



Silviculture Prescription
Ole Shaker

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Northern Berkshire District
Lindon W. Bates Memorial State Park
Hancock, MA

Prepared by:

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April 3, 2018

Approved by:

Management Forestry
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Date: April 9, 2018

Site Data

Geology

This project is located within the Taconic Mountain Range, on the north slope of larger hills south of State Highway 20. Perry Peak is south of the project area with most of the project occurring between 1500' and 1800'. A majority of the project area consists of gentle 10-20% slopes which allow for excellent drainage, however, there are hills in the project area have slopes that can approach 50%. The parent material is characterized as a gravelly loam formed from basal till over metamorphic rock. Within the context of this project, site degradation as a result of elevation and/or topography is not anticipated.

Soils

Eighty nine percent of the soils located within the project are of the Taconic – Macomber soil associations. This association is characterized by moderately deep, gravelly loam soils that are very well drained, and very stony. This soil association is found on slopes of 8% - 50% and at elevations of approximately 1,000 ft. – 1,800 ft. Annual precipitation is 35" – 48" per year, and the mean annual temperatures run 39°F – 45°F. Frost-free periods range from 110 days – 195 days per year, and it is not considered prime farmland. According to the Forest Productivity and Stand Complexity Model (Goodwin, Hill. 2012) generally best sites are located near the lower slopes, and degrade as elevation increases. This would indicate that combinations of both uneven aged and even aged management are appropriate for the site. The changes in productivity with elevation will also dictate how these strategies are implemented. According to the USDA NRCS online soil survey the soils located within this project have a moderate to severe potential for erosion under normal conditions, and will require strict adherence to Massachusetts Forestry Best Management Practices in order to avoid a loss of site quality and productivity. Evidence of this potential is already manifesting as a series of severe washouts along the Beacon Trail. A complete soil map, MAP 2, is attached.

Climate

The mean annual temperature for the sale area is between 39°F and 45°F with an average of 35" - 48" of precipitation. Tropical storm systems do not typically affect this area but occasionally make impacts with the most recent being Tropical Storm Irene in 2011. Nor'easters and strong cold fronts from Canada have the potential for major impacts, and occur more regularly. Other erratic weather events such as ice storms, early season blizzards, microbursts, and even tornados are not uncommon. Fires are also known to occur during times of drought or extended periods of dry and windy conditions, and may increase in frequency and severity moving forward in time. This is because winters are expected to be shorter, warmer, and with less precipitation potentially lengthening spring and fall, which is when a majority of fires occur in the northeast. Also as this area moves forward in time, the frequency of storms and the amount of precipitation is expected to increase during the summer months. According

to the US Forest Service Climate Change Tree Atlas the oak/hardwood stands should increase in abundance over time, due to the favorable climate conditions while the mixed northern hardwoods and eastern white pine/hardwoods stands will most likely decrease. Also due to the warmer, shorter winters; pests such as hemlock wooly adelgid will become more destructive, as cold winters are required to moderate their populations.

Hydrology

All of the wetland resources indicated on MAP 1 have been located. They currently consist of intermittent streams situated on the east, south, and west sides of the sale area. They all begin as seeps within the sale area and flow down to either Mt. Lebanon Brook on the north side of the sale or into Seace Brook on the south side of the sale, both of which are perennial streams. Mt. Lebanon Brook and Seace Brook eventually empty into Richmond Pond. Wooded wetlands are located along the northern boundary of the project area. These were most likely formed due to water impoundment after the construction and/or upgrade of Massachusetts State Highway 20, as evidence by the dying trees that are not typically associated with wetlands; i.e.: sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), etc. Also indicated on MAP 1, are the potential locations of filter strips that will be used for water and wetland resource protection, and will be in compliance with current Massachusetts Forestry Best Management Practices. Typical water resources encountered during the marking phase of the project, that do not currently appear on MAP 1, include small intermittent streams and wooded wetlands that were too small to detect during the initial DEP wetland mapping project. If additional wetlands such as non-certified vernal pools, additional intermittent streams, upland wetlands, etc. are encountered; standards outlined in the most recent edition (currently 2013 2nd edition) Massachusetts Forestry Best Practices Manual will be followed as they relate to harvesting requirements, filter strips, water bars, slash management, etc.

Potential Vegetation

The area currently supports all potential vegetation that is typical to this type natural community and forest cover type. Forest harvesting post settlement, but prior to state acquisition, focused on subsistence activities that did not significantly alter the regenerating forest and ground cover following land clearing activities associated with the settlement period. Since state acquisition, management activities have been primarily thinning. Overstory tree species present include red oak (*Quercus rubra*), sugar maple, red maple (*Acer rubrum*), white birch (*Betula papyrifera*), yellow birch (*Betula alleghaniensis*), white ash, eastern white pine (*Pinus strobus*), Norway spruce (*Picea abies*), black cherry (*Prunus serotina*), black birch (*Betula lenta*), Eastern Hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*), and hophornbeam (*Ostrya virginiana*). Ground cover, shrubs, and small tree species include princess pine (*Lycopodium spp.*), various ferns, Canada mayflower (*Maianthemum canadense*), serviceberry (*Amelanchier spp.*), striped maple (*Acer pensylvanicum*), hobblebush

(*Viburnum lantanoides*), witch hazel (*Hamamelis virginiana*), wood sorrel (*Oxalis spp.*), and musclewood (*Carpinus caroliniana*)

Site Productivity

An analysis was conducted across all properties managed by the Bureau of Forestry to assess site productivity and complexity using Geographic Information System (GIS) data layers of Prime Forest Soils, Potential Vegetation Complexity, Late Successional potential, Forest Diversity, Early Successional potential, CFI Site Index, and CFI Stand Structure (Goodwin, Hill, 2012). The analysis found that there is a very close correlation between the stands present and the productivity of the sites. Generally, the oak/hardwood stand is the most productive and complex, followed by the mixed northern hardwoods stand, and the eastern white pine/hardwoods stand is the least productive and complex. However, the Natural Resource Conservation Service Custom Soil Resource Report lists the soil textures generally as a gravelly loam or gravelly silt loam. Loam soils in of themselves are typically very productive, which would indicate that the planted eastern white pine may be not be entirely appropriate for the site at its current density and/or distribution. In a typical, mesic hardwood stand, eastern white pine would occur as a minor component of scattered trees within the stand rather than a dominant overstory cover type, and may be adversely influencing the complexity of the site. Also since the soils are productive, both even aged and uneven aged management techniques would be appropriate.

Archeological and Cultural Resources

The DCR archeologist noted that there are “No known or documented significant pre-contact or historic period archaeological resources in the project parcel. ” Any cultural resource features located before or during the forestry project will be protected according to guidelines set forth in the *Bureau of Forestry Cultural Resource Management Protection Standards and Guidelines* and indicated on harvest maps accordingly. All cultural resources will be staked and flagged prior to harvesting.

Additional actions that are intended to protect cultural resources include:

- GPS, photograph, flag/protect and avoid cellar holes, stone walls, wells, trash pits and other associated cultural features located within the project area.
- Existing breaks in stone walls will be utilized to protect the integrity of the stone walls.
- Existing roads, landing areas and skid trails will be re-used during operations.
- Trees will be felled away from the road.
- Timber Sale Contract language designed to protect cultural resources requires timber harvesters immediately report any undocumented cultural resources.

Stand Data

The Ole Shaker Forest Management Project is approximately 197 +/- acres in size with 130 +/- acres of mixed northern hardwoods, 29 +/- acres of eastern white pine/hardwoods, 14 +/- acres of oak/hardwoods, and a 24 +/- acres for an American beech treatment area. As the sale is marked the final project acreage will most likely change to some degree due to areas that are inoperable, skips in treatment the create internal reserves, currently unidentified hydrologic resources, etc.

Stand and Parcel History

This parcel was owned from the settlement period until 1825 by William Berry, and was then acquired by the Mount Lebanon Shaker Community in the 1830's. In 1911 – 1912 it was purchased by the Bates family, the namesake of the Park. The land was willed to the City of Pittsfield following the death of Lindell T. Bates, brother of Lindon W. Bates, Jr. in 1937, and then turned over to the Commonwealth's state forest and parks system in 1939.

Prior to state acquisition the area appears to have been a source of building materials and firewood for both the Shaker community and potentially the Bates'. There are no extensive areas of very large or exceptionally old trees. Also judging by the size and distribution of the remnant stands, some of the peaks appear to have been cleared at some point in the past 60 or 70 years. No records were located that would indicate the eastern white pine or Norway spruce were planted as part of the Massachusetts Reforestation Lot program or Civilian Conservation Corps project. It is therefore inferred that the plantations were installed as private improvements pursued by one of the previous landowners.

Since state acquisition there have been 4 sales recorded on this site, focused mainly in the northwest corner of the property, and totaling 81 acres. The most recent operation identified was a thinning in 1989 on 18 acres.

The following are descriptions of the forest types located within the entire sale area (MAP 1).

Forest Stand Attributes

Mixed Northern Hardwoods Stand

This is generally a two-aged stand, with an overall density of approximately 120 ft²/acre of basal area¹ that is split evenly between the two age classes. The dominant and codominant trees are primarily eastern white pine (*Pinus strobus*), red oak (*Quercus rubra*), white ash (*Fraxinus americana*), and black cherry (*Prunus*

¹ **Basal Area** is the cross-sectional area of a tree 4.5 feet above ground. The basal area of all trees in a given land area describes the degree to which an area is occupied by trees.

serotina). Intermediate and understory trees are largely composed of American beech (*Fagus grandifolia*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and white birch (*Betula papyrifera*). Other minor understory species include hophornbeam (*Ostrya virginiana*), American elm (*Ulmus americana*), butternut (*Juglans cinerea*), black birch (*Betula lenta*), and quaking aspen (*Populus tremuloides*). The stand tends to be more even-aged toward the bench and lower slope on the northeast edge of the sale, whereas the hillside appears to be more uneven-aged, with more evenly distributed small and large diameter trees. Damage from sugar maple borer is evident within the stand. Additionally, many of the beech are infected with Beech Bark Disease Complex (BBD), emerald ash borer (EAB) is present within the area, and many of the black cherry is infected with black knot of cherry.

Oak/Hardwood Stand

The Oak-Hardwood stands within the project area have a composition similar to that of Mixed Northern Hardwoods, with the exception of a significant red oak component. These stands are typically even aged and have densities around 150 ft² of basal area per ac. This area is on the lower slope of the project area and is mainly two-aged. Due to the size and location of this stand, and past use history, the change in stand type from mixed northern hardwoods to oak/hardwoods may be due to the occurrence of a fire during the sapling or pole stage. Further evidence of this is potential scenario is in the two-storied nature of the stand, where a fire burned an entire cohort and primarily the oak survived.

Eastern White Pine/Hardwoods Stand

The Eastern White Pine-Hardwoods consist of 29 +/- acres of mostly two-aged forest, located on the western portion of the project area. These stands are composed mainly of an overstory of planted eastern white pine (*Pinus strobus*), with a significant component of mixed northern hardwoods; basal areas are in excess of 120 ft² per acre. The white pine has weevil damage, is approximately 95 years old, and is also showing signs of Caliciopsis canker and/or needle cast disease through heavy sapping. The understory consists of a mix of hardwoods, with pole size red oak and red maple. The size, density, and distribution of the eastern white pine indicates that planting may have occurred while the stand was reestablishing itself following the settlement period, where large tracts of land were cleared for farming and livestock grazing.

Beech Treatment Area

The overstory in this area consists mainly of mixed northern hardwoods; i.e.: white ash, yellow birch, black cherry, red maple, etc. Basal areas of trees over 6" in diameter at breast height (dbh) are also similar. The condition that makes this area dissimilar from the previously described mixed northern hardwoods is the

amount of beech regeneration in seedlings and saplings that is present. The profuse beech regeneration is in response to beech bark disease complex (BBD), and becoming so dense that other species of trees are not able to establish themselves. In turn, this is reducing the diversity of tree species within the forest canopy. Additionally the diversity and occurrence of ground cover is also decreasing because of extreme shading. This beech regeneration is clonal, and will have the same susceptibility to BBD, eliminating the possibility of it maturing into healthy trees.

Groundcover – All Stands

Groundcover in all of the stands, including the beech treatment area (though at a far less frequent occurrence and distribution), is fairly similar consisting mainly of *Lycopodium* spp., Indian cucumber (*Medeola virginiana*), Canada mayflower (*Maianthemum canadense*), stinging nettle (*Urtica dioica*), hay-scented fern (*Dennstaedtia punctilobula*), and evergreen wood fern (*Dryopteris intermedia*). Invasive exotic species have also been identified within the project area to include Japanese barberry (*Berberis thunbergii*) and glossy buckthorn (*Frangula alnus*).

Stand Exam

A stand exam of the mixed northern hardwoods, eastern white pine/hardwoods, and oak/hardwoods was completed in February of 2018. The beech treatment area was not part of the examination because there is no harvesting planned within this area. For the purposes of this prescription all stands (with the exception of the beech treatment area) within the project will be considered as a single population for sampling because they will undergo similar treatments. Also, mixed northern hardwoods comprise a significant component of all identified stands. The results of the stand exam are as follows:

Figure 1 – Species Composition of the Project Area Overstory (5" + dbh)

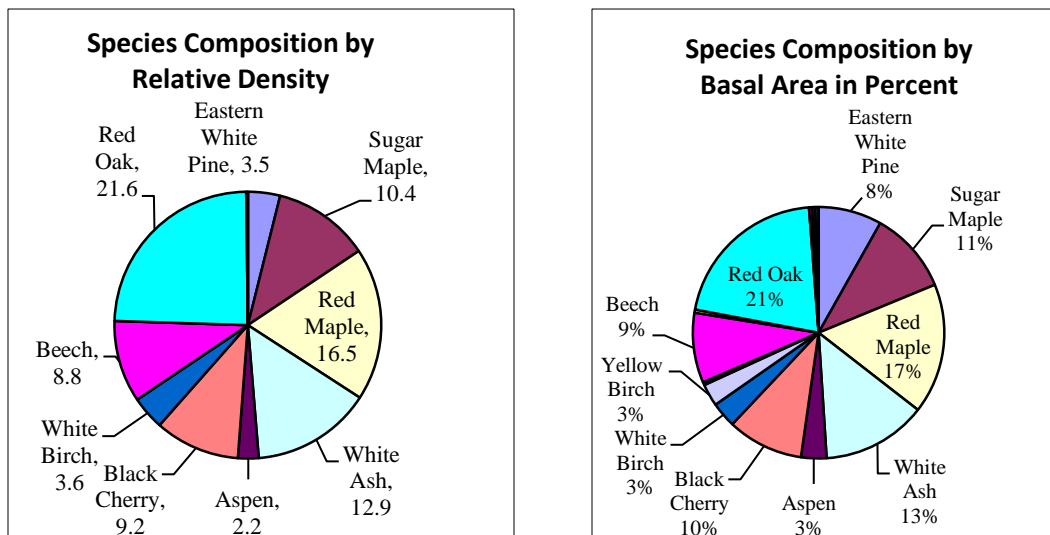


Table 1 – Stocking Diagnostics of the Project Area

Stocking Diagnostics

Species	Total Trees/Acre	Total BA/Acre	% BA/ac by Species	Relative Density ²	% Acceptable Growing Stock
Eastern White Pine (EWP)	6.9	9.8	8%	3.5	50%
Sugar Maple (SM)	21.6	12.7	11%	10.4	69%
Red Maple (RM)	33.3	20.0	17%	16.5	68%
White Ash (WA)	19.0	16.1	13%	12.9	76%
Aspen (ASP)	2.4	3.9	3%	2.2	100%
Black Cherry (BC)	8.6	11.7	10%	9.2	71%
White Birch (WB)	7.0	3.9	3%	3.6	38%
Yellow Birch (YB)	3.9	3.4	3%	0.0	43%
Black Birch (BB)	0.6	0.5	0%	0.0	0%
Beech (ABE)	16.9	10.7	9%	8.8	23%
Basswood (BW)	0.6	0.5	0%	0.0	100%
Red Oak (NRO)	16.8	24.9	21%	21.6	90%
Norway Spruce (NSPR)	0.6	0.5	0%	0.2	100%
Hophornbeam (HOPH)	0.6	0.5	0%	0.0	100%
Hickory (HICKORY)	0.6	0.5	0%	0.0	100%
Total	139.1	119.5	100%	89	68%
<i>Median Stand Diameter --></i>				15.0	93
				<i><<- Estimated Relative Density</i>	

Table 3 – Advanced Regeneration within the Project Area

SPECIES	Stems/Acres	SPECIES	Stems/Acres
Sugar Maple	102	Hophornbeam	7
American Beech	929	Yellow Birch	175
Red Maple	15	Black Cherry	329

² **Relative Density** is a quantification of the current density of a forest stand to a predetermined maximum level. In this prescription 119 ft² per acre of basal area is 93% relative density. Maximum relative density would be 128 ft² per acre of basal area.

Table 4 – Ground Cover within the Project Area

SPECIES	AVG. % COVER	% of plots observed
Lycopodium	0.24	2.44
Musclewood	0.24	2.44
Misc. Herbaceous Vegetation	2.20	14.63
Alder	0.37	2.44
Striped Maple	7.44	41.46

SPECIES	AVG. % COVER	% of plot observe
Ferns	10.24	36.5
Hobblebush	8.57	26.5
Misc. Woody Vegetation	1.71	14.6
Serviceberry	0.24	2.4
Hawthorn	0.24	2.4

Figure 2 – Harvest Volumes Using Group Selection

Harvest Volumes

Species	Total Board Feet	Total Cords
Eastern White Pine	39,407	97
Sugar Maple	21,379	107
Red Maple	54,479	144
White Ash	47,036	105
Black Cherry	37,047	79
White Birch	2,588	9
Yellow Birch	5,176	NA
Beech	7,232	99
Red Oak	121,356	83
Norway Spruce	3,299	NA
Total	338,997	724

Residual Volumes

Total Board Feet	Total Cords
100,400	241
54,469	265
138,801	356
166,876	251
94,387	190
6,593	23
18,362	NA
18,425	250
309,189	190
8,405	NA
863,696	1,766

Within the Ole Shaker forest management project area it is estimated that there is 281 ft³/ac of coarse woody debris (CWD) on the ground. The minimum retention guideline listed in the DCR Management Guidelines (2012) is 256 ft³/ac. At the conclusion of the project the amount of CWD is expected to substantially increase due to tops left in the woods and non-merchantable trees that are marked to be cut. Non-merchantable trees that are often marked include beech less than 6", striped maple, pin cherry, live rotting trees competing with healthy trees, etc.

Aesthetic Resources

Roads and trails that will be impacted by the harvest are State Highway 20 and the Beacon Trail. Though none of these are designated scenic byways, maintaining the visual experience for the users of these roads and trails is a high priority. In order to ensure that this occurs, slash management and harvest guidelines outlined in the 2013

2nd Edition of the Massachusetts Forestry Best Management Practices Manual will be followed. Additionally, marking techniques designed to limit visual impacts will be employed.

There has also been a request from members of the community to retain a portion of the planted eastern white pine. In order to facilitate this request eastern white pines that have a very low commercial value, and are not negatively impacting larger (10"+ dbh) healthy and vigorously growing hardwoods or softwoods of the following species: red oak, sugar maple, red spruce (*Picea rubens*), butternut, or hickory (*Carya spp.*); will be retained at minimum rate of 3 stems per acre, should the minimum rate exist. In those cases where less than 3 stems per acre persist, every effort will be made to leave behind those trees that are there; provided that the impact to forest health is minimal.

Recreation Resources

The resource based recreational activities that most forest users participate in throughout the sale area, are: hiking, hunting, and wildlife viewing. There is an existing trail system within the western portion of the project area (Beacon Trail). Erosion to portions of the Beacon Trail is significant due to poor maintenance and poor location of the road on which it is located. Timber sale revenue will be used to realign and reconstruct the trail to mitigate current erosion issues. The purpose of this project is to ultimately improve the experiences of users and visitors to the state park. Other than perhaps temporary trail closures, none of the activities associated with harvesting are anticipated to restrict known, permitted recreation.

Threatened and Endangered Species

There are no Threatened or Endangered Species (TNE), critical habitats, or estimated habitats of TNE species listed in the 13th edition of the Mass Natural heritage Atlas.

Wildlife

Species

The wildlife occurring in this area is typical of a northern hardwood forest. Observed species include black-capped chickadee, ruffed grouse, blue jay, and common crow. Other species expected to occur are black bear, various songbirds, raccoon, various fur bearers, grey squirrel, various raptors, and other small mammals such as bats and rodents.

The Massachusetts Division of Fish and Wildlife commented that "The proposed harvest will result in increased browse, mast, and age class enhancement, which is all good, but proposed openings of up to 1/3 acre are not large enough to provide source habitat for SWAP young forest species. Including a few openings of 5+ acres within the area of

planted white pine would have positive wildlife benefits and would favor regeneration of shade-intolerant hardwoods over beech.”

The DCR does not debate the science or validity of this statement, however, the personal connections that forest users have to the land are an important factor in the decisions regarding how a management project is implemented. Within the planted eastern white pines harvesting will occur; however, installing five acre clearings are contrary to the requests made by stakeholders regarding retention rates. As such, the recommendation of installing openings of 5+ acres will not be implemented.

Snags and Retained Live Trees

All snags will be retained on-site provided that they do not pose a hazard to humans during or after operations. Live trees that appear to be a den or nest site either currently or in the recent past will also be retained.

Evaluation of the Data and Projected Results

The Massachusetts Department of Conservation and Recreation has developed a list of ecological services and benefits derived from active forest management of Woodland Zones (Exhibit 1). The following are lists of goals and objectives for the Ole Shaker Forest Management Project and the associated ecological services and benefits that are satisfied.

Goals and Objectives of the Ole Shaker Forest Management Project

Goal 1: Successful Implementation of Silvicultural Prescription (MA DCR Goal – Production of Wood Products, Diversified Habitats, Carbon Stock Management, Water, Recreational Opportunities).

Objectives

- Residual relative density of 65% within the project area and between 77 ft² and 51 ft² BA/ac
- No cutting or harvesting within filter strips.
- No cutting or harvesting within 75’ of listed cultural resources or cemeteries other than stone walls.
- No loss of undesignated wood.
- Ensure harvesting contractor compliance with all BMP’s.
- Frequently monitor operations to minimize and/or mitigate damage to the site.
- Ensure full understanding of contractual requirements by the harvesting contractor.
- Mitigate damage caused by EAB, Beech Bark Disease Complex, white pine weevil, and black knot of cherry.

Residual basal area ranges provided within the objectives and the Silvicultural Prescription section were determined using the Fox DS Cruiser version 2007.2 Workhorse (New Hampshire Forests & Lands Staff, 2009) which analyzes inventory data gathered in the field, and comparing those results with stocking tables located in the Silvicultural Guide for Northern Hardwoods in the Northeast (Leak et al., 2014)

Goal 2: Adequate Stocking in Single Tree and Group Selection Areas (**MA DCR Goal – Diverse Habitats & Carbon Stock Management**).

Objectives

- Have 500+ stems per acre of healthy native hardwood or softwood regeneration across the stand, with the exception of those species which can dominate a site; i.e.: striped maple, pin cherry, etc.; at 5 years post-harvest.
- Reduced beech competition with native tree regeneration and ground cover.

Goal 3: Increase biological diversity and introduce more complexity into existing stands (**MA DCR Goal – Diverse Habitats & Water**).

Objectives

- Install gaps within all stands in order to create early successional habitat and begin a new age class of trees.
- Reduce the crown closure of eastern white pine to less than 50% in the eastern white pine/hardwood stand.

Goal 4: Remove beech infected BBD outside of the Beech Treatment Area (**MA DCR Goal – Diverse Habitats**).

Objectives

- Beech that show clear signs of BBD will be biased for removal, while adhering to the guidelines established in the Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines (2012). Particularly those guidelines relating to legacy trees and opening sizes.
- Reduce the density of beech in the Beech Treatment Area by at least 70%

Silvicultural Prescriptions

Mixed Northern Hardwoods Stand

Emerald Ash Borer Mitigation

White ash trees greater than 10" in diameter will be biased for harvest due to the presence of emerald ash borer (EAB) in Berkshire County and specifically the Town of Hancock. This forest pest has a greater than 99% mortality rate on infected ash trees.

Beech Bark Disease Complex Mitigation

Beech greater than 6" in diameter, and showing signs of BBD will be biased for removal. Healthy beech trees with no signs of infection and 10"+ in diameter will be biased for retention. Reduction of beech within the stand may be upward of 80%, however, cutting intensity will not exceed those guidelines established in the 2012 Massachusetts Landscape Designation guidelines.

Sugar Maple Borer Mitigation

Sugar maple showing signs of borer damage, as well as mature sugar maple that are of poor health and/or vigor will be biased for removal. The only exceptions to this are those trees within 1 tree length of a group selection opening, as they will help to provide a seed source for new regeneration. Since susceptibility to sugar maple borer is not identified as a genetic predisposition, but rather an indicator of the tree's health at the time of infestation, passing on a negative trait through the progeny of an attacked tree is not a concern.

Black Knot of Cherry Mitigation

Black cherry over 6" in diameter, and showing signs of infection will be biased for removal. Larger cherry with galls will be evaluated on a case by case basis for removal. Clean black cherry will be biased for retention, as these trees may be resistant to the disease. Black knot is caused by a naturally occurring fungus, and no additional treatments or measures will be taken.

Remainder of the Stand

An expanding-gap irregular shelterwood system (Raymond *et al.*, 2009) will be used. This type of system works by creating gaps in the forest canopy through harvesting, and expanding those gaps through each successive entry. In order to facilitate future entries and perpetuate the system, gaps will be installed systematically throughout the sale area. Installed gaps will be no less than 1/10 of an acre and will not exceed 1/3 of an acre; however, the final size of each gap will be determined according to the conditions present on the ground. The stand will also be thinned in between the installed gaps using variable density thinning within the range identified.

The purpose of this system will be to maintain diversity; i.e.: biological, density, age, size, and successional; manage for superior crop trees; pre-salvage white ash; create horizontal and vertical structural complexity; and control understory beech. This will be accomplished by:

- The introduction of a new cohort of regeneration by expanding initial gaps with each successive entry
- Retaining legacy trees in the overstory;
- Varying thinning densities which will create a range of tree densities and light conditions in the understory
- Removing trees that are not expected survive until the next silvicultural entry, freeing up resources and growing space
- Promoting crop trees that are financially and ecologically desirable

The target residual basal areas for those areas that are selected as groups will be between 20 ft² and 0 ft² per acre, while retaining advanced regeneration of tree and ground cover species that do not have a tendency to dominate a site. Species that tend to exhibit site dominance in upland natural systems include: American beech, striped maple, pin cherry, hobblebush, and various species of ferns. Those areas that are thinned between gaps will have a target between 77 ft² BA/ac and 51 ft² BA/ac.

Eastern White Pine/Hardwoods

Remnant planted white pine will be retained at the rate listed in the *Aesthetic Resources* section of the plan, provided they meet the listed criteria also included in that section.

Any white ash over 10" dbh will also be targeted, regardless of current health. New age classes will be introduced through expanding gap, irregular shelterwood similar to that of the Mixed Northern Hardwood Stand with the main difference being that the gaps will not be based on the potential for surrounding hardwood recruitment, but rather the removal of the eastern white pine.

White Pine Weevil Mitigation

Canopy closure targets are to be less than 50% in order to prevent weevil damage to younger pines that are regenerating in the understory. Retained trees will be healthy and vigorously growing, with no signs of damage.

Caliciopsis Canker and/or Needle Cast Disease Mitigation

All eastern white pine with indications of disease, or insect damage will be biased for removal. Retained trees will be healthy and vigorously growing, with no signs of damage.

Oak/Hardwoods

Trees with poor form, low health, and/or low vigor will be targeted for removal. Disease mitigation strategies referenced within the other stands will be implemented when the corresponding species and conditions are encountered. For example, all white ash over 10" dbh will be removed as part of the emerald ash borer mitigation strategy, or, all black cherry showing clear signs of infection by black knot of cherry will be removed.

Additionally, an irregular shelterwood will be implemented in a manner similar to that referenced in the mixed northern hardwoods stand, with the openings centered on red oak and/or hickory.

Beech Treatment Area

The area shown on MAP 1 indicates an area that will be treated for nuisance American beech. The American beech overstory in this area has extensive infections of BBD and has developed into a situation in which stump and root sprouts are at extremely high densities. The density of American beech regeneration is so high that it is negatively impacting the recruitment and diversity of native flora in terms of both trees and ground cover. The treatment will entail the application of herbicide, most likely a mix of triclopyr and/or glyphosate to kill at least 80% of the existing American beech. Healthy beech 10" and greater in diameter, and having no indication of disease, will be biased for retention within the project area. Herbicide is applied as either a foliar application, or as a partial girdle that is then treated with herbicide. Both of these methods are low volume, targeted, methods that typically minimize non-target species mortality.

During marking activities priority for harvest will be given to those trees that are of poor form, poor vigor, diseased, damaged, etc.

All Stands and Beech Treatment Area

Due to climate change considerations red spruce and eastern hemlock (*Tsuga Canadensis*) will be biased for retention if they are encountered on the site.

Short Term and Long Term Desired Future Conditions

Short Term (Present – 100 years)

Mixed Northern Hardwoods

Ground cover density, diversity, and distribution are expected to increase. Advance regeneration will develop into desirable growing stock, most likely: birches, maples, some oak, beech, and white ash. Herbicide applications may be used to control significant American beech expansion, building upon the areas in and around the beech treatment directly associated with this project. Sun exposure and herbicide treatments

should limit the growth of beech and provide the opportunity for more tree and ground cover species to escape beech brush shading prior to crown closure.

Eastern White Pine/Hardwoods

The residual planted pines will most likely be dead providing excellent roosting, nesting, and denning habitat. More species diversity in both the understory and overstory will be evident with a mix of healthy hardwoods and eastern white pine. Noxious weeds will be minimal; and the site will not be dominated by American beech, hobblebush, or striped maple. Rather, these species will all be constituents of the overall natural system manifesting in small pockets of one tenth acre or less dispersed throughout the stand.

Long Term (100 years +)

Ground cover densities, distribution, and diversity will be maintained through subsequent silvicultural entries. Gap-expansion will be used in those areas that had gaps established in the previous entries. Sugar maple should become more plentiful as competition is reduced through beech brush control and cutting that biases against sugar maple removal. An uneven-aged condition, representing the entire spectrum of natural community development from early successional to old growth, will be found throughout the area.

Logging System Requirements

Conventional and mechanical harvesting equipment, other than slashers, will be permitted. Equipment cannot exceed 6 psi ground pressure. State Highway 20 will be used for hauling designated timber off of state owned lands and the Beacon Trail for forwarding and/or skidding. This area will most likely be open for harvesting all year, provided that soil conditions remain stable. Generally, all trees will be felled into the stand and slash will remain in that location unless required for the skid trail stabilization. Deviations from this will be reviewed on a case-by-case basis by the forester-in-charge or their designee. Currently, 3 stream crossings are anticipated which may increase or decrease during marking operations.

Haul Roads

The haul road for the sale is State Highway 20.

Skid Trails

Primary skid trail have been identified in MAP 1. Very few previous skid trails were located during the stand exam so the installation of additional skid trails will be required. Skid trails will be marked prior to the start of harvesting activities, and it is understood that minor changes to the routes may be required during the course of logging operations. It is anticipated that the Beacon Trail, as discussed above in

Recreation Resources, will be improved prior to logging operations beginning. All proposed changes will be reviewed on a case-by-case basis by the forester-in-charge and/or Program Supervisor as required. Prior to the leaving the harvest areas all skid trails will have water bars installed, and excess disturbance will be mitigated.

Landings

Preliminary landings have been located, and are shown on MAP 1. Additional landings may be required, but are not anticipated. Any additional landings that may be required will use existing openings or gaps when possible. Prior to leaving the sale, all landings will be smoothed, logging residue will be moved into the woods, and the landings will be seeded.

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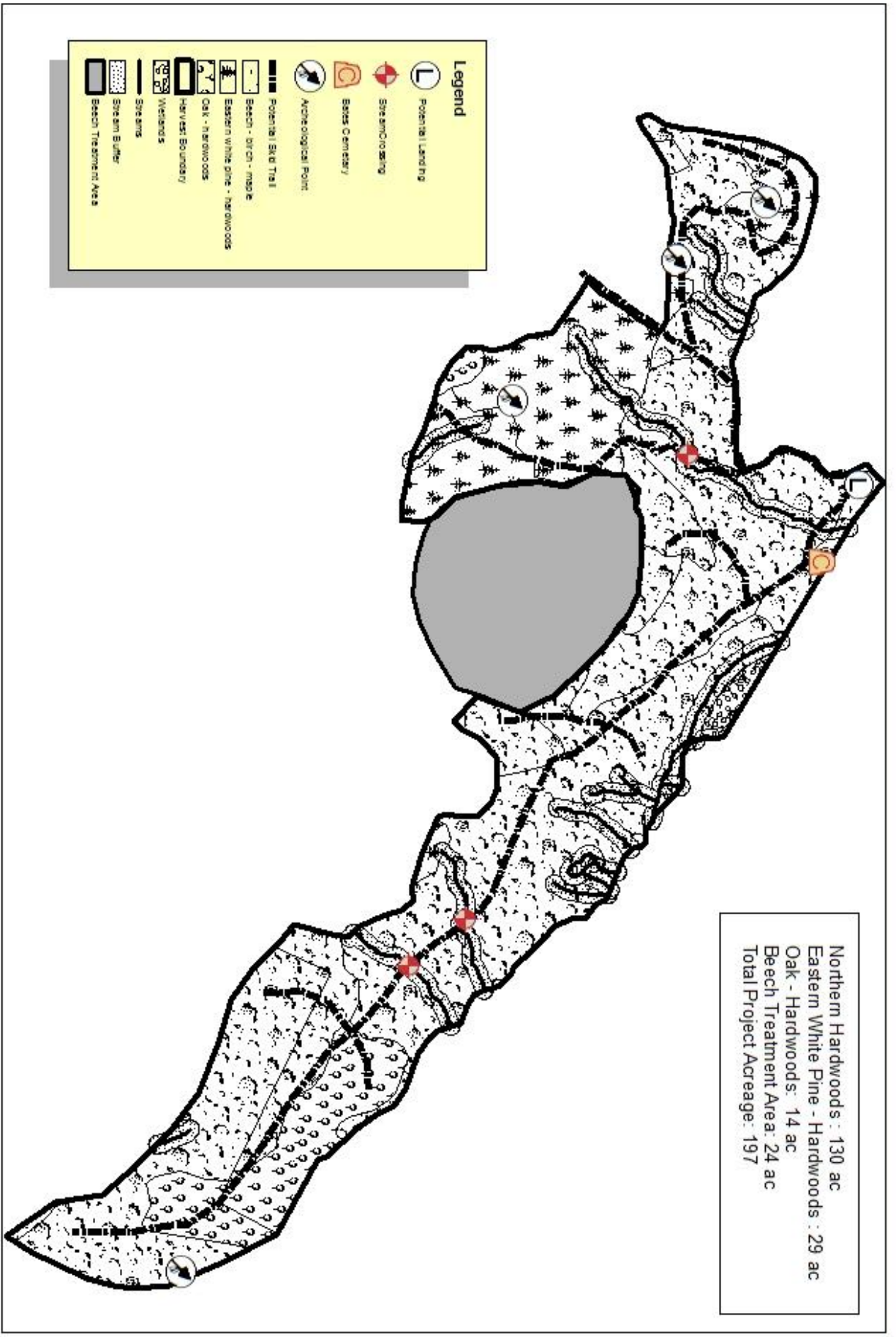
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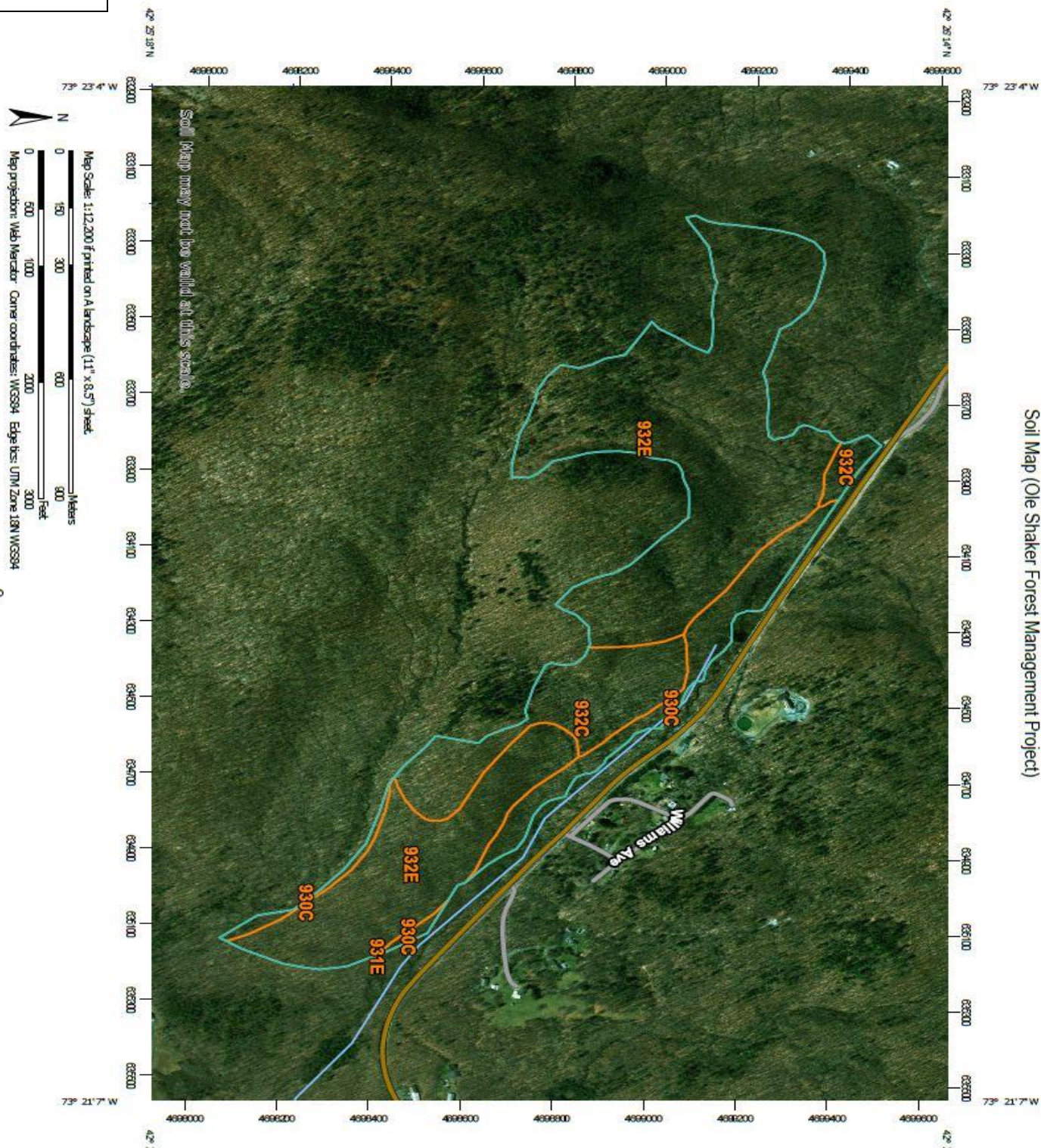
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LINDON W. BATES MEMORIAL STATE PARK Ole Shaker Forest Management Project



MAP 2



Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
930C	Fullam-Lanesboro association, rolling, very stony	19.5	11.2%
931E	Lanesboro-Dummerston association, steep, very stony	0.0	0.0%
932C	Taconic-Macomber association, rolling, very stony	27.7	15.9%
932E	Taconic-Macomber association, steep, very stony	126.5	72.9%
Totals for Area of Interest		173.7	100.0%

MA Department of Conservation and Recreation
Division of State Parks and Recreation
Woodland Zone

The Mission of the Bureau of Forestry Management Forestry Program in lands designated as Woodland on State Forests, Parks and Reservations is to provide ecosystem services and benefits associated with active forest management.

Ecosystem services that are provided through active forest management on the Woodland landscape are:

- ***Production of wood products*** that is ecologically and economically sustainable benefiting local economies.
 - ***Water*** quality protection and enhancement of water supply.
 - ***Diverse habitats*** that range from early seral vegetation to late successional forest encompassing many structural components and provide protection from extreme disturbance events.
 - ***Recreational opportunities*** that are safe and fitting for their location determined in conjunction with the Operations staff of the Division of Parks and Recreation
 - ***Carbon stock management*** using innovative and scientific forest management methods for increasing sequestration.
-
- ❖ Forest management on DCR forests, parks, and reservations endeavors to demonstrate excellent forestry practices to private landowners and the public.
 - ❖ The ecosystem services that state lands provide will be balanced across the landscape and the scale of time where they are deemed appropriate.