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Silviculture Prescription
Clam River

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Southern Berkshire District
Otis State Forest
Sandisfield, MA

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August 30, 2017

Approved by:

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Silvicultural Prescription Clam River Dam

Site Description

This prescription will describe a 145 acre harvest area in the town of Sandisfield on the Clam River Dam parcel of Otis State Forest and on the Tiffany parcel of Sandisfield State Forest. There will be three separate timber sale units conducted under the Clam River Dam Management Proposal completed in February of 2016. It's anticipated that units one and two will be combined for the first timber sale and unit three will be offered at a later time. An abutting timber sale on town land adjacent to unit three was recently sold and operating two separate sales using a shared road and log landing network could create a difficult management situation for the Town of Sandisfield and DCR.

Timber sale unit one is bordered on the north and east by state and private forest land and Hammertown Road (town road), on the south by the dam flood control area and on the west by the impounded waters of the Clam River, a significant tributary of the Farmington River. Elevation in the stand ranges from approximately 1200' along the eastern edge of the stand to a low of 1050' along the shore of the Clam River Impoundment. The stand slopes vary from 15-30% toward the Clam River with a predominantly west and southwest aspect. A small perennial stream forms the northern border of the stand and another seasonal stream bisects the stand from east to west and will need to be bridged. There is an upland area of poor drainage with associated wet seeps that can only be managed during frozen or dry conditions.

The second timber sale area, unit 2, is a part of Sandisfield State Forest known as the "Tiffany" parcel and has been under state ownership since the early 1900's. This stand has had the most recent harvesting history of the three separate units having a harvest done in 1986. A town road borders the western portion of the 51 acre stand and private forest land abuts the other the three sides. Elevation here ranges from 1300' at the far eastern corner to 1125' along Hammertown Road. A seasonal stream runs through the northern portion of the stand which the forester does anticipate crossing for this project. Wetland seeps and one smaller seasonal stream are also in the stand otherwise the area is mostly well drained upland forest.

The southernmost area, unit 3, lies south and west of the Clam Dam covering 52 acres of hemlock hardwood and northern hardwood forest types. This area has a predominantly eastern aspect with elevations ranging from 1300' to 1200' along the Clam River below the Dam. Slopes in the stand range from 15-35% and old log roads are evident throughout the treatment area. The portion of the stand that is northwest of the Dam will need to be accessed through an abutting property that is owned by the town of Sandisfield due to a steep rocky hillside and the dam itself on our property. The forester plans on working with the town's forester to coordinate access from their property on an existing old woods road that would travel several hundred feet through the town's property before reentering the state land where the road eventually reaches the log landing on the dam access road. The town may also consider using the DCR landing for timber management on their property sometime in the future.

Climate

Precipitation- The nearest weather station to this site is in West Otis and records a normal total precipitation of nearly 47 inches annually. The station reports a mean winter/spring snowfall of 57.7 inches with a maximum of 160 inches recorded. In general the climate is typical of New England hill towns with cold, snowy winters and hot, humid summers.

- National map unit symbol: 2wlnm
- Elevation: 750 to 2,070 feet
- Mean annual precipitation: 31 to 95 inches
- Mean annual air temperature: 27 to 52 degrees F
- Frost-free period: 90 to 160 days
- Farmland classification: Not prime farmland

Soils

According to the latest web soil survey data this harvest area contains three major soil associations. Soil composition, origin and their limitations for use will be analyzed for the specific forest soils covered in the prescribed treatment area (See Soils Map).

BmE (901E) - Berkshire Marlow association: This association which is found on the sides of hills and mountains consists of very deep, well drained Berkshire and Marlow soils formed from glacial till. 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. Site index is 52 for sugar maple and 67 for red oak. All of

the proposed landing areas for the three units fall within this soil type which has a moderate rating of limitations to construction and haul road development. For limitations affecting the construction of haul roads and log landings, the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, and sand content.

PmC (905C) - Peru Marlow association: 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. Berkshire, Marlow and Peru soils are derived mainly from granite, gneiss, and schist. Peru soils are similar to Marlow soils in that they are extremely stony but the Marlow soils are rarely mottled in the lower parts of the subsoil. 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.

LtE (904E) - Lyman Tunbridge association: This map unit consists of shallow, somewhat excessively drained Lyman soils and deep, well drained Tunbridge soils. These soils are common on the mountainous uplands in the area with slopes ranging from 15 to 45 percent (tree skidding will not occur in the treatment area where slopes exceed 35 percent). Permeability is moderately rapid in these soils and root zone is restricted by bedrock, usually at a depth of 20 to 30 inches. Wind throw can be a problem in these soils due to the shallow depth to bedrock and minimizing soil disturbance and maintaining organic cover will help absorb run off and limit erosion. Lyman Tunbridge soils are derived mainly from granite, gneiss, and schist which are fractured at the surface but solid underneath.

Hydrology

Wetlands within the designated project area requiring mitigation include several small streams, the Clam River, the Clam River Impoundment, and a poorly drained upland area of seeps and associated road drainage from the town roads. There will be two streams crossings; one will need to be bridged with portable timber bridges (mats) and the other could be poled or forded during dry or frozen conditions (DCR service forester will decide the best approach) . Filter strips (50' wide and greater depending on slope) will be implemented around all streams and regulated wetlands. *Upland drainages that have a defined channel due to a hydraulic gradient which flows within, into or out of an area subject to protection under the Wetland Protection Act will also need to be mitigated* (MA BMP 2000).

Vegetation

The forest in the project area is typical of Western Massachusetts northern hardwoods where the transitional species more common in the oak hardwood forests of Southern New England are present. The moist forest in this area contains some deep, rich and fertile soils that can grow valuable timber though the many rocky areas can be problematic to harvesting operations. Main overstory species 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,* eastern white pine *Pinus strobes,* and the occasional pignut hickory *Carya glabra,* and American elm Ulmus Americana can also be found. There are also several isolated clumps of bigtooth aspen *Populus grandidentata* that colonized the cleared areas near the dam site and along construction access roads.

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,* mountain maple *Acer spicatum,* 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 HH (hemlock/hardwood appx. 110 acres) and is dominated by eastern hemlock and a variety of northern hardwood associates such as American beech, yellow and black birch, white ash, red maple, and red oak. In sale unit two there is a component of mature white pines that were included in the hemlock/hardwood type. The minor type is BB (northern hardwood appx. 35 acres) and is dominated by species such as sugar maple, beech and yellow birch, black birch, white ash, red maple and red oak.

Structure, ages and size classes present:

There are a wide variety of size classes present in both forest types from sapling sized trees to the large diameter white pine and hemlock trees that are found throughout the treatment area. Tree size classes are predominantly in the small-medium sized sawtimber classes and are determined mostly by past management history of the forest. The average age of the stands is 84 years old with some remnants of past stands, mostly hemlocks and white pines, which contribute significant structural diversity to the stand. Understory structure provides foraging and nesting substrate, and escape and roosting cover for birds and mammals.

Forest Health

The forest in the proposed treatment area is generally healthy with the usual tree decline agents present like beech disease and hemlock wooly adelgid. Beech disease causes mortality and defects in beech in Europe and North America. The disease results when the beech scale insect *Cryptococcus fagisaga* attacks the bark creating a wound then the fungi *Neonectria faginata and Neonectria ditissima* invade the tree through a wound causing the canker to form. Excessive cankers degrade the tree and can eventually cause mortality. Hemlock wooly adelgid *Adelgis tsugae,* originated in Asia, is an insect that feeds on hemlock and spruce trees by sucking the sap from the needles and can cause mortality when populations are high. Beech bark disease is definitely present in the area but the forester hasn't spotted any significant signs of wooly adelgid though it's probably present somewhere. The other looming threat to the forest health here is emerald ash borer *Agrilus planipennis* a beetle that feeds on the cambium of ash trees eventually causing mortality.

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 Clam River Dam 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 DCR archeologists has reviewed the proposal for this sale area and noted that there are no "pre-Contact" sites recorded within, adjacent or near the proposed project area. No historic period or archeological resources documented within, adjacent or near the treatment area. All stonewalls, cellar holes, wells, trash pits and other associated cultural features located within the treatment area will be documented and protected from damage during the harvesting operations. Existing breaks in stone walls will be utilized to protect the integrity of the walls if a crossing is necessary.

All three of the treatment units contain some form of skid roads, woods roads, trails (snowmobile or illegal ATV) or dam access roads created during construction of the dam. Some of these existing roads/trails will be re-used during operations and all will be restored and improved according to MA road and trail BMP's to minimize impacts and erosion. Snowmobile trails will be disrupted as little as possible during the riding season.

All hazard trees (where utility lines allow) will be removed from state lands that border town roads and the dam access road. Trees will be felled away from these roads and no slash will be allowed within 25' of the road.

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 these 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 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.

Hard mast such as hickory nuts, acorns, and beech nuts are foods that can be consumed or stored for use during the winter season. They are required by many wildlife species including bears, squirrels, and mice. The northern hardwood stand has 30 sq.ft. of basal area (BA) of trees that produce high quality hard mast (American beech, northern red oak, ironwood and pignut hickory), and 118 sq.ft. BA of other hard mast producers (red maple, sugar maple, eastern hemlock, white ash, yellow birch, black cherry, sweet birch, and American basswood). The hemlock hardwood stands have approximately. 10 sq.ft. BA of high quality hard mast tree species and 145 sq.ft. of other hard mast producing species.

Soft mast (fruits), such as cherries and berries are high energy foods required by many wildlife species including bears and many species of migrating songbirds where high energy sources are of key importance during fall migration. The northern hardwood stands contain two tree species, black cherry and American basswood, approximately 10 sq.ft. BA of soft mast producers. Hemlock hardwood stands contain approximately 5 sq.ft. BA of black cherry and no other soft mast producing trees.

Understory data for both stand types listed high quality hard mast species present (American beech, northern red oak, and ironwood), and several other hard mast producers (eastern hemlock, red maple, striped maple, sugar maple, sugar maple and witch hazel). The understory data had two species of high quality soft mast (hobble-bush and maple leaf viburnum).

Browse is a critical food source for herbivores such as deer, rabbits, and cottontails. High quality browse species and lesser quality browse species in both stands include many of the aforementioned soft and hard mast producing species. The northern hardwood stands had a good distribution of browse species, with 70% of plots having at least one browse species, while the hemlock hardwood stands were even better with 82% of plots having at least one browse species.

Stand Data

The stand data was generated with the Silvah (version 7.0) forest stand analysis program. Overstory (OS) plots were taken with a 20 BAF prism using 2" diameter breast height (dbh) classes for acceptable growing stock (AGS), unacceptable growing stock (UGS) and dead trees. Products were estimated for each tree sampled and wildlife potential (dens and cavaties) of both live and dead trees was recorded. Two understory plots (6' radius) to estimate trees <4" dbh and ground cover vegetation were measured at each OS plot, and two coarse woody debris transects (50') were measured at each OS plot.

Northern Hardwood Prescription

Project Goals:

- Increase forest stand species diversity and stand complexity
- Enhance wildlife habitat by creating a patchwork of small openings
- Provide sustainable wood products and support local timber industry
- Provide in-kind services for DCR parks and recreation services and local municipalities
- Improve existing snowmobile trails

The management prescription for the 35 acres of northern hardwoods (NH) in the project area will be an uneven aged method of regeneration with small group openings. The stand is dominated by red maple, sugar maple, hemlock, white ash, beech, yellow birch and black birch which together comprise 84 percent of the 148 sq.ft. of basal area per acre. This is a small sawtimber stand with an average medial diameter of 13.1 inches. Relative Density in the stand is 89% for all species. Stands at or above 80 percent density should generally receive a commercial thinning at this time. The number of trees of acceptable growing stock in all size classes is just above 50 percent. The forester will implement a thinning treatment with group openings up to 1/3 acre in size. The harvest will concentrate on removing unacceptable growing stock, white ash sawlogs, and some larger healthy trees to open the canopy and improve spacing. The uneven aged silvicultural treatment will reduce stand stocking by 30-40% leaving a residual stand basal area of 70-90 sq.ft./acre. Relative stand density will be reduced to 50-60% from the current level of 89%.

Hemlock Hardwood Prescription

Project Goals:

- Increase forest stand species diversity and stand complexity
- Encourage regeneration of native hardwoods in hemlock hardwood stands
- Enhance wildlife habitat by creating a patchwork of small openings
- Provide sustainable wood products and support local timber industry
- Provide in-kind services for DCR parks and recreation services and local municipalities
- Improve existing snowmobile trails

The hemlock hardwood stands account for more than 75 percent of the project area. They are widely variable in species composition, size class, and structure. The management prescription for these stands will also be an uneven aged approach with group openings (less than 1/3 acre) and commercial thinning. The stand is dominated by hemlock, red maple, black birch, white pine, red oak, white ash and sugar maple which together comprise 86 percent of the basal area. This is a medium sized sawtimber stand with an average medial diameter of 14.3 inches. Average stand basal area is 165.5 sq.ft. per acre with a relative stand density of 97 percent. Stand basal area will be reduced by approximately 30-40% with a residual stand BA of 75-95 sq.ft. per acre. Removals will concentrate on unacceptable growing stock with poor crown potential and vigor, white ash, tree spacing of mature trees. Stand relative density will be reduced to around 60 percent leaving more sunlight to improve growth on the residual trees and maximize stand growth potential.

Summary of Understory

Understory sampling was done with 6 foot radius plots at the center of each overstory plot and at the midway point to the next OS plot. Trees and shrubs under 4 inches were broken down into four size classes: < 1 ft, 1-3 ft, 3-5 ft, and > 5 ft. Ground cover of ferns and grasses was estimated on a percent cover basis. The understory in the stand is comprised of mid tolerant and shade tolerant species. Beech was the most common species tallied in the understory found on 45% of plots in both stand types. In the northern hardwood stands, or BB, the next most prevalent species was striped maple followed by red oak, hemlock, sugar maple and yellow birch. Hobblebush and ironwood were found on 5% of the plots in the stand. Fern cover and undesirable tall wood plants may interfere with regeneration if the stand was to be managed in an even aged system.

In the hemlock hardwood stands the understory was similar to the NH stand in that beech was the most common species found followed by hemlock, red oak, striped maple, sweet birch, ironwood, red maple, witch hazel and maple leaf viburnum. The understory species are mid tolerant and shade tolerant so the same species will likely persist after the uneven aged treatment is completed. Beech and fern species can be a problem in the group openings and post treatment controls may be necessary.

Coarse Woody Debris

The estimated volume of coarse woody debris (CWD) in the northern hardwood stand is 201.9 cubic feet/ acre. There are 12 observations on eighteen transects in the stand. Transects are each 50' long with a total length of all transects of 900 feet. In the hemlock hardwood stands there was 510.9 cubic feet/acre with 22 observations on 1100' of transects. Currently all stands in this prescription exceed the guidelines for CWD retention in MA and will contain even more CWD after the prescribed treatment.

Northern Hardwood Stands

Overstory Summary- Quality, Diameters, Age, Structure, Density, Volumes, Values: (2016 inventory data)

Composition - BA, percent BA, trees per acre

	all species	all oaks	RM	SM	EH	WA	AB	YB	BC	NRO	SB	OST	BAS	PH	WP
Total BA	**147.8**	**8.9**	24.4	22.2	20.0	20.0	17.8	11.1	8.9	8.9	8.9	2.2	1.1	1.1	1.1
Percent BA	**100**	**6**	17	15	14	14	12	8	6	6	6	2	1	1	1
Trees per acre	**287**	**17.4**	19.8	62.7	40.5	24.2	49.5	29.5	12.6	17.4	11.2	14.8	3.2	1.4	0.4

Quality - percent in AGS

	all species	all oaks	RM	SM	EH	WA	AB	YB	BC	NRO	SB	OST	BAS	PH	WP
Saplings	**25**	**0**	0	100	0	0	0	0	0	0	0	0	0	0	0
Poles	**56**	**67**	100	100	33	100	0	67	50	67	67	0	0	0	0
Small sawtimber	**45**	**100**	18	67	56	43	17	50	67	100	75	0	0	100	0
Medium sawtimber	**59**	**100**	0	0	100	57	33	0	50	100	100	0	0	0	0
Large sawtimber	**50**	**0**	0	0	0	100	0	0	0	0	0	0	0	0	100
All sizes	**50**	**88**	18	80	50	61	13	60	50	88	75	0	0	100	100

Diameters and Ages - inches, years

	all species	all oaks	RM	SM	EH	WA	AB	YB	BC	NRO	SB	OST	BAS	PH	WP
Medial diameter	**13.1**	**14.5**	15.7	11.0	12.1	14.8	11.8	10.0	15.8	14.5	13.0	7.0	8.0	12.0	24.0
Merchantable medial diameter	**13.4**	**14.5**	15.7	11.4	12.6	14.8	12.3	10.0	15.8	14.5	13.0	10.0	8.0	12.0	24.0
Quadratic mean diameter	**9.7**	**9.7**	15.0	8.1	9.5	12.3	8.1	8.3	11.4	9.7	12.1	5.3	8.0	12.0	24.0
Years to maturity	**27**	**18**	11	44	36	16	38	53	11	18	33	53	50	40	0
Effective age	**78**	**72**	79	76	84	74	82	67	79	72	87	67	40	80	160

Relative density - percent

	all species	all oaks	RM	SM	EH	WA	AB	YB	BC	NRO	SB	OST	BAS	PH	WP
Rel. Density	**89**	**6**	12	21	10	8	12	8	4	6	5	2	1	1	1
AGS only	**50**	**5**	3	17	6	5	2	5	2	5	4	0	0	1	1

Crawl Table (Understory Data)

Stems per acre																
Height class	**all species**	**SM**	**AB**	**EH**	**YB**	**WA**	**RM**	**NRO**	**OST**	**BC**	**SB**	**BAS**	**PH**	**WP**	**HOB**	**STM**
<1 ft	**154.1**	19.3	96.3					38.5								
1-3 ft	**231.1**		192.6	38.5												
3-5 ft	**57.8**		19.3	38.5												
>5 ft	**211.8**	57.8	57.8	38.5	38.5				19.3							
understory totals	**654.8**	77.0	365.9	115.5	38.5	0.0	0.0	38.5	19.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent plots		10.0	45.0	10.0	10.0	0.0	0.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	5.0	20.0
DBH size class	**all species**	SM	AB	EH	YB	WA	RM	NRO	OST	BC	SB	BAS	PH	WP	HOB	STM
SAPS	**60.8**	22.6	12.7	12.7					12.7							
POLE	**143.9**	26.1	29.0	15.8	25.4	10.9	2.0	14.5	2.0	8.8	6.1	3.2				
SM SAW	**68.4**	14.0	6.1	10.7	4.2	8.5	15.7	0.8		2.4	4.5		1.4			
MD SAW	**12.5**		1.6	1.1		4.4	1.7	2.1		1.0	0.5					
LG SAW	**1.4**					0.4	0.4			0.4				0.4		
overstory totals	**287.0**	62.7	49.5	40.5	29.5	24.2	19.8	17.4	14.8	12.6	11.2	3.2	1.4	0.4	0.0	0.0

STM=striped maple, OST=hop hornbeam, MLV=maple leaf viburnum, WHL=witch hazel

Hemlock Hardwood Stands

Overstory Summary- Quality, Diameters, Age, Structure, Density, Volumes, Values: (2017 inventory data)

Composition - BA, percent BA, trees per acre

	all species	all oaks	EH	RM	SB	NRO	SM	WA	WP	YB	BC	AB	PB	ASP
Total BA	**156.4**	**11.8**	49.1	29.1	13.6	11.8	10.9	10.9	10.0	8.2	5.5	4.5	1.8	0.9
Percent BA	**100**	**8**	31	19	9	8	7	7	6	5	3	3	1	1
Trees per acre	**247**	**5.3**	79.4	39.4	36.2	5.3	20.1	18.7	4.8	20.9	9.2	9.3	2.8	0.7

Quality - percent in AGS

	all species	all oaks	EH	RM	SB	NRO	SM	WA	WP	YB	BC	AB	PB	ASP
Saplings	**100**	**0**	0	0	100	0	0	0	0	100	0	0	0	0
Poles	**64**	**0**	52	25	100	0	80	100	0	100	100	50	100	0
Small sawtimber	**54**	**100**	43	42	100	100	83	33	33	75	0	0	100	0
Medium sawtimber	**60**	**80**	61	40	0	80	0	50	75	100	100	0	0	0
Large sawtimber	**67**	**100**	0	0	0	100	0	0	50	0	100	0	0	0
All sizes	**60**	**92**	52	37	93	92	75	50	55	89	83	20	100	0

Diameters and Ages - inches, years

	all species	all oaks	EH	RM	SB	NRO	SM	WA	WP	YB	BC	AB	PB	ASP
Medial diameter	**14.3**	**21.4**	13.8	13.5	11.3	21.4	11.7	13.5	21.5	12.2	15.0	12.4	11.0	16.0
Merchantable	**14.4**	**21.4**	13.8	13.5	11.9	21.4	11.7	13.5	21.5	13.2	15.0	12.4	11.0	16.0

medial diameter														
Quadratic mean diameter	**10.8**	**20.3**	10.6	11.6	8.3	20.3	10.0	10.3	19.6	8.5	10.4	9.5	10.9	16.0
Years to maturity	**21**	**0**	28	23	41	0	42	22	0	32	15	37	47	13
Effective age	**87**	**107**	92	67	79	107	78	68	143	88	75	83	73	107

Relative density - percent

	all species	all oaks	EH	RM	SB	NRO	SM	WA	WP	YB	BC	AB	PB	ASP
Rel. Density	**97**	**6**	30	18	9	6	11	5	5	5	2	4	1	0
AGS only	**59**	**5**	16	7	9	5	8	3	3	5	2	1	1	0

Volumes and Values - International 1/4 inch Log Rule

	all species	all oaks	EH	RM	SB	NRO	SM	WA	WP	YB	BC	AB	PB	ASP
Gross Total Cords	**43.4**	**4.2**	11.6	9.0	3.2	4.2	3.0	3.2	3.6	2.0	1.7	1.1	0.5	0.3
Net Total Cords	**34.7**	**3.4**	9.3	7.2	2.6	3.4	2.4	2.6	2.8	1.6	1.4	0.9	0.4	0.2
Net Pulpwood Cords	**19.1**	**1.3**	4.0	4.9	1.9	1.3	1.8	1.3	0.6	1.3	0.7	0.7	0.4	0.2
Gross Board-foot	**12695.2**	**1539.6**	3685.1	2079.7	858.0	1539.6	584.7	968.9	1650.4	392.6	563.0	258.4	65.0	49.9
Net Board-foot	**10261.2**	**1450.3**	3291.8	1438.8	376.8	1450.3	380.4	840.9	1590.5	194.6	508.7	130.1	32.9	25.3
Dollars	**1354.3**	**570.5**	98.4	105.4	5.6	570.5	25.9	204.6	52.6	10.8	274.3	5.1	0.8	0.4

Crawl Table (Understory Data)

Stems per acre																	
Height class	**all species**	**EH**	**RM**	**SB**	**YB**	**SM**	**WA**	**AB**	**BC**	**NRO**	**WP**	**PB**	**ASP**	**STM**	**OST**	**MLV**	**WHL**
<1 ft	**587.9**	111.5	40.5			70.9		202.7		162.2							
1-3 ft	**364.9**	121.6						101.4		40.5				81.1		20.3	
3-5 ft	**304.1**	10.1						162.2						101.4	10.1		20.3
>5 ft	**283.8**	70.9	10.1	101.4				30.4						20.3	50.7		
understory totals	**1540.6**	314.2	50.7	101.4	0.0	70.9	0.0	496.6	0.0	202.7	0.0	0.0	0.0	202.7	60.8	20.3	20.3
Percent plots		34.2	5.3	18.4	0.0	10.5	0.0	44.7	0.0	23.7	0.0	0.0	0.0	21.1	13.2	2.6	2.6
DBH size class	**all species**	EH	RM	SB	YB	SM	WA	AB	BC	NRO	WP	PB	ASP	STM	OST	MLV	WHL
SAPS	**20.8**			10.4	10.4												
POLE	**147.5**	59.3	21.0	18.2	6.9	14.1	11.9	7.2	7.2			1.7					
SM SAW	**57.1**	11.3	16.0	7.1	3.3	5.5	5.5	1.5	0.7	2.0	2.4	1.2	0.7				

MD SAW	**18.2**	8.4	2.4	0.5	0.3	0.5	1.0	0.5	1.0	2.0	1.4						
LG SAW	**3.1**	0.3					0.3		0.3	1.3	1.0						
overstory totals	**246.7**	79.4	39.4	36.2	20.9	20.1	18.7	9.3	9.2	5.3	4.8	2.8	0.7	0.0	0.0	0.0	0.0

STM=striped maple, OST=hop hornbeam, MLV=maple leaf viburnum, WHL=witch hazel

Short and long term expected conditions:

Both the short and long term desired condition is a forest composed of a more diverse variety of tree and shrub species than currently exists. The forest will have a component of all the current size classes present before treatment but the thinning will narrow the range of diameters and mold the stand structure into a healthier forest with increased growing potential for the residual trees. The commercial thinning will increase the proportion of valuable trees over the long term by concentrating the cutting on small to midsized trees in the UGS class. There will also be a dramatic decrease in the number of merchantable white ash trees in the forest. The forester intends to keep some of the pole sized ash trees as a seed bank if the emerald ash- borer doesn't kill all of them as is the predicted outcome for ash trees in our area. The prescribed treatment will result in a more diverse mixture of species (less ash) and make the stand more resilient to weather events or biological pathogens. Most of the smaller beech will be marked in the sale and may need chemical treatment to inhibit beech sprouts from dominating the understory as is currently the case in some areas.

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. Remove mature trees with spacing dictates that improve overall stand health and quality and decreases crown competition.
2. Remove all unacceptable growing stock in the small to midsize range with the exception of wildlife cavity trees and in keeping with residual stand goals.
3. Remove most of the ash (retain small diameter stems < 10") and all diseased beech trees.
4. Leave all snags, Exceptions for operators will be authorized to cut any snag which might create a safety hazard.

<u>Sale Layout and Harvesting Limitations</u>:

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. All significant stream crossings will be bridged with portable timber bridges or poled with DCR service forester approval. Smaller wetlands and intermittent draws will be crossed using on-site material as corduroy and with poled crossings.

Landings and Skid Roads

Two of the three landings are preexisting and have associated skid trail systems nearby. The new landing to be created is for the northernmost treatment area, unit 1, and is adjacent to the town road and an old dozer road used for dam construction. The necessary improvements will be outlined in the future timber sale contract. Skid trails labeled on the attached map may have minor relocations and adjustments made when the final cutting plan map is prepared.

Equipment Restrictions

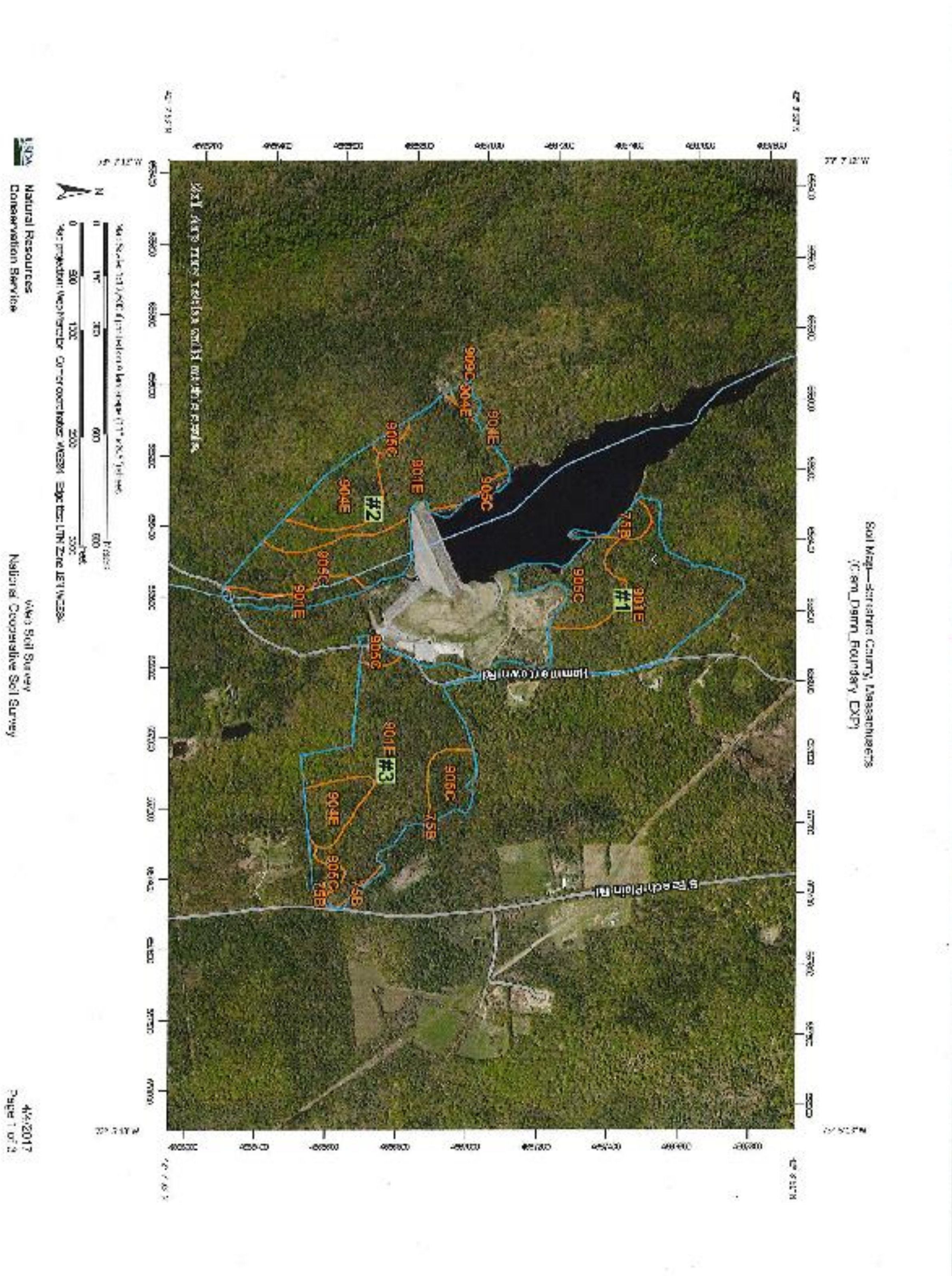
Restrictions on types of equipment used are not anticipated, but the size of equipment will have upper limitations. Equipment used in the harvest will be limited to machines having no more than 6 lbs per square inch of ground pressure.

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 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.
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 and to be felled will be marked with a blue X.


#1
#2
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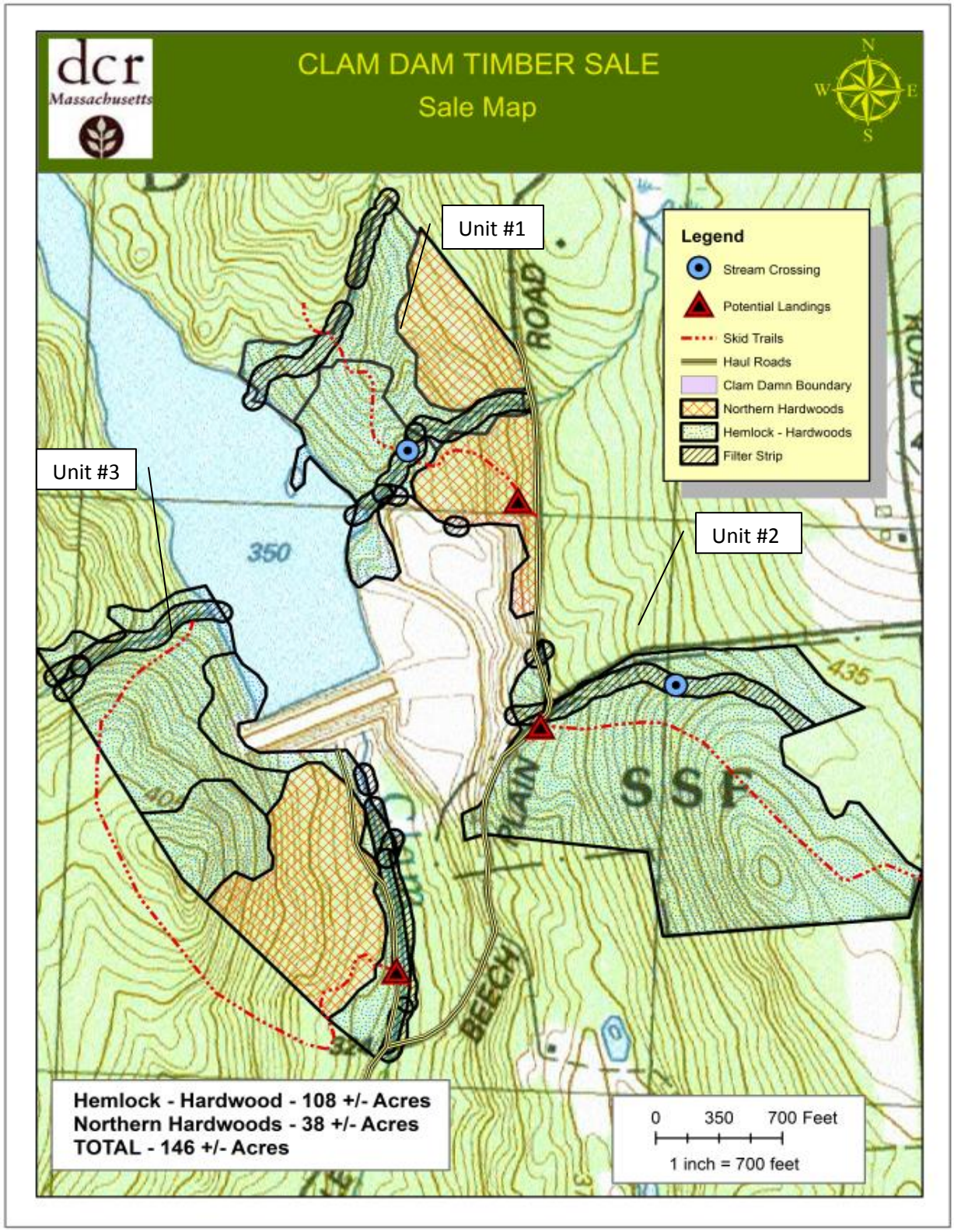
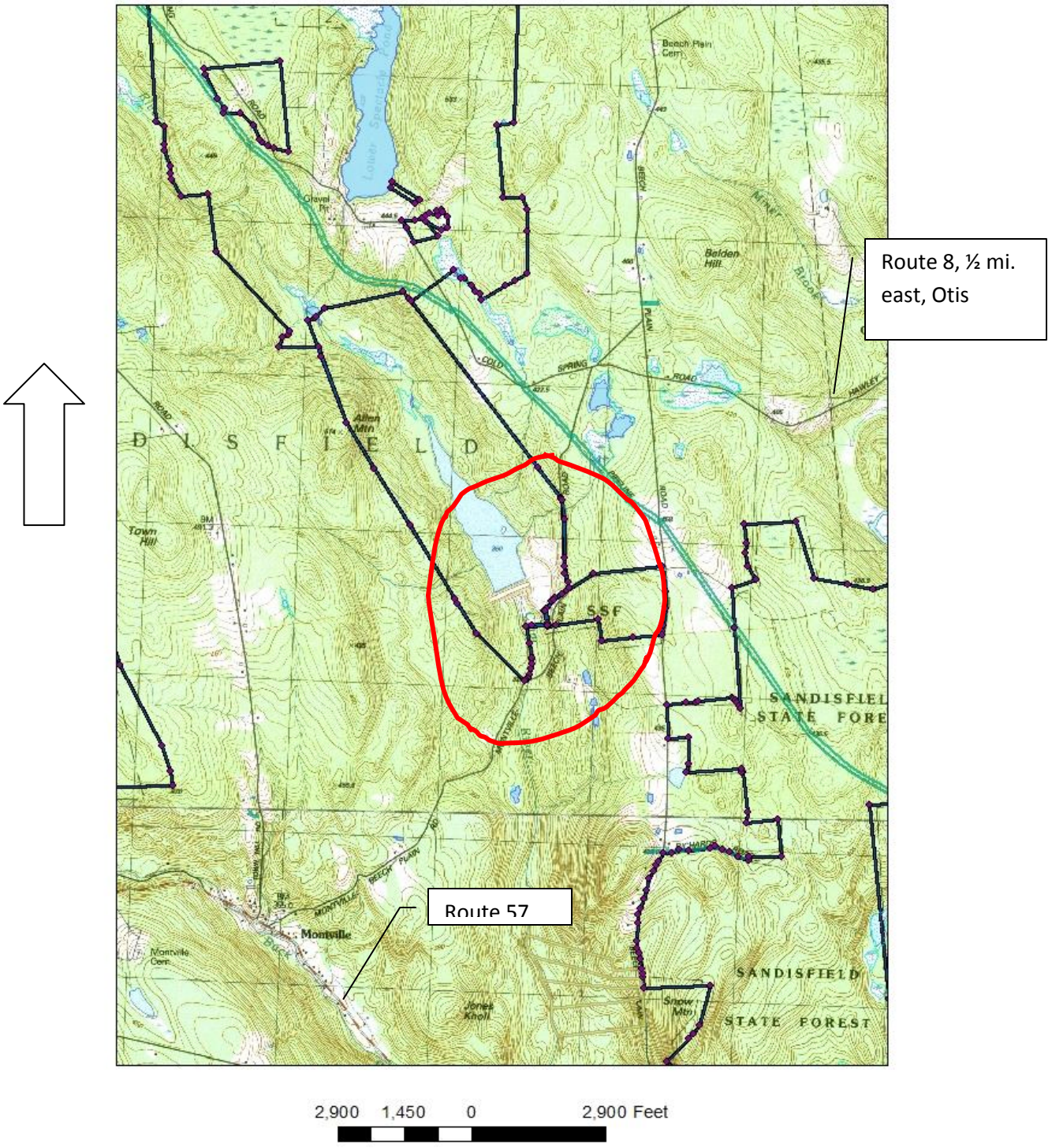
901E
904E
905C
75B
Natural Resources
Conservation Service
Web Soil Survey
National Cooperative Soil Survey

Soils Map


dcr
Massachusetts
CLAM DAM TIMBER SALE
Sale Map
N
W
E
S
Unit #1
Unit #2
Unit #3
Legend
Stream Crossing
Potential Landings
Skid Trails
Haul Roads
Clam Damn Boundary
Northern Hardwoods
Hemlock - Hardwoods
Filter Strip
ROAD
350
435
SSF
BEECH
Hemlock - Hardwood - 108 +/- Acres
Northern Hardwoods - 38 +/- Acres
TOTAL - 146 +/- Acres
0 350 700 Feet
1 inch = 700 feet



Locus Map Clam Dam Sale

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