

Forest Management Plan

For the

Catamount Community Forest

Town of Williston

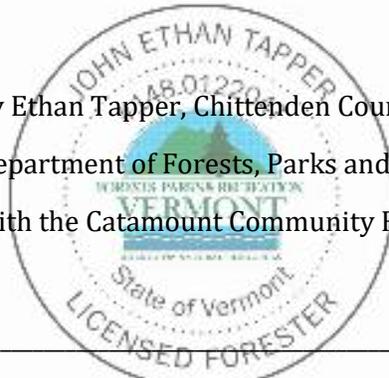
Chittenden County, Vermont

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Vermont Department of Forests, Parks and Recreation

In Conjunction with the Catamount Community Forest Committee



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Date

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Vermont Land Trust

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Introduction.

The purpose of this Forest Management Plan (FMP) is to accompany the Catamount Community Forest's September 2018 Management Plan ("Catamount Community Forest Plan," henceforth referred to as "MP"), adopted by the Williston Selectboard on September 4, 2018. This FMP will provide detailed, specific recommendations for the management of forested areas of the CCF using detailed forest inventory data and a scientific process. This FMP provides no binding mandates; however, the management recommendations in this document are intended to satisfy the goals and objectives put forth in the MP, in addition to best practices for the responsible management and stewardship of forested ecosystems.

The CCF MP states "The Town of Williston will manage the [CCF] as a municipal forest for wildlife habitat, timber harvesting and management, public recreation, education, and water quality protection." This FMP lays out a holistic management approach that considers these benefits, in addition to aesthetic, cultural, economic and community values, the value of demonstrating responsible forest stewardship and additional management considerations such as carbon sequestration and storage as part of encouraging a healthy, diverse, resilient forest.

The silvicultural recommendations put forth in this FMP are meant to be applied in the field by a Vermont-licensed forester in agreement with the Town of Williston, utilizing best practices and complying with all pertinent laws. The Catamount Community Forest Committee will be responsible for implementing the day-to-day administration of this FMP, under the advisement of the Chittenden County Forester.

At the time of any planned forest management activities, the Williston Selectboard will have the opportunity to vet any potential foresters and loggers considered for this work, who will be put forward by recommendation of the Catamount Community Forest Committee and will ultimately need to agree to a written contract with the Town.

All of the forest management activities prescribed in this FMP should be accompanied by 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 should be considered an important goal of this FMP, and a way that the CCF can contribute to high-quality forest management well beyond its borders. The opportunities for demonstration and education associated with this FMP are especially unique, as it presents unique projects in partnership with the United States Fish and Wildlife Service, Vermont Fish and Wildlife Department, Audubon Vermont, the University of Vermont Forestry Department and others to create crucial wildlife habitat resources and to demonstrate climate-adapted and restorative forest management as part of a long-term scientific study.

This FMP is also intended to satisfy Section B.2d of the CCF's conservation easement, and a similar mandate to establish a Forest Management Plan "that finds an appropriate balance between recreation, wildlife habitat, water quality protection and timber harvesting." on p. 6 of the CCF's MP. In accordance with this easement, this FMP shall be updated in 10 years, in 2030.

History.

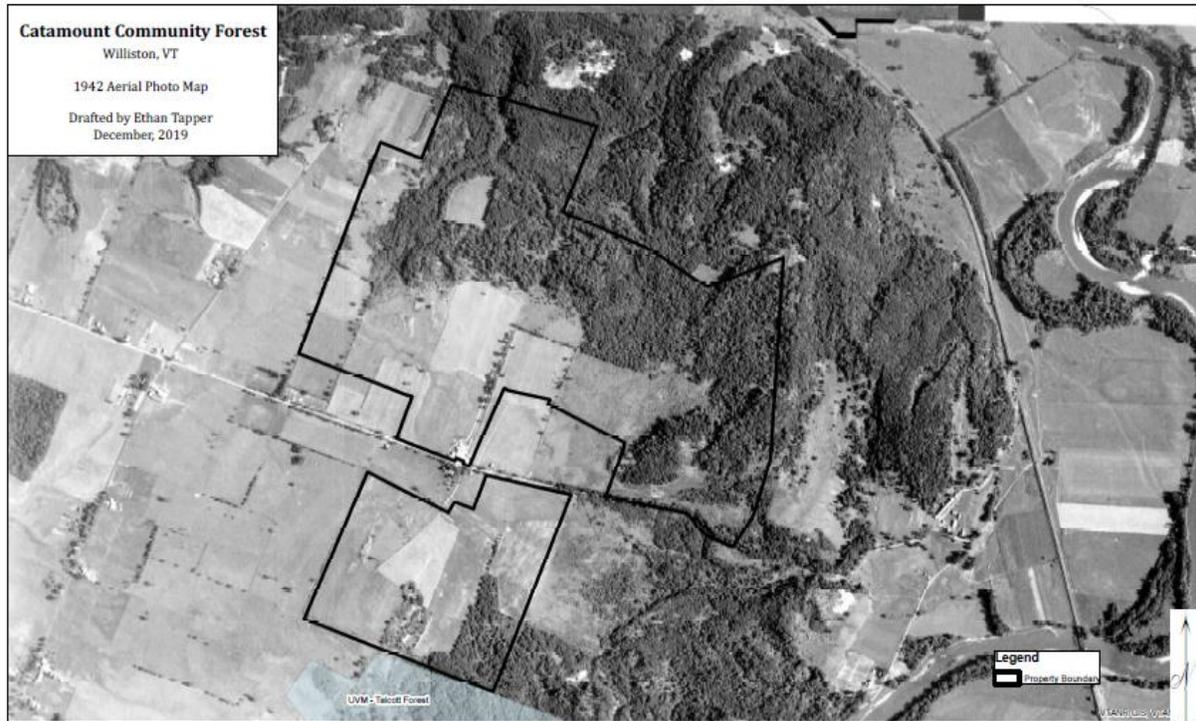


Figure 2: Current CCF Boundary Superimposed Over 1942 Aerial Photograph

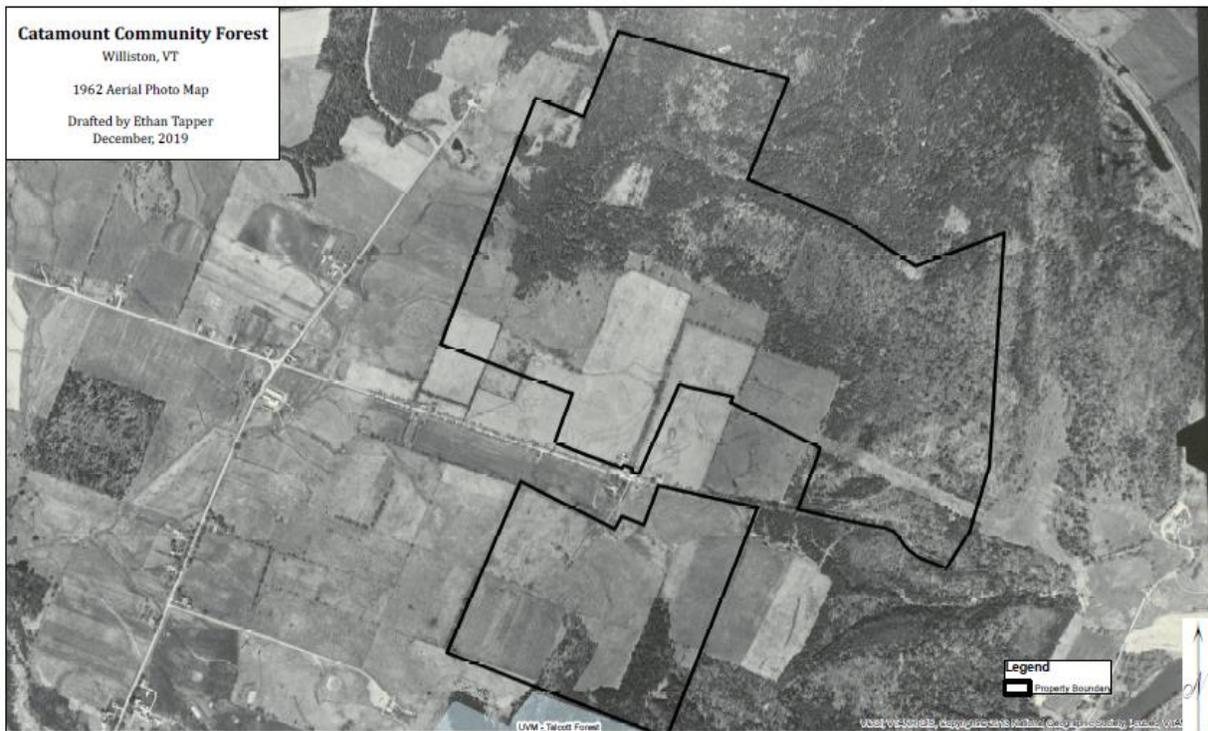


Figure 1: Current CCF Boundary Superimposed Over 1962 Aerial Photograph

The history of this parcel is discussed in depth in the MP. Like the majority of Vermont, it is likely that even the steepest and rockiest areas of the CCF were cleared for sheep pasture in the early-mid 1800's and managed as such for decades. More marginal pastures in the north, northeast and southeast of the CCF were allowed to revert from agricultural use to forestland sometime in the late 1800's through a combination of natural regeneration and perhaps some planting in the areas of the property now mapped as Stands 2 and 7. These areas are shown as being forested in the 1942 aerial photograph of the CCF above (Fig. 1). Between 1942-1962, additional areas of remote and marginal pastures were allowed to revert to forest, as shown in in Figure 2. Between 1962 and 1999, nearly all pastures and fields in the portion of the CCF north of Governor Chittenden Road reverted to forest, with forest cover nearing its present extent. While these historical dates may seem remote, the forested lands which now dominate the character of the CCF are largely shaped by this agricultural usage and the subsequent regeneration, in combination with site characteristics and how the land has been managed since being allowed to revert to forest.

While what is now the CCF has been in the McCullough family since 1873. Records of forest management in the CCF begin in 1947, when the first Chittenden County Forester, George W.C. Turner, visited the site, remarking that "not much timber [has been] cut in past 70 years, except [for] home use." Turner marked and supervised a timber harvest of the areas mapped in this FMP as Stands 2, 3, 4, 6 and 7 in summer of 1947, yielding about 185 thousand board feet (MBF) of sawtimber. Further timber harvesting occurred under Turner's supervision in 1961 (150 MBF). Turner's successor, Bill Hall supervised additional harvesting in 1981-82 (113 MBF, 140 cords pulp and 6 cords firewood), 1984 (17.6 MBF and 70 cords firewood) and 1992 (43 MBF of white pine and hemlock and 155 cords of pine pulp) with well-respected loggers Richard and Art Lavigne of Colchester. The exact details of these harvests – the species and condition of trees cut -- is not known, except in very general terms. Current forest structure and composition gives us clues, but can never express the entirety of what the management history consisted of.



Figure 3: Current CCF Boundary Superimposed Over 1999 Aerial Photograph

In 1982-86 – 19,000 Christmas trees – white pine, balsam fir, Scotch pine, Douglas fir and white spruce were planted on the property, mostly in the area mapped as Stand 13 in this FMP. Many of these trees were not harvested, which resulted in the odd composition of these Stands today.

The property was part of the American Tree Farm System, and in 1989 Jim and Lucy McCullough were named Outstanding Tree Farmers of Vermont, nominated by Hall for their exemplary forest management for multiple uses. In Hall's 1988 nomination he states: "perhaps just a few words exemplify the work of the McCullough family – enthusiasm, dedication, hard work, and pride." Following these accolades, the McCullough property was highlighted in the press, the site of numerous demonstrations and educational events including one hosting Senator Patrick Leahy, among other dignitaries.

In the 1990's management of the property shifted to a consulting forester, Greenleaf Forestry. Under the guidance of Greenleaf Forestry, many areas in the northern portion of the CCF were commercially harvested in 2008-9, blowdown was lightly salvaged following the December 2010 windstorm and Stands 2, 4 and 6 were partially harvested in 2015. The latter harvest generated 220 MBF of primarily white pine but also hemlock, red oak and white ash sawtimber, and 164 cords of pulp and firewood according to records provided by the former landowners. The goal of the 2008-9 treatment was primarily to "thin" stands, lowering stand densities to encourage the health and growth of the highest-quality trees, though Stands 7 and 8 were harvested using a "group selection" method, to create small pockets of regeneration. The 2015 harvest was intermediate (a "thinning" as described above) in nature in Stands 2 and 4 but attempted to begin the process of regenerating Stand 6 to a new cohort of stems. This latter treatment removed overstory pine trees, leaving a midstory of variable, and in some cases poor, quality, and is beginning to regenerate as of 2019. For a more detailed description of the effects of these treatments, see the Stand Description section of this FMP.

Larger copies of Figures 1-3 can be found at the back of this FMP.

Ecological Protection Zones (EPZ's).

Ecological Protection Zones (EPZ's) are areas defined, mapped and afforded special protections in the CCF's conservation easement. These EPZ's include streams, wetlands and vernal pools, and buffers around these features with special rules. These rules, quoted below, can be found on pages 12-15 of the CCF's conservation easement. They are addressed in the CCF's MP, however their implications for forest stewardship and management are as follows:

- Vernal Pool EPZ: the vernal pool mapped on the property is buffered with several zones with special protections.
 - o EPZ Primary Zone – within 100 feet of the vernal pool, “there shall be no removal of standing timber or downed wood or disturbance to the pool’s hydrology. The only forest management activity which may take place within the EPZ Primary Zone ... shall be control of exotic species and activities which enhance amphibian habitat.” Within this zone no forest management of any kind will occur, except invasive exotic plant removal. This area will be avoided with logging equipment in the course of any forest management operations in the CCF.
 - o EPZ Secondary Zone – within 500 feet of the EPZ Primary Zone (600 feet from the vernal pool) “timber harvesting is permitted but amphibian habitat needs, such as coarse woody debris and shade, shall be addressed in the preparation of forest management plans, which shall explicitly state what prescriptions have been imposed to protect and enhance amphibian habitat.” Any forest management in this Zone will occur in the winter, under frozen ground conditions, to avoid soil disturbance. Harvesting in this area will leave at least 4 dead-standing trees (“snags”) per acre, and will leave as much coarse and fine woody debris on the forest floor as possible. Whole-tree harvesting is not appropriate for this area.
- Wetland Protection Zone (WPZ): within these mapped areas, “ protection or restoration of the wetland natural communities... shall be [CCF's] highest priority,” and “all management activities, including ... forest management activities...shall focus on the goals of a) maintaining the natural structure and species composition of the natural communities present, or communities that may develop naturally over time.” Within wetland natural communities, no forest management will occur other than restoration work through the removal of invasive exotic plants. These wetlands will be buffered with 50-foot no-cut buffers, and all Vermont wetland rules and Vermont AMP's will be followed in the course of their management.
- Riparian Buffer Zone (RBZ): within these areas (50 feet from the top of the bank of several streams on the CCF) “any management or use of the RBZ shall be conducted in a manner designed to protect soil integrity and minimize erosion.” No forest management will occur in these areas, except crossing them to access other areas on established forest management trails. Crossing of RBZ's shall be done minimally, and in accordance with Vermont AMP's.

EPZ's are mapped in the CCF's Forest Stand Map (attached).

--- MANAGEMENT CONSIDERATIONS AND PRIORITIES ---

(See also p. 10 – 11 of MP)

Diversity and Resiliency.

The encouragement of diversity is at the core of the forest management objectives for this property. The CCF's MP that the Forest Management Goals for the property (p. 11) include to: "maintain and encourage a diversity of native species, of all taxa," "to maintain a structurally complex forest." Encouraging diversity is also stressed in the "Forest management Policies" section of the MP (p. 35).

In forest management the terms "diversity" and "resiliency" are intertwined.

The concept of encouraging **diversity** in a forest has its roots in a number of different concepts (not in order of importance):

- i. From a *wildlife management* perspective, offering a wide range of habitat conditions provides habitat for the widest array of wildlife species. This includes encouraging a diversity of tree and plant species within a given area ("*alpha diversity*"), protecting species and compositional diversity between different types of sites ("*beta diversity*") and enhancing a diversity of age and canopy classes of trees in the forest ("*structural diversity*"). A single wildlife species may require a range of habitat conditions in order to fulfill their basic needs, and/or require different habitat conditions and attributes at different life stages or at different times of year. Vermont's forests, which are generally young as a result of past human land use, in many cases do not represent as wide a range of habitat conditions as were likely to have existed in Vermont prior to European settlement, especially lacking young forest, old forest and structurally diverse forests across the landscape. Actively encouraging a diversity of site-appropriate habitat conditions, especially those that may be uncommon across the broader landscape, will make the CCF a much greater resource for a wider range of wildlife species.
- ii. From an *ecological* perspective, studies have shown that natural forest development patterns tend towards increased structural and species diversity over time. "*Old growth*" or "*late successional*" forests are generally highly diverse, supporting a variety of tree species and age classes of trees. An "*ecological forestry*" approach, such as is outlined in this FMP, seeks to manage forests as they manage themselves, modeling our actions after natural disturbance events and actively seeking to establish late successional characteristics in the forest. This generally includes encouraging several age classes of trees, in combination with other features like dead standing trees, coarse woody debris on the forest floor and biological legacy trees (trees that are not managed for timber and are allowed to live out their natural lifespan) mimics natural forest growth and development, utilizing the forest's natural processes of development and regeneration to keep itself healthy, vibrant, resilient and productive over time.
- iii. From a *climate change resilience perspective*, species and structural diversity in forests improves their "*resilience*" --- its ability to maintain its health and continuous natural processes in response to stress --- to disturbance events, and their ability to remain healthy and productive in light of the uncertain future effects of climate change. In addition to being buffered from catastrophic disturbances, which expose them to a loss of soil carbon, structurally diverse forests are known to store more carbon than less diverse forests, so they can play a larger role in mitigating the effects of climate change. In the CCF, managing for a resilient forest means encouraging species and structural diversity, protecting uncommon species, habitat types and ecological features, acting aggressively to control

invasive exotic plants and generally encouraging the features and processes endemic to natural forest growth and development through an ecological forestry approach.

Connectivity.

Forest fragmentation can be defined as the process by which blocks of intact forest are divided by human settlement and infrastructure. The fragmentation of forests by roads, homes, and development has a number of serious negative effects on wildlife habitat and ecosystem function.

For many wildlife species, the fragmentation of forests limits their ability to move through the landscape and access different habitats, which can affect their ability to hunt, forage, find cover, reproduce, and ultimately remain genetically “fit” as a species. In the case of some “interior dependent” species, such as black bear, shrinking habitat can drastically alter their behavior and ability to occupy a given area.

Forest fragmentation also contributes to a host of other problems, including altering forest vegetation and creating greater opportunities for the establishment and spread of invasive species. It is in the interest of the CCF’s wildlife habitat objectives, in addition to overall forest health, to engage only in forest management activities which allow the CCF to maintain its utility as a wildlife corridor and interior habitat block.

In general, responsible forest management and light recreation are not seen to contribute to forest fragmentation, although intensive use of an area for recreation and irresponsible forest management can alter wildlife behavior and usage. Concentrating trail development near roads and other fragmenting landscape features and leaving interior portions of properties relatively “un-trailed,” will preserve portions of the CCF where wildlife can move freely without being disturbed by human activity.

The CCF is part of relatively unfragmented forest block approximately 1,200 acres in size, bounded by Interstate 89 to the south, agricultural fields to the north, northeast and east, and housing developments to the west and southwest. This block connects to agricultural fields along the Winooski River, which may help connect this block to other areas of intact habitat. This 1,200 acre block is classified as a “priority” block by Vermont Conservation Design, and connects to “highest priority” blocks to the north, east and southeast across roads and via the Winooski River corridor. Unfragmented forest blocks of this size are uncommon in Williston and other parts of central Chittenden County.

Invasive Species Control.

Invasive exotic plants (hereafter called “invasives”) are an enormous threat to the continued health and productivity in the CCF, and to ecosystems world-wide. These species are aggressive competitors which can outcompete native plants, especially on forest edges, the understory of disturbed forests and in field-origin, pioneer stands. The result of this is the interruption of ecological processes (such as the natural regeneration and succession of forests), decreased diversity, decreased quality of wildlife habitat, decreased ecosystem resilience and diminished ecosystem function.

A general invasive plant inventory was done in the development of this FMP with the help of Brian Bornique, a UVM intern primarily supported by VLT and under the supervision of the Chittenden County Forester, and the Williston Master Naturalist program. Invasive exotic plants are well established in the CCF, primarily in a dense infestation in Stand 5, but also scattered

throughout northern portions of the property and Stand 11. These areas must be dealt with swiftly and aggressively for these areas to ever have a chance of regaining normal ecological processes. Without treatment, these infestations will spread, further compromising additional areas of the CCF. Any disturbance, whether human-caused or natural, will result in some new establishments of these species, so monitoring harvested or disturbed areas regularly should be a priority.

In lieu of the removal of these species, no other forest management or wildlife habitat management activities are likely to be successful over the long term. Failure to control these species will result in the degradation of the ecological and aesthetic benefits of the forest, including recreation, aesthetics, wildlife habitat, forest productivity, health and resilience, climate change resiliency, carbon sequestration and storage, and water quality. To “protect the forest from the invasion of exotic, invasive species,” is identified as a Forest Management Goal in the MP, page 11.

The importance of controlling invasive exotic plants is compounded by the fact that unchecked populations of these species produce seeds which are spread to neighboring properties. In this way, inaction with respect to invasive plants is not solely problematic for the health of ecosystems in the CCF --- it contributes to a much larger issue that threatens forests and other ecosystems throughout our region. To the extent that the CCF is part of a much larger biotic community, it is the responsibility of the managers of the CCF to address this problem actively and aggressively with the best tools available. The CCF also has an opportunity to demonstrate how to effectively manage invasives, which may contribute to better management of this threat region-wide.

Complete *eradication* of these species is unlikely --- instead, it is prudent to strive for *control*, a level of infestation that has an insignificant impact on forest ecology at the CCF and at which small plants can be easily hand-pulled before they become well-established. Maintaining control of invasive plants over time will require the annual monitoring of the CCF for new introductions of these species by volunteers.

Controlling invasive plants is a capacity issue --- while it may be theoretically possible to control invasives at a level of infestation like that at CCF, the amount of time, expense, and human energy would be prohibitive, and the likely result would be that populations of invasives would not be significantly effected. The use of small amounts of herbicide, applied in an extremely careful, conservative, and targeted way will allow the CCF to make a meaningful difference in invasive exotic plant populations on this property. 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.

Most invasive exotic plants, unlike pathogens, fungi, or insects, were introduced to our environment intentionally. Species such as common buckthorn and multi-flora rose were used as living fences to eliminate the need to maintain wire, wooden, or stone fence lines. Invasives such as shrub honeysuckle, Norway maple, Japanese barberry and burning bush (*Euonymus*) were popular landscape plants. Autumn olive and Russian olive (*Eleagnus*) were planted by foresters and conservationists as food for wildlife. In each case, these plants spread into forests and other natural environments 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).

Common buckthorn (*Rhamnus cathartica*) is one of the most prevalent invasives in the CCF, present primarily in Stands 5 and 11, but scattered throughout. Especially in Stand 5, the infestation of this species is extreme, completely dominating the understory in many areas. This species is extremely difficult to control. When it is small (up to about 2 feet in height), it may be possible to hand-pull, taking care to remove the entire root system. When it is larger than this, removal is sometimes possible using a weed wrench, but in most cases herbicide, applied to the cut surface of the plant's stump, is the only feasible control option. Viable seeds from common buckthorn often persist in the "seed bank" of the soil for up to 5 years, so multiple years of follow-up treatments are usually necessary in areas dominated by the species even once seed-bearing individuals are removed.

Shrub honeysuckle (*Lonicera sp.*) also occurs in Stands 11 and 5, in addition to being scattered throughout the property. Honeysuckle poses a similar threat to ecosystems, and is equally difficult to control mechanically, to buckthorn, although it tends to be slightly less resilient to chemical treatment. This species may be hand-pulled until it is 2-3 feet in height (depending on soils), taking care to remove the entire root system. Plants larger than this must generally be treated with herbicide, either through a cut stump treatment or a foliar spray.

Japanese Barberry (*Berberis sp.*) was noted throughout the northern portion of the CCF. Barberry is a difficult species to control mechanically by hand-pulling due to its abundant thorns and powerful root system. Some flame weeding has been done of these species, with some local success. The presence of this species is correlated with larger populations of deer ticks and is considered the most virulent invasive plant by many land managers in southern New England. Very small plants may be hand-pulled (with gloves), but most plants over 2 feet in height generally must be treated with herbicide, usually through a foliar spray.

Invasive Species Control Priorities:

- Treatment/removal of invasives should be conducted in all areas as soon as possible.
- Monitoring for invasives should be ongoing in all areas, including areas where invasive species are not currently known to be.
- Areas scheduled for silvicultural treatment, and those with large, seed-bearing invasive plants, should be prioritized for control efforts.
- Herbicide, applied as a foliar spray and cut-stump treatment, may be used as part of an Integrated Pest Management (IPM) approach to lower the populations of these species to a level manageable through mechanical means (hand-pulling).
- Following the initial treatments of these species, hand-pulling and other mechanical methods should be used as much as possible to control invasives.

Wildlife Habitat.

Wildlife habitat has been identified by the Williston community in the development of the MP as an important focus of the Town's management strategy for the CCF, and the maintenance of high-quality habitat is identified in several places in the property's conservation easement. As discussed in the diversity section of this FMP (above), the management of forests for wildlife habitat is intertwined with other objectives for the CCF. Wildlife habitat management should be emphasized as part of a whole-system approach to forest management, which seeks to preserve intact, functional, vibrant, resilient forested ecosystems, and recognizes all native species of wildlife as critical parts of this system. The establishment, maintenance and protection of wildlife habitat with this approach will include the protection of uncommon and sensitive habitat features and the creation and maintenance of habitat conditions which may be lacking in abundance across the landscape. This approach serves both to encourage the charismatic wildlife species with which we are familiar, such as neotropical songbirds, white-tailed deer, moose, bobcat, black bear, and coyote, but also to support all species of native biota and the processes that sustain them.

The goals/objectives/ and prescriptions in this management seek to specifically support songbird habitat by:

- 1) Diversifying vertical and horizontal structure, including the establishment of a robust understory/shrub layer;
- 2) Maintaining and enhance overall tree/shrub/plant species diversity in the CCF;
- 3) Retaining and recruiting biological legacy trees for cavity creators and nesters, including large-diameter snags and cavity trees;
- 4) Creating canopy gaps for insectivores;
- 5) Retaining and recruiting coarse and fine woody material to the forest floor;
- 6) Creating habitat conditions which are under-represented across the landscape and favored by specialized bird species, namely early successional forest and shrubland habitat.
- 7) Removing invasive exotic plants which diminish the quality of forage, mast, and future habitat available to songbirds.
- 8) Restricting forest management between April 1 and August 1 to avoid songbird mating season (MP p. 20).
- 9) Continuing to work with The Green Mountain Audubon Society (GMAS) to monitor bird usage of the CCF over time.

At present, the CCF features mostly even and two-aged habitat, with relatively closed canopies. Stand 7, which was harvested in 2015, features some areas of young growth, but no extensive areas of young forest exist on the property. Shrubland habitat exists in Stand 11, Stand 13 and along the mapped open meadows and wetlands on the property. True multi-aged forest was only noted in sections of Stand 2.

White-tailed deer populations in Chittenden County and other portions of Vermont were noted in Vermont Fish and Wildlife's 2018 Antlerless Recommendation as being above the carrying capacity of their habitat, and local populations in the area of the CCF appear to be very high. Where deer are over-abundant their browse often contributes to decreasing diversity in the composition of the forest, the abundance of invasive exotic plant species and the inability to regenerate certain species of native trees and plants. Deer populations tend to increase with forest fragmentation and development, decreasing winter severity, an increase in the abundance of "posted" lands and decreasing hunter numbers, all of which are issues across Vermont and most prominently in Chittenden County.

Most of Stands 1-4 have been mapped by the State of Vermont as a Deer Wintering Area (DWA, or “deer yard”). DWAs are critical resources for white-tailed deer in the winter, as continuous softwood canopies cause lower snow depths and higher temperatures. The southerly aspect of the CCF further increases the attractiveness of this winter habitat for deer. The presence of DWAs is thought to be a limiting factor for deer abundance across the landscape. While the overabundance of deer in the CCF is troubling, excellent DWA habitat will still be encouraged by maintaining functional, contiguous softwood canopies whenever possible while also seeking to regenerate small areas of hardwoods near DWAs for winter browse and softwoods for continuous DWA function over time.

In the CCF, deer browse damage is extremely evident and troubling. The influence of this browse is contributing to lower regeneration success in areas harvested in 2015, decreasing biodiversity in the understory throughout the CCF, and in an increase in the prominence of invasive exotic plants. In this way, the over-abundance of deer is a concern for forest health and resilience, wildlife habitat, water quality, the long term ecological and economic productivity of the CCF. It is likely that without action this problem will become even more pronounced in the future.

While the MP does not allow for hunting for safety reasons, it is recommended here that options for safely hunting deer, especially antlerless deer on the CCF be considered in the future. Deer management on the CCF should be nuanced, both striving to provide excellent habitat for a healthy population of deer, while also keeping their population at a low enough level that forest growth and regeneration can occur unimpeded. At current population levels, it is not likely that this can be done without active management of the deer herd by humans.

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

Wildlife habitat priorities:

- Protect and enhance the function of DWAs where they are present.
- Encourage trees of a diversity of age classes and site-appropriate species.
- Encourage late-successional characteristics in the forest.
- Buffer and protect sensitive features and features of great habitat significance, such as vernal pools, den sites, streams and wetlands.
- Protect uncommon natural community types and sensitive features.
- Act aggressively to control invasive exotic plant species.
- Encourage habitat conditions that may be uncommon on the larger landscape.
- Monitor deer population and browse impacts in the CCF.
- Investigate systems for encouraging the responsible, safe hunting of deer, especially antlerless deer, in the CCF.

Water Management.

Several perennial, intermittent, and ephemeral streams drain from the CCF, connecting to the Winooksi River just south of the property boundary. Some of these streams are afforded special protections in the CCF’s conservation easement. The primary purposes of these protections are to buffer aquatic and wetland plants and animals from disturbance; to prevent wetland and water-quality degradation; to provide important plant and animal habitat, and to provide

organic matter, nutrients and structure to aquatic systems. These streams and stream corridors also have significant aesthetic value and contribute to the water quality in the Lake Champlain Basin.

Beyond those identified in the CCF's conservation easement, several additional seeps and seasonal wet areas are present in the CCF. All additional identified sensitive hydrological features will be protected with buffers as defined by Vermont AMP's (see below) in the course of any forest management activities.

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 the standards in the CCF's conservation easement, best practices for maintaining aquatic and riparian habitat, and laws pertaining to the protection of wetlands, should be strictly adhered to in the course of forest management in the CCF.

Water Management Priorities:

- Any forest management activities should take the utmost care to preserve and enhance the quality of water on and flowing through the CCF.
- The streams and wetlands identified in the CCF's conservation easement will be protected with 50-foot RBZ's in which no management will occur. Any other perennial and intermittent streams identified in the CCF will be afforded the same protections.
- Vernal pools will be protected by the EPZ Primary and Secondary Zones, as defined above. No management will occur in the Primary Zone of the property's mapped vernal pool. Additional vernal pools, as they are identified and verified, will be afforded the same protections.
- Ongoing vernal pool monitoring should be pursued in conjunction with VLT and the Forest Ecosystem Monitoring Cooperative (FEMC).
- If active management is recommended to improve the quality of wildlife habitat in wetland, riparian or aquatic environments, the Vermont Department of Fish and Wildlife and DEC Wetlands Program should be consulted for its recommendations and approval, and the approval of VLT will be sought.
- The AMP's and Vermont's wetland rules should be strictly adhered to in the course of forest management.

Soils.

Along with disturbance history and climatic variables, soils inform our knowledge of which tree species are likely to be most healthy, productive, and competitive in a given area. See soils map (attached) for details on the location of individual soil types in the CCF.

In general, mineral soils in Vermont are influenced by a combination of bedrock, glacial deposits, and lacustrine/riverine deposits. The latter influence is of special importance in the Champlain Valley, as this area has been filled two large bodies of water, one an enormous freshwater glacial lake ("Lake Vermont") and the other a brackish, inland sea ("The Champlain Sea") in the last 13,500 years. Following the departure of the Laurentide ice sheet, Vermont was inundated with water to an elevation of approximately 600' ASL. This lake, draining south,

remained at approximately this level until approximately 12,000 years ago, when an ice dam in the Saint Lawrence Valley failed catastrophically, causing the water level to drop by about 300 feet over the course of a short period of time --- several hours to several days. The Saint Lawrence Valley had been compressed by the glacier to below sea level, causing saltwater to fill Vermont from the north to a level of approximately 320' ASL. The land under the Saint Lawrence Valley gradually rebounded from this compression, causing water levels to approach what they are today around 10,000 years ago.

Each of these large bodies of water caused the deposition of soil particles in the Champlain Valley; in general, areas covered by deep water were covered in fine particles like clays, whereas areas of shallow waters and the sites of coastlines, deltas and streams were covered in coarser particles, like sands and gravel. Most of the CCF, with the exception of eastern and southern areas, is at or below 600' ASL, and so generally sandy and gravelly soils dominate. In areas higher than 600' in elevation at the CCF are generally most influenced by bedrock, aspect, soil depth and steepness of slope.

Soils in the CCF are generally deep and well-drained, with the majority of the property located below 600' ASL. As a result, soils on the property are generally dominated by lacustrine deposits, mainly sand and silt loams. The far south of the property and eastern portions of the area of the CCF north of Governor Chittenden Road are above 600' ASL, and so feature thinner soils more influenced by bedrock. Areas of the property mapped as Cabot silt loam are relatively poorly drained and should be harvested in winter or under very dry summer conditions.

A Soil Map for the CCF can be found at the end of this FMP.

Soil Management Priorities:

- Minimize soil compaction, rutting and erosion in the course of any forest management activities or related infrastructure development.
- Strictly adhere to Vermont AMP's.
- Allow active forest management in areas with thin, wet, or sensitive soils only with frozen ground conditions.
- In areas with well-drained soils, forest management may occur in dry summer/fall months, and intentional scarification of soils may occur for silvicultural purposes as prescribed in this FMP. Soil disturbance will be kept to the minimum required for silvicultural purposes in this case.
- Seek to keep forest management equipment on established forest management roads and trails as much as possible.
- In the course of any forest management activities, prioritize the deposition of fine and coarse woody debris for soil and fertility building purposes.

Carbon Sequestration and Storage.

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.

Carbon offsets are a quantification of additional carbon stored in the course of improved land management practices, reforestation 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 CCF, especially when multiple additional parcels are “aggregated” into a single carbon project.

The enrollment the CCF in a voluntary carbon project could produce an additional source of revenue for the property, which could help support practices like recreational trail maintenance and development, wildlife habitat management practices, non-commercial timber stand improvement and invasive species control.

The CCF 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.
- Over the next 10 years, investigate aggregating the CCF with other landowners’ or municipalities’ forested lands to enter into a voluntary forest carbon project.

Recreation.

The importance of preserving and enhancing the qualities of the CCF that make it such an important cultural resource for residents of Williston and beyond cannot be overstated. The property provides aesthetic benefits, access to nature, extensive recreational offerings, and is a symbol of an intact and healthy block of forestland in an increasingly developed and fragmented landscape. All management activities at the CCF should seek to maintain or enhance the way that this property benefits the Williston community, understanding that these benefits must be framed within the context of a maintaining a healthy forest and a healthy broader ecosystem. Recreation is an incredibly important use of this property, and is the way that most people directly enjoy the benefits of healthy forests. As such, recreation should be a critical consideration in any forest management decision at the CCF. A more in-depth discussion of recreation can be found in the CCF’s MP, in section “IX. Recreation and Education” (p. 25)

Many recreational trails in the CCF, especially those groomed for cross country skiing, have been established in the location of old forest management trails (“forestry trails,” “logging trails,” or “skid trails”). Some of these trails have been substantially improved with gravel and other road-building materials to make them usable for a wide variety of different uses and

users. Using these trails rather than establishing new trails would be preferable, as the creation of new forestry trails would necessitate the disturbance of new areas of forestland, which would have potentially negative impacts on soils and forest ecology. Accordingly, some sections of recreational trail will need to be closed for safety reasons during forest management.

The license agreement between the Town and the COFC dictates that “all reasonable actions will be taken to cause the least amount of disruption to existing trails while such work is being performed...” While encouraging a diverse array of native tree species and addressing current ecological conditions in the forest requires harvesting in the late summer/early fall, care will be taken to avoid impacts to COFC trails as much as possible, especially graded “doubletrack” trails, which have been upgraded with geotextile fabric and gravel. These trails in particular will be avoided whenever possible, and a detailed plan is being developed with the COFC to limit impacts to all trails at the COFC. This will limit impacts to the COFC’s operations, and also potential costs associated with trail restoration.

The license agreement goes on to state that: “...any damage to the [COFC trails at the CCF] caused by such work shall be restored at the Town’s expense.” Recreational trails will be restored to their prior condition, funded by a combination of timber sale revenues, volunteer time and Town funds following the harvest. The primary restoration activity will be clearing brush, which can be done by volunteers. Other restoration activities could include the smoothing of shallow ruts, smoothing and grading double-track recreational trails and adding material to trails.

It is recommended that \$10,000 be set aside from timber sale revenue and capitol budget funds to account for the possible costs of trail restoration.

The wildlife habitat management work scheduled in Stands 5, 11 and 13 will likely occur in fall or winter 2020-21 and will result only in very localized recreational trail closures for a period of about 10-14 days, in addition to several days in subsequent years for invasive species treatment. No disturbance to recreational trails whatsoever is expected to occur due to this work.

Moving forward, new recreational trails on the CCF should avoid existing forestry trails whenever possible. This “recreation with forestry in mind” approach is based on the understanding that active forest management is an allowed and supported long-term use of the CCF, and so the maintenance of forest management infrastructure (i.e. skid/logging trails) as such is critical to protecting this use over time. This approach avoids conflict between recreation and forest management by ensuring that as little disruption as possible occurs to recreational trails and their usage during the course of forest management activities.

The extensive use of the CCF 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, during and after forest management, is strongly recommended.

Recreation Priorities:

- Recreational trails will be restored to their current condition as soon as is possible following completion of forest management in all areas.

- Provisions will be placed in the timber sale contract with the logger to clear main (“double track”) trails clear of brush after the timber sale.
- Brush will be cleared from single-track recreational trails with volunteers. No significant disruption to these trails is expected from the scheduled logging in Stands 2 and 3.
- The start of the harvest could be delayed slightly to accommodate COFC camps and programming finishing in early August.
- In the contract with the logger, periodic times may be designated to not work, so that the COFC can use truck roads (not skid roads) for races and events safely;
- Educational programming and educational resources will be specifically targeted to COFC trail users before, during and after forest management.
- Avoid physical disruptions to trails and disruption to trail use as much as possible in the course of forest management activities.
- Before commencing with any active forest management make a detailed closure/restoration plan with the Catamount Community Forest Committee and the Catamount Family Outdoor center to avoid impacting recreational usage as much as possible and to quickly restore any impacted trails following harvesting.
- Set aside \$10,000 to account for possible trail restoration costs.
- New recreational trails should avoid existing/historic forest management roads and trails.
- Leverage recreational trail usage in CCF to educate more people about modern, responsible forest stewardship.

Access and Operability

Access, in a forest management context, refers the ability of forest management equipment to reach a property, transport any forest products to an area where they can be processed, sorted, and load them onto log trucks, ultimately shipping them to a mill or other market. The trails on which logging equipment travels within the property are referred to as “skid trails,” “logging trails,” or “skid roads.” The area where logs are piled, processed, sorted and loaded onto trucks is referred to as a “log landing” or “landing” (sometimes called a “header” or “log yard”). The roads, passable by log trucks, which access the landing are referred to as “truck roads” or “haul roads.” Access to the CCF for forest management purposes will likely occur via:

- The gravel road extending from the Catamount Family Outdoor Center’s parking area, with a landing in the open land north of the power line corridor. This road is in good condition and will require no upgrades to afford log truck access.
- The gravel road connecting Governor Chittenden Road to agricultural fields south of this road. This access is not a deeded right-of-way and so can only be used with agreement of the McCullough family. The use of this section of road may require adding at least one load of gravel in at least one location, over an existing culvert.
- A landing to be developed along Governor Chittenden Road in the southwest of Stand 10. The historic road accessing this part of the property crosses the property of a neighbor, and so permission may need to be obtained to use and upgrade this road. In any case, some upgrading, and the clearing of a landing site, will likely be necessary before any activity can occur in Stands 8-10.

Operability refers to the ability of logging equipment to operate within the property. Operability may be limited by steep or rocky ground, natural features such as water bodies, wetlands and cliffs, and a lack of available, appropriate skid trail infrastructure.

Operability in the majority of the CCF is fair, with existing skid trails and old farm roads reaching most areas. Small portions of the property are steep, rocky, wet and/or feature thin soils which will limit the ability of logging equipment to operate but should not significantly limit operability in the CCF overall. For the most part, these sensitive areas should be avoided anyway in accordance with best practices for soils, as described above. Vermont AMP standards should be met or exceeded whenever harvesting occurs, to protect streams, wetlands, vernal pools and wet areas, especially when working near the property's mapped RBZ's and EPZ's.

Due to the silvicultural objectives for the CCF, some areas are scheduled to be harvested in summer/fall. Due to restrictions in the MP, this will mean starting any harvest no earlier than August 1. The purpose of summer harvesting is to cause some light soil disturbance for silvicultural purposes, but extensive rutting, soil compaction, erosion and root damage must be avoided, especially in the mapped vernal pool Secondary Zone EPZ. Skid roads may not be used when soils are excessively wet and may need to be avoided following periods of rain.

An additional problem will be where historic logging roads and trails have been improved and upgraded to high-quality recreational trails. To avoid soil impacts to other areas, these trails should be used, but care should be taken to avoid impacting them with logging equipment as much as possible. A detailed plan should be developed with the Catamount Family Outdoor Center to restore any damage to these trails following harvesting, to exclude the public from the harvesting site while it is active (except during forestry-related educational events) for safety purposes, and to minimize disruptions to the recreational trail network and its usage.

Access and Operability priorities:

- Comply with CCF conservation easement standards, Vermont Wetland Rules and Vermont AMP's.
- Make a plan with UVM to access to the Talcott Forest in conjunction with demonstration projects described in "**Demonstration of Responsible Forest Stewardship**" section, below.
- Make detailed plans with Catamount Family Outdoor Center to mitigate impacts to trails and trail usage associated with planned forest management activities; see "Recreation" section, above.
- Make a plan for future access to Stands 8-10.

Cultural Features

Cultural features are elements of the landscape that speak to its history. Common examples of these are stone walls, the foundations of old homes, historical artifacts, and plant assemblages associated with agricultural use. In the context of this property, this may also be used to describe locations of likely archaeological significance, or of cultural significance to local and historical indigenous peoples. For a more in-depth discussion of the management of cultural resources, please see "VII. Historic and Cultural Resources" section of the CCF's MP (p. 24). This property also features some open-grown old "wolf trees," which will be protected in the course of forest management.

Cultural features priorities:

- All cultural features should be buffered and protected during the course of forest management and recreational activities.
- All cultural features should be mapped as they are discovered.

- A 50-foot-wide buffer, in which no disturbance from timber harvesting shall occur, should be maintained around all cellar holes and cultural artifacts. All known locations of cultural resources should be located and marked prior to harvesting.
- Operate only in winter in areas of likely archaeological significance.
- Protect old field “wolf trees” in the course of harvesting.

Boundaries

Boundaries of forested properties are usually marked by a combination of wire and stone fence line and trees which are “blazed” (marked with an axe) and/or marked with paint. Corners are usually marked by metal pipes, rebar, metal stakes, cement monuments or stone piles, in addition to blazed “witness trees.” Depending on the way that boundaries were marked, and how they were subsequently maintained, these boundaries can be either very clear or virtually non-existent.

Clearly-marked boundaries are essential to the management of forested properties. Vermont law dictates that forest landowners must demarcate boundaries prior to harvesting of timber. Failure to locate or 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.

The boundaries of the CCF were assessed in summer 2019 by UVM intern Brian Bornique. Boundaries in virtually all locations, mostly wire fence but also consisting of axe blazes and stone fence, were found, but the property would benefit from having them painted.

Boundary maintenance priorities:

- All boundaries that can be located using existing field evidence should be marked with durable, bright boundary marking paint in the next 5 years.
- Any sections of boundary lines that cannot be located should be identified, and options for surveying them considered.
- Monitor boundary lines regularly and re-paint every 5 years.

Emerald Ash Borer

While this forest is not heavily stocked with ash species, white ash is present in the CCF. Infestation by the Emerald Ash Borer (EAB) is likely sometime in the future, which will probably result in heavy mortality of these species. Ash is an important element of diversity in forests across the landscape, and so our response to EAB must be nuanced – capturing some value in ash when it is appropriate within forest management prescriptions outlined in this FMP, but also retaining lots of healthy ash to bear seed and potentially exhibit genetic resistance to this pest.

For some 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. This could preserve the possibility of future generations of ash trees should some more effective landscape-scale of EAB be created in the future and/or preserve the possibility of new generations of 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 put

out 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 CCF to avoid any unintentional transmission of this species.

- Ash Management Priorities:

- Retain healthy ash of all sizes/ages in all areas.
- Capture value in some mature ash, when this is compatible with scheduled prescriptions.
- Create opportunities to regenerate ash by retaining seed trees and creating openings larger than $\frac{1}{4}$ acre.
- Explore the possibility of treating some charismatic ash trees with systemic insecticides to protect them from EAB infestation.
- Follow Vermont’s “Slow the Spread” guidelines whenever ash is harvested.

--- OVERVIEW OF FOREST CONDITIONS ---

Overall, the CCF is a diverse, vibrant forest featuring unique conditions and unusual forest and natural community types. Differing land use and timber harvesting histories have led to forest stands in a variety of developmental stages. Most stands on the property are “young” to “middle-aged.” Multi-aged forest and very young (*early successional*) forest are present but relatively underrepresented on the property. Very old, or *late successional* forest types are generally not represented in the CCF.

The majority of the CCF is dominated by typical lower elevation forests in the Winooski River Valley of Chittenden County. The majority of the property features deep, well-drained soils. Scattered areas feature poorly-drained soils and thin, dry soils are present in eastern and southern areas above 600 feet ASL. Soils in most areas show indications of being relatively acidic, although in some areas concave slopes lead to increased water retention and organic matter/mineral deposition, creating small pockets (“coves”) with locally enriched soils.

Like most forests in Vermont, those found at the CCF are generally even-aged and two-aged. Portions of Stands 2 are multi-aged, as a result of multiple partial harvests over the last 70 years which retained many large, overstory white pine trees. Stand 7 shows signs of having had a very similar structure until recent harvesting removed that oldest age class of white pine, leaving it as a generally two-aged stand.

The portion of the property north of Governor Chittenden Road features Stands dominated by white pine of various ages. Stands 2, 4, 7, and 9 are probably the oldest Stands on the property, having perhaps reverted from field to forest around 1900. Other Stands in the north and east of the northern portion of the property followed in the early 1900’s. Stand 6 reverted to forest between 1942 and 1962, and Stands 3 and 5 reverted sometime in the late 1960’s or 1970’s. Stand 13 was planted in Christmas trees between 1982-86 and Stand 11 was allowed to revert to forest around 2000.

For the most part, these younger white pine stands (Stands 1, 3 and 5) are poor in overall quality and condition. Some of these have begun to succumb to windthrow and canopy decline is widespread in Stand 3. Stand 5 is dominated by a white pine and other early successional species in generally poor health, with an understory dominated by common buckthorn and other invasive exotic plants.

Forest Management Priorities

The Management Priorities outlined above give the framework for management decisions that will occur in the CCF. However, this framework must be translated into action on the ground. Specifically, the prescriptions in this FMP will:

- Honor the terms and condition of the CCF MP, and the CCF’s conservation easement.
- Act aggressively to control invasive exotic plant species.
- Work to enhance species and structural diversity over time.
- Encourage late-successional forest characteristics, including recruiting and maintaining fine and coarse woody debris and biological legacy trees.
- Protect uncommon natural community types and sensitive features.
- Protect water resources.

- Protect cultural resources on the property.
- Protect and enhance opportunities for wildlife, including providing habitat conditions that are relatively uncommon across the landscape.
- Enhance the resilience of forests to climate change and natural/human-caused disturbance events.
- Increase carbon sequestration and storage capacity in the CCF.
- Demonstrate responsible forest stewardship, with a goal of increasing the quality of forest stewardship in the town/county/region.
- Demonstrate forest management that supports forest adaptation and restoration in partnership with UVM at CCF and neighboring Talcott Forest.

See also “Forest Management Policies” in the CCF MP (p. 34).

--- ACTIVE FOREST STEWARDSHIP ---

Forest stewardship is a term that describes the way we care for our forests, from the management of boundary lines, roads and trails to how we influence their structure and composition, and the ecosystems services they provide, through active management. Forest stewardship often involves harvesting some trees to provide firewood or sawtimber, increase production of maple sap, generate some income for a landowner, or to create wildlife habitat and/or structural conditions that may be lacking across the landscape as a result of human land use and influence.

Vermont's Working Landscape.

The “working landscape” is a term that refers to actively-managed, undeveloped land and how this land contributes positively to Vermont's economy, ecology, and cultural identity. While the term makes most people think of agricultural land, Vermont is about 76% forested, and so the vast majority of Vermont's working landscape is actually “working forest,” engaged in long-term forest management for timber, wildlife habitat, maple syrup, forest-based recreation and other benefits. About 80% of Vermont's forested lands are privately-owned, meaning that individuals and families are ultimately responsible for the management of the majority of this resource and the benefits it produces, from local economic benefits and the production of local, renewable resources to scenic beauty, recreational opportunities, clean air, clean water, wildlife habitat and carbon sequestration and storage. Allowing private landowners to periodically harvest forest products in a responsible way for themselves or to generate income from their properties not only produces local, renewable resources; it can help provide the economic means for these landowners to keep their forested land forested.

Keeping the CCF “working” benefits Williston and the surrounding community in a variety of ways. The harvesting of forest products benefits the local economy, providing work for local loggers, mills, truckers, firewood processors, value-added wood product producers and retailers by generating local, renewable resources in an intentional and sustainable way. Active forest management can also provide a means to address human-created conditions in the forest, improving wildlife habitat and forest health by increasing diversity and habitat conditions that may be underrepresented across the landscape. Finally, showcasing high-quality forest management through the harvesting of timber, as described above, provides opportunities for residents of Williston and beyond to learn from and interact with this process. Incorporating extensive education and outreach as a critical component of any active forest management will produce benefits that emanate far beyond the boundaries of the CCF, helping make the public more aware and knowledgeable of modern, well-executed forest management and the production of local, renewable forest resources.

Demonstration of Responsible Forest Stewardship.

Beyond being a healthy, beautiful forest producing ecosystem services like clean air, clean water, wildlife habitat and carbon sequestration and storage, the CCF has the opportunity to serve as a model of responsible forest stewardship. This goal is detailed in the property's MP, which states that forest management on the CCF has importance for: “educational purposes --- demonstrating responsible, sustainable timber harvesting to residents of Williston and beyond” (p. 34). By demonstrating high-quality forest management, and having education and outreach around these activities be a priority, the CCF can educate landowners, municipalities and others on how to be good forest stewards, making the benefits from any management work much greater. Every activity prescribed in this FMP is intended to be applied in conjunction with

public events, forums, educational tools and activities that will showcase and build understanding around these practices. Care should be taken to cultivate an open, transparent, and inclusive process around these events, providing many opportunities for members of the Williston community (and those in surrounding communities) to ask questions, comment, and be heard in different ways.

Any and all proceeds from timber harvested at the CCF should be used towards the maintenance of the CCF, its forest health and its recreational opportunities. It is recommended that at least 50% of proceeds be specifically dedicated towards wildlife habitat enhancement, non-commercial forest stand improvement work, forest road stabilization and improvement and invasive species control.

Adaptation and Resilience

The prescriptions in Stand 2 of this management plan, and in the work in the adjacent Talcott Forest, are intended to be applied as part of a project called "Adaptation and Restoration of Northern Forests: Collaborative Management of Forests at Risk Across the Urban to Rural Gradient," in partnership with the University of Vermont Forestry Department. to measure how forests adapt to climate change in light of differing management strategies. This will include active management as described elsewhere in this FMP, the gathering of data on multiple variables as the forest stands at the CCF respond to this work over time, and some site manipulation, including the planting of native species that may become more competitive in likely future climate scenarios. The work done at CCF will help to inform the understanding of how forests respond to a changing climate, and provide tools landowners, forest managers and forest scientists to use to manage forests in a changing climate. A detailed description of considerations and features in this project for this project are listed below, in Table 1.

The project will not result in any additional costs to the Town of Williston.

Table 1: Desired future condition and associated objectives and management tactics for developing resilient, adaptive forest conditions at Catamount Community Forest

DESIRED FUTURE CONDITION
<ul style="list-style-type: none"> • Multiple combinations of species composition and structure present (multiple pathways to recovery from disturbance, such as wind and ice) • High overall tree species diversity with increased component of species that are adapted to future climate conditions/disturbance compared to current condition, particularly in the regeneration layer <ul style="list-style-type: none"> • Increase white pine, red oak, and bitternut hickory component promoting resilience to future drought and temperature increases • Increase future-adapted species historically or currently present in broader landscape, including American chestnut, white oak, chinquapin oak, and shagbark hickory • Both deciduous and conifer components present with diverse functional traits (e.g., drought tolerance or phenology) that mitigate hydrological events, and support favorable diversity of microclimates/microhabitats for wildlife • Multiple age classes present (uneven-aged, ~4 cohorts) • Minimum BA of 70-80 ft²/ac • Increased amount of dead wood (snags: 1-3/acre; downed dead: >300 ft³/acre) • Low levels of insect and disease issues, no invasive species

<ul style="list-style-type: none"> • Large tree component for maintaining high, on-site carbon stores and mature forest structure • Demonstration area representing responsible forest management for addressing climate change and invasive species impacts on forests in the Champlain Hills
OBJECTIVES
<ul style="list-style-type: none"> • Maintain species composition as a mixed pine-hardwood forest with some deviation from current conditions (multiple recovery pathways) • Maintain/increase (favor) white pine and red oak component • Increase abundance of drought-adapted species currently on site (white pine, red oak, bitternut hickory) and those projected to increase in region under climate change (American chestnut, white oak, chinquapin oak, and shagbark hickory) • Maintain minimum BA of 70-80 ft²/ac, with mosaic of lower density regeneration openings and higher density inter-patch areas (100-110 ft²/ac) • Maintain/increase vigor and quality of residual trees while maintaining current productivity levels consistent with type (0.5 cord/ac/yr, 2 ft²/ac/yr) • Increase age class diversity • Increase amount of dead wood for safe sites for regeneration, erosion control, and moisture retention on site • Consistently apply BMPs to minimize impacts of episodic hydrological events • Maintain diversity of microhabitats for wildlife • Maintain forest conditions that allow water and nutrient cycling to recover to pre-disturbance rates • Ensure presence of advance regen to allow recovery following disturbance • Enhance stability of selected carbon pools (e.g., soils) while encouraging accretion in others (e.g., living and dead biomass) • Remove and prevent establishment of non-native plant species
TACTICS
<ul style="list-style-type: none"> • Group selection: 20% of the area in gaps (0.25-1 ac), anchoring gaps on large white pine and red oak or in areas with advance regen of desired species <ul style="list-style-type: none"> • 20% in reserves (no cutting) (for deep shade, large living and dead tree components) • Light thin remaining matrix to maintain 100-110 ft²/ac BA, mark for quality and longevity, resistant crown forms, retain all Spruce (resilient to disturbance, maintain forest health) • Plant nearby central hardwood species not currently found on site as well as species with similar ecological functions that occur within 100 miles of CCF, in gaps • Cutting cycle length of 20 yr • Expand previous gaps / implement fewer gaps to promote red oak and white pine advance regen established following previous harvest entry • Assess red oak and white pine regen in thinned matrix areas to determine next step in matrix (thin, selection harvests, etc.) • Favor summer/fall harvesting (cable skidder) to achieve incidental scarification to promote light-seeded species (white pine, yellow birch) and burial of acorns • Additional site prep in gaps if needed to remove invasive species and other competing species (may also do follow up release treatments in gaps to favor natural and planted seedlings if competition from other species becomes concern post-harvest)

- Harvest during a good cone/acorn year, if possible, to promote white pine and red oak
- Retain slash on site to alleviate overland flow and minimize erosion – stipulate that limbing occurs in forest
- Deliberately fell 3 large (> 14 inches DBH), low quality/cull trees per acre for downed woody material
- Apply VT AMPs

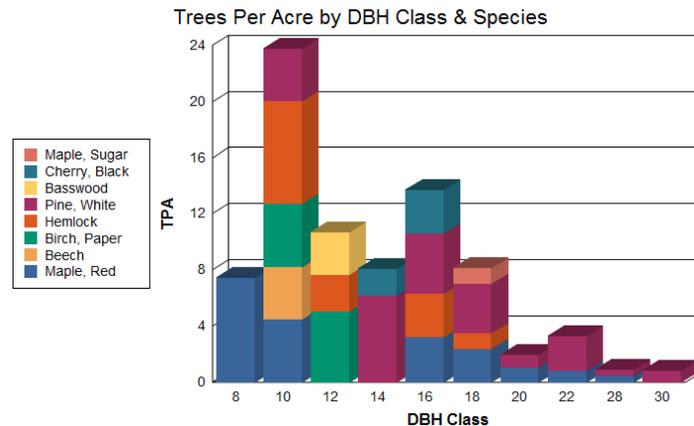
--- STAND DESCRIPTIONS ---

Stand 1

Size: 17 Acres

Forest Type: White Pine – Northern Hardwood Forest

Structure & Composition: This is a generally two-aged stand, dominated by white pine but with pockets of hardwoods and hemlock and some pockets of very young forest (~10 years old). White pine accounts for 34% of the total basal area in the stand, followed by red maple (18%), hemlock (12%), paper birch (6%) and black cherry (6%). A variety of other northern hardwoods were also noted during the field inventory.



General Description: Stand 1 is a field-origin stand, with an overstory generally dominated by 60-80-year-old white pine. This pine is variable in health and quality, with some healthy stems but with about 35% of the trees featuring damage from white pine weevil, blister rust or general poor form and condition. Field evidence suggests that this Stand was harvested at least twice over the last 30 years, most recently about 10 years ago. These treatments removed some white pine from the overstory and released some hardwood and hemlock to the midstory. The more recent treatment, combined with blowdown and some decline of canopy trees, has also created some understory regeneration dominated by beech and some small pockets of more diverse regeneration.

Stand Summary: 4 plots, 10 BAF prism

Total Basal Area/Acre:	82 ft ²
Acceptable Basal Area/Acre:	56 ft ²
Quadratic Mean Stand Diameter:	13.8 in.
Trees/Acre:	80

Approximate Stand Age: 60-80/30/10 years

Stand Health: Generally poor health and condition, especially with respect to white pine, from general decline, blister rust and white pine weevil damage. Invasive exotic plants scattered throughout the Stand.

Invasive Species: Common buckthorn, shrub honeysuckle, Japanese barberry scattered throughout.

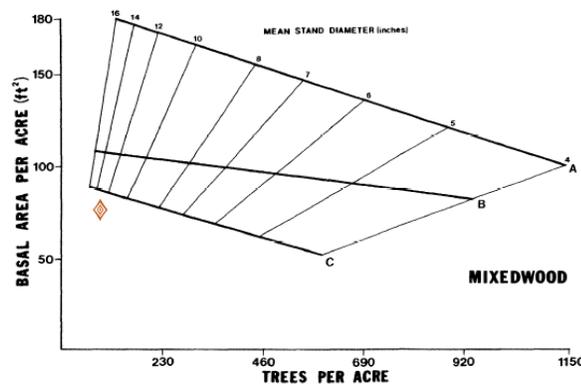


Figure 7.—Stocking guide for main crown canopy of mixedwood stands (25 to 65 percent softwoods) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual

Figure 4: 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.](#)

Soil Types: Duane and Deerfield soils, Enosburg and Whatley soils. Generally poorly drained.

History/Previous Activity: This area was cleared in the 1800's for pasture. Following this, it was managed as a pasture or hayland until sometime between 1942 and 1962. Field evidence suggests that the Stand was probably thinned in the 1980's or 1990's, and landowners records describe an additional thinning in winter 2008-9. Additional blowdown occurred in the Stand in 2010 and/or 2012.

Access and Operability: This Stand is accessed via established forest trails connecting to Governor Chittenden Road. It is very wet in places and features a mapped vernal pool and its primary and secondary zone EPZ's and a small WPZ. If harvesting is to occur, it must only occur under frozen conditions.

Management Objectives:

The primary objective for management of this area is to encourage the development of a healthy, diverse, resilient forest, while protecting mapped EPZ's and sensitive areas. This will include establishing/maintaining structural and species diversity, creating and maintaining high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Due to the location of a vernal pool and its primary and secondary zone EPZ's within this Stand, special care will be taken to protect and enhance amphibian habitat within this Stand.

Management Activities:

The priority for this stand should be the treatment of invasive exotic plants. The infestation of these species is at a level that will likely require the targeted use of herbicide in most areas. This work will likely need to be contracted out to an invasive plant removal contractor. If work is to be conducted in mapped wetland areas, a permit from a Vermont wetland ecologist may need to be sought.

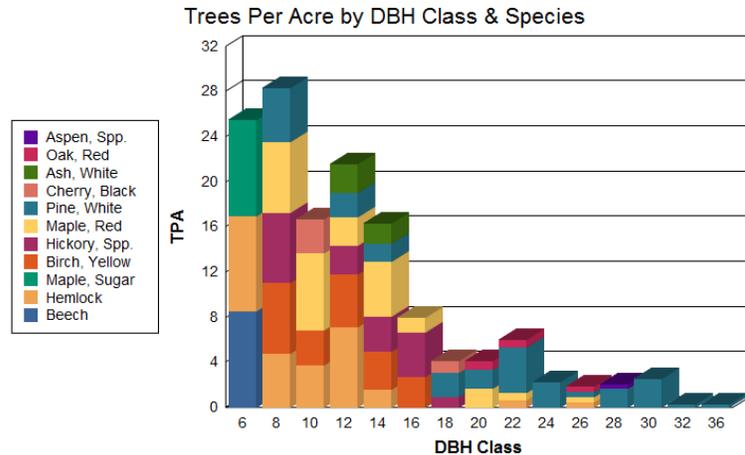
The opportunity for additional forest management activities should be reassessed at the time of the next FMP update.

Stand 2

Size: 46 Acres

Forest Type: White Pine- Hemlock Forest

Structure & Composition: This Stand is one of the most fascinating areas of the CCF, with a multi-aged structure resulting from multiple harvest entries over the last 70 years. The dominant cohort is comprised mostly of white pine (51% of the stocking by basal area), in addition to red maple (20%), hemlock (15%), bitternut hickory (13%), yellow birch (13%) and red oak (5%). Ash and other hardwoods are present as minor associates. The white pine component is virtually all super-dominant overstory trees, whereas hemlock and hardwood consist of younger trees in lower canopy positions.



General Description: Stand 2 is a multi-aged stand with a super-dominant overstory of very large, impressive white pine trees, many in excess of 23” in diameter and 110’ in height, and younger age classes of hemlock and hardwoods. The composition of the stand varies depending on how much white pine has been retained in the overstory – in areas where the stocking of white pine is lower, hemlock and hardwoods dominate. The Stand was harvested in 2008-9, but this treatment did not create significant understory regeneration --- the stand is only structurally deficient with respect to very young trees (less than 20 years old).

Stand Summary: 11 plots, 10 BAF prism

Total Basal Area/Acre:	130 ft ²
Acceptable Basal Area/Acre:	116 ft ²
Quadratic Mean Stand Diameter:	13.1 in.
Trees/Acre:	140

Approximate Stand Age: 100/70/40 years

Stand Health: Scattered blister rust and possible red rot in overstory white pines. Deer browse damage is extensive throughout the understory.

Invasive Species: Honeysuckle, common buckthorn and Japanese barberry plants scattered throughout the Stand, mostly near boundaries with Stands 1 and 5.

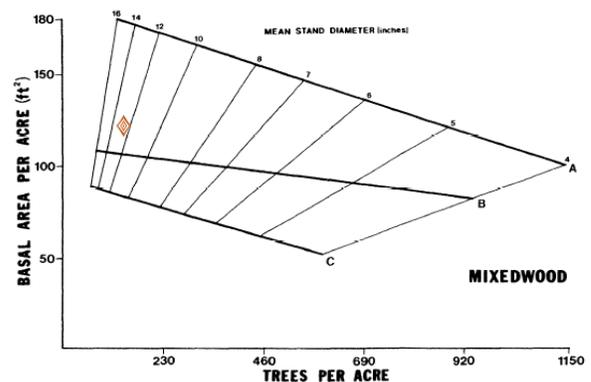


Figure 7.—Stocking guide for main crown canopy of mixedwood stands (25 to 65 percent softwoods) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual stocking, the C line is minimum stocking.

Figure 5: 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.](#)

Soil Types: Belgrade and Eldridge soils, Cabot silt loam, Munson and Raynham silt loams, Enosburg and Whatley soils. Most soils are well-drained and dry, but pockets are poorly drained.

History/Previous Activity: This area has been harvested multiple times since 1947, most recently in winter 2008-9, in a harvest which removed a small portion of large pine in the overstory.

Access and Operability: This Stand will be accessed via a gravel road leading from the CCF's parking area into open land in Stand 5. Operability is variable, with most areas suitable for summer harvesting, but some areas featuring poorly-drained soils. While the goal for this Stand will be largely summer harvesting, some portions of the Stand should be either operated in the winter or excluded from harvesting all together.

This Stand contains a portion of the CCF's mapped Vernal Pool Primary and Secondary Zone EPZ's, and a mapped WPZ. Within the primary zone and the WPZ, no harvesting will occur. Within the secondary zone, special care must be taken to avoid soil disturbance and rutting as this may hinder the usage of this area by amphibians. The WPZ will be buffered from entry by logging equipment in conformance with Vermont AMP's, Vermont Wetland Rules, and the terms specified in the CCF's conservation easement.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage, and the maintenance of natural stand dynamics and ecosystem processes.

In the portion of the Stand mapped as a vernal pool EPZ and WPZ, special care will be taken to protect these sensitive areas, including specifically protecting and enhancing amphibian habitat in the former area.

Also of high importance in this Stand is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship. This Stand is an especially important area to demonstrate responsible forest management, because it presents such unique conditions – particularly its multi-aged structure.

Management Activities:

This stand will be managed in partnership with UVM as part of the “Adaptation and Restoration of Northern Forests: Collaborative Management of Forests at Risk Across the Urban to Rural Gradient,” as described in Table 1.

A single tree/group selection treatment is recommended to occur in this Stand in 2021-22. This treatment will remove all trees in groups up to 1 acre in size, targeting mature and declining white pine and hemlock, poor quality midstory hardwoods, and areas with high-quality established regeneration. The goal of this treatment will be to enhance the structure of this Stand by regenerating a new age class of trees. Groups of a variety of shapes and sizes should be placed to maximize diversity and complexity within the Stand. Most large white pine trees will be retained for future entries and as biological legacies, though some of them will be cut. These groups will cover up to 20% of the Stand area.

The goal of these groups is to establish new regeneration of all native species, but especially white pine, hemlock and red oak. Beech is an important native species, but harvesting will generally seek to lower its abundance overall due to the effects of beech bark disease, its positive correlation with deer browse and

its tendency to create a monoculture in the forest understory. To the extent possible harvesting should be timed to occur around oak and pine mast years. For maximum efficacy, this treatment should be conducted as much as possible with dry conditions in summer and fall. Due to restrictions on summer harvesting in the MP, work in this Stand may occur no sooner than August 1. Wetter portions of the Stand may need to be harvested in winter to minimize soil impacts and potential impacts to amphibians in the vernal pool Secondary Zone EPZ.

Between groups, individual poor-quality trees of all species and age classes may be harvested to encourage the growth of the healthiest stems in the Stand and to increase vertical structural diversity. Where red oak and other hard mast trees are found between patches, their mast production should be encouraged by conducting a crown release on 2-4 sides Basal area between patches should be reduced to no less than 100-110 ft²/acre.

Within the portion of the Stand mapped as a Vernal Pool Primary Zone EPZ, no harvesting will occur. Within the Secondary Zone EPZ, harvesting and the operation of logging equipment may occur provided that a continuous canopy is retained, soil disturbance, especially rutting, is minimized, and lots of coarse and fine woody material (to the standards of Table 1, p. 24) and a relatively continuous forest canopy are retained following the harvest. However, a goal for this Stand is to keep 20% of the Stand area unharvested, as a “control.” This area will likely be situated in the portion of the Stand mapped in the Secondary Zone EPZ.

The mapped WPZ on the border of this Stand and Stand 3 should be excluded from harvesting and protected and buffered per the restrictions in the CCF’s conservation easement, Vermont Wetland Rules and Vermont AMP’s.

Before and/or after harvesting, an additional priority for this stand should be the treatment of invasive exotic plants. The infestation of these species, while lower than adjacent Stands, is at a level that will likely require the targeted use of herbicide in most areas, and will likely need to be contracted out to an invasive plant removal contractor. If work is to be conducted in mapped wetland areas, a permit from a Vermont wetland ecologist may need to be sought.

A detailed schedule for the work in Stands 2 and 3 is as follows:

- Forest Management would commence in the northern section in early August 2021. Depending on weather and other factors, this work might be completed in autumn 2021, or (with some downtime in November and early December to avoid wet soils) completed in early winter 2021-22.
- While the total acreage of Stands 2 and 3 is larger, due to easement restrictions and operability issues the total harvest area in Stands 2 and 3 is approximately 35 acres.
- There are two main skid trails that split the northern harvest area in half, one accessing the west and northwestern portions and another accessing eastern portions. It would be possible to structure the harvest so that only one main trail is used at a time, meaning that one side of the harvest area could remain open to recreational usage while the other is being harvested and vice versa.
- The logger would move to a southern landing in the field north of the Talcott Forest when they finish in the north, most likely in winter 2021-22 or after August 1, 2022. If work in either the north or the south of the CCF occurs in the winter, harvesting will be suspended by mid-March and resume in August 2022, completing the job in both areas by November 2022.

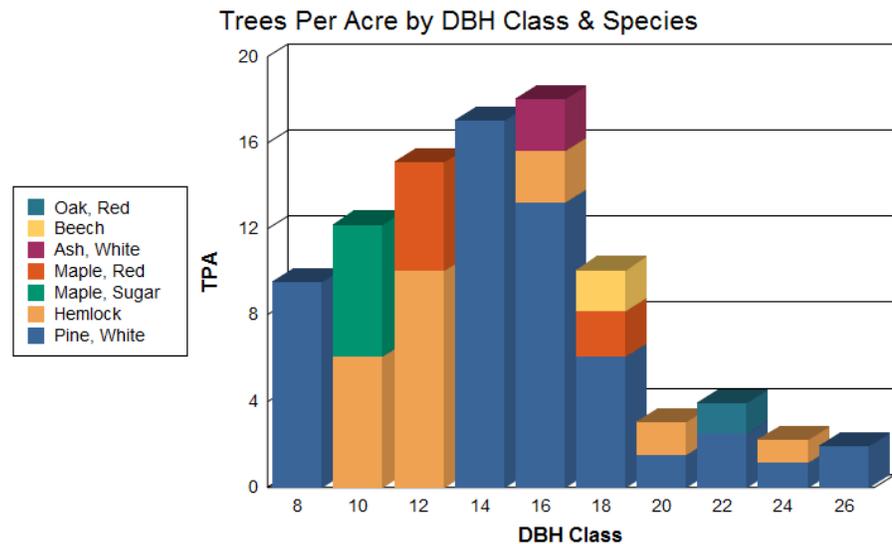
Stand 3

Size: 4 Acres

Forest Type: White Pine Forest

Structure and Composition: This stand is dominated by white pine (76% of the basal area), with hemlock (10%) and red maple (3%) also present. Beech, ash, aspen, red oak and sugar maple are present as minor associates. This is a two-aged stand resulting from field abandonment in the early 1960’s followed by harvesting 10 years ago. The overstory is dominated by declining white pine, with a poor-quality understory of mostly beech.

General Description: Aerial photos from 1942 show this stand as a small open field surrounded by forest. In 1962, it had begun to regenerate, and by 1999 it was entirely forested. The Stand was thinned in the early 2000’s, but the residual trees generally did not respond positively to this work, leading to a declining, low-vigor overstory. The recent treatment also failed to establish a high-quality understory, generating a younger age class almost solely dominated by beech.



Stand Summary: 4 plots, 10 BAF

Total Basal Area/Acre:	106 ft ²
Acceptable Basal Area/Acre:	60 ft ²
Quadratic Mean Stand Diameter:	14 in.
Trees/Acre:	93

Approximate Stand Age: 60/10 years

Stand Health: Some blister rust noted on white pine. Many white pine in the Stand are declining.

Invasive Species: Scattered Japanese barberry, common buckthorn and shrub honeysuckle noted in the center of the Stand.

Soil Types: Belgrade and Eldridge Soils, generally well-drained.

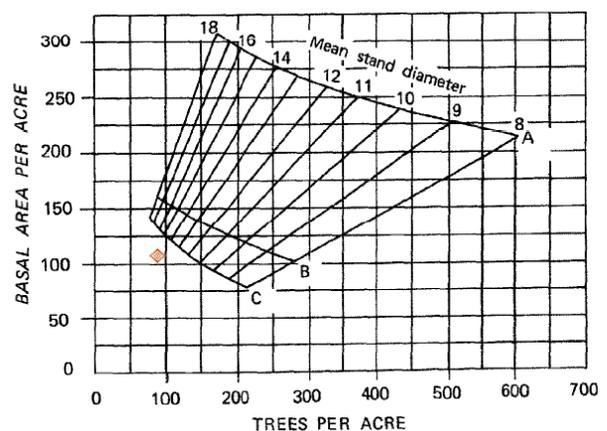


Figure 6: White Pine Stocking Guide. Lancaster, K. F. and Leak, W.B. 1978. Silvicultural Guide for White Pine in the Northeast Gen. Tech. Rep. NE-41.

History/Previous Activity: This Stand was maintained as pasture from the 1800's through the 1960's, at which point it was allowed to succeed to forest. The Stand was last thinned in winter 2008-9. Blowdown occurred in the Stand in 2010 and/or 2012.

Access and Operability: Access to this Stand will be as with Stands 1 and 2. Operability is fair throughout.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

This stand will be managed in partnership with UVM as part of the “Adaptation and Restoration of Northern Forests: Collaborative Management of Forests at Risk Across the Urban to Rural Gradient,” as described in Table 1.

In 2021-22 an irregular group shelterwood treatment should be implemented in this Stand, with a goal of beginning the process of regenerating a new stand in a way that encourages diversity and complexity. Groups up to 1 acre in size, within which all trees will be cut, are to be established, covering about 1/3 of the total acreage of the Stand. These groups will be placed where overstory trees are poorest in quality, or where a pocket of high-quality non-beech regeneration is established. Within groups, individual windfirm trees maybe retained for structural diversity and as a biological legacy and seed source.

The goal of these groups is to regenerate this poor-quality stand to a diverse array of all native species, but especially white pine, hemlock and red oak, while retaining individual windfirm trees and small inclusions of healthy trees, for structural and species diversity. Harvesting will generally seek to lower the abundance of beech due to the effects of beech bark disease, its positive correlation with deer browse and its tendency to create a monoculture in the forest understory. To the extent possible harvests should be timed to occur around oak and pine mast years. 25-35% of the Stand will be regenerated every 10-15 years, until the Stand has been entirely regenerated, with the exception of scattered biological legacy trees and small inclusions of healthy trees.

Between groups a thinning will occur, reducing stocking to 90-100 ft²/acre of basal area by removing poor quality trees of all age classes. This treatment will seek to concentrate growth on trees of superior form, quality and condition, and allow them to increase wind firmness as future biological legacies.

For maximum efficacy, this treatment should be conducted as much as possible in dry months in summer and early fall. Due to restrictions on summer harvesting in the MP, harvesting should occur no sooner than August 1. The portion of the Stand adjacent to a mapped wetland will be buffered, protected and excluded from harvesting as required in the CCF's conservation easement, Vermont AMP's and Vermont Wetland Rules.

Before and/or after harvesting, an additional priority for this stand should be the treatment of invasive exotic plants. The infestation of these species, while lower than adjacent Stands, is at a level that will

likely require the targeted use of herbicide in most areas, and will likely need to be contracted out to an invasive plant removal contractor. If work is to be conducted in mapped wetland areas, a permit from a Vermont wetland ecologist may need to be sought.

For a detailed schedule of the harvest in this Stand, see Stand 2.

Stand 4

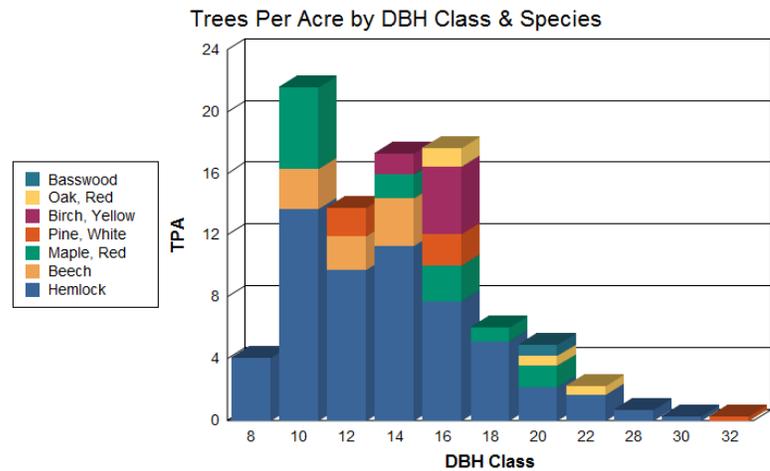
Size: 14 Acres

Forest Type: Hemlock – Northern Hardwoods

Structure and Composition: This is a relatively isolated Stand in the north of the property, featuring a variety of structural conditions, including pockets of multi-aged structure. Stand 4 is primarily dominated by hemlock (59% of the basal area), with red maple (11%), yellow birch (7%), beech (6%), and red oak (4%). White pine and hardwoods are present as minor associates.

General Description: This Stand features some unique conditions, functioning as a relatively protected deer wintering area, which pockets of hardwoods scattered throughout. The Stand has probably been harvested multiple times over the last 70 years, most recently in 2015, in a treatment that removed large pine and hemlock from the overstory and created some pockets of regeneration.

Stand Summary: 5 plots, 10 BAF prism



Total Basal Area/Acre:	110
ft ²	
Acceptable Basal Area/Acre:	80 ft ²
Quadratic Mean Stand Diameter:	14
Trees/Acre	115

Approximate Stand Age: 100/60/5 years

Stand Health: No concerns noted.

Invasive Species: None noted.

Soil Types: Adams and Windsor loamy sands.

History/Previous Activity: This area was probably maintained as open pasture until around 1900. It has probably been harvested multiple times over the last 70 years, most recently in 2015, when large pine and hemlock was removed from the overstory.

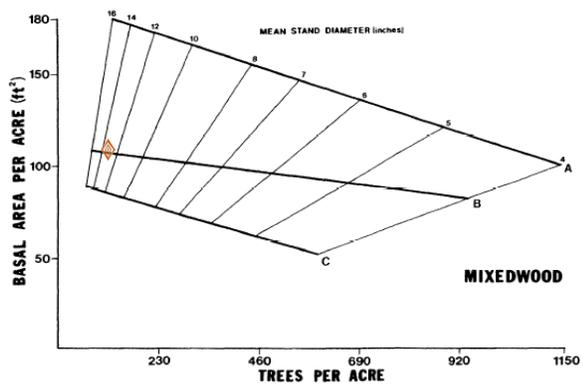


Figure 7.—Stocking guide for main crown canopy of mixedwood stands (25 to 65 percent softwoods) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual stocking, the C line is minimum stocking.

Figure 7: 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.](#)

Access and Operability: Access to this Stand would likely occur via the property of a neighbor to the north. Operability is good throughout.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

This area has special import in its function as a deer wintering area, a function which management should seek to protect and enhance.

Management Activities:

The primary goal of this Stand over the next year will be to continue to provide excellent wildlife habitat and ecosystem services. The possibility of a timber harvest should be reassessed at the time of the next FMP update.

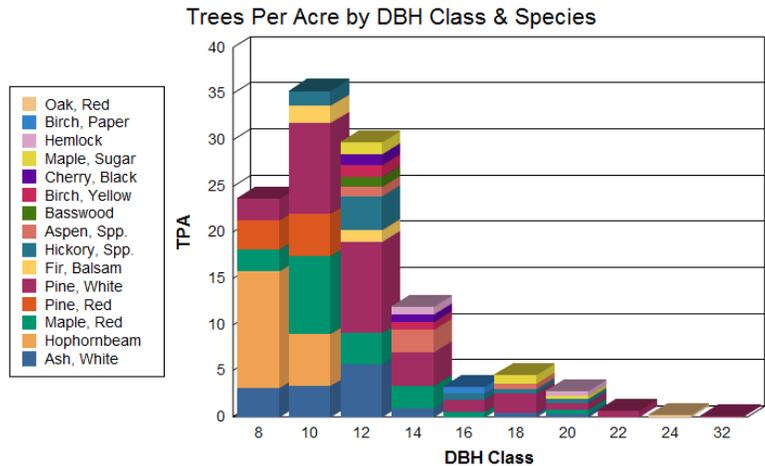
Stand 5

Size: 50 Acres

Forest Type: White Pine-Northern Hardwood

Structure and Composition: Stand 5 is one of the youngest stands in the northern section of the CCF, with all areas 40 – 60 years of age or younger. The Stand is dominated by white pine (26% of the basal area), red maple (12%) and white ash (6%). While strongly even-aged, many areas have a dense understory of buckthorn and other invasive exotic plants.

General Description: Aerial photos from 1942 and 1962 show this Stand as entirely open. It is likely that only in the late 1960’s to 1970’s did the oldest areas of the Stand revert to forest, with some areas not reverting until the 1980’s or 1990’s. This is an even-aged stand, with a generally very poor-quality overstory comprised of weevil and blister-rust afflicted white pine, declining aspen, old Christmas trees, and early successional forest. Many areas of this Stand are densely infested by common buckthorn, shrub honeysuckle and other invasive exotic plants.



Stand Summary: 14 plots, 10 BAF prism

Total Basal Area/Acre:	79 ft ²
Acceptable Basal Area/Acre:	25 ft ²
Quadratic Mean Stand Diameter:	11.4
Trees/Acre	112

Approximate Stand Age: 20-60 years.

Stand Health: Very poor-quality stand overall, dominated by unhealthy and declining trees and invasive exotic plants.

Invasive Species: Dense common buckthorn, shrub honeysuckle and Japanese barberry.

Soil Types: Cabot silt loam, Enosburg and Whatley soils, Duane and Deerfield soils, Munson and Raynham silt loams. Poorly drained in pockets.

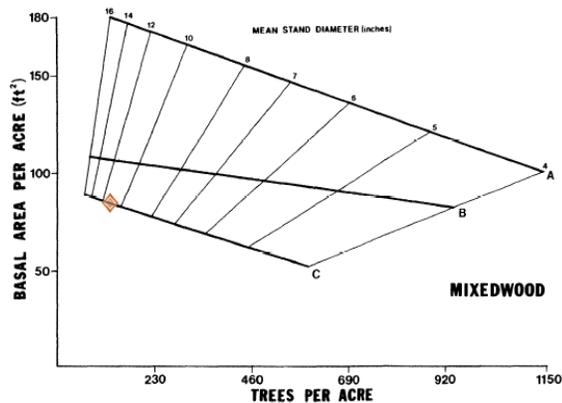


Figure 7.—Stocking guide for main crown canopy of mixedwood stands (25 to 65)
 Figure 8: Mixedwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. *Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.*

History/Previous Activity: This area was maintained as open land until the 1960's or 70's, when it was gradually allowed to revert to forest. No significant forest management has occurred in this Stand.

Access and Operability: Access to this Stand may occur via gravel road leading from the CCF parking area to the open land within the Stand. Operability is fair, with some wet/sensitive areas.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

This Stand is in dire need of drastic management to help it develop into a diverse, healthy forest. At the same time, there is the opportunity to create some wildlife habitat which is underrepresented across our landscape.

In partnership with the U.S. Fish & Wildlife Service's Partners for Fish and Wildlife Program (USFWS), Vermont Fish and Wildlife (VTFW) and Audubon Vermont, creating patch cuts to create young forest habitat is recommended in 2020. 2-3 patch cuts from 2-5 acres in size should be created in this Stand in areas where the overstory and understory stocking are the poorest in quality and condition. Within these patches, all trees will be chipped on site with a "brontosaurus", except for snags, cavity trees, and scattered trees and pockets of trees with wildlife value. This work will be non-commercial, funded by USFWS and perhaps VTFW. Following the treatment, patches will be allowed to regenerate for a season or two and then invasives will be treated with a foliar spray of herbicide, also by USFWS. This treatment may need to be repeated at least one additional time to ensure that invasives are not allowed to dominate the young, regenerating patches.

On the edge of fields and open areas in the southwest of the property, several areas will be managed for golden-winged warbler, a migratory songbird of concern in Vermont, by using the brontosaurus to create and perpetuate small pockets of shrubland habitat, and by treating invasive plants with herbicide using cut-stump and foliar application methods. This work will also be non-commercial, funded by USFWS and perhaps VTFW, and supported by USFWS, VTFW and Audubon Vermont.

Between patches, it is strongly recommended that invasive species control occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work should first focus on large, seed-bearing individuals and then proceed to interior forest areas. Depending on the extent of the Town's investment, this work will likely need to occur for several years, at least, before the species are under control in this Stand. Funding for this work could come from town conservation funds and/or from timber sale revenues from the work prescribed in other Stands.

Patch cuts may not be implemented in the mapped Vernal Pool Secondary Zone EPZ in this Stand. All work near mapped WPZ's must comply with Vermont Wetland Rules, Vermont AMP's and the CCF's conservation easement. In some areas, a permit may need to be obtained from a state wetland ecologist to apply herbicide within or near a mapped WPZ.

No grinding work may occur between April 1 and August 1 of any year, in accordance with rules in the CCF MP for songbird nesting.

Stand 6

Size: 28 acres

Forest Type: White Pine – Northern Hardwood Forest

Structure & Composition: This stand is dominated by red maple (28% of the stocking by basal area). White pine (18%), bitternut hickory (10%), hemlock (8%), and white ash (8%). Other northern hardwoods are present as associates. This is a generally two-aged forest, with some pockets of multi-aged forest similar to Stand 2.

General Description: This is a variable quality, relatively diverse even-aged Stand. While it was forested in the 1942 aerial photo of the CCF, it is likely that this stand was only allowed to revert to forest in the 1930's. The Stand is similar to Stand 7 in that it was recently harvested in an operation that primarily removed large trees, in this case white ash, red oak, and white pine. Like Stand 7, the result of this was the structural simplification of the Stand, releasing a midstory of variable quality but creating some pockets of regeneration. Unlike Stand 7, this treatment was applied to single trees and small groups of trees, rather than to the entire Stand, so some of the structural complexity in stand 6 was retained.

Stand Summary: 8 plots, 10 BAF prism

Total Basal Area/Acre:	80 ft ²
Acceptable Basal Area/Acre:	65 ft ²
Quadratic Mean Stand Diameter:	13
Trees/Acre	87

Approximate Stand Age: 90/70/5 years

Stand Health: Scattered invasive plants, white pine weevil and blister rust on white pine.

Invasive Species: Scattered shrub honeysuckle, common buckthorn and Japanese barberry.

Soil Types: Cabot silt loam. Somewhat poorly drained in most areas.

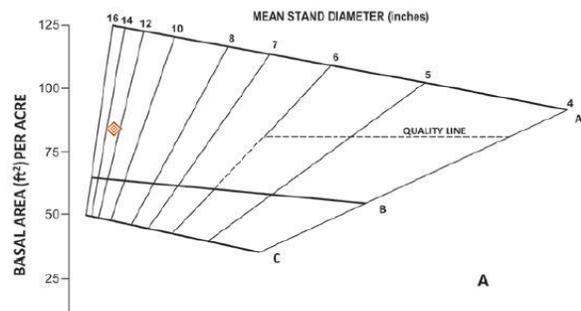
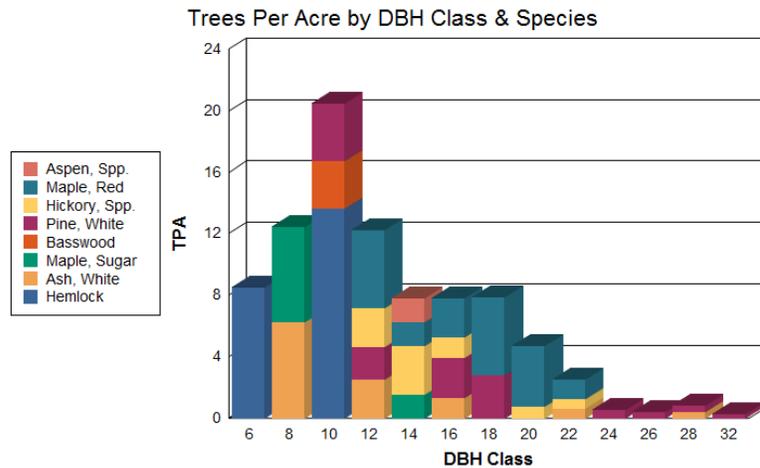


Figure 9: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.](#)

History/Previous Activity: Since being allowed to revert to forest in the early 1900's, Stand 6 has been harvested multiple times, probably pre-commercially and then commercially in the 1970's and 1980's. It was lightly harvested in 2015 in a single tree/group selection treatment targeting large trees.

Access and Operability: Access to this Stand will occur as with Stands 1-3 and 5. Operability may be challenged by very wet ground in a few places, which may necessitate winter harvesting.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

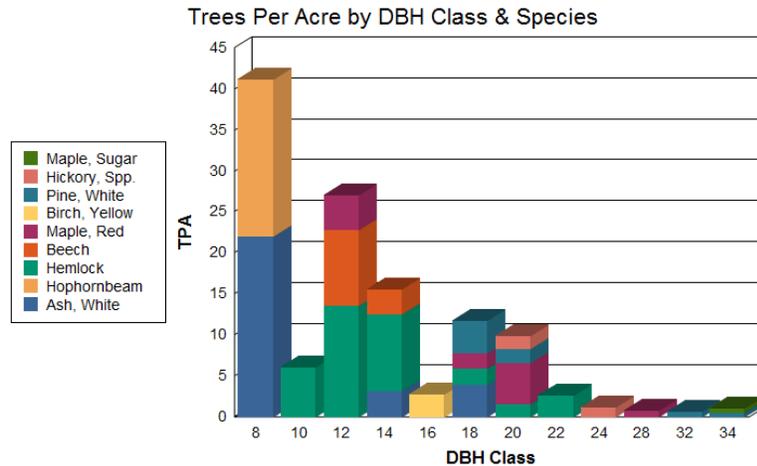
The only activity prescribed in the Stand over the next 10 years is invasive species control. This work should occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from timber sale revenues from other Stands.

Stand 7

Size: 13 Acres

Forest Type: Hemlock – Northern Hardwood Forest

Structure & Composition: This is a generally 2-aged Stand, with a young cohort resulting from a harvest in 2015. Hemlock accounts for 37% of the total basal area in the stand, followed by red maple (20%), white pine (17%), white ash (17%) and beech (10%). A variety of other northern hardwoods were also noted during the field inventory.



General Description: Prior to the 2015 harvest in this Stand, Stand 7 probably resembled Stand 2 in many ways, with a multi-aged structure punctuated by large super-dominant overstory white pine. However, harvesting in 2015 removed virtually all white pine from the stand, releasing a hemlock-hardwood midstory of variable, and somewhat poor overall, health and condition. The harvest also created some understory regeneration throughout the Stand.

Stand Summary: 3 plots, 10 BAF prism

Total Basal Area/Acre:	100 ft ²
Acceptable Basal Area/Acre:	72 ft ²
Quadratic Mean Stand Diameter:	13 in.
Trees/Acre:	121

Approximate Stand Age: 60-80 years/5 years

Stand Health: Many overstory trees released in the 2015 harvest appear to be responding poorly to the treatment.

Invasive Species: Common buckthorn, shrub honeysuckle, Japanese barberry scattered throughout, especially barberry.

Soil Types: Cabot silt loam, Belgrade and Eldridge soils.

History/Previous Activity: This area was allowed to revert to forest around 1900. As a result of multiple harvests, most recently a group selection treatment in 2008-9, the Stand developed a multi-aged structure.

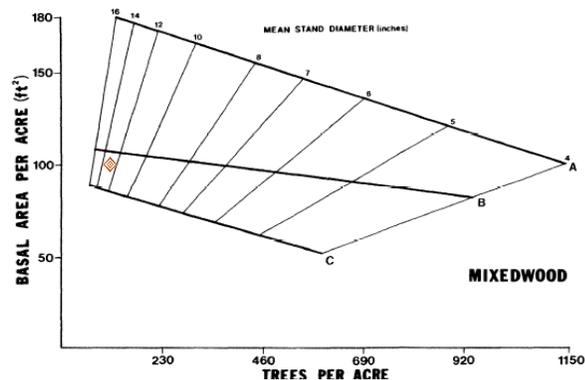


Figure 10: Mixedwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.](#)

The most recent (2015) harvest of the property removed nearly all large white pine from the stand, reverting the Stand to a 2-aged structure.

Access and Operability: This stand is wet in places and should only be operated in the winter or with very dry summer conditions.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship. This area will particularly serve as a valuable demonstration area, as a counterpoint to Stand 2.

Management Activities:

No commercial harvesting of trees is prescribed in Stand 7 over the next 10 years. This Stand is an excellent demonstration of what not to do when managing for a diverse, resilient forest, and as such should be used as a counterpoint to Stand 2; because both of these Stands were very similar prior to 2015, they provide an excellent contrast to each other that will highlight the importance of encouraging diversity in forested stands, such as is being done in Stand 2.

The only activity prescribed in the Stand over the next 10 years is invasive species control. This work should occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from timber sale revenues from other Stands.

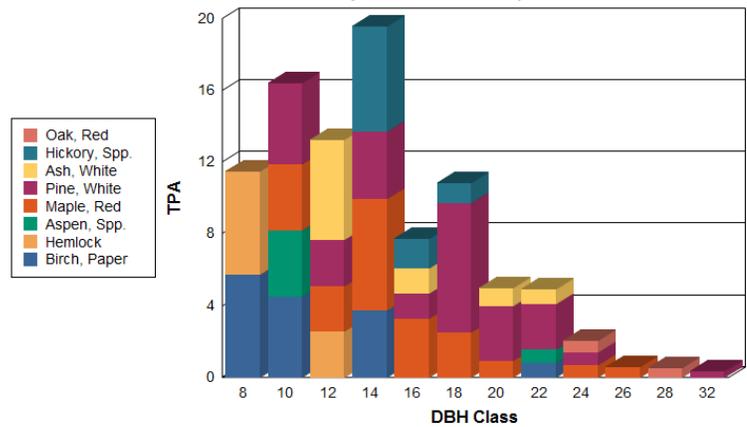
Stand 8

Size: 25 Acres

Forest Type: White Pine – Northern Hardwood Forest

Structure & Composition: This is a two to three-aged Stand located in the northeastern corner of the CCF. The dominant cohort is comprised mostly of white pine (36% of the stocking by basal area), in addition to red maple (23%), and bitternut hickory, paper birch and white ash (10% each). Hemlock, red oak and other hardwoods are present as minor associates.

Trees Per Acre by DBH Class & Species



General Description: Stand 8 is very similar to Stand 6, except for soils (Stand 8 is located on bedrock-derived soils above 600’ASL) and harvesting history. Due to a history of active management, this Stand features multiple age classes, including a dense understory dominated by hemlock in places. The overstory is comprised of pockets of white pine of variable, sometimes very good, quality and condition, red oak and other hardwoods of variable quality.

Stand Summary: 4 plots, 10 BAF prism

Total Basal Area/Acre:	104 ft ²
Acceptable Basal Area/Acre:	90 ft ²
Quadratic Mean Stand Diameter:	14.3 in.
Trees/Acre:	93

Approximate Stand Age: 90/70/30 years

Stand Health: Scattered blister rust and white pine weevil damage. Invasive species are becoming established in the Stand and deer browse damage is prominent.

Invasive Species: Scattered honeysuckle and Japanese barberry were noted throughout this Stand, especially on the boundary with Stands 6 and 9.

Soil Types: Lyman-Marlow complex, Peru fine sandy loam.

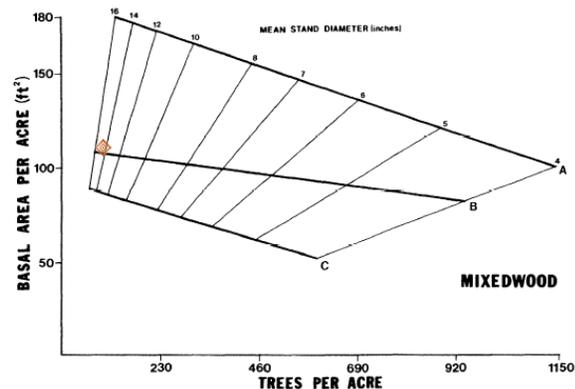


Figure 7.—Stocking guide for main crown canopy of mixedwood stands (25 to 65 percent softwoods) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual stocking, the C line is minimum stocking.

Figure 11: 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.

History/Previous Activity: This area was allowed to revert from pasture in the early 1900's, probably around the 1930's. Field evidence suggests that it was harvested around the 1960's, and perhaps in the early 1990's. Landowner records say that portions of the stand were treated with a group selection treatment in 2008-9.

Access and Operability: This stand is accessed by the CCF parking area, as described in Stands 1-7, or by a landing along Governor Chittenden Road in the south of Stand 10. There are some areas with thin or wet soils throughout stand 8, but in general operability is good.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

A single tree/group selection treatment is recommended to occur in this Stand in 2026. This treatment will remove all overstory trees in groups up to 1 acre in size, targeting mature and declining white pine and hardwoods, and areas with high-quality established young trees. The goal of this treatment will be to enhance the structure of this Stand by releasing its dense understory, and also to establish new pockets of regeneration. Groups should be placed to maximize diversity and complexity within the Stand, but will try to be placed around or next to red oak seed trees. These groups will cover up to 20% of the Stand area.

The goal of these groups is to establish new regeneration of all native species, but to the extent possible harvesting should be timed to occur around oak mast years to attempt to recruit this species.

Between patches, individual poor-quality trees of all species and age classes may be harvested to encourage the growth of the healthiest stems in the Stand and to release small pockets of established, healthy immature stems and regeneration. Basal area between patches should be reduced to no less than 85 ft²/acre.

This Stand may be operated in summer or winter months. Summer harvesting is preferred to favor oak regeneration, although it may not happen before August 1 of any year.

Before harvesting, invasive species control should occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from timber sale revenues from the work prescribed in other Stands.

A detailed schedule for this forest management will be established closer to the harvest date.

Stand 9

Size: 24 Acres

Forest Type: Red Oak – Northern Hardwood Forest

Structure and Composition: This stand is dominated by bitternut hickory (25% of the basal area), with white ash (18%), sugar maple (16%), red maple (14%), white pine (10%), hemlock (8%) and beech (6%) present to lesser degrees. This is a relatively even-aged forested comprised of a mix of hardwoods, but dominated in character by red oak and other dry/acidic site species.

General Description: Aerial photos from 1942 show parts of this stand in a state of partial regeneration, with some areas still relatively open. By 1962, the Stand was completely forested. For the most part this is a thin-soiled ridgetop hardwood stand with site indicators suggesting that it is a good site for growing red oak, beech and hemlock, but is not currently dominated by these species. Deer browse damage in the understory is inhibiting the ability of many species, but especially red oak, to become established in the Stand. There are a couple pockets of variable-quality white pine in southern portions of the Stand.

Stand Summary: 5 plots, 10 BAF

Total Basal Area/Acre:	102 ft ²
Acceptable Basal Area/Acre:	84 ft ²
Quadratic Mean Stand Diameter:	13 in.
Trees/Acre:	100

Approximate Stand Age: 70 years

Stand Health: Severe deer browse damage in the understory of this stand.

Invasive Species: Scattered shrub honeysuckle noted throughout western portions of the Stand.

Soil Types: Lyman- Marlow complex.

History/Previous Activity: This Stand was allowed to succeed to forest in the early 1900's, probably between the 1920's and 1950's. Field evidence suggests that portions of this Stand may have been

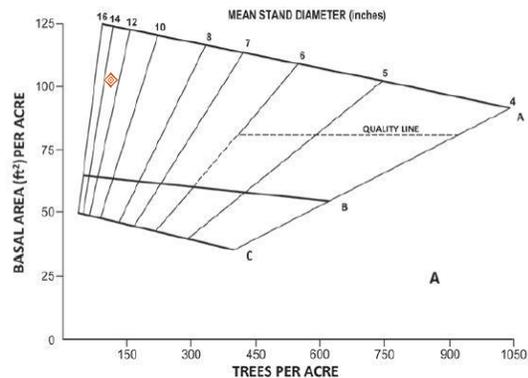
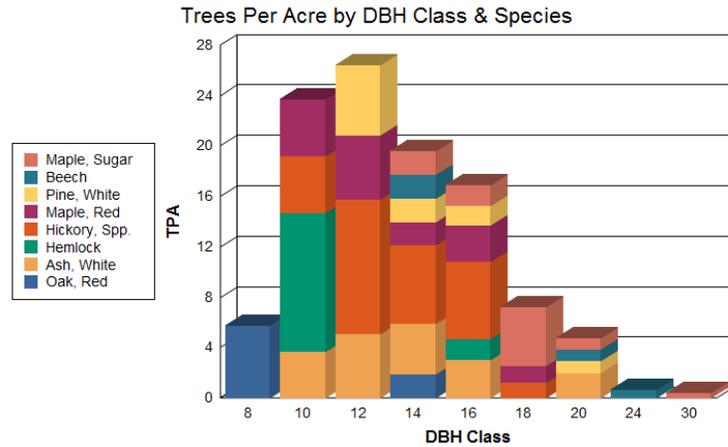


Figure 12: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.

harvested heavily some time in the mid-late 1900's, and western areas received some limited harvesting in 2008-9.

Access and Operability: While access to this Stand via the CCF's parking area is possible, access to this Stand will preferably occur via a landing in the south of Stand 10, along Governor Chittenden Road. In order to use a historic access route in that location, permission would need to be granted by the neighbor to the west of Stand 10, across whose property the beginning of this road passes. The road would then need to be improved and a landing cleared near the southeast corner of the Stand.

Operability is good throughout this Stand, though some areas have thin/sensitive soils, and southern portions of the Stand are steep. Very steep areas should be excluded from harvesting to avoid soil impacts and loss.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

A single tree/group selection treatment is recommended to occur in this Stand in 2026. This treatment will remove all overstory trees in groups up to 1 acre in size, targeting mature and declining white pine and hardwoods, and areas with high-quality established regeneration. The goal of this treatment will be to enhance the structure of this Stand by releasing existing regeneration and understory trees, and also establishing new pockets of regeneration. Groups of a variety of shapes and sizes should be placed to maximize diversity and complexity within the Stand, but should be preferentially placed around or next to red oak seed trees. These groups will cover up to 20% of the Stand area.

Between patches, individual poor-quality trees of all species and age classes may be harvested to encourage the growth of the healthiest stems in the Stand and to release small pockets of established, healthy immature stems and regeneration. Basal area between patches should be reduced to no less than 85 ft²/acre.

The goal of groups in this Stand is to establish new regeneration of all native species, but to the extent possible harvesting should be timed to occur around red oak mast years to attempt to recruit this species. This Stand should be preferentially harvested in summer/fall to increase efficacy of recruiting red oak regeneration. In any case no harvesting may occur between April 1 and August 1.

Before harvesting, invasive species control should occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from timber sale revenues from the work prescribed in other Stands.

“Indian Lookout” is an important scenic vista located in the east of this Stand. The maintenance of this view by periodically cutting or topping several trees is permitted, provided it is done minimally and without causing erosion.

Stand 10

Size: 17 Acres

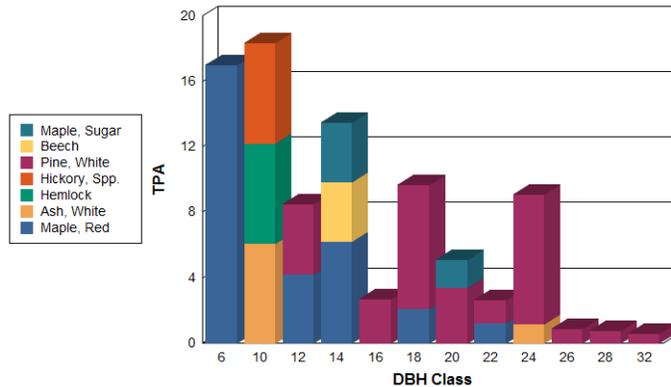
Forest Type: White Pine – Northern Hardwoods

Structure and Composition: Stand 10 is primarily dominated by white pine (60 % of the basal area), white ash and sugar maple (7% each). Hemlock, red oak and other hardwoods are present as associates. This is a two-aged stand with some areas dominated by white pine and others by red oak and associated hardwoods.

General Description: Aerial photos from 1942 show this stand as about 60% open, with a barn or homestead in the west of the Stand. Aerial photos from 1962 show that this Stand had apparently fully reverted to forest by that time. On the ground, the stand is a mix of two-aged hardwoods and two-aged white pine overtopping young hardwoods.

Stand Summary: 3 plots, 10 BAF prism

Trees Per Acre by DBH Class & Species



Total Basal Area/Acre:	107 ft ²
Acceptable Basal Area/Acre:	86 ft ²
Quadratic Mean Stand Diameter:	15
Trees/Acre	101

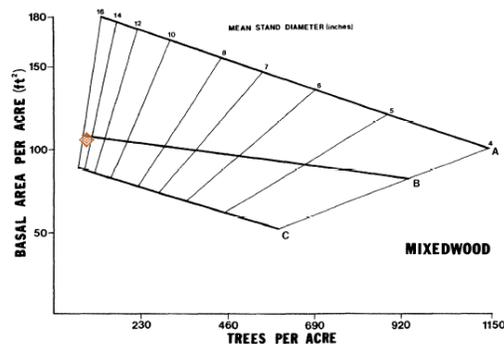


Figure 7.—Stocking guide for main crown canopy of mixedwood stands (25 to 65 percent softwoods) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual stocking, the C line is minimum stocking

Figure 13: 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.*

Approximate Stand Age: 70-80 years

Stand Health: Scattered white pine blister rust and weevil damage, deer browse damage throughout.

Invasive Species: Scattered shrub honeysuckle.

Soil Types: Marlow fine sandy loam.

History/Previous Activity: This area was generally maintained as open pasture until the early 1900’s, when it was allowed to revert to forest. Some areas were not allowed to revert back to forest until the 1940’s or early 1950’s. Field evidence suggest it was harvested in the 1990’s or early 2000’s.

Access and Operability: Access to this Stand may occur from a landing on Governor Chittenden Road in the south of the Stand, with considerations as described in the Stand 9 section, above. Some portions of this Stand are very steep.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

A single tree/group selection treatment is recommended to occur in this Stand in 2026. This treatment will remove all overstory trees in groups up to 1 acre in size, targeting mature and declining white pine and hardwoods, and areas with high-quality established regeneration. The goal of this treatment will be to enhance the structure of this Stand by releasing existing understory stems and establishing new pockets of regeneration. Groups should be placed to maximize diversity and complexity within the Stand. These groups will cover up to 20% of the Stand area.

Between patches, individual poor-quality trees of all species and age classes may be harvested to encourage the growth of the healthiest stems in the Stand and to release small pockets of established, healthy immature stems and regeneration. Basal area between patches should be reduced to no less than 85 ft²/acre.

The goal of groups in this Stand is to establish new regeneration of all native species, but to the extent possible harvesting should be timed to occur around red oak and white pine mast years to attempt to recruit these species. Summer harvesting is will also increase recruitment of these species, although it may not happen before August 1 of any year.

Before harvesting, invasive species control should occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from timber sale revenues from the work prescribed in other Stands.

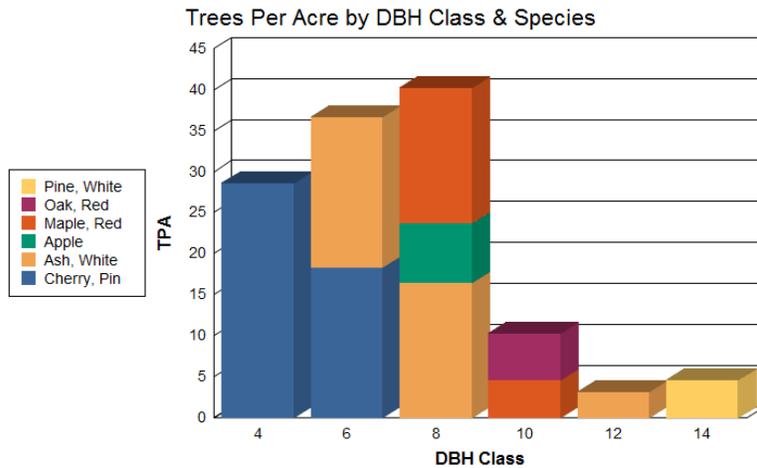
A detailed schedule for this forest management will be established closer to the harvest date.

Stand 11

Size: 15 Acres

Forest Type: Early Successional

Structure and Composition: This stand is one of the youngest on the property, an even aged stand comprised of a mix of hardwood, and some pine, poles. It is primarily dominated by white ash (31% of the basal area), with red maple (23%), black cherry (16%), white pine (16%), and red oak (8%). Other hardwoods, invasive plants, apple and hawthorn trees are also present in the Stand. This Stand is young and immature enough that a sizable portion of the composition was in trees too small to be captured here (<4" DBH).



General Description: This is a young forest Stand, allowed to revert to forest in the last 20 years – aerial photos from 1999 still show this area as somewhat open. It contains pockets of larger hardwood and white pine poles, but also areas still in an early successional/shrubland condition and dominated by species like nannyberry and graystem dogwood. Common buckthorn, shrub honeysuckle and Japanese barberry are present throughout the Stand, in a fairly dense, severe infestation.

Stand Summary: 4 plots, 10 BAF prism

Total Basal Area/Acre:	32.5 ft ²
Acceptable Basal Area/Acre:	30 ft ²
Quadratic Mean Stand Diameter:	6.9
Trees/Acre	124

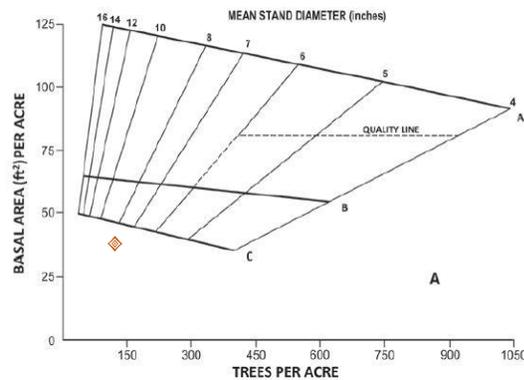


Figure 14: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. *Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.*

Approximate Stand Age: 20 years.

Stand Health: Stand health overall is variable, with the biggest issue coming from invasive plants.

Invasive Species: Dense infestation, especially of common buckthorn and shrub honeysuckle.

Soil Types: Peru fine sandy loam, Lyman Marlow complex.

History/Previous Activity: This area was probably maintained as open pasture until the early 2000's, when it was allowed to revert to forest.

Access and Operability: Access may occur via the hayfield access road connecting to Governor Chittenden Road to the northeast of the Stand. Pockets of the Stand are slightly wet.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

In partnership with the U.S. Fish & Wildlife Service's Partners for Fish and Wildlife Program, Vermont Fish and Wildlife and Audubon Vermont, management for golden-winged warbler, a migratory songbird of concern in Vermont, is recommended in 2020. This will be accomplished by using a "brontosaurus" to create and re-establish small pockets of shrubland habitat throughout the Stand, and by treating invasive plants with herbicide using cut-stump and foliar application methods. This work will also be non-commercial and funded by USFWS.

Throughout this Stand, it is strongly recommended that invasive species control occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work should first focus on large, seed bearing individuals and then proceed to cleaning interior forest areas of invasive exotic plants. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from Timber sale revenues from the work prescribed in other Stands.

If possible, apple and hawthorn trees in this stand should be released and pruned to bear fruit for wildlife. This work can easily be done by volunteers.

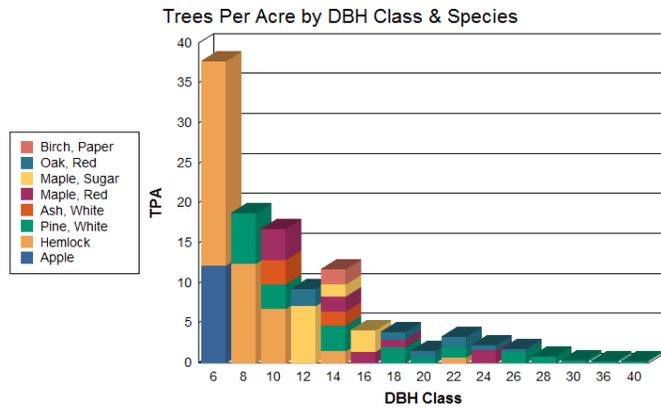
Stand 12

Size: 18 acres

Forest Type: Hemlock – Northern Hardwood Forest

Structure & Composition: This stand is dominated by white pine (34% of the stocking by basal area), hemlock (18%), red maple and red oak (14% each) and sugar maple (12%). White ash, paper birch, apple and other hardwood species are also present as minor associates. This Stand is comprised of two somewhat distinct areas, featuring different structural and compositional attributes.

General Description: The eastern portion of this Stand is dominated by white pine, with some pockets of hemlock. This area was salvaged in 2008, and apparently again following the 2010 or 2012 windstorms, leaving a two-aged Stand with pockets of dense regeneration, and some dense invasives. The western portion of the stand is dominated by large red oak, and was less effected by the recent windstorms. Between these two areas is a small historic orchard, located along the CCF’s southern boundary.



Stand Summary: 6 plots, 10 BAF prism

Total Basal Area/Acre:	83 ft ²
Acceptable Basal Area/Acre:	70 ft ²
Quadratic Mean Stand Diameter:	12
Trees/Acre	112.5

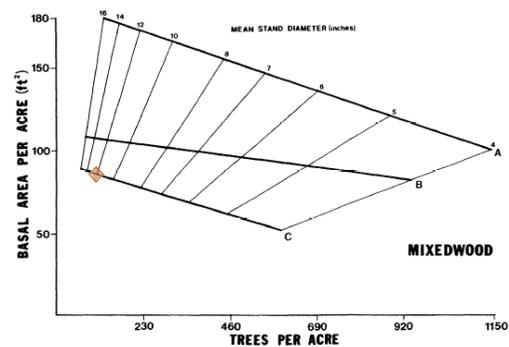


Figure 7 —Stocking guide for main crown canopy of mixedwood stands (25 to 65 percent softwoods) shows basal area and number of trees per acre and quadratic mean stand diameter. The A line is fully stocked, the B line is suggested residual stocking, the C line is minimum stocking.

Figure 15: 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.](#)

Approximate Stand Age: 70-100 years

Stand Health: Scattered white pine weevil and blister rust issues.

Invasive Species: Dense pockets of honeysuckle in the east of the Stand. Honeysuckle, buckthorn and Japanese barberry located on the edges of the entire Stand. The largest Japanese barberry bush in the world is located just to the northwest of the Stand, in the open land.

Soil Types: Lyman-Marlow complex, Peru fine sandy loam, Adams and Windsor loamy sand.

History/Previous Activity: Aerial photos show this Stand as forested in 1942, though portions of the Stand may have been under management as a forested pasture. A small area in the south of the Stand appears to have been managed as an orchard. It was probably harvested in the 1990’s, and portions of the Stand were salvaged 6-8 years ago.

Access and Operability: Access to this Stand will occur across the hayfield. With a landing in the open land somewhere to the north of the Stand boundary. This landing will also afford access to the adjacent Talcott Forest, owned by UVM, for the purpose of climate adaptation research as described elsewhere in this FMP. Operability within the stand is good, although there are pockets of steep ground and thin soils.

Management Objectives:

The primary objective for management of this area is the encouragement of a healthy, diverse, resilient forest, including the establishment and maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the encouragement of carbon sequestration and storage and the maintenance of natural stand dynamics and ecosystem processes. Also of high importance is the sustained production of local renewable forest resources, the continued use of this area for dispersed recreation, the protection of water resources, and the use of this area as a site to demonstrate responsible forest stewardship.

Management Activities:

This stand will primarily be managed for wildlife habitat, with little active management at present. Harvesting is prescribed on the adjacent Talcott Forest in 2021-22, at which point a landing will be established to the north of the Stand in the open land. At this time a temporary agreement shall be struck with the University of Vermont to transfer liability to them and to their logging contractor. The Town of Williston may also ask for a “performance deposit,” which may be held until the completion of the harvest to ensure that the landing and trails on the CCF are adequately restored.

Throughout this Stand, including on field edges, it is strongly recommended that invasive species control occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work should first focus on large, seed bearing individuals and then proceed to cleaning interior forest areas of invasive exotic plants. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from timber sale revenues from the work prescribed in other Stands.

Apple trees in the Stand should be released and pruned for wildlife. This may be done in conjunction with the work on Talcott Forest in 2021, or by volunteers any time over the next 10 years. Oak “crop trees” throughout the Stand should also be released on 2-3 sides by volunteers or in 2021 to increase acorn production. This latter treatment should be very light, occurring wherever high-quality oak crop trees are present, as defined by healthy oak trees in dominant and co-dominant canopy positions.

Stand 13

Size: 12 acres

Forest Type: Early Successional/Christmas Tree Plantation

Structure & Composition: This stand is dominated by balsam fir (46% of the stocking by basal area), white spruce (27%), and red maple (14%). A variety of other hardwoods, white pine, and conifers are also present in the Stand. This stand is a mix of a variety of conifer plantations planted in the 1980's, mixed with partially-regenerating fields in a shrubland/open condition.

General Description: Stand 13 is perhaps the strangest area in the CCF, the site of plantations of a variety of native and exotic conifers planted in the 1980's for Christmas trees.

Interspersed with these are areas in a shrubland or semi-open condition, areas densely infested by invasive plants and areas that have partially regenerated into native tree species. Most areas of the Stand feature trees in very poor or somewhat poor condition, although the presence of species like balsam fir, and shrubland habitat, presents some novel conditions for wildlife.

Stand Summary: 5 plots, 10 BAF prism

Total Basal Area/Acre:	82 ft ²
Acceptable Basal Area/Acre:	60 ft ²
Quadratic Mean Stand Diameter:	7.8
Trees/Acre	248

Approximate Stand Age: 20-40 years

Stand Health: Conifer plantations are in variable condition, with Scotch pine declining rapidly, but pockets of fir and spruce generally doing well. and declining rapidly. The extent of invasive plant infestation in this stand is extremely troubling.

Invasive Species: Shrub honeysuckle, common buckthorn and multiflora rose scattered throughout the Stand, and dense in many areas.

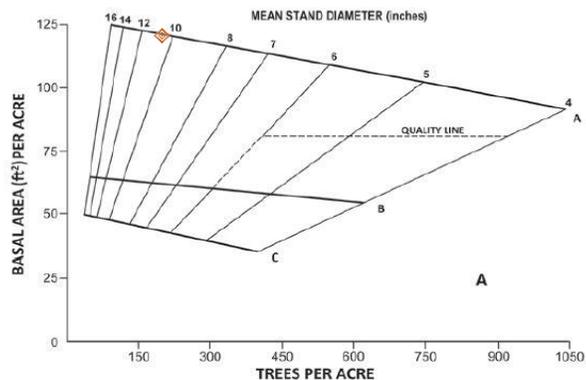
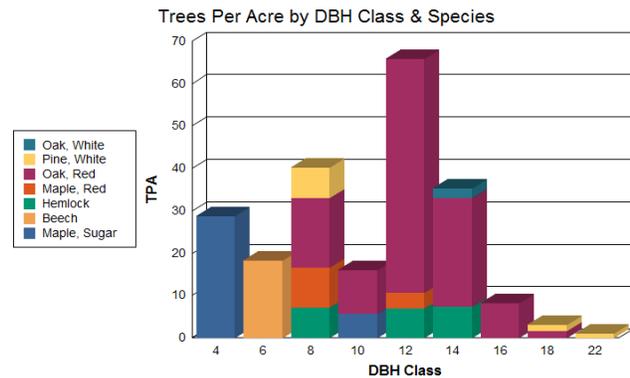


Figure 16: Hardwood Stocking Guide. Leak, W.B., Yamasaki, Y., and R. Holleran. 2014. [Silvicultural Guide for Northern Hardwoods in the Northeast Gen. Tech. Rep. NRS-132.](#)

Soil Types: Cabot silt loam, Enosburg and Whatley soils.

History/Previous Activity: This Stand was maintained as pasture until the 1980's, when it was planted with Christmas Trees. In some areas the trees were thinned or harvested, but it was largely allowed to go without management for the last 20 years.

Access and Operability: Access to this Stand will occur via the gravel road extending northward from the CCF parking area. The Stand is very wet and borders mapped WPZ's, and so any management must take great care to avoid soil disturbance and follow WPZ rules in the CCF's conservation easement, and Vermont wetland rules.

Management Objectives:

The primary objective for management of this area is the establishment and the maintenance of structural and species diversity, the maintenance of high-quality wildlife habitat, the sustained production of forest products using low-impact logging techniques, and the use of this area for dispersed recreation.

The use of uneven-aged management techniques will transition this stand over time to a condition which is rich in species diversity, structural diversity, and well-stocked with high-quality timber. This is a condition which is the most beneficial to forest health, wildlife habitat, and the sustained production of high-quality forest products.

Management Activities:

In partnership with the U.S. Fish & Wildlife Service's Partners for Fish and Wildlife Program, Vermont Fish and Wildlife and Audubon Vermont, management for golden-winged warbler, a migratory songbird of concern in Vermont, is recommended in 2020. This will be accomplished by using a "brontosaurus" to create and re-establish small pockets of shrubland habitat throughout the Stand, and by treating invasive plants with herbicide using cut-stump and foliar application methods. This work will also be non-commercial and funded by USFWS.

Throughout this Stand, it is strongly recommended that invasive species control occur using both cut-stump and foliar applications of herbicide to the extent that the Town can afford to. This work should first focus on large, seed bearing individuals and then proceed to cleaning all areas of invasive exotic plants. This work will likely need to occur for several years before the species are under control. Funding for this work could come from town conservation funds and/or from timber sale revenues from the work prescribed in other Stands.

All work near mapped WPZ's must comply with Vermont Wetland Rules, Vermont AMP's and the CCF's conservation easement. In some areas, a permit may need to be obtained from a state wetland ecologist to apply herbicide within or near a mapped WPZ.

Schedule of Management Activities

(Timing of specific activities may be shifted)

Stand	Activity	Scheduled Year	Priority	Cost	Funding Source/Partners
All Stands	Invasive species removal	Ongoing (beginning in 2020)	1	Variable	CCF budget, Williston conservation fund timber sale revenue.
All	Monitor for invasive species	Annually	1	None	Volunteers, service learning projects (UVM), Williston Master Naturalist Program
Stand 5	Patch Cuts, golden-wing warbler habitat	2020	1	None	Partners for Fish and Wildlife (US Fish and Wildlife Service), Vermont Fish and Wildlife, Audubon Vermont
Stands 11 and 13, and open meadow areas	Golden-winged warbler habitat management	2020	1	None	Partners for Fish and Wildlife, Vermont Fish and Wildlife, Audubon Vermont
Stand 5, 11, and 13	Invasive treatment follow-up from 2020 treatment	2021-22	1	None	Partners for Fish and Wildlife
Stands 2 and 3	Make plan to minimize impacts to recreational usage/trails with Catamount Family Outdoor Center	2020-21	2	None	County Forester/Catamount Family Outdoor Center staff/board
Stand 2	Single Tree/Group Selection – as part of <u>“Adaptation and Restoration of Northern Forests: Collaborative Management of Forests at Risk Across the Urban to Rural Gradient.”</u>	2021-22	2	None (revenue positive)	County Forester, UVM
Stand 3	Irregular Group Shelterwood – as part of <u>“Adaptation and Restoration of</u>	2021-22	2	None (revenue positive)	County Forester, UVM

	<u>Northern Forests: Collaborative Management of Forests at Risk Across the Urban to Rural Gradient.</u>				
Stand 10	Investigate potential landing in southwest of Stand	2025	2	None (revenue positive)	County Forester
Stands 8-10	Make plan to minimize impacts to recreational usage/trails with Catamount Family Outdoor Center	2025	2	None	County Forester/Catamount Family Outdoor Center staff/board
Stands 8-10	Single Tree/Group Selection	2026	2	None (revenue positive)	County Forester
Vernal Pool	Ongoing monitoring	Ongoing	3	None	VLT/FEMC
All	Monitor deer browse impacts	Ongoing	3	None	Volunteers/FPR Grant, UVM students, Williston Master Naturalists
All	Boundary line maintenance	Ongoing	3	Approx. \$120 - \$150 (paint)	Volunteers

Works Referenced

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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.

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.