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Silviculture Prescription
Beulah Land Red Pine Lot

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Central Berkshire District
Chester-Blandford State Forest
Blandford, MA

Prepared by:

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Approved by:

Management Forestry
Program Supervisor  Date: February 2, 2016
William N. Hill, CF

Overview:

The Beulah Land Red Pine Forest Management project is on the central portion of the Chester-Blandford State Forest (see Locus Map) along Beulah Land Road (Cole Estate Road on some historic maps) near the intersection with Observation Hill Road. It comprises approximately ninety two acres of red pine plantation, hemlock hardwoods and oak- hardwoods forest types.

The conditions that led to selecting this project for forest management are:

- Significant portions of the project area have been affected by biotic (red pine scale) agents that are causing mortality in the overstory red pine trees.
- Due to the loss of overstory crown cover there is an acceptable density of sugar maple, black birch, hop hornbeam and other native tree saplings available to be released in the understory.
- This project will provide an opportunity to repair drainage and erosion issues on Observation Hill Road.
- Will provide an opportunity to demonstrate thinning of young oak-hardwood stands for increased growth and timber quality.
- Desire to capture monetary value of off site red pine trees prior to mortality of the stand.
- This project area offers an excellent opportunity to demonstrate and fulfill objectives for DCR Woodlands including the restoration of a native ecosystem.

The Beulah Land Red Pine Removal Forest Management Project proposes to:

- Remove/salvage an overstory of dying red pine stand and release an existing understory .
- Demonstrate thinning for quality and vigor within the Hemlock/Hardwood and oak - hardwood forest types.
- Remove/reduce the costs and safety concerns of the dying red pine stands along traveled roads.
- Demonstrate harvesting techniques and best management practices that protect forest productivity, soil and water resources.
- Repair portions of Beulah Land road and Summit Hill Road.
- Fulfill management approaches for Woodlands as directed by the Forest Futures Visioning Process (2010) and subsequent Management Guidelines (2012) including the restoration of a native forest conditions.

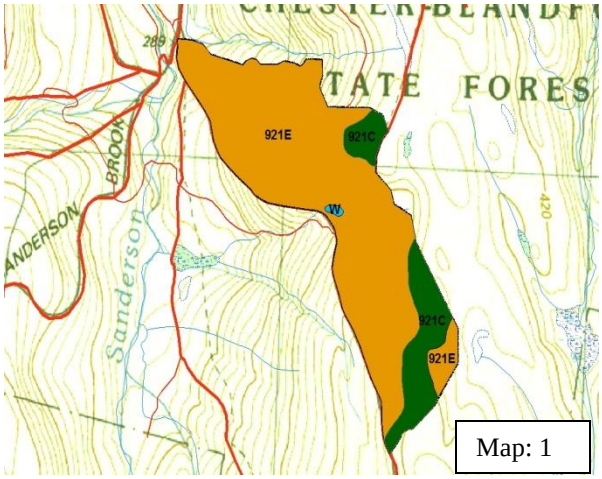
The Beulah Land Red Pine Lot Forest Management Project is 92 acres in size and will result in two, individual timber sale entries. See the Silviculture section; Hemlock Hardwoods. This prescription will cover the entire project area.

Site Data:

Geology and Landforms: This proposed project area lies in the North West portion of the Town of Blandford and is located in the central portion of Chester-Blandford State Forest adjacent and east of Beulah Land Road. The project is bounded by Beulah Land roads to the west and an unnamed brook to the north. Observation Hill Road is a portion of the eastern boundary and a forest type change is the remainder of the east boundary and the south boundary. The lowest point of elevation (960 feet) is located at the northern portion of the project area. From here the terrain rises quickly to the south and east to an elevation of 1380 feet at the southern end of the project area.

Along with the stream along the northern boundary mentioned above there is one additional stream located in the middle of the project area running generally parallel to Observation Hill Road. This stream is dammed before crossing Beulah Land Road. Both of these streams have fairly steep grades. These streams flow into Sanderson Brook which crosses RT 20 and flows into the Westfield River.

The project area ranges from generally flat in the Southern portions with slopes facing west and northwest. These slopes range from less than five percent to over 40 percent in the gullies created by the steams. A portion of the project area is extremely steep and is covered in sporadic rocks and boulders and will be excluded from harvest.



Map: 1

Soils: There are two soil types within this project area 921C and 921E, both are in the Westminster-Millsite Association. For forestry use these two types can be considered the same. These soils are formed in glacial till on mountainous uplands. The Westminster soils are typically found in the upper slopes and are shallow and excessively drained. The Millsite soils are moderately deep and well drained and located on the less sloping portions. This soil type is considered moderate for forest growth, low risk for erosion and has few equipment limitations. (Excerpts from "Soil Survey of Hampden County Massachusetts", NRCS 1995).

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.

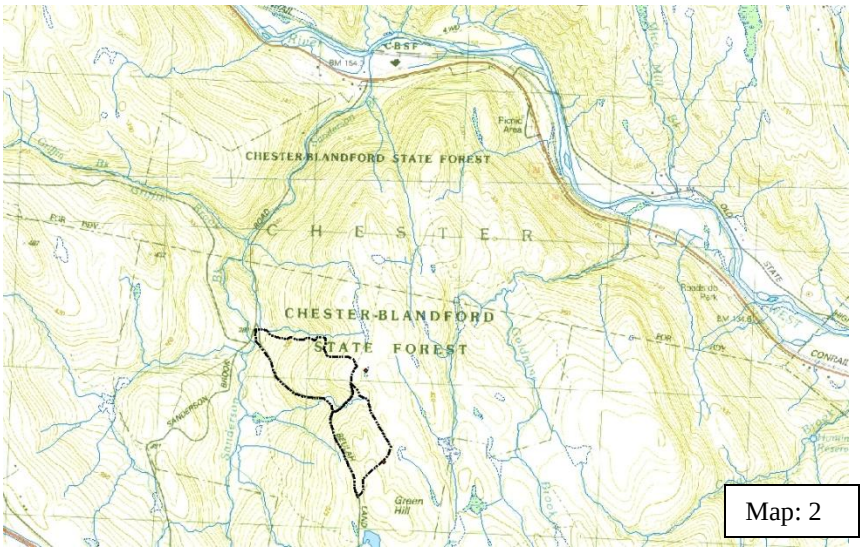
Table 1:

	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 >= .01 Precipitation	144						
Average Wind Speed	6.1						

The two most recent major events which damaged this project area were the ice storm of 2008 and the 2011 hurricane Irene. The ice storm 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. Hurricane Irene causes extensive road damage due to flooding. Much of this damage was repaired.

Hydrology and Watershed: The project area falls entirely within the Westfield Watershed. All rain fall within this project area drains directly into intermittent or perennial streams which flow westerly into Sanderson Brook. From here the water flows down Sanderson Brook north under Route 20 and the Rail Road to the West Branch of the Westfield River.

Along with the stream along the northern boundary mentioned above there is one additional stream located in the middle of the project area running generally parallel to Observation Hill Road. This stream is dammed before crossing Beulah Land Road creating a small pond (less than ½ acre). Both of these streams have fairly steep grades. These streams flow into Sanderson Brook which crosses RT 20 and flows into the Westfield River.



Map: 2

There are no mapped certified vernal pools by NHESP however several potential vernal pools are mapped just outside of the project area. There were two potential vernal pools found in a Pre-Harvest Vascular Plant Inventory that was conducted in 2008. Both of these are located outside of the current project area. There may also other seasonal seeps, intermittent streams or small forested wetlands areas located throughout the project area not seen during initial site visits.

Stand Information: The proposed project area consists of approximately 92 acres of Red Pine, Oak-Hardwood and Hemlock-Hardwood forest types. Throughout the project area the dominant tree species that were observed are red pine (Pinus resinosa), red oak (Quercus rubra), Hemlock (Tsuga canadensis), sugar maple (Acer saccharum), red maple (Acer rubrum), black birch (Betula lenta), white birch (Betula papyrifera), white ash (Fraxinus americana), black cherry (Prunus serotina), American beech (Fagus grandifolia) and quaking aspen (Populus tremuloides). The exotic red pine plantation portion of this project area has been shaped by rapid mortality in recent years caused by red pine scale (Matsucoccus resinosae) (http://www.nhstateparks.org/uploads/pdf/RP_pestalert.pdf).

The DCR Management Guidelines of 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". The current species compositions and the GIS analysis of the Beulah Land Road site history (land use; agriculture/logging) and conditions (soil types, productivity; vegetation cover) suggests a range of site complexity from moderate to high indicating that even age methods of regeneration may be appropriate at this location, however due to current conditions and forest types even aged management will be preformed.

Disease and Insects: There current and potential threats to this project area include Red Pine Scale and Hemlock Woolley Adelgid (HWA). Damage from both of these insects can be seen both in the project area and in the surrounding landscape. Both insects can cause rapid collapse of the associated stands.

- Red Pine Scale was first reported in Connecticut in 1946 and has spread through New England since. It is believed to introduced to the the region on exotic pines planted in 1939 at the World's Fair in New York. In the

United States this scale only attacks the Red Pine tree. Other pines species are not affected.

The scale is first detected by the presence of red/browning of individual branches, followed by a rapid decline of the whole crown. As Red Pine Scale expands feeding on the tree, secondary pests such as turpentine beetles can enter and speed the mortality process. http://www.nhstateparks.org/uploads/pdf/RP_pestalert.pdf

- Hemlock Woolly Adelgid (HWA) is belived to have originated in Japan and was found near Richmond, VI in 1951 and has spread north as far as Maine. Once infested with this aphid insect tress typically decline and die within 4 – 10 years. There is no natural native control for this forest pest. http://na.fs.fed.us/spfo/pubs/pest_al/hemlock/hwa05.htm

Roads, Trails and Recreation: The main access to the state forest is Beulah Land Road. This road is owned by the town of Blandford until it crosses into the state forest boundary where its ownership changes to DCR. Access to the project area and landing locations will be off the DCR owned portion of Beulah Land Road. Some landing sites are preexisting and will be utilized when possible. All landings will be graded and restored upon completion of this project. In conjunction with this project restoration of eroded sections of both Beulah Land Road and Observation Hill Road will be a priority.

Chester-Blandford S.F. is open to all legal passive recreation activities that are allowed on DCR properties including hunting, fishing, snowshoeing, hiking and birding. As directed in the Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines" a 50 foot buffer where slash will be light and natural in appearance will be in place along CCC Ski Trail mentioned below.

The CCC Ski Trail (mapped main ski trail) is located within the project area. The last formal maintenance of this trail was approximately 12 years ago. This trail is one of several ski trails cut in to the hemlock stand in the 1930's as a formal downhill ski area by the Civilian Conservation Corps. After lying dormant for many years, the Student Conservation Crew (SCA) trail cleared the main trail and it was placed back on the official trail maps. During the 2006 trail inventory of this forest, portions of this trail showed damage from illegal ATV use. In accordance with the "Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines" trail restoration will be a priority. Installing drainage features to prevent further erosion will occur on the main CCC Ski Trail.

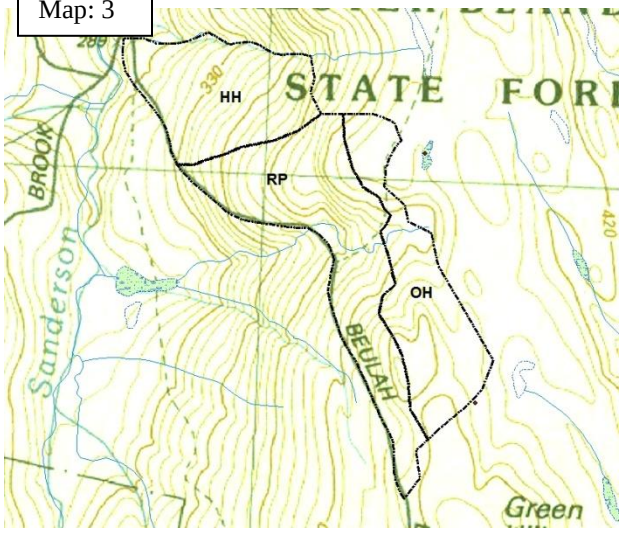
There is also a trail located in this project area that was built illegally and is not recognized by DCR as a designated trail. This trail runs through the Chester-Blandord State forest from east to west, and is known internally within DCR as the White Trail. Sections of this trail within the state forest have attracted illegal mountain bike riding and associated trail building as well. As in previous forestry projects within the Chester-Blandford S.F., illegal trails will be removed with the timber sale operation.

Cultural and Archeological Feature: There are no known pre-contact sites or cultural resources within the proposed project, however several CCC era historic features occur just outside of harvest area. The dam of the unnamed brook mentioned above will be surrounded by this project. An old chimney is located at the site of the old CCC ski lodge found at the bottom of the ski trail across the street from the harvest area. The dam and chimney as well as any other features 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". During reconnaissance no stone walls were found. If any walls are found they will be left intact during this project.

Stand Data:

Forest Stand Attributes: This prescription will describe the conditions and treatments within the 95 acre project area. (Map: 3) This project area will be broken up into three stands for silvicultural treatment based on forest type. These stands will be Red Pine (35 acres), Oak/Hardwoods (30 acres) and Hemlock Hardwoods (30 acres).

Map: 3



The red pine stand is a plantation establish approximately 80 years ago. This area was planted after a clear-cut harvest resulting in a mixed plantation and native sprout origin stand. The oak/hardwood and hemlock/hardwood stands are typical for this area consisting primarily of red oak, American beech, black birch, sugar maple, white ash, red maple, poplar, black cherry and hemlock.

Disturbance History: This project area has been shaped in recent years by red pine scale and hemlock wooley adelgid the hemlock trees. Both non native forest pathogens are causing collapse of their respective stands. Much of this forest including the prescribed project area were heavily cut or clearcut in the early part of the 20th century. Some areas were re-planted with red pine, white pine or Norway spruce while other areas were left for natural succession to take over.

There is no recent timber management conducted by the DCR in this prescribed area based on department records; however there have been harvests on the west side of Beulahland Road in 1984, 1988, 1997 and 2006. These harvests consisted of similar silviculutral practices as will be prescribed here.

Stand Structure: All three of these stands are approximately 110 years old and are considered to be fully stocked. The oak/hardwoods stand is in good health and showing vigorous growth. Due to biotic (insect and disease) agents the overstory trees of the red pine and hemlock/hardwoods stands are in significant decline. The original single age class stand is beginning to break up due to the above mentioned disturbances and regenerate slowly a mix of native tree species.

- Red Pine (RP): This stand is fully stocked with a overstory basal area of 204 ba/ac which is considered to be above the "A" level according to stocking charts. The measured relative density of the stand is calculated at 115%. Currently the stand is overcrowded causing the already stressed trees to succumb quicker to the red pine scale. Red oak, poplar and black birch make up approximately 18% of the stand; however they are not evenly spread throughout. The overstory quadric mean of the stand is 11.2"dbh with measured trees reaching 18"dbh. (Table 2)

  The understory of this stand is dominated by sugar maple, American beech, hop horn beam, black cherry, red maple and black birch saplings (>600 stems/acre over 1.0"dbh). These species as well as red oak are represented in smaller sized classes as well (>1020 stems/acre under 1"dbh). (Table 3) Shrub and ground cover species noted throughout the stand were ferns, mountain Laurel and partridge berry. A project wide list (all three stands)

of noted Vascular Plant List that was composed from a 2008 inventory by Nancy Putnam is included as an appendix.

Throughout the stand there is an average of 13 snags under 12”dbh per acre. All snags recorded on plots were red pine, however several hardwood snags were noted throughout the stand. (Table 4) On average 75.3 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 red pine mortality, is less than 12 inches in diameter and is still in the hard/sound category. This figure is below the recommended minimum of 256 cubic feet of CWD as required in the Landscape Designation Guidelines, however this amount is expected to increase post harvest.

Table 2: Red Pine Type (Live trees greater than 5”dbh)

	All species	Red Pine	Red Oak	Black Birch
Basal area (square feet/ac)	204	168	32	4
percentage of stand	100	82	16	2
Stems per unit area (stems per acre)	299	247	46	6
Quadric Mean Diameter	11.2			
Relative Density	113	84	29	0
Sawlog Gross Total (bf/ac)	22356	20220	2135	0
Cords Gross Total (cds/ac)	27	23	0	4

Table 3: Red Pine Type (Live trees less than 5”dbh)

	All species	Black Cherry	American Beech	Hop Horn Beam	Red Maple	Red Oak	Sugar Maple	Striped Maple
3” - 12” High	510	90	30	90	30	210	30	30
1’ – 4.5’High	390	0	90	0	60	0	0	150
4.5’Hight – 1”dbb	500	262.5	100.5	12	12.5	12.5	62.5	
> 1.0” – 4.9” dbh	5.8	4.4	0.9	0.4	0	0	0	

Table 4: Red Pine Snags

Dbh Range	Total	Softwood
6” – 12”	13.2	13.2
12” – 15”	0	0
15”+	0	0

- Oak/Hardwoods (OH): This stand is over stocked with an overstory basal area of 150 ba/ac and an average of 216 trees/acre, this is above the “A” level according to local stocking charts. Under the current condition the stand is overcrowded and causing the more suppressed and intermediate trees to compete with the larger dominant trees for the limited resources. Acceptable growing stock, trees free of mechanical and biological defects, account for 65% of the stand. Red oak, beech and black cherry dominate the overstory with hemlock, spruce, sugar maple, red maple, white ash, paper birch and black birch present in

smaller amounts. The quadric mean of the overstory stand is 11.3”dbh with measured trees reaching 19”dbh. (Table 5)

The understory of this stand is a diverse mixture of species and size. There are over 2550 trees under 5”dbh per acre with most (1590) being in the 1-4.5’ height class. The species in the understory listed by prominence are beech, hop horn beam, red maple, black cherry and red oak. (Table 6) Shrub and ground cover species noted throughout the stand were mountain laurel, ferns, hobble bush and partridge berry and witch hazel. A project wide list (all three stands) of noted Vascular Plant List that was composed from a 2008 inventory by Nancy Putnam is included as an appendix.

Within in this stand no snags were recorded on inventory points, however there were several snags noted throughout the stand in the small 5”-10”dbh size range. On average 322.4 cubic feet of coarse woody debris per acre were recorded in inventory transects. Much of this total is a result of the stands natural mortality from competition and is still in the hard/sound category.

Table 5: Oak/Hardwoods Overstory (all measured trees greater than 5”dbh)

	All species	Red Oak	American Beech	Black Cherry	Spruce	Red maple	Paper Birch	Hemlock	Black Birch	White Ash	Sugar Maple
Basal area (square feet)	150	98	6	20	4	6	4	4	2	2	2
Percentage of Acceptable growing stock	87	98	33	80	100	67	50	50	50	50	50
Percentage of stand	100.0	65	04	13	03	04	03	03	01	01	01
Stems per unit area (stems per acre)	216.9	105.5	31.9	25.0	21.3	9.1	6.0	6.0	3.0	3.0	3.0
Quadric Mean Diameter	11.3	13.0	5.9	12.1	5.9	11.0	11.0	11.0	11.0	11.0	11.0
Relative Density	111	86.8	5.6	16.1	2.5	0	0	0	0	0	0
Sawlog Gross Total (bd/ac)	12,077	10,310	0	1,294	0	0	0	474	0	0	0
Cords Gross Total (cds/ac)	15.2	7.8	3.47	0	3.04	0	0	0	0	0	0

Table 6: Oak/Hardwoods Understory (measured trees less than 5”dbh)

	All species	Red Oak	American Beech	Black Cherry	Red Maple	Hemlock	Black Birch	Sugar Maple	Hop Horn Beam	Striped Maple
3” - 12” High	480	240	30	60	60	0	0	0	60	0
1’ – 4.5’High	1590	030	390	270	240	0	240	30	240	30
4.5’Hight – 1”dbb	240	0	210	0	0	0	0	0	0	0
> 1.0”dbh	240	0	120	0	60	30	0	0	60	0

- Hemlock Hardwoods (HH): This stand is over stocked with an overstory basal area of 196ba/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 88% of the stand. Hemlock, white ash and red oak dominate the overstory with red maple, paper birch, black birch, yellow birch, sugar maple and beech

present in smaller amounts. The quadric mean of the overstory stand is 11.8"dbh with measured trees reaching 20"dbh. (Table 8)

The understory of this stand is occupied by hemlock, red oak, black cherry, beech and hop horn beam. (Table 9) In this stand mountain laurel, hobble bush, ferns, maple leaf viburnam and clubmoss's are predominant ground cover species, however the density of these species would should not prohibit regeneration or tree species. A project wide list (all three stands) of noted Vascular Plant List that was composed from a 2008 inventory by Nancy Putnam, DCR Upland Ecologist, is included as an appendix.

Throughout the stand there is an average of 14.5 snags per acre. The majority of these snags are small hemlock between 6 and 12"dbh. (Table 14) On average is 313 cubic feet of coarse woody debris per acre were recorded in inventory transects. Much of this total is a result of the declining hemlock and is still in the hard/sound category.

Table 8: Hemlock/Hardwood Overstory (all measured trees greater than 5"dbh)

	All species	Hemlock	White Ash	Red Oak	Red Maple	Paper Birch	Black Birch	Yellow Birch	Sugar maple	Beech
Basal area (square feet)	196	122	16	14	12	10	8	6	6	2
Percentage of Acceptable growing stock	88	87	88	100	83	80	100	100	100	0
percentage of stand	100.0	62	8	7	6	5	4	3	3	1
Stems per unit area (stems per acre)	256.4	166.3	14.6	18.3	20.8	10.5	10.5	7.8	6.5	1.1
Quadric Mean Diameter	11.8	11.6	14.2	11.8	10.3	13.2	11.8	11.8	13.0	18.0
Relative Density	94	55.7	12.7	0	9.9	9.5	0	0	4.8	1.5
Sawlog Gross Total (bd/ac)	20,919	14,449	1,617	2,092	460	537	598	897	270	0
Cords Gross Total (cds/ac)	23.74	18.52	.96	0	2.31	1.47	0	0	0	.48

Table 9: Hemlock/Hardwood Understory (measured trees less than 5"dbh)

	All species	Hemlock	Red Oak	Black Cherry	Beech	Hop Horn Beam
3" - 12" High	360	0	240	60	30	30
1' – 4.5'High	0	0	0	0	0	0
4.5'Hight – 1"dbb	0	0	0	0	0	0
> 1.0"dbh	20	30	0	0	0	0

Table 10: Hemlock/Hardwood Snags

Dbh Range	Total	Softwood	Hardwood
6" – 12"	10.6	10.6	0
12" – 15"	1.6	0	1.6
15"+	2.3	0	2.3

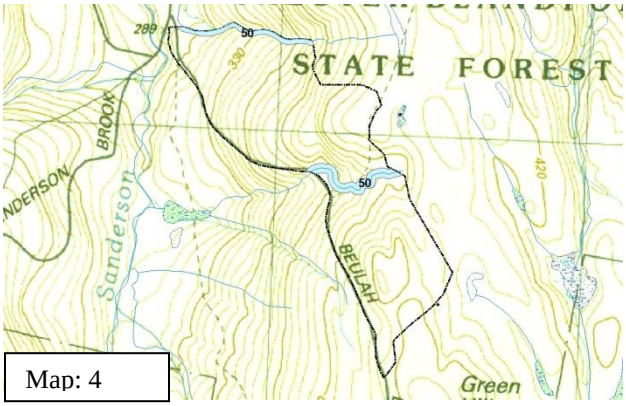
Wildlife Habitat Conditions: According to the NHESP "Massachusetts Natural Heritage Atlas 13th Edition" there is no priority or estimated habitats located in the proposed harvest area. No rare plants have been identified in the field to date. During the Pre-Harvest Vascular Plant Inventory that

was conducted in 2008 there were no state listed plant species nor were any invasive species found in the area. Care will be taken to properly report and address the needs of any state-listed rare plant or wildlife species if found on the site.

No rare animals or critical habitat were noted upon the initial site visit. Large mammals noted through observed signs were deer and coyote. Small mammals noted were turkey, 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 within the Red Pine and Hemlock/Hardwoods stands there will be an abundance of large diameter course woody debris (CWD) as the dead trees fall down. As the Oak/Hardwoods stand matures more opportunity for large diameter CWD will accumulate. With in all stands small diameter CWD is abundant and will increase as a result of the prescribed harvest. 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: Along with the stream along the northern boundary mentioned above there is one additional stream located in the middle of the project area running generally parallel to Observation Hill Road. This stream is dammed before crossing Beulah Land Road. Both of these streams have fairly steep grades. These streams flow into Sanderson Brook which crosses RT 20 and flows into the Westfield River. There will be a 50' no cut buffer along each of these streams.



Map: 4

There are no mapped certified vernal pools by NHESP however several potential vernal pools are mapped on the NHESP shape file just outside of the project area. During a Pre-Harvest Vascular Plant Inventory conducted in 2008 there were two potential vernal pools found just outside of the current project area. There may also other seasonal seeps, intermittent streams or small forested wetlands areas located throughout the project area not seen during initial site visits.

Recreation & Aesthetic: The main access to the state forest is Beulah Land Road. This road is owned by the town of Blandford until it crosses into the state forest boundary where its ownership changes to DCR. Access to the project area and landing locations will be off the DCR owned portion of Beulah Land Road. Some landing sites are preexisting and will be utilized when possible. All landings will be graded and restored upon completion of this project. In conjunction with this project restoration of eroded sections of both Beulah Land Road and Observation Hill Road will be a priority.

Chester-Blandford S.F. is open to all legal passive recreation activities that are allowed on DCR properties including hunting, fishing, snowshoeing, hiking and birding. As directed in the Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines" a 50 foot buffer where slash will be light and natural in appearance will be in place along CCC Ski Trail mentioned below.

The CCC Ski Trail is located within the project area. The last formal maintenance of this trail was approximately 12 years ago. After lying dormant for many years, the Student Conservation Crew

(SCA) trail cleared the trail and it was placed back on the official trail maps. During the 2006 trail inventory of this forest, portions of this trail showed damage from illegal ATV use. In accordance with the "Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines" trail restoration will be a priority. Installing drainage features to prevent further erosion will occur on the CCC Ski Trail.

There is also a trail located in this project area that was built illegally and is not recognized by DCR as a designated trail. This trail runs through the Chester-Blandord State forest from east to west, and is known as the White Trail. Sections of this trail within the state forest have attracted illegal mountain bike riding and associated trail building as well. As in previous forestry projects within the Chester-Blandford S.F. illegal trails will be removed with the timber sale operation.

Evaluation of Data, Siviculture and Projected Results:

Primary/Secondary goals: The primary goal of treatment in these stands will be to ensure future diversity of age, size and species mixture by demonstrating several types of silviculture. These practices will help in ensuring diverse and resilient forests as directed in the goals of the "Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines". This is being accomplished by creating a well planned and balanced science based forestry plan.

Secondary goals of this project are to capture value of damaged and/or diseased trees and to provide raw materials to the forest products industry. This project will also assist the community by repairing the forest roads / trails and provide income to the town from the Forest Product Trust Fund.

Red Pine Plantations: Due to the species composition and rapid mortality of these stands, even aged silviculture will be utilized to manage for improvement. The silvicultural practices in these stands will demonstrate an overstory removal with reserves of native hardwoods. These stands will be managed to change this stand from a planted red pine dominated overstory to a natural oak – hardwood stand. Forest management efforts will also be aimed at creating and maintaining vertical (tree heights) by retaining mature native hardwood and softwood as well as the desirable regeneration (trees under 5"dbh) within these stands.

This harvest will create openings in the current overstory greater than 1/3 acre and therefore DCR Commissioner approval has been obtained as required in the "Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines" . The stand will remain fully stocked upon completion of this harvest, consisting roughly 50 trees per acre of native hardwood and approximately 500 saplings (1"-5"dbh) per acres.

The primary goal of treatment in these stands is to remove the diseased red pine while retaining, protecting and releasing the advanced regeneration currently in place. The secondary goal of management in these stands is to capture the potential product and value of the red pine prior to total stand collapse.

- **Silviculture Methods:** An overstory removal also called single stage shelterwood with reserves will be prescribed for the red pine plantations. This will be the only step in converting these plantations to new natural oak-hardwood stands. Within these stands all red pine will be removed except when needed to satisfy filter strip requirements. It is anticipated that all poplar will be harvested promoting the sprouting and retention of this species in the future. Trees of other species including oak, cherry, maples and birches which make up approximately 10

percent of the current overstory will be retained as reserve trees during the harvest to provide structural diversity in the stand. After this harvest releases the current understory, dominated by sugar maple, hop horn beam and black birch, a new age class will be established.

- **Desired Future Conditions:** By releasing the sapling sized stand of hardwoods by harvesting the diseased red pine, the resulting stand will provide habitat diversity in size and structure in the larger forest ecosystem for years to come. The future stand will be composed of a young northern hardwood forest of small trees (less than 5"dbh) with several residual hardwood trees scattered throughout. The future composition of the stand will be native hardwoods consisting of sugar maple, black cherry and red oak with associate species of hemlock, aspen and red maple.
- **Anticipated Future Treatments:** This stand should be examined in approximately 5 years to ensure the advanced regeneration has survived and additional regeneration is of desired species. No further treatment is expected until this stands reaches 40-50 year old, at which time commercial thinning may be conducted.

Oak-Hardwoods: Silvicultural practices in these stands will demonstrate commercial thinning of oak/hardwoods to provide additional space, light and water resources for remaining trees. These stands will be managed for optimal growth of high quality sawlog trees. Forest management efforts will also be aimed at retaining wildlife trees and ensuring adequate course woody debris.

The primary goal of treatment in these oak/hardwood stands is to reduce competition in the overstory and increase growth of red oak and other preferred tree species for high quality wood products in the future. Secondary goals of this project are to capture the commercial value of low vigor, damaged and/or diseased trees for low grade forest products and fuelwood markets.

- **Silviculture Methods:** A commercial thinning will be applied though out the oak hardwood stands where the basal area or density of the stand will be reduced to allow for adequate resources for remaining growing stock. This will remove approximately one third to one half of the currently over stocked stand. Priority for trees to be removed will be based on quality (poor form, structural damage) and crown class (understory and intermediate) and species.

- **Desired Future Conditions:** This harvest should lead to a stands of high quality red oak and other hardwood species. The stand will be fully stocked and trees will have ample opportunity to grow. As the stand matures wildlife trees will become larger and provide more habitat opportunities. An example of post harvest tree spacing is pictured to the right.
- **Anticipated Future Treatments:** This stand should be examined in approximately 10 years to verify if the goals treatment were met. It is anticipated that the next silvicultural treatment will occur roughly 20 years after this current harvest and will begin the process of regenerating the stand.

Hemlock-Hardwoods: Harvesting will be postponed in this stand until further coordination with Recreation staff occurs to evaluate the recreation potential within this stand. After coordination with Recreation staff, a separate forest products sale will occur using the silvicultural methods outlined below.

Silvicultural practices in these stands will demonstrate group selection harvesting and commercial thinning of hemlock/hardwoods to promote regeneration in advance of the HWA caused mortality in these stands. These stands will be managed for a high level of tree and understory plant species diversity, while trying to retain a component of hemlock. Forest management efforts will also be aimed at creating and maintaining vertical (tree heights) and horizontal (down woody material) stand complexity. This will be the first step in converting these even aged stands to uneven aged.

The primary goal of treatment in these hemlock/hardwood stands is to retain hemlock as softwood component to keep diversity of stand level types in the forest. This may not be possible with the advancement of HWA in the area, but clusters of the healthiest hemlocks will be identified for retention. Even if these retained hemlocks eventually succumb to HWA, they will provide valuable clusters of snag habitat for wildlife and avoid having dispersed dead hemlock throughout the stand which could pose a potential safety hazard to hikers. Establishing white pine will also be attempted to act as a secondary softwood species. A secondary goal in this area to capture value of low vigor, damaged and/or diseased trees while ensuring the potential for future growth and regeneration of desirable high quality wood products.

- **Silviculture Methods:** This harvest will utilize group selection, an uneven aged regeneration method to encourage regeneration of mid shade tolerant species, coupled with intermediate thinning in the remaining areas to favor future growth on well-formed canopy. This will be the first step in establishing regeneration in an area where high levels of mortality are expected. During this project 30-50% percent of the area will be regenerated by harvesting 1/3 acre group openings. These groups can be located to promote advanced regeneration or establish new regeneration. Within these group openings all trees over 5 inches in diameter and all hardwoods over 4.5 feet in height will be removed leaving behind the advanced softwood regeneration.

  The commercial thinning will be used to release dominant and co-dominant hemlock trees to provide additional light and nutrients in hopes of warding off the immediate effects of HWA. White pine will also be a tree favored to remain in the thinned portion of the stand. Where thinning will occur no more than 50% of the basal area will be removed.
- **Desired Future Conditions:** In twenty years the openings created in this stand will have regenerated to small patches of large sapling (average 5”dbh) groups of desirable species. The new cohort of trees will be dominated by oak, birch and maple with white pine in a lesser amount. The residual thinned hemlock from the original stand may be deceased or be in a state decline.
- **Anticipated Future Treatments:** This stand should be examined in approximately 10 years to ensure adequate regeneration has been achieved in the group openings. If the overstory resists mortality from HWA a treatment can occur roughly 20 years after this current harvest to expand and create new group openings to further regenerate the stand and add an additional age class. If the expected mortality occurs in this stand no further commercial work may take place until the new stand is larger enough for commercial work.

Logging System Requirements: By using Observation Hill Road as a division line, this project will be divided in two operational units. The harvester will have to complete one section prior to beginning work on the second. Work will begin in the rear of each section and move towards the landing. The Forester and harvester will cooperatively decide which section to begin with.

The harvesting of these stands can be primarily accomplished with a cut-to-length harvester and forwarder to ensure safely, efficiently and effectively. A conventional felling system of a chainsaw and skidder will be allowed as needed in areas inaccessible to the mechanized equipment provided

this equipment has a ground pressure of 6psi or below. Whole tree harvesting and skidding lengths greater than 33 feet will not be allowed in this prescription area, all trees felled will be processed or limbed within the stand leaving slash dispersed in the felled location except where needed for skid trail use. Harvesting in this manor will increase amounts of CWD by leaving more material in the woods.

Project Access and Landings: Access to the proposed project area will be from Chester Road to Beulahland Road in the town of Blandford. Several existing Truck landings will utilized be along Beulah Land Road. As in the past tractor trailers will be allowed for log transport out of the forest. Upon completion of all harvesting activity 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 forwarder / skid trails from illegal vehicles.

Forwarder Road and Skid Trails: Throughout the project area forwarder / skid trails will be laid out to avoid all water features and to avoid slopes. Any existing segments will be evaluated and connected as needed. Primary skid trails will be laid out and marked prior to the project being advertized. Any unavoidable stream or wetland crossing will be designed at or above the standards of the "Massachusetts Forestry Best Management Practices".
Upon completion of all harvesting activity all forwarder / skid road will be left in a stable state and water bars will be installed according the "Massachusetts Forestry Best Management Practices". All stream/wetland crossing will be stabilized and entrances will be blocked to prevent illegal access.

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.

- Repair and restoration of drainage features on Beulah Land Road and Observation Hill Road.
- Maintenance cutting of vegetation and restoration of illegal off-road vehicle damage of the CCC Ski Trail. An attempt to block access to illegal vehicles will be made.
- Assist Bureau of Recreation in removal of hazard trees within the Sanderson Brook Falls recreation area.

<u>Prescription Documentation:</u>
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 red diagonal stripes the buffers and filter strips along all wetland and associated streams.
2. Locate, flag and paint with red diagonal stripes the remaining wooded project boundary line. This will not be done where the project boundary is a road.

3. Flag temporary layout of the primary skid trail network with orange flagging. Using orange paint mark small noncommercial stems or stems already marked for removal located along adjusted skid trails upon completion of marking (Orange).
4. Flag temporary layout of any unavoidable 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. Locate and mark perimeter of landing and group openings with one red diagonal stripes.
6. General tree marking guide:

Marking type	Type of Tree	Tally Method	Mark Type
Leave Tree	Leave Tree	As needed	Red Horizontal Line
Cut Tree	Red Pine All Sizes	Individual tally DBH - 1/0 height	Blue Dot
Cut Tree	Cut Saw Log	Individual tally DBH & height	Blue Horizontal Line
Cut Tree	Cut Pulp/Cord Wood	Individual tally DBH - 1/10 height	Blue Dot
Cut Tree	Cut Live Cull Tree	No tally	Blue X
Cut Tree	Dead Tree Warning	No tally	Blue X

Red Pine: Overstory Removal: Remove all red pine within the stand. In areas where residual stand exceeds $40^{sq/ft}$ reduce stand by following the prioritized guide below. Road buffer may be reduced below the 50% basal area restriction for removal of red pine only, hardwood should be retained to ensure adequate stocking.

1. All Red Pine
2. Unacceptable \ Diseased White Ash
3. Any Diseased Hardwood
4. Unacceptable Red Maple, American Beech, Poplar or Birch
5. Unacceptable Red Oak
6. Unacceptable Black Cherry
7. Other Acceptable Hardwood

Retention of mature seed producing red oak and small diameter white ash and hemlock within the thinned portion of the stand is desirable.

Oak Hardwoods: Commercial Thinning: Remove 1/3 of the basal area reducing the stand to approximately $80\text{-}90^{sq/ft}$ 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. Any Diseased Hardwood
3. Unacceptable Red Maple, American Beech, Poplar or Birch
4. Unacceptable Red Oak
5. Unacceptable Black Cherry
6. Other Acceptable Hardwood

Retention of mature seed producing red oak and small diameter white ash and hemlock within the thinned portion of the stand is desirable.

Hemlock/Hardwood Forest Type: Group Selection Cutting: There will be 18-20 $1/3^{rd}$ acre openings within this forest type. Each group will be located with a GPS unit and will have an

adjustment allowance of 100 feet. This adjustment will be used for moving the group to areas of established desired advance regeneration and/or areas of trees of poor health due to disease or mechanical damage. Adjustment will also be made to ensure the group is not located in any excluded area. The opening will be randomly distributed throughout the area. These opening will cover approximately twenty percent of the total delineated eligible areas. Within these patches all live trees 5"dbh and above will be marked for harvest.

Remainder of Stand: Remove no more than 1/3 of the basal within the remainder of the stand.

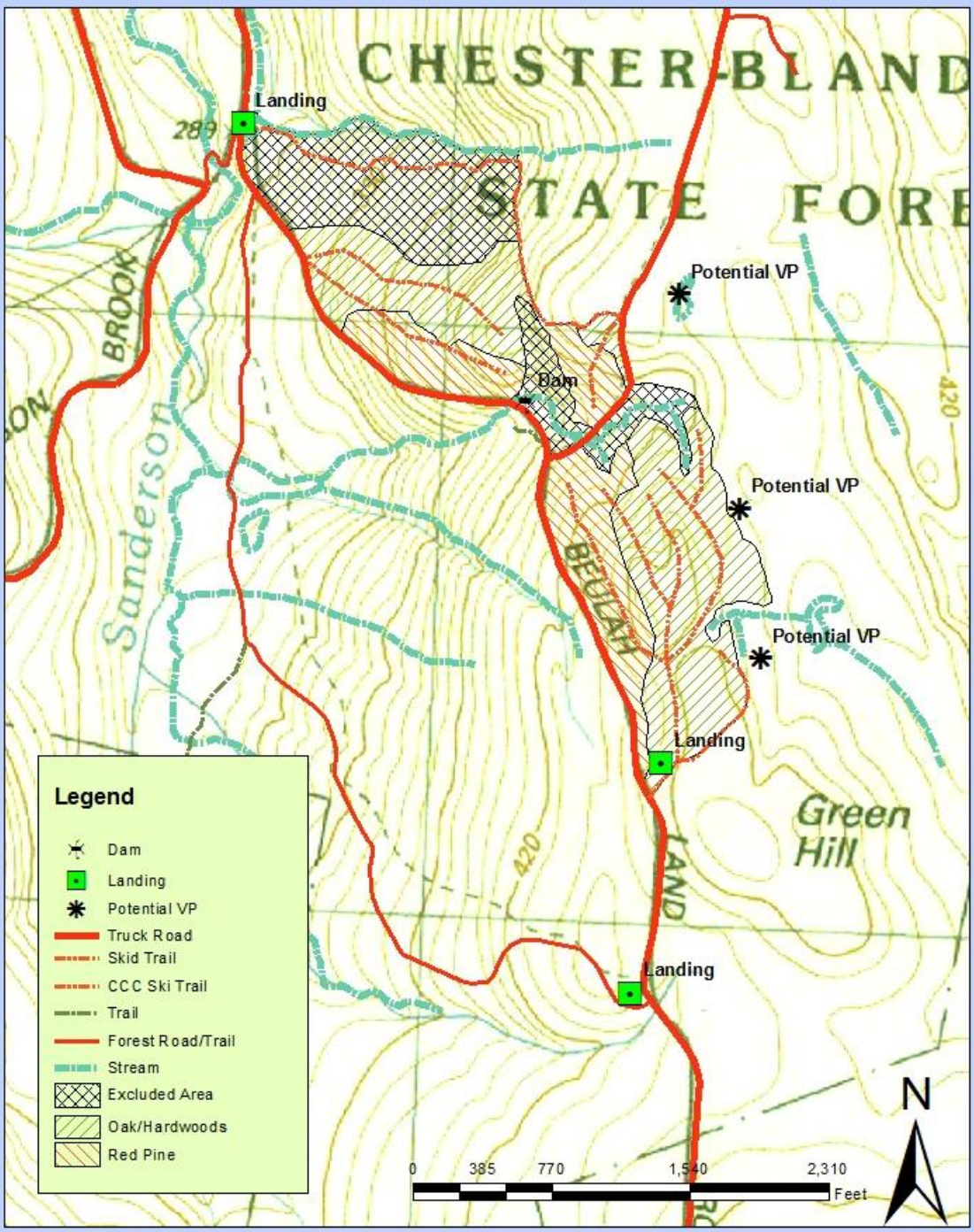
1. Unacceptable \ Infested Hemlock
2. Unacceptable \ Diseased Hardwood Tree
3. Any White Ash above 8" DBH

Retention of mature seed producing red oak and small diameter white ash and hemlock within the thinned portion of the stand is desirable.

Attached:

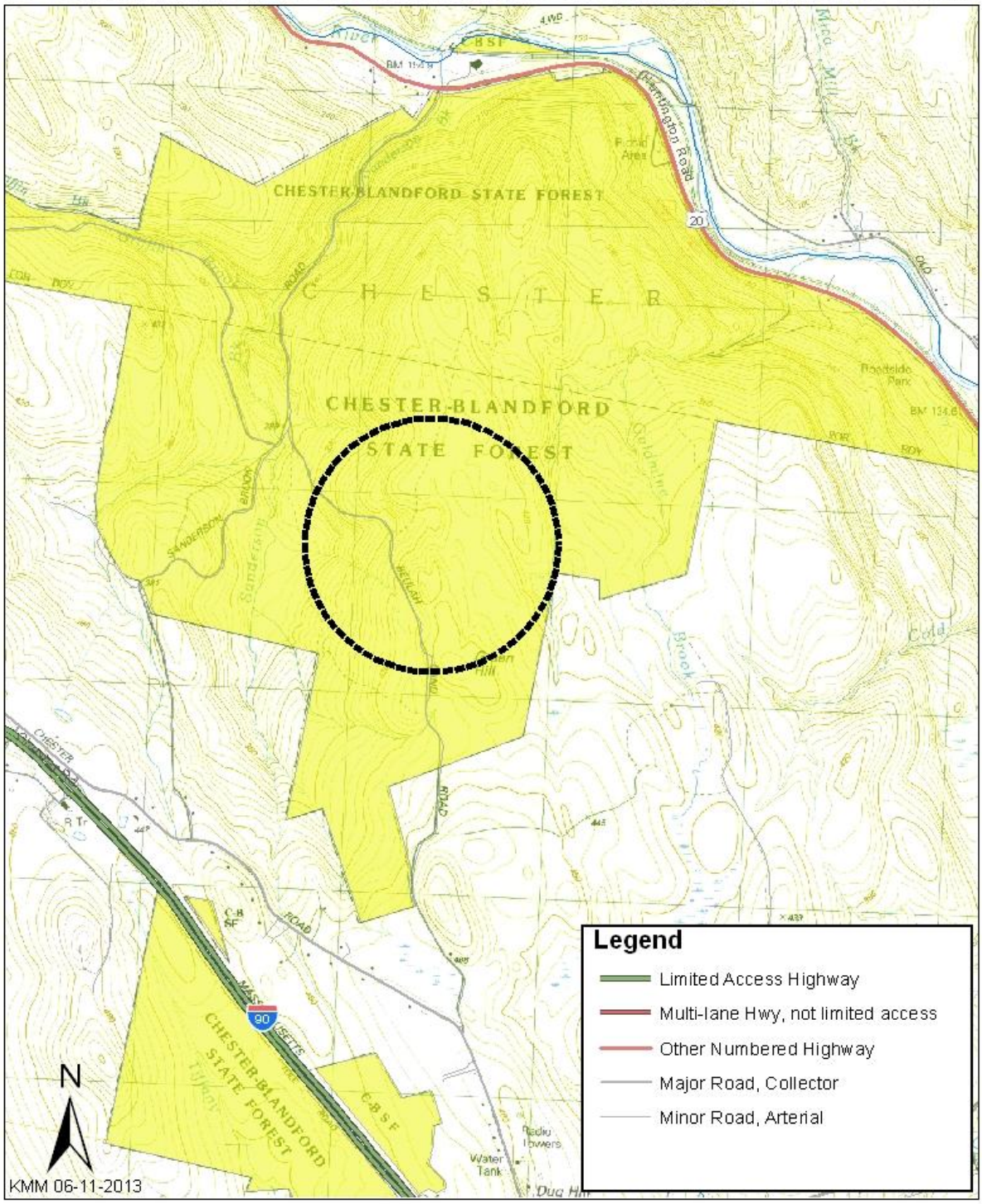
- Stand Map
- Locust Map
- Vascular Plant List

Chester - Blandford State Forest
Beulah Land Red Pine Removal



KMM 02/02/2016

Chester-Blandford State Forest
Beulah Land Road Red Pine Removal - Locus Map



APPENDIX – VASCULAR PLANT LIST

		Relative Abundance		
Scientific Name	**Common Name**	**Understory**	**Overstory**	**Comments**
Acer pensylvanicum	Striped Maple	A	-	
Acer rubrum var. ?	Red Maple	O	C	
Acer saccharum	Sugar-maple	C	A	
Acer spicatum	Mountain-maple	O	-	
Amelanchier sp.	A Shadbush	O	-	
Amphicarpaea bracteata	Hog-peanut	O	-	
Aralia nudicaulis	Wild Sarsaparilla	C	-	
Arisaema triphyllum ssp. ?	Jack-in-the-Pulpit	O	-	
Aster (=Oclemena) acuminatus	Whorled Wood-aster	C	-	
Aster (=Eurybia) divaricatus	White Wood-aster	C	-	
Aster sp.	Aster Genus	O	-	Symphyotrichum sp.
Betula alleghaniensis	Yellow Birch	O	C	
Betula lenta	Black Birch	O	C	
Betula papyrifera	Paper-birch	O	C	
Carex debilis var. ?	Stalked Sedge	O	-	collected
Carex sp.	a sedge	O	-	c.f. swanii
Carya cordiformis	Bitternut-hickory	O	O	
Castanea dentate	American Chestnut	O	-	
Chimaphila maculate	Striped Pipsissewa	O	-	
Cinna latifolia	Slender Woodreed	O	-	collected
Coptis trifolia ssp. groenlandica	Goldthread	O	-	
Cornus alternifolia	Pagoda-dogwood	O	-	
Crataegus sp.	Hawthorn Genus	O	-	bright red fruit
Dennstaedtia punctilobula	Hay-scented Fern	A	-	
Diphasiastrum digitatum	Southern Ground-cedar	O	-	
Dryopteris carthusiana	Spinulose Wood-fern	O	-	
Dryopteris intermedia	Intermediate Wood-fern	C	-	
Dryopteris marginalis	Marginal Wood-fern	O	-	
Epifagus virginiana	Beech-drops	C	-	
Euthamia graminifolia var. nuttallii	Nuttall's Flat-topped Goldenrod	O	-	
Fagus grandifolia	American Beech	A	A	
Fraxinus Americana	White Ash	O	C	
Gaultheria procumbens	Wintergreen	O	-	
Grass, unidentified	Unknown grass	O	-	
Hamamelis virginiana	Witch-hazel	O	-	
Huperzia lucidula	Shining Clubmoss	C	-	

Ilex verticillata	Winterberry	O	-	
Kalmia latifolia	Mountain-laurel	A	-	
Lindera benzoin	Spicebush	O	-	
Lobelia inflate	Indian Tobacco	O	-	
Lycopodium annotinum	Bristly Clubmoss	O	-	
Lycopodium obscurum	Ground-pine	C	-	
Maianthemum canadense	Canada Mayflower	O	-	
Maianthemum (=Smilacina) racemosum	False Solomon's Seal	O	-	
Medeola virginiana	Indian Cucumber-root	C	-	
Mitchella repens	Partridge-berry	O	-	
Monotropa uniflora	Indian Pipe	O	-	
Onoclea sensibilis	Sensitive Fern	O	-	
Osmunda cinnamomea	Cinnamon-fern	O	-	
Osmunda claytoniana	Interrupted Fern	O	-	
Osmunda regalis var. spectabilis	Royal Fern	O	-	
Ostrya virginiana	Hop-hornbeam	C	-	
Oxalis Montana	Mountain Wood-sorrel	O	-	
Oxalis sp.	A Wood-sorrel	O	-	
Parthenocissus sp.	Woodbine	O	-	
Picea rubens	Red Spruce	O	-	
Pinus resinosa	Red Pine	O	C	
Pinus strobus	White Pine	O	O	
Polygonatum pubescens	Solomon's Seal	O	-	
Polygonum cilinode	Fringed Bindweed	C	-	collected
Polypodium sp.	Rockcap-fern	O	-	
Polystichum acrostichoides	Christmas-fern	O	-	
Populus grandidentata	Big-toothed Aspen	O	O	
Potentilla sp.	Cinquefoil Genus	O	-	
Prunus serotina	Black Cherry	O	C	
Prunus virginiana	Choke-cherry	O	-	
Pteridium aquilinum var. latiusculum	Bracken Fern	O	-	
Quercus rubra var. rubra	Red Oak	O	A	
Quercus velutina	Black Oak	O	O	
Rhus hirta	Staghorn-sumac	O	-	
Rubus spp.	Blackberry/dewberry genus	C	-	
Sambucus racemosa ssp. pubens	Red-berried Elderberry	O	-	
Solidago bicolor	Silverrod	O	-	
Solidago caesia	Bluestem-goldenrod	O	-	
Solidago rugosa ssp. ?	Rough Goldenrod	O	-	
Thelypteris noveboracensis	New York Fern	O	-	

Trientalis borealis	Starflower	C	-	
Trillium sp.	Trillium Genus	O	-	
Tsuga Canadensis	Eastern Hemlock	C	C	
Uvularia sessilifolia	Wild Oats	C	-	
Vaccinium angustifolium var. ?	Lowbush Blueberry	C	-	
Vaccinium corymbosum	Highbush-blueberry	C	-	
Vaccinium pallidum	Early Sweet Blueberry	O	-	
Viburnum acerifolium	Maple-leaf Viburnum	A	-	
Viburnum lantanoides	Witch-hobble	O	-	
Viola sp.	Violet Genus	O	-	

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