

Forest Management Plan

For the

Milton Town Forest

Town of Milton

Chittenden County, Vermont

2022

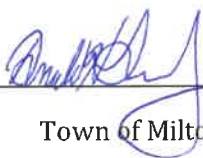
Prepared by Ethan Tapper, Chittenden County Forester
Vermont Department of Forests, Parks and Recreation
In Conjunction with the Milton Conservation Commission



7/25/22

Ethan Tapper, Chittenden County Forester

Date



Town of Milton

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Introduction.

The purpose of this Forest Management Plan (FMP) is to provide detailed, specific recommendations for the management of ecosystems at the Milton Town Forest (MTF) using forest inventory data and a scientific process. The recommendations in this document are intended to provide a roadmap for the management of these ecosystems within the context of best practices for the management of forests, wildlife, water quality and more. This FMP is not intended to provide detailed recommendations on governance, recreation or other uses of the MTF.

This FMP describes a holistic approach for the stewardship of MTF, considering a wide range of different benefits, values and opportunities offered by the parcel. These include wildlife habitat, responsible forest management, conservation education, public recreation and the preservation of biodiversity, all framed within the aesthetic, cultural, economic and community values that the MTF offers to the Milton community.

The silvicultural recommendations put forth in this FMP are intended to be overseen by the Chittenden County Forester. If the Chittenden County Forester is unavailable, they shall be overseen in the field by a Vermont-licensed forester in agreement with the Town of Milton.

Any foresters and loggers contracted to complete work described in this FMP will be put forward by recommendation of the Milton Conservation Commission and the Chittenden County Forester. The Milton Conservation Commission will be responsible for implementing the day-to-day administration of this FMP, under the advisement of the Chittenden County Forester.

All of the recommendations prescribed in this FMP should be accompanied by extensive public outreach and education before, during, and after their implementation. In addition to encouraging a healthy, vibrant forest, the demonstration of thoughtful, responsible forest management and stewardship is a critical goal of this FMP.

This FMP shall be updated in 10 years, in 2032.

--- OVERVIEW OF FOREST CONDITIONS ---

Overall, the MTF is a unique and diverse parcel, a 485-acre jewel on the edge of the increasingly fragmented and developed Champlain Valley. The centerpiece of the MTF, the 33-acre Milton Pond, is surrounded by diverse forests and wetlands, important wildlife habitat for a wide range of different biota. The MTF is accessed by a well-used recreational trail system maintained by volunteers and by two parking areas on the Milton-Westford Road.

The Forest.

The forest stands at the MTF can be separated into two different groups. In the west of the parcel (Stands 1-4), northern hardwoods are dominant. In most parts of this western area, enriched soils support a Rich Northern Hardwood Forest natural community, typically dominated by sugar maple, white ash and American basswood. While sugar maple and white ash are common in this area, the forest is generally young, simple and degraded, and hasn't yet has time to develop into a mature version of this natural community. Among this hardwood forest, areas of thinner, dryer soils support patches of Red Oak-Northern Hardwood Forest, with red oak, American beech and white pine.

In the east of the MTF (Stands 5-8) the forest is entirely different – supporting a diverse mix of different tree species and natural communities, including Northern Hardwood Forest and Red Spruce – Northern Hardwood Forest, not to mention the unique natural communities surrounding Westford Bog and Milton Marsh.

The primary difference between these two halves of the parcel are their soils: the Hinesburg Thrust Fault runs between these two areas, just west of Milton Marsh and Milton Pond. To the west of the Thrust Fault, bedrock is primarily quartzite and dolostone rich in calcium and other minerals, creating enriched” soils. To the east of the Thrust Fault, bedrock is largely schist covered in deep glacial till. While soils in these latter areas have pockets of enriched soils, they are much less enriched than soils in western areas and so support a different suite of natural communities.

More detailed information on the natural communities, ecology and history at the MTF can be found in the 2003 report titled: “Milton Town Forest: Inventory, Assessment and Recommendation” on the Milton town website and linked via the QR code here.



Scan this QR code to read the 2003 “Milton Town Forest: Inventory, Assessment and Recommendation” report

Streams and Wetlands.

Wetlands are a prominent feature at the MTF. Westford Bog is the largest example of this, an approximately 40-acre wetland complex featuring about 10 acres of mapped Red Maple-Sphagnum Acidic Basin Swamp. A more detailed ecological inventory of the Westford Bog can be found in the “Bove Property: Natural Resource Assessment and Land Use Planning Final Report” on the Milton town website and linked via the QR code here



Scan this QR code to read “Bove Property: Natural Resource Assessment and Land Use Planning Final Report”

Milton Marsh is another important wetland in the MTF. It is a large (approx. 30 acres) beaver wetland complex west of Westford Bog in the center of what was cleared agricultural land as recently as the 1960's. In summer 2021, Milton Marsh was supporting an active beaver population. Some portions of the Marsh were open water, whereas others were “beaver meadows,” formerly dammed areas which had succeeded into a diverse mix of herbaceous species, including goldenrod and Joe-Pye weed.

Milton Pond is a natural pond, though it was dammed and expanded in 1923. It features unique aquatic habitat for a variety of organisms, and is also flanked by pocket wetlands and beaver ponds.

The headwaters of Mallets Creek, a waterway draining a large portion of Milton and Colchester, originates just south of Milton Pond, flowing through the pond and exiting the MTF to the north. Rogers Brook, which drains into the Lamoille River, runs through Milton Marsh and is also fed by the outflow of Westford Bog.

Threats.

While the MTF is a truly special and important place, it is facing some real challenges. The legacy of land use on this parcel – both agricultural clearing and subsequent high-grade logging – has created forests which are young, simple, and lack the diversity and complexity of older forests. In some cases, these areas are unhealthy, degraded and vulnerable to climate change.

Non-native pests are also having an impact on the MTF. Earthworms, which are not native to Vermont, are having a profound impact on soils, causing them to be degraded. As this FMP was written in summer 2021, *Lymantria dispar dispar* (“LDD,” or “spongy moth,” formerly known as “gypsy moth”), a non-native insect, was in the middle of an outbreak; causing widespread defoliation of trees, especially oaks. While invasive exotic plants are not abundant (yet) in the MTF, common buckthorn, shrub honeysuckle and wall lettuce were all noted on the parcel. If left untreated, the infestation of these plants will increase, causing profound impacts to wildlife, forest health, and more.

Finally, deer browse is causing a huge impact on ecosystems at the MTF, impacting the forest’s ability to regenerate and support a healthy, diverse understory of native trees and plants. While white-tailed deer are native to Vermont, their populations in some parts of the state are increasing, exceeding the carrying capacity of their habitat. Where deer are overpopulated – such as in a huge portion of the United States – their browse is massive biodiversity threat that has cascading negative implications for ecology and ecosystem resilience.

History.

Like the majority of Vermont, it is likely that even the steepest and rockiest areas of the MTF were cleared at some point in the early-mid 1800's, along with about 80% of Vermont. The largest single driver for this clearing was the creation of sheep pasture, although the need for wood for fuel (before the advent of the woodstove, a typical home would burn dozens of cords of wood per year), charcoal (at a time when wood and charcoal were used in iron smelting and to power trains), building materials and fenceposts were also drivers of repeated forest clearing and exploitation. The need for wood combined with the relative scarcity of forests in Vermont by the 1850's put the remaining forests at even greater risk.

Wool markets crashed in Vermont around the middle of the 19th century, forcing farmers to diversify their enterprises. At this time, more marginal pastures in the southwest (Stand 2), west (Stand 1) and northeast (Stands 5 and 7) of the MTF were probably allowed to revert from agricultural land to forestland, while other areas remained in agricultural use. These former areas are forested in the 1942 aerial photograph of the MTF shown in Figure 1.

Milton Pond is a natural body of water, appearing on maps of Milton from as early as 1869. While over the last several centuries it has been used for multiple purposes, its most notable recent use was serving as a water supply for the Town of Milton from 1923 to 1993. The current dam, which expanded the size of the pond, was constructed in 1923. The Town purchased the parcel from the Milton Water Corporation in 1969.

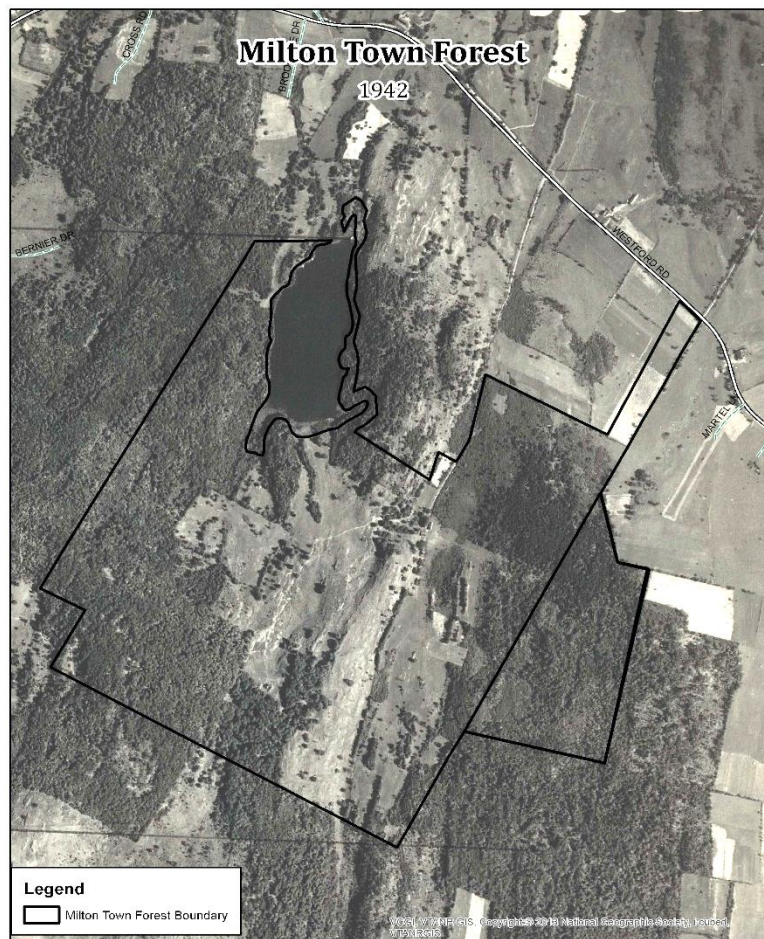


Figure 1: 2021 MTF Boundary Superimposed over 1942 Aerial Photo



Figure 2: 2021 MTF Boundary Superimposed over 1962 Aerial Photo

STATE OF VERMONT
DEPARTMENT OF FORESTS AND PARKS

COOPERATOR'S WOODLAND RECORD

Chronological Record of Visits,
Recommendations, Comments, Etc.

5/25/83 Ream of Ernie of Reservoir Property south
of Milton Westford Road. See my letter
of 7/29/83. Suggested (if possible) to not put
timber sale up on bid but to award it to a good
reputable logger in order to get a quality job.
The establishment of property lines must be
done before any cutting is permitted.

11/14/85 Contacted Mr. Duffin by phone re: his letter of
11/14/85. Reiterated all points in my letter to Ernie
Laird.

5/19/86 Call from Joe Nelson (FRD) re: "clobber job" of
the Milton Reservoir property.

1983-86 notes from the files of Chittenden County Forester Bill Hall. The
"Reservoir Property" is the MTF.

Between 1948-1962, most of the remaining open/agricultural areas of the MTF began to revert to forest, as shown in in Figure 2. The 1962 aerial photograph shows pastures in transition, the tiny dots of trees punctuating fields which were entirely open in in 1942.

While these historical dates may seem remote, the forests at the MTF – and throughout much of New England – are as much a product of this land use history as they are natural processes. Forests at the MTF – the tree species growing there, the way they are growing, their soils, the habitat that they offer – are profoundly shaped by agricultural usage and the subsequent regeneration, in combination with how the land has been managed since being allowed to revert to forest.

The MTF has been logged on several occasions throughout its history. According to Town records, in 1948 all trees 12" and diameter and larger were sold to the Atlas Plywood Corporation of Boston in the areas mapped here as Stands 1 and 2. The most recent and notable logging occurred in 1985-86, when the Town of Milton sold the right to cut all trees in the MTF larger than 10" in diameter to a logger for \$50,000. The subsequent logging job was unsupervised and reportedly very poorly done – called a "clobber job" and an "unmitigated disaster" by Chittenden County Forester Bill Hall and Assistant Chittenden County Forester David Brynn, respectively. According to a 1993 forest management plan written by Hall, most of Stand 1 was clearcut, and portions of Stands 2 and 3, 4 and 6 were heavily cut.

Following the fallout from the 1985-86 logging, the Town designated the MTF an official Municipal Forest in 1991. Bill Hall developed a Forest Management Plan for the parcel in 1993, although there are no records of any of his recommendations from that FMP being carried out. Also in 1993, according to the Town, the Town Charter was revised to mandate that the MTF be managed "using proper forest and wildlife practices."

Recreational access to this parcel has been a perennial issue, to the point where in 2000 the Town considered selling the parcel partially for this reason. The 135-acre "Bove Parcel" was added to the 350-acre MTF in 2006 (mapped here as Stands 5, 7, and 8) partially to solve this access issue. While the history of the Bove parcel is uncertain, it appears to have been logged in the 1990's in a harvest that removed large pine, spruce and hemlock.



Scan this QR Code
to read the 2003
LIA report.

Between 1962 and today, the MTF's developed into the forest that present-day visitors know and love (Fig. 3).

For a (much) more detailed look at the history of the Milton Town Forest, read the 2003 University of Vermont report on the parcel, available on the Milton Town website.

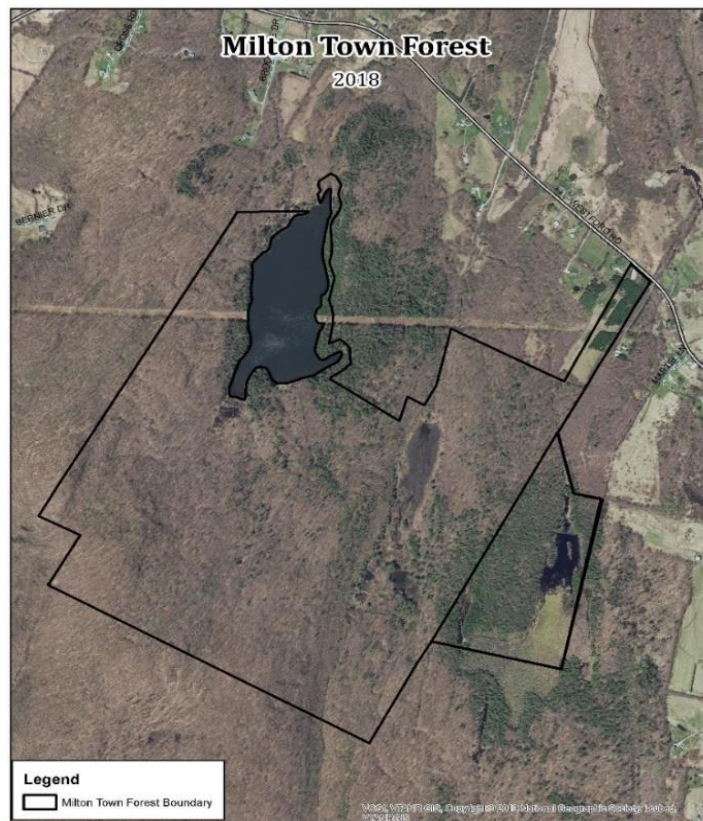


Figure 1: 2021 MTF Boundary Superimposed over 2018 Aerial Photo

9/19/86
Bill,
WAS OUT WITH RAY BERNIER
ON USE VALUE INSPECTION. UNFORTUN-
ATELY, HE BORDERS MILTON TOWN
FOREST. APPARENTLY PHIL PELKEY
BOUGHT CUTTING RIGHTS FOR 10"4
TREES FOR \$50,000. IT IS AN
UNMITIGATED DISASTER. PELKEY
WASN'T CONTENT W/ MILTON'S WOOD,
HE CUT OVER BERNIER'S LINE IN
SEVERAL PLACES IN SPITE OF PINK
FLOURESCENT FLAGGING.
THOUGHT THAT YOU WOULD BE
INTERESTED! WILL TALK W/ YOU
ON MONDAY. D.

Note from Assistant Chittenden County
Forester David Brynn to Chittenden County
Forester Bill Hall, dated September 19, 1986.

Reserve Zone.

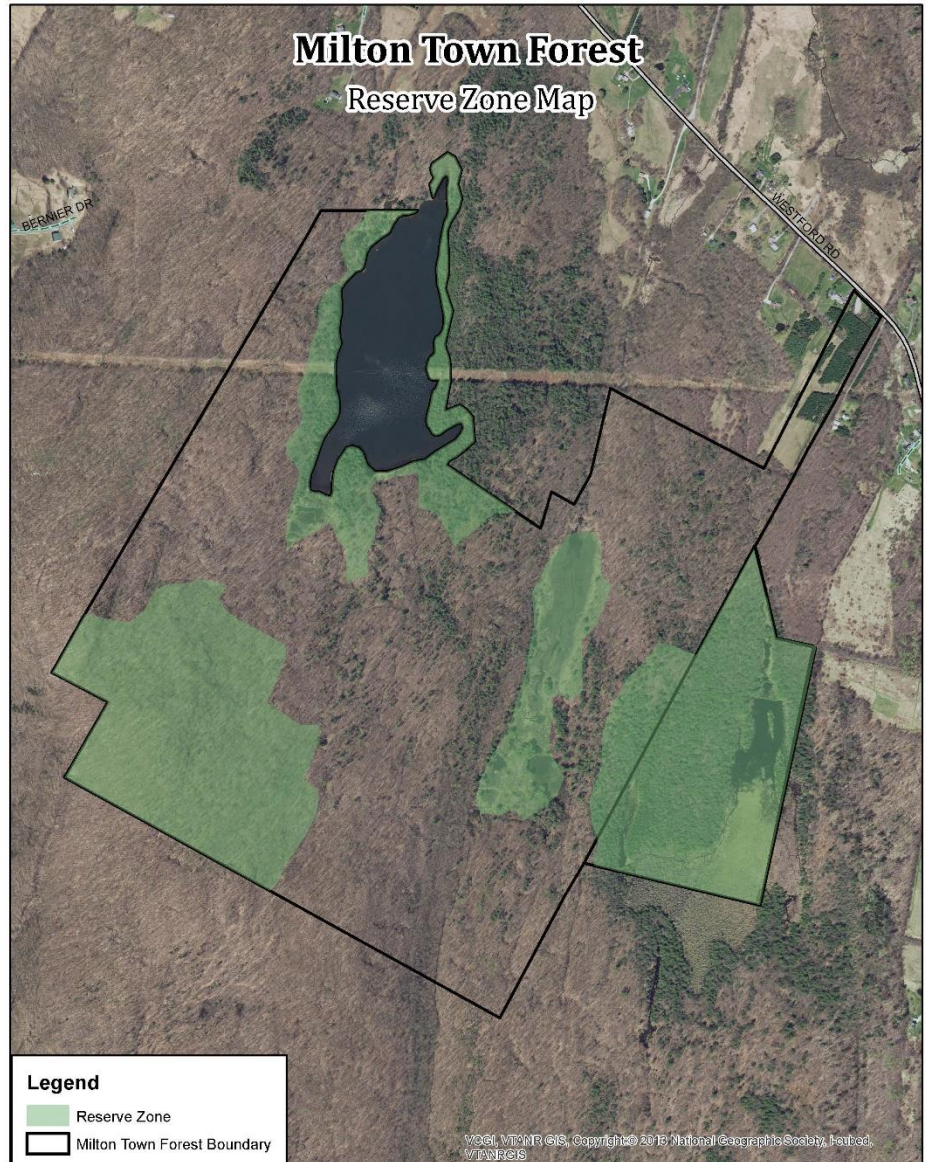
Like the Hinesburg Town Forest and the Andrews Community Forest in Richmond, it is recommended that the Milton Town Forest create a “Reserve Zone.” Within the Reserve Zone, no forest management will occur except for invasive plant and deer control. Ecosystems within this area will be allowed to “manage themselves” – to grow and develop on their own. In forested portions of the Reserve Zone, these areas may eventually develop into old forests, which have unique attributes, provide unique habitat and are relatively uncommon across our landscape (only about 1,000 acres of old forest is known in Vermont).

In order to create and maintain healthy, resilient landscapes, we need to manage for diverse forests, a diversity of different forest types and conditions, and also a diverse range of approaches. Responsibly managing some areas and leaving other areas as unmanaged reserves are two compatible and complimentary strategies to building healthy, functional, diverse landscapes.

The Reserve Zone mapped in this Forest Management Plan consists of a total of 170 acres, about 36% of the area of the MTF (not including Milton Pond).

The areas mapped within the Reserve Zone are: Westford Bog and Milton Marsh, buffers, steep areas, wetlands and sensitive areas around Milton Pond and two unique Stands on the parcel – Stand 2 and Stand 7. The former stand is a relatively mature forest with some old forest characteristics and the latter is a diverse and unusual stand that buffers Westford Bog.

In addition to the reserves mapped here, approximately 20% of each stand in which forest management occurs should be left as an unmanaged “control” for demonstration and educational purposes. These controls will showcase the differences between managed and unmanaged areas and may be used for replication in future research. Additionally, streams, wetlands, cultural features and unique areas – and buffers around them – will also be left unmanaged.



--- MANAGEMENT CONSIDERATIONS AND PRIORITIES ---

The primary goals of this forest management plan are:

- To encourage diverse, resilient forests and other ecosystems;
- To protect biodiversity, protecting and enhancing habitat for all native species;
- To provide great public recreational opportunities;
- To demonstrate responsible forest stewardship in an open, transparent and inclusive way.

Diversity and Resiliency.

Encouraging diversity at many levels is critical to the goals of this FMP. Diversity is important for a number of reasons:

- i. Encouraging diversity in the forest is a balance between creating habitat for lots of different species ("*alpha diversity*") and protecting unique and unusual areas, even if they don't support a lot of different species ("*beta diversity*"). As we manage the trees in our forests, it is also important to manage for different ages and sizes of trees growing in different ways ("*structural diversity*").

Forests with a diverse mix of tree, shrub and plant species growing in a variety of different ways offer a wide range of habitat conditions for native organisms – most notably wildlife but also trees, herbaceous plants, invertebrates, fungi and more. Actively encouraging a diversity of site-appropriate habitat opportunities, especially those that may be uncommon across the broader landscape, will make the MTF a much greater resource for all of our native species.



- ii. Forests are naturally diverse: forest development patterns tend towards increased *complexity* (layered structural and species diversity) over time. Vermont's forests, which are relatively young and simple, do not represent as wide a range of habitats as were likely to have existed in the forests of Vermont prior to European colonization. In particular, young ("early successional") forest, old forest and structurally diverse forests are underrepresented across the landscape as compared to pre-colonial forests.

An *ecological forestry* approach, such as is outlined in this FMP, seeks to *manage forests like they manage themselves*; modeling our actions after forests' natural developmental patterns and processes. By doing so, we hope to encourage and expedite the development of diverse, complex forests, utilizing the forest's natural processes to keep itself healthy, vibrant, resilient and productive over time.

- iii. Diverse forests are *resilient* and *adaptive* – able to stay healthy in a changing climate and a changing world. Building resilience into our forests means encouraging the resilience of all the biota that make up our forests, all of which are under subject to a profound and

increasing range of stressors. By actively encouraging forests to become more diverse, we reduce their vulnerability to climate change, non-native pests and pathogens and other stressors and provide refugia for all native species.

Diversity and Resiliency Priorities:

- Manage forests for species and structural diversity;
- Manage for landscape-level diversity, protecting sensitive and unusual habitats;
- Manage for complex forests, with big trees, lots of dead wood and different sizes and ages of trees;
- Manage for all native species, including trees, shrubs, herbaceous plants, wildlife, fungi, invertebrates and more;
- Allow ecosystems in the Reserve Zone to be unmanaged (except for deer and non-native invasive plant control);
- Actively and aggressively address threats to diversity and resiliency, such as non-native invasive plants, deer overabundance, and earthworms.

Wildlife Habitat and Biodiversity.

We are in the midst of a mass extinction event, an enormous global decline in biodiversity. This is a threat not just to wildlife but also to our ecosystems, which rely on biodiversity to keep themselves healthy and productive. In encouraging the development of diverse, resilient forests, we also hope to make wildlife populations more resilient in our changing world.

At the MTF, wildlife habitat management is part of a whole-system approach to forest management, which seeks to preserve intact, functional, vibrant, resilient, whole forested ecosystems and recognizes that all native species are valuable and critical to this vision. The establishment, maintenance and protection of wildlife habitat with this approach includes the protection of uncommon and sensitive habitat features and the creation and maintenance of habitat conditions which are uncommon across the landscape. This approach serves both to encourage



Photo: Gary Sturgis

charismatic larger wildlife species like neotropical songbirds, white-tailed deer, moose, bobcat, and black bear, but also to support all species of native biota and the processes that sustain them.

In addition to actively managed areas, unmanaged areas provide important habitats and ecological services which are uncommon across our landscape. The Reserve Zone in the Milton Town Forest will protect those benefits while other areas will benefit from being actively managed. To improve the value of these habitats to wildlife, it is recommended that recreational trails in the Reserve Zone are as limited as possible.

While all of the MTF is great habitat, the most prominent and unusual habitats at the MTF are Milton Pond, Milton Marsh and Westford Bog. All of these features are truly unique and have tremendous wildlife value to a huge range of different species.

They should be monitored for invasive exotic plant species (which should be removed whenever found) but otherwise left unmanaged.



Westford Bog



Deer Browse Damage on Ash

In Vermont Fish and Wildlife's 2018 Antlerless Recommendation, white-tailed deer populations in Chittenden County and other portions of Vermont were identified as exceeding the carrying capacity of their habitat. Where deer are over-abundant, their browse can decrease diversity in the composition of the forest, increase the abundance of invasive exotic plant species and make it difficult to regenerate certain species of native trees and plants. Deer populations tend to increase with forest fragmentation and development, decreasing winter severity, increases in the abundance of "posted" lands and decreasing hunter numbers, all of which are issues across Vermont and most prominently in Chittenden County. Deer populations in the MTF appear to be very high and to be having an adverse effect on the health of forests and other ecosystems.

While the recommendations in this FMP are intended to create high-quality habitat for white-tailed deer, in the MTF deer browse damage is extremely evident and troubling. By suppressing

regeneration and diversity in the forest, it is a concern for wildlife habitat, forest health and resilience, water quality, and the long term ecological and economic productivity of the MTF. It is likely that without action this problem will become even more pronounced in the future.

It is recommended that increased hunting of deer, especially antlerless deer, is encouraged at the MTF in the future. Other community forests in the area are wrestling with this same issue, and so a variety of ideas and creative approaches are available. The long-term goal should be to reduce the local deer population to a level where forest growth and regeneration can occur without being significantly impeded by deer browse. At current population levels, this cannot be done without active management of the deer herd.

Additional steps can be taken to limit the impacts of deer browsing during forest management activities, such as leaving trees and treetops “high” (un-lopped) and proactively creating larger openings in the canopy, when appropriate, to overwhelm the deer herd’s collective browsing ability. These measures should mitigate some browse impacts to regeneration, although that will have much less impact than lowering the deer population through hunting.

The process of protecting biodiversity is complex. In the case of the MTF, it will mean making some tough decisions: cutting trees, killing invasive plants, killing deer. In our complex world, doing the right thing can feel counter-intuitive at times. The goal of all these efforts is to preserve ecosystems which are healthier, more resilient and richer with habitat for all Vermont’s native species into the indefinite future.



Deer Browse Damage on Sugar Maple

Wildlife Habitat and Biodiversity Priorities:

- Encourage diverse, complex forests;
- Buffer and protect sensitive features and features of special habitat significance, such as vernal pools, den sites, streams and wetlands;
- Control and monitor for non-native invasive plant species;
- Encourage habitat conditions which are uncommon on the larger landscape, such as young forest and old forest;
- Protect high-quality habitat for all of the MTF’s species, including white-tailed deer, by lowering the local deer population – encouraging the responsible, safe hunting of deer, especially antlerless deer, in the MTF.

Recreation.

The importance of preserving and enhancing the qualities of the MTF that make it such an important cultural resource for residents of Milton and beyond cannot be overstated. The property provides public recreational opportunities through its extensive and well-used trail system. Recreational usage, especially trail usage, is the way that most people form a relationship with the

forest, and so has a positive influence on forest stewardship. As such, recreation should be a critical consideration in any forest management that occurs at the MTF.

Recreation is also a balancing act: trails can have negative impacts on wildlife. Recreation and forest stewardship can also create conflicts, as forest management changes the way forests look and may require temporary trail closures. While this is a potential problem, it is also an opportunity to educate trail users about how forests work, responsible forest stewardship and how recreation should be framed within the context of a maintaining a healthy forest.

Some prominent recreational trails at the MTF are located on historic farm roads and forest management roads. These and other recreational trails may need to be temporarily closed for periods of time during forest management activities, and may need to be restored and/or cleared of brush following forest management. Careful planning can insure that as little disruption to trail usage as possible occurs during forest management, and that any damage to recreational trails is minimized. Trail restoration and clearing can be done by volunteers or revenue can be allocated from forest management proceeds to cover the costs of hiring someone to restore and clear trails.

Moving forward, any new recreational trails on the MTF should avoid forestry trails whenever possible. This “recreation with forestry in mind” recognizes that active forest management is an allowed and supported long-term use of the MTF, and that maintaining forest management infrastructure (i.e. skid/logging trails) is critical to protecting this use over time. Separating forestry and recreational infrastructure minimizes conflict between recreation and forest management.

The extensive use of the MTF for recreation makes it a valuable resource for the demonstration of responsible forest stewardship and active forest management (see “Demonstration of Responsible Forest Stewardship” section, below). The use of interpretive signage that emphasizes the goals and objectives of forest management and that interacts positively with existing recreational resources is strongly recommended.

Recreation Priorities:

- Avoid physical disruptions to trails and trail use as much as possible during forest management;
- Before commencing with any active forest management, make a detailed trail closure/restoration plan with the Milton Conservation Commission to avoid impacting recreational usage as much as possible and to quickly restore any impacted trails;
- New recreational trails should avoid existing/historic forest management roads and trails;
- Leverage recreational trail usage in MTF to educate more people about forests and modern, responsible forest stewardship.

Demonstration of Responsible Forest Stewardship.

Simply put, *forest stewardship* is the way we take care of our forests. Stewardship can mean many different things, from logistical responsibilities like maintaining boundary lines and maintaining forest roads to actively managing forests. Forest stewardship can be relatively active, relatively passive or anywhere in between. In our modern world the minimum responsible level of forest stewardship is controlling biodiversity threats like non-native invasive plants and deer overpopulations.

The MTF can improve forest health and forest stewardship beyond its borders by prioritizing education and outreach around the recommendations in this Forest Management Plan. Every activity prescribed in this FMP is intended to be applied in conjunction with an open, transparent and inclusive public process, including public events, forums, educational tools and activities that will showcase and build understanding around these practices. As part of this process, care should be taken to provide many opportunities for members of the Milton community (and those in surrounding communities) to ask questions, comment, and be heard in different ways.



Education and Demonstration at the Hinesburg Town Forest. Over two winters, 19 public events were held at this project, attended by over 500 people.



Educational Signage Put Up Following Forest Management at the Hinesburg Town Forest

Any and all proceeds from timber harvested at the MTF shall be reinvested in the MTF, its forest health and its recreational opportunities. It is recommended that at least 75% of proceeds be used for pre-commercial forest management and for invasive plant control.



Scan this QR code to learn more about forest management demonstration and education at the Hinesburg Town Forest

--- OTHER CONSIDERATIONS ---

Invasive Species.

Non-native invasive plants (hereafter called “invasives”) are an enormous threat to the health, productivity and resilience of ecosystems world-wide. Invasives are aggressive competitors which easily outcompete native plants. As they establish, they interrupt critical ecological processes,



Buckthorn Patch Near Milton Marsh

decrease ecosystem diversity at multiple levels and decrease the quality of wildlife habitat. Failure to control these species will result in the degradation of the ecological and aesthetic benefits of the MTF, including recreation, aesthetics, wildlife habitat, forest productivity, health and resilience, climate change resiliency, carbon sequestration and storage, and water quality.

Most invasive exotic plants, unlike pathogens, fungi, or insects, were introduced to our environment intentionally – planted as ornamentals or for a variety of other reasons. In each case, these plants spread into forests and other ecosystems due to a combination of attributes including, but not limited to:

- i. Resilience to disturbance (i.e. ability to survive even when repeatedly cut and/or pulled);
- ii. Vegetative reproduction (the ability to reproduce asexually by sprouting, even from small chunks of root or stem);
- iii. Abundant fruiting, often coupled with wildlife dispersion;
- iv. Shade tolerance;
- v. Allelopathic tendencies (the ability to inhibit the growth or establishment of other species by use of soil-borne chemicals).

Compared to nearby areas, the invasive plant infestation at the MTF is relatively minor: in the summer of 2021 only a few pockets of invasives were noted. Most of these were found just west of Milton Marsh, although some honeysuckle was seen on the northern shores of Milton Pond as well. Buckthorn and honeysuckle were found in Stand 8, and on the parcel boundary along the trail running to the east of Stand 8.

Unfortunately, this is not likely to be a permanent situation. Nearby properties have extremely dense infestations of these species (in addition to other invasive species, most notably Japanese barberry), making it likely that new infestations will develop over time. Monitoring for invasive plants – and removing them whenever they are found – is an integral part of modern forest stewardship.

Complete *eradication* of invasives is unrealistic. Instead, our goal should be *control*: to remove all known invasive plants and then regularly monitor the MTF for new invasives, removing them whenever they are found. This will require the time and the attention of some volunteers.

Controlling larger invasive plants, or denser infestations of them, may require the use of small amounts of herbicide, applied in an extremely careful, conservative, and targeted way. Herbicide should be regarded as a necessary tool to lower populations of invasives to a level at which they can be controlled without the further use of herbicides.

All known infestations of invasives should be removed from the MTF in 2022. In particular, large seed-bearing buckthorn and honeysuckle around Milton Marsh and in Stand 9 should be the top priority. A system for monitoring for invasives should be established ASAP.

Water Quality and Aquatic Habitat.

Westford Bog, Milton Pond and Milton Marsh are the most prominent aquatic features on the MTF. These areas provide important habitat to beaver, muskrat, moose, waterfowl, reptiles and amphibians and many other species of wildlife, not to mention unique plants communities. Wetlands support downstream flood resiliency and water quality.

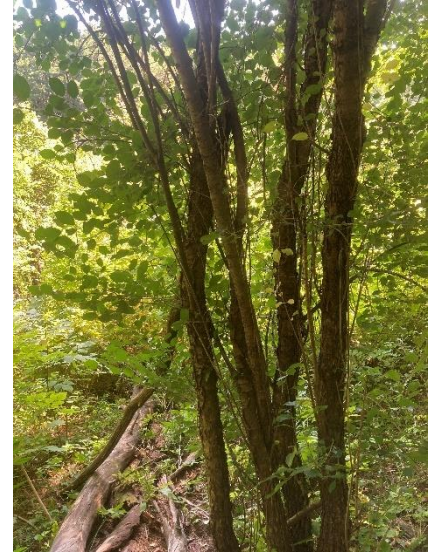
The 33-acre Milton Pond, and the small brooks flowing into it, comprise the headwaters of Mallets Creek, a prominent waterway draining a large portion of Milton and Colchester. Milton Pond is a natural pond, though it was dammed and expanded in 1923. It is also flanked by pocket wetlands and beaver ponds.

Milton Marsh and Westford Bog collectively cover more than 70 acres. Westford Bog is a wetland complex featuring about 10 acres of mapped Red Maple-Sphagnum Acidic Basin Swamp. Milton Marsh is an active beaver flowage featuring a complex mosaic of wetland habitats. Both wetlands drain into Rogers Brook, a tributary of the Lamoille River.

The Acceptable Management Practices (AMP's) for maintaining water quality on logging jobs in Vermont give guidance on how to cross and manage hydrologic features in the course of active forest management activities. These standards, in addition to best practices for maintaining aquatic and riparian habitat and laws pertaining to the protection of wetlands, should be strictly adhered to during of forest management in the MTF.

Carbon Sequestration and Storage.

Trees and plants sequester carbon from the atmosphere, fixing it into living biomass (wood and plant material). Forests store large amounts of carbon, with a large amount (up to 60%) found in dead wood and forest soils. While carbon dioxide is also released from forests as biomass is decomposed, forests are a major carbon "sink," absorbing and storing much more carbon than they release.



Large buckthorn near Milton Marsh. Controlling invasives this large will likely require the use of small amounts of herbicide.



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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, letting some areas be unmanaged, by making forests more *resilient* by increasing structural and species diversity and addressing forest health threats like non-native invasive plants and deer overpopulations. By far the biggest threat to forests' ability to sequester and store carbon globally is the conversion of forests to other uses – residential and commercial development, agriculture – so keeping forests as forests is equally or more important than any other action we take with respect to forest carbon.

Carbon offsets or *carbon credits* are a quantification of additional carbon stored in the course of improved land management practices, reforestation/afforestation and other activities. These offsets are monetized and sold to net producers of carbon, either to bring them into compliance with a regulatory carbon emissions cap (such as is the case in “regulatory” or “compliance” markets such as those in California and Europe) or to provide a voluntary balancing of their carbon footprint (“voluntary” markets). Compliance markets are a more lucrative marketplace for carbon offsets, but are also more costly and difficult to enter into, requiring individual forested parcels to be thousands of acres in size to make them economically feasible. Voluntary markets are much more feasible for a piece of land the size of the MTF, especially when multiple additional parcels are “aggregated” into a single carbon project.

The enrollment the MTF in a voluntary carbon project could produce an additional source of revenue for the property, which could help support practices like recreational trail maintenance, non-commercial timber stand improvement and invasive species control. It is recommended that the MTF investigate enrollment in such a program over the next 10 years.

Access.

Forest management infrastructure consists of:

- **Trails** or “skid trails”: generally unimproved or minimally-improved pathways through the woods that skidders (equipment that drags trees out of the woods) travel on.
- **Truck roads:** improved (usually gravel/dirt, often single-lane) roads passable by log trucks, which link a log landing to a town-maintained road.
- **Landings** or “log landings”: open areas where logs are piled, processed, sorted and loaded onto trucks.

In order to have “access” to a parcel for forest management, all of these pieces must be in place. While there are numerous historic skid trails throughout the parcel (and one historic woods road), and recreation trails, there is currently no truck road or landing on the MTF. In order to obtain access to Stands 5 and 6 as prescribed in this FMP, one of the following options would need to occur (in order of likely cost):

- Obtain permission to access the MTF through the property of a neighbor;
- Establish a new log landing south of the eastern parking lot at the MTF by clearing a section of Stand 8;

Establishing a landing in Stand 8 will require the consultation of a wetland ecologist from the State of Vermont, and may not be feasible given mapped wetlands in this area. The handicap-accessible trail extending south from the MTF's eastern parking area will not be used as a truck road or skid trail for forest management at the MTF.

Cultural Features.

Cultural features are historical legacies found in the woods. Common examples of these are stone walls, cellar holes and historical artifacts. All known cultural features should be mapped as they are discovered and will be buffered and protected during the course of forest management and recreational activities.

Boundaries.

At the Milton Town Forest, parcel boundaries are marked by a combination of “blazes,” stone fence and wire fence. Parcel boundaries have been extremely well-marked and maintained by Brian and Bonnie Pease.

Clearly-marked boundaries are essential to the management of both public and privately-owned forested parcels. Failure to maintain boundaries may result in disputes with neighboring property-owners, and/or expensive surveying costs. For this reason, it is recommended that boundaries are walked and maintained continuously, but not less frequently than once every 5 years. Every 5 years existing boundary line evidence should be re-painted with bright, durable boundary marking paint.

Emerald Ash Borer.

The MTF features a high proportion of ash, with the species accounting for 10% the stocking in several stands, and over 30% in Stand 3. The MTF is about 10 miles from two known occurrences of EAB, making it just on the edge of a “confirmed infested area.” If it is not already present in the MTF, infestation by the Emerald Ash Borer (EAB) is likely sometime in the future. When this occurs, we can expect heavy or complete mortality of this species. Our response to EAB must be nuanced – capturing some value in ash when it is appropriate but also retaining lots of healthy ash to bear seed and potentially exhibit genetic resistance to this pest.

For a few individual ash trees, especially large, charismatic and otherwise “culturally-important” ash trees, a systemic insecticide treatment may be appropriate. Keeping these trees alive will both preserve ash on our landscape, protect important individual trees, and ensure an ongoing source of seed, preserving the possibility of future generations of ash trees should some more effective treatment of EAB be created in the future and/or should we find ash with genetic resistance to EAB. These treatments are applied by “stem-injection” and must be completed by a Vermont-licensed pesticide applicator before a tree is more than 1/3 infested with EAB. Applications must be completed every 2-3 years, depending on the chemical used, to ensure efficacy. Recommendations for chemicals to be used should follow guidelines established by the Vermont Dept. of Forests, Parks and Recreation, and should avoid the use of neonicotinoid insecticides.

Vermont has developed a series of guidelines known as “Slow the Spread” which detail how ash should be transported and processed in light of EAB. These guidelines should be followed at the MTF to avoid any unintentional transmission of this species.

Conservation.

While the MTF is protected by Town ordinance, it is not formally and permanently protected. As a result, this parcel could theoretically be sold, subdivided and/or developed some time in the future. At least once in its history, the question of whether to sell the MTF has already been raised by the Town Selectboard. *Conservation easements* permanently protect ecosystems, natural resources and public access. They allow landowners to retain fee ownership of a parcel of land and afford them

flexibility in how they choose to manage it while protecting it from subdivision and development forever. Conservation easements do not generally preclude responsible forest management or recreation.

As of 2021, two other Community Forests in Chittenden County – the Hinesburg Town Forest and Mobbs Farm in Jericho – are in the process of donating conservation easements to the Vermont Land Trust. While both of these parcels are theoretically protected by Town ordinance, both have been faced with the prospect of development or loss in the past. Once they are formally conserved, these incredible public resources will be protected in perpetuity.

It is recommended that the Town reach out to the Vermont Land Trust or the Trust for Public Land to pursue donating a conservation easement on the MTF over the next 10 years.

--- STAND DESCRIPTIONS ---

Stand 1

Size: 43 Acres

Forest Type: Northern Hardwood Forest

Description:

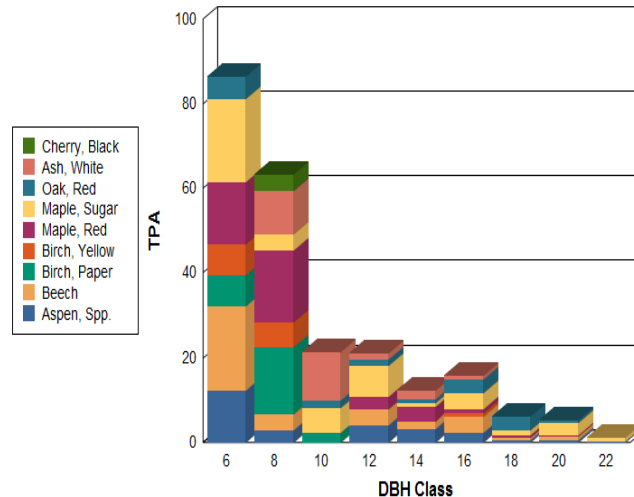
This is a two-aged stand, covering a mosaic of different young forest types to the west of Milton Pond. What unites this stand, and defines its character, is the aggressive logging that occurred in 1985-86. According to a 1993 Forest Management Plan written by Chittenden County Forester Bill Hall, much of this stand was effectively clearcut at that time. Site evidence suggests that prior to 1985

this area was a combination of pockets of enriched northern hardwood forest, dominated by sugar maple and white ash, and red oak-northern hardwood forest, dominated by red oak, American beech and red maple.



Young Forest in Stand 1 in an area clearcut in 1985-86

Trees Per Acre by DBH Class & Species



Today, most visitors to Stand 1 would never know that this area had such a checkered past. The area has regenerated into a young forest of aspen (poplar) paper birch and pin cherry, all “intolerant” species that thrive in large openings. Scattered among these young trees are trees and small pockets of trees which were too small to cut in 1986 and/or had no commercial value. While for the most part these trees are unhealthy, some of these older trees, especially red oak and sugar maple are healthy and vigorous.

Composition: Overall, sugar maple accounts for 28% of the total basal area in the stand, followed by beech (17%), red maple (15%), red oak (14%), poplar spp. (13%), white ash (11%) and paper birch (7%). On portions of the stand with thinner and dryer soils, red oak, red maple and beech are much more common, whereas on areas which deeper, more moist soils sugar maple and white ash are more common.

Stand Summary: 10 plots, 10 BAF prism

Total Basal Area/Acre: 113 ft²/acre

Acceptable Basal Area/Acre: 60.5 ft²/acre

Quadratic Mean Stand Diameter: 9.4 in.

Trees/Acre: 233

Approximate Stand Age: 80/35 years

Stand Health: Older trees in the stand are generally poor in health and overall vigor. Beech bark disease is prominent throughout the Stand. LDD defoliation on oak, paper birch, and beech in summer 2021. Deer browse damage was noted throughout the stand.

Invasive Species: Shrub honeysuckle noted on the western shores of Milton Pond.

Soil Types: Lyman-Marlow Complex

History: This area was cleared in the 1800's and allowed to revert back to forest sometime in the late 1800's or early 1900's – the 1942 aerial photo of the MTF shows this area as forested at that time. In the early 1900's, portions of the Stand may have been used as a sugarbush or pastured sugar bush. Historical records suggest that all trees greater than 12" in diameter were sold to the Atlas Plywood Corporation in Boston in 1946 and may have been cut at that time. Nearly all trees greater than 10 inches in diameter were cut in 1986.

Access and Operability: The easiest access to this Stand would be via established woods roads connecting Milton Pond to the Milton-Westford Road through the property of a neighbor to the north. Access to some areas may also be afforded through neighbors to the west.

Management Objectives:

The primary objective for this stand is to encourage the development of a healthy, diverse, resilient forest. This will include promoting tree diversity and complexity, creating and maintaining high-quality wildlife habitat, and demonstrating responsible stewardship while protecting stand dynamics and ecosystem processes.

Management Activities:

Remove honeysuckle and any other non-native plants established around Milton Pond to avoid the risk of these plants spreading into wetlands and the forest interior. Smaller plants can be hand-pulled, but larger plants will need to be pulled out with a weed wrench or treated using a cut-stump application of wetland-safe herbicide.

While no forest management is prescribed in this Stand over the next 10 years if the capacity and/or funding is available:

- Conduct a non-commercial crop tree release of red oak, beech, and other mast-producing tree species. Designate "crop trees" with wildlife value and "release" them on 2-4 sides by cutting competing trees. Cut trees should be left on the ground. This treatment can occur wherever crop trees exist in the Stand and should be supervised by a licensed consulting forester.

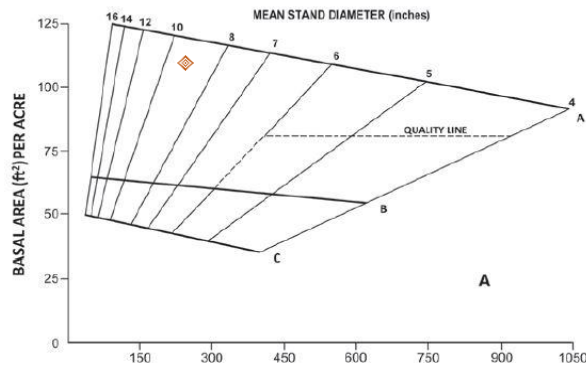


Figure 2: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.

The opportunity for additional forest management activities should be reassessed at the time of the next FMP update.

Stand 2 – RESERVE ZONE

Size: 62.5 Acres

Forest Type: Rich Northern Hardwood Forest

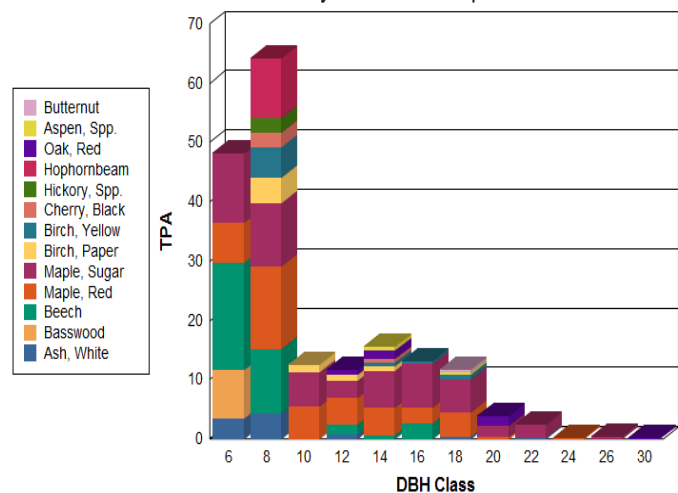
Description:

Similar to Stand 1, the character of this Stand was altered by the logging that occurred in 1985-86. However, in this stand the loggers appear to have generally removed only the largest and/or most valuable trees. As a result, this Stand contains many more large old trees than Stand 1.



Maidenhair Fern in Stand 2

Trees Per Acre by DBH Class & Species



Like Stand 1, Stand 2 also contains pockets of red oak, beech and red maple where soils are dry and thin, but the vast majority of the forest is a classic Rich Northern Hardwood Forest natural community with sugar maple in the overstory and maidenhair fern, blue cohosh and ramps in the understory.

While this Stand is not old forest, there are old trees with complex bark, cavities, and lichen/bryophyte communities. This will allow it to develop old forest-type structure and habitat sooner than any other Stand on the MTF. For this reason it is being set aside as an unmanaged area in the MTF's Reserve Zone.

Composition:

The dominant cohort in this stand is comprised mostly of sugar maple (46% of the stocking by basal area), in

addition to red maple (28%), beech (11%) and red oak (6%)..

Stand Summary: 12 plots, 10 BAF prism

Total Basal Area/Acre: 110 ft²/acre

Acceptable Basal Area/Acre: 53.68 ft²/acre

Quadratic Mean Stand Diameter: 10.5 in.

Trees/Acre: 184

Approximate Stand Age: 120/40 years

Stand Health: Beech bark disease, some LDD defoliation of oaks in summer 2021. Deer browse damage is extensive throughout the understory.

Invasive Species: none noted.

Soil Types: Lyman-Marlow Complex.

History: This area was probably cleared in the early 1800's and allowed to revert to forest in the late 1800's. Field evidence suggests that Stand 2 was probably a sugarbush or pastured sugarbush in the early 1900's – the 1942 aerial photo of the MTF shows this area as forested at that time. Historical records suggest that all trees greater than 12" in diameter were sold to the Atlas Plywood Corporation in Boston in 1946 and may have been cut at that time. This stand was logged in 1985-86.

Management Objectives:

The primary objective for this Stand is to allow it to develop without human intervention for ecological and educational reasons. Protecting this area as an unmanaged reserve will provide unique wildlife habitat and ecological goods and services, support a resilient landscape and support the sequestration and storage of carbon.

Management Activities:

As part of the MTF's Reserve Zone, no forest management will occur, except for controlling non-native invasive plants, pests and pathogens and the deer population.

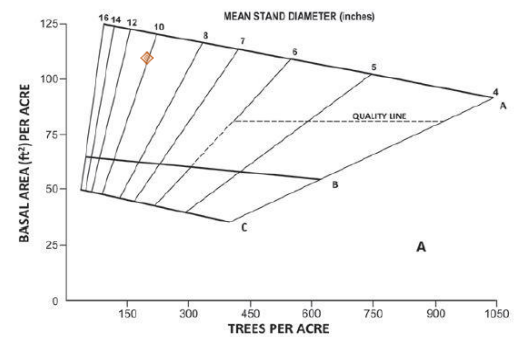


Figure 3: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.

Stand 3

Size: 23.1 Acres

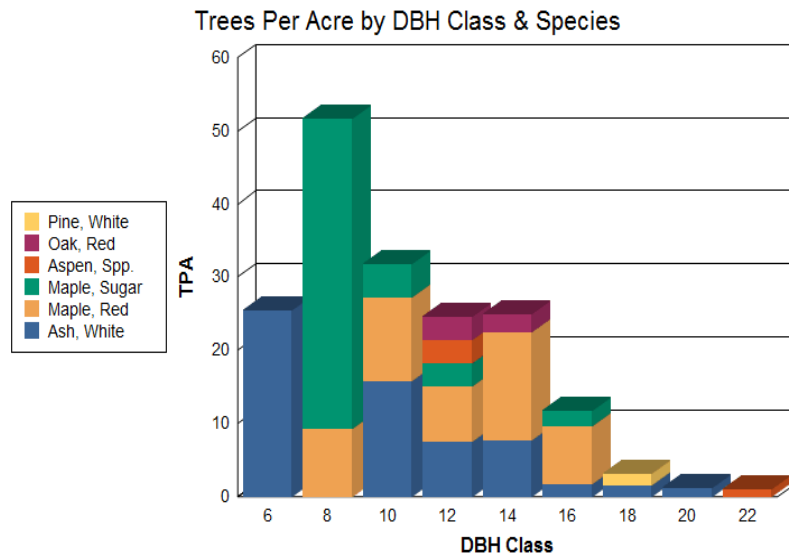
Forest Type: Northern

Hardwood Forest

Description:

The history of Stand 3 is very similar to Stands 4 and 6 – historic aerial photos show that this area was an open field in 1942 and had just begun to revert to forest in 1962. While, like in Stand 4, there are pockets of sugar maple poles scattered throughout Stand 3, this stand features a higher

proportion of white pine and red maple. One two-acre area in the west of Stand 3 may have been planted in a white pine plantation sometime in the 1950's.



Stand 3 is essentially a small valley with numerous seeps and small streams feeding into Milton Pond. Soils are sandy but also wet and thin in places, making it vulnerable to windthrow. Besides its composition, this stand is defined by its complexity. It appears to have been affected by both the 2010 and the 2017 windstorms, blowing down pockets of white pine and aspen. The blowdown resulting regeneration makes this the most uneven-aged stand on the MTF, with the highest amount of structural diversity.

Composition:

This stand is dominated by red maple (37% of the basal area), with white ash (32.5%) and sugar maple (20%) also present. While white pine only accounts for 2.5% of the basal area in the inventory, it may represent a more sizable portion of the stand in reality.

Stand Summary: 5 plots, 10 BAF

Total Basal Area/Acre: 102 ft²/acre

Acceptable Basal Area/Acre: 65 ft²/acre

Quadratic Mean Stand Diameter: 10.3 in.

Trees/Acre: 176

Approximate Stand Age: 70/11/4 years

Stand Health: Blister rust and needle cast noted on white pine -- many white pine in the Stand are declining. Worms and deer browse affecting understory diversity.

Invasive Species: None noted.

Soil Types: Lyman-Marlow Rocky Loams

History/Previous Activity: This Stand was maintained as pasture from the 1800's through the 1940's or 1950's, when it was allowed to revert to forest. One small area may have been planted with white pine in the 1960's. According in a 1993 FMP for the parcel, some portions of this stand were heavily cut in 1985-86. Blowdown occurred in the Stand in 2010 and 2017.

Access and Operability: This stand could be accessed as with Stands 1 or accessed to the east through Stands 4 and 5.

Management Objectives:

The primary objective for this Stand is to encourage the development of a healthy, diverse, resilient forest. This will include promoting tree diversity and complexity, creating and maintaining high-quality wildlife habitat, and demonstrating responsible stewardship while protecting stand dynamics and ecosystem processes. Due to the location of Stand 3, it will also be managed to protect water quality to Milton Pond and Malletts Creek.

Management Activities:

No forest management is recommended in this Stand over the next 10 years – allow the Stand to continue to grow and develop. The only forest stewardship activities that are recommended are to monitor for invasive exotic plants and to reduce the deer population in the area.

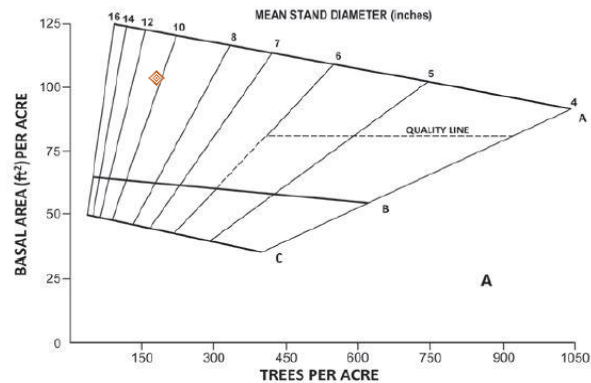


Figure 4: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.](#)

Stand 4

Size: 91.4 acres

Forest Type: Rich Northern Hardwood Forest

Description:

Stand 4 is the largest Stand at the MTF, an area that was nearly entirely open pasture until the 1960's. Once it was allowed to revert to forestland, this Stand developed into a forest dominated by an even-aged cohort of sugar maple poles, with occasional emergent white ash, white pine and red oak.

Like Stands 1 and 2, scattered throughout the Stand are pockets of white pine and red oak/red maple/beech on thinner and dryer soils.

Stand 2 is an example of an extremely altered stand. It is dominated by a single age-class of trees, lacking structural diversity and many of the other facets of healthy forests, including big trees and dead wood on the forest floor.



Dense, Even-Aged Sugar Maple in Stand 4

(16%), white pine (14%), and red maple (7%) the next most common species. Red oak and a variety of other hardwoods are present as minor associates.

Stand Summary: 19 plots, 10 BAF prism

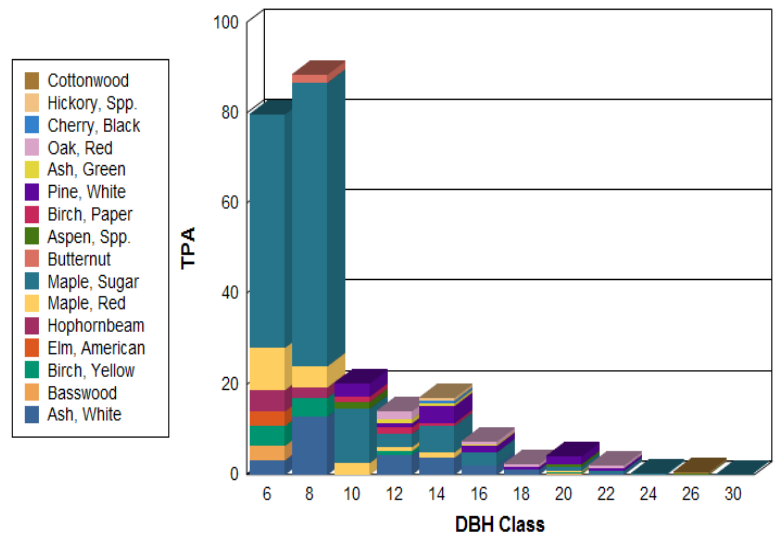
Total Basal Area/Acre: 105 ft²/acre

Acceptable Basal Area/Acre: 66 ft²/acre

Quadratic Mean Stand Diameter: 9 in.

Trees/Acre: 236

Trees Per Acre by DBH Class & Species



One of the most striking characteristics of the stand is the prevalence of earthworm activity. Throughout Stand 4, the forest floor is bare dirt, lacking the rich layer of leaf litter of healthy forest soils. With no organic material to absorb and slow down water erosion of topsoil is evident throughout the stand, and deer browse in the understory is creating still more challenges to tree and plant regeneration.

Composition:

By far the most prominent species in Stand 4 is sugar maple (49 % of the basal area), with white ash

Approximate Stand Age: 60 years

Stand Health: White pine blister rust, extreme worm activity, deer browse damage, ash decline.

Invasive Species: Large seedbearing buckthorn and honeysuckle were noted along the western shore of Milton Marsh. Pockets of small buckthorn and a patch of wall lettuce noted in the east of the stand.

Soil Types: Lyman-Marlow Complex

History/Previous Activity: Maintained as pasture/pastured sugarbush until the 1950's or early 1960's. Some large sugar maple were cut in 1986.

Access and Operability: For commercial forest management, access to this Stand would likely occur via the property of a neighbor to the north. For the precommercial work prescribed here, access on foot or with an ATV can occur via either of the MTF's trailheads.

Management Objectives:

The primary objective for this Stand is to encourage the development of a healthy, diverse, resilient forest. This will include promoting tree diversity and complexity, creating and maintaining high-quality wildlife habitat, and demonstrating responsible stewardship while protecting stand dynamics and ecosystem processes.

Management Activities:

To address the young age of this Stand, the lack of diversity and complexity, and the biodiversity threats posed by worms and deer browse, extensive pre-commercial forest management work is recommended in Stand 4 over the next 10 years.

In most areas of this stand a variable density thinning will occur. The goal of a thinning is to lower the density of trees in the stand, favoring the healthiest trees – in this case the goal will be to lower stocking in these areas to approximately 75-90 ft²/acre. Retained trees may be healthy individuals of all species, but especially sugar maple and red oak. Thinning this stand will help alleviate competitive stresses on the healthiest trees, making them more resilient to environmental stresses. It will also help the trees become larger sooner, expediting the creation of a more mature stand.

At the same time, Stand 4 should also be encouraged to become more complex. Gaps of all shapes and sizes – most no larger than 1/8-1/10 of an acre but none larger than ¼ acre – can be cut in areas of unhealthy trees. By creating these gaps we will encourage the development of structural diversity and complexity sooner than it would naturally occur, making the stand more resilient and complex. To increase complexity even more, snags, cavity trees, and large legacy trees of all species should be retained, as should areas of unique or unusual forest.

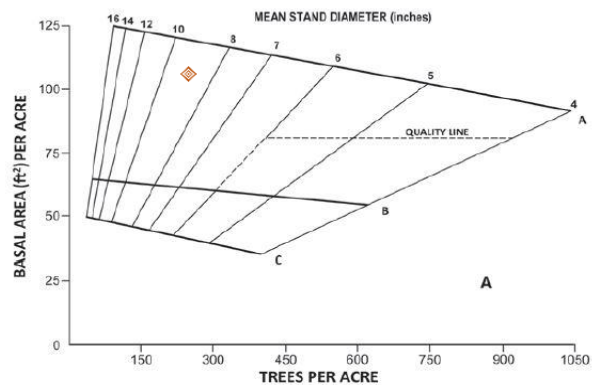


Figure 5: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.](#)

Cut trees should be left unlopped on the forest floor – intentionally creating a “mess.” This dead wood will provide unique habitat not currently present in Stand 4, help water disperse and infiltrate (mitigating erosion), provide lots of organic material which may help counter-act some of the effects of the earthworms in the Stand and help protect seedlings and saplings from deer browse.

This is a pre-commercial treatment, meaning that it will need to be done by volunteers or by a paid contractor. If the latter option is chosen, some of the revenue from the commercial forest management proposed in Stands 5 and 6 can be used to pay for this work. It is recommended that this work occur annually, at a rate of 5-10 acres per year.

This work will have tremendous demonstration value, and will be a great place to showcase forest management in a less-intimidating setting than in a commercial forest management project. It should be accompanied by educational signage and an open, inclusive and transparent process. At least 20% of this stand should be left un-treated, to show the differences between managed and unmanaged areas.

Finally, all invasive plants should be removed from this stand as soon as possible. Smaller plants may be pulled by hand, but larger plants – such as those on the eastern shores of Milton Marsh – should be treated with a cut-stump application of wetland-safe herbicide. The entirety of the Stand should be continually monitored for new populations of invasive plants.

Stand 5

Size: 40.7 Acres

Forest Type: Northern Hardwood Forest

Description:

In terms of structure and composition, this is one of the most interesting stands at the Milton Town Forest. The character of this Stand is defined by very large red maple and black



Dense Fern Understory in Stand 5, a Symptom of Heavy Deer Browse

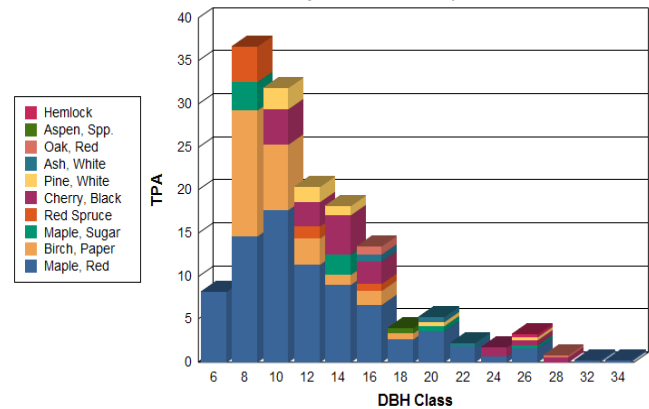
cherry (occasional red spruce, white pine, white ash and red oak) overtopping an understory dominated by thick ferns and a patchy midstory. For the most part, overstory trees lack value, although there are occasional ash, black cherry and red maple that could yield sawlogs.

Stand 5 is part of the “Bove Parcel,” acquired by the Town in 2006, and so the land use history of this stand (and Stand 7) is a bit of a mystery. It seems to have been logged on several occasions, most recently in the 1990’s, when scattered large pine were cut.

Composition:

The Stand is dominated by red maple (68% of the basal area), black cherry (20%), white pine and sugar maple (6% each). Red spruce, balsam fir, white ash and red oak also contribute significantly to the character of the Stand.

Trees Per Acre by DBH Class & Species



Stand Summary: 8 plots, 10 BAF prism

Total Basal Area/Acre: 124 ft²/acre

Acceptable Basal Area/Acre: 51 ft²/acre

Quadratic Mean Stand Diameter: 12.5 in.

Trees/Acre: 146

Approximate Stand Age: 100 years.

Stand Health:

Overstory trees are generally declining from old age (red maple and black cherry are not generally long-lived in Vermont). Some LDD defoliation on oak in summer 2021. Extreme impacts to the understory from deer browse.

Invasive Species: None noted.

Soil Types: Peru Fine Sandy Loam, Cabot Silt Loam

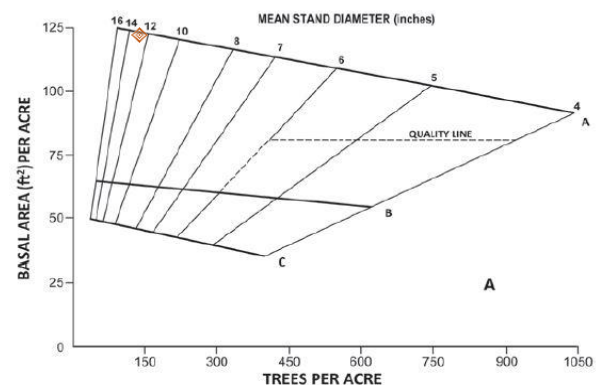


Figure 6: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.](#)

History/Previous Activity:

This Stand was allowed to revert to forest sometime around 1900, although it appears to have been grazed at least through the 1960's. It has been logged on several occasions, most recently in the 1990's.

Access and Operability:

Access to this Stand for forest management will be difficult. The most likely access seems to be via the property of a neighbor to the north or east.

The MTF could also develop forest management access to this stand by creating a new log landing; clearing a section of Stand 8 and using the parking area on the Milton-Westford Road to access this landing. In the case of either of these options, managing this stand under frozen winter conditions is recommended.

The handicap-accessible recreational trail running to the east of Stand 8 will not be used as a skid trail or truck road for forest management operations in this stand.

Management Objectives:

The primary objective for this Stand is to encourage the development of a healthy, diverse, resilient forest. This will include promoting tree diversity and complexity, creating and maintaining high-quality wildlife habitat, and demonstrating responsible stewardship while protecting stand dynamics and ecosystem processes.

Management Activities:

An irregular group shelterwood is prescribed in Stand 5, in conjunction with work in Stand 6. The goal of this project will be to encourage Stand 5 to become more diverse, more complex and more like an old forest while creating great habitat opportunities for wildlife and addressing biodiversity threats.

Throughout the stand, unhealthy trees, or those crowding healthier, more vigorous trees, will be harvested. The basal area in the stand as a whole will be reduced to approximately 80 ft²/acre, although the stocking will be intentionally variable, leaving more trees in some areas and less and others to create a gradient of light conditions.

As part of this project, some large, mature ash, black cherry and other tree species will be harvested. At the same time, many large trees of all species will be designated as "legacy trees," to be retained in perpetuity. The goal of legacy trees is to provide the important ecological and habitat benefits of big, old trees, and eventually of large-diameter dead wood. At least 10 legacy trees per acre will be labeled and retained as part of this project and an additional 10 legacy trees per acre will be labeled and retained in each future entry.

Groups of all different shapes and sizes – but no larger than 0.5 acres – will also be created, regenerating approximately 20% of the Stand area in total. Within groups, most or all overstory trees will be removed. Groups will be located in areas of unhealthy trees, and/or where vigorous regeneration is established.

Tree tops, small trees, and branches should be left uncut and unlopped on the forest floor. Leaving a "messy" forest, in addition to creating lots of regeneration all at once, will lower the impact of deer browsing on the understory of this stand, allowing a more diverse and vibrant generation of trees to establish.

The goal for this forest management project is to create a forest with many different sizes, ages and species of trees, a diverse, vigorous understory, an irregular canopy punctuated by gaps of all different shapes and sizes, big, old legacy trees, and lots of dead wood on the forest floor. In short, it will create a complex forest well-equipped to provide a wide range of habitats for wildlife and to be resilient in a changing climate.

This work will be another great place to showcase how forests work and what responsible forest management looks like. It should be accompanied by educational signage and an open, inclusive and transparent outreach process. An additional part of this education should be keeping 20% of the Stand area as un-treated “control,” to show the differences between the managed and the unmanaged areas.

It is recommended that this work be conducted under frozen winter conditions, and that either a cable skidder or a cut-to-length system is used to complete the work.

This is a commercial treatment, meaning that it will generate revenue for the town. This revenue shall be re-invested in the MTF, and should be used to pay for the pre-commercial work in Stand 4, invasive plant control or a variety of other projects.

Stand 6

Size: 34.9 acres

Forest Type: Northern Hardwood Forest

Description:

This is a generally low-quality, young stand located to the east of Milton Marsh. Historical records suggest that this stand likely began to revert to forest around 1969, making it the MTF's youngest forest. While its history is similar to Stand 4, this stand (in addition to Stands 5 and 7) is located east of the Hinesburg Thrust Fault, meaning that its soils are much poorer than stands just to its west.

While the tree species in the overstory of this stand – mostly white pine, red maple and aspen – are generally in decline, some promising hardwood poles and saplings are beginning to push into the midstory. Like most other areas of the MTF, understory diversity is limited by deer browse damage and by pockets of extreme earthworm activity.

Composition: This stand is dominated by red maple (47.5% of the stocking by basal area). Poplar spp. (17.5%), sugar maple (16%), white pine (14%), and white ash (10%). Hemlock, red oak, beech and other northern hardwoods are present as associates.

Stand Summary: 5 plots, 10 BAF prism

Total Basal Area/Acre: 132 ft²/acre

Acceptable Basal Area/Acre: 54 ft²/acre

Quadratic Mean Stand Diameter: 10.8 in.

Trees/Acre: 208

Approximate Stand Age: 55 years

Stand Health: White pine blister rust, deer browse damage, earthworms, LDD defoliation on oaks. General overstory decline.

Invasive Species: None noted.

Soil Types: Peru Fine Sandy Loam, Lyman-Marlow Complex

History/Previous Activity: Since reverting to forest in the late 1960's, the only logging that has occurred was likely some cutting of the largest trees in the stand (sugar maple, white pine) in 1986.

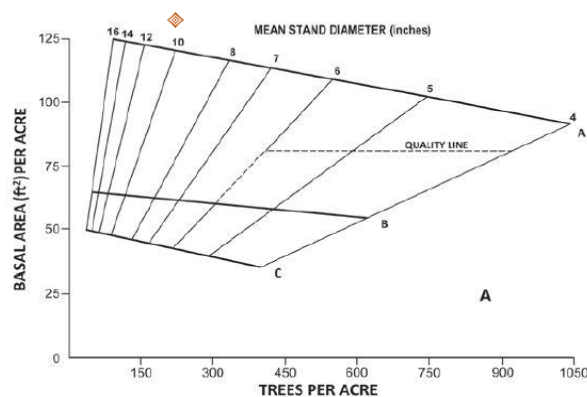
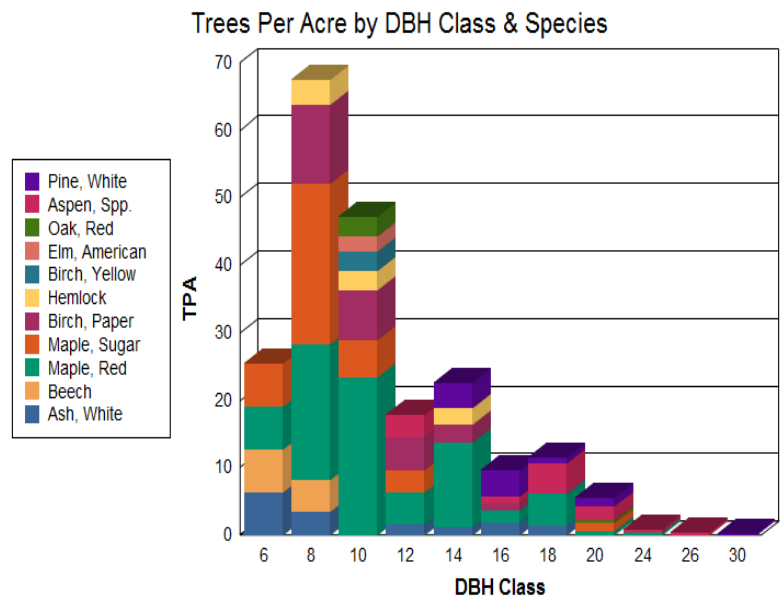


Figure 7: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132](#).

Access and Operability:

Access to this stand will occur as with Stand 5.

Management Objectives:

The primary objective for this stand is to encourage the development of a healthy, diverse, resilient forest. This will include promoting tree diversity and complexity, creating and maintaining high-quality wildlife habitat, and demonstrating responsible stewardship while protecting stand dynamics and ecosystem processes.

Management Activities:

An irregular group shelterwood is prescribed in this stand, in conjunction with work in Stand 5. Forest management in Stand 6 will be completed as described in the Management Activities section of Stand 5 except the following:

In Stand 6, most of the forest management work will be focused on creating groups of all different shapes and sizes, but generally larger than those in Stand 5 – up to 2 acres in size. Groups will be placed in areas of the most unhealthy trees, and/or where vigorous regeneration and advance regeneration is established, regenerating no more than 35% of the Stand in total,.

Between groups, unhealthy trees, or those crowding healthier, more vigorous trees, will be harvested to encourage a diverse composition and the growth of the stand's healthiest trees. Between groups, the basal area will be reduced to approximately 80 ft²/acre, although the stocking will be intentionally variable.

While more commercially marginal, this will be a commercial treatment when combined with the work in Stand 5, meaning that it will generate revenue for the town. This revenue shall be re-invested in the MTF, and can be used to pay for the pre-commercial work in Stand 4, invasive plant control or a variety of other projects.

Stand Summary: 5 plots, 10 BAF prism

Total Basal Area/Acre: 132 ft²/acre

Acceptable Basal Area/Acre: 82 ft²/acre

Quadratic Mean Stand Diameter: 9.7 in.

Trees/Acre: 259

Approximate Stand Age: 100 years/30 years

Stand Health: Fir decline, pine blister rust, LDD defoliation on oaks from summer 2021, deer browse damage.

Invasive Species: None noted.

Soil Types: Peru Fine Sandy Loam, Lyman-Marlow Complex

History/Previous Activity: This area was probably allowed to revert to forestland sometime in the late 1800's or early 1900's, although the wettest portions of it may never have been entirely cleared. It has been logged multiple times in its history, most recently in the 1990's.

Management Objectives:

The primary objective for this stand is to allow it to develop without human intervention for ecological and educational reasons. As an unmanaged reserve, this stand will provide unique wildlife habitat, support a healthy resilient landscape and sequester and store carbon.

Management Activities:

As part of the MTF's Reserve Zone, no forest management will occur, except for controlling non-native invasive plants, pests and pathogens and the deer population.

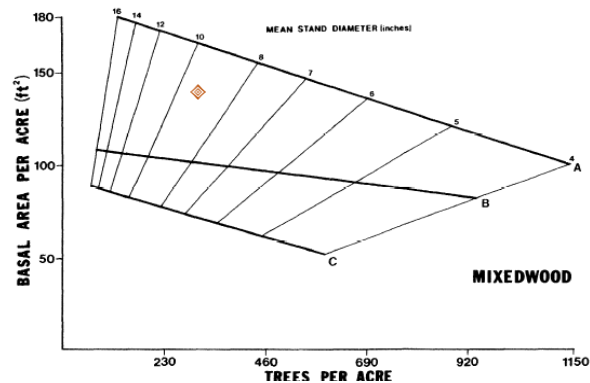


Figure 8: Mixedwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.](#)

Stand 8

Size: 4 Acres

Forest Type: Balsam Fir-Norway Spruce-Blue Spruce

Description:

This is an approximately 4-acre Christmas tree plantation which was never harvested. Overall, trees in this area are somewhat healthy, although the stand is very crowded. Structural diversity is extremely low, with virtually no growth in the forest understory. The stand is largely located on wetland soils.

Composition:

Balsam fir is the most common tree species in this plantation, accounting for 70% of the basal area in the stand. Norway spruce (20%) and blue spruce (10%) are also present.

Stand Summary: 4 plots, 10 BAF prism

Total Basal Area/Acre:	220 ft ²
Acceptable Basal Area/Acre:	180 ft ²
Quadratic Mean Stand Diameter:	8.2 in.
Trees/Acre:	550

Approximate Stand Age: 20-30 years

Stand Health: Overall good health and vigor except for decline in blue spruce.

Invasive Species: common buckthorn and shrub honeysuckle noted on edges of stand and in small openings, including some larger bushes/trees.

Soil Types: Peru fine sandy loam, Cabot silt loam.

History/Previous Activity: This area was continuously maintained as pasture until the 1990's, when it was planted with Christmas trees. It was purchased by the Town in 2006 to afford trail access to the historic MTF.

Access and Operability: This stand is accessed by the MTF parking area, off of the Milton-Westford Road. This area may serve as the access to other areas of the MTF for forest management purposes, though a wetland ecologist from the Vermont will need to be consulted.

Management Objectives:

The primary objective for this stand is to encourage the development of a healthy, diverse, resilient forest. This will include promoting tree diversity and complexity, creating and maintaining high-quality wildlife habitat, and demonstrating responsible stewardship while protecting stand dynamics and ecosystem processes. Also important in this stand is aesthetics, as Stand 8 serves as the gateway to the MTF for many.

Management Activities:

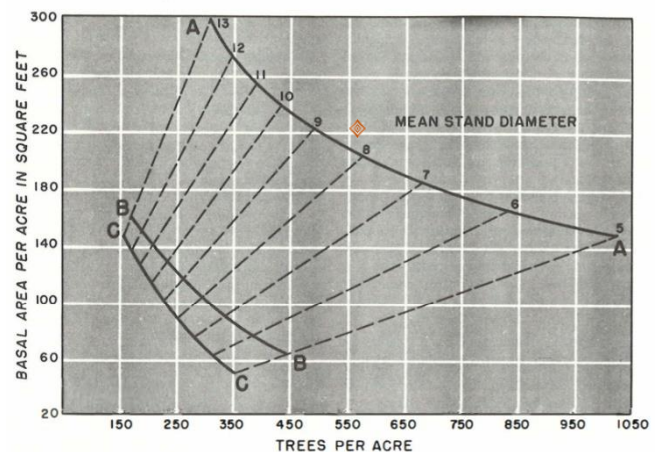


Figure 9: Spruce-Fir Stocking Guide. Frank, Robert M., Bjorkbom, John C. A silvicultural guide for spruce-fir in the Northeast. Gen. Tech. Rep. NE-6. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1973. 29 p. <https://doi.org/10.2737/NE-GTR-6>

Recommendations from a 2022 Forest Bird Habitat Assessment of the MTF by Audubon Vermont identify this stand as an ideal place to create early successional, or “young forest,” habitat. Early successional habitat is created when all or most trees are removed over a relatively large area – usually at least 2 acres in size. This habitat type is extremely important for many species of birds, including several species of neotropical songbirds whose populations are declining in our region.

In the southern half of the stand, all trees should be ground or felled. In the northern two acres of the stand, small canopy gaps up to $\frac{1}{4}$ acre in size (but most $\frac{1}{10}$ - $\frac{1}{8}$ acre) should be created, covering no more than 15% of this portion of the stand. The remainder of the stand should be thinned to an overall stand density of approximately 180-190 ft²/acre, favoring native species such as balsam fir and with leaving all woody material on site. All of this work his work would be non-commercial, but funding for early successional habitat creation is relatively easy to obtain. Before commencing with this work, a state wetland ecologist will need to be consulted.

In the meadow south and west of Stand 8, a more shrubby, diverse habitat should be encouraged for by reducing brush-hogging to once every 3 years (at most). Natural regeneration of this area may be complemented by planting of native shrubs such as willow, *Viburnum* species, choke cherry and dogwoods which provide value to pollinators as well as providing soft mast (berries) for wildlife.

Finally, it may be necessary to use this stand for forest management access to Stands 5 and 6. As described in other parts of this plan, this could consist of cutting trees to install a temporary log landing within the stand. In the case of a landing, this area could be seeded down with native pollinator plants and could serve as a pollinator meadow in the long intervals between forest management projects -- a wetland ecologist for the state would need to be consulted, and a wetlands permit may be necessary for this option as well.

In the case of any of these options, all invasive plants must be controlled in and adjacent to the stand before anything else happens, and frequent monitoring of the stand for newly established invasives should occur.

Schedule of Management Activities

(Timing of specific activities may be shifted)

Stand	Activity	Scheduled Year	Priority	Cost	Funding Source/Partners
4	Pre-Commercial Forest Management – Variable Density Thinning	Ongoing (beginning in 2022) – 5-10 acres/year	1	~ \$500/acre or volunteers.	Forest management revenue, habitat stamp, USFWS Partners. County Forester, volunteers, Milton Conservation Commission
1,4	Control invasive plants	ASAP	1	~ \$1,000 or volunteers	Forest management revenue. County Forester, volunteers, Milton Conservation Commission
All	Create system for monitoring for invasive plants	2022	1	None	Volunteers, Milton Conservation Commission
All	Work to incentivize antlerless deer harvest	Ongoing	1	None	County Forester, VT Fish and Wildlife, Milton Conservation Commission
Stands 5 and 6	Develop Forest Management Access	2022-23	2	Up to \$10,000	Town budget, town road crew. County Forester
Stands 5 and 6	Commercial Forest Management	2024	2	None (revenue positive)	County Forester
Stand 8	Early Successional Habitat Creation/Thinning/ Canopy gaps		3	None or up to \$5,000 depending on strategy	Town funds, Habitat Stamp, USFWS Partners. Milton Conservation Commission, County Forester
All	Boundary line maintenance	Ongoing	3	Approx. \$120 - \$150 (paint)	Volunteers, Milton Conservation Commission
All	Consider donating conservation easement on MTF		1	Unknown	Vermont Land Trust, Trust for Public Land, County Forester

All	Consider enrolling in a voluntary carbon project		3	None (revenue positive)	County Forester, Vermont Land Trust, The Nature Conservancy
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Works Referenced

- Frank, Robert M., Bjorkbom, John C. *A silvicultural guide for spruce-fir in the Northeast*. Gen. Tech. Rep. NE-6. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1973. 29 p. [https:// doi.org/10.2737/NE-GTR-6](https://doi.org/10.2737/NE-GTR-6)
- Hagenbuch, S., Manaras, K., Shallow, J., Sharpless, K., Snyder, M. *Silviculture with Birds in Mind* (2011). Audubon Vermont & Vermont Dept. of Forests, Parks and Recreation.
- Leak, William B.; Solomon; Dale S.; DeBald. 2014. *Silvicultural guide for northern hardwood types in the northeast(revised)* . Gen. Tech. Rep. NE-603. Newtown Square, PA: US Dept. of Agriculture, Forest Service, Northern Research Station.
- Leak, W.B., M. Yamasaki, J.S. Ward, K. Desmarais, and K.P. Bennett. 2017. *Ecology and Management of Northern Red Oak in New England*. University of New Hampshire Cooperative Extension, Durham, NH.
- Leak, William B.; Yamasaki, Mariko; Holleran, Robbo. 2014. *Silvicultural guide for northern hardwoods in the northeast*. Gen. Tech. Rep. NRS-132. Newtown Square, PA: US Dept. of Agriculture, Forest Service, Northern Research Station.
- Raymond, P., Bedard., S., Roy, V., Larouche, C., Tremblay, S. December, 2009. *The Irregular Shelterwood System: Review, Classification, and Potential Applications to Forests Affected by Partial Disturbances*. Journal of Forestry.
- Reay, R., Blodgett, D., Burns, B., Weber, S., and Frey, T. (1990). *Management guide for deer wintering areas in Vermont*. Vermont Department of Forest, Parks, and Recreation, Vermont Department of Fish & Wildlife, and USDA Forest Service publication.
- Seymour, Robert S. *Integrating Natural Disturbance Parameters into Conventional Silvicultural Systems: Experience from the Acadian Forest of Northeastern North America* (2005).
- Thompson, E. H., & Sorenson, E. R. (2005). *Wetland, woodland, wildland: A guide to the natural communities of Vermont*. Montpelier: Vermont Dept. of Fish and Wildlife and the Nature Conservancy.

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.

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.

Ecological Forestry: A system of forest management that seeks to actively manage forest stands using methods that emulate natural processes.

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.

Irregular Group Shelterwood: There are many variants of this type of silvicultural treatment, but the version described here is a means for managing a stand over a period of time while creating and preserving a patchy, uneven structure. Specifically, irregular shelterwoods of this type remove the overstory of a stand in groups (which can be larger than the groups described as part of a group selection system), retaining trees which serve as potential growing stock, seed sources, and shade within the groups. These pockets of regeneration are expanded progressively over multiple entries, at each stage releasing the established regeneration from the previous harvest.

Group Selection: This treatment system involves harvesting all stems in a small area, usually between several trees to about 1 acre in size. The areas in which all trees are harvested are called “groups.” The goal of groups is to establish a new pocket of regeneration 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, seeking to establish a balance of different ages of trees over time. 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.

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 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.