dcr | Massachusetts Department of Conservation and Recreation

Silviculture Prescription
Egg Shell Lot 2

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Southern Berkshires District
Sandisfield State Forest
Sandisfield, MA

Prepared by:

Jeffery Martin – Assistant Management Forester – Southern Berkshires District
Massachusetts Department of Conservation and Recreation
P.O. Box 1433 / 740 South Street – Pittsfield - MA 01202
jeff.martin@state.ma.us – 413-442-8928 ext. 124

June 2016

Approved by:

Management Forestry
Program Supervisor  Date: June 10, 2016

William N. Hill, CF

Silvicultural Prescription Eggshell 2 Lot

Site Description:

This prescription will describe a 75 acre harvest area on the northern edge of the 320 acre Hartshorn parcel of the Sandisfield State Forest in Berkshire County Massachusetts. It is the second silvicultural entry phase of the initial 165 acre Hartshorn project area. The first timber sale in the project (Eggshell 1) was completed in the fall of 2014. Eggshell 2 will use the same main skid road system and landing area that was used for the previous timber sale. This site straddles a ridge that reaches a height of 1640 feet (500 meters) elevation. Slopes are gentle to moderate with a total elevation change of less than 164 feet (50 meters). There are two intermittent stream crossings and some areas of poor drainage in the saddle between the main ridge and the lower ridge to the south. The Western portion of the proposed harvest area is separated from the rest of the stand by a brook and two beaver related wetlands.

Soils:

According to the Soil Survey of Berkshire County, produced by NRCS in 1988, this harvest area contains the following three soil associations.

PoB –Pillsbury Loam: (10%) This is a nearly level to gently sloping, very deep, poorly drained soil found at the foot of slopes and in slightly concave areas of glacial till uplands. The main management concerns are seasonal high water table, seedling mortality and wind throw. It is recommended that thinning of trees be limited to no more than 30 percent of current stand density. The low soil strength limits the use of heavy equipment except when the soil is dry or frozen. Site index for this association is 55 for sugar maple and 60 for red oak.

BmE- Berkshire Marlow association: (65%) This association which is found on the sides of hills and mountains consists of very deep, well drained Berkshire and Marlow soils. Berkshire soils are typically on steeper and higher slopes and Marlow on the less steep, lower slopes. Constructing roads and trails on the contour and careful placement of water bars helps control erosion. The Thinning of crowded stands in this soil type results in more vigorous growth. Steep slopes and lots of stones and boulders are a hindrance to management in the Berkshire soils. Marlow soils are more common on this site as the presence of large stones and boulders and steep slopes were notably absent during the stand inventory. Site index is 52 for sugar maple and 67 for red oak.

PmC- Peru Marlow association: (25%) This association consists of very deep, moderately well drained Peru soils and very deep well drained Marlow soils. Peru soils are typically found on the lower parts of the slopes and Marlow on the upper slopes. Thinning crowded stands results in more vigorous growth. In some areas control of competing vegetation is needed for best growth of newly established seedlings. Site index is 56 for sugar maple and 67-70 for red oak.

Hydrology:

Wetlands within the designated project area requiring mitigated crossings include two streams, one intermittent and one perennial. Both stream crossings will be bridged with portable timber bridges (mats). Filter strips (50' wide) will be implemented around the two stream crossings, along the perennial stream, and around any seeps and springs that are found. No vernal pools were found during the stand inventory. Adjacent vegetated wetlands which include beaver related ponds and swamps and forested wetlands will also be buffered with 50' filter strips.

Vegetation:

This project area is comprised of a 75 acre northern red oak stand that has had little silvicultural activity since the Commonwealth acquired the property in 1924. There were some trees cut in the southwest corner of the quarter of the stand in a 2009 single tree selection harvest, removing mostly beech and ash, but not changing the overall stocking and species composition of the stand. The forester will mostly avoid harvesting in this area except to remove an occasional ash tree or oak that is in close proximity to the skid road. Generally speaking this is now a high quality Northern red oak stand that is at least 100 years old with minimal evidence of management.

Current species composition:

Main overstory species from highest percentage(in terms of stocking expressed in basal area per acre) to lowest are: Northern red oak *Quercus rubra,* sugar maple *Acer saccharium,* red maple *Acer rubrum,* American beech *Fagus grandifolia,* Eastern hemlock *Tsuga Canadensis,* black cherry *Prunus serotina,* white ash *Fraxinus anericana,* white birch *Betula papyrifera,* black birch *Betula lenta,* yellow birch *Betula alleghaniences,* and pignut hickory *Carya glabra.*

The understory and herbaceous layer is made up of the above tree species along with patches or individuals of hobblebush *Viburnum alnifolium,* striped maple *Acer pennsylvanicum,* witch hazel *Hamamelis Virginian,* downy shadbush *Amelanchier arborea,* Eastern hop-hornbeam *Ostrya virginiana, and* hawthorn *Crataegus spp.* The herbaceous layer is dominated by a variety of deciduous shrubs and ferns including: arrowwood *Viburnum dentatum,* lowbush blueberry *Vaccinium sp.,* gooseberry *Ribes sp.,* hay-scented fern *Dennstaedtia punctilobula,* wood fern *Dryopteris intermedia,* Christmas fern *Polystichum acrostichoides,* and cinnamon fern *Osmunda Cinnamomea.*

Forest Types:

The 2003 Sewall forest type project has classified the overstory into two types for this proposed harvest area. The major type here is OH (oak/hardwood) meaning the dominant species is oak in association with other hardwoods. The minor type is BB (beech, birch, maple) and is typically dominated by northern hardwood species such as sugar maple, beech and yellow birch. During the stand inventory plots which fell in the BB type did not significantly differ from those in OH type and Northern Red Oak is the dominant tree species throughout. Consequently, the forester decided to designate the entire 75 acre sale area as an OH type.

Ages and size classes present:

According to the 1924 forest type map this stand contained four different cover types. The most common condition observed covering approximately 60% of the stand was a cut and burned area that was regenerating a white birch/black cherry forest. Assuming the regenerating forest consisted of seedling and sapling sized trees then the stand age in that segment would be 90-110 years old. The other cover types were sugar maple, red oak, ash and yellow birch types with an average diameter of 6-7" making the stand in this area 20-30 years older with an effective stand age of approximately 120-130 years old. The forested acreage outside the cut and burned types, approximately 40 % of the stand in 1924, had an average canopy closure of only 50% indicating a recent harvest that left some pole timber in the over story. Currently this is an even-aged sawtimber sized stand with very little pole timber or smaller size classes present according to the current stand inventory.

Site Productivity

The sale area has a site index of 65-70 for Northern red oak and has a mid to high prime land analysis rating.

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." An analysis of Eggshell lot site history (land use: agriculture/logging) and conditions (soil types, productivity: vegetation cover) suggests a high level of complexity indicating that uneven age methods of regeneration may be appropriate.

Cultural and Archeological Features

The observation of well built stone walls in the area is a good indication of past agricultural use. There are interior stonewalls and stonewalls along much of the outside boundaries of the harvest area, which before the state acquired the land were the former boundaries of the Hartshorn family parcel. Across the stream in the western section of the stand there are two prominent former charcoal pits and at least one old stone arch that was probably used for making maple syrup. Where interior walls will need to be crossed we will use existing openings if possible and restore them to their original condition at the end of the harvest. No other cultural resources were found during the stand examination process but if any are found during tree marking they will be protected from harvesting activities.

The DCR archeologists has reviewed the proposal for this sale area and noted that there are no "pre-Contact" sites within a mile of the sale and that no limitations other than the standard guidelines which call for care around walls, cellar holes and other features are required.

Wildlife Habitat Conditions

Wildlife found on this forest is typical of species normally found in Southern Berkshire County. There are no rare species or features noted in the sale area or in the immediate vicinity. The project area is currently lacking diversity in forest structure with very few gaps in the canopy where sunlight can get through and promote young forest growth. The proposed harvest will create openings up to 1/3 of an acre in size and other small gaps that will promote some young forest growth thus benefitting wildlife species requiring theses habitats.

The proposed harvest will not significantly adversely affect habitat for most species. The exception is those species which require large blocks of early succession habitat, which will significantly decline in the future under current management strategy summarized here. The Division of Fish and Wildlife has commented that this proposed harvest will provide for a more diverse forest habitat but has recommended that in the future larger openings be added to provide the missing larger blocks of young forest habitat.

Stand Data-

As mentioned previously the Eggshell 2 timber sale will be inventoried as a single 75 acre Northern Red Oak stand. A timber stand cruise was done using the Two-Phase Sampling system and processed with the "Fox DS Cruiser". The method applied here is the "Big BAF method" and uses two basal area factors, one (20 BAF) to estimate stand basal area and the other (80 BAF) to sample for value, monetary or otherwise, per single unit of basal area.

Forest Stand Attributes:

Previous silviculture history in this stand is remarkably absent as past harvests did not extend into this far reaching segment of Hartshorn. As noted above, the last time any harvesting was done here was prior to the Commonwealth's acquisition of the property in the early 1920's. The forest in this stand is fairly homogeneous with red oak the dominant species in this 100 plus year old even-aged stand. There were 28 overstory plots taken in the stand along with a 300^{th} acre understory plot at each point center. Coarse woody debris transects were also collected for the stand. All pertinent charts and graphs for the current overstory conditions are in Appendix 1.

Summary of Overstory Stand:

Total basal area/acre for the stand is 139 sqft. with just under 60% of the basal area as Northern red oak, the other species were: red maple 9%, sugar maple 8%, hemlock 7%, American beech 6%, white ash 3%, and black birch, white birch, hickory, yellow birch, and black cherry comprised 2% or less of the basal area in the stand. There is not much open growing room in the stand's canopy, estimated relative density is at 113%, with red oak accounting for 70% of that. Currently the stand is overstocked and competition induced stress is beginning to show with increased mortality of light starved limbs and reduced diameter growth of smaller trees. Total stand volume is just over 1 million board feet for the 75 acre harvest area, with red oak accounting for more than 80% of the total. Hardwood trees under 11' dbh are scarce in this stand with approximately 20 trees per acre

Overall this is a healthy stand of good quality, mature red oak trees. There are a few biological agents affecting the overall health of the red oaks, some cankers (probably strumella or hypoxylon) were noted and some dark colored galls were also present in oak crowns. Weather events like past ice storms (1998, 2008) have had some debilitating effects on the tree crowns but probably no more than the severe competition for sunlight in the stand. Beech and ash trees in the stand all have the usual issues of degradation from beech back disease and ash decline but the trees are not a major component of the stand. Total trees/acre is just under 100 with a Quadratic Mean Diameter of 16.5" for the stand. Median stand diameter is 19.5" with red oak leading the pack at 20.4".

The term "acceptable growing stock" (AGS) commonly is used to describe trees that have log potential now, or in the future, and a reasonable crown. "Unacceptable growing stock" (UGS) denotes trees that do not meet the "acceptable definition" due to defect, noncommercial species, or unhealthy condition. AGS should comprise the bulk of residual stocking after harvesting (Leak,Yamasaki, Halleran). In this inventory mature trees with low risk were considered AGS and total acceptable growing stock in the stand is 79% with red oak at 97%, as most of them contain a merchantable log. Hemlocks, found along the lower slopes near the beaver swamps and connecting brook, appear healthy and vigorous and no signs of wooly

adelgid were found during the stand exam. Sugar maple and red maple acceptable growing stock were 75% and 50% respectively while American beech had the lowest amount of AGS in the stand at just 33%.

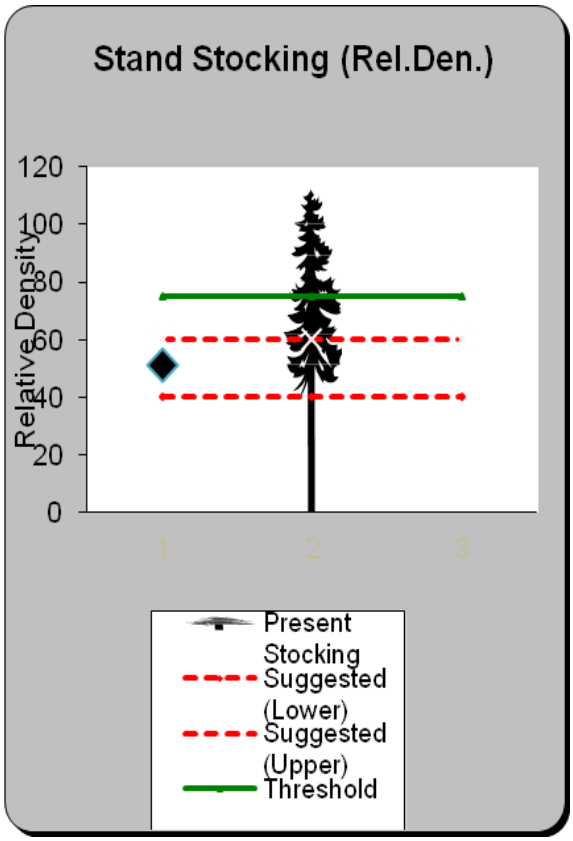
Summary of Understory

Understory sampling was done with a1/ 300th acre (6.8' radius) plot at the center of each overstory plot. The understory in the stand is comprised of mid tolerant and shade tolerant species. Beech was the most common species tallied in the understory followed by red oak, red maple, black cherry, ash, sugar maple, yellow birch and hemlock. More than 60% of the plots had both beech and oak on them and many had 4-5 tree different tree species tallied. Notable understory shrubs in the stand include hawthorn, service berry, Eastern hop-hornbeam (ironwood), blue beech (muscle wood), and striped maple. Other plant species found during the survey include low bush blueberry, arrow wood, various ferns and partridgeberry. With the exception of beech, none of the species tallied in the understory have high enough densities to be problematic in a post harvest situation. Walking through the stand is relatively easy and the diversity of tree and shrub species of various shade tolerance levels should be easy to maintain with a harvest that involves thinning and small group openings in the canopy.

Coarse Woody Debris

The estimated volume of coarse woody debris in this stand is 505.9 cubic feet per acre. There are twenty three observations on eighteen transects. Transects are each 50' long with a total length of all transects of 900 feet. Almost half of the observations of CWD were less than 6" in diameter and the rest were in the 6-12" range, with one observation in the 18-24" class.

Silviculture Prescription:



This stand is known to be at least 100 years old with a minimal amount of past harvesting history. At the current average stand basal area of 139 sq.ft. and 94 trees per acre, the stand is over stocked and mature. The stand should be thinned to increase diameter growth on the residual stand. The forester proposes a combination of thinning and group openings up to one third acre in size to promote a more diverse and complex forest stand condition. This type of treatment is an uneven aged forest stand management system where the goal is to have multiple age and size classes present in the stand. Group openings will be placed around healthy full crowned trees to encourage seed regeneration. Ideally the timber harvest should be done during dry harvesting months so that there is some scarification of the soil to promote seed regeneration. Outside of group openings the basal area will be reduced to approximately half the current level with a target residual stocking of 49-74 sq.ft./acre. Relative density in the thinned areas will be reduced from the current 113% to around 55%. See Appendix 2 for the Thinning Guidelines Chart.

Thinning Guidelines

Present Basal Area =	**138.6**	**Ft^2/ac**
Present Relative Density =	**113**	**%**
Suggested Upper BA =	**74**	**Ft^2/ac**
Suggested Lower BA =	**49**	**Ft^2/ac**

Explanation of graph - The tree represents stand stocking and the green bar is the threshold of 75% relative density. The rule of thumb is if you can thin 1/3 of the relative density and have the residual stocking between the upper and lower red dashed lines, thinning is probably a good idea! The black diamond is the residual stocking from the customized Prescription Density Guide.

Short and long term expected conditions:

Both the short and long term desired conditions is a forest composed of a more diverse variety of tree and shrub species than currently exists. The forest will have a component of very large trees (25+" diameter) but will primarily be composed of medium to large trees (16-26" diameter). The vertical structure of the forest will change dramatically with all tree size classes present from seedlings and saplings to the large diameter oaks currently dominating the stand. Currently red oak dominates the stand and a more diverse mixture of species will make the stand more resilient to weather events or biological pathogens. The forester hopes to get good regeneration of oak, cherry, black birch and red maple in the thinned areas, again scarification of the soil will greatly help the cause. Most of the smaller beech will be marked in the sale and will most likely need chemical treatment to inhibit beech sprouts from dominating the understory as is currently the case.

The collection of small group openings will create a patchwork of early succession forest that benefits wildlife and mimics the small wind events that commonly occur over the forested landscape. Shrub species like high and low-bush blueberry, hawthorn, serviceberry, and chokecherry will hopefully colonize the small openings created by the harvest. The irregular shaped group openings will blend into the thinned areas and it will likely be hard to differentiate one from the other at times after the harvest is completed.

Marking Guidelines:

In general, within the confines of no forest openings greater than one third acre allowed and residual stand basal area goals:

1. Identify full crowned mast seed trees and create group openings up to 1/3 acre around them.
2. Remove mature trees with spacing dictates that improve overall stand health and quality and decreases crown competition.
3. Remove all unacceptable growing stock with the exception of wildlife cavity trees.
4. Remove most of the ash (retain small diameter stems) and all diseased beech trees.

5. Leave all snags, Exception operators will be authorized to cut any snag which might create a safety hazard.

Sale Layout and Harvesting Limitations:

Wetlands and Stream Crossings:

Designated wetlands and small forest seeps will be excluded from the harvest. Harvesting within 50 feet of any wetland (vegetated or stream) will be limited to 50% of the basal area. There will be two stream crossings needed for the harvest, both of which have been used previously, and will be bridged with the portable timber bridges.

Landings and Skid Roads:

The existing landing located off South Sandisfield road will be used. The former main skid road used for Eggshell 1 will be used for Eggshell 2. Skid trails labeled on the attached map may have minor relocations and adjustments made when the final cutting plan map is prepared. The operator may be given the option of improving the main skid road to truck road specifications to reduce forwarding distance.

Equipment Restrictions:

Restrictions on types of equipment used are not anticipated, but the size of equipment will have upper limitations. Equipment used in the harvest will be limited to machines having no more than 6 lbs per square inch of ground pressure. A combination of cable skidder and forwarder will be required if the main skid road is not upgraded to truck road specifications. Due to the size of the trees on the sale a mechanical harvester is not suitable for this operation.

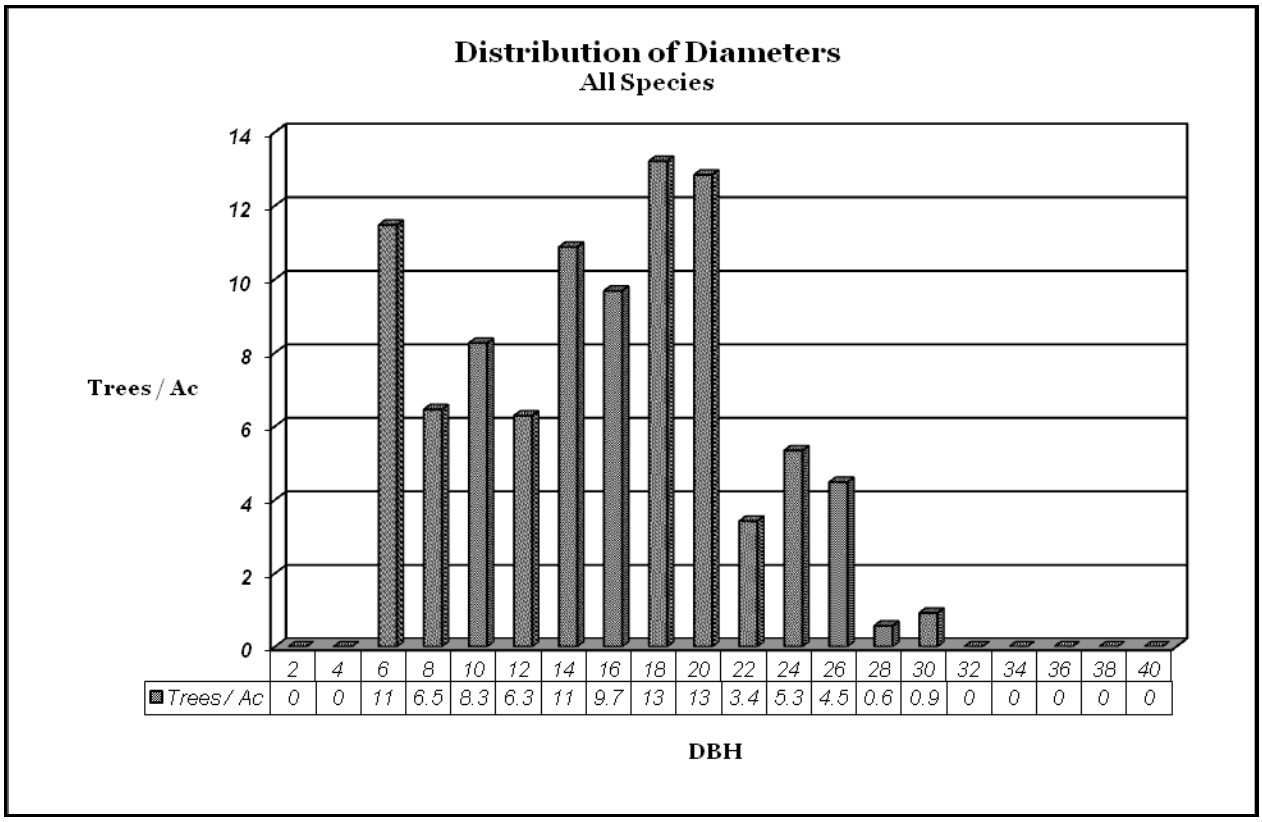
Utilization:

Whole tree harvesting will not be allowed on this site. All merchantable material at least eight inches in diameter, eight feet long, and 50% sound must be removed from the sale area. Unless specifically tallied and designated for removal any down material should not be removed. Snags cut for safety measures must be left in place on the ground.

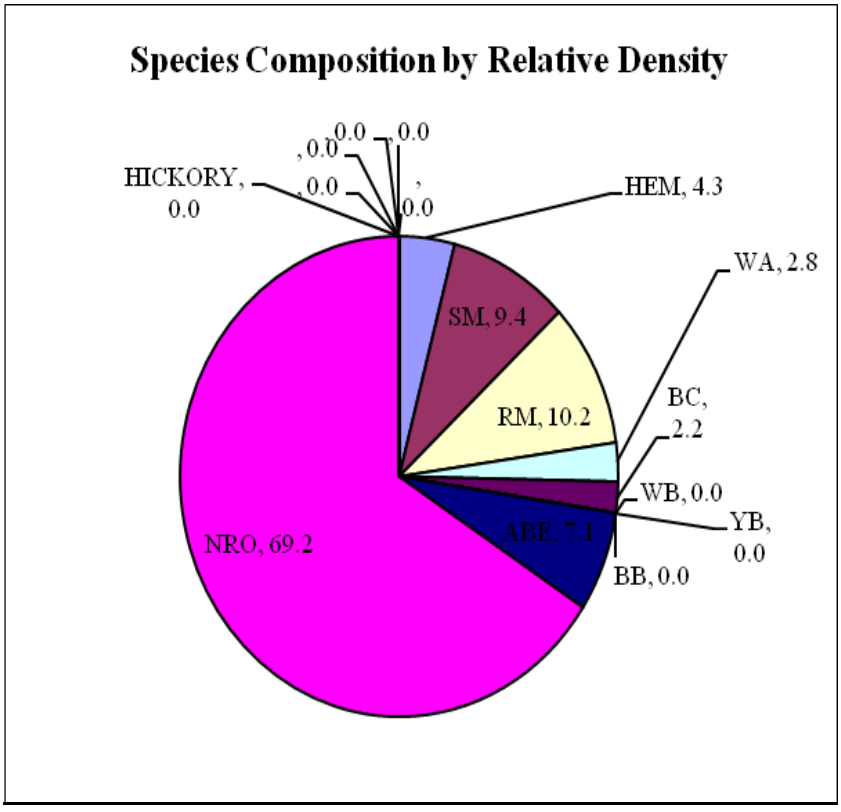
Guidelines for Delineation of Sale Attributes:

1. All wetlands and associated buffers, filter strips, and streams will be flagged and painted with two orange diagonal lines. In some places this line is also the sale boundary.
2. The sale area will boundary will be marked with two orange diagonal lines and flagged.
3. The skid trail network will first be flagged then painted after timber marking is complete in order to finalize trail adjustments.
4. All cut trees over 5 inches will be butt marked in blue paint and marked at dbh, or higher, according to the following protocols:
    - Saw logs (11 " and up dbh) will be marked with a horizontal blue line.
    - Pulp/Cord wood will be marked with a vertical blue line.
    - Cull trees to be felled will be marked with a blue X.

Appendix 1 – Analytical Charts of Current Stand Conditions



	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
Trees / Ac	0	0	11	6.5	8.3	6.3	11	9.7	13	13	3.4	5.3	4.5	0.6	0.9	0	0	0	0	0



Appendix 2 - Thinning Guideline Chart

Predicted Stand Density Results and Harvest Volumes

		Harvested		Residual		
Spp	% to cut	Sawtimber	RelDen	Sawtimber	RelDen	Basal Area
HEM	10	1,956	0	17,607	2.3	5.0
SM	20	7,654	2	30,616	9.1	11.6
RM	50	27,536	5	27,536	5.3	6.7
WA	90	22,032	2	2,448	0.2	0.2
BC	25	7,426	1	22,278	1.9	2.5
WB	5	0	0	0	0.0	1.1
YB	5	0	0	0	0.0	2.1
BB	5	0	0	0	0.0	2.1
ABE	80	14,686	5	3,671	1.2	1.6
NRO	50	326,829	32	326,829	31.9	37.2
HICKORY	0	0	0	9,428	0.0	1.1
	5	0		0		
	5	0		0		
	5	0		0		
	5	0		0		
	5	0		0		
Total		408,119	47	440,414		71.1
				Try to get this between 40 and 60	52	<<<

References

McCullough, Deborah, G., Schneeberger, Noel F. and Katocich, Steven A. 2008. *Pest Alert Emerald Ash Borer*. NA-PR-02-04. Northeastern Area State and Private Forestry. U.S. Department of Agriculture, Forest Service

Scanu, Richard J. 1988. *Soil survey of Berkshire County Massachusetts*. United States Department of Agriculture, Soil Conservation Service.

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

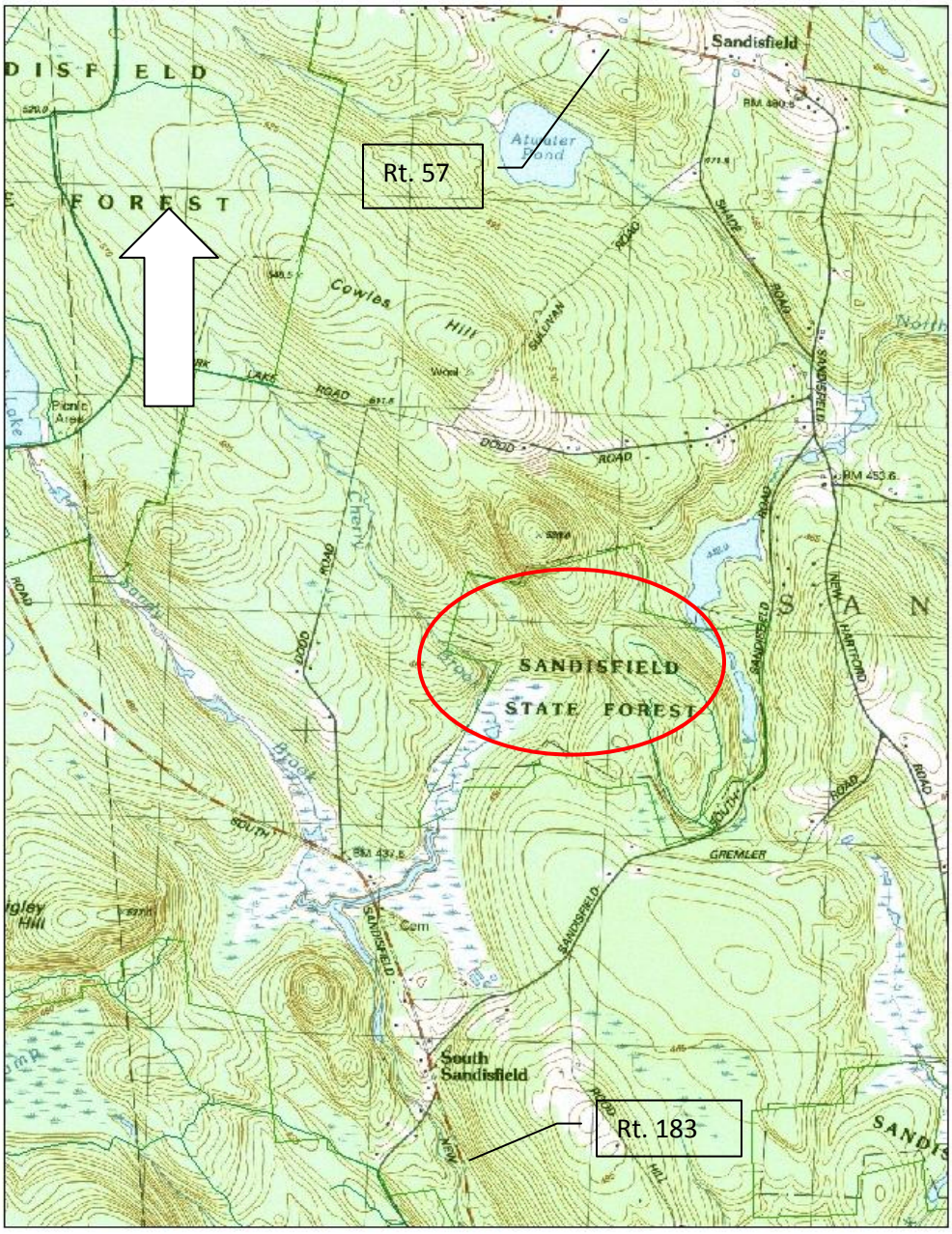
Massachusetts Department of Conservation & Recreation. 2007. *Southern Berkshire District Forest Resource Management Plan*.

Kittredge Jr., David B. and Parker, Michael. 2000. *Massachusetts Forestry Best Management Practices Manual*. Massachusetts Department of Environmental Protection, Office of Watershed Management and U.S. Environmental Protection Agency, Region I, Water Division, Water Quality Section.

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.

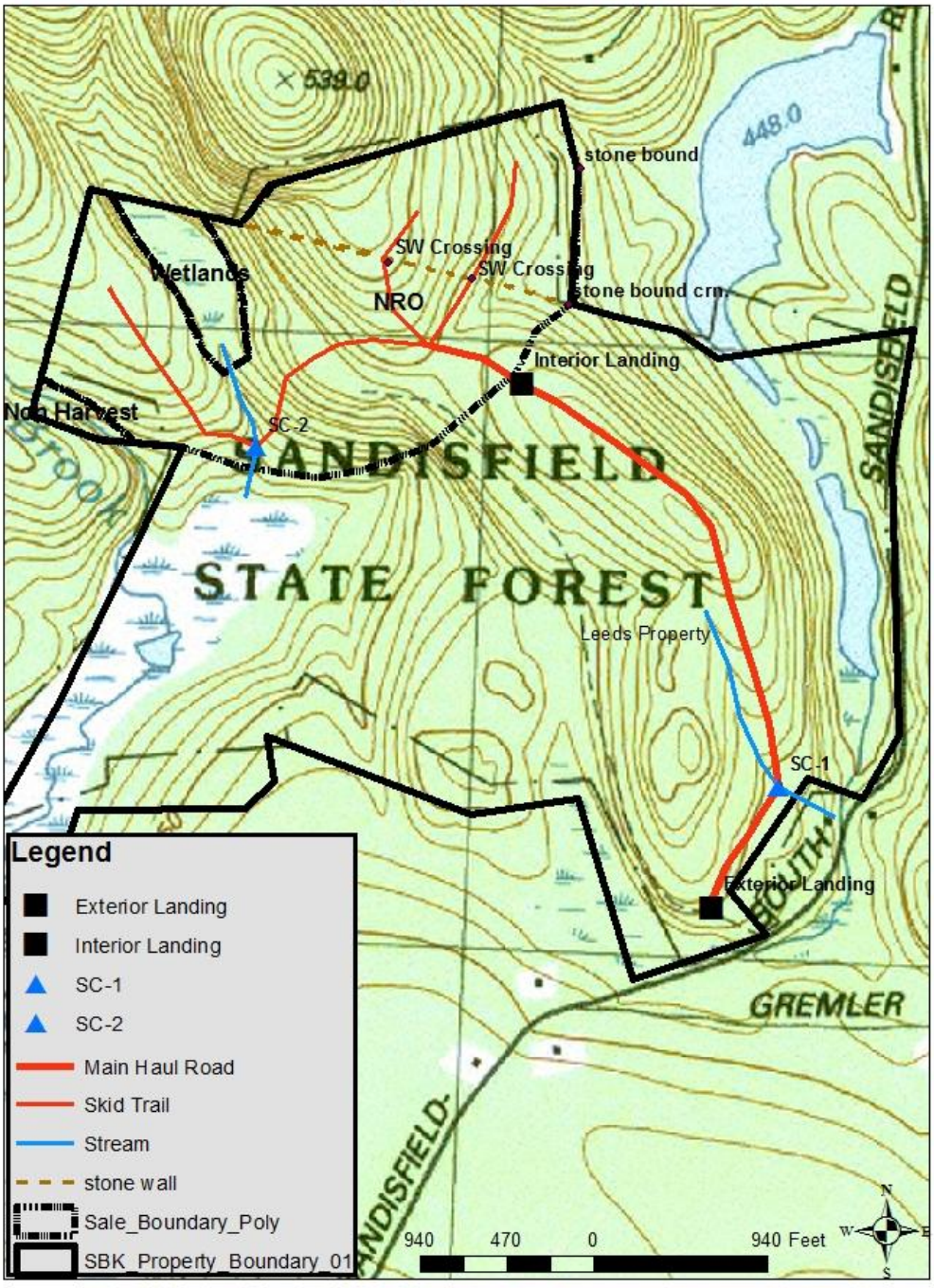
Susse, Roland., Allegrini, Charles., Brucciamacchie, Max and Burrus Roland. *Management of Irregular Forests,* Association Futaie Irregulier, 24 quai Vauban, 2500 Besancon-France. 2011 edition. (English translation, Phil Morgan).

Hibbs, David E. and Bentley, William R. *A Management Guide for Oak in New England*, Cooperative Extension Service, College of Agriculture and Natural Resources, The University of Connecticut, Storrs, CT 06268



Locus Map for Eggshell 2 Timber Sale

Sandisfield State Forest
Egg Shell 2 Lot



Prescription Map – Eggshell 2 Lot