning focusing on releasing well-formed trees. The main species targeted for release should be sugar maple, yellow birch, and red maple. Legacy trees should also be released during this treatment. About 30% of the canopy trees should be chosen as reserved. Long lived trees such as sugar maple, yellow birch, red spruce, and white pine should be chosen as legacy trees. Legacy trees should be marked with an “L”. Target residual density between the patches should be 80-70ft².

Throughout the stand trees should be cut and dropped or pushed over with equipment to increase down dead wood. Based on the amount of downed woody material currently in this stand, the target during this treatment should be 7-10 large trees per acre dropped or pushed over and left on the forest floor. To increase the number of standing dead in this stand, snags should be created through gridding and retaining low vigor trees. If possible, larger trees should be targeted for girdling. The target for snags creation during this treatment should be 5-7 trees/ acre.

Plant warmer climate adapted species, like red oak, hickory and red spruce in the groups cut. This will increase the stands resilience to climate change and will increase diversity. Planting can happen any time after group selection harvest treatment has been implemented. It may be necessary to protect the trees planted from deer. If funds allow consider protecting trees with tree tubes.

Reserve Lands

Total forest in reserve: 60.6ac

There are parts of the Brookfield Town Forest that are best held in reserve and not managed for timber. These areas are mapped on the forest management map. There are 4 areas being held in reserve. The following are descriptions of areas that will be held in reserve.

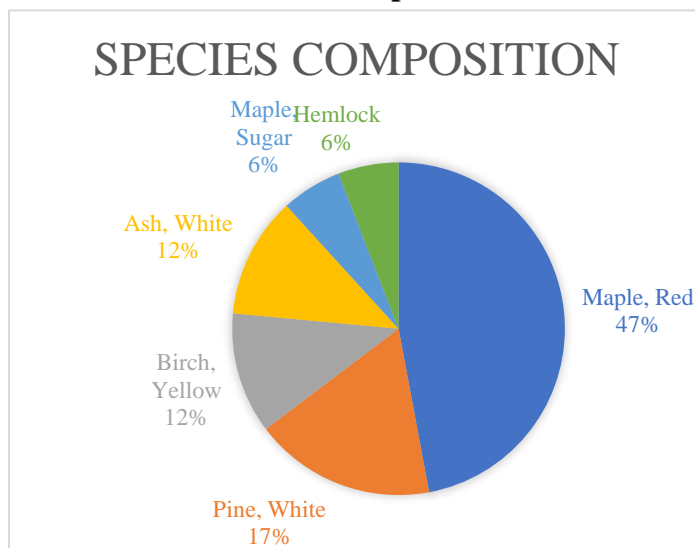
Stand 5 Northern Hardwood Old Forest Reserve

8 acres

Description

Stand 5 is in the southwest of the property, south of the brook and west of the Halfway Brook Rd. This stand was harvested 10 years ago. The eastern part of the stand has wet soils and there is a small wetland here the runs along the road. A small landing was established during the last harvest to access this stand. The wetness of this area created significant soil disturbance during the logging operation. This landing should either be avoided or used during frozen conditions. During the last timber sale done here a group selection and thinning was implemented. This has left the stands stocking low in many areas. The understory is lacking new tree growth and is currently occupied by ferns and brambles. This stand is a northern hardwood stand with red maple, white pine, yellow birch, and white ash the most common species found here. The quality of the trees in this stand is mixed with a third of the density being considered poor quality.

Points Sampled: 3



Stand Statistics

Quadratic Mean Stand Diameter: 14"

Volume: 3,570bf/ac 2.89 cords/ac

Basal Area: 57 ft²/ac

AGS BA: 39ft²/ac

UGS BA: 11ft²/ac

Trees per Acre: 50

Snags: None tallied

Terrain

The terrain is relatively gently rolling and slopes from west to east. The slope increases in the western portion of the stand. There is one trail which leaves the landing and heads west up the slope. With some work, this trail could be used for recreation. Currently it is overgrown and has large water bars installed.

Regeneration

| Species | Stems/ac |
|---------------|------------|
| Striped maple | 357 |
| Aspen | 285 |
| Beech | 143 |
| Total | 642 |

The regeneration in this stand is a bit disappointing. The intent of the previous treatment was to stimulate new tree growth. Currently there is little regeneration of value established here. It takes time for new trees to become established. It is too early yet to know how this stand will respond to the past treatment.



Fern dominated group with hardwoods starting to establish themselves

Downed Woody Material

Downed woody material was not measured in this stand. Qualitatively, the DWM in this stand is low to moderate.

History

This stand was harvested in 2012-2014. This harvest implemented a single tree and group selection treatment. It targeted poor quality pines and hardwoods. The goal was to increase growing space and stimulate new tree growth.

Soils

There are two soil complexes found in this stand. One is Buckland loam complex, 8-25% slopes very stony. These soils are deep, moderately well drained, and productive. The other complex found in this stand is Cabot silt loam, 3-15% slopes very stony. These soils are shallow, poorly drained and not very productive. The site class of these soils is a 2-3 out of 4, with 1 being the most productive and 4 the least productive. (see soil report for more details)



Group cut in 2012-2014

Forest Health

This stand is relatively healthy with few pathogens noticed. The ash in this stand is threatened by Emerald Ash Borer.

Invasive plants

No invasive plants were found with in this stand.

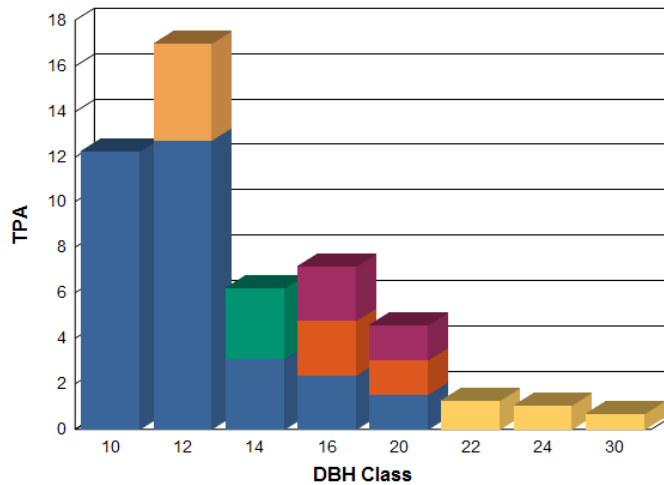
Species Composition and Volume Table

| Species | Basal Area | Basal Area Percentage | Trees Per Acre | Quadratic Mean Stand Diameter (inches) | Relative Density | Percent AGS | Boardfoot Volume | Pulp Volume (Cords) |
|---------------|--------------|-----------------------|----------------|--|------------------|--------------|------------------|---------------------|
| Maple, Red | 26.67 | 47.06 | 31.99 | 12.36 | 21.48 | 8.57 | 942.38 | 2.89 |
| Pine, White | 10 | 17.65 | 3 | 24.72 | 3.33 | 3.7 | 1469.46 | 0 |
| Birch, Yellow | 6.67 | 11.77 | 3.91 | 17.69 | 5.16 | 2.38 | 274.18 | 0 |
| Ash, White | 6.67 | 11.77 | 3.91 | 17.69 | 5.16 | 5.26 | 754.55 | 0 |
| Maple, Sugar | 3.33 | 5.88 | 3.12 | 13.99 | 2.65 | 0.83 | 65.78 | 0 |
| Hemlock | 3.33 | 5.88 | 4.24 | 12 | 1.57 | 1.08 | 63.84 | 0 |
| [TOTAL] | 56.67 | 100 | 50.18 | 14.39 | 39.35 | 81.17 | 3570.19 | 2.89 |

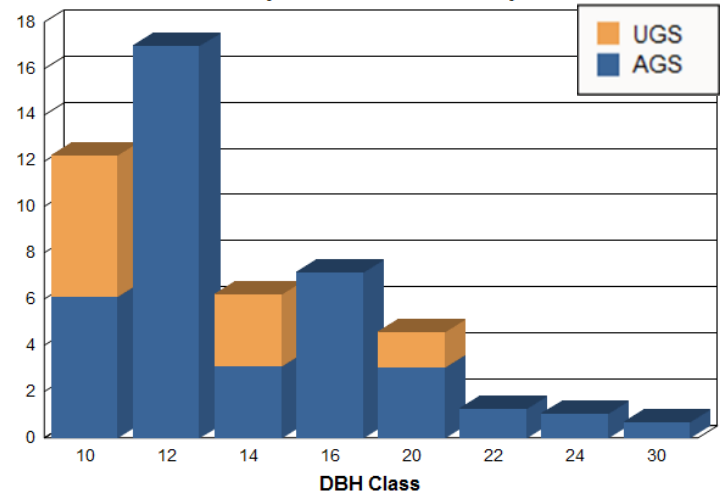
Stand Structure

This stand is two aged. Meaning the stand has two distinct age classes. It is on it is way to developing a third age class and becoming uneven aged.

Trees Per Acre by DBH Class & Species



Trees Per Acre by DBH Class & Quality

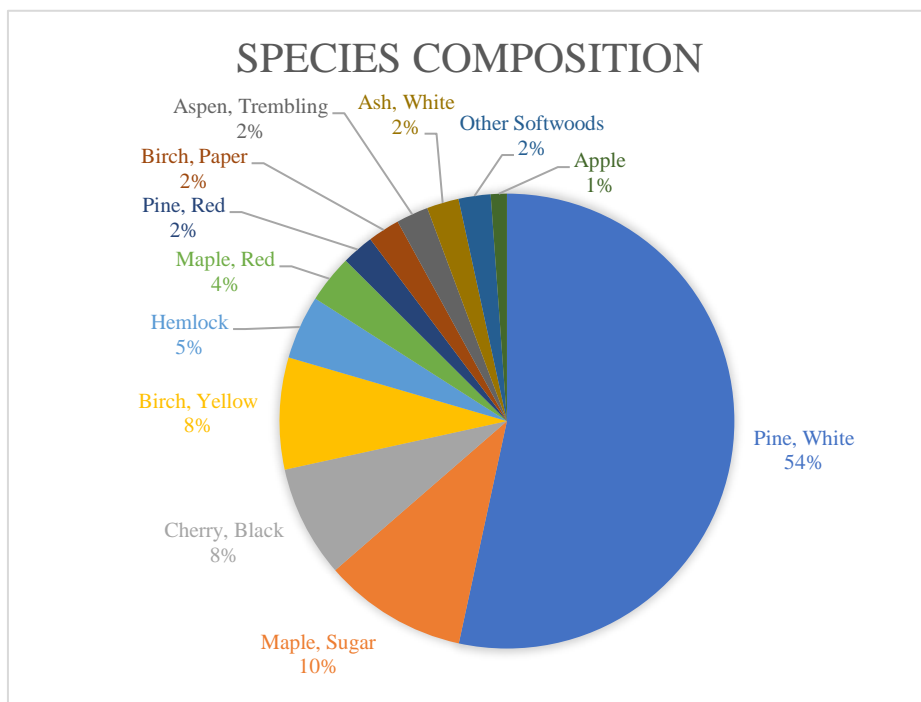


Stand 6 Riparian Reserve

16.7 acres

Points Sampled: 7

This area encompasses Halfway Brook and two of its tributaries. Each stream has been given a buffer of at least 50' and in most places, the buffer is 100'. These buffers include some of the steep banks associated with these streams. These steep banks are sensitive, with the trees and vegetation growing along the banks helping to stabilize the soil. The riparian areas are helping with stream stabilization and water quality. Water quality should be the main management goal of this area, with little to no forest management taking place within the area mapped.



Stand Statistics

Quadratic Mean Stand Diameter: 14"

Volume: 8,108bf/ac 12.93 cords/ac

Basal Area: 126 ft²/ac

AGS BA: 76ft²/ac

UGS BA: 50ft²/ac

Trees per Acre: 115

Snags:

| Snags < 12" | Snags 12-16" | Snags > 16" | Total |
|-------------|--------------|-------------|---------|
| 15.0/ac | 5.0/ac | 1.0/ac | 21.0/ac |

Regeneration

Regeneration data was not gathered for this stand.

Downed Woody Material

Downed woody material was not measured in this stand. Qualitatively, the DWM in this stand is low to moderate.



Species Composition and Volume Table

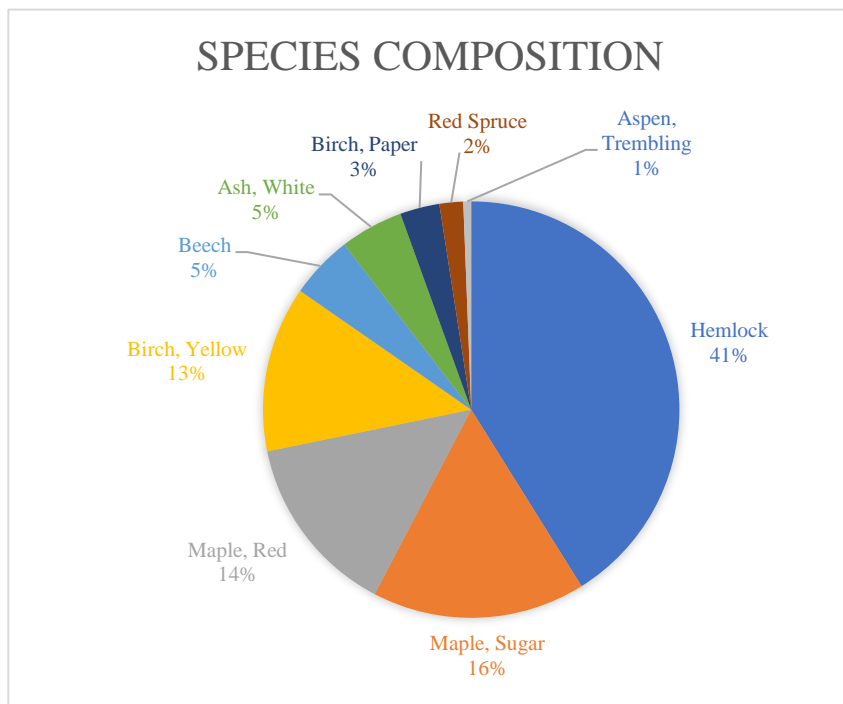
| Species | Basal Area | Basal Area Percentage | Trees Per Acre | Quadratic Mean Stand Diameter (inches) | Relative Density | Percent AGS | Boardfoot Volume | Pulp Volume (Cords) |
|------------------|-------------------|------------------------------|-----------------------|---|-------------------------|--------------------|-------------------------|----------------------------|
| Pine, White | 67.14 | 53.41 | 44.06 | 16.72 | 24.68 | 38.27 | 5948.27 | 6.68 |
| Maple, Sugar | 12.86 | 10.23 | 17.59 | 11.58 | 10.33 | 2.5 | 251.91 | 1.53 |
| Cherry, Black | 10 | 7.95 | 7.96 | 15.18 | 7.85 | 37.5 | 291.6 | 1.5 |
| Birch, Yellow | 10 | 7.95 | 8 | 15.14 | 7.86 | 16.67 | 542.32 | 0 |
| Hemlock | 5.71 | 4.54 | 6.44 | 12.75 | 2.7 | 2.15 | 336.28 | 0.45 |
| Maple, Red | 4.29 | 3.41 | 10.55 | 8.63 | 3.62 | 2.86 | | 0.91 |
| Pine, Red | 2.86 | 2.28 | 1.2 | 20.9 | 1.19 | 100 | 245.29 | 0 |
| Birch, Paper | 2.86 | 2.28 | 5.24 | 10 | 2.63 | 9.09 | | 0.53 |
| Aspen | 2.86 | 2.28 | 5.91 | 9.42 | 1.32 | | | 0.33 |
| Ash, White | 2.86 | 2.28 | 4.75 | 10.51 | 2.34 | 2.63 | 205.87 | 0.52 |
| Red Spruce | 1.43 | 1.14 | 0.54 | 22.04 | 0.33 | 14.29 | 286.57 | 0 |
| Fir, Balsam | 1.43 | 1.14 | 1.34 | 13.99 | 0.46 | | | 0.48 |
| Apple | 1.43 | 1.14 | 1.82 | 12 | 0.65 | | | 0 |
| [TOTAL] | 125.71 | 100 | 115.38 | 14.13 | 65.96 | 59.66 | 8108.11 | 12.93 |

Stand 7 Old Forest Reserve

29.4 acres

Points Sampled: 11

This area is located in three different areas of the Brookfield Town Forest. They are mapped as stands 7-A, 7-B and 7-C. Areas 7-A and 7-B have seen light logging in the past 40 years and are steep and hard to operate in. These areas have been managed infrequently and because of this they are well on their way to becoming old growth. These areas should be held in reserve with no management taking place. Area 7-C was treated during the latest harvest. This area is being held in reserve to provide connectivity between the areas being held in reserve north and areas being held in reserve to the south. The boundary of area 7-C may change as treatments are done in stand 4. The boundary of this area should be easy to locate on the ground. As more time is spent in and around this area the boundary may shift, but the intention of connecting the reserves will stay the same. Once boundaries are located on the ground a new map will be created showing the location of area 7-C.



Stand Statistics

Quadratic Mean Stand Diameter: 13"

Volume: 7,350bf/ac 16.04 cords/ac

Basal Area: 148 ft²/ac

AGS BA: 90ft²/ac

UGS BA: 58ft²/ac

Trees per Acre: 115

Snags:

| Snags < 12" | Snags 12-16" | Snags > 16" | Total |
|-------------|--------------|-------------|--------|
| 0/ac | 3.0/ac | 0.5/ac | 3.5/ac |

Regeneration

Regeneration data was not gathered for this stand.

Downed Woody Material

Downed woody material was not measured in this stand. Qualitatively, the DWM in this stand is low.

Species Composition and Volume Table

| Species | Basal Area | Basal Area Percentage | Trees Per Acre | Quadratic Mean Stand Diameter (inches) | Relative Density | Percent AGS | Boardfoot Volume | Pulp Volume (Cords) |
|---------------|------------|-----------------------|----------------|--|------------------|-------------|------------------|---------------------|
| Hemlock | 60.91 | 41.11 | 55.62 | 14.17 | 28.82 | 45.16 | 3839.93 | 5.81 |
| Maple, Sugar | 24.55 | 16.57 | 35.49 | 11.26 | 19.99 | 15 | 918.55 | 2.19 |
| Maple, Red | 20.91 | 14.11 | 16.86 | 15.08 | 16.37 | 14.29 | 615.89 | 3.92 |
| Birch, Yellow | 19.09 | 12.88 | 22.84 | 12.38 | 15.28 | 33.33 | 798.52 | 1.19 |
| Beech | 7.27 | 4.91 | 19.91 | 8.18 | 6.25 | 6.98 | 140.58 | 1.53 |
| Ash, White | 7.27 | 4.91 | 8.34 | 12.64 | 5.83 | 15.79 | 565.81 | 0.39 |
| Birch, Paper | 4.55 | 3.07 | 4.87 | 13.09 | 4.3 | 27.27 | 145.43 | 0.68 |
| Red Spruce | 2.73 | 1.84 | 2.02 | 15.74 | 0.8 | 42.86 | 325.35 | 0 |
| Aspen | 0.91 | 0.61 | 0.21 | 28.19 | 0.4 | | | 0.34 |
| [TOTAL] | 148.18 | 100 | 166.15 | 12.79 | 98.04 | 60.74 | 7350.05 | 16.04 |



Area 7-A



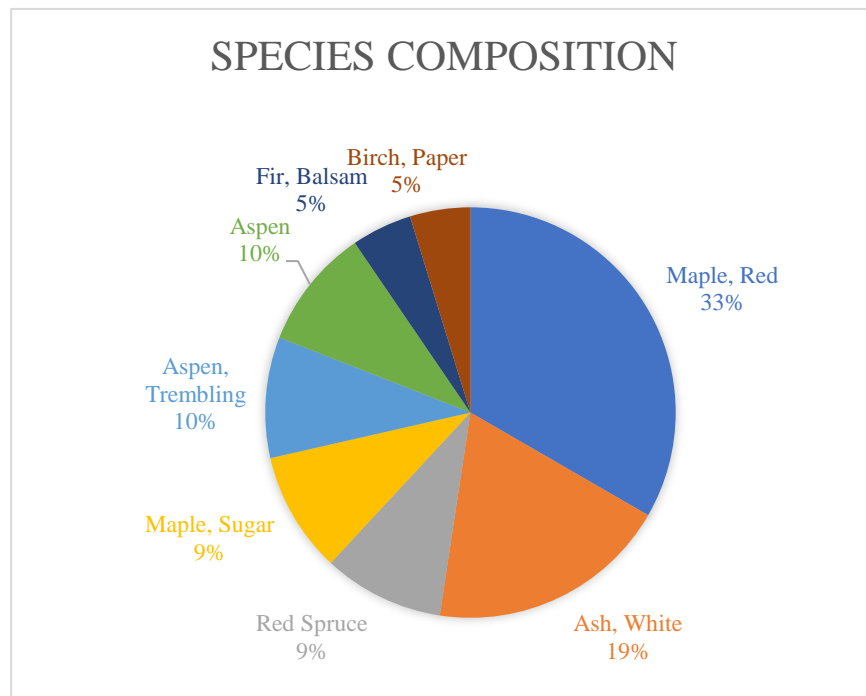
Area 7-B

Stand 8 Forested Wetland

6.5 acres

Points Sampled: 2

This area is a remote section of forest in the western most part of the Brookfield Town Forest. Here the soils are wet. It is not mapped as wetland by the Department of Environmental Conservation but given the vegetation growing here and high water table this area appears to be a forested wetland. Because of the fragile soils this area is best left unmanaged and protected for its unique ecological characteristics.



Stand Statistics

Quadratic Mean Stand Diameter: 13"

Volume: 7,350bf/ac 16.04 cords/ac

Basal Area: 105 ft²/ac

AGS BA: 60ft²/ac

UGS BA: 45ft²/ac

Trees per Acre: 140

Snags: None tallied

Regeneration

Regeneration data was not gathered for this stand.

Downed Woody Material

Downed woody material was not measured in this stand. Qualitatively, the DWM in this stand is low.

Species Composition and Volume Table

| Species | Basal Area | Basal Area Percentage | Trees Per Acre | Quadratic Mean Stand Diameter (inches) | Relative Density | Percent AGS | Boardfoot Volume | Pulp Volume (Cords) |
|------------------|---------------|-----------------------|----------------|--|------------------|--------------|------------------|---------------------|
| Hemlock | 60.91 | 41.11 | 55.62 | 14.17 | 28.82 | 45.16 | 3839.93 | 5.81 |
| Maple, Sugar | 24.55 | 16.57 | 35.49 | 11.26 | 19.99 | 15 | 918.55 | 2.19 |
| Maple, Red | 20.91 | 14.11 | 16.86 | 15.08 | 16.37 | 14.29 | 615.89 | 3.92 |
| Birch, Yellow | 19.09 | 12.88 | 22.84 | 12.38 | 15.28 | 33.33 | 798.52 | 1.19 |
| Beech | 7.27 | 4.91 | 19.91 | 8.18 | 6.25 | 6.98 | 140.58 | 1.53 |
| Ash, White | 7.27 | 4.91 | 8.34 | 12.64 | 5.83 | 15.79 | 565.81 | 0.39 |
| Birch, Paper | 4.55 | 3.07 | 4.87 | 13.09 | 4.3 | 27.27 | 145.43 | 0.68 |
| Red Spruce | 2.73 | 1.84 | 2.02 | 15.74 | 0.8 | 42.86 | 325.35 | 0 |
| Aspen | 0.91 | 0.61 | 0.21 | 28.19 | 0.4 | | | 0.34 |
| [TOTAL] | 148.18 | 100 | 166.15 | 12.79 | 98.04 | 60.74 | 7350.05 | 16.04 |



Forested wetland in stand 8

Reserve Management Strategy

All the areas held in reserve will be allowed to develop naturally. This approach will allow for these areas to develop old forest characteristics passively. There may be some circumstances when management activities will occur in these reserves. Invasive plant control will take place in all areas where if necessary. There is also an opportunity for trails to be established in some of the areas held in reserve.

Schedule of Management Activities

(Timing of specific activities may be shifted)

| Stand | Activity | Scheduled Year | Priority | Cost | Partner |
|--------------|--|------------------------|-----------------|--|---------------------------------------|
| All | Locate Boundary | 2023 | High | Variable, some areas may require a surveyor to re-establish the line | Volunteers/ County Forester, Surveyor |
| All | Boundary line maintenance | Annual (10-year cycle) | High | \$120-\$150 for paint | Volunteers/ County Forester |
| All | Monitor for invasives plants | Annual | High | None | Volunteers, County Forester, |
| All | Invasive plant removal | Annual | High | Low to medium depending on how they are treated | Volunteers, |
| All | Improve trails for recreation | Annual | High | Variable | Volunteers, VYCC, Trail user groups |
| 3 | 1 st stage of a shelterwood | 2025 | Medium | None, revenue positive | County Forester |
| 4 | Group section & crop tree release | 2025 | Medium | None, revenue positive | County Forester |
| 4 | Tree planting in groups | Post-harvest | Medium | Variable depending on cost of the trees | Volunteers / County Forester |
| 1 | Single tree and groups selection | 2023-2032 | Low | None, revenue positive | County Forester |
| 2C, 2B, 2D | Tree planting | 2023-2032 | Medium | Variable depending on cost of the trees | Volunteers / County Forester |
| 2-A | Overstory removal | 2023-2032 | Low | None, revenue positive | County Forester |

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Glossary

AGS: Acceptable Growing Stock (AGS) is a classification given to trees in a stand which are considered healthy and capable of producing a sawlog sometime in the future.

Age Class: See “Cohort.”

Cable Skidder: A skidder which uses a cable winch to drag trees out of the forest. These skidders are generally smaller and lighter than skidding equipment used by whole-tree logging crews.

Cohort: A group or generation of trees of generally the same age, often initiating from the same disturbance event.

Composition: The proportion of trees of different species present in a given forest or stand.

Cover Type/Forest Type: A classification given to a stand based on the dominant tree species present at a given moment in time.

Cut to length system: A method of logging where trees are processed at the stump into log lengths. Normally this system uses a forwarder to haul logs to landing.

DBH: Diameter at Breast Height – the diameter measurement of the trunk of a tree 4.5’ above the ground. DBH is the standard system for measuring tree diameter in forestry.

Even-Aged: A stand comprised of trees of a single age class (cohort), usually resulting from a single disturbance event.

Forwarder: Logging equipment used to haul logs to the landing. This equipment grabs log and places them in it bunk.

Harvest: The process of cutting trees to extract a forest product from the woods.

Intermediate: The canopy position of trees who have been over-topped by other stems, but are still receiving some direct light from above. These stems are generally higher in quality than suppressed trees, and in the case of shade-tolerant species may be healthy, but overall they are poor in condition.

Group Selection: This treatment system involves harvesting all stems in a small area, usually no greater than 1 acre in size. These areas in which all trees are harvested are called “groups,” and may be as small as 2-3 trees in size. The goal for these groups is to regenerate a new cohort of trees or to release existing regeneration. Usually, these groups will regenerate a portion of a stand in proportion to the frequency of cutting and the rotation age of the stand. For instance, in a stand with a cutting cycle (frequency) of 20 years and a target rotation age of 100 years, 20% of the stand would be regenerated using groups each time cutting is done. This way, by the time the full rotation age has passed, all areas have been regenerated and there are 5 age classes of trees in the forest. In reality, a fully-balanced age-class distribution would be next to impossible to achieve, but this is the general goal of this system.

Landing: A cleared area where logs are yarded or skidded to for loading onto trucks for transport to the mill.

Midstory: Trees with a canopy position below the overstory, but above the understory in a stand. The midstory of a forest usually consists of suppressed and intermediate stems and/or slow growing or shade tolerant species.

Natural Community: An assemblage of biotic/abiotic factors in an environment, and the processes that govern them. Natural communities consist of all levels of biota in a forest, and consider how forest composition and structure changes over time.

Overstory: The highest canopy position of trees in a forest. Overstory trees are generally those whose crowns are exposed to full or nearly full light.

Pole: An immature tree generally 4"-10" DBH

Prescription: A silvicultural strategy for how to manage a stand to achieve a desired result. A prescription will detail exactly how to harvest a forest, including providing metrics for the residual stand, and a detailed description of trees to be cut and those to be retained.

Release: The process of removing trees from competition, allowing them to grow more freely.

Regeneration: Young trees and plants (usually less than 4" DBH) in the forest, often growing in response to a human-caused or natural disturbance event.

Sapling: An immature tree generally 2-4" DBH.

Stem: A word used in forestry to refer to a tree.

Silviculture: The art and science of tending a forested stand, generally using timber harvesting as a tool.

Single Tree Selection: This treatment harvests trees of all age classes in a stand to encourage the growth of higher quality stems and the establishment of regeneration of shade-tolerant tree species. This treatment can also be used to ensure that there is an even distribution of trees of different species throughout the stand. This treatment is often employed between groups as part of uneven-aged management.

Skidder: A tractor-like machine, used to drag or "skid" trees out of the forest.

Stand: An area of forest in a similar enough condition, with regards to structure, composition, history and other factors, to be managed as a single unit.

Structure: In a forestry context, structure describes the presence of different age classes and canopy heights within a stand. Vertical structure is comprised of trees of different heights interspersed throughout an area, whereas horizontal structure described the presence of pockets of trees of different ages. In uneven-aged management, single tree selection usually encourages the creation vertical structure, whereas group selection creates horizontal structure. Structure may also describe the arrangement of dead wood across in a forest.

Succession: The process by which trees in a forest move from one generation and condition to the next. "Early successional" stands are those that establish following a disturbance, stocked by shade-intolerant and pioneer species, while "late-successional" (sometimes used interchangeably with "old-growth") stands, occur when stands have developed into older forest types, often stocked by larger, older trees of shade-tolerant species and a more complex, uneven-aged structure.

Suppressed: Trees which have been completely overtopped by overstory stems, receiving little to no direct sunlight, are considered "suppressed." Except in the cases of very shade-tolerant species, suppressed trees are often stunted and poor in quality.

Timber: Timber is used to describe the forest products (sawlogs, pulp, firewood, etc.) located inside the standing trees present in the forest. This word is sometimes also used to describe these products after the trees have been cut but before they have been processed or milled.

Treatment: A silviculturally planned and executed timber harvest.

Two-aged: A stand which is comprised of two distinct age classes. This is a common condition in managed forests, as the overstory is often targeted for logging, regenerating a new understory cohort while retaining some overstory trees.

UGS: Unacceptable Growing Stock (UGS) is a classification given to unhealthy trees unlikely to live long or to produce a sawlog in the future.

Uneven-aged: A stand comprised of three or more distinct age classes of trees. This forest type is common in undisturbed and “old-growth/late successional” forests.

Uneven-age management: This management system seeks to emulate natural disturbance regimes and natural forest growth patterns by establishing and maintaining multiple age classes of trees within a single stand.

Understory: Trees located at the lowest canopy positions in the forest, usually consisting of very young stems less than 10’ in height.

Whole-Tree Logging Crew: A type of logging crew that utilizes large, mechanized machinery to process trees from the stump up. Trees are processed on the landing into a variety of products, and tree tops and limbs are chipped.