## Plan Purpose and Organization

This plan provides forest management advice and meets planning and silvicultural standards of the Vermont Department of Forest Parks and Recreation, required for Use Value Program eligibility. The Plan describes each forest stand and past management, and makes recommendations for future management.

## Property Description

The property consists of 399.5 acres in the town of Marlboro. Forest vegetation covers 196.44 acres, a wetland occupies 1.6 acres, 2.96 acres are kept open, and 190.5 acres are excluded from Use Value.

The School Property Account Number (SPAN) is 378-117-10341.

## Access to the Forest and Limits to Operations

South Road divides the property and provides the main points of access. An extensive network of wood roads and recreational trails provides access to the remaining woodlands.

## Methods and Definitions

### Stand Boundaries

The plan bases forest stands on species composition, presence or absence of regeneration, tree age, stocking levels, past management, and intended management. Stand boundaries were identified and mapped from aerial photographs using Geographical Information System (GIS), Global Positioning System (GPS), and field observations.

Clear differences in the vegetation may not appear along the mapped stand boundaries. Often, the change in vegetation characteristics between stands occurs gradually. Boundaries have been mapped in areas of transition within the vegetation, that over distance separate distinct types.

### Sampling

Stand data was sampled at systematically located prism points. At each point, species, diameter and acceptability rating were recorded for each sampled tree. For each stand, average tree age, stand pathology, height of dominant trees, presence of sapling and seedling regeneration, elements of forest history, and ease of access were noted.

### Site Classes

The Use Value program recognizes 4 soil productivity classes, based on the SCS soil survey. Site 1 soils have the greatest productivity, site 4 the least. All soils within the property have site 1, 2, or 4 potential for timber growth.

### Stocking

Stocking levels have been determined from USFS stocking guides: A is overstocked, B is adequately stocked, and C is under stocked for optimal future growth.

### Acceptability as Future Growing Stock

Landowner management goals and tree condition determine the acceptability of specific trees as future growing stock. For timber management, the Plan defines acceptable growing stock as hardwood trees with the potential to yield 16 linear feet of 2 sawlogs with one or more clear faces and softwoods with the potential to yield 32 linear feet of sawlogs.

**Management Recommendations**

Species and site capabilities, stocking levels, stand quality, regeneration and tree age, as well as landowner goals and values serve as the basis for management recommendations.

Commercial operations usually serve as the means to accomplish silvicultural objectives. The dates recommended for harvests represent the ideal time to carry out operations based on forest present condition. However, those dates may not coincide with future favorable market or ecological conditions. When desirable from those perspectives, management should allow alteration of the operation.

## Silvicultural Systems

Silvicultural systems have 2 primary objectives: the first, management of the stand to produce desired products or benefits; the second, securing desirable regeneration at the appropriate time or times. Successful management requires the attainment of both these goals. Throughout the course of management, even if the time of stand regeneration lies in the distant future, management actions should not unduly compromise the ability to accomplish regeneration objectives.

Management of the College lands should accomplish the goals of the College Community. These have been identified from the results of a survey of the College Community conducted in 1987 and by the College Administration. Policies have been developed that support accomplishment of the goals.

**Goal 1.** The woodlands will continue to serve as an educational resource.

**Objectives**

Important educational resources should be protected.

Management activities should be based on accepted silvicultural principles and demonstrate well-planned systems of management.

Management activities should be ongoing.

Management should be integrated with education. Students should participate in all aspects of management.

Areas of the woodland that clearly demonstrate important patterns of historical use should be managed to sustain that value.

**Goal 2**. The woodlands should be managed to benefit wildlife.

**Objectives**

Important wildlife habitat should be identified and protected.

Management of the timber resource should include provisions to enhance habitat.

Management activities should sustain habitat over the long term.

**Goal 3.** The woodlands should provide opportunities for recreation.

**Objectives**

Harvesting of timber should not reduce long-term recreational values.

Roads created for timber harvesting should be designed to also serve as ski and hiking trails. When existing ski trails are used for harvesting access, trail quality should be improved by that use.

Vegetative buffers should be maintained between areas where timber is harvested and areas of high recreational use.

**Goal 4.** The woodlands should provide a peaceful setting for the appreciation of natural beauty.

**Objectives**

Visual quality should be maintained at times of harvest through close product utilization and high standards of workmanship.

Important aesthetic and natural areas should be protected.

Unique vegetation types and specimen trees should be preserved.

**Goal 5.** Management activities should not diminish water quality.

**Objectives**

Logging roads should be designed and constructed to minimize risk of erosion.

Vegetative buffers should be maintained between trails and forest roads and streams.

Trail and road construction and use should not cause water to directly discharge into a watercourse.

A full forest canopy should be maintained adjacent to streams to prevent increases in water temperature.

Logging debris should be kept away from streams, seeps and vernal pools.

Spring seeps and vernal pools should be protected.

**Goal 6.** The woodlands should be managed to provide an ongoing supply of forest products.

**Objectives** The forest should be managed to provide a sustained yield of forest products for harvest at regular intervals.

Timber management should conserve the product resource over the long term.

Management activities that will enhance long-term value should be carried out.

The product resource should be protected from loss to pathogens or decline.

Fuelwood should be cut to provide for the College's needs.

When trees are harvested, the residual stand should be protected from damage.

Timber management should be integrated with other uses and should not substantially reduce other important values.

Harvesting should be scheduled to avoid conflicts with other uses.

# Stand 1 northern hardwoods



**Sampling:** Eight 20-factor prism points on November 25th, 2013.

**Description and History**

This stand is dominated by sugar maple and white ash. The cool eastern slope favors the establishment of these species. The maples are distributed throughout the stand, and ash gains prominence on the moister soils.

A younger class dominated by sugar maple is present at several points. Suppressed sugar maples in the older class have the appearance of younger trees, at times making it difficult to accurately distinguish between age classes.

Very old stonework and piles of bricks indicate that maple sap was boiled at 2 different locations in the stand. Presumably, most of the area was occupied by a sugarbush that was harvested as long ago as 110 years. None of the ancient maples remain.

In 1996, a thinning removed trees in decline and released crop trees for future growth. Because of stand pathology, many ash of sawtimber size were harvested. The thinning emphasized retaining sugar maple, cherry and healthy ash for future growth.

The ice storm of 2008 affected broad areas to the south on eastern slopes between 1600 and 1700 feet in elevation. Following the storm, a harvest removed damaged and mature hardwoods.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Tunbridge – Lyman Fine Sandy Loams with site 2 potential, and Berkshire – Tunbridge Fine Sandy Loams with site 1 potential for timber growth.

**Timber Potential**

In areas where recent harvesting reduced stocking below basal area 80 square feet per acre, the majority of trees are unacceptable for growing stock. Elsewhere, to the north and east, high quality sugar maple and ash grow in abundance.

Pathology

The stand has had a long history of pathological problems, including defoliation by pear thrips, eastern tent caterpillars, anthracnose, and other pests. Around 15% of the sugar maples show signs of sugar maple borer damage. The majority of the beech is infected by beech bark scale disease. The high percentage of mature ash presents a management risk. There is very strong probability emerald ash borer insect will reach southern Vermont within a few years. Where it has become established in the mid-west, it has killed close to 100% of the ash within areas of hundreds of square miles.

**Regeneration and Understory Vegetation**

Where stocking is low due to harvesting and ice damage, raspberries dominate the understory along with beech and striped maple saplings. Elsewhere, beech saplings occur alone throughout the understory, reaching heights up to 30 feet and entering the pole size class.

Stand 1 Management Objectives

1. Even aged management with a 125-year rotation.
2. Regeneration of the stand to Northern hardwoods.

Silvicultural Recommendations

Management should follow the irregular shelterwood system. The next treatment should consist of a thinning and proceed with these objectives.

1. Where stocking exceeds basal area 125 square feet per acre in the eastern stand area, thinning should focus on releasing high quality maples and other desirable hardwoods for long-term growth, removing firewood-grade trees as well as some sawtimber to achieve optimal stocking and even spacing between reserved trees.
2. Stocking should be uniformly reduced to basal area 85 square feet per acre.
3. The thinning should bypass areas treated in 2008-2009.

Schedule of Treatments

The recommended treatment should take place in 2016.

# Stand 2 hemlock, hardwoods



**Sampling:** Six 20-factor prism points on November 25th, 2013.

**Description and History**

This stand lies to the west on steep western-facing slopes. Older hemlock dominates at most points. A class of younger hardwoods near 60 years in age is present at a few points. It is not clear if harvesting, beech mortality, or wind damage introduced this class.

In 1995, easily accessible areas of the stand were lightly thinned. More recently, a few trees were cut along the eastern edge of the stand at the top of the ridge where a main skid trail was installed for access to adjacent stands.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Tunbridge – Lyman Fine Sandy Loams with site 2 potential for timber growth.

**Timber Potential**

Overall potential is low due to the high percentage of hemlock and steep slopes limiting growing resources and access for harvesting. Younger hardwoods have moderate long-term potential.

Pathology

The stand appears free of significant pathological problems.

**Regeneration and Understory Vegetation**

Understory vegetation is sparse or absent at most points. To the east where harvesting removed hemlock and stocking is lower, beech saplings dominate.

Stand 2 Management Objectives

1. Even aged management with a 150 year rotation.
2. Regeneration of the stand to northern hardwoods.

Silvicultural Recommendations

Management should follow the irregular shelterwood system. The next treatment should combine harvesting and thinning and proceed with these objectives.

* Where the older class dominates, thinning should reduce basal area to approximately 105 sq. ft. per acre and release high quality hardwoods and hemlocks for growth. Reserved trees should be evenly spaced at 20 feet.
* In concentrations of good quality younger trees, harvesting of groups of older trees should release those in the younger class. Groups will approach 1/3 acre in area and in combination remove approximately 5 acres of the overstory.
* Overall, the recommended treatment will reduce stocking to basal area 95 sq. ft. per acres.

Schedule of Treatments

The next treatment should take place in 2016.

**Stand 3 white pine, hardwoods**



**Sampling:** Six 20-factor prism points on November 25th, 2013.

**Description and History**

This stand developed in a meadow and consists of patches of white pine approximately 50 years in age and individual pines of similar age scattered through concentrations of younger hardwoods in the large sapling to small pole-size class. The pine's aggressive early growth allowed them to establish dominance.

Thinning in 1995 removed rough quality dominant pines. Further cutting within the past five years harvested sawtimber quality pines, releasing younger hardwoods.

**Pathology**

White pine weevil has periodically affected the white pines. The adult moth lays its eggs on the growing terminal shoot of the pine stem and on hatching, juvenile weevil larvae feed on the shoot and kill it. This allows a radial branch to take over in forming the main stem of the tree. Although this has small effect on the health of the tree, it can result in a significant reduction in timber quality.

Dominant pines with ample growing space are those most negatively affected by the weevil. Radial branches developing into stems have space to grow outward rather than upward and sawtimber quality is consequently poor. Reduction in quality is far less in closely grown pine. Well stocked areas retain good potential.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Tunbridge – Lyman Fine Sandy Loams with site 2 potential for timber growth.

**Timber Quality**

The remaining pines have fair potential in both the near-term and the long-term. Younger hardwoods including red maple and sugar maple have good long-term potential.

**Stand 3 Management Objectives**

* Even aged management with a 100-year rotation.
* Regeneration of the stand to northern hardwoods.

**Silvicultural Recommendations**

Management should continue under the irregular shelterwood system. The next treatment should combine harvesting and thinning and should proceed with the following objectives.

* Where young hardwoods are fully stocked and occur with poor quality individual older pines, harvesting should remove the pines to fully release the younger class.
* Where the pines have good long-term potential and are well stocked, thinning should treat both age classes a single entity, releasing high quality younger hardwoods and widely spaced pines with good long-term characteristics for growth.
* The combined harvest and thinning should reserve average stocking at an average basal area 80 square feet per acre.

Schedule of Treatments

The next treatment should take place in 2024.

# Stand 4 hardwoods, white pine



**Sampling:** Seven 20-factor prism points on November 25th, 2013.

**Description and History**

The stand developed in lands abandoned from agricultural beginning 80 years ago. Lands to the north near the road and farmstead were used as pasture more recently than those to the south. About 35 years ago, a limited harvest of rough quality pines created canopy openings within which spruce and hardwood saplings have developed.

Pine is most important in the species composition near the stand boundaries; spruce and the hardwoods occur in greater frequency toward the center of the stand. Aspen and spruce are clustered while red maple, white birch, and cherry are more uniformly distributed there. The other tree species occur infrequently.

The pines became established partly as a result of deer and cattle food preferences. Cattle will consume hardwood seedlings while avoiding pine; deer browse freely on most hardwood buds and browse pine saplings lightly. Pastures were often kept clear of hardwoods. These provided necessary fuel for heat and cooking. Pines were bypassed because they produce creosote when burned, increasing the risk of chimney fires. Consequently, a pine seed source was often available near the farmstead. Further, pine’s heavy seed can penetrate grass cover more effectively than light seeded hardwoods.

The stand area to the north contains an extensive shrub component and former pasturing influenced its species composition. Hawthorn, juniper, meadowsweet and steeplebush are present in the understory. All are unpalatable and advance when cattle periodically use a pasture reverting to woodland.

The only recent treatment in the stand's history was a small patch clearcut in 1987 to improve grouse habitat. The treated area is located along the northwestern edge of the wetland.

**Regeneration**

Beech and striped maple saplings dominate the understory throughout much of the stand area. Scattered whiter pine and red spruce saplings occur as well.

**Wildlife Resource**

The vegetation provides habitat for a variety of wildlife and has been important habitat for grouse and woodcock during younger stages of growth.

Woodcock require mixed vegetation predominantly in the younger age classes. Territory can consist of less than 10 acres. Nesting occurs in grassy areas or in leaves on the forest floor close to younger vegetation.

Woodcock are summer visitors and their principal food is earthworms. Worms occur only in fertile, open, friable soils. Within the stand, such soils occur primarily near the wetland. The brushy wet areas occupied by alder and willow serve as daytime woodcock cover and small openings in the stand are frequented by night. The pine areas are occasionally used as daytime cover.

The stand provides diverse songbird habitat. The presence of several strata of vegetation encourages both tree and ground nesting species. Flowering shrubs provide habitat for insects that in turn are an important songbird food resource. The wetland cover type provides specialized habitat for redwing blackbird and perhaps other species.

The presence of low dense browsable vegetation also favors deer, hare, and small rodents. These may attract hawks, owls, fox and coyote.

**Pathology**

Many of the aspen are in decline. Aspen is a short-lived species and subject to a variety of chronic pathological problems. Hypoxylon cankers were observed on most stems during the 2013 field cruise.

Since early in the stand's history, white pine weevil larvae have periodically fed on the growing terminal shoots of pine stems within the stand. These terminal shoots have died, allowing lateral branches to take over in forming the main stem or stems. In areas of low stocking and ample light, several branches often established dominance and individual trees have multiple stems. In shaded more heavily stocked areas and on less dominant trees, single have branches have formed a main stem.

Emerald ash borer poses a threat to the few ashes in the stand.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Berkshire – Tunbridge Fine Sandy Loams with site 1 potential and Westbury Fine Sandy Loams with site 2 potential for timber growth.

**Timber Resource**

The hardwoods have good long term potential. The pines vary in quality.

**Stand 4 Management Objectives**

* Even-age management with a 120-year rotation age.
* Enhancement of grouse, woodcock and songbird habitat.
* Regeneration of the stand to diverse hardwoods.

**Silvicultural Recommendations**

Management should follow the irregular shelterwood method. The next treatment should combine harvesting and thinning and proceed with the following objectives.

* + Where overstory quality is poor and within close proximity to prior wildlife cutting, harvesting should remove groups of trees up to ¾ acre in size to create areas of early-successional hardwoods to sustain grouse and woodcock habitat. The harvest should remove 5 groups totaling close to 4 acres.
  + Elsewhere, thinning should maintain stocking at basal area 75 square feet per acre, releasing hardwoods with good long-term potential at even spacing.

**Schedule of Treatments**

The recommended harvest should take place in 2016.

## STAND 5 WHITE PINE, HARDWOODS



**Sampling:** Seven 20-factor prism points on November 25th, 2013.

**Description and History**

This stand formed in an abandoned orchard. A few old apple trees remain scattered throughout. White pine dominates in height, diameter, and percentage of species composition. With the exception of ash, the hardwoods are partially suppressed and their crowns have a lower position in the canopy.

Initial stocking was fairly low and many pines have grown without significant competition. Areas to the south and east are dominated by closely spaced pines. Present stocking varies from a low of basal area 80 to a high of basal 220 sq. ft. per acre.

No recent silvicultural treatments have occurred.

**Regeneration**

Dense ash saplings carpet the understory between 1 and 3 feet in height. Deer have heavily and repeatedly browsed most of these. Occasional ash individuals have advanced up to 6 feet along with sugar maple, beech and red maple saplings.

**Wildlife Resource**

The old apple trees sporadically bear fruit and are an occasional fall food resource for many animals, including deer, bear, grouse, woodchuck, and raccoon. Because the trees are suppressed, fruit production is limited in most years.

Typically, pine stands have little wildlife value, but may serve as winter shelter for deer and as summer cover for grouse and woodcock if in close proximity to important habitat of those species. The proximity of this stand to open land and grouse and woodcock habitat in stand 3 contributes to overall habitat value.

**Pathology**

The stand appears free of present significant pathological problems. In past years, a number of pines have succumbed to white pine blister rust. This fungal infection is of European origin and requires a co-host in the genus Ribes to complete its life cycle. Various species of currants and gooseberries can serve as an alternate host. Infection was not observed in 2013.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Berkshire – Tunbridge Fine Sandy Loams with site 1 potential for timber growth.

**Timber Resource**

Over half of the pines have good near-term potential. In closely stocked areas, many have yet to reach desirable sawtimber size. To the west and north hardwoods have good long-term potential, particularly sugar maple, yellow birch, and black cherry.

**Stand 5 Management Objectives**

* Even-aged sawtimber management with a 110-year rotation.
* Maintenance of wildlife habitat.
* Regeneration of ash, maple and cherry.

**Silvicultural Recommendation**

Management should continue under the irregular shelterwood system. The next treatment should combine harvesting and thinning and proceed with these objectives.

* Where the stand is well stocked with good quality pine, thinning should reduce stocking to basal area 140 sq. ft. per acre and create even spacing at 18-20 feet between stems.
* Where quality is less uniform, harvesting should remove small groups of unacceptable trees to promote developing regeneration and to release apple trees from competition. Groups will approach 1/5 acre in area and in combination remove less than 2 acres of the overstory.
* Management should maintain aspens and cherries for grouse.
* Management should reserve a diverse seed source for eventual regeneration.
* Overall, the recommended treatment will reduce stocking to basal area 100 sq. per. per acre.

**Schedule of Treatments**

The recommended harvest should take place in 2016.

# Stand 6 white pine, hardwoods



**Sampling:** Five 20-factor prism points on November 25th, 2013.

**Description and History**

The eastern stand area is dominated by pine and similar to those in stand 4. The species composition to the west is dominated by aspen, sugar maple, pine, cherry, and red maple. This stand is recognized as distinct from stand 4 because the hardwoods separate the two areas of pine. The stand formed in abandoned pastureland about 60 years ago. There is no evidence of former treatment.

**Regeneration**

Hardwood saplings ranging from 2 to 30 feet in height occur at most points. Beech and striped maple occupy large areas, particularly to the east and north; ash and sugar maple increase in frequency to the south and west. The ash and sugar maple have been heavily browsed at most points. Hayscented ferns occupy a few small areas toward the center of the stand.

**Pathology**

White pine weevil has affected many of the pines. In areas of lower stocking to the west, stem deformities result. Due to higher stocking in the east, stems are straighter.

In early 1991, a windstorm damaged several pines in the eastern stand area.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Berkshire – Tunbridge Fine Sandy Loams and Berkshire – Monadnock Fine Sandy Loams with site 1 potential, and Westbury Fine Sandy Loams with site 2 potential for timber growth.

**Timber Resource**

Timber potential is strong to the east where pine is concentrated and weak to the west where pines are scattered and of poor form. Although site quality is uniformly high throughout, irregularities in species composition and stocking, as well as weevil damage and wind have reduced overall potential.

**Stand 6 Management Objectives**

* Even-aged timber management with a 100-year rotation.
* Regeneration of the stand to northern hardwoods.

**Silvicultural Recommendations**

A buffer between timber activities and college housing should be maintained.

The stand should be managed under the uniform shelterwood method. The next treatment should consist of a thinning with the primary objective of improving stand quality.

* To the east, pine should be favored as future growing stock and thinning should remove poor quality trees from all diameter classes while retaining better medium diameter stems for growth. Basal area should be reduced to an average of 110 sq. ft. per acre
* To the west, the treatment should consist of a crown thinning, removing larger diameter trees of low quality while retaining smaller diameter trees with greater potential for future growth in value. In general, weevil damaged pines and sugar maple culls should be harvested and smooth-stemmed medium diameter hardwoods retained. Basal area should be reduced to approximately 85 sq. ft. per acre.
* The removal of larger stems will result in short term stocking and spacing irregularities.

**Schedule of Treatments**

The recommended thinning should take place in 2016.

## STAND 7 NORTHERN HARDWOODS



Sampling: Nine 20-factor prism points on November 25th, 2013.

Description and History

The stand contains trees in 3 age classes. The oldest class occurs irregularly and includes a few 130-year old hemlocks and hardwoods remaining from a harvest of about 80 years ago.

Younger trees near 75 years in age that became established following the harvest dominate at all points.

A pole size class, dominated by beech, is present in many locations. The youngest class became established following harvests of about 40 years ago. Older sugar maples in the southern stand area are located near an abandoned farmstead and may have been used for maple syrup production.

The southern stand area is dominated by sugar maple, yellow birch and ash. Beech, red maple, white birch and hemlock dominate to the north. Stocking is uniform to the south and somewhat variable in the north.

The last treatment occurred in 1996. It removed most of the older class and thinned the middle-aged class.

Basal area 100 sq. ft. per acre is the most commonly encountered stocking. Stocking reached 160 sq. ft. per acre where beech poles are growing into the overstory.

Regeneration

Beech, hophornbeam, and striped maple saplings continue to be the most common species in the understory. To the north, saplings are very dense in areas of lesser stocking and a more open canopy. To the south, the forest canopy is more uniformly closed and saplings are less concentrated.

Wildlife Resource

Remoteness from human population and beech concentration make the stand important habitat for black bear. Claw scratch wounds on several beeches indicate they have been climbed by bear seeking beechnuts. The nuts are rich in calories and are an important fall food as bear prepare for hibernation. Males experience significant weight loss during the early autumn rut and beech mast is particularly important for them. Bear food requirements are substantial and they do not frequent stands of low beech concentration. The dominance of beech in the northern stand area establishes its habitat value.

Bear require a buffer between their woodland habitat and human activity. The width of the buffer may vary depending on terrain and vegetation characteristics, but typically a quarter to a half-mile is required. Although beech is concentrated in other areas of the college lands, only here does that isolation distance exists.

In milder periods, the open hardwoods to the south are an important deer wintering area. Saplings there have been intensively browsed. The sunny southern exposure encourages snowmelt and makes beechnuts on the forest floor available in early and late winter.

In autumn, turkey move to hardwood stands to forage, feeding on seeds of many tree species. In winter, they often rely on stands where hophornbeam is concentrated. Hophornbeam seed falls in early winter, often after snow has covered the ground and made other foods less available. The combination of beech and hophornbeam is especially favorable for turkey. If snow is less than several inches deep, they may scratch through the snow to obtain beechnuts.

Male and female fisher tracks were observed throughout the stand during the February 2004 fieldwork.

Pathology

Beech bark disease has had a major impact on the stand over the last half century. Trees have often failed to contain the infection, allowing the fungus to spread within the stem. Many trees have died, particularly to the north, resulting in stocking irregularities, canopy openings, and areas of dense saplings.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Berkshire and Monadnock Fine Sandy Loams with site 1 potential, and Westbury Fine Sandy Loams with site 2 potential for timber growth.

Timber Resource

Timber potential is fairly high, particularly to the south where sugar maple and yellow birch dominate. Soils are thin on the ridge reducing site and tree quality somewhat. The cutting of 1996 released many high quality hardwood stems for an extended period of growth

Stand 7 Management Objectives

* Even-aged management with a 110-year rotation.
* Regeneration of the stand to sugar maple, ash, beech and yellow birch.
* Protection and enhancement of deer, turkey and bear habitat.

Silvicultural Recommendations

Management should continue under the uniform shelterwood system with special provisions made for deer, turkey and bear management. The next treatment should consist of a thinning and proceed with these objectives.

* The thinning should reduce stocking to an average of 85 sq. ft per acre and create as uniform spacing as antecedent conditions allow. As often as possible given stocking and spacing objectives and age variation, the middle-aged class should be favored as future growing stock.
* The treatment should reserve a diverse seed source for eventual regeneration.
* To the south, hophornbeam should be retained as a food source for turkeys and other wildlife species.

Schedule of Treatments

The recommended thinning should take place in 2016.

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# Stand 8 mixedwood



**Sampling:** Five 20-factor prism points on November 25th, 2013.

**Description and History**

The vegetation in this small stand is extremely variable in age and species composition. The only unifying characteristic is the proximity of the small patches of diverse vegetation to one another. The area has been mapped as a stand for convenience sake, not because of uniform character.

Much of the stand to the south consists of small abandoned pastures and former tilled lands lying close to the old farmstead. Older trees were maintained along fencerows and close to the former house site. These had aesthetic value, were often used for sugaring, and provided shade for livestock.

The lands were gradually abandoned from agricultural use. Average tree age increases with distance from the house and barn sites. Soil conditions and the year in which different areas went out of agricultural use affected current species composition. Whether a soil has been exposed by tilling or is in sod greatly affects what seed will root there. Hardwoods become established more readily in disturbed soils; spruce and pine cones and seed can penetrate grass cover. Germination of a seed is profoundly affected by soil moisture that may vary from year to year. Temporal and spatial variations in former use have resulted in a complex stand.

Near the old stone foundations, small patches of 50-90 year old pine, white birch, spruce and red maples occur, as do scattered older hardwoods. Older hemlocks dominate the northwest stand area and along Pond Brook. To the east across Pond Brook, the stand is more uniform, consisting of middle-aged hardwood, spruce and hemlock.

Cutting last occurred in 1996 west of Pond Brook and increased variability. The treatment created forest openings and introduced patches of saplings, blackberries, raspberries and herbaceous vegetation.

The north-south running woods road through the stand is of particular interest as it linked the former farm to other roads and the community beyond.

**Regeneration**

Saplings of many species are present, including spruce, fir, hemlock, beech, striped maple, yellow birch and white pine. Species tend to occur in patches.

**Wildlife Resource**

The structural diversity of the stand provides habitat for diverse species.

Deer frequent the southern stand area. Hardwood saplings and shrubs have been heavily browsed there. Herbaceous plants and spring shoots of blackberries and raspberries are annually grazed. Small patches of softwood provide occasional winter shelter. Deer activity is very high in mild winters.

The blackberries and raspberries have value for a variety of wildlife including songbirds, grouse, turkey, and black bear.

The developing spruce and fir saplings may provide cover for snowshoe hare.

**Pathology**

Spruce and fir are shallow rooted species and subject to wind throw on wet soils and exposed sites. harvest in 1973 created several stand openings that have served as corridors that funnel wind, increasing its speed. Ongoing spruce and fir blowdowns has resulted in several areas. Several spruces have recently died from unidentified causes.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Berkshire and Monadnock Fine Sandy Loams with site 1 potential for timber growth.

**Timber Resource**

Areas of white pine are limited in size, but have very good potential. East of Pond Brook, sugar maple is concentrated, but the sunny western exposure has encouraged epicormic branch sprouting, reducing sawtimber potential. The older red maple is of poor quality. The hemlock has low sawtimber value.

**Stand 8 Management Objectives**

* Uneven aged management with a 20-year cutting interval.
* Development of sawtimber to greater than 16 inches DBH at final harvest.
* Retention of species and structural diversity.
* Maintenance of wildlife habitat.
* Protection of historic character.

**Silvicultural Recommendations**

Management should continue under the group selection system. The next treatment should combine harvesting and thinning and proceed with these objectives.

* Areas well stocked with white pine should be thinned to an average basal area of 130 sq. ft. per acre, reserving high quality stems at even spacing.
* Areas with good quality hardwoods should be thinned to basal area 85 sq. ft per acre, also reserving stems at even spacing.
* Groups of wind damaged spruce and fir and patches of low quality hardwoods should be harvested. This will release saplings and herbaceous growth, benefiting a broad range of wildlife, particularly hare, deer and bear. Groups should be between ¼ and ½ acre in size, and account for up to 1 acre of total stand area.
* Undamaged areas of hemlock, spruce and fir to should be left untreated or lightly thinned.
* Overall the treatment will reduce stocking to basal area 100 sq. ft. per acre.

**Schedule of Treatments**

The recommended harvest should take place in 2016.

## STAND 9 HEMLOCK, SPRUCE, HARDWOODS



**Sampling:** Six 20-factor prism points on November 25th, 2013.

**Description and History**

This stand consists primarily of hemlock and spruce and contains small amounts of hardwood, balsam fir and pine. To a large extent, the hemlock and spruce are spatially separated, each forming nearly a pure stand where it occurs.

Fifty-five year old trees of mixed species composition dominate the stand area to the north. To the south where hemlock dominates, trees are older, although several patches of younger spruce are present.

The last cutting took place in 1996, removing a limited amount of hardwoods and thinning areas of spruce. Hemlock areas were only lightly thinned.

**Regeneration**

Where hemlock shades the understory, little regeneration is present. In small openings created by the last thinning, spruce, hemlock, beech, yellow birch, and striped maple occur.

**Wildlife Resource**

The stand has provided winter shelter for deer in times of deep snow and extreme cold. Although deer do not use the hemlock cover in mild winters, preferring sunny areas of open hardwood, in harsh winters, the cover is critical to the success of the population. Absence of use for a several year period should not be taken as evidence that the stand is not valuable winter shelter.

The dense canopy and low elevation may provide a north-south travel corridor for a number of species.

**Pathology**

Minor amounts of wind throw have occurred over the years. The crowded conditions and wet soils near the brook have resulted in some natural decline in vigor.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Westbury Fine Sandy Loams with site 2 potential for timber growth.

**Timber Resource**

Tree quality is generally good to the south. Diameters are smaller to the north and near-term potential is lower. Hemlock’s dominance reduces overall potential.

**Stand 9 Management Objectives**

* Even aged management with a rotation age of 130-years.
* Regeneration of the stand to hemlock, spruce and yellow birch.

**Silvicultural Recommendations**

Management should follow the irregular shelterwood system. The next treatment should combine harvesting and thinning and proceed with these objectives.

* Hemlock areas should be lightly thinned and maintained as winter cover for deer. Stocking in these areas should be maintained above basal area 120 square feet per acre.
* Easy access for deer exists between cover and potential feeding areas, but browsable saplings are very limited. Small groups of spruce should be harvested to expand areas of hardwood and spruce saplings. This recommendation works well with spruce biology as spruce seldom responds positively to thinning and thinned areas are often subject to blowdowns and shoestring fungus infection. Groups will approach 1/5 of an acre in size remove up to 2 acres of the overstory.
* Overall, the recommended treatment will reduce stocking to an average of basal area 120 sq. ft. per acre.

Eventually it will be necessary to harvest in areas of hemlock cover. Treatments should coincide with good hemlock seed years in an effort to regenerate hemlock saplings.

Over the long term, in order to sustain an ongoing supply of browse, treatments should occur every 10-15 years. Areas cut in the first year would ideally be cut again after 50 years. The areas of regeneration created should not be greater than the capacity of the deer to use them. In each cutting, approximately an acre and a half of saplings should be created, in several small patches. The recommended treatments will incidentally benefit hare, songbirds and grouse.

The cuttings should closely utilize harvested materials to keep sapling areas free of debris and accessible to deer.

The Loop Trail runs along the western edge of the stand. Harvesting should be buffered from the trail to maintain aesthetics there and to create privacy for deer. Trails should not be developed to the east of the Loop Trail, as they would negatively impact deer habitat.

**Schedule of Treatments**

The recommended treatment should take place in 2016.

## STAND 10 WHITE PINE



Sampling: Five 20-factor prism points on November 25th, 2013.

Description and History

This contains nearly 100% white pine along with a small amount of hardwoods. It appears that as many as 55 years ago, limbs were pruned from crop-trees to a height of 8 -10 feet above the ground. Crop-tree competitors may have been girdled as well. Stumps from those trees would have rotted long ago, so it’s unclear. These treatments would have coincided with Halsey Hicks and Buck Turner’s days at the college and the active program of forestry courses they offered.

A thinning in 2008 uniformly reduced stocking to basal area 170-175 square feet per acre, higher than the optimum for pine growth.

Regeneration and Understory Vegetation

Striped maple, beech and red maple saplings continue to dominate the understory, reaching heights between 6 and 20 feet in height.

Wildlife Resource

Deer have browsed hardwood saplings moderately. The advancement of beech and striped maple saplings-- species that tolerate browsing -- and the absence of tall ash, cherry and sugar maple saplings -- species intolerant of browsing --suggest deer feed in the stand in most winters.

Pathology

Minor wind throw has taken place over the years. Blister rust caused limited mortality many years ago.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Marlow Fine Sandy Loams with site 1 potential for timber growth.

Timber Resource

Tree quality is very good. The stand has very good potential in both the near-term and the long-term.

Stand 10 Management Objectives

* Even aged management with a rotation age of 110 years.
* Regeneration of the stand to pine and hardwoods.

Silvicultural Recommendations

Management should follow the irregular shelterwood system. The stand’s high visibility encourages maintenance of a continuous overstory and development of 2 distinct age classes. This will require developing regeneration over a long period beneath a partial canopy.

The next treatment should consist of a thinning and proceed with these objectives.

* Thinning should uniformly reduce stocking to basal area of 120 sq. ft. of per acre and reserve even spacing at 18-20 feet between stems.
* Because of the prolonged period of full stocking, the crowns of many sawtimber size pines have dwindled and the trees will not respond vigorously to release. The thinning should carefully identify trees capable of responding and reserve those for future growth. In almost all cases, the diameters of these will exceed the mean stand diameter.

Schedule of Treatments

The recommended thinning should take place in 2019.

## STAND 11 NORTHERN HARDWOODS, PINE



Sampling: Five 20-factor prism points on November 25th, 2013.

Description and History

The stand species composition varies from point to point. To the north and east over the majority of the stand, 60 years old northern hardwood species dominate. To the west, a few larger diameter older white pines and small groups of older sugar maples are present. These trees appear to well exceed 100 years in age. The younger class is present there as well.

Stocking approaches full in the younger hardwood and is full in the older area. Light thinning occurred in 2008 when the adjacent pine stand was treated.

Regeneration

Sapling growth is limited at points, consisting primarily of beech saplings with lesser amounts of striped maple, sugar maple and occasional red oak. To the east and south, a few small groups of red spruce advanced saplings are present.

Pathology

The older sugar maples are in very poor condition.

Site and Soils

The NRCS soil survey classifies the soils in this stand as Berkshire - Tunbridge Fine Sandy Loams with site 1 potential for timber growth.

Timber Resource

The older trees are generally of poor quality, suggesting they may have been bypassed in harvests of long ago. The younger hardwoods have very good potential.

Stand 11 Management Objectives

* Even aged management with a 120-year rotation.
* Regeneration of the stand to sugar maple, ash, cherry white pine and other hardwoods.

Silvicultural Recommendations

Management should continue under the irregular shelterwood system and promote the development of the younger class over the next 2 decades. The next treatment should combine harvesting and thinning and proceed with these objectives.

* Harvesting should remove older trees in the ravine to release the younger class. Because of the location of a walking trail adjacent to the ravine, harvesting will have to proceed carefully and should reserve older trees where harvesting could unduly reduce aesthetics.
* Where younger trees dominate, thinning should reduce stocking to a basal area of approximately 85 sq. ft. per acre and retain trees at even spacing. The thinning should remove all of the older age class to the east where younger hardwoods are fully stocked.

Schedule of Treatments

The recommended treatment should take place in 2019.

# Management Summary and operations schedule

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Stand** | **Action** | **Silvicultural Objectives** |
| 2016 | 1 | Thinning | Thin to reduce stocking and release maples and other hardwoods. |
| 2016 | 2 | Thin, Harvest | Thin older areas to reduce stocking and release high quality hemlock and hardwoods. In younger areas, harvest older trees to release the younger class. |
| 2024 | 3 | Thin, Harvest | Harvest older pines to release younger hardwoods where they are fully stocked beneath low quality pines. Thin both age classes where quality and potential is high in both. |
| 2016 | 4 | Thin, Harvest | Harvest small groups to promote young hardwood growth for wildlife habitat. Thin well stocked areas to release hardwoods. |
| 2016 | 5 | Thin, Harvest | Thin pine-dominated areas for quality. Harvest small groups in low-quality areas to promote regeneration. |
| 2016 | 6 | Thinning | Thin the pine area to the east for quality. To the west, remove larger diameter pines and low-quality hardwoods to release hardwoods with strong potential. |
| 2016 | 7 | Thinning | Thin to reduce stocking and release high quality hardwoods, favoring the middle age class. |
| 2016 | 8 | Thin, Harvest | Thin pine and hardwood areas to optimum stocking. Harvest groups of wind-damaged spruce and fir. Lightly thin hemlock dominated areas. |
| 2016 | 9 | Thin, Harvest | Thin hemlock areas lightly. Harvest small groups of spruce to release and establish hardwood sapling growth. |
| 2019 | 10 | Thinning | Thin to release strong dominants and create uniform stocking and spacing. |
| 2019 | 11 | Thin, Harvest | Harvest older trees to release the younger class. Reserve some older hardwoods for seed. Thin to the east where hardwoods dominate to release high quality trees at uniform spacing. |
| 2024 | All |  | Re-evaluate and update management plan. |

**GLOSSARY**

*Acceptable growing stock.* The stand basal area which is in stems of sufficient species, quality and vigor to meet the long term objectives of stand development. For sawtimber management, acceptable growing stock for hardwood includes trees with the potential to develop 20 feet of bole length in logs with 2 or more clear faces; for softwood, acceptable growing stock includes trees with the potential to develop 40 feet of bole length as sawlogs. Trees which form multiple stems less than 11 feet above the ground are unacceptable regardless of upper stem quality. For wildlife management, the value of the species or individual tree within a stand determines acceptability.

*Age*. The number of growth rings at breast height in trees present within a stand excluding vegetation in the regeneration class.

*Basal area.* The estimated cross sectional surface area of all stems at breast height within a stand expressed in square feet per acre.

*Coefficient of variation.* The average deviation from the mean value for basal area, diameter, etc. expressed as a percentage of the mean.

*Crown class.* The relative position in height and size of a tree crown within the forest canopy. Super dominants are large and emerge well above adjacent crowns. Dominants are well released from competition and are established high in the canopy. Co-dominants are subject to partial competition and occur lower in the canopy. Suppressed crowns occur low in the canopy, are subject to full competition, and lack vigor.

*Cull factor*. The stand or species basal area in trees with no potential timber or wildlife value.

*Harvest*. A cutting intended to create canopy openings which will allow a younger age class to advance.

*Height.* The average height of dominant trees within a stand.

*MBF.*  Thousand board feet.

*Mean diameter.* The quadratic mean diameter (M.S.D.) or diameter of the tree of average basal area measured at 4.5 feet above the ground. This may be calculated for all trees within a stand and for each species.

*Regeneration.* The presence of saplings and seedlings in significant numbers.

*Rotation*. The optimum period of growth for a forest stand expressed as the maximum tree age at time of final harvest.

*Site*. The potential of the soils and micro environment to grow timber.

*Species composition*. The basal area by species, each species basal area being expressed as a percentage of the total.

*Stocking level.* The basal area of the stand as compared with the basal area which would allow the greatest annual timber volume growth per acre. A is overstocked, B, adequately stocked and C, under stocked.

*Thinning*. An early or intermediate cutting in an even-aged stand intended to create optimal conditions for ongoing growth. Large canopy openings are not created.

# Signature Page

|  |  |  |
| --- | --- | --- |
| Marlboro College date |  | County Forester date |
|  |  |  |

# 

# UVA FOREST PLAN MANAGEMENT SUMMARY

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| new |  | | revised | X | amendment | |  | change of ownership | | |  | |
| School Property Account Number (SPAN) | | | | | | 378-117-10341 | | | Town Located | Marlboro | | | |
| Plan preparer | | George B. Weir, Hayden Lake Consulting Foresters | | | | | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Year of entry |  | Previous owner |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year of last Plan |  | | | Year Parcel withdrawn from program | | |  | |
| Year of last inspection | | |  | | Orthophoto Number | 132036 5000 2010 | | | |
|  | | | | | | | | | | |
| Landowner Name | | Marlboro College | | | | | |
| Address | | P.O. Box A  Marlboro, VT 05344 | | | | | |

|  |  |
| --- | --- |
| Total Forestry Acres | 196.44 |

**Stand Information**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Stand | Acres | Age  Structure | Site Class | Timber Type | MSD | Total BA | AGS BA | Management  Activities | Schedule  Date |
| 1 | 39 | Even | 1, 2 | 6 | 12.3 | 74 | 55 | 2 | 2016 |
| 2 | 32 | Even | 2 | 11 | 12 | 131 | 84 | 2/ 4 | 2016 |
| 3 | 4 | Even | 2 | 3 | 14.1 | 67 | 47 | 2/ 4 | 2024 |
| 4 | 29.54 | Even | 1, 2 | 11 | 12 | 82 | 63 | 2/ 4 | 2016 |
| 5 | 12.2 | Even | 1 | 11 | 14.8 | 120 | 95 | 2/ 4 | 2016 |
| 6 | 12.2 | Even | 1, 2 | 3 | 13.8 | 155 | 118 | 2 | 2016 |
| 7 | 33.2 | Even | 1, 2 | 6 | 13.3 | 120 | 80 | 2 | 2016 |
| 8 | 2.6 | Uneven | 1 | 11 | 15.7 | 150 | 131 | 7/ 8 | 2016 |
| 9 | 20.4 | Even | 2 | 11 | 13.7 | 153 | 140 | 2/ 4 | 2016 |
| 10 | 7.5 | Even | 1 | 3 | 16.5 | 185 | 135 | 2 | 2019 |
| 11 | 3.8 | Even | 1 | 11 | 16.8 | 122 | 85 | 2/ 4 | 2019 |