FOREST MANAGEMENT PLAN

for the property of

Daphne E. Hallowell

40 Headlands Way
Westport, New York 12993

519.60 acres (421.6 certified eligible)

Parcel IDs:

66.2-2-8.000
66.2-2-9.110
66.2-2-10.000
66.2-2-11.000
66.2-2-12.000

Deed (Liber/Page): 696/291

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Original certication date: 2/9/1989

Prepared by:

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Saranac, NY 12981

Introduction

This plan covers the fifteen year period from 2019 to 2034. It lays out the near- and medium-term actions that should guide the development of the Headlands Farm forest. It also qualifies portions of the property for continued enrollment in the 480-a Forest Tax Law program and commensurate reduction in property taxes.[1] Owners participating in the program are obliged to manage enrolled portions of their property according to their approved forest management plan and to make any reasonable investments for improvement that the plan recommends. 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 480-a can be found at the New York Department of Conservation's website: `https://www.dec.ny.gov/lands/5236.html`.

Property Description

Some 80 percent of the 519 acre Headlands Farm property is productive forestland to be managed according to this plan. The property is located within the Adirondack Park in the Town of Westport, Essex County, New York. The property fronts Lake Shore Road and all stands are operationally accessible via a well developed internal road network. Property-wide, elevations range from 95 to 740 feet above mean sea level. The property fronts Lake Champlain along over 8/10 of a mile of shoreline and five small streams flow through the property and enter into lake. The largest of these drains less than 1,000 acres, while the others are considerably smaller and originate on the property or not far upstream from its boundaries. Portions of the largest streams support wetlands, including seasonally flooded forested wetlands, alder shrub wetlands, and small shallow emergent marshes. In addition to the property's southern boundary along Lake Champlain, an irregular line runs for over four miles defining the east, west, and north boundaries. Lake Shore Road accounts for portions of that line, but the majority of boundaries are between adjoining properties. These lines are generally well marked in the field (typically with tree blazes and red boundary marking paint), but will require on-going maintenance. Soils, forest health, and other pertinent topics are discussed in the individual stand area descriptions that follow.

Principles, Goals & Strategies For Forest Management

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.

Timber management

Management should provide regular returns from timber harvesting. Long-term value growth is provided by maintaining full site occupancy with investment-grade stems: healthy trees capable of producing high quality sawtimber or veneer and worth retaining in the stand until they reach their full, site- and species-specific target diameters. 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 providing the stand conditions which 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.

Amenity values

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: promoting the growth and development of the most appealing 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. Carefully planned and deliberately located infrastructure should facilitate the satisfying use of the property, creating an appropriate balance between access and connectedness, on the one hand, and 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.

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 thorough inventory of the property in the summer of 2019. General conditions were assessed qualitatively in conjunction with quantitative sampling. Observational notes and sample summary statistics together provide the basis for the stand 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" in diameter at breast height (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 su-

pervised. 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. The dates assigned to timber harvests and other management activities prescribed in this plan are intended to guide, rather than constrain, forest management. To accommodate dynamic markets and variable weather, scheduled timber harvests may be advanced or delayed by one year from the date indentified in this plan; if operational or economic conditions change substantially, the management schedule may be further revised by an ammendment to this plan.

The property should be reassessed in 2024 and the findings brought to bear on a reassessment of the goals and strategies proposed in this plan, leading to a formal management plan update.

Management Schedule

2020 - Stand 1: Commercial harvest

2021 – Stand 2: Commercial harvest

2022 – No scheduled activity

2023 – Stand 3: Commercial harvest

2024 – Management plan update; boundary line maintenance

2025 – Stand 5: Commercial harvest

2026 – Stand 6: Commercial harvest

2027 – Stand 4: Commercial harvest

2028 – No scheduled activity

2029 – Stand 7: Commercial harvest; management plan update; boundary line maintenance

2030 – No scheduled activity

2031 – No scheduled activity

2032 – No scheduled activity

2033 – No scheduled activity

2034 – Full management plan revision; boundary line maintenance

Stand 1

Mixedwood
17.80 acres

Site-specific information

- **Soils:**
  Tunbridge, Lyman
- **Site Class:**
  II & III (determined from soil mapping and field assessment)
- **Access:**
  Less than 1 mile
- **Stand history:**
  All but the roughest portions of this stand had been cleared for grazing in the 19th century and originated after agricultural abandonment over 100 years ago. Since professional forest management began on the property in the 1980s, the stand has benefitted from regular improvement harvests and has aquired a more complex demographic structure. Portions of the stand were most recently harvested in the winter of 2007-2008 as part of a operation that included adjacent parts of Stand 2.

Current forest information

- **Age Class Structure:**
  Uneven-aged
- **Species (% stocking):**
  hemlock (28%), red oak (28%), white pine (16%), beech (7%), hard maple (7%), soft maple (6%), ash (3%), yellow birch (3%), hophornbeam (1%)
- **Regeneration:**
  Regeneration is present throughout the stand. It generally reflects the composition of the overstory cohort, though hemlock and beech are somewhat overrepresented. Regeneration is not evenly distributed, with dense pockets of desirable stems, including white pine and hard and soft maple, established beneath canopy openings.
- **Forest health:**
  Few forest health issues were observed on this portion of the property. Beech bark disease is present and affects older beech trees.
- **Volume/ac:**
  0.4 MBF veneer, 5.6 MBF sawtimber, 2.5 MBF tie logs, 8.8 cds pulp
- **Size class structure (%BA):**
  6-10": 16% | 11-16": 44% | 17-22": 32% | 23+": 7%

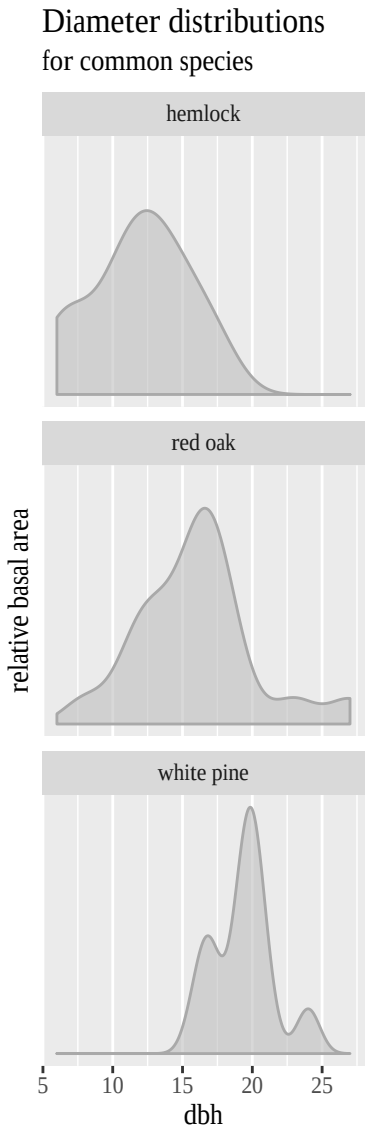

Figure 1: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

Inventory information

- 6 points, 10 BAF, August, 2019

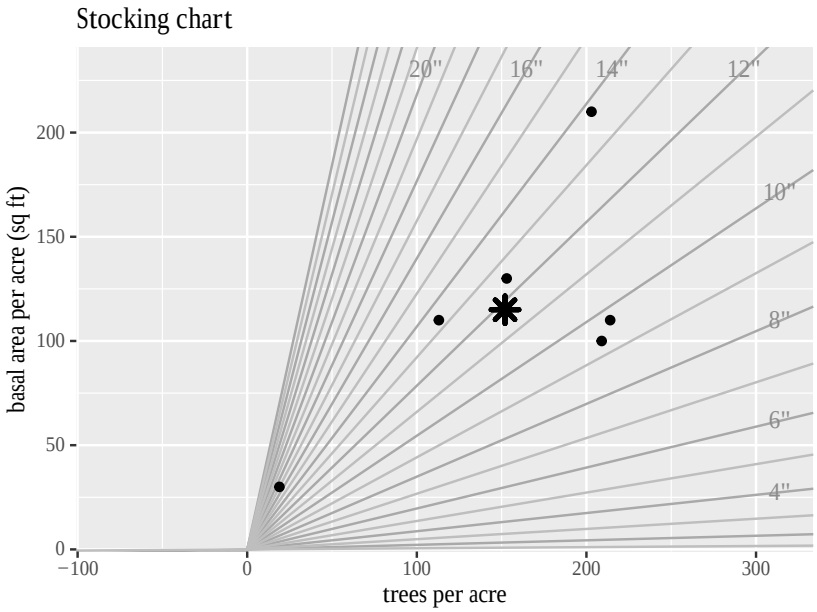

Figure 2: Points represent individual plots. Asterisk represnts stand average. Radial lines are quadratic stand diameters.

Table 1: Measures of stocking for all live trees (total) and acceptable growing stock.

	Total	Acceptable
Basal area (sqft/ac)	115	85
QSD (in)	12	12
Stems/ac	152	103

Silvicultural prescription

2020 – Group selection harvest with commercial tending: Groups between 0.25 and 1.5 acres should be established throughout the stand; in aggregate, the area of group openings should not exceed 15% of the total stand area. Groups should be located so as to: (1) release desirable advanced regeneration, (2) provide a variety of site conditions and light environments for the establishment of a diverse new regeneration cohort, and (3) remove concentrations of unacceptable growing stock or economically mature stems. Some larger group openings may be structured as group shelterwoods, with up to 40 sqft. of residual basal area retained to favor shade-intermediate to shade-tolerant species. The matrix between group openings should be lightly thinned, to approximately 100 sqft., with an emphasis on retention of high-value stems.

Stand 2

Mixed softwood
108.20 acres

Site-specific information

- **Soils:**
  Chatfield, Cayuga, Nehasne, Tunbridge, Kalurah
- **Site Class:**
  II (determined from soil mapping and field assessment)
- **Access:**
  County road frontage
- **Stand history:**
  The history and development of this stand closely follows that of Stand 1, though the accessible, easily-worked areas along the road were abandoned later than some of the more rugged sections of these stands. Like all of the stands on the property, it has benefitted over recent decades from thoughtful management and well-executed improvement harvests. The stand was last entered in the winter of 2006-2007 and again 2007-2008 in conjunction with activity in parts of Stand 1.

Current forest information

- **Age Class Structure:**
  Uneven-aged
- **Species (% stocking):**
  hemlock (41%), white pine (31%), soft maple (10%), hard maple (4%), red oak (4%), beech (3%), yellow birch (3%), white oak (2%), ash (1%), aspen (0%), hickory (0%), hophornbeam (0%), other hardwood (0%)
- **Regeneration:**
  Regeneration is established in much of the stand and generally reflects the composition of the overstory cohort. Some patches of exceptionally vigorous young white pine are present beneath canpy gaps and there is an encouraging amount of red oak seedlings and saplings distributed throughout the stand.
- **Forest health:**
  Invasive plant species, including Japanese barberry, common buckthorn and bush honeysuckle, are present in the stand and in places (primarily along the road) will inhibit regeneration if canopy openings are created.
- **Volume/ac:**
  0.1 MBF veneer, 10.4 MBF sawtimber, 3.1 MBF tie logs, 5.4 cds pulp
- **Size class structure (%BA):**
  6-10": 19% | 11-16": 29% | 17-22": 34% | 23+": 18%

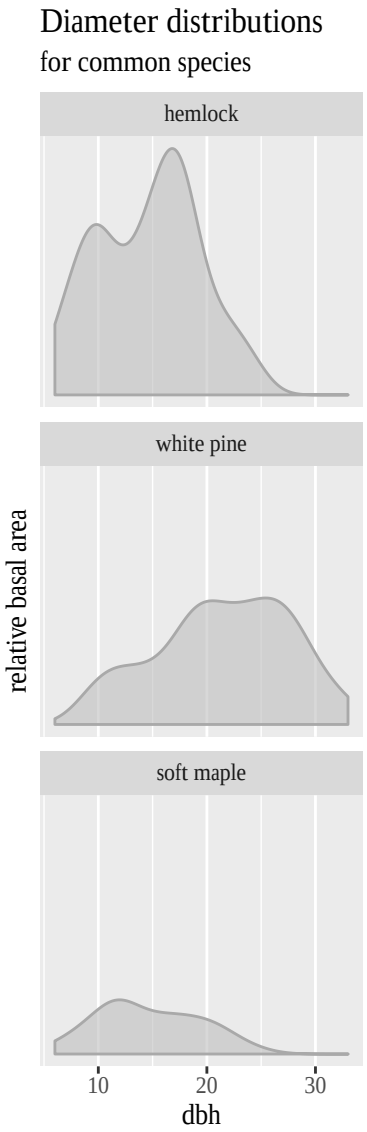

Figure 3: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

Inventory information

- 26 points, 10 BAF, August, 2019

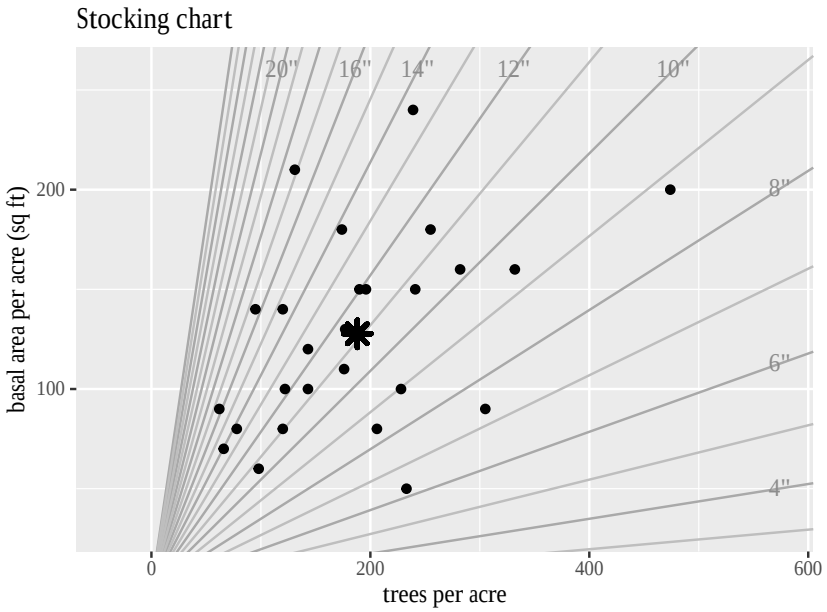

Figure 4: Points represent individual plots. Asterisk represnts stand average. Radial lines are quadratic stand diameters.

Table 2: Measures of stocking for all live trees (total) and acceptable growing stock.

	Total	Acceptable
Basal area (sqft/ac)	128	110
QSD (in)	11	12
Stems/ac	188	152

Silvicultural prescription

2021 – Group selection harvest with commercial tending: Groups between 0.25 and 1.5 acres should be established throughout the stand; in aggregate, the area of group openings should not exceed 15% of the total stand area. Groups should be located so as to: (1) release desirable advanced regeneration, (2) provide a variety of site conditions and light environments for the establishment of a diverse new regeneration cohort, and (3) remove concentrations of unacceptable growing stock or economically mature stems. Some larger group openings may be structured as group shelterwoods, with up to 40 sqft. of residual basal area retained to favor shade-intermediate to shade-tolerant species. The matrix between group openings should be lightly thinned, to approximately 110 sqft., with an emphasis on retention of high-value stems.

Stand 3

Mixedwood
75.20 acres

Site-specific information

- **Soils:**
  Chatfield, Hollis, Pittsfield, Covington
- **Site Class:**
  II & III (determined from soil mapping and field assessment)
- **Access:**
  Internal road frontage
- **Stand history:**
  This stand developed following agricultural abandonment in the late 1800s. Though somewhat thin soiled, the eastern portion of the stand appears to have been improved pasture, while the steeper western portion of the stand was likely a combination of unimproved pasture and wooded pasture with isolated patches of inaccessible remnant forest. Recent harvest activity focused on improving timber quality, maintaining stand vigor and establishing new regeneration. Entries occured in 2004 and 2005, and again between 2015 and 2017.

Current forest information

- **Age Class Structure:**
  Uneven-aged
- **Species (% stocking):**
  white pine (35%), hemlock (28%), red oak (17%), hard maple (8%), soft maple (5%), beech (1%), hickory (1%), white oak (1%), basswood (1%), yellow birch (1%), cedar (0%)
- **Regeneration:**
  Regeneration is variable across the stand but generally sufficient to meet the goals of an uneven-aged management system with large target diameters and extended patch-scale rotations. Composition of the advanced regeneration cohort is similar to that of the overstory.
- **Forest health:**
  Only minor forest health issues were noted, including beech bark disease, a few instances of maple borer damage, and occassional signs of dieback among the white pines.
- **Volume/ac:**
  0.5 MBF veneer, 10.5 MBF sawtimber, 2.5 MBF tie logs, 7.1 cds pulp
- **Size class structure (%BA):**
  6-10": 12% | 11-16": 32% | 17-22": 31% | 23+": 25%

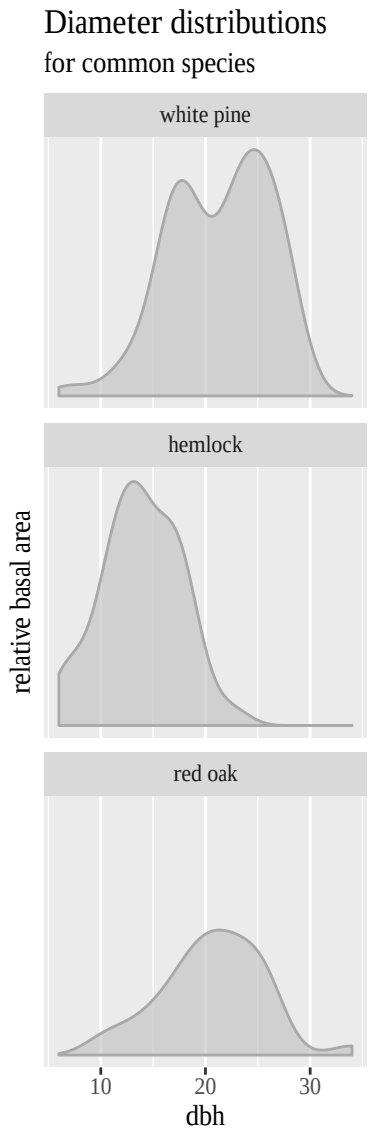

Figure 5: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

Inventory information

- 17 points, 10 BAF, August, 2019

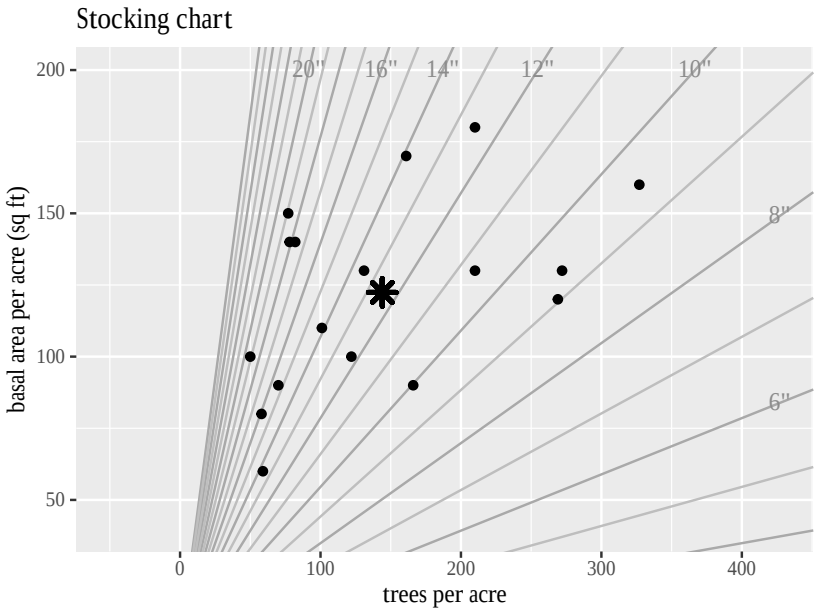

Figure 6: Points represent individual plots. Asterisk represnts stand average. Radial lines are quadratic stand diameters.

Table 3: Measures of stocking for all live trees (total) and acceptable growing stock.

	Total	Acceptable
Basal area (sqft/ac)	122	109
QSD (in)	12	14
Stems/ac	144	108

Silvicultural prescription

2023 – Group selection harvest with commercial tending: Groups between 0.25 and 1.5 acres should be established throughout the stand; in aggregate, the area of group openings should not exceed 15% of the total stand area. Groups should be located so as to: (1) release desirable advanced regeneration, (2) provide a variety of site conditions and light environments for the establishment of a diverse new regeneration cohort, and (3) remove concentrations of unacceptable growing stock or economically mature stems. Some larger group openings may be structured as group shelterwoods, with up to 40 sqft. of residual basal area retained to favor shade-intermediate to shade-tolerant species. The matrix between group openings should be lightly thinned, to approximately 110 sqft., with an emphasis on retention of high-value stems.

Stand 4

Mixedwood
91.80 acres

Site-specific information

- **Soils:**
  Chatfield, Vergennes, Kingsbury
- **Site Class:**
  II (determined from soil mapping and field assessment)
- **Access:**
  Internal road frontage
- **Stand history:**
  This stand developed primarily from cultivated fields and improved pasture, with some portions of the stand having remained open into the 20th century. An irregular pattern of gradual abandonment and subsequent harvesting have led to the development of a reasonably well-structured stand. The stand has been harvested twice in the past two decades, with entries in 2003-2004 and again in 2012-2013.

Current forest information

- **Age Class Structure:**
  Uneven-aged
- **Species (% stocking):**
  white pine (48%), hemlock (21%), red oak (10%), hard maple (5%), basswood (3%), ash (2%), hickory (2%), soft maple (2%), white oak (2%), paper birch (1%), beech (1%), elm (1%), yellow birch (1%)
- **Regeneration:**
  Regeneration is scattered throughout the stand, but concentrated in areas with reduced stocking. There are limitted stems in the pole and small sawtimber size-classes, but should be a sufficient sapling cohort following recent harvests to create a more balanced size-class structure. All of the principal overstory species are present among the regeneration.
- **Forest health:**
  Some invasive plants are present in the stand but not yet sufficiently well establised to pose a threat to continued productivity. These include buckthorn and honeysuckle.
- **Volume/ac:**
  0.6 MBF veneer, 7.4 MBF sawtimber, 2 MBF tie logs,
  5 cds pulp
- **Size class structure (%BA):**
  6-10": 18% | 11-16": 39% | 17-22": 23% | 23+": 20%

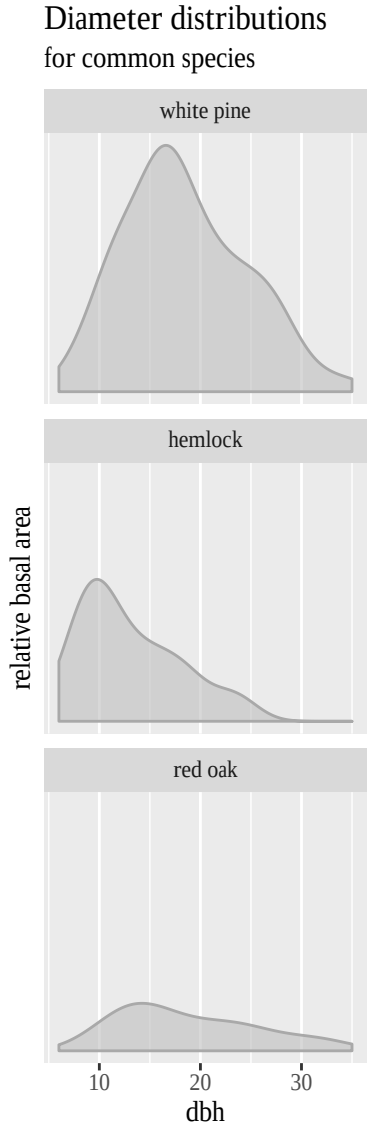

Figure 7: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

Inventory information

- 17 points, 10 BAF, August, 2019

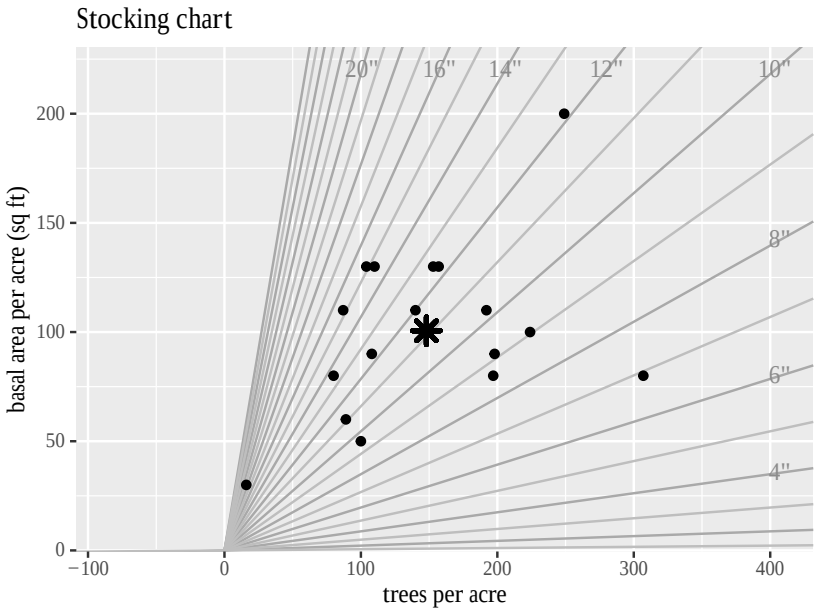

Figure 8: Points represent individual plots. Asterisk represnts stand average. Radial lines are quadratic stand diameters.

Table 4: Measures of stocking for all live trees (total) and acceptable growing stock.

	Total	Acceptable
Basal area (sqft/ac)	101	92
QSD (in)	11	11
Stems/ac	148	132

Silvicultural prescription

2027 – Group selection harvest with commercial tending: Groups between 0.25 and 1.5 acres should be established throughout the stand; in aggregate, the area of group openings should not exceed 15% of the total stand area. Groups should be located so as to: (1) release desirable advanced regeneration, (2) provide a variety of site conditions and light environments for the establishment of a diverse new regeneration cohort, and (3) remove concentrations of unacceptable growing stock or economically mature stems. Care should be taken to avoid establishing gaps where invasive plants are established in the understory. The matrix between group openings should be lightly thinned, to approximately 110 sqft., with an emphasis on retention of high-value stems.

Stand 5

Oak-pine
27.40 acres

Site-specific information

- **Soils:**
  Vergennes, Cayuga, Pittsfield
- **Site Class:**
  I & II (determined from soil mapping and field assessment)
- **Access:**
  Internal road frontage
- **Stand history:**
  The history and development of this stand is similar to that of Stand 4: productive, tillable soils were cleared and improved early in the farm's settlement and reamained open later than other areas of the property. A largely even-aged stand developed and, in recent decades, has been improved through relatively frequent, low-intensity harvests, including in 2005, 2006 and 2017.

Current forest information

- **Age Class Structure:**
  Even-aged
- **Species (% stocking):**
  red oak (35%), white pine (21%), hemlock (19%), hard maple (14%), soft maple (7%), white oak (2%), yellow birch (2%)
- **Regeneration:**
  Regeneration is sparse in this stand and will require thoughtful attention in advance of any end-of-rotation harvest planning.
- **Forest health:**
  The stand is largely in good health, though some invasive plants are present where the stand borders roads and open fields.
- **Volume/ac:**
  1.8 MBF veneer, 10.6 MBF sawtimber, 3.2 MBF tie logs, 7.2 cds pulp
- **Size class structure (%BA):**
  6-10": 9% | 11-16": 30% | 17-22": 25% | 23+": 37%

Inventory information

- 5 points, 10 BAF, August, 2019

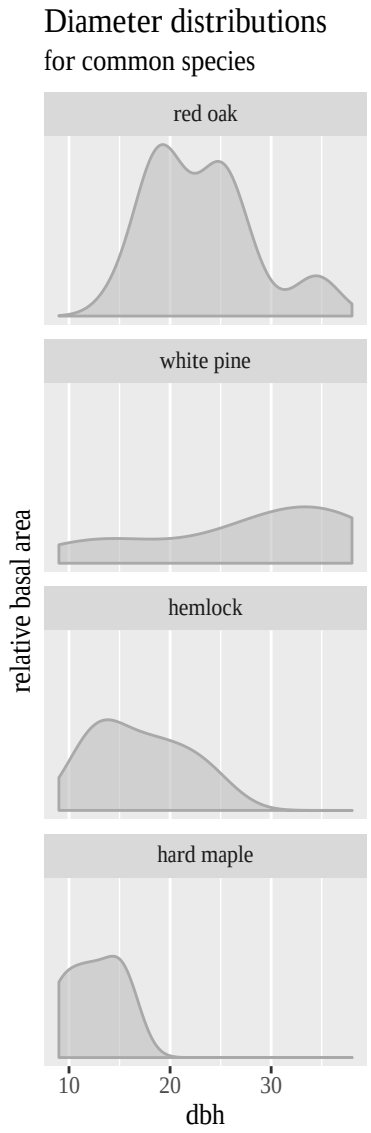

Figure 9: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

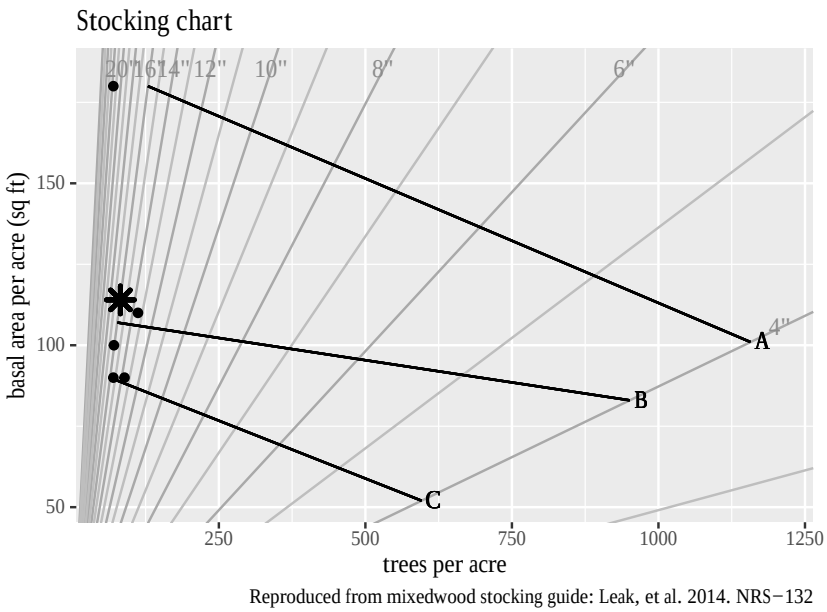

Figure 10: Points represent individual plots. Asterisk represnts stand average. Radial lines are quadratic stand diameters.

Table 5: Measures of stocking for all live trees (total) and acceptable growing stock.

	Total	Acceptable
Basal area (sqft/ac)	114	110
QSD (in)	16	16
Stems/ac	82	79

Silvicultural prescription

2025 – Commercial thinning: Basal area should be reduced to around 90 sqft., with removals concentrated among at-risk stems and those in direct competition with virogous, high-quality oaks, hard maples, or other valuable species.

Stand 6

Mixedwood
61.90 acres

Site-specific information

- **Soils:**
  Chatfield, Hollis
- **Site Class:**
  II & III (determined from soil mapping and field assessment)
- **Access:**
  Less than 1 mile
- **Stand history:**
  This stand includes steep rocky areas that were never cleared as well as former pasture that appears to have been abandonded in the late 19th century. Recent harvests have helped the stand develop a more favorable size-class distribution and have improved the overall quality and vigor of the stand. Portions of the stand were harvested in 2011-2012.

Current forest information

- **Age Class Structure:**
  Uneven-aged
- **Species (% stocking):**
  white pine (25%), red oak (24%), hickory (18%), hemlock (12%), hard maple (11%), white oak (4%), beech (3%), soft maple (2%), ash (1%), cedar (1%), yellow birch (1%)
- **Regeneration:**
  Regeneration is established in much of the stand and generally reflects the composition of the overstory cohort. Hemlock, hard maple, and white pine are all present, though variably distributed, among the regeneration.
- **Forest health:**
  Few forest health issues were observed on this portion of the property. Beech bark disease is present, though beech accounts for an insignificant portion of total stocking in the stand.
- **Volume/ac:**
  0.5 MBF veneer, 6.7 MBF sawtimber, 1.6 MBF tie logs, 7.3 cds pulp
- **Size class structure (%BA):**
  6-10": 31% | 11-16": 32% | 17-22": 27% | 23+": 10%

Inventory information

- 15 points, 10 BAF, August, 2019

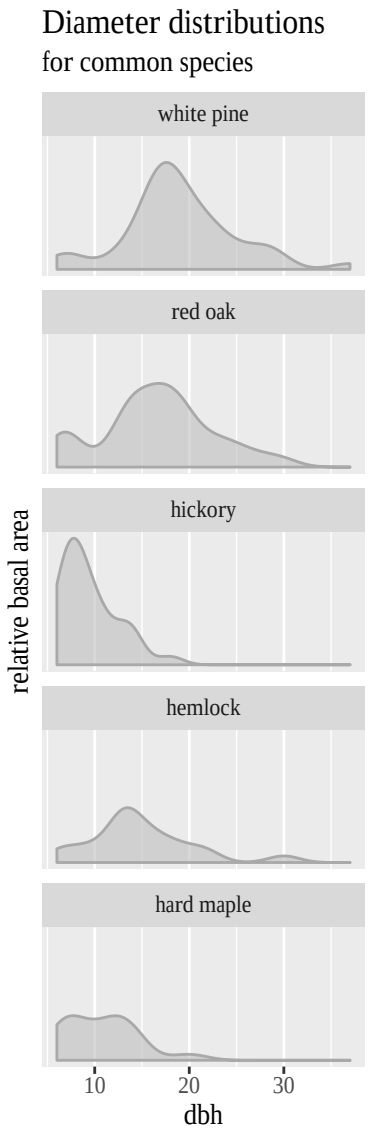

Figure 11: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

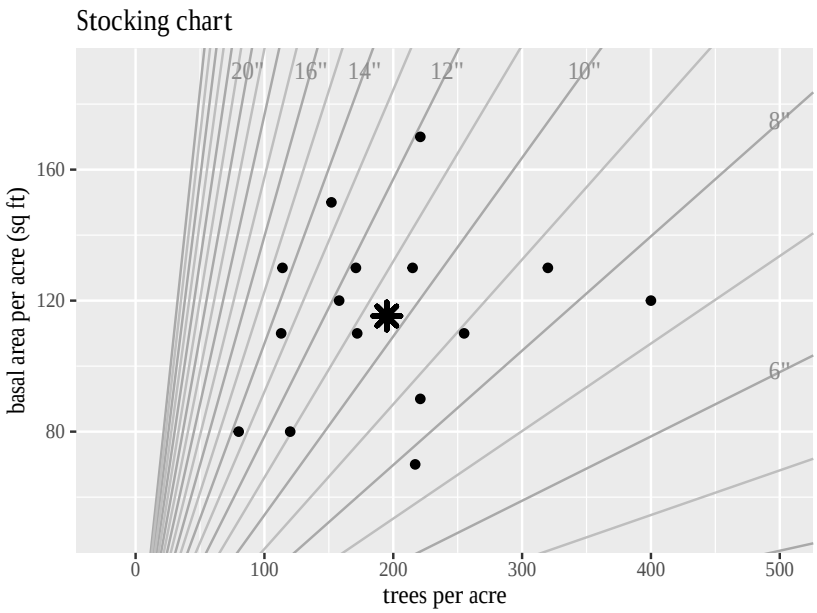

Figure 12: Points represent individual plots. Asterisk represnts stand average. Radial lines are quadratic stand diameters.

Table 6: Measures of stocking for all live trees (total) and acceptable growing stock.

	Total	Acceptable
Basal area (sqft/ac)	115	100
QSD (in)	10	10
Stems/ac	195	167

Silvicultural prescription

2026 – Group selection harvest with commercial tending: Groups between 0.25 and 1.5 acres should be established throughout the stand; in aggregate, the area of group openings should not exceed 15% of the total stand area. Groups should be located so as to: (1) release desirable advanced regeneration, (2) provide a variety of site conditions and light environments for the establishment of a diverse new regeneration cohort, and (3) remove concentrations of unacceptable growing stock or economically mature stems. Some larger group openings may be structured as group shelterwoods, with up to 40 sqft. of residual basal area retained to favor shade-intermediate to shade-tolerant species. The matrix between group openings should be lightly thinned, to approximately 110 sqft., with an emphasis on retention of high-value stems.

Stand 7

Mixedwood
40.90 acres

Site-specific information

- **Soils:**
  Chatfield, Hollis
- **Site Class:**
  II (determined from soil mapping and field assessment)
- **Access:**
  Less than 1 mile
- **Stand history:**
  This stand developed primarily from unimproved or only lightly improved pasture, though some areas of the stand near present-day field's edges appear to have remained open into the mid-20th century. Recent entries, along with varied site characteristics and a complex land-use history, have helped to break up the even-aged structure. The was harvested along with Stand 6 in 2011-2012.

Current forest information

- **Age Class Structure:**
  Uneven-aged
- **Species (% stocking):**
  white pine (46%), red oak (19%), soft maple (9%), cedar (7%), hemlock (5%), white oak (4%), ash (3%), hard maple (3%), hickory (2%), aspen (1%), beech (1%), hophornbeam (1%)
- **Regeneration:**
  Regeneration is scattered throughout the stand and generally only concentrated in areas with reduced stocking. All of the principal overstory species are present among the regeneration, but shade tolerant species like hard maple, hemlock and beech are relatively more abundant.
- **Forest health:**
  Few forest health issues were observed on this portion of the property. Beech bark disease is present, though beech accounts for an insignificant portion of total stocking in the stand.
- **Volume/ac:**
  0.1 MBF veneer, 6 MBF sawtimber, 1.8 MBF tie logs, 7.1 cds pulp
- **Size class structure (%BA):**
  6-10": 29% | 11-16": 25% | 17-22": 34% | 23+": 12%

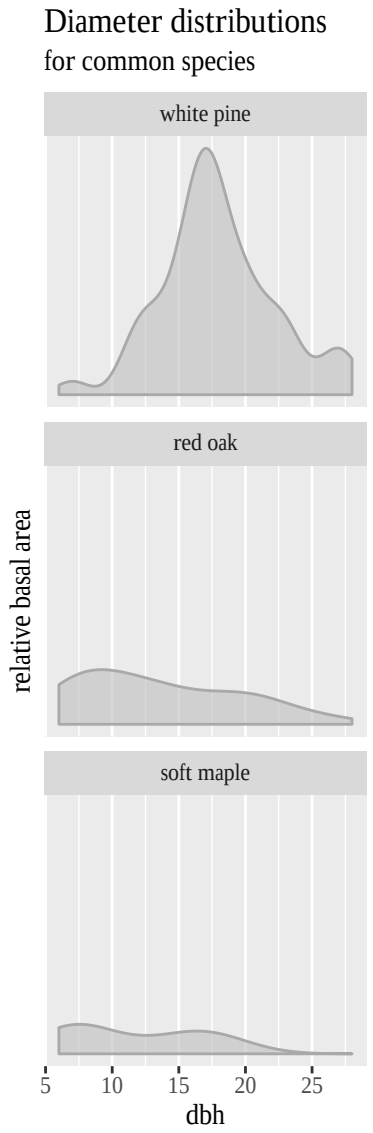

Figure 13: Distributions are approximated with kernel density estimation. Common species are those that account for at least 8 percent of the total stocking and areas under each curve represent species basal areas.

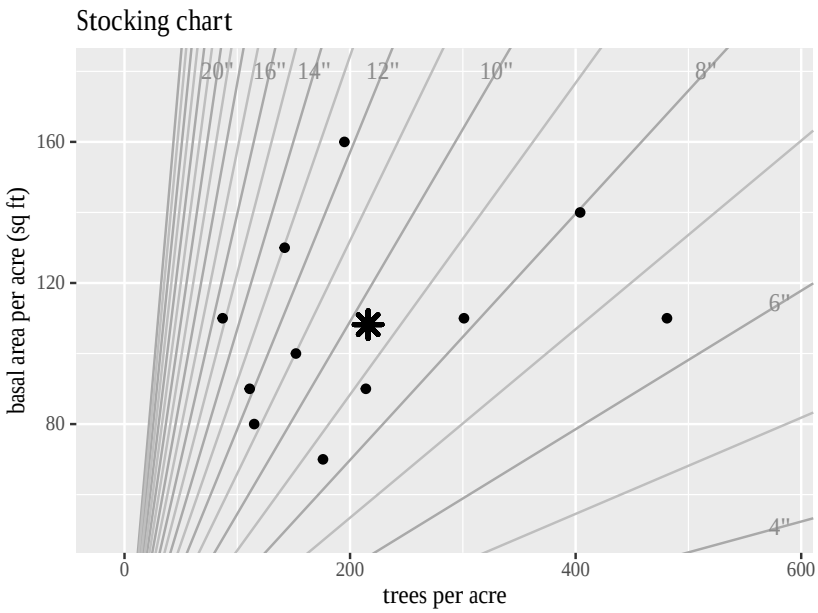

Figure 14: Points represent individual plots. Asterisk represnts stand average. Radial lines are quadratic stand diameters.

Inventory information

- 11 points, 10 BAF, August, 2019

Table 7: Measures of stocking for all live trees (total) and acceptable growing stock.

	Total	Acceptable
Basal area (sqft/ac)	108	88
QSD (in)	10	10
Stems/ac	216	171

Silvicultural prescription

2029 – Group selection harvest with commercial tending: Groups between 0.25 and 1.5 acres should be established throughout the stand; in aggregate, the area of group openings should not exceed 15% of the total stand area. Groups should be located so as to: (1) release desirable advanced regeneration, (2) provide a variety of site conditions and light environments for the establishment of a diverse new regeneration cohort, and (3) remove concentrations of unacceptable growing stock or economically mature stems. Some larger group openings may be structured as group shelterwoods, with up to 40 sqft. of residual basal area retained to favor shade-intermediate to shade-tolerant species. The matrix between group openings should be lightly thinned, to approximately 110 sqft., with an emphasis on retention of high-value stems.