dcr | Massachusetts Department of Conservation and Recreation

Silviculture Prescription

Cold River Forest Management Project

Incorporating

South County Road Forest Management Project

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Northern Berkshire District
Florida State Forest
Florida, MA

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Approved by:

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Program Supervisor _____ Date: July 16, 2020

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Introduction

The Cold River Forest Management Project expands upon the South County Road Forest Management Project that was developed in 2016 and proposed in 2017. There were issues related to the Norway spruce plantations located on the southern side of South County Road that were not recognized or addressed in the original South County Road Forest Management Project. Specific items to address were the rapid decline of the plantations and the maintenance problems that the Town of Florida was having. Due to the disruption that will be created on South County Road with logging activities, and the limited feasibility of having those plantations treated silviculturally as a stand-alone project, the Cold River Forest Management Project was developed to incorporate the original South County Road Project and expand the project to include those Norway spruce plantations located on the southern side of South County Road.

Site Data

Geology

This project is located within the Hoosac Mountain Range, on the south slope of Flat Rock Hill. The general project area has an average slope of 9% - 10% with a gradual increase in steepness on the north end of the sale, which is also nearer to the peak of Flat Rock Hill. The parent material is composed of loamy supraglacial till derived from one or more of the following materials: granite, gneiss, phyllite, and/or mica schist. Within the context of this project, site degradation as a result of elevation and/or topography are not anticipated.

Soils

Eighty nine percent of the soils located within the project are of the Tunbridge – Lymann soil association. This association is characterized by deep sandy loam soils that are well drained, but very stony. This soil association is found on slopes of 3% - 15% and at elevations of approximately 1,100 ft. – 2,400 ft. Annual precipitation is 31” – 95” per year, and the mean annual temperatures run 27°F – 52°F. Frost-free periods range from 60 days – 160 days per year, and it is not considered prime farmland. The remaining eleven percent is made up of the Peru – Marlow association, which have very similar characteristics, and for the purposes of this prescription are nearly indistinguishable from the Tunbridge-Lymann soils. According to the Forest Productivity and Stand Complexity Model (Goodwin, Hill. 2012) in general terms best sites are located near the base of the slope, and become less productive with elevation. This would indicate that combinations of both uneven-aged and even-aged management may be most appropriate for the site. The changes in productivity with elevation will also dictate how these strategies are implemented. According to the USDA NRCS online soil survey, the soils located within this project have a slight potential for erosion under normal conditions. As such, loss of site quality and productivity are not anticipated as a result of activities related to this project.

Climate

The mean annual temperature for the sale area is 41°F with an average of 46" of precipitation. Tropical storm systems do not typically affect this area but occasionally make impacts with the most recent being Tropical Storm Irene in 2011. Nor'easters and strong cold fronts from Canada have the potential for major impacts and occur more regularly. Other erratic weather events such as ice storms, early season blizzards, microbursts, and even tornados are not uncommon. These weather events are the primary forces influencing the disturbance ecology of the area and are expressed in the landscape as gaps in the forest canopy.

Hydrology

All wetland resources indicated on MAP 1 have been located. They currently consist of 2 intermittent streams that begin as seeps within the sale area and flow down into Cold River. There are also isolated wetlands indicated on MAP 1 that were located in the sale area and are delineated on the ground to avoid any damage. All filter strips that are used for water and wetland resource protection will be in compliance with current Massachusetts Forestry Best Management Practices. Typical water resources encountered during the marking phase of the project, that do not currently appear on MAP 1, include small intermittent streams and wooded wetlands that were too small to detect during the initial DEP wetland mapping project. As additional wetlands such as non-certified vernal pools, additional intermittent streams, upland wetlands, etc. are encountered; standards outlined in the most recent edition (currently 2013 2nd edition) Massachusetts Forestry Best Practices Manual will be followed as they relate to harvesting requirements, filter strips, water bars, slash management, etc.

Potential Vegetation

The area currently supports all potential vegetation that is typical for this natural community and forest cover type, that being mixed northern hardwoods with a significant coniferous component. Overstory tree species present include red oak (*Quercus rubra)*, sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), white birch *(Betula papyrifera*), yellow birch (*Betula, alleghaniensis*), white ash (*Fraxinus americana*), eastern white pine (*Pinus strobus*), red spruce (*Picea rubens*), Norway spruce (*Picea abies*), black cherry (*Prunus serotina*), black birch (*Betula lenta*), eastern hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*), and hophornbeam (*Ostrya virginiana*). Ground cover species include princess pine (*Lycopodium spp.*), sarsaparilla (*Aralia nudicaulus*), various ferns, Indian cucumber (*Mediola virginiana*), Canada mayflower (*Maianthemum canadense*), serviceberry (*Amelanchier spp.*), striped maple (*Acer pensylvanicum*), hobblebush (*Vibernum lantanoides*), witch hazel (*Hamamelis virginiana*), wood sorrel (*Oxlis spp.*), mountain-ash (*Sorbus americana*), and highbush blueberry (*Vaccinium corymbosum*).

One of the goals of this forest management project is to begin the removal of Norway spruce plantations, an exotic species of vegetation, and encourage conditions for the recruitment of native flora.

Site Productivity

An analysis was conducted across all properties managed by the Bureau of Forestry to assess site productivity and complexity using Geographic Information System (GIS) data layers of Prime Forest Soils, Potential Vegetation Complexity, Late Successional potential, Forest Diversity, Early Successional potential, CFI Site Index, and CFI Stand Structure (Goodwin, Hill, 2012). The analysis found that 28% of the area ranked in the top 1/3 of the productivity scale, while 38% ranked in the bottom 1/3 of the productivity scale. Due to the moderate productivity of the hardwood area and the existing trend towards an uneven aged condition, a gap-expanding irregular shelterwood method will be employed to mimic natural disturbance and begin the process of converting an even-aged stand to an uneven-aged stand. Within the Norway spruce plantations, openings between 1/3 and 1 acre in size will be installed.

Archeological and Cultural Resources

All DCR Archeologist recommendations will be integrated into the project and they are as follows:

Known significant historic archaeological resources in the project parcel are located between Church Road and South County Road (FLO.HA.1 Moses B. Yaw Rifles. 19th century single dwelling site, agricultural outbuilding, arms factory). The DCR archaeologist will visit the site and flag area before work begins.

Any cultural resource features located before or during the forestry project will be protected according to guidelines set forth in the *Massachusetts Forestry Best Management Practices manual, currently the 2013 2nd Edition* and indicated on harvest maps accordingly. Additional resources will be flagged, protected, photographed, and mapped. The DCR staff archaeologist will be consulted if there are any questions or concerns.

Stand Data

Forest Stand Attributes

The Cold River Project is approximately 107± acres in size with 31± acres of Norway spruce plantation and 76± acres of mixed northern hardwoods and oak (oak-hardwood cover type).

Cover Types

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

Oak-Hardwood

The largest single species stand components include red oak, red maple, eastern white pine, and hemlock. Other merchantable species within the stand include yellow birch, white birch, black birch, sugar maple, American beech, black cherry, and red spruce. This stand is trending towards an uneven aged condition with an average basal area of 133.3 ft^2/ac, with a 98% relative density[1]. Though there is not any evidence of previous logging operations, there are numerous indicators of natural disturbance that have contributed to the uneven aged condition; i.e.: blowdowns, ice damage, uprooted stems, etc. Most of the natural regeneration present is oak and red maple. Overall the stand is healthy, and this project is intended to ensure that this continues.

Norway Spruce Plantation

The Norway spruce plantation is dominated by Norway spruce, but has some areas of where eastern white pine was also planted. In the areas where the Norway spruce has died, holes in the canopy coupled with unoccupied growing space has facilitated native tree recruitment that includes red oak, red maple, and eastern white pine. This is an even aged stand and will be reduced by 50% during this entry. The current basal area is 196.7 ft^2/ac, with a relative density of 85%. As with the Oak/Hardwood stand there is no evidence of previous logging activities.

Stand History

Oak-Hardwood Stand

This stand is composed of trees that colonized the area after farms and grazing areas were abandoned around the turn of the century. Throughout the sale area evidence of previous agriculture activities are evident with the presence of stone walls and remnant field trees. Since the areas were abandoned there is no evidence of previous management activities; i.e.: old skid trails, stumps, etc.

Norway Spruce Plantation

A 1937 map of the Savoy State Forest Master Plan between the United States Department of the Interior and the Massachusetts Department of Conservation depicts the Cold River project area as part of a much larger “Forestry Area”. Based upon the type of work that

[1] *Relative density is the absolute density expressed as a percentage of a referenced level. For example, in this prescription the hardwood stand has an absolute basal area per acre of 133.3 ft^2 which is 98% of full site occupancy. Full site occupancy would be approximately 136 ft^2. At this relative density level there is a high level of competition between trees which often results in poor tree vigor and mortality.*

was normally undertaken at the time within Savoy Mountain State Forest and Florida State Forest, it is likely that a Forestry Area is where hand-planted Norway spruce and/or white pine plantations were installed. According to the map, Forestry Areas are located throughout Florida and Savoy Mountain State Forests, and the projects were conducted by the Civilian Conservation Corps.
The specific plantations within the Cold River project were never properly maintained for growth, production, and/or diversity and are now in a state of decline. Root diseases coupled with severe weather events have caused significant blow-down. Soils under Norway spruce plantations are often more acidic than soils under other species. Soil acidity appears to increase with stand age as soil buffering capacity decreases with age. (Binkley, Dan; Valentine, David. 1991) Due to the acidic soils, the rate at which other species can colonize the site is reduced leaving relative densities moderate with a significant amount of growing space unoccupied.

Stand Exam

A stand exam of this project was completed in September of 2017with the following results:

Figure 1 – Oak-Harwood Stand Species Composition

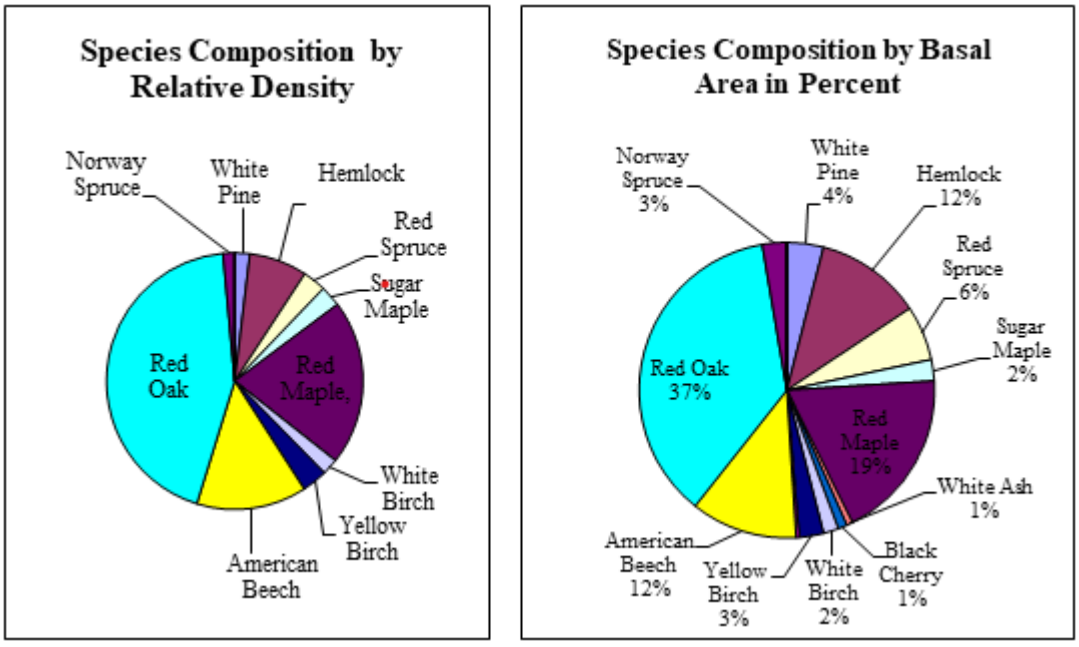
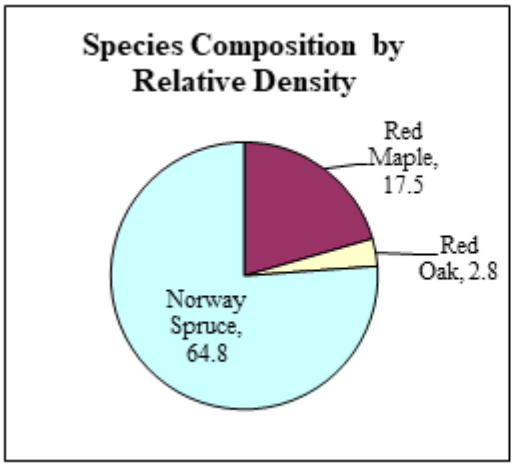


Table 1 – Stocking Diagnostics of Oak/Hardwood Stand

Species	Total Trees/Acre	Total BA/Acre	% BA/ac by Species	QMD	% Rel Density
Eastern White Pine	3.3	5.3	4%	17.3	1.9
Hemlock	16.2	15.6	12%	13.3	7.2
Red Spruce	10.4	8.0	6%	11.9	2.9
Sugar Maple	6.0	3.1	2%	9.8	2.6
Red Maple	42.3	24.9	19%	10.4	20.5
White Ash	1.4	0.9	1%	10.8	0.0
Black Cherry	2.1	1.3	1%	10.8	0.0
White Birch	6.5	2.2	2%	7.9	2.0
Yellow Birch	13.3	3.6	3%	7.0	3.2
Black Birch	0.7	0.4	0%	10.8	0.0
American Beech	49.8	15.6	12%	7.6	13.6
Red Oak	47.5	48.9	37%	13.7	43.0
Norway Spruce	6.2	3.6	3%	10.2	1.4
Total	205.6	133.3	100%	10.9	98
				13.3	100

<<- ***Estimated Relative Density***

Figure 2 – Norway Spruce Plantation Species Composition



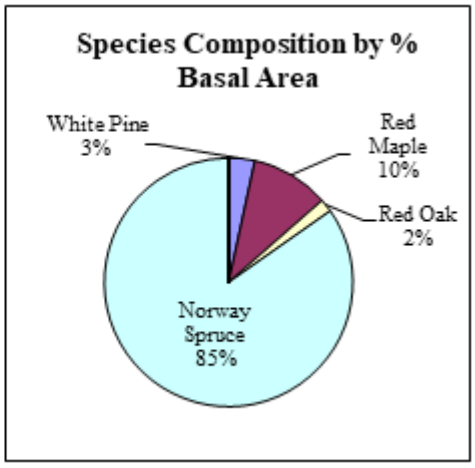


Table 2 – Norway Spruce Plantation Stocking Diagnostics

Species	Total Trees/Acre	Total BA/Acre	% BA/ac by Species	QMD	% Rel Density	
EWP	**13.4**	**6.7**	**3%**	**9.6**	**0.0**	
RM	**66.1**	**20.0**	**10%**	**7.4**	**17.5**	
NRO	**1.4**	**3.3**	**2%**	**21.2**	**2.8**	
NSPR	**286.2**	**166.7**	**85%**	**10.3**	**64.8**	
Total	**367.0**	**196.7**	**100%**	**9.9**	**85**	
			Median Stand Diameter -->>	**11.9**	**88**	***<<- Estimated Relative Density***

Table 3 – Advanced Regeneration within the Project Area

SPECIES	Stems/Acres		SPECIES	Stems/Acres
Eastern White Pine	24.49		Eastern Hemlock	48.98
Norway Spruce	97.96		Red Spruce	134.69
American Beech	685.71		Hophornbeam	6.12
Red Maple	342.86		Yellow Birch	30.61
Red Oak	612.24		Black Cherry	73.47

Table 4 – Ground Cover within the Project Area

SPECIES	AVG. % COVER	% of Plots Observed		SPECIES	AVG. % COVER	% of Plots Observed
Lycopodium	0.61	4.08		Striped Maple	5.10	10.20
Canada Mayflower	1.02	6.12		Highbush Blueberry	3.67	12.24
Indian Cucumber	0.41	4.08		Witch Hazel	1.43	4.08
Partridge Berry	0.20	2.04		Mountain-Ash	0.20	2.04
Ferns	12.55	46.94		Wood Sorrel	0.51	2.04
Hobblebush	8.57	26.53		Sarsaparilla	0.41	4.08
Serviceberry	0.41	4.08				

Aesthetic Resources

No part of the project is within an area that is considered a Scenic Highway. The Town of Florida has requested the installation of 1 tree length hazard removal strips in areas where plantations meet South County Road. This because a high number of trees are falling into the road as a result of the declining health of the plantations. In those areas that are Oak-Harwood along South County Road, a 50' buffer strip will be included in which no more than 50% of the basal area will be removed.

Recreation Resources

Hunting: This area has a long history of hunting and is a popular spot. Deer, bird, and small game hunters frequent the area during open seasons.
Wildlife Viewing: Due to the presence of moose and alpine vegetation, Florida State Forest is a popular destination for this user group. Moose sign has been observed in the project area.

Trails: Flat Rock Hill Trail serves as the western boundary of the sale and is used primarily by snowmobiles during the winter, and in the summer by hikers. The trail is in fair condition and may be used for skidding and/or forwarding during this sale. At the completion of harvesting activities, the trail will be restored to its original condition.

Threatened and Endangered Species

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

Wildlife

Species

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

The recommendations made by the Division of Fisheries and Wildlife will be followed to the extent possible, except for the creation of 5-acre openings. This size opening is not required to meet the silvicultural goals of the project, and habitat goals intended to be satisfied with that size opening should be met with the 10-acre beech treatment area. The entirety of the Division's recommendations are as follows:

For Goal 2 (Improve wildlife habitat) openings of 1/3 to 1 acre will provide browse and cover for common, generalist species like deer and bear, but really won't do much to dampen beech response or provide habitat for declining wildlife (typically need larger openings of 5+ ac to accomplish that). However, these 1/3 to 1-acre groups will help achieve Goals 1, 4 & 6. There is opportunity within the six polygons of Norway spruce plantation to add wildlife benefits by creating two or three 5 ac openings that feature 10-20% overstory retention in groups that contain healthy spruce, dead/dying spruce, and any overstory hardwoods. Establish these retention groups adjacent to canopy gaps that support red oak and/or sugar maple. If a canopy gap has good red oak seedlings, locate adjacent retention group on the north side of the regeneration. If a canopy gap supports good sugar maple seedlings, locate adjacent retention group on south side of gap. In the mixed NH/Oak stand, try to retain groups of full-crowned hemlock for wildlife cover. If available, fell a poor-quality pine into hemlock retention group for shaded downed woody material.

Snags, Retained Live Trees, and Course Woody Debris

Within the Cold River sale area, it is estimated that there is 201 ft^3/ac of course woody debris (CWD) on the ground. The minimum retention guideline listed in the DCR Management Guidelines (2012) is 256 ft^3/ac. In order to increase the amount of CWD on the ground, cull trees will be required to be felled, tops will be left in the woods, and marked trees less than 6" in diameter will be felled and remain in the woods.

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

Evaluation of the Data and Projected Results

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

Goals and Objectives of the Cold River Project

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

Objectives

- Residual relative basal areas at 56% within the hardwood stand with between 80 ft^2 and 53 ft^2 BA/ac. Residual relative densities within the Norway spruce openings at less than 10% with between 0 and 20 ft^2 BA/ac.
- No cutting or harvesting within filter strips.
- No cutting or harvesting within 75' of identified cultural resources other than stone walls.
- No loss of undesignated wood.
- Ensure harvesting contractor compliance with all BMP's.
- Frequently monitor operations to minimize and/or mitigate damage to the site.
- Ensure full understanding of contractual requirements by the harvesting contractor.
- Residual CWD greater than 256 ft^3 per acre.

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

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

Objectives

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

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

Objectives

- Install gaps within the existing Norway spruce stand to create early successional habitat and begin a new age class of trees.
- Utilize single tree selection within the Oak-Hardwood stand to continue the trend towards and uneven aged stand.

Goal 4: Remove beech infected with Beech Bark Disease Complex (BBD) (MA DCR Goal – **Diverse Habitats).**

Objective

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

Goal 5: Commence the process of removing the off-site Norway spruce plantations.

Objective

- Approximately ½ of the current stocking within the existing Norway spruce plantations will be reduced through group selection openings.

Silvicultural Prescription

Oak-Hardwood Stand

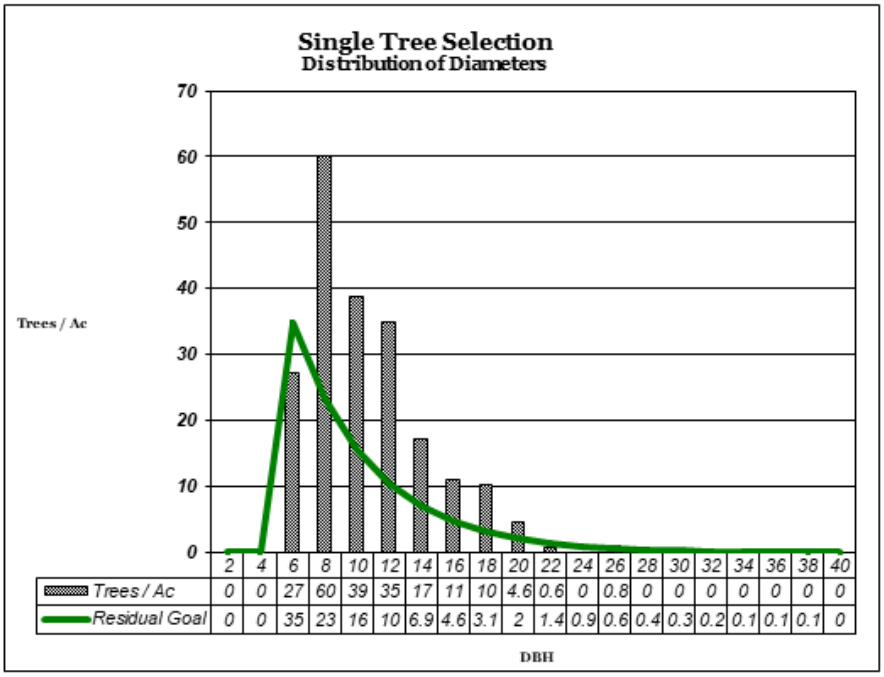
White ash trees greater than 10" in diameter will be biased for harvest due to the presence of emerald ash borer (EAB) in Berkshire County. This forest pest has a greater than 99% mortality rate on infected ash trees.

In the northern portion of the sale area shown on MAP 1 indicates a planned treatment for nuisance American beech. The American beech in this area have extensive infections of beech bark disease (BBD) and has developed into a situation in which stump and root sprouts are at extremely high densities. The density of American beech regeneration is so high that it is negatively impacting the recruitment and diversity of native flora in terms of both trees and ground cover. The treatment will

entail the application of herbicide, most likely a mix of triclopyr and/or glyphosate to kill at least 80% of the existing American beech. Healthy beech 10" and greater in diameter, and having no indication of disease, will be biased for retention within the project area.

Through the rest of the stand a single tree selection system will be used (Smith and Lamson, 1982). In this system the stand is harvested according to a curve created by determining the desired residual basal area, the largest diameter tree desired, and an expression of the stand structure for uneven-aged management. This method was chosen because the stand is already tending towards an uneven-aged condition.

Figure 3 – Diameter Distributions



	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
Trees / Ac	0	0	27	60	39	35	17	11	10	4.6	0.6	0	0.8	0	0	0	0	0	0	0
Residual Goal	0	0	35	23	16	10	6.9	4.6	3.1	2	1.4	0.9	0.6	0.4	0.3	0.2	0.1	0.1	0.1	0

During marking activities, priority for harvest will be given to those trees that are of poor form, poor vigor, diseased, damaged, etc.
Due to climate change considerations red spruce and eastern hemlock will be biased for retention.

Table 5 – Estimated Harvest and Residual Volumes for Single Tree Selection

		Harvested		Residual		
Species	% to cut	Sawtimber	Cords	Sawtimber	Cords	Basal Area
Eastern White Pine	20	17,796	5	71,185	18.1	4.3
Hemlock	20	20,175	25	80,700	101.2	12.4
Red Spruce	5	3,182	5	60,451	86.4	7.6
Sugar Maple	30	5,318	7	12,408	16.4	2.2
Red Maple	60	36,762	208	24,508	139.0	10.0
White Ash	80	3,545		886		0.2
Black Cherry	30	0		0		0.9
White Birch	60	2,659	15	1,773	9.8	0.9
Yellow Birch	30	5,318	8	12,408	18.5	2.5
Black Birch	30	0		0		0.3
American Beech	80	7,514	198	1,879	49.6	3.1
Red Oak	30	108,320	69	252,747	161.2	34.2
Norway Spruce	100	10,542	72	0	0.0	0.0
Total		221,132	612	518,946	600.1	78.6

Norway Spruce Plantations

Openings between 1/3 and 1 acre will be created within the Norway spruce plantations. The created gaps may be used to enhance existing gaps that are recruiting native hardwood, native softwood, and native groundcover. Openings will be no less than 100' apart if all trees are removed (0 ft^2 of basal area of trees 6"and greater in diameter). The reason for these openings is to further recruit native tree species and begin removing the plantations, which are in a state of decline. The areas in between openings will not be harvested.

There are also removal strips along South County Road that are approximately 80' (1±tree length) that will run along the entirety of plantations immediately adjacent to South County Road. This is being done at the request of the Town of Florida to reduce the burden to them clearing dead and/or downed trees from the roadway, and in some cases these trees are also disrupting phone and electric service when they fall into wires.

Table 6 – Volumes for Norway Spruce Plantation Group Selection Harvest

Species	Est BdFt	Est Cords
White Pine	12,965	0.00
Red Maple	3,594	37.12
Red Oak	6,871	0.00
Norway Spruce	184,009	341.32

Desired Future Conditions

Present – 100 years

Oak-Hardwood Stand

Ground cover density, diversity, and distribution are expected to increase.
Advance regeneration will develop into desirable growing stock, most likely: birches, maples, some oak, beech, and white ash. Herbicide applications will be used to control significant American beech expansion. Sun exposure and herbicide treatments should limit the growth of beech and provide the opportunity for more tree and ground cover species to escape beech brush shading prior to crown closure.

Norway Spruce Plantations

Norway spruce plantations will be removed over the next 2 cutting cycles. Improvement thinning within the previously created gaps will occur. Areas designated for improvement thinning; healthy native hardwoods (other than striped maple and pin cherry) and conifers will be preferred stock while striped maple, pin cherry, and diseased or otherwise unhealthy hardwoods and conifers will be targeted for removal.

100 years +All Stands

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

Logging System Requirements

Conventional and mechanical harvesting equipment will be permitted. Tops will be required to remain in the woods, and whole trees will not be skidded to landings. Equipment cannot exceed 6 psi ground pressure and will need to meet dimensional requirements in order to limit residual stand damage. South County Road will be used for hauling designated timber off state-owned lands, and the Flat Rock Hill snowmobile trail for forwarding and/or skidding. This area will most likely be open for harvesting all year, provided soil conditions remain stable. Generally, all trees will be felled into the stand and slash will remain in that location unless required for skid trail maintenance. Deviations from this will be reviewed on a case-by-case basis by the forester-in-charge or their designee. No stream crossings are anticipated.

Haul Roads

The haul road for the sale is South County Road. This road will not require improvements; however, the harvester will be required to return the road to the original condition. A bond may also be required by the Town of Florida. The current road profile is anticipated to be sufficient for the activities being conducted.

Skid Trails

Primary skid trails have been identified on MAP 1. Since no record of harvesting exists, and no previous skid trails were located during the stand exam, the installation of all interior skid trails will be required. Skid trails will be marked prior to the start of harvesting activities, and it is understood that minor changes to the routes may be required during logging operations. All proposed changes will be reviewed on a case-by-case basis by the forester-in-charge and/or Program Supervisor as required. Prior to leaving the harvest areas all skid trails will have water bars installed, and excess disturbance will be mitigated.

Landings

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

REFERENCES

Goodwin, D.W. and W.N. Hill. 2012. Forest Productivity and Stand Complexity Model [A GIS Grid Analysis using ArcGIS®]. Massachusetts Department of Conservation and Recreation, Amherst, MA.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions. Available online. Accessed [09/08/2017]

Natural Heritage & Endangered Species Program Staff. Massachusetts Division of Fisheries and Wildlife. NHESP Priority Habitats of Rare Species. Available Online. Accessed [09/08/2017]

Smith, H. Clay and Lamson, Neil L. 1982. Number of residual Trees: A Guide for Selection Cutting. US Forest Service Northeastern Forest Experiment Station.

Leak, Yamasaki, Holleran. 2014. Silvicultural Guide for Northern Hardwoods in the Northeast. US Forest Service Northern Research Station.

New Hampshire Forests & Lands Staff. 2009. Fox DS Cruiser ver 2007.2 Workhorse. New Hampshire Forests and Lands, Concord, NH.

Binkley, Dan; Valentine, David. 1991. Fifty-year biogeochemical effects of green ash, white pine, and Norway spruce in a replicated experiment. Forest Ecology and Management. 40: 13-25. [15696]

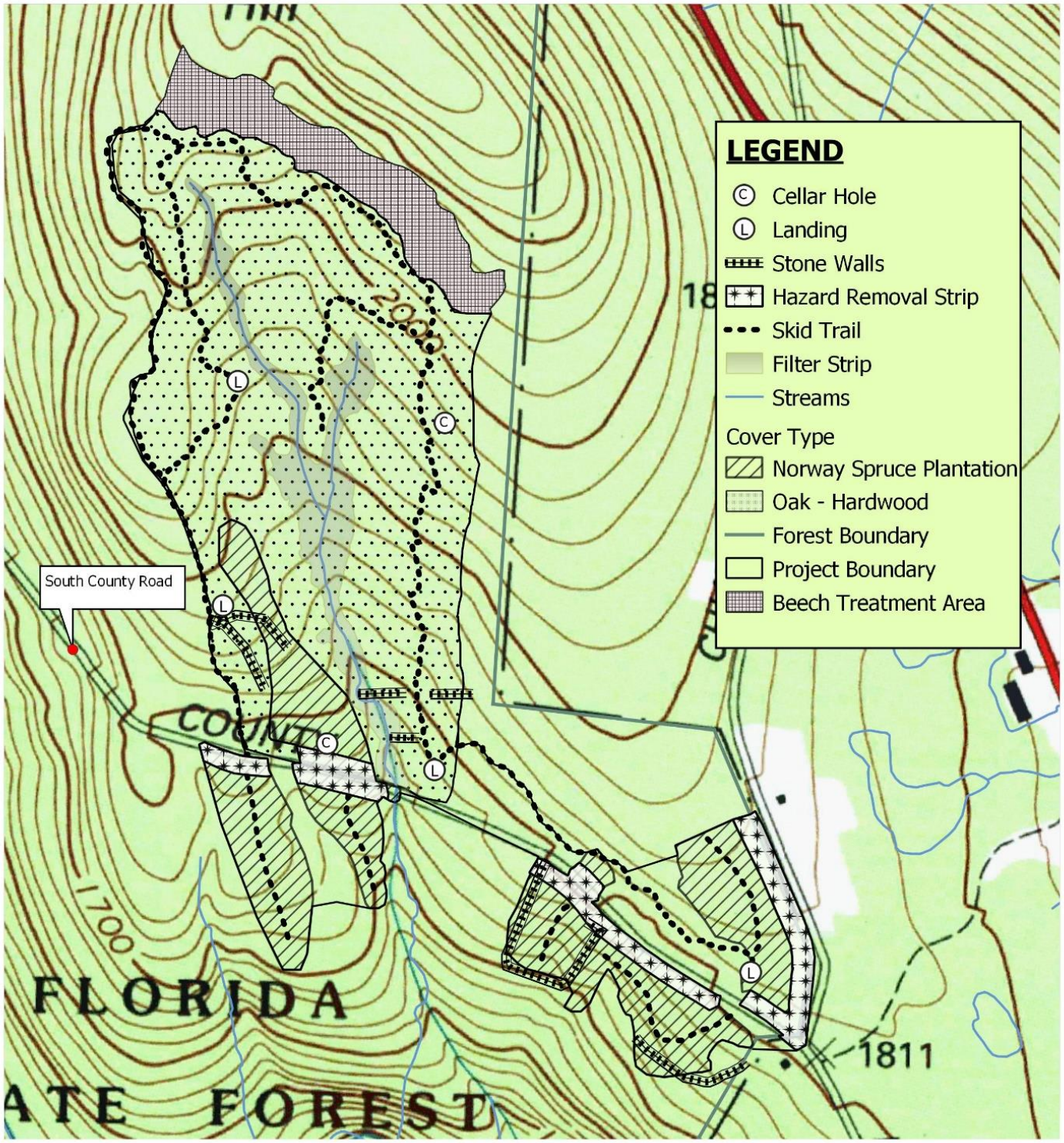
Massachusetts Department of Conservation and Recreation Staff. 2012. Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines. Massachusetts Department of Conservation and Recreation, Boston,

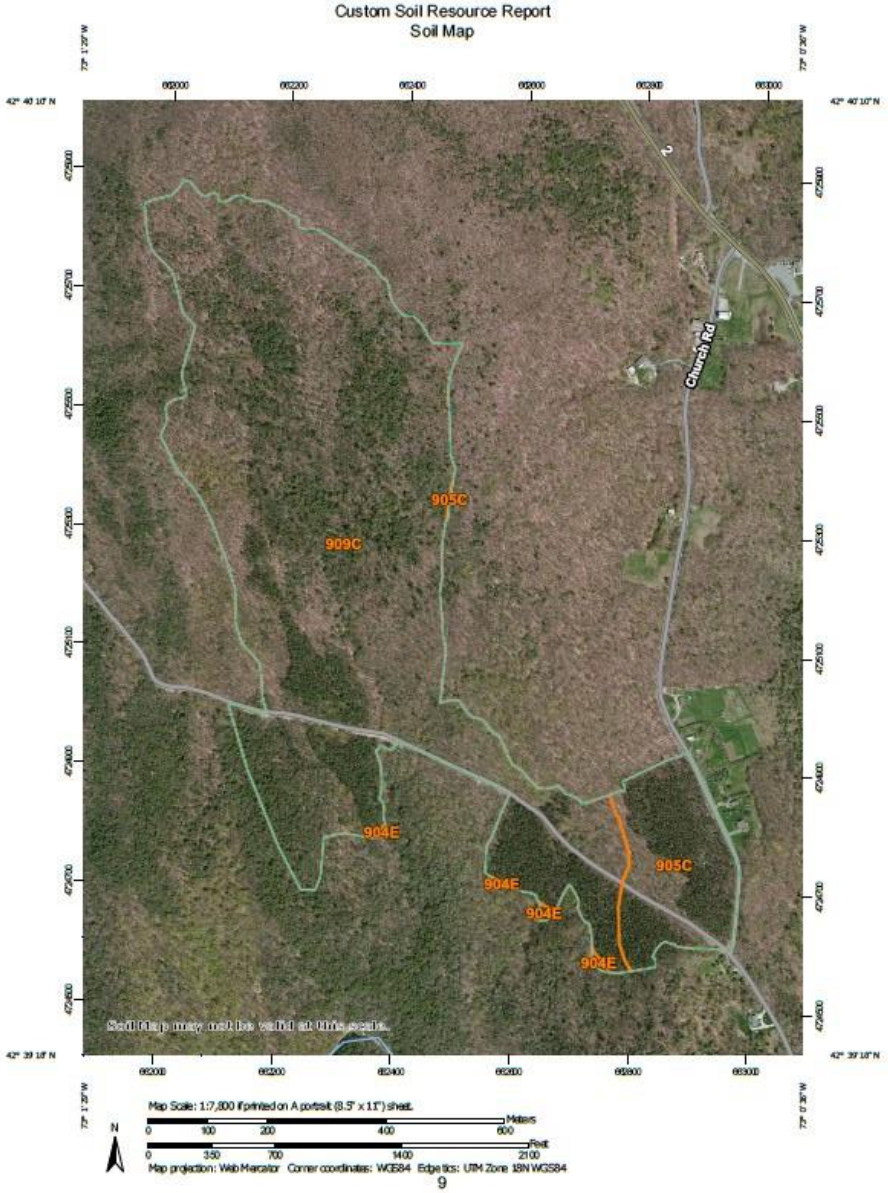
MAP 1

COLD RIVER FOREST MANAGEMENT PROJECT

Florida State Forest

Florida, MA





Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
904E	Lyman-Tunbridge association, 15 to 60 percent slopes, extremely stony	0.3	0.3%
905C	Peru-Marlow association, 3 to 15 percent slopes, extremely stony	14.0	11.3%
909C	Tunbridge-Lyman association, 3 to 15 percent slopes, extremely stony	109.1	88.4%
Totals for Area of Interest		123.4	100.0%

EXHIBIT 1

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

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

- ***Production of wood products*** *that is ecologically and economically sustainable benefiting local economies.*

- ***Water*** *quality protection and enhancement of water supply.*

- ***Diverse habitats*** *that range from early seral vegetation to late successional forest encompassing many structural components and provide protection from extreme disturbance events.*

- ***Recreational opportunities*** *that are safe and fitting for their location determined in conjunction with the Operations staff of the Division of Parks and Recreation*

- ***Carbon stock management*** *using innovative and scientific forest management methods for increasing sequestration.*

- Forest management on DCR forests, parks, and reservations endeavors to demonstrate excellent forestry practices to private landowners and the public.

- The ecosystem services that state lands provide will be balanced across the landscape and the scale of time where they are deemed appropriate.