

FOREST MANAGEMENT PLAN FOR LAND BELONGING TO

RAYMOND OTIS ROBINSON

in Bridgewater, Vermont

Prepared by Redstart Forestry

P. O. Box 475

Corinth, Vermont 05039

October 2013

Landowner's Address: Otis Robinson
P. O. Box 132
Bridgewater, VT 05034

Town in which land is located: Bridgewater
SPAN 084-026-10034

Access Distance: Less than one mile to a Class III road with a small amount of frontage on Chateauguay Road. A former town road, Kellogg Road, runs through the center of this property, connecting Robinson-Buelah Road and Gold Coast Road.

Grand List Description: 960.86 acres and camp

Enrolled in Use Value Appraisal Program: 958.86 acres

Orthophoto Number: Series 5000, 140124; 2011

This 10-year forest management plan is to be used as a guide to forest management activities on the 960.86-acre property belonging to Otis Robinson in Bridgewater, Vermont. This plan conforms to the standards adopted by the Current Use Advisory Board for eligibility in Vermont's Use Value Appraisal Program, as well as to the criteria required by the Forest Stewardship Council to qualify for marketing wood as "green certified" under Redstart Forestry's Resource Manager Certificate #SW-FM/COC-2179. This property will be enrolled in the UVA program for the 2014 tax year.

This land is in the center of the town of Bridgewater. Access has been developed along both sides of Kellogg Road which bisects the property and connects Robinson-Beaull Road in the north to Gold Coast Road in the south. The property has frontage on a small stretch of the Chateaugay Road which has not been developed. Truck access to the property is from the south via Gold Coast Road. A series of exposed ledges and mud at the north end of Kellogg Road on this parcel currently make it difficult to drive from end to end. An old camp and pond are located in the center of the property, within the UVA excluded area as shown on the attached forest management map. Otis pieced this large parcel together over many years by purchasing smaller contiguous pieces of land. For many years, Otis personally managed this property as a timber investment. Together with his wife, Otis owns an additional 140 acres adjacent to this parcel to the northwest. In more recent years, much of the forest management on the parcel has been completed by Jeff Robinson, Otis's cousin and business partner.

The property lines are marked with blazes, stone wall, barbed wire, river, and some iron pins and stone markers at the corners. Portions of the boundary have been blazed and painted in recent years by adjacent landowners. Evidence was not found along significant lengths of the boundary, particularly in the western and southeastern portions of the property. A well-marked boundary is a landowner's best defense against accidental or intentional timber theft and is a great aid when planning forest management activities.

With the exception of several small landings and a small field around the camp, this parcel is completely forested. Northern hardwoods are dominant, with lesser amounts of softwood growing in the lowlands and shallow soil areas. Overall, the quality of the forest as timber is good and stocking levels are acceptable. The topography is hilly and dominated by a large ridge that forms the eastern property boundary. Steep slopes, exposed ledge, and boulders on the soil surface make harvesting a challenge in many places, though no portion of the property is inaccessible.

The landowner is committed to land conservation and wishes to manage this property for a variety of objectives, including timber, wildlife, aesthetics, and recreation. The land is well suited for his objectives.

Landscape setting: This parcel is part of the Central Green Mountains Region, which includes the main spine of the Green Mountains as well as the surrounding high foothills. Within this region, hardwoods, spruce, fir, and hemlock dominate most of the landscape, with areas of white pine in the valleys that were most recently abandoned from agricultural use. Primary and vacation home development pressure in this area is

moderate and increasing due to the land's proximity to the tourism and recreation centers of Killington and Woodstock. Water draining from this property flows generally south and west to the North Branch of the Ottauquechee River. The Ottauquechee River is a significant tributary of the Connecticut River. Invasive plant species are not abundant in the area, though some can be found along major waterways, abandoned farmland, and major roads. Only one small common buckthorn plant was noted and was yanked up. The entire property has been mapped as seasonally important habitat for sustaining black bears by the Vermont Department of Fish and Wildlife. This parcel has no deer wintering yards. About 10 acres of forested swampland in Stand 2 are mapped as Class 2 wetlands. No rare, threatened, or endangered species have been mapped on the property.

Information was collected at 155 sample points in October of 2013 for this plan. Point centers were set on an 8-chain grid. Basal areas and mean stand diameters are estimated from a random point sampling of trees. A 10-factor basal area prism was used to determine which trees to tally at each sampling point. Data, including basal area, tree species, diameter, crown position, and tree height were gathered at each sampling point and an assessment was made of the sawlog potential of each stem. Tallied stems were measured using a Biltmore stick. It is from this information that the "Basal Area/Acre," "Number of Trees/Acre," "Mean Stand Diameter" and "Acceptable Growing Stock" figures were calculated using NED I. Site class is based on soils and site index information and personal judgment. The "Species Composition" percentages refer to percent of total basal area. Acreage for the various forest types was calculated using Arc GIS and is approximate. Trees included in the Acceptable Growing Stock category must have the potential to grow a sawlog that will be at least 10 inches in diameter at the small end, and 10 feet long, with at least two clear faces.

Management units are delineated according to forest type, natural community type, stand structure, and scheduled treatment. All scheduled treatment dates are approximate and refer to a date plus or minus three years. (A treatment date of 2016 means that the activity can be carried out between 2013 and 2019.) Actual activity will depend on the condition of the stand, logger availability, climate, weather, and market conditions.

STAND 1

This stand is in the southwest corner of the property, including both sides of the main south-flowing drainage in this part of the property. While the orthophoto would suggest that a significant component of softwood is present, conifers are only found in the forest understory as an advanced regenerating age class. This stand is wholly dominated by northern hardwood species. Typically, terrain is moderately sloping and operable, though there are several areas of steep slope with boulder fields which present a challenge while logging. Tree quality is generally good and growing conditions are favorable for timber production. There is a selection of remarkably big maple, ash, and oak trees scattered across the steeper hillside area in the central part of the stand.

Acres: 71.25 (11 sample points)

Forest Type: Northern Hardwood

Natural Community Type: Northern Hardwood Forest

Species Composition: Sugar maple (49%), white ash (12%), beech (12%), yellow birch (10%), red spruce (6%), red maple (5%) and smaller amounts of red oak, black cherry, hophornbeam, and paper birch. Regeneration is dominated by beech, striped maple, yellow birch, red spruce, paper birch, sugar maple, and white ash. Regeneration is generally advanced sapling sized, though there are some areas of lower regeneration.

Total Basal Area/Acre: 92 sq. ft.

Acceptable Growing Stock (Basal Area/Acre): 66 sq. ft.

Number Trees/Acre: 136

Mean Stand Diameter: 11.1" D.B.H. (Diameter at Breast Height)

Timber Volumes: 3.227 MBF and 18.1 cords per acre

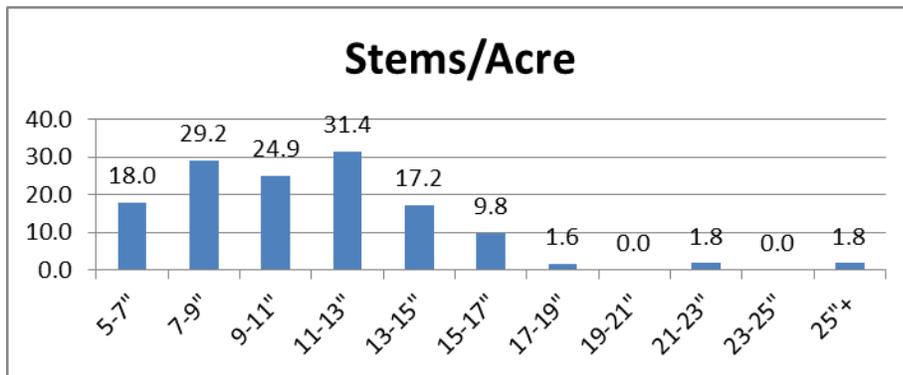
Stocking: Well stocked, above the B-line stocking level for even-aged northern hardwood stands. The stand would be considered overstocked at above 123 sq. ft. of basal area/acre (the A line) and understocked at below 47 sq. ft. (the C line). The recommended stocking level following a thinning (the B line) is 65 sq. ft.

Site Class: I, II (from soils and field examination)

Soil Mapping Unit: Berkshire-Tunbridge complex underlies the hilly western portion of

the stand and Peru, Skerry, and Colonel soils underlie eastern areas. Soils east of the brook are deep and generally well drained except for some wet soils found adjacent to the brook. West of the brook, soils are moderately deep to quite shallow to bedrock and well drained.

Stand Age: All-aged



This stand is all-aged but dominated by trees in the pole and sawtimber size classes.

Advanced regeneration, poles, sawtimber, and mature sawtimber are present throughout the stand. The current Q-factor is 1.19 and the desired Q-factor is 1.30. Additional young regeneration will improve the Q-factor, provided that some large trees are retained.

Stand History and Cultural Elements: Most of Vermont was cleared for agricultural use by the mid-1800s. Following the Civil War and the opening of the Ohio River valley and mid-western states, the wool industry in Vermont collapsed, resulting in the abandonment of large areas of marginal pastureland. A second wave of agricultural abandonment came during the great depression in the 1930s and a third wave followed WWII in the 1950s. This stand was likely cleared of its trees and pastured up until the late 1800s or early 1900s. It has been logged in the distant past and there was some recent logging completed (group selections) along Kellogg Road frontage and in the northwest corner of the stand. A small foundation was noted in the eastern part of the stand. The foundation was built on a rock outcrop and appears to have been for a sugarhouse. It would not be surprising to find evidence of past tapping buried in the hearts of some of the larger maple trees.

Water Quality, Wetlands, and Riparian Zones: This stand contains a main drainage that flows south from the property. This stream is well confined to its course and is lined with coarse gravel and small boulders. While an old stream crossing point was noted

near the southern boundary line, it is not necessary to cross the stream while logging as access is well developed on both sides of the brook. Reduce the intensity of harvesting within 50 feet of the brook to maintain full canopy closure over the water. Cool water is critical to the health of trout populations downstream and forest canopy cover is best way of beating the summer heat.

Access Network: The eastern side of the stand can be logged directly from Kellogg Road. The western portions of the stand are logged from the north via two main trails leading back to a developed landing in Stand 2. Logging in the southern portions of the stand will require a gentle uphill skid back to the landing area. Main trails are all in good repair with little danger of erosion.

Wildlife: This stand appears to be attracting black bears more so than other portions of the property. A selection of healthy beech trees and large red oaks are producing hard mast required by bears in the late summer and fall months. Claw marks were noted in several beech trees indicating recent feeding by bears. These mast producing species also feed a large variety of other wildlife species, ranging from mice and blue jays to deer and turkey. While oak is a valuable lumber species and may be harvested for sawlogs, scattered mature oak must be retained at all times to produce acorns for wildlife and to perpetuate this species on the landscape. All healthy beech trees should be retained as well, though diseased beech may be freely harvested for firewood.

Coarse Woody Debris (CWD): 12.2 dead trees per acre and 1.82 pieces of coarse woody debris were tallied per sample point. These numbers are average for this forest type. Medium sized standing dead trees are present in acceptable numbers. When logging, try to leave standing dead trees standing for wildlife use.

Insects and Disease and Invasive Species: Most maturing beech trees growing in this stand are infected with beech bark disease and are in some stage of decline. Some healthy beech trees were noted and should be retained. Normal sugar maple pests are also noted here but with no cause for alarm. White ash trees in the southwest portions of the stand have reached a very mature size and are at high risk for loss by the approaching emerald ash borer. While there is no reason to panic and harvest all ash trees in the forest, it is wise to identify areas of mature ash and to prioritize them for harvesting. This is one of those areas. No invasive plants were noted.

Longterm Objective: Continue uneven-aged management for the production of good

quality hardwood sawlogs and wildlife habitat. Uneven-aged stands have at least three distinct age classes of trees, which may include young regeneration, advanced regeneration, pole-size trees, immature sawtimber, mature sawtimber, and over-mature/geriatric trees. Selection harvests are used periodically to encourage the establishment of new generations of trees. Other goals of selection harvests are to remove mature sawtimber and poor quality or diseased stems, and to thin groups of densely stocked trees with good long-term potential. Group selections, ranging in size from 12 trees to ½ acre, are a good way to remove bunches of poor quality stems and to regenerate tree species that are less tolerant of shade. When using uneven-aged management, the best quality, most healthy crop trees are grown to specific diameter objectives. In this stand, sugar maple is considered mature at 18-20 inches in diameter. White ash, yellow birch, paper birch, black cherry, and red maple crop trees are considered mature at 16 inches. Red oak is grown largely for its wildlife value, but can be considered mature as timber at 20-24 inches. Beech also is grown to feed wildlife. All healthy beech trees should be retained, but diseased trees may be freely harvested as firewood. Red spruce is considered mature at 14-16 inches, but it should be retained in pockets as cover for wildlife and nesting songbirds. Leave at least two or three large snags or cull trees per acre for woodpeckers and other cavity nesters. Maintain a representation of all tree species currently present for the benefits of biodiversity, including resistance to insect and disease outbreaks.

Scheduled Treatment: Carry out a selection harvest in the southern end of this stand on both sides of the main drainage around 2016. In general, single tree selections should be used. All recently logged areas should be avoided. Harvesting mature ash is a priority. Smaller amounts of mature sugar maple, oak, and birch are also available for harvest. In areas of immature forest, use single tree selections to thin out the slow growing, defective, and diseased trees for small sawlogs and firewood. In these areas, the best quality trees should be left standing with room to expand their live crowns on three sides. Exclusive of group selections, the target residual basal area is 60-70 sq.ft./acre.

STAND 2

This stand is centrally located on both sides of Kellogg Road. Terrain typically slopes quite gently to the west. Soils throughout the stand are moderately deep to bedrock, though rather shallow to a perched water table. This combination of deep soil and available moisture made this an important area to the settlers who once farmed this land. In general, this area only recently regenerated from agricultural use. Most of the stand has been logged within the last 5 years. The resulting forest is a patchwork of forest openings in various stages of regeneration, separated by irregular areas of intact forest and dotted with small swampy openings which are too small to be practically mapped out as non-productive areas. The northern arm of this stand is a uniform area of swampy softwood forest which has seen little recent management.

Acres: 115.11 (21 sample points)

Forest Type: Mixedwood

Natural Community Type: Lowland Spruce-Fir Forest and Hemlock-Hardwood Forest

Species Composition: Red spruce (39%), sugar maple (17%), red maple (15%), white ash (7%), paper birch (6%), yellow birch (5%), beech (5%), and smaller amounts of black cherry, red oak, aspen, hophornbeam, black ash, white pine, and balsam fir. Sapling and advanced sapling-sized red spruce and beech are the two most commonly found species in the regenerating age class. Smaller amounts of hardwoods, including aspen and red oak, are also present, along with small amounts of balsam fir and white pine. Berry bushes still dominate some of the recently created patch cuts and herbaceous plants such as JoePye weed largely dominate the wet openings.

Total Basal Area/Acre: 104 sq. ft.

Acceptable Growing Stock (Basal Area/Acre): 88 sq. ft.

Number Trees/Acre: 258

Mean Stand Diameter: 8.6 " D.B.H. (Diameter at Breast Height)

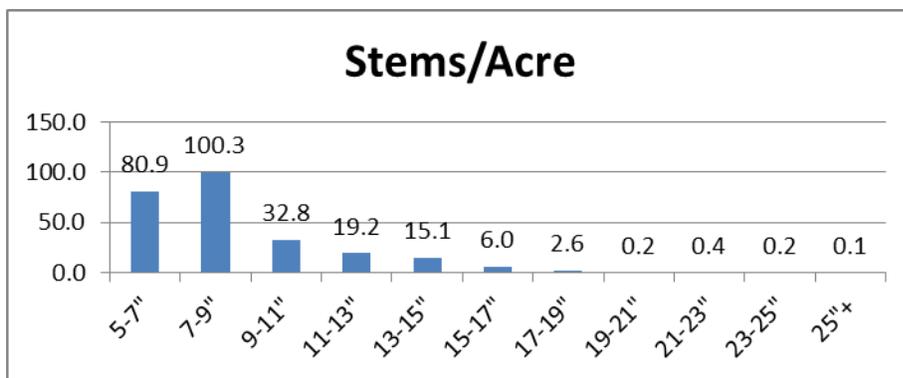
Timber Volumes: 2.944 MBF and 12.5 cords per acre

Stocking: Well-stocked, at the B-line stocking level for even-aged stands with 25-65% softwood species in the overstory. The stand is considered overstocked at above 165 sq. ft. of basal area/acre (the A line) and understocked at below 82 sq. ft. (the C line). The recommended stocking level following a thinning (the B line) is 105 sq. ft.

Site Class: I, II, III (from soils and field examination)

Soil Mapping Unit: Southern portions of the stand are largely underlain by Peru-Skelly-Colonel soils on gentle slopes. Wetter areas are underlain by Cabot silt loam which features a perched water table due to a hardpan soil layer less than 2 feet below the soil surface. Cabot is fertile, though trees growing in Cabot are highly prone to windthrow. The wettest areas are underlain by Pondicherry-Wonsqueak mucks which are borderline non-productive. More productive areas in the northern parts of the stand are underlain by Berkshire-Tunbridge soil complex.

Stand Age: All-aged



This diameter distribution shows a stand that is dominated by rather young, small diameter trees. Because this area was recently harvested, the larger diameter classes are a bit under-represented. Aim to retain a few large diameter trees per acre indefinitely.

Stand History and Cultural Elements: The most important cultural feature of this stand is the Kellogg cemetery located along the Kellogg Road. This cemetery is ringed with stone wall and should be buffered when harvesting. This stand began regenerating from pasture and crop field use starting in the 1930s. The last permanent dwelling along Kellogg Road was vacated in the 1940s. At that time, the land was completely let to grow back to forest. Some old spruce stumps were noted which were cut 20-30 years ago at about 12 inches in diameter. Recently, Jeff used a cut-to-length harvester and forwarder setup to make a series of patch cuts ranging in size from ¼ acre up to 2 acres. Maturing spruce was the primary target of this harvest. The far northern arm of this stand has not really been logged since regenerating from pasture, and the area around the Kellogg cemetery (see map) was treated quite conservatively as well. Otis's camp is within this stand.

Water Quality, Wetlands, and Riparian Zones: Terrain is quite flat throughout the stand and soils are typically shallow to a hardpan layer, which results in a perched water table. During wet times of the year, this stand can be very wet. During dry times of the year, wetness is only associated with the main drainage along the north end of the stand and the forested wetland north of the UVA exclusion. About 10 acres of this stand is mapped as Class 2 wetland by the State of Vermont. In general, it is best to avoid harvesting timber in wetlands, though during very dry times of the year or solidly frozen times of the year, logging can be done with minimal impact on the underlying soils or the hydrology of the wetland. The State of Vermont regulates what uses are allowed in Class 1 or 2 wetlands. In general, silvicultural activities are permitted in Class 2 wetlands provided that certain precautions are taken to protect against pollution and to protect endangered species and deer wintering areas. The specific rules on logging in wetlands can be found online at:
<http://www.nrb.state.vt.us/wrp/publications/wetrule2002.pdf>

Access Network: Being a generally flat stand, access trails can be made in just about any location. All wood harvested from this stand is skidded to Kellogg Road where trucks can be loaded. No erosion was noted. The main trail heading west in the south end of the stand is kept clear of logging debris and is used as a VAST trail.

Wildlife: Ruffed grouse (partridge) densities are as high here as anywhere else in Vermont. An average of 3-4 flushes per hour was noted during the inventory. Grouse thrive in recently logged areas with an abundance of low brushy cover and seed and berry producing species. Also noted were deer and moose browse signs and a barred owl persistently calling.

Coarse Woody Debris (CWD): 13.9 dead trees per acre and 1.95 pieces of coarse woody debris were tallied per sample point. Coarse woody debris in this stand tends to be small to medium sized. Retaining large trees to grow and decline naturally will provide better habitat for woodpeckers, owls, and other cavity nesting creatures.

Insects and Disease and Invasive Species: Root and butt rot was noted in the recently cut red spruce stumps. Root and butt rot is a fungus that decays wood fibers in the bottom 8 feet of softwood trees. Infected trees are prone to windthrow and are commonly blown down in patches of about a dozen stems. Windthrow was noted as being problematic. A number of tall trees left isolated by recent logging were observed tipped over at the roots. Soils in this stand are shallow to an impenetrable

hardpan layer which limits roots to the upper 2 feet of soil, predisposing trees to windthrow. Use group selections as the primary tool for management to avoid leaving trees isolated. Expect some windthrow along the edges of group selections.

Longterm Objective: Continue all-aged management for mixedwood sawlog production and firewood production. Wherever possible, favor red spruce, which is considered mature at 14-16 inches in diameter. Sugar maple and yellow birch are also highly desirable and are considered mature in this stand at 18 inches. Paper birch, red maple, white ash, and black cherry are mature at 16 inches. Retain some large beech for mast production and retain any smooth-barked trees for their disease resistance. Other species can be left or cut to meet wildlife objectives. Pre-commercial thinning is encouraged as a means of allocating growing space to the best quality immature trees in any given area. Primarily use group selections every 10-15 years to harvest areas of mature, diseased, or defective trees, and to encourage vigorous regeneration. Group selections should range from 12 trees to 2 acres in size. About 10-15 acres worth of group selections can be made every 10-15 years. The resulting patchwork should include trees ranging in age from 0 years to 100 years old. Retain at least two large pieces of coarse woody debris in each patch cut as drumming logs for male grouse.

Scheduled Treatment: The stand was recently treated with group selections and most of the stand will not require treatment again until 2023. The northern arm of the stand, including the forested swamp, was not treated during the last harvest. A band of well-drained soil surrounding the swamp contains plenty of tall red spruce and hardwoods that are ready for management. Use single tree selections and small group selections (12 trees) to harvest mature and bully red spruce while generally thinning between crop quality stems in this area. There is no pressing need to complete any management in the swampy area itself. This limited amount of harvesting is scheduled for 2016 and will produce spruce logs and some firewood. Residual basal areas in this part of the stand will be around 90-100 sq.ft./acre.

STAND 3

This large hardwood stand is in the western tier of the property. A conical hill dominates the eastern half of the stand, while steep west-facing slopes define the western half. Eastern portions of the stand were recently logged but western portions have not been harvested in 20+ years. While access routes are established to most of the stand, it is a long, uphill skid from western areas back to Kellogg Road. Harvested timber could potentially be brought northwest to the Chateauguay Road, but access has not been developed and slopes are quite steep in this part of the property. Timber quality varies, but is generally good. Where logging was recently completed, immature but desirably formed trees dominate the stocking. In areas not recently logged, mature sawtimber can easily be found.

Acres: 224.77 (37 sample points)

Forest Type: Northern Hardwood

Natural Community Type: Northern Hardwood Forest

Species Composition: Sugar maple (51%), white ash (12%), yellow birch (11%), paper birch (10%), beech (7%), red maple (5%), and smaller amounts of black cherry, aspen, basswood, elm and red spruce. The species composition of the regenerating age class varies throughout the stand. Where species other than sugar maple dominate the canopy, sugar maple is abundant in the understory. Where sugar maple dominates the canopy, beech, hophornbeam, red spruce, and white ash dominate the regeneration mix. Some recently cut areas are currently dominated by berry bushes. Where there has been no recent cutting, beech, red spruce, and striped maple are present.

Total Basal Area/Acre: 93 sq. ft.

Acceptable Growing Stock (Basal Area/Acre): 74 sq. ft.

Number Trees/Acre: 132

Mean Stand Diameter: 11.4 " D.B.H. (Diameter at Breast Height)

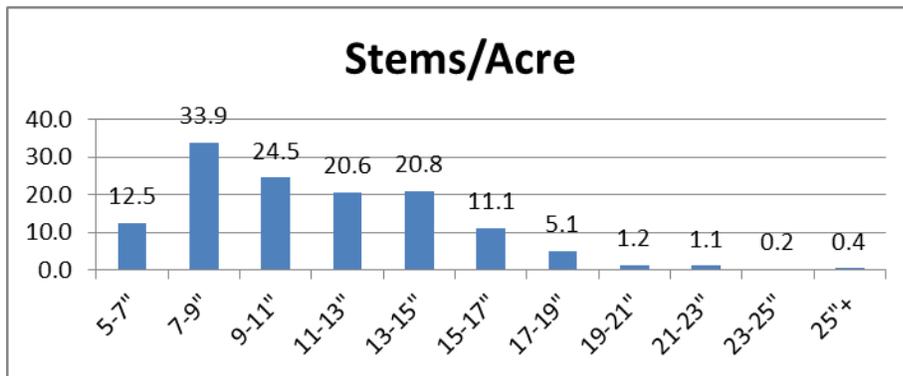
Timber Volumes: 3.838 MBF and 17.8 cords per acre

Stocking: Well stocked, above the B-line stocking levels for even-aged northern hardwood stands. The stand would be considered overstocked at above 123 sq. ft. of basal area/acre (the A line) and understocked at below 47 sq. ft. (the C line). The recommended stocking level following a thinning (the B line) is 65 sq. ft.

Site Class: I, II (from soils and field examination)

Soil Mapping Unit: Most of this stand is underlain by Berkshire-Tunbridge or Tunbridge-Lyman soil complexes which are 10-40" deep to bedrock and reasonably well drained. Flatter areas are underlain by Peru, Skerry, Colonel soils or Marlow loams. Steep rocky areas leading west towards Chateauguay Road are underlain by Berkshire-Manadonock soils.

Stand Age: Transitioning to all-aged



This diameter distribution shows a stand that is largely even-aged but is making the transition to an all-aged forest structure. The current Q factor is 1.22 and the desired Q factor is 1.30. Advanced regeneration is currently underrepresented across the stand.

Stand History and Cultural Elements: Like other portions of the property, this stand was once largely cleared for use as pasture. Starting around 1900, this land was left to grow back to forest. Some old field grown trees can still be identified throughout the stand. The west side of the stand was logged around 20-25 years ago, at the same time that a basic access trail was carved into this steep portion of the property. More recently, the eastern half of the stand was logged and access was improved into this part of the property. Trees in the northeast part of the stand are the youngest and may have only regenerated from pasture within the last 40 years. Stone walls scattered around the stand are a testament to the past use of the land.

Water Quality, Wetlands, and Riparian Zones: One significant brook flows west through the stand on its way to the North Branch. The brook starts off fairly small and flows through a well-defined bed that is cut into the deep soil. Bank stability in

eastern portions of the stand is not good, so trees growing along the stream should always be left to help retain soil. As the stream flows west, it widens and scours a bed right down to the underlying bedrock. Before leaving the property, the brook cascades over a series of bedrock outcrops. Crossing this brook is not necessary and should be avoided if at all possible. The northern stand/property boundary is Blind Creek. This stream flows over bedrock and boulders for its entire length and has many series of plunge pools which hold brook trout.

Access Network: Bulldozed and water barred access trails lead to most parts of the stand. Trails in the far western side of the stand dead end near the boundaries of the property, though those boundaries do not appear to be marked. It is a long, uphill skid from all western portions of the stand to the landing area along Kellogg Road. Kellogg Road becomes quite rough as it approaches this landing. Just south of the landing, a significant amount of excavation work was done to improve Kellogg Road, namely cleaning out ditches, installing corduroy, and adding material to the road bed. A series of exposed ledges in the road are just one more obstacle to harvesting in northern portions of the property.

Wildlife: For whatever reason, wildlife signs were not nearly as abundant in this stand as in other areas. Some signs of bear activity on mature beech trees were noted and several grouse were flushed, but deer and moose activity were much less obvious.

Coarse Woody Debris (CWD): 15.5 dead trees per acre and 1.84 pieces of coarse woody debris were tallied per sample point.

Insects and Disease and Invasive Species: No abnormal forest health conditions were noted in this stand. Beech bark disease continues to be problematic and the normal variety of sugar maple pests are present. Paper birch does appear to be declining across the stand area likely as a result of insect activity, a variety of leaf fungi, and natural senescence. When harvesting, targeting maturing paper birch is recommended. No invasive plants were noted.

Longterm Objective: Continue management for hardwood sawtimber production while transitioning to an all-aged forest. Sugar maple is the most important species and should be encouraged where possible. It is mature at 18-20 inches diameter. Yellow birch and white ash are considered mature at 16-18 inches, while black cherry, paper birch, and red maple are mature at 16 inches. Retain some large beech for mast production and retain any smooth barked trees for their disease resistance.

Otherwise, beech may be harvested freely for firewood. Other species are left or cut to meet wildlife objectives. Primarily use single tree selection harvesting when managing this stand. Group selections are appropriate on the gentle slopes and should range from 12 trees up to 1 acre in size. The harvesting interval for any portion of the stand is 20-25 years.

Scheduled Treatment: Continue selection harvesting activities in a manner similar to what has been completed in recent years. The entire western half of the stand is available for harvesting. The target residual basal area should be 60-70 sq.ft./acre exclusive of any patch openings which should not exceed 15% of the total stand area. Prior to harvesting, the boundaries need to be identified and marked. Trees in the northeastern corner of the stand are very immature but would benefit from light firewood thinning or pre-commercial thinning aimed at releasing crop trees and culling defective stems.

STAND 4

This stand is found in four distinct areas across the property. The species composition is remarkably similar across all of the areas. The two eastern blocks of Stand 4 are high elevation, shallow soil forests that are found along the eastern boundary line at the height of a significant ridge. The two western blocks are also shallow soil sites that also have a generally west aspect. While soils in Stand 2 are shallow to a perched water table, soils in this stand are shallow to bedrock. Spruce seems perfectly content to grow in all of these areas and is typically well formed. Hardwoods seem less inclined to grow with highly desirable timber form, though there are nice quality pockets of hardwood scattered throughout the area. Steep slopes and some exposed ledge are present in all parts of the stand except adjacent to Kellogg Road where terrain is gentle. The western portions of the stand are around 1700 feet in elevation while the two eastern portions of the stand are almost entirely above 2000 feet and almost touch the 2400-foot elevation contour. As with any stand this large, there is considerable variation in site conditions and productivity.

Acres: 221.03 (32 sample points)

Forest Type: Red Spruce-Hardwood

Natural Community Type: Red Spruce-Northern Hardwood Forest and Hemlock

Forest

Species Composition: Red spruce (47%), paper birch (17%), sugar maple (14%), yellow birch (8%), beech (7%), and smaller amounts of white ash, red maple, striped maple, hemlock, and mountain ash. Red spruce is the species most commonly found growing in the forest understory. Sugar maple and beech are found in pockets throughout the stand. Regeneration is quite thick in some places but entirely absent from others.

Total Basal Area/Acre: 92 sq. ft.

Acceptable Growing Stock (Basal Area/Acre): 69 sq. ft.

Number Trees/Acre: 191

Mean Stand Diameter: 9.4" D.B.H. (Diameter at Breast Height)

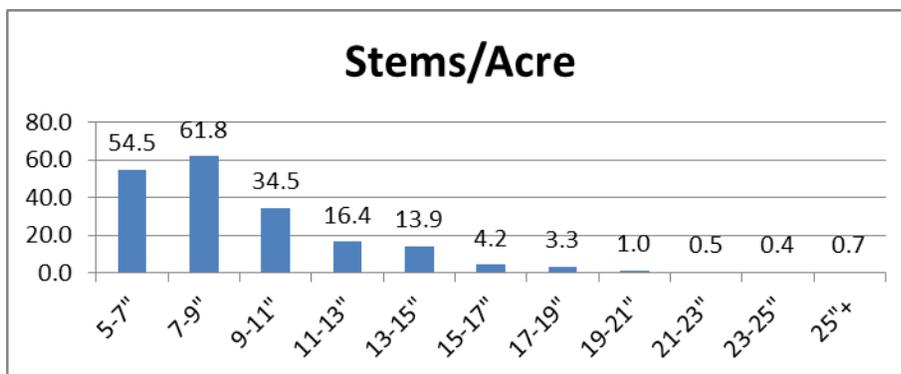
Timber Volumes: 3.402 MBF and 11.3 cords per acre

Stocking: Adequately stocked, between the C-line and B-line stocking levels for even-aged stands with 25-65% softwood species in the overstory. The stand would be considered overstocked at above 165 sq. ft. of basal area/acre (the A line) and understocked at below 82 sq. ft. (the C line). The recommended stocking level following a thinning (the B line) is 105 sq. ft.

Site Class: II (from soils and field examination)

Soil Mapping Unit: Berkshire-Tunbridge and Tunbridge-Lyman soils complexes underlie this entire well drained stand.

Stand Age: Even-aged (transition to all-aged)



This diameter distribution shows a stand that is relatively even-aged due to a general

lack of management since regenerating from pasture. Uniform pole sized stands of spruce and hardwoods dominate the stand, with pockets of larger diameter sawtimber and scattered large diameter, field grown hardwoods.

Stand History and Cultural Elements: As with other stands, this area was once cleared for agricultural use. Pockets of trees were left on ledge outcrops and in other shallow soil areas and some of these islands of trees are still going strong. Following agricultural abandonment, these areas were rather slow to regenerate due to typically dry growing conditions, poor soil fertility, and a lack of an up-hill seed source. Once established, tree growth has been somewhat slow for many of the same reasons. Red spruce seems well suited to growing in this stand, especially at the higher elevations where it is able to outcompete most hardwoods. There has been some logging in the southern portion of this stand along the eastern boundary, and along Kellogg Road, but the rest of the areas have seen minimal logging activity.

Water Quality, Wetlands, and Riparian Zones: Being at generally high points in the watershed, there is little concern for water quality when working in most of this stand. A stream originating near Kellogg Road does flow through this stand for a short while before flowing into Stand 3. Soils near the drainage are not well drained and should be avoided except during the winter months.

Access Network: The two portions of this stand along the eastern ridge are accessed from the ends of the existing network of skid trails leading downhill to Kellogg Road. While these are the highest elevation portions of the property, they are easier to access for logging purposes than those sections of the property downhill of Kellogg Road. Portions of this stand west of Kellogg Road are also accessed by existing skid routes, but will require a rolling uphill skid back to a landing site.

Wildlife: High elevation mixedwood forests provide important habitat for many species. The Bicknell's thrush is a vocal Neotropical migratory songbird that only nests in mountain spruce-fir forests in New England such as this. Retain spruce along the ridge wherever it can be grown. At lower elevations, red spruce and hemlock cover is important to deer seeking to escape inclement weather. While deer are not known to winter on this property, they will likely seek shelter in areas of dense softwoods during early fall and late spring wintery storms.

Coarse Woody Debris (CWD): 29.0 dead trees per acre and 1.48 pieces of coarse woody debris were tallied per sample point. Coarse woody debris in this stand tends to be

small to medium sized. Retain all large dead trees.

Insects and Disease and Invasive Species: Tough growing conditions are the primary hazard to forests at higher elevations. Frequent early fall and late spring snowfalls break the branches of trees that either retain leaves late into autumn or break bud early in spring. Red spruce is well adapted to enduring ice storms and sheds heavy snowfall making it a competitive species at upper elevations. Red spruce also resists desiccation better than hardwoods such as maple or paper birch. Paper birch is commonly exhibiting decline leading to mortality throughout the upper elevations and wherever stocking levels are high enough to create a stressful environment. Salvage log areas of upper elevation paper birch and generally thin all but the most vigorous paper birch from mixedwood stands at lower elevations.

Longterm Objective: Continue all-aged management for quality mixedwood wildlife habitat and sawlog production. At upper elevations, red spruce will be the most productive species to be grown as sawtimber. Wherever possible, favor red spruce, which is considered mature at 14-16 inches in diameter. At lower elevations, a diversity of tree species in addition to red spruce should be encouraged. Sugar maple sawlog quality trees are mature at 16-18 inches. Other hardwood species are mature at 14-16 inches. Retain some large beech for mast production. The primary tools of management to be used in this stand are single tree selections and small group selections not to exceed 1 acre in size.

Scheduled Treatment: In all areas not recently managed, a selection harvest is appropriate and it will be aimed primarily at harvesting declining paper birch for sawlogs and pulpwood. Because paper birch is the dominant overstory species in some places, group selections of up to 1 acre will need to be used. At all times, seek to preserve red spruce both in the overstory and understory of the forest. At upper elevations along the eastern ridge, some mature sized red spruce is available for harvest, but immature areas should be left to grow. In the western portions of the stand, paper birch should also be examined for harvest and red spruce promoted where possible. Again, a small amount of mature spruce is available for harvest, but immature trees should be left to continue to grow. Some pre-commercial thinning would be beneficial in dense pole sized western areas particularly near the northern property line. This work is scheduled for 2016.

STAND 5

All of this hardwood stand is east of Kellogg Road, from 1700 to 2300 feet in elevation. The southern two thirds of the stand have been managed in recent years, including just about all areas easily accessed from Kellogg Road. Timber quality is not bad in most places, but it is not quite as good as east and northeast facing slopes elsewhere on the property. Being a west facing stand, beech is especially competitive in the regeneration mix and will likely become a larger percentage of the stocking over the next 20 years. Again, this stand is very large and contains lots of variation. Stocking figures do a rather poor job of describing this variation. In some areas, there has been no recent management and stocking levels have grown near the overstocked condition. In other areas, 2-acre patch cuts were employed to recruit new regeneration.

Acres: 326.70 (60 sample points)

Forest Type: Northern Hardwood

Natural Community Type: Northern Hardwood Forest

Species Composition: Sugar maple (45%), white ash (12%), beech (12%), yellow birch (10%), paper birch (8%), red spruce (5%), red maple (4%) and smaller amounts of black cherry, pin cherry, hophornbeam, basswood, striped maple, and red oak. Beech is the most common species in the understory, with smaller amounts of sugar maple, striped maple, hophornbeam, yellow birch, and red spruce.

Total Basal Area/Acre: 85 sq. ft.

Acceptable Growing Stock (Basal Area/Acre): 57 sq. ft.

Number Trees/Acre: 173

Mean Stand Diameter: 9.5" D.B.H. (Diameter at Breast Height)

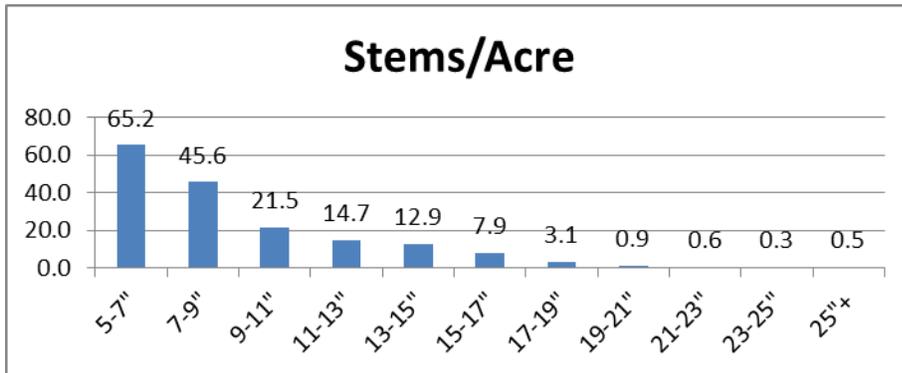
Timber Volumes: 2.343 MBF and 15.3 cords per acre

Stocking: Well stocked, above the B-line stocking level for even-aged northern hardwood stands. The stand would be considered overstocked at above 123 sq. ft. of basal area/acre (the A line) and understocked at below 47 sq. ft. (the C line). The recommended stocking level following a thinning (the B line) is 65 sq. ft.

Site Class: I, II (from soils and field examination)

Soil Mapping Unit: Tunbridge-Berkshire soil complex underlies most of this stand.

Stand Age: All-aged



Of all the stands on the property, this stand has the diameter distribution that most closely resembles the ideal shape for an all-aged stand. With some additional growth to build the 20"+ size classes, this stand should easily achieve the target Q factor of 1.3. The current Q factor is 1.29.

Stand History and Cultural Elements: This stand began regenerating from pasture 70-100 years ago and has been logged periodically over the past 40 years. The most recent harvesting was completed within the last 5 years. The 1998 ice storm caused damage in the higher elevation portions of the property, but most noticeably in the far northern part of the stand. Some salvaging was completed following this storm, primarily in the northern half of the property.

Water Quality, Wetlands, and Riparian Zones: This stand contains the headwaters of four drainages, all of which eventually flow into the North Branch of the Ottauquechee River. These drainages tend to be very small while still in the upper reaches of their watersheds. Reduce the intensity of logging within 25 feet of these drainages and avoid crossing them where possible.

Access Network: Established skid routes lead to nearly all portions of the property. Many trails were used in recent harvesting activities and are easily identifiable. Those trails not used since 1998 in the north end of the stand have grown up to saplings and will have to be re-opened for harvesting. No erosion was noted.

Wildlife: Signs of bear activity on beech trees was noted in all of the stand. Retain all healthy beech trees and those trees showing historic signs of bear use. Retain any oak trees that are found, along with all large diameter standing dead trees and live trees with substantial cavities which may be used by nesting owls, woodpeckers, or small mammals.

Coarse Woody Debris (CWD): 21.9 dead trees per acre and 1.28 pieces of coarse woody debris were tallied per sample point. Again, dead trees in this stand tend to be somewhat smaller than what is most useful to wildlife. Dead trees over 16" diameter have the most potential.

Insects and Disease and Invasive Species: Normal amounts of beech bark disease and sugar maple pests were noted. As beech becomes a more dominant part of the stocking, the effect of beech bark disease will become greater and greater. Ice damage from 1998 is still evident in the crowns of trees growing above 2100 feet. Most trees have recovered satisfactorily, though the occasional ash tree will be noted which is still struggling to regenerate a substantial crown. No invasive plants were noted.

Longterm Objective: Continue uneven-aged management for the production of good quality hardwood sawlogs. In this stand, sugar maple is considered mature at 18-20 inches in diameter. White ash, yellow birch, paper birch, black cherry, and red maple crop trees are considered mature at 16 inches. The return interval for harvesting in any part of the stand is 20-30 years. Single tree selections are the tool of choice in this stand. Group selections may be made as large as 2 acres if there are insufficient desirable crop trees within the area. Generally though, group selections should be kept smaller, at 1 acre or less. Single tree selection harvesting should be viewed as the tool of choice in most instances. Keep any beech trees that appear free of beech bark disease. In time, it may become necessary to pre-commercially thin beech poles that are growing among more desirable crop tree species.

Scheduled Treatment: Several pockets of hardwood along the eastern side of the stand in the northern half of the property were noted which would benefit from some selection harvesting. If these areas can be harvested economically, they should be. Target declining paper birch, mature white ash, and defective trees of all species while releasing crop trees using single tree selections. Avoid creating any more large openings in the near future. This work is very limited in scope and is not especially high priority. Hardwood sawlogs, firewood, and pulp are the expected products. The scheduled date is 2019.

SUMMARY

STAND	ACRES	FOREST TYPE	SCHEDULED TREATMENT
1	71.25	Northern Hardwood	2016: Selection harvest in southern half
2	115.11	Mixedwood	2016: Selection harvest only northeast of camp
3	224.77	Northern Hardwood	2016: Selection harvest only in western areas
4	221.03	Red Spruce-Hardwood	2016: Selection harvest aimed primarily at harvesting declining paper birch
5	326.86	Spruce-Hardwood	2019: Very limited selection harvest in pockets along the eastern stand edge in northern half of property
<hr/>			
	958.86	Total Productive Forestland	
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	958.86	Total Enrolled in Use Value Appraisal Program	
	2.00	Excluded from Use Value Appraisal Program	
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	960.86	Total Grand List	

UVA MANAGEMENT PLAN SUMMARY FORM

New [X] Update [] Amendment [] Change of Ownership []

Town: Bridgewater

1) Parcel ID: SPAN 084-026-10034

2) Plan Preparer: Redstart Forestry

3) Year of Entry: 2014 5) Previous Owner:

4) Year of last plan:

7) Year of last inspection:

8) Ortho Sheet #: 140124 Year: 2012

Following is prepared by agent

 9) Landowner Names: Raymond Otis Robinson

10) Landowner address: P. O. Box 132
 Bridgewater, VT 05034

11) Total Forestry acres in parcel: 959

12) Stand Information

Std #	Acres	Age	Site	Type	MSD	Tot BA	AGS BA	Mgmt	Date
1	71	2	1	06	11	92	66	7	2016
2	115	2	1-3	6/9	9	104	88	7/8	2016
3	225	2	1,2	06	11	93	74	7/8	2016
4	221	2	2	6/9	9	92	69	7/8	2016
5	327	2	1,2	06	10	85	57	7	2019

13) No Activity:

14) Mgmt Activities - other:

15) Timber Types - other: