



*Silviculture Prescription
Sherlock Lot*

*Massachusetts Department of Conservation and Recreation
Bureau of Forestry*

*Central Berkshires District
October Mountain State Forest
Washington, MA*

Prepared by:

*Kristopher Massini – Management Forester – Central Berkshires District
Massachusetts Department of Conservation and Recreation
P.O. Box 1433 / 740 South Street – Pittsfield - MA 01202
kris.massini@state.ma.us – 413-442-8928 ext. 124*

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Approved by:

Management Forestry
Program Supervisor

William N. Hill, CF

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Overview:

The Sherlock Lot Forest Management project is on the eastern slope of the October Mountain State Forest (see Locus Map). The conditions that led to selecting this project for forest management are:

- Significant portions of the project area have been affected by abiotic (ice) and biotic (beech bark disease) agents and the overstory trees are in significant decline.
- Due to the loss of the overstory trees there is a danger of heavy sprouting of American beech and subsequent loss of site diversity.
- This project area offers an excellent opportunity to demonstrate and fulfill objectives for DCR Woodlands.

The Sherlock Lot Forest Management Project endeavors to:

- Demonstrate thinning for stand improvement and group selections for regeneration in northern hardwood forest types that have been damaged by ice storms and beech bark disease.
- Demonstrate multi-age silvicultural systems including irregular shelterwood and group selection and even age silvicultural systems to regenerate forests primarily composed and dominated by severely diseased American beech.
- Prevent proliferation of American beech with beech bark disease complex.
- Demonstrate harvesting techniques and best management practices that protect forest productivity, soil and water resources.
- Fulfill management approaches for Woodlands as directed by the Forest Futures Visioning Process (2010) and subsequent Management Guidelines (2012)

The Sherlock Lot Forest Management Project is 161 acres in size and will result in two or more timber sale entries. This prescription will cover one timber sale entry totaling 54 acres and encompassing 2 stands.

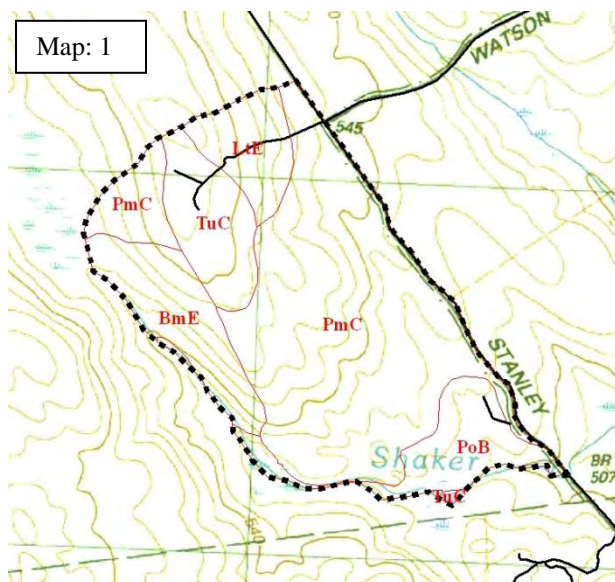
Site Data:

Geology and Landforms: This proposed project area is located along the southern boundary of the Town of Washington within the October Mountain State Forest (see Appendix I: Locus Map). The project area is bound by Watson/Stanley Road to the east, Shaker Mill Brook to the south and west, a wetland complex associated with Shaker Mill Brook to the northwest and a change in forest cover type to the north. The east, west and southern sides of this area rise in elevation from a low of 1670 feet at the intersection of Shaker Mill Brook and Watson Road to the northern boundary where at the top of the hill is an elevation of 1900 feet. According to GIS analysis at no point in this project area do slopes exceed the 40% management restriction guidelines set forth by the Landscape designations for DCR Parks and Forests: Selection Criteria and Management Guidelines (2012) or the Central Berkshire Forest Resource Management Plan (2007) (CBFRMP) .

This area has been shaped largely by the retreat of the last glacial period. Much of this area is covered in sporadic rocks and boulders that become denser in and around drainage areas. Along the higher elevations in the northern portion of the stand several outcroppings occur.

Soils: There are five soil types associated with this project area as shown on the soils map below (Map: 1). The soils range from very poorly drained to flat bottom types to excessively drained upland soils. All of these soils formed as a result of glacial till. As with topography the forest

composition changes with the soil types. The five types are described below (excerpts from “Soil Survey of Berkshire County Massachusetts”, NRCS 1988).



- **PmC - Peru-Marlow Association:** This map unit consist of very deep, moderately well drained Peru soils and very deep, well drained Marlow soils. Peru soils are typically on the lower parts of slopes or in slightly concave areas and Marlow soils are on the upper parts of slopes on in convex areas. Permeability of Peru soils is moderate above the substratum and moderately slow to slow in the substratum. Permeability of Marlow soils is moderate above the substratum and moderately slow or slow in the substratum. Potential productivity is moderate for sugar maple on Peru soils and for northern red oak on Marlow soils. The main management concerns are the large stones and boulders on the surface and plant competition. Thinning crowded stands to accepted, standard stocking levels while removing

diseased, poorly formed, and otherwise undesirable trees allows more vigorous growth. Shelterwood cutting, seed tree cutting and clearcutting establish natural regeneration or provide suitable planting sites. In some areas removing or controlling competing vegetation is needed for the best growth of newly established seedlings. (109.2 ac)

- **BmE – Berkshire-Marlow Association:** This map unit consists of very deep, well drained Berkshire and Marlow soils. The soils are on the sides of hill and mountains. Berkshire soils are typically on the steeper and higher slopes, and Marlow soils are on the less steep and lower slopes or in concave areas. Permeability in Berkshire soils is moderate to moderately rapid, and that in Marlow soils is moderate above the substratum and moderately slow to slow in the substratum. Potential productivity is very high for eastern white pine on Berkshire Soils and moderate for northern red oak on Marlow soils. The main management concerns are large stones and boulders, slope, and severe erosion hazard. Constructing access roads and trails on the contour and installing water bars help to control erosion. Plant competition is moderate. Thinning woodlands of undesired stock, such as dead or diseased trees, or removing trees in crowded areas allows more vigorous growth and regeneration. (22.5 ac)
- **TuC – Tunbridge-Lyman Association:** This map unit consists of moderately deep, well drained Tunbridge soils and shallow, somewhat excessively drained Lyman soils. These soils are on the sides and tops of hill and mountains. Tunbridge soils are typically on the flatter parts of slopes between rock outcrops, and Lyman soils are on the upper slopes or in convex areas. Permeability is moderate or moderately rapid in Tunbridge soils and moderately rapid in Lyman soils. Potential productivity for sugar maple on these soils is moderate. Wind throw is a moderate hazard because of depth to bedrock. Generally, the soils are droughty. (19.2 ac)
- **LtE – Lyman-Trunbridge Association:** This map unit consists of shallow, somewhat excessively drained Lyman soils and moderately deep, well drained Tunbridge soils. These soils are on the mountainous uplands. Lyman soils are typically on the upper steep slopes

and Tunbridge soils are in the less sloping areas or in pockets between Lyman soils and rock outcrops. Permeability is moderately rapid in Lyman soils and moderate or moderately rapid in Tunbridge soils. Potential productivity for sugar maple on these soils is moderate. The main management concerns are shallow depth to bedrock, the low available water capacity of the soils and slope. Growth and survival sometimes is poor. Wind throw is a moderate hazard. (14.6 ac)

- **PoB – Pillsbury Loam:** This is a nearly level to gently sloping, very deep, poorly drained soil on foot slopes of drainage ways and in slightly concave areas of glacial till uplands. Permeability of this Pillsbury soil is moderate above the substratum and slow in the substratum. Potential productivity for sugar maple on this soil is moderate. The main management concerns are the seasonal high water table, high seedling mortality, and the wind throw hazard. Thinning should be designed to minimize wind throw by locating and orienting cut to reduce wind effects, by keeping residual stand density at or slightly above standard stocking levels, and by limiting changes in stand density to 30 percent or less. (20.5 ac)

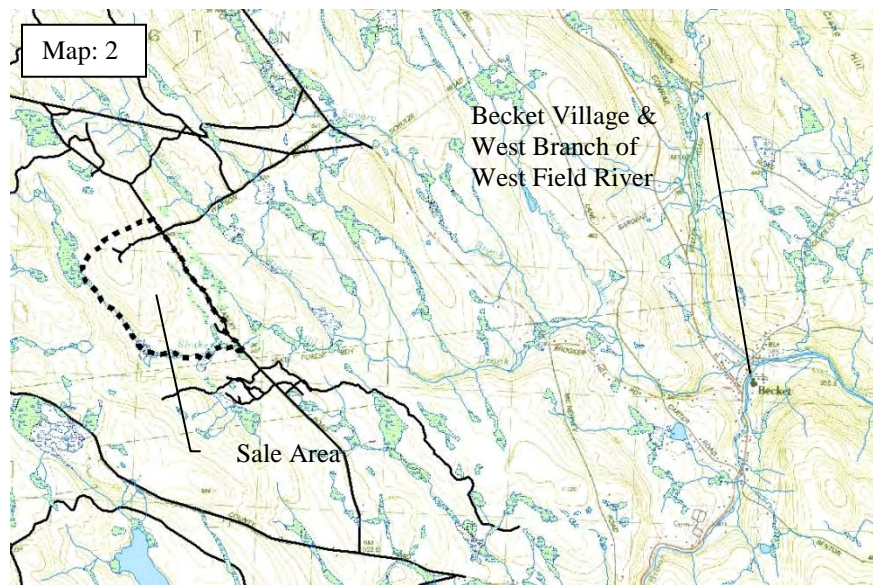
Climate: The project location lies in an area of mild summers and moderate winters with year round precipitation possible. Winds generally come from the west. Although major weather events can happen in any given year the chances of hurricanes, tornadoes, ice storms or other forest changing events are seldom but do occur. The figures below (Table 1) are excerpt from the National Weather Service 2012 Climatological Report for Pittsfield, MA. The climate period used to determine normal value is 1981 through 2010.

Table 1:

	2012 Annual	2011 Annual	Normal Annual Value	Normal Winter	Normal Spring	Normal Summer	Normal Fall
Annual Maximum Temp	58.4	56.5	55.3	31.7	54.3	76.7	57.9
Annual Minimum Temp	39.2	37.4	35.4	15.4	32.9	55	38
Annual Mean Temp	50	50.2	48.3	23.6	43.6	65.8	48
Total Precipitation (in)	36.36	59.46	45.38	8.6	11.44	12.74	12.6
Days with $\geq .01$ Precipitation	144						
Average Wind Speed	6.1						

The most recent major event which damaged this project area was the ice storm of 2008. This event produced ice amounts of 0.5 – 1.5 inches thick on all surfaces causing extensive tree damage by breaking limbs and uprooting due to the ice's weight. This damage is still evident in the project area where many trees with more than 50% crown loss have not recovered and broken branches and downed trees remain on the ground.

Hydrology and Watershed: The project area falls entirely within the Westfield River Watershed. Much of the Westfield River and several of its tributaries are designated as a National Wild and Scenic River. All water within this site drains directly into or through wetlands linked with intermittent streams into Shaker Mill Brook which is a designated tributary of the Wild and Scenic River. Shaker Mill Brook then travels east to North Becket Center where it enters the West Branch of the West Field River as seen in the map below (Map: 2). Regulations affecting the Wild and Scenic River are the same which would be in place without the designation. There are no municipal watersheds or private water supplies within or near the boundaries of the project area.



Shaker Mill Brook and its headwater wetland area make up the western and southern boundary of the project area. Prior to leaving the sale area the brook flows into a dammed area on the west side of Watson road, then crosses under the road and continues.

Along with Shaker Mill Brook there is one other perennial stream with associated wet lands located in the eastern portion of the project area. This unnamed stream runs parallel with Watson Road. There are also

numerous seeps, intermittent streams and small forested wetland areas located throughout the area.

Potential Vegetation: Throughout the project area the dominate overstory tree species that were observed are white ash (*Fraxinus Americana*), sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), quaking aspen (*Populus tremuloides*), yellow birch (*Betula alleghaniensis*), white birch (*Betula papyrifera*), and Eastern hemlock (*Tsuga canadensis*). Tree size, composition and density vary throughout the project area based on stand history, but it generally consists of mature larger tree sizes with a dense understory of American beech.

The understory throughout the project area is dominated by American beech with smaller amounts of sugar maple, red maple, yellow birch striped maple, hop horn beam and red spruce. Major ground cover species include ferns, club moss, grasses, rubus and hobble bush. There is also a substantial amount of American beech seedlings in the groundcover layer. Both the understory and groundcover species are thriving due to increased light form the declining overstory. There were no observed invasive species located in the project area.

This area was most likely used as pasture land based on evidence of barbed wire fencing and foundation locations. According to a 1924 forest inventory this area was a small diameter young forest of early successional species. At that time the area was dominated by poplar, white ash, sugar maple, yellow birch, paper birch, black cherry and beech. In the 1970s and 1980s both commercial fuelwood and home fuelwood harvests were conducted by the State.

This project area has been shaped in recent years by beech bark disease, white ash die back, recent history of forest tent caterpillar outbreaks and the ice storm of 2008 (insects and diseases described in next section). These events are pushing all these forest types into beech dominated forest due to the slow natural decline of forest canopy and American beech ability to aggressively compete in a shaded understory.

There are individual forest stands within the major forest type that range from less than one acre to 40 plus. In many cases these smaller forest types will be lumped together for operational needs into larger stands as this project progresses.

- **Northern Hardwood Stands** – The majority of the project area, approximately 105 – 115 acres, is in a mixed northern hardwood type. These stands are located in the PmC, BmE, LtE, and PoB soil types. This forest type will be broken down into individual stands for management purposes based on dominant tree species, topography and soils to assist planning in proper management decisions. The current size class in this forest type range from small to large diameter trees. The density of the northern hardwood stands is generally high but there are some gaps in the forest canopy mostly caused by white ash mortality. Throughout the project area white ash has been in decline for several years. It is anticipated that the emerald ash borer (EAB) will kill the remaining stressed trees upon its arrival. The stand age is approximately 80-100 years old.
- **Beech Stands** – This forest type is found along the higher elevations located TuC soil type in the middle and northern portions of the project area. Beech dominates these stands with associates of other northern hardwood species. The understory is also dominated by beech with small amounts of other hardwood species present. This forest type represents approximately 50-60 acres of the project area. There is a moderate infestation of Beech Bark Disease throughout this forest type, and the project area as a whole, causing moderate to high mortality of the beech trees. This is beginning to cause natural gaps in the forest canopy which are becoming occupied by diseased beech clones. The current size class of this forest type is small to large trees with a medium to high stocking level. The estimated age is 80-100 years old.

Disease and Insects: There are past, current and potential threats to this project area including beech bark disease, forest tent caterpillar, white ash decline and emerald ash borer whose damage has been can or can be amplified by the crown damage and weakening of the trees during the 2008 ice storm.

- **Beech bark disease (BBD)** was first found in Maine in the 1930s and has been spreading throughout the Northeast and beyond since then. It is believed to have come to the US from Europe through Nova Scotia. It has spread throughout the eastern United States and Canada.

BBD is a two stage insect/disease which starts when the beech scale insect attacks the bark leaving a path way for the Nectria fungus to invade and eventually lead to the death of the tree. BBD can attract other insects and diseases to hasten the declining tree into death. BBD reduces nut production negatively affecting wildlife which depends on it as a source of food. This disease will continue to re-infect the root sucker regeneration creating a continuous state of diseased beech in the stand.



There is evidence of resistance to the BBD in some individual beech. This is evident in dense beech stands where one or several stems appear vigorous and free of BBD when all others are damaged. Potential resistant beech are generally maintained and promoted throughout the stand.

- **Forest tent caterpillar (FTC)** is a native insect with an outbreak occurrence of 6-16 years and typically lasting three years in duration.



During these outbreaks complete defoliation each year by caterpillars may occur weakening the trees over time. This event generally will only kill previously weakened trees or when timed with another damaging event.

In this region the insects preferred host trees are



sugar maple and aspen, but will feed also on birch, cherry basswood and ash. The project area as well as much of western Massachusetts experienced the last FTC outbreak between 2006 and 2008.

- Ash Decline or ash dieback is still fully not yet understood. It is believed to be caused by a combination of biotic and environmental conditions. This list of potential stresses includes ash yellows, air pollution, fungi, viruses, drought and insects. Ash decline is evident in most stands in the region where stands are overcrowded and with a high density of ash.
- Emerald Ash Borer (EAB) was first found in Michigan and Ontario in 2002. It was introduced from Asia and has few natural predators here to control populations. EAB has spread from Michigan and is now located throughout the northeastern part of the United States and Canada. This insect feeds exclusively on ash trees and has destroyed millions trees across its range already. EAB is generally attracted to trees which were previously weakened or stressed.



The EAB has a one year life cycle in which each female lays 30-60 eggs on average with maximum of 200 in some cases. After the eggs are deposited in bark the larvae chew into the tree and begin feeding on the phloem of the tree. The following year the adult will exit the tree through a D-shaped hole and begin feeding on foliage to continue the cycle.

The first and currently only infestation found in Massachusetts is located approximately 6.5 miles from this project area. It is generally accepted that there is no way to stop or control EAB, however there are ways to reduce and slow the spread to areas not yet infested.

Site Productivity: The Landscape designations for DCR Parks and Forests: Selection Criteria and Management Guidelines (2012) stated that forest stands will be “classed . . . and considered for silvicultural treatments that generally fit their productivity, structural complexity (or potential thereof) and diversity”. An analysis of the Sherlock Lot site history (land use; agriculture/logging) and conditions (soil types, productivity; vegetation cover) suggests a moderately high level of complexity indicating that uneven age methods of regeneration may be appropriate. The average site index throughout the project area is 64 for white ash and 56 for sugar maple.

Cultural and Archeological Feature: Watson and Stanley Roads located in Washington and Becket are both gravel secondary roads which are maintained year round for vehicle traffic. There is a private dwelling located 0.6 miles to the east along Watson Road in Washington and a private dwelling located 1.5 miles to the south on Stanley Road in Becket.

There are no formal trails or recreational activities to buffer for this project. The project area is however open to all legal passive recreation activities that are allowed on DCR properties. Currently there is no formal parking area for visitors.

There are homestead sites located to the north and south of the project area with full foundations and evidence of out buildings. Within the proposed project area one potential small stone foundation has been found along Watson Road; however no record of a building here exists. This potential stone foundation site and any others found within the project area will be protected from disturbance during any operation and will be treated according to guidelines set forth in the “Bureau of Forestry – Cultural Resource Management Protection Standards & Guidelines” as directed by the review of this project by the staff archeologist.

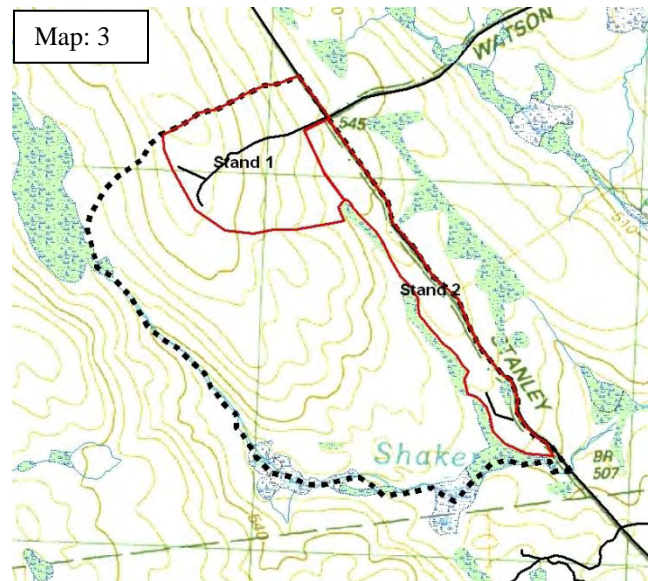
Stand Data:

Forest Stand Attributes: This prescription will describe the conditions and treatments within 54 acres of northern hardwoods that will be treated out of the total 161 acre project area (Map: 3). The stands of pure beech described earlier will not be entered during this prescription period.

Although the entire prescription area to be managed is similar it will be broken down into two stands for management and treatment purposes. These stands are typical northern hardwood stands for this area consisting primarily of American beech, sugar maple, white ash, red maple and black cherry. These stands are in a state of decline due to disease and weather events of the past decades. The slow collapse of the overstory has given rise to a thick understory of diseased American beech seedling and saplings. In some areas of the project area hobble bush has also taken over areas of the understory.

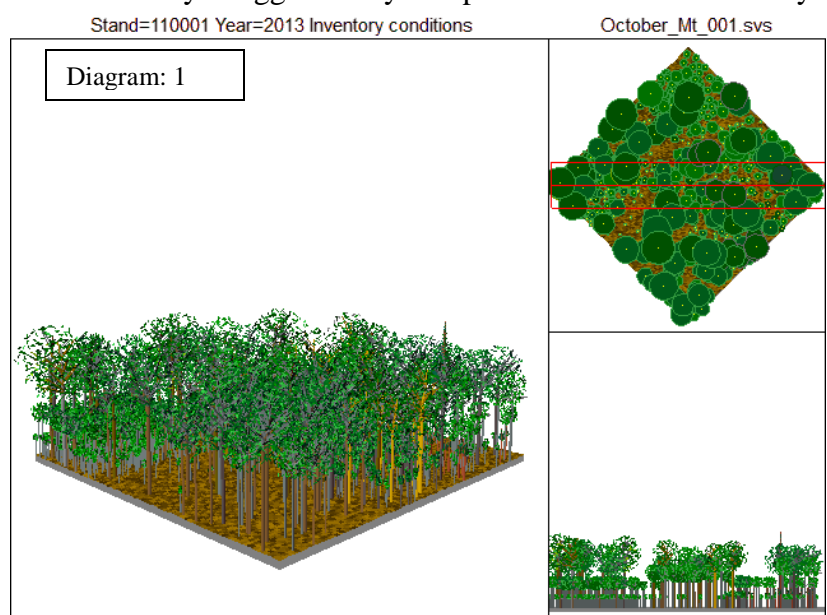
Stand 1 is located along the northern edge of the project area and contains 36 acres. This area is comprised primarily of the soil type LtE soil type, and is covered by sporadic rocks.

Stand 2 is located along the eastern portion of the project area between Watson road and the intermittent streams and wetland complex and contains 17 acres. This stand is predominantly the PmC soil type and has less rock than Stand 1.



Disturbance History: This project area has been shaped in recent years by beech bark disease, white ash die back, recent history of forest tent caterpillar outbreaks and the ice storm of 2008. These events are pushing all these forest types into beech dominated forest due to the slow natural decline of forest canopy and American beech ability to aggressively compete in a shaded understory.

During the late 1970's and early 1980's commercial fuelwood and home fuelwood cutting occurred in this project area. Within Stand 1 a commercial fuelwood project was in the early 1980's. The goal of this project was to thin low quality and undesirable growing stock from maturing overcrowded stands. This operation allowed the remaining forest to grow with more vigor. Within Stand 2 home fuelwood harvests were conducted by individual homeowners for firewood. Material harvested for



this purpose was generally poor quality small and medium sized trees located within 200 feet of the road. Wood was generally removed from the forest by hand, wheel barrel or small truck. This practice was used to maintain road shoulders and safety, enhance views into the forest, and provide firewood to homeowners.

Stand Structure: Both of these stands are northern hardwood type and considered to be fully stocked. A representation of the current stands is seen in Diagram: 1. Both stands are approximately 100 years old and due to abiotic (ice) and biotic (beech bark disease) agents the overstory trees are in significant decline. The original single age class stand is beginning to break up due to the above mentioned disturbances and regenerate slowly to American beech.

- Stand 1: This stand is over stocked with a basal area of 146 ba/ac and is considered to be a high “A” level according to local stocking charts. Under the current condition the stand is overcrowded causing the already stressed trees to compete for the limited resources. Acceptable growing stock, trees free of mechanical and biological defects, account for 60% of the stand. Sugar maple, white ash, red maple and American beech dominate the overstory with yellow birch, black cherry paper birch and red spruce present in smaller amounts. The quadric mean of the stand is 11.1”dbh with measured trees reaching 27”dbh. (Table 1)

The understory of this stand is dominated by American beech seedling and saplings of all size classes (666 stems/acre). Other understory species include striped maple, red maple, red spruce, sugar maple and hop horn beam. (Table 2) The dominant ground cover species (all trees less than 4.5’ in height, shrub and herbaceous species) that would affect regeneration of tree species are ferns, hobblebush and blackberry and American Beech. A list of other observed species is below. (Table 3)

Throughout the stand there is an average of 28 snags per acre. The majority of these snags are American beech trees under 12”dbh. Sugar maple snags as large as 24”dbh were recorded in the stand inventory and white ash and black cherry snags over 24”dbh were observed in the field. (Table 4) On average 577 cubic feet of coarse woody debris (CWD) per acre were recorded in inventory transects. This material is greater than three inches in diameter and three feet in length. Much of this CWD is a result of the 2008 ice storm and is still in the hard/sound category. (Table 5) This figure exceeds the recommended minimum of 85 cubic feet of CWD as required in the CBFMP.

Table 1: Stand 1 Overstory (all measured trees greater than 5"dbh)

	All species	sugar maple	white ash	red maple	American beech	yellow birch	black cherry	paper birch	red spruce
Basal area (square feet)	146.7	40.0	31.1	26.7	22.2	11.1	8.9	4.4	2.2
Acceptable growing stock	86.7	28.9	20.0	15.6	8.9	4.4	4.4	2.2	2.2
Unacceptable growing stock	60.0	11.1	11.1	11.1	13.3	6.7	4.4	2.2	0.0
percentage of stand	100.0	27.3	21.2	18.2	15.2	7.6	6.1	3.0	1.5
Stems per unit area (stems per acre)	220.2	64.9	35.4	21.0	79.6	12.5	3.0	2.4	1.3
Quadric Mean Diameter	11.1	10.6	12.7	15.2	7.2	12.7	23.4	18.3	18.0
Relative Density	95.13	32.71	12.05	14.49	19.53	8.87	2.57	4.32	0.59
Sawlog Gross Total (bd/ac)	12,546	2,816	4,714	2,448	190	508	990	342	537
Cords Gross Total (cds/ac)	28	9	6	4	4	2	1	0	0

Table 2: Stand 1 Understory (measured trees less than 5"dbh)

	All species	American beech	striped maple	red maple	red spruce	sugar maple	hophornbeam
Basal area (square feet)	19.4	12.4	3.3	1.5	1.1	1.1	0.1
percentage of stand	100.0	63.8	16.9	7.5	5.6	5.6	0.6
Stems per unit area (stems per acre)	888.9	666.7	66.7	88.9	22.2	22.2	22.2
Relative density (percent)	28.90	20.54	4.11	1.71	1.07	1.36	0.11

Table 3: Ground cover (all trees less than 4.5' in height, shrub and herbaceous species)

species	Density	Rel Density	Frequency	Rel Frequency	Percent cover	Rel Percent cover	Importance Value
fern	377.78	15.89	100.00	14.06	31.11	56.00	28.65
American beech	800.00	33.64	100.00	14.06	0.00	0.00	15.90
striped maple	177.78	7.48	55.56	7.81	5.56	10.00	8.43
clubmoss	88.89	3.74	44.44	6.25	2.78	5.00	5.00
grass	88.89	3.74	33.33	4.69	2.22	4.00	4.14
yellow birch	133.33	5.61	44.44	6.25	0.00	0.00	3.95
blackberry	66.67	2.80	33.33	4.69	1.67	3.00	3.50
lettuce	44.44	1.87	22.22	3.13	2.78	5.00	3.33
hobblebush	44.44	1.87	22.22	3.13	2.22	4.00	3.00
vine	66.67	2.80	22.22	3.13	1.67	3.00	2.98
hophornbeam	66.67	2.80	33.33	4.69	0.00	0.00	2.50
wild sarsaparilla	44.44	1.87	22.22	3.13	1.11	2.00	2.33
sugar maple	44.44	1.87	22.22	3.13	0.00	0.00	1.66
red maple	44.44	1.87	22.22	3.13	0.00	0.00	1.66
partridgeberry	22.22	0.93	11.11	1.56	1.11	2.00	1.50
moss	22.22	0.93	11.11	1.56	0.56	1.00	1.17
Solomon's seal	22.22	0.93	11.11	1.56	0.56	1.00	1.17
mapleleaf viburnum	22.22	0.93	11.11	1.56	0.56	1.00	1.17
eastern white pine	44.44	1.87	11.11	1.56	0.00	0.00	1.14
red spruce	22.22	0.93	11.11	1.56	0.00	0.00	0.83
paper birch	22.22	0.93	11.11	1.56	0.00	0.00	0.83
northern red oak	22.22	0.93	11.11	1.56	0.00	0.00	0.83
black cherry	22.22	0.93	11.11	1.56	0.00	0.00	0.83

Table 4: Snags

dbh range	Total	American beech	white ash	yellow birch	red maple	sugar maple
6.00 - 12.00	22.13	11.32	6.73	0.00	4.07	0.00
12.00 - 18.00	4.82	0.00	0.00	4.82	0.00	0.00
18.00 - 24.00	1.77	0.00	0.00	0.00	0.00	1.77

Table 5: Stand 1 course wood debris (CWD)

Diameter	Total Pieces	hard (sound) - with bark	hard (sound) - without bark	soft (decayed) - with bark	soft (decayed) - without bark
0-6	14.00	10	2	2	0
6-12	12.00	3	6	1	2
12-18	2.00	0	2	0	0
18-24	3.00	0	2	1	0

- **Stand 2:** This stand is fully stocked with a basal area of 120 ba/ac and is considered to be an “A” level according to local stocking charts. Under the current condition the stand is overcrowded causing the already stressed trees to compete for the limited resources. Acceptable growing stock, trees free of mechanical and biological defects, account for 66% of the stand. American beech, white ash, sugar maple, black cherry and yellow birch dominate the overstory with red maple, paper birch hemlock and aspen present in smaller amounts. The quadric mean of the stand is 10.8”dbh with measured trees reaching 28”dbh. (Table 6)

The understory of this stand is dominated by American beech seedling and saplings of all sizes (598 stems/acre). Other understory species include sugar maple, white ash, yellow birch and striped maple. (Table 7) In this stand ferns are the dominant ground cover species (all trees less than 4.5’ in height, shrub and herbaceous species) that would affect regeneration of tree species. In this stand American beech will also inhibit regeneration of desirable tree species. A list of other observed species is below. (Table 8)

Throughout the stand there is an average of 6 snags per acre. The majority of these snags are white ash and American beech trees between 12 and 18”dbh. White ash snags as large as 24”dbh were recorded in the stand inventory and black cherry snags over 24”dbh were observed in the field. (Table 9) On average is 390 cubic feet of coarse woody debris per acre were recorded in inventory transects. Much of this total is a result of the 2008 ice storm and is still in the hard/sound category. (Table 10)

Table 6: Stand 2 Overstory (all measured trees greater than 5”dbh)

	All species	American beech	white ash	sugar maple	black cherry	yellow birch	red maple	paper birch	eastern hemlock	quaking aspen
Basal area (square feet)	120.0	31.4	25.7	25.7	11.4	11.4	5.7	2.9	2.9	2.9
AGS	80.0	17.1	25.7	11.4	8.6	5.7	5.7	2.9	2.9	0.0
UGS	60.0	14.3	0.0	14.3	2.9	5.7	0.0	0.0	0.0	2.9
percentage of stand	100.0	26.2	21.4	21.4	9.5	9.5	4.8	2.4	2.4	2.4
Stems per unit area (stems per acre)	188.5	55.3	32.1	54.8	11.6	13.5	2.5	10.7	6.5	1.5
Quadric Mean Diameter	10.8	10.2	12.1	9.3	13.4	12.5	20.6	7.0	9.0	19.0
Relative Density	80.03	25.88	10.67	21.56	4.47	9.19	2.81	2.58	1.26	1.60
Sawlog Gross Total (bd/ac)	11,938	2,543	3,745	1,789	1,782	715	853	0	0	510
Cords Gross Total (cds/ac)	15	4	2	4	1	2	1	1	0	0

Table 7: Stand 2 Understory (measured trees less than 5"dbh)

	All species	American beech	yellow birch	sugar maple	red spruce	striped maple
Basal area (square feet)	25.9	17.9	2.8	2.8	1.6	0.8
percentage of stand	100.0	69.3	10.8	10.8	6.0	3.0
Stems per unit area (stems per acre)	857.1	542.9	57.1	57.1	57.1	142.9
Relative density (percent)	33.68	24.52	3.49	3.49	1.44	0.74

Table 8: Stand 1 Ground Cover (all trees less than 4.5' in height, shrub and herbaceous species)

species	Density	Rel Density	Frequency	Rel Frequency	Percent cover	Rel Percent cover	Importance Value
fern	314.29	12.09	100.00	13.21	25.00	45.22	23.51
American beech	1085.71	41.76	100.00	13.21	0.29	0.52	18.49
clubmoss	200.00	7.69	85.71	11.32	5.71	10.34	9.78
striped maple	171.43	6.59	71.43	9.43	5.00	9.04	8.36
CA mayflower	114.29	4.40	57.14	7.55	2.86	5.17	5.70
wild sarsaparilla	85.71	3.30	42.86	5.66	2.86	5.17	4.71
Indian cucumber	85.71	3.30	42.86	5.66	2.14	3.88	4.28
clover	85.71	3.30	42.86	5.66	2.14	3.88	4.28
aster	85.71	3.30	42.86	5.66	2.14	3.88	4.28
grass	85.71	3.30	28.57	3.77	2.14	3.88	3.65
Solomon's seal	57.14	2.20	28.57	3.77	1.43	2.58	2.85
hobblebush	57.14	2.20	28.57	3.77	1.43	2.58	2.85
wintergreen	28.57	1.10	14.29	1.89	0.71	1.29	1.43
trillium	28.57	1.10	14.29	1.89	0.71	1.29	1.43
mapleleaf vib	28.57	1.10	14.29	1.89	0.71	1.29	1.43
red maple	28.57	1.10	14.29	1.89	0.00	0.00	1.00
hophornbeam	28.57	1.10	14.29	1.89	0.00	0.00	1.00
e white pine	28.57	1.10	14.29	1.89	0.00	0.00	1.00

Table 9: Stand 2 Snags

dbh range	Total	white ash	American beech
12.00 - 18.00	4.66	2.33	2.33
18.00 - 24.00	1.19	1.19	0.00

Table 10: Stand 2 Course Woody Debris

Diameter	Total pieces	hard (sound) - with bark	hard (sound) - without bark	soft (decayed) - with bark	soft (decayed) - without bark
0-6	13.00	7	4	0	2
6-12	10.00	4	4	0	2
12-18	2.00	0	0	0	2
18-24	1.00	0	1	0	0

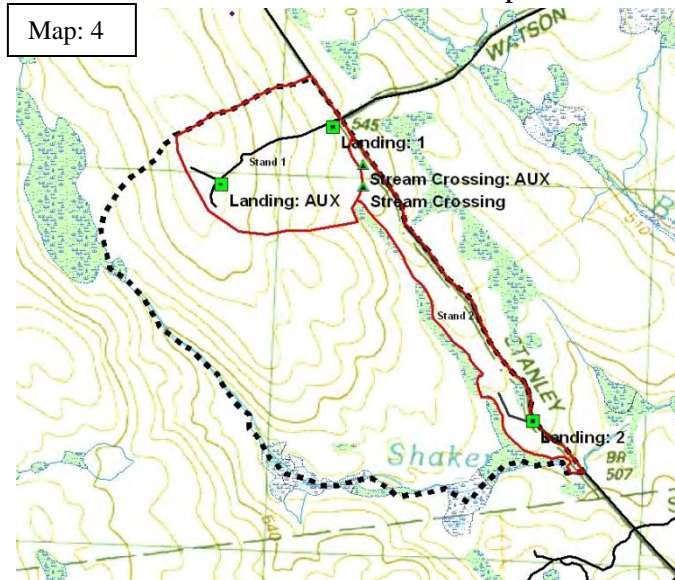
Wildlife Habitat Conditions: According to the NHESP “Massachusetts Natural Heritage Atlas 1^{3th} Edition” there is no priority or estimated habitat sites located in this proposed project area. No rare plants have been identified in the field to date. Care will be taken to address the needs of any rare/endangered plant if found.

No rare animals or critical habitat were noted upon the initial site visit. Large mammals noted were deer, moose, bear and coyote. Small mammals noted were squirrel and porcupine. It has been observed in previous forestry operations nearby that large herbivore pressure is not a concern. The proposed project area is a small portion of the total land in these forest types in the immediate vicinity.

Due to the deteriorating nature of the forest types in this project area there is an abundance of large diameter course woody debris (CWD) and both live and dead wildlife trees (snags), see Tables 4, 5, 9&10. There were also a large amount of live wildlife trees observed in the field. These included large trees of various species with large cavities, rotten portions, large dead branches and broken tops.

Water Resources: There are several identified water resources on this proposed project area. They will all be treated at or above the minimum standards set forth in “Massachusetts Forestry Best Management Practices Manual”. There will be no timber management in regulated wetlands during this scheduled harvest to avoid timing issues with seasonal operation of the harvest.

Shaker Mill Brook and its headwater wetland area which make up the western and southern boundary of the project area will not be affected by the management of these two stands, however management of future stands in the project area will have at minimum a 100 foot filter strip where no harvesting will occur and will follow filter strip standards of the “Massachusetts Forestry Best Management Practices Manual” as needed beyond 100 feet. The one exception to this will be the portion of this filter strip within 100 feet of Watson Road where trees determined to be a public safety issue may be removed. There are no anticipated stream or wetland crossings for Shaker Brook and the associated wetland complex now or in the future of this project proposal.



Both Stand 1 and Stand 2 will have their boundaries along the unnamed stream with associated wet lands. This unnamed stream runs parallel with Watson Road with Stand 2 being in-between. The southern boundary of Stand 1 will be at the wetland that begins this stream. This unnamed stream will have at minimum a 50 foot filter strip where no harvesting will occur and will follow filter strip standards of the “Massachusetts Forestry Best Management Practices Manual” as needed beyond 50 feet. There will be no harvesting in the associated wetland complex of this stream and a 50 foot buffer along the wetland boundary which will exclude equipment.

All additional upland drainages, intermittent streams, seeps and wetlands, and vernal pool resources found within the active project area will be mapped and protected to filter strip standards of the “Massachusetts Forestry Best Management Practices Manual” as needed.

There will be a need of one stream/wetland crossing along the intermittent stream drainage near Watson Road (Map: 4). There will be an alternate crossing location which may be used based on seasonal operating conditions. Skid road and trails will be laid out to minimize the number of other crossings throughout the remaining project area. Shaker Mill Brook will not be crossed. All regulated stream and wetland crossing will be bridged and/or corduroyed.

It is not anticipated that any other live stream or wetland crossing will be needed. Any stream or wetland crossing will be designed using standards of the “Massachusetts Forestry Best Management Practices Manual” and “Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines”

Recreation & Aesthetic: Watson and Stanley Roads located in Washington and Becket are both gravel secondary roads which are maintained year round for vehicle traffic. There is a private dwelling located 0.6 miles to the east along Watson Road in Washington and a private dwelling located 1.5 miles to the south on Stanley Road in Becket. As per the “Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines”, there will be a 50 foot buffer along Watson road where no more than 50% of live basal area will be harvested and no slash with in 25’ of the road will remain. The Massachusetts Slash Law will be observed beyond the 25’ no slash zone.

There are no formal trails or recreational activities to buffer for this project. The project area is however open to all legal passive recreation activities that are allowed on DCR properties. There is currently no formal parking area for visitors.

Evaluation of Data and Projected Results:

Objectives: Silvicultural practices in Stand 1 and 2 (see Map: 3) figure will demonstrate patch regeneration of northern hardwoods as well as control of undesirable beech regeneration. This harvest will begin the process of moving these stands to a more uneven aged structure by aiding/creating a new age class through removal of diseased and damaged trees. Subsequent harvests will continue this process by adding/expanding regeneration by harvesting more patches of mature trees. In this first harvest entry trees to be removed either by thinning or patch removal will be chosen based on crown health and sign of disease/insect damage.

The result of the patch removals is for a high level of diversity in tree and understory plant species as well as creating and maintaining vertical (tree heights) and horizontal (down woody material) stand complexity. The commercial thinning between the patches will provide additional light and nutrient resources for remaining trees.

Primary/Secondary goals: The primary goal of treatment in these stands will be to ensure future diversity of tree, shrub and herbaceous layer. These stands are currently in decline due to ice damage and insect damage, mortality due to disease, and a dense understory of beech. Currently there are 666 understory stems per acre of beech in Stand 1 and 542 in Stand 2. If left unchecked, the two stands will become dominated by diseased beech with steady decline in diversity and complexity.

Secondary goals of this project are to capture value of damaged and/or diseased trees, provide raw materials to the lumber industry and to assist the town of Washington with danger tree maintenance along Watson Road.

Silviculture Methods: The practices used in these stands will be a quality based commercial thinning with patch openings of up to 1/3 acre in areas that have acceptable advanced regeneration or severe crown damage and/or disease. The thinning area will remove an average of 30% of the basal area; the patches will remove all trees over 5 inches in diameter leaving behind all acceptable advanced regeneration. These patches will not exceed 20% of the total stand base.

The 1/3 acre patch size was chosen to comply with current guidelines established in Landscape designations for DCR Parks and Forests: Selection Criteria and Management Guidelines (2012). This 1/3 acre size is generally considered the smallest opening size for regeneration of shade intolerant and mid-tolerant species. Due to existing canopy conditions American beech dominates the understory. The existing American beech understory and small proposed opening size will inhibit fully shade intolerant species such as pin cherry (*Prunus pensylvanica*), black cherry, white birch and aspen (*Populus*). To ensure the shade intolerant and mid-tolerant species have a chance to compete in this marginal light environment, chemical control of beech will be used in these stands.

Throughout the sale area all American beech that appears to be free of beech bark disease will be retained. Chemical treatment will avoid these clones in hope that the clean appearance of the trees is a sign of disease resistance. By leaving these trees a resistant population of American beech may be established.

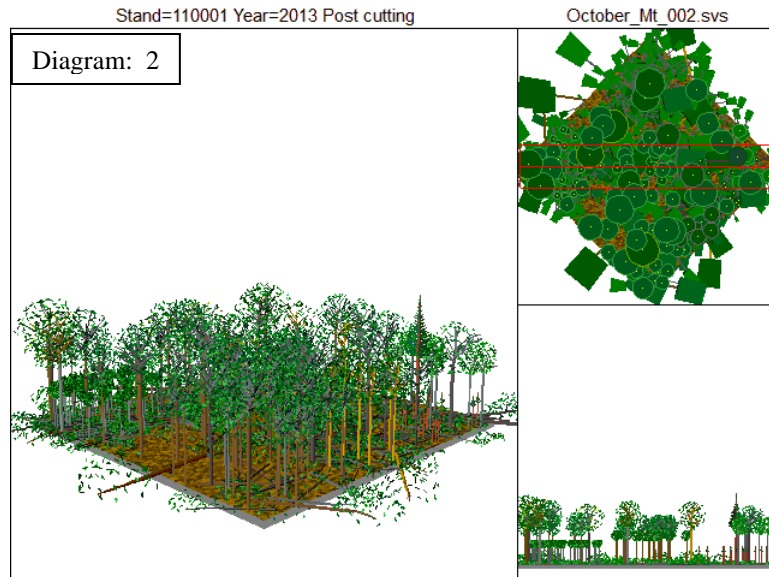
- **Stand 1:** Throughout the entire stand the basal area of live trees will be thinned from 146 ba/ac to approximately 100 ba/ac moving this stand's location on the stocking guide from a high "A" level to a high "B" level. In addition to the general quality/salvage thinning small 1/3 acre openings will be made in areas where current desirable regeneration can be assisted and/or in areas with high overstory damage and mortality. When possible the new 1/3 acre patches will be used to expand natural existing patches. These patches will total about 4.5 acres or about 20 percent of the stand area. Within each patch cut all tree species above 5" dbh will be marked for removal.

As discussed above, due to the current levels of American beech regeneration and the anticipated sprouting of harvested American beech, a pre-harvest chemical treatment is planned. Beech control will be conducted in 1/3 acre patches and a 15 foot buffer around these patches prior to the commercial harvest. This treatment will be conducted late in the growing season, likely in the month of September. A combination of Rodeo (glyphosate 53.8%) and Arsenal (imazapyr) will be used in a water solution, applied with a motorized backpack sprayer. This method of application allows for targeting the desired beech trees and minimizes damage to non-target plants. All beech less than 10 feet in height in the 1/3 acre patch and within the 15 foot buffer around the patch will be treated.

- **Stand 2:** The basal area of live trees will be thinned from 120 ba/ac to approximately 80 ba/ac moving this stand from an "A" level to a low "B" level. This thinning will be prioritized by the removal of mechanically damaged trees first. Due to the narrow width of the stand and its location between Watson Road and the wetland/stream complex, patch cuts of up to 1/3 acre will be used only if local stem mortality is excessive or if safety is an issue along the road.

To control the sprouting of American beech in this stand all beech over 10 feet in height will be cut during the commercial portion of this project. A foliar treatment will be conducted 1 to 2 growing seasons after commercial harvesting is completed. This treatment will be conducted late in the growing season, likely in the month of September. A combination of Rodeo (glyphosate 53.8%) and Arsenal (imazapyr) will be used in a water solution, applied with a motorized backpack sprayer. This method of application allows for

targeting the desired beech trees and minimizes damage to non-target plants. All beech less than 10 feet in height in the stand treated.

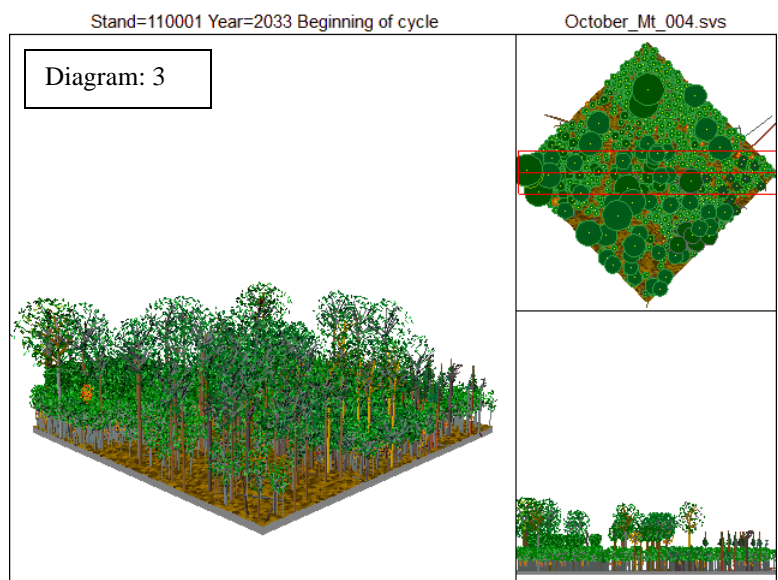


Desired and Expected Results:
By removing a large portion of the damaged, diseased and dying trees through thinning and patch removal the remaining stand will be comprised of a larger percentage of healthy trees with patches of regeneration advancing into the upper canopy. Removal of American beech understory will allow other native northern hardwood species to successfully compete for light and nutrient resources establishing new age classes. The Diagram generated from The US Forest Service SVS program to the left shows what these

stands will generally look like upon completion of the prescribed harvest (Diagram: 2). These stands should be monitored in approximately 3- 5 years to determine the success of the chemical foliar treatment of American Beech.

Below is a description and diagram of what these stands will look like in 2033 prior to a next treatment if the stand is unaffected by natural disturbances such as ice, wind, insects or disease (Diagram: 3). The data used for this description was based on growth models derived from US Forest Service programs Forest Ecosystem Decision Support Software (NED) and the Forest Vegetation Simulator (FVS).

- Stand 1: This stand will have 120 trees per acre less than the present day overstory, however the stocking of the stand will grow back to 94 ba/sq. The quadric mean tree diameter of the stand will be close to an inch larger. The understory is expected to be regenerating in the patch openings. This stand should be monitored between 2029 and 2034 to determine if regeneration in the patch openings was successful. When regeneration is successfully established it is anticipated that the next silvicultural treatment will be used to expand and create new patch openings to further regenerate the stand.



- Stand 2: This basal area of this stand will grow back to a level of 100 ba/ac after the completion of this first growing cycle. The quadric mean diameter will grow an inch to

11.8" dbh. The current prescribed harvest as well as natural mortality will create an understory environment where sugar maple can regenerate without the competition of American beech. This stand should be monitored between 2029 and 2034 to determine if regeneration in the thinning was successful. Further thinning may be prescribed at this point to further the growth of this regeneration.

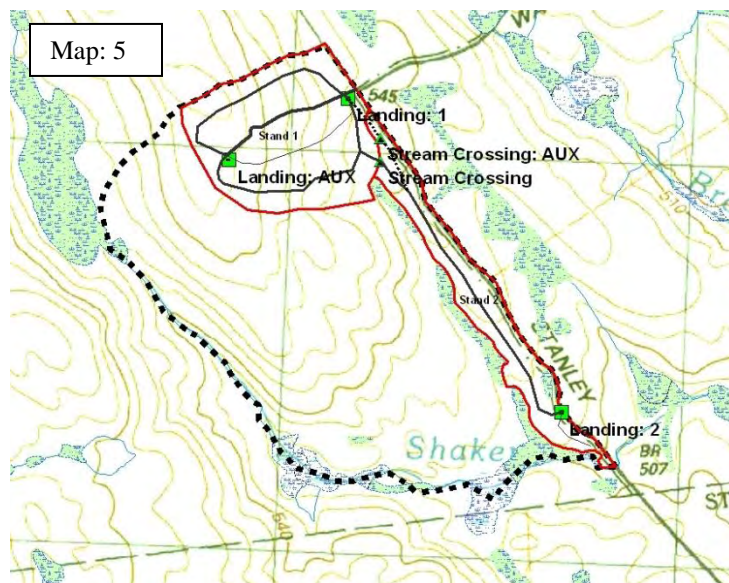
Logging System Requirements: These stands can be efficiently and effectively harvested with a variety of logging equipment. Both mechanized and conventional felling systems will be allowed provided equipment has a ground pressure of 6psi or below. Whole tree harvesting will not be allowed in this prescription area, all trees felled will be limbed within the stand leaving slash dispersed in the felled location except where needed for skid trail use. Skidding length of stems can be restricted based on equipment size as well as operator ability to protect residual trees.

- **Project Access and landings:** Access to the proposed project area will be from either State Route 8 in Becket, to County Road to Stanley Road which turns in to Watson Road upon crossing the town line into Washington or State Route 8 in Washington to Frost Road to Pittsfield Road (also known as Washington Mountain Road) to Watson Road. Access to landing will be an existing woods road into the project area.

As per the Massachusetts ch132 cutting regulations, there will be a 50 foot buffer along Watson road where no more than 50% of live basal area will be harvested. Within stand 2 all slash will be removed within 50 feet of Watson road and will be cut to lay lower than 2 feet within the remainder of the stand. There are no recreation trails in the project area to buffer.

A landing will be constructed near the beginning of the main un-named access road into the northern portion of the project area off of Watson Road (Map: 5, Landing: 1). A requirement of the harvest will be to clear, stump and grade the designated landing area. Approximately 50 yards of bank run gravel will be required for the access road and finished parking area portion of the landing. This gravel will stabilize the surface for road vehicle traffic during the project and upon completion of recreational use.

A second landing off of Watson Road in the southern portion of the project area may be used for this prescription entry (Map: 5, Landing: 2). If used landing will be small and



natural surface if weather conditions permit.

Upon completion of all harvesting activity both landings will be free of debris and graded to prevent erosion. Cleared portions that are not graveled will be seeded with "Berkshire Conservation Mix" grass seed and mulched with straw. Where possible boulders will block access to the skid trails and mark the extent of the parking area.

- **Skid Road and Trails:** Throughout the project area there are existing skid trail segments still visible from the previous

harvest. These existing segments will be evaluated and connected as needed to gain access to necessary areas of the project area. Primary skid trails will be laid out and marked prior to the project being advertized. The anticipated stream/wetland crossing will be located and marked (Map: 5).

Upon completion of all harvesting activity all skid road will be left in a stable state and water bars will be installed according the “Massachusetts Forestry Best Management Practices”. The stream/wetland crossing will be stabilized.

- **Wildlife Resources:** Current snags will be retained; however operators have the right to remove any snag that poses a safety hazard to themselves or equipment. Operators will not be required to utilize cull trees, if left behind they will add to the amount of large diameter CWD. Limbs and tops (slash) will also be left in place to augment existing CWD and add soil nutrients through decomposition.

In-kind Services: Upon final tally of product the extent of in-kind services will be determined.

- Chemical control of beech, to help these stands retain a diverse northern hardwood forest type.
- Equipment and materials to maintain/restore roads and trails within October Mountain State Forest.
- Installation of a gate and small parking area for recreational use at proposed landing on un-named access road in northern portion of project area.

Prescription Documentation:

Project Marking Guidelines: Follow the directions below for marking instructions of sale and stand level features.

Sale Level:

1. Locate, flag (pink wetlands) and paint with two red diagonal stripes the buffers and filter strips along the wetland and associated streams. This line is also part of the of project boundary of stands 1 and 2.
2. Locate, flag and paint with two red diagonal stripes the remaining wooded project boundary line of stands 1 and 2.
3. Flag temporary layout of skid trail network with orange flagging. Using orange paint mark small non commercial stems or stems already marked for removal located along adjusted skid trails upon completion of marking (Orange).
4. Flag Temporary layout of all wetland and stream crossing with labeled orange flagging. Using Red paint mark and label each crossing upon completion of marking and any final adjustment to location.
5. Mark perimeter of landing and 1/3 acre openings with two orange diagonal stripes.
6. General tree marking guide:

Type of Tree	Tally Method	Mark Type
Cut Saw Log	Individual tally DBH & height	Blue Horizontal Line
Cut Pulp/Cord Wood	Individual tally DBH - 1/10 height	Blue Dot
Cut Live Cull Tree	Count	Blue X
Dead Tree Warning	No tally	Blue X

Stand 1:

Commercial Thinning: Remove 1/3 of the basal area reducing the stand to approximately 100 square feet of ba/ac by following the prioritized guide below.

1. Unacceptable \ Diseased American beech
2. Unacceptable \ Diseased white ash
3. Unacceptable black cherry, red maple, American beech or birch
4. Unacceptable Sugar Maple
5. Any other tree based on appearance of mechanical strength and vigor

Patch Cutting: Within this stand up to twenty-one 1/3 acre opening will be located in areas of established desired advance regeneration and/or areas of trees of poor health due to disease or mechanical damage. The opening should be distributed throughout the stand. These opening will cover approximately twenty percent of the total delineated stand. Within these patches all live trees 5"dbh and above will be marked for harvest.

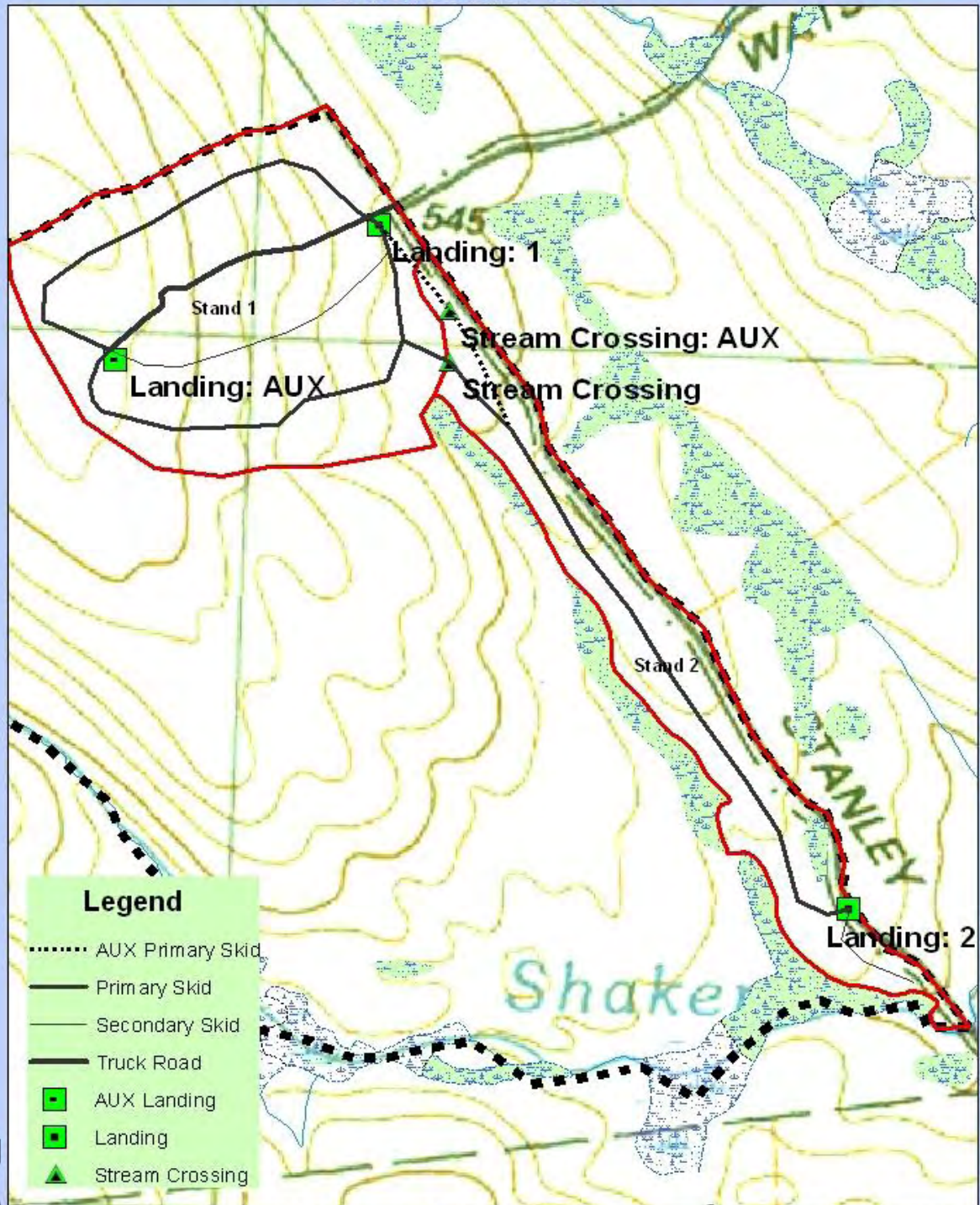
Stand 2:

Commercial Thinning: Remove 1/3 of the basal area reducing the stand to approximately 80^{sq/ft} by following the prioritized guide below. Remove no more than 50% of the basal area within the road buffer.

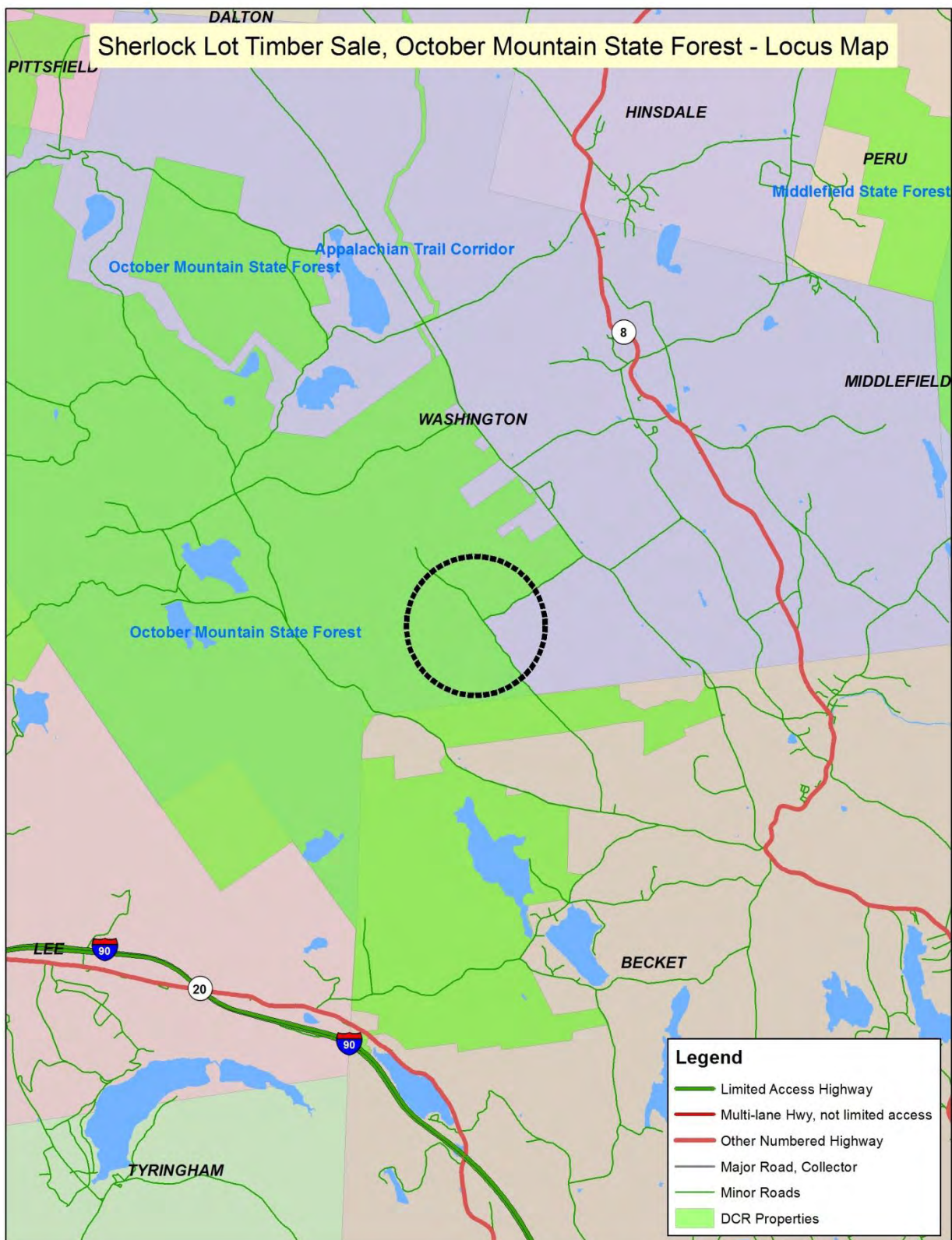
1. Unacceptable \ Diseased White Ash
2. Unacceptable \ Diseased Sugar Maple
3. Unacceptable Red Maple, American Beech or Birch
4. Unacceptable Red Oak
5. Unacceptable Black Cherry
6. Other American Beech, Red Maple or Red Oak

Patch Cutting: Within this stand up to five 1/3 acre opening can be located in areas where trees of poor health due to disease or mechanical damage are concentrated. The opening will give desirable shade intolerant regeneration a chance to compete in these areas where mortality is inevitable. These opening will cover a maximum of 10 percent of the total stand. Within these patches all live trees 5"dbh and above will be marked for harvest. Patches will not be located within the Road buffer strip unless trees pose a specific risk to the public roadway, a waiver of the road side buffer will be sought through the Forest Cutting Plan.

October Mountain State Forest Sherlock Lot



KMM02/26/2013



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