

*Andrew and Tom Meyer Property
Forest Management Plan
July 09, 2020*

This forest management plan is a blueprint for responsible land stewardship. It is the result of a planning process that incorporated an assessment of the history and current conditions on the property, consideration of the various courses of future development that the forest could follow, and discernment as to which outcomes best suit the landowners' particular objectives.

By signing below, I certify that I approve of—and agree to manage my forestland according to—the following management plan. I further certify that any of my forestland that is enrolled in Vermont's Use Value Appraisal program is under active long-term forest management in accordance with the state's minimum acceptable standards for forest management. These standards include following Acceptable Management Practices to maintain water quality on logging operations.

Landowner

Date

Landowner

Date

Landowner

Date

Landowner

Date

This forest management plan meets the standards promulgated by the Vermont Department of Forests, Parks and Recreation as required for eligibility in the Use Value Appraisal Program.

County Forester

Date

Effective date of plan
April 1, 2020

Property

91.45 acres
Hardwick, VT
SPAN 282-089-11700
Mapping based on VMP photo(s)
160220, 160224, 164220, 164224

Owner

Andrew and Thomas Meyer
3707 Bridgman Hill Road
Hardwick, VT 05843

Prepared by

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Introduction

This plan covers the ten year period from 2021 to 2030. It lays out the near- and medium-term actions that should guide the development of the Andrew and Tom Meyer Forest. It also qualifies the property for Use Value Appraisal (UVA) and commensurate reduction in property taxes.¹ Owners participating in the Use Value Appraisal program are obliged to manage their property according to the plan and to make any reasonable investments for improvement that the plan recommends.²

The plan is organized to reflect the forest decision making process. It begins with a general overview of the property, then lays out the landowner's management goals, before exploring the forest in detail and discussing the actions that could be taken to help meet those goals. Its recommendations were developed in accordance with the principles and practices of scientifically sound forestry, as described in the relevant management guidelines, textbooks and academic journals.

¹ Further information about UVA and current valuations can be found at the Vermont Tax Department's website: <https://tax.vermont.gov/property-owners/current-use>.

² UVA management plan standards are determined by the Department of Forests, Parks, & Recreation and are available at https://fpr.vermont.gov/forest/your_woods/use_value_appraisal or through a County Forester.

Property Description

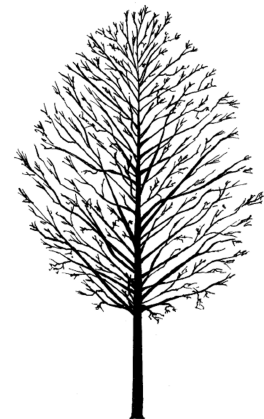
Some 84 percent of the 91.45 acre Andrew and Tom Meyer property is productive forestland that will be managed according to this plan. Its elevations range from 1140 to 1270 feet above mean sea level. One unnamed stream flows south across the property and into the Lamoille River in Hardwick. A small open wetland borders the stream as well, and accounts for all of the property's non-productive forestland. The stream and marsh limit vehicular access somewhat, but the great majority of the property's forestland is easily reached on a network of existing trails, which connect to a recently constructed access off Center Road. Property boundaries are demarcated by old flagging and healed over blazes, many of which have been repainted blue. The lines can be difficult to locate, and should be re-flagged before any logging operations. Soils, forest health, and other pertinent topics are discussed in the individual stand area descriptions that follow.

Principles, Goals & Strategies For Forest Management

The following sections describe the chief principles and goals that should guide forest management on the property; and outline the general strategies that can be used to support them.

Conservation

The ecological functioning, productive capacity and biological diversity of the forest resource should be maintained or improved over time so



as to provide opportunities for the current or future landowners to continue to enjoy and use the property. A management strategy that is sustainable in the long-term and viable in the short- and medium-terms offers a strong measure of protection against future development or conversion.

Ecological integrity, wildlife habitat, and biodiversity

Management should prioritize the protection of critical ecological functions, water resources, and threatened or rare plant and wildlife communities. Wetlands and stream-side riparian zones should be carefully delineated and protected; and management should give consideration to the habitat needs of native wildlife populations and to the relationship between the property, its neighbors and the larger landscape they are nested within. Management should be informed by and aim to improve landscape diversity, wildlife travel corridors, and habitat connectivity. Locally under-represented habitat types should be identified and promoted. Stand scale and sub-stand scale management should focus on developing or maintaining species-specific habitat needs, such as nesting sites, cover, mast production, preferred browse or other unique structural and compositional requirements.

Timber management

Management should provide regular returns from timber harvesting. Long-term value growth is provided by maintaining full site occupancy with healthy trees capable of producing high quality sawtimber or veneer. Tree species which yield sought-after, high-value wood should be promoted within each stand or, when regenerating a new stand, attention should be paid to creating stand conditions that favor the establishment of those species. At a property-wide scale, a variety of species should be maintained, providing options for seizing future market opportunities and a hedge against species-specific market depreciation. Among desired species, additional preference should be given to individual trees of sufficient vigor and grade-potential for strong future value growth. Consideration of economic efficiency should inform the timing and coordination of infrastructure investments and stand maintenance, improvement and harvest operations.

Scenery, recreation, and exploration

Conscientious management can create or maintain a landscape that is attractive, accessible and conducive to reflection, exploration and appreciation. Attractiveness can be managed for by fostering diversity within the landscape: accelerating the growth and development of the

most receptive individual trees in some places; maintaining the look, feel and accompanying privacy provided by a dense forest in other places; and elsewhere creating occasional vistas out from the forest and improvements in depth of visual penetration within it. Attentive maintenance of existing roads and trails and thoughtful improvements to the trail network should facilitate the satisfying use of the property, creating an appropriate balance between access and connectedness, on the one hand, while preserving places of refuge and sanctuary, on the other. A system of roads and trails of various sizes, suited for various purposes, and interconnected with a broader trail network, provide for both enjoyable recreation and efficient operations. An inviting, easily accessed working forest should also encourage study and intellectual exploration, allowing an interested land owner to become increasingly knowledgeable about their land and positioned to contribute meaningfully to its ongoing management.

Stand Descriptions & Management Recommendations

Presented below are detailed stand-by-stand descriptions of the forest, the long-term structural, compositional and functional goals for each stand, and the near-term silvicultural treatments or management activities that have been prescribed to advance each stand toward those goals. The data presented in the following pages was obtained from a field examination of the property in July of 2020. General conditions were assessed qualitatively in conjunction with quantitative sampling. Observational notes and sample summary statistics together provide the basis for the area descriptions and management recommendations. All sampling was done using a systematic sample and variable radius plots. In stands with uneven-aged structures, all trees 6" dbh and larger were measured in each plot. In stands with even-aged structures, all main-canopy trees were measured in each plot.

When contractors are used to implement silvicultural prescriptions, they should be highly skilled, properly equipped, fully insured, and closely supervised. A professional forester should prepare and administer commercial treatments, and logging operations should be timed to coincide with favorable weather conditions (working on wet soils only when they are frozen, for instance) and favorable timber markets. Use Value Appraisal program guidelines allow any management activities prescribed in this plan to be carried out up to three years before or after the date indicated. Landowners in the Use Value Appraisal program must file a Forest Management Activity Report with the County Forester by February 1st if any commercial logging occurred in the previous year.

The property should be reinventoried in 2029 and the findings

Management Schedule

2024

- Area 1: Single tree selection

2029

- Reinventory forest

brought to bear on a reassessment of the goals and strategies proposed in this plan, leading to a formal management plan update. At any point over the course of this management period, this plan may be updated to incorporate new information and to reflect any new thoughts, concerns or considerations on the part of the landowner or the foresters helping to manage the land.

Area 1

Mixed softwood

63.33 legal acres | 61.87 measured acres

Site-specific information

- **Soils:**
Vershire-Lombard complex (moderately deep, well drained, very stony glacial till on summits, shoulders, and backslopes)
Buckland silt loam (very deep, moderately well drained, very stony dense glacial till on footslopes)
Cabot silt loam (very deep, poorly drained, very stony dense glacial till on toeslopes and drainageways)
- **Site Class:**
 II – III (determined from soil mapping and field assessment)
- **Access:**
 Good trail network with the potential to tie in to trails on nearby properties. All forestland is less than 1 mile from Center Road and a good access road was constructed off Center Road about a decade ago. Some wet areas in the south and west are better accessed on frozen soils.
- **Stand history:**
 History of periodic logging. Portions of the stand were logged in the early 90s, leading to variable stocking and age structures.

Current forest information

- **Age Class Structure:**
 Uneven-aged
- **Average stocking (with 95% confidence intervals):**
 141 sq ft basal area (+/- 28 sq ft)
 10.5" quadratic stand diameter (+/- 0.6")
 234 trees per acre (+/- 48 trees)

Size Class	Total	AGS	UGS	Target
6-11 in.	55	48	7	40
12-15 in.	66	63	4	45
16-21 in.	14	12	2	12
22+ in.	6	4	1	0
Total	141	127	14	97

Current (total, acceptable, and unacceptable growing stock) and post-harvest target basal areas (sq ft/ac) by size class.

Diameter distributions for common species

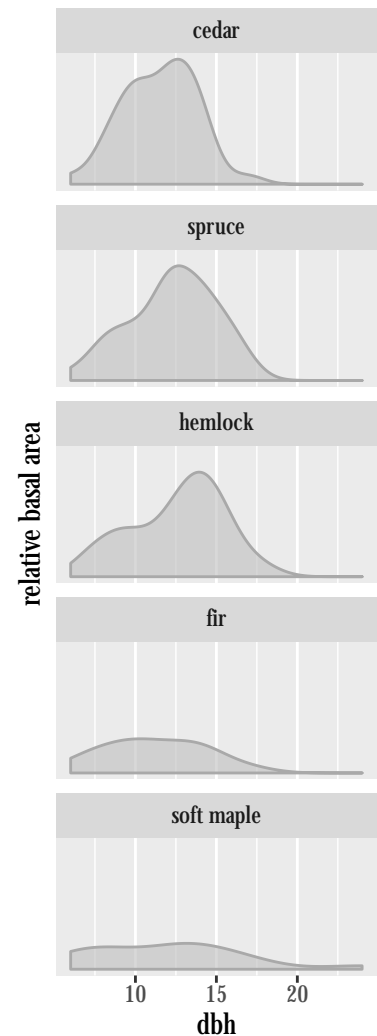


Figure 1: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

- **Species (% stocking):**

cedar (21%), spruce (21%), hemlock (19%), fir (9%), soft maple (9%), hard maple (5%), white pine (4%), aspen (4%), paper birch (3%), yellow birch (3%), ash (2%), black cherry (1%), other hardwood (1%), tamarack (1%)

- **Regeneration:**

Scattered fir, spruce and yellow birch in areas of higher stocking, where there was no logging in the 90s. Logged areas host abundant fir, spruce, paper birch, and yellow birch saplings, especially where stocking was brought below about 100 square feet.

- **Forest health:**

Relatively high mortality in fir, even among poles. One non-native honeysuckle was observed during the inventory and removed. Invasive plants are not a threat, but should be watched for so that any developing populations can be kept in check. Heavy deer browse probably inhibited hardwood regeneration after the last logging operation and pushed the composition toward fir and spruce.

Inventory information

- 14 points, 10 BAF, July, 2020

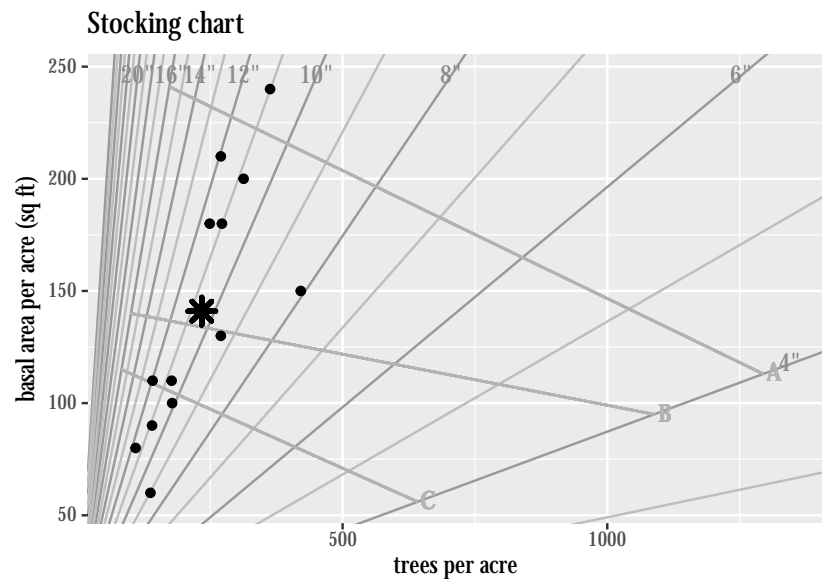


Figure 2: Points represent individual plots. Asterisk represents stand average. Radial lines are quadratic stand diameters.

Long-term management system

Selection system

We will continue to manage the stand using uneven-aged techniques. Single tree selection has been the dominant paradigm in at least the last several cutting cycles, and seems to be working. The last logging operation covered about half of the stand area, left a healthy residual, and triggered abundant regeneration. We plan to continue using single tree selection treatments, with a 15 or 20 year cutting cycle, residual basal areas of 80 to 100 square feet per acre (after Frank and Bjorkbom 1973), and diameter objectives that vary by species. Balsam fir and aspen should be considered mature at 14" dbh; spruce, red maple, black cherry, and paper birch at 18"; and white pine, hard maple, and yellow birch at 20". While cedar is well represented in the stand by basal area, it is mostly limited to denser 'microstands' on wet soils within the larger stand. These areas should not be treated the same as the rest of the stand because high deer browse pressure will almost certainly prevent the cedar from regenerating, and it will eventually be replaced by other species. This process has been eroding cedar populations across the northeastern US and eastern Canada for the last half century. Instead, cedar pockets should be treated as even-aged inclusions until the deer population is less or steps have been taken to prevent their browse. At that time concerted efforts can be made to regenerate the next generation of cedar with a reasonable chance of success. (See Larouche and Ruel (2015) and Boulfroy et al. (2012) for more information.)

Silvicultural prescription

Single tree selection

Year: 2024

The areas of the stand with higher stocking, that were not logged in the 90s, should be treated using single tree selection when softwood timber markets become favorable. Generally, the basal area should be reduced to 80 or 100 square feet per acre (after Frank and Bjorkbom 1973) with the goal of meeting the post-harvest target basal areas by size class that are presented in the diameter distribution table above (under "Current forest information"). This will allow us to simultaneously capture the value of mature trees, thin immature cohorts, and establish a new cohort. The residual species composition should generally reflect the existing composition, though we expect to decrease the relative abundance of fir and hemlock somewhat and increase the relative abundance of spruce. Spruce, maple, and birch will ideally be regenerated, but deer browse pressure will probably limit hardwood regeneration and advance fir regeneration will persist. Tending in future harvests can be used to decrease the fir component. Hunting in the years after the treatment could also help to increase the survival

of hardwood regeneration. In areas dominated by cedar, the stocking should be kept higher (perhaps 150 square feet per acre) and well formed cedars with large crowns should be retained, to ensure that a healthy cedar population will remain until cedar can be successfully regenerated.

Logging should either be carried out in winter on frozen soils, or skid trails should be carefully located to keep equipment out of wet areas. The treatment will also be a good opportunity to improve the recreational trail network, and pre-harvest skid trail layout will ensure that any new trails that are built will contribute to the property's recreation potential.

Area 2

Northern hardwood

13.16 legal acres | 12.86 measured acres

Site-specific information

- **Soils:**

Vershire-Lombard complex (moderately deep, well drained, very stony glacial till on summits, shoulders, and backslopes)

Buckland silt loam (very deep, moderately well drained, very stony dense glacial till on footslopes)

- **Site Class:**

II – III (determined from soil mapping and field assessment)

- **Access:**

Good trail network. All forestland is less than 1 mile from Center Road. Wet area in the east should be avoided until trees have fully established themselves.

- **Stand history:**

Developed from abandoned pasture c. 1960s. Much of the stand established well and is now in the stem exclusion phase of development; but wetter soils in the east, near Center road, have delayed establishment and left areas dominated by herbaceous growth. We suspect that this wet area will develop a closed canopy eventually, but probably not in the next several decades.

Current forest information

- **Age Class Structure:**

Even-aged

- **Average stocking (with 95% confidence intervals):**

75 sq ft basal area (+/- 49 sq ft)

6.2" quadratic stand diameter (+/- 1.9")

356 trees per acre (+/- 244 trees)

Size Class	Total	AGS	UGS
6-11 in.	58	48	10
12-15 in.	8	8	0
16-21 in.	0	0	0
22+ in.	0	0	0
Total	65	55	10

Current basal area (sq ft/ac) of total growing stock, acceptable growing stock (AGS), and unacceptable growing stock (UGS) by size class.

Diameter distributions for common species

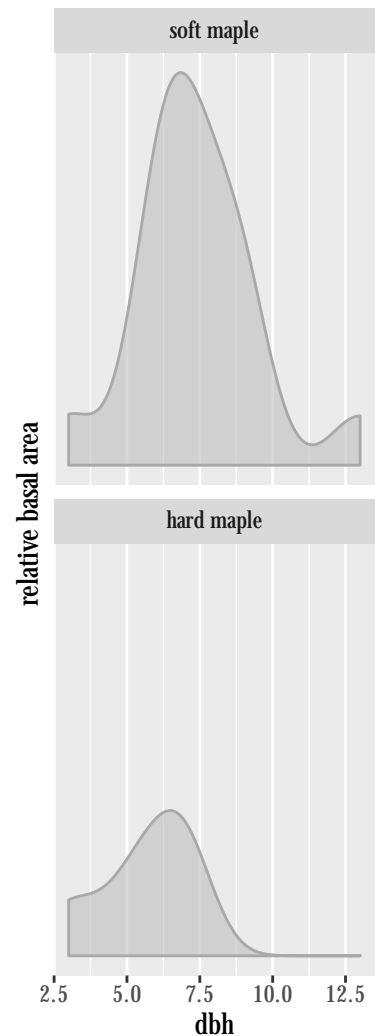


Figure 3: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

- **Species (% stocking):**
soft maple (54%), hard maple (12%), aspen (8%), fir (8%), yellow birch (8%), ash (4%), black cherry (4%), cedar (4%)
- **Regeneration:**
Young stand is still in stand establishment and stem exclusion phases, and has not developed any advance regeneration.
- **Forest health:**
A couple of exotic honeysuckle plants were observed in the wet open area, but they only constitute a very minor infestation and should not be a problem as long as machinery is excluded.

Inventory information

- 4 points, 10 BAF, July, 2020

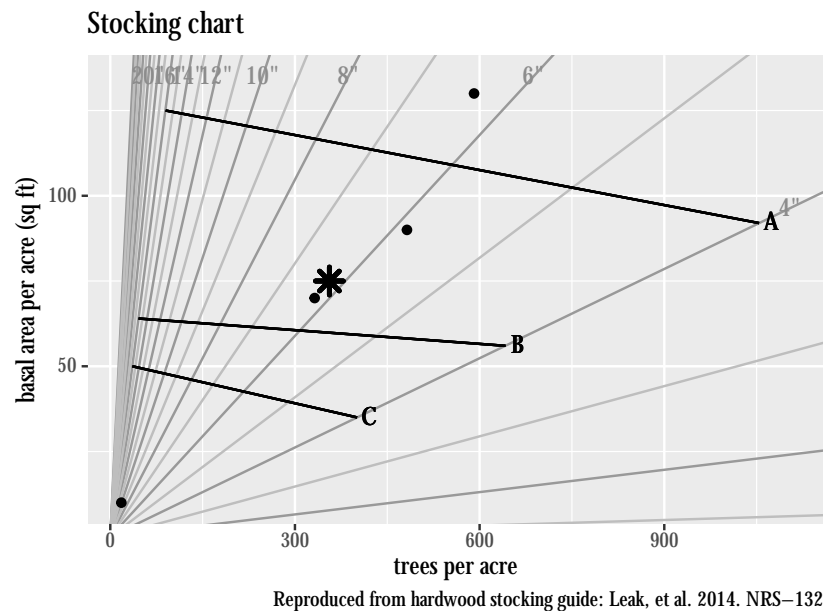


Figure 4: Points represent individual plots. Asterisk represents stand average. Radial lines are quadratic stand diameters.

Long-term management system

Even-aged management

This stand should be managed using even-aged techniques and grown on a rotation of about 100 years. We believe the stand is 50 or 60 years old now. Thinnings should be carried out every 15 or 20 years, starting when trees reach merchantable sizes.

Silvicultural prescription

No logging is necessary in this young stand over the next ten years. Efforts to eradicate honeysuckle from the wet, eastern section of the stand could pay off, though they don't appear to be spreading. At the least, they should be monitored so they can be dealt with if they do begin to spread. Wet-tolerant trees could be planted in open spots too, to speed stand establishment, but planting is not necessary.

References

- Boulfroy, Emmanuelle, Eric Forget, Philip V. Hofmeyer, Laura S. Kenefic, Catherine Larouche, Guy Lessard, Jean-Martin Lussier, Fred Pinto, Jean-Claude Ruel, and Aaron. Weiskittel. 2012. “Silvicultural Guide for Northern White-Cedar (Eastern White Cedar).” NRS-GTR-98. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. doi:10.2737/NRS-GTR-98.
- Frank, Robert M., and John C. Bjorkbom. 1973. “A Silvicultural Guide for Spruce-Fir in the Northeast.” Gen. Tech. Rep. NE-6. USDA FS Northeastern Experiment Station.
- Larouche, Catherine, and Jean-Claude Ruel. 2015. “Development of Northern White-Cedar Regeneration Following Partial Cutting, with and Without Deer Browsing.” *Forests* 6 (12): 344–59. doi:10.3390/f6020344.