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Silviculture Prescription
Erving State Forest – Red Pine HQ

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Eastern Connecticut Valley District
Erving State Forest
Erving, MA

Prepared by:

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Approved by:

Management Forestry Program Supervisor _____ Date: August 6, 2020

William N. Hill, CF

Location: **Erving, junction of Route 2 and Route 2A**

Approximate Size: **8 Acres**

Management Objectives:

- Mitigate hazardous conditions
- Release advance regeneration
- Implement invasive species control measures

Silvicultural Systems:

- Even Aged
    - Overstory removal with reserves

Inventory Specifications:

A systematic grid of sample plots was established using QGIS which encompassed the entire 9.8 acres based on 1 plot per 1/2acre resulting in 14 variable radius plots. Measurements taken at each plot included overstory trees, regeneration, and coarse woody debris (CWD). The Big BAF sampling method was utilized for overstory estimates, with the two angle gauges used being 20 factor and 80 factor. Regeneration and ground cover data was gathered by establishing a 1/300 acre plot, at the center of each overstory plot. The size classes utilized in regards to regeneration are as follows; size class 1 = 0-1' in height, size class 2 = 1' – 4.5' in height, size class 3 = 4.5' tall – 1" dbh, and size class 4 = 1" dbh – 5" dbh. CWD estimates are a result of a 50' transect at each plot. Programs utilized to interpret data recorded in the field include, NH Fox DS Cruiser for overstory data and a series of calculations completed within excel for ground cover, regeneration, and CWD.

Geology/soils/landforms

The project area lies at approximately 570' in elevation. The topography is generally mild, with some slight to moderate south facing slopes, not exceeding 15%. Soils present on this site include Windsor and Merrimac Soils, Hinckley loamy sand, Merrimac fine sandy loam, and Windsor loamy sand. All of these soils are described as being quite deep (more than 80" to a restrictive feature) and somewhat excessively drained or excessively drained. See Table 1 in Appendix for more information regarding site index.

Climate

This region, specifically central Massachusetts, receives an average of 44.83" of precipitation annually. The highest average precipitation occurs in the month of March, with totals reaching 3.91"; with the least amount of precipitation falling in the month of February reaching a total of 3.17". The average annual temperature is estimated at 47.1 degrees Fahrenheit, with the maximum average temperature falling in the month of July at 81.9 degrees Fahrenheit and the minimum average temperature falling in the month of January at 14.0 degrees Fahrenheit. This data was obtained from the National Oceanic and Atmospheric Association (NOAA) and is specific to central Massachusetts. Averages are based on over 100 years of recorded data for this region.

Hydrology

No wetlands or wetland resources have been identified within the project area. The project area is located approximately 500' north of the Millers River and is within the Millers River watershed. The Millers River watershed covers approximately 310 square miles and is located in north central Massachusetts, extending into southern New Hampshire. The head waters of the Millers River are located in Ashburnham, MA, from there it flows in a south westerly direction until reaching the Connecticut River at the tri-town junction of Gill, Erving, and Montague. As with many larger rivers in Massachusetts, the Millers River was home to numerous industrial facilities which have been dwindling in the past several decades. There are several water treatment facilities located within the watershed, one of which is located directly on the Millers River in the town of Erving, with others scattered amongst the smaller tributaries located throughout the watershed.

Site Productivity

The DCR Management Guidelines of 2012 state that forest stands will be "classed… and considered for silvicultural treatments that generally fit their productivity, structural complexity (or potential thereof) and diversity". Analysis of the project area using the Forest Productivity and Stand Complexity Model (Goodwin, Hill, 2012), indicates that 100% of the project area is classified as "Low". Areas exhibiting low complexity and productivity potential lend themselves less complex forest management strategies, generally even aged silviculture systems. An even aged system will be implemented to minimize the presence of red pine in the overstory and allow for the release of advance regeneration. This model takes into consideration an array of GIS information and data, including stand type, stocking levels, and site index (obtained from CFI database), among others.

Soil productivity varies throughout the project area, with the majority of soil types being suitable for the growth of upland species. See Table 1 in appendix for specific site index information in regard to each

soil type present within the project area. All information pertaining to soils was obtained from the NRCS Soil Survey – Franklin County.

Potential Vegetation

This site is currently dominated by planted red pine, with inclusions of white pine and assorted hardwood species. The forest headquarters building was once home to a state run nursery, which was responsible for the care and distribution of seedlings throughout the region in an attempt to reforest degraded pasture and agricultural land. The current overstory is a direct result of planting efforts made by the Civilian Conservation Corps in the 1930s. Without C.C.C. intervention, it is assumed that this stand would have contained a mix of upland hardwoods and eastern white pine, as the soils present are classified as somewhat excessively drained to excessively drained. White pine and red oak are the most prevalent in understory and are expected to thrive with the removal of the overstory vegetation. The presence of exotic invasive species may hinder regeneration efforts in portions of the stand. Control efforts will be implemented with the hopes of controlling and limiting exotic invasive plant species impact on future stand conditions.

Cultural

Two stone foundations have been identified in the southern portion of the project area, located along Route 2A. Work is anticipated to occur within proximity to these structures. Care will be taken to prevent any damage. At this point no other cultural resources have been identified.

DCR Archeology staff conducted a field visit to the site and provided insight on how operations can occur around the foundation structures located along route 2A. It was determined that these structures will be protected through the course of harvesting operations. Removal of all overstory trees will be permitted in and around these structures, as long as heavy equipment does not travel over any structure, trees be directionally felled away from structures to prevent damage, and trees that are cut within close proximity to foundations will be cut as close to grade as possible. Equipment should stay at least 10' away from any structure if possible; some exceptions to this 10' buffer may be necessary to safely remove trees within proximity of the structures. DCR Forestry staff will be on site while work occurs in and around these structures and will inform the contractors of these structures location as well as guidelines pertinent to working in and around these structures.

Recreation

Erving State Forest is home to several miles of forest roads and hiking trails, along with the Laurel Lake campground and day use areas. The area where the proposed forest management is to occur has no recreational opportunities due to its small size and isolated location focused on state forest administration and fire control. This parcel was separated from the larger Erving State Forest parcels to the north by a reconstruction of Route 2 in the 1950s and is bounded on the north by Route 2 and on the south by Route 2A.

This small parcel is designated as a 'Parkland' due to the presence of the Erving State Forest Headquarters building. This facility acts as a home base for the DCR District 9 fire crew as well as for DCR operations staff which work throughout the Erving State Forest complex. There are several administrative buildings located within the parcel along with vehicles, communication equipment, and weather data recording equipment.

Wildlife/NHESP

According to the most recent Natural Heritage and Endangered Species Program (NHESP) layer available at www.mass.gov/mgis, there are currently no priority or estimated rare species habitats associated with this proposed forest management area. In accordance to provisions set forth in DCR's Management Guidelines document the following wildlife habitat considerations will be implemented, except for areas which are within 1.5 trees lengths from any infrastructure or parking area:

- Retention of at least 1 to 3 large diameter trees (where possible >18" dbh) and 4 live 10"-12" dbh trees per acre that have the potential to serve as cavity and den trees and future snags.
- Retention of all dead snags and stubs in the harvest area as safe operating conditions allow.
- Retention of an average of one of the oldest, largest diameter, well-formed dominant trees (where possible > 18" dbh) per acre in the harvest area to serve as legacy trees.
- Maintain a minimum of 256 cubic feet per acre of coarse woody material within the harvest area.

Stand Data

Red Pine (Stand 1)

This approximately 8 acre stand encompasses the entire parcel, with the exception of administrative areas. There is some variability within the stand where the overstory red pine has died leaving room for an occasional hardwood or white pine to reach canopy height. Being a planted monoculture, the overstory is almost exclusively dominated by red pine (*Pinus resinosa*), with scattered occurrences of eastern white pine (*Pinus strobus*) and assorted hardwood species. The estimated basal area throughout this stand is approximately 147 ft^2/acre, total stems per acre (including all overstory species present) is estimated at 196, and the estimated quadratic mean diameter is 11.7" at breast height (See Table 2 in Appendix).

Regeneration is abundant throughout the stand and is a direct result of previous harvesting operations. Species present include, white pine, red oak, pin cherry (*Prunus pensylvanica*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), white oak (*Quercus alba*), black birch (*Betula lenta)*, black cherry (*Prunus serotina*) and eastern hemlock (*Tsugas canadensis*). The most prominent of these is white pine with an estimated 1,200 stems per acre across all size classes, with the majority (approximately 60%) of which being size class 4 (1" – 5" DBH); total stems per acre for all species was estimated at 1,992(See Table 3 in appendix) . Understory plants observed includelowbush blueberry (*Vaccinium angustifolium*), pink lady slipper (*Cypripedium acaule*), starflower (*Triantalis*borealis), wintergreen (*Gaultheria procumbens*), Canada mayflower (*Maianthemumcanadense*), dewberry (*Rubusflagellaris*), black huckleberry (*Gaylussacia baccata*), hazelnut (*Corylus spp*.), and assortments of grass and fern species (See Table 4 in appendix). Glossy buckthorn (*Frangula alnus*) is widespread throughout the project area with densities varying throughout. Oriental bittersweet (*Celastrusorbiculatus*) is present in isolated areas, mainly along route 2A and on the edge of the mowed field east of the forest headquarters building. Some level of invasive plant treatments will occur prior to harvesting operations, these treatments may include the use of foliar herbicide. CWD was estimated at approximately 1,518cubic feet per acre, with a large percentage of which being larger than 6" diameter.

Prescribed Management

Red Pine (Stand 1)

This stand has a history of active forest management, from the initial planting of the red pine to multiple entries intended to increase yields and promote regeneration. The management strategy implemented over the past three decades has been a traditional three stage shelterwood, with the first entry in 1984 acting as the preparation cut and the second entry in 1995 acting as the regeneration cut. Generally, the regeneration cut is followed by an overstory removal, which aims to release the regeneration established in the previous entry. The red pine scale (*Matsucoccus resinosae*) has been identified in a red pine stand located several hundred feet north of this proposed forest management project and judging by the current condition of the overstory red pine located at this site, it is probable that it is present throughout this project area. All of the overstory red pine within this project area are expected to succumb to the pest within the next few years. The main objective for this project is to mitigate potentially hazardous conditions created by a failing overstory, while also releasing advance regeneration and reverting the site to a more natural mix of native species.

Prescribed management for this stand will continue using an even-aged silvicultural system which has been implemented over the past several decades. This entry will act as the final stage of the three stage shelterwood system and will consist of an overstory removal with reserves. The focus will be on the removal of a large majority of red pine in the overstory, while maintaining several legacy trees per acre in accordance with DCR Management Guidelines. No reserve or legacy trees will be retained within 1.5 tree lengths of any infrastructure.

The intent is to mitigate hazardous conditions, while also releasing established regeneration and removing the large portions of the planted red pine. This method will establish a relatively even aged forest but will encourage a more diverse mix of native species. Future management will focus on increasing structural diversity and forest complexity, by implementing uneven-aged management strategies. A future entry into this stand will not occur for at least 20 to 30 years.

Operational Information

Logging Requirements

All primary and secondary skid roads will require the implementation of erosion control measures, including but not limited to, the construction of water bars, installation of culverts, and slashing of roads.

Harvesting will be permitted year-round, as long as ground conditions are stable and allow for harvesting operations. There are currently no NHESP restrictions to this site. During hours of operation, this portion of the state forest will be closed for recreational use due to hazards pertaining to harvest operations.

General Guidelines

All operations throughout this sale will adhere to the guidelines and restrictions set forth in the Massachusetts Best Management Practices Manual (2013). With the approval of DCR service forestry,

the hope is to waive all aesthetic road buffers in order to mitigate hazardous forest conditions along Route 2A.

Timber Marking Guidelines

Marking guidelines are as follows:

- Trees marked with a single blue stripe will be cut and removed.
    - Horizontal stripe indicates sawtimber tally
    - Vertical slash indicates pulp or firewood tally
- Skid roads will be painted in red, all trees marked with red paint are to be cut and removed (the same marking scheme mentioned above applies to skid trail marking).
- Harvest boundaries will be marked with three horizontal yellow stripes, indicating edge of project area. These boundary trees will be cut and removed.

Appendix

Table 1. -Soil Site Index Summary

Soil Type	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac/yr	
229—Windsor and Merrimac soils				
Windsor	Eastern white pine	66	114	Eastern white pine, Northern red oak, Pitch pine
	Northern red oak	52	29	
	Pitch pine	60	—	
	Sugar maple	55	29	
Merrimac	—	—	—	—
245—Hinckley loamy sand				
Hinckley	Eastern white pine	61	100	Black oak, Eastern white pine, Pitch pine
	Northern red oak	49	29	
	Paper birch	60	54	
	Pitch pine	60	—	
	Red pine	54	92	
	Red spruce	39	86	
	Sugar maple	59	30	
	White spruce	52	114	
254—Merrimac fine sandy loam				
Merrimac	—	—	—	—
255—Windsor loamy sand				
Windsor	Eastern white pine	57	100	Eastern white pine, Northern red oak, Pitch pine
	Northern red oak	52	29	
	Red pine	61	100	
	Sugar maple	55	29	

Red Pine (Stand 1) Data

Table 2. – Red Pine (Stand 1) Overstory Data

Species	Trees/Acre	QMD	BA/Acre	BF/Acre	Avg. Ht (logs)	Total BF (Stand)
eastern white pine (*Pinus strobus*)	56.65	10.96	37.14	3,669.64	2.40	29,573.60
red pine (*Pinus resinosa*)	128.02	12.30	105.71	16,965.93	3.05	136,728.43
northern red oak (*Quercus rubra*)	2.11	11.15	1.43	0.00	-	0.00
pin cherry (*Prunus pensylvanica*)	8.02	5.72	1.43	0.00	-	0.00
black oak (*Quercus velutina*)	2.11	11.15	1.43	0.00	-	0.00
Total	196.90	11.71	147.14	20,635.57		166,302.02

Table 3. - Red Pine (Stand 1) Understory Trees./Acre

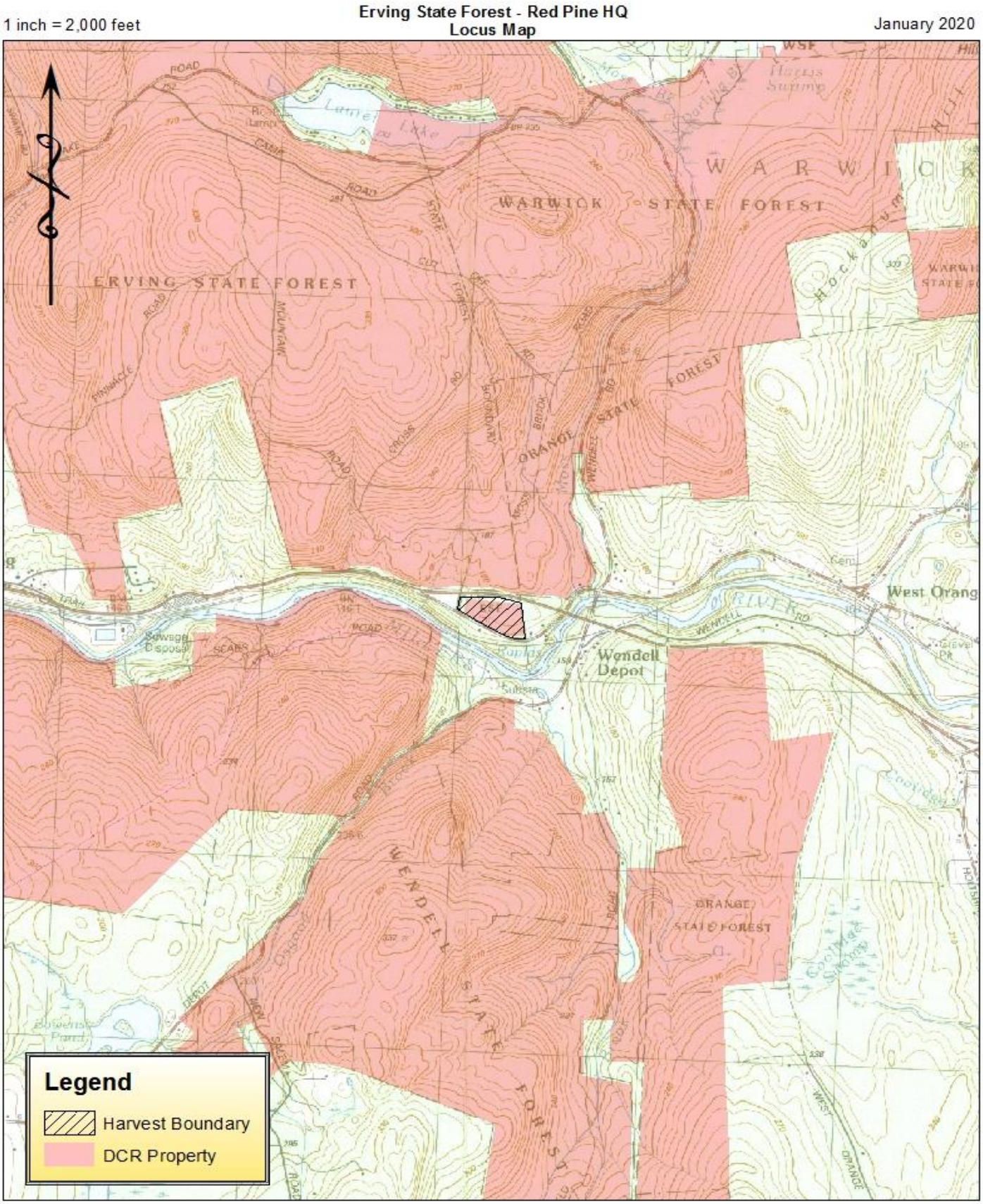
	Size Class*				
SPECIES	**1**	**2**	**3**	**4**	**TOTAL**
northern red oak (*Quercus rubra*)	385.71	21.43	0.00	21.43	428.57
eastern white pine (*Pinus strobus*)	214.29	42.86	214.29	728.57	1200.00
americanbeech (*Fagus grandifolia*)	0.00	0.00	64.29	42.86	107.14
black birch (*Betula lenta*)	150.00	0.00	0.00	0.00	150.00
white oak (*Quercus alba*)	21.43	0.00	0.00	21.43	42.86
red maple (*Acer rubrum*)	21.43	0.00	0.00	0.00	21.43
eastern hemlock (*Tsugas canadensis*)	0.00	0.00	21.43	0.00	21.43
black cherry (*Prunus serotina*)	0.00	0.00	0.00	21.43	21.43
TOTAL	792.86	64.29	300.00	835.71	1992.86

*size class 1 = 0-1’ in height, size class 2 = 1’-4.5’ in height, size class 3 = 4.5’ in height – 1”dbh, size class 4 = 1”DBH-5”DBH

Table 4. – Red Pine (Stand 1)Understory - Shrub/Herbaceous Data

SPECIES	AVG. % COVER	# plots observed	% of plots observed
assorted grass species	0.93	4	28.57
assorted fern species	11.21	6	42.86
Canada mayflower (*Maianthemum canadense*)	4.14	9	64.29
wintergreen (*Gaultheria procumbens*)	5.36	1	7.14
starflower (*Triantalis borealis*)	2.21	7	50.00
glossy buckthorn (*Frangula alnus*)	39.64	9	64.29
lady slipper (*Cypripedium acaule*)	0.29	2	14.29
lowbush blueberry (*Vaccinium angustifolium*)	7.07	5	35.71
hazelnut (*Corylus spp.*)	0.71	3	21.43
black huckleberry (*Gaylussicia baccata*)	1.43	2	14.29
dewberry (*Rubus flagellaris*)	7.86	4	28.57
grape (*Vitis spp.*)	3.93	2	14.29
raspberry (*Rubus idaeus*)	0.36	1	7.14
oriental bittersweet (*Celastrus orbiculatus)*	0.71	1	7.14
poison ivy (*Toxicodendron radicans*)	0.71	1	7.14

Map 1. Locus Map



Map 2– Forest Stand Map

1 inch = 100 feet

Erving State Forest - Red Pine HQ

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