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Silviculture Prescription
SE Home Fuelwood 2015

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Southeast
F. Gilbert Hills State Forest
Foxborough and Wrentham, MA

Prepared by:

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Approved by:

Management Forestry
Program Supervisor  Date: October 2, 2015

William N. Hill, CF

Background

The general area of the F. Gilbert Hills State Forest was used by colonial settlers mainly for firewood, timber, the manufacture of charcoal, and pastureland. These land uses supported a minimal forest cover into the mid to late 1800s. Brush fires were common in the late 1800s and early 1900s. The State Forest Commission, established in 1914, bought burned or cut-over lands for reforestation and forest improvement.

Foxboro State Forest began in 1926 with the purchase of 381 acres. The Civilian Conservation Corps (CCC) was active in the early years with a camp located near the present site of the forest headquarters. The CCC planted hundreds of thousands of trees in the state forest, but most were destroyed in subsequent wildfires. Water holes throughout the state forest were created by the CCC and are still in use today. The forest was renamed F. Gilbert Hills State Forest in 1969 after a dedicated state Forester. In the 1930s he produced a series of illustrative maps of many of the Department's properties.

The state forest consists of a variety of forest types including: mixed oak, northern red oak, Eastern white pine-oak, Eastern white pine –hardwoods, Eastern white pine, oak hardwoods, and shrub swamp. Currently the State Forest is approximately 1,037 acres.

Site Data

Geology and Landforms

The project area, like most of the state forest, consists mainly of thin till with pockets of shallow bedrock and rock outcrops. There is a small thick till section in the northwest corner of the project area. The project area is flat to rolling terrain with moderate slopes in the central and eastern sections. Glacial erratics are common.

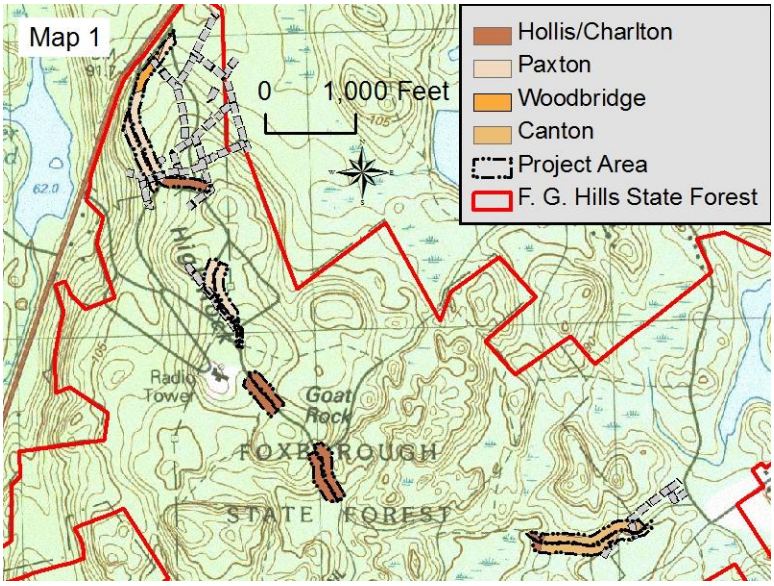
The F. Gilbert Hills State Forest is located in the Southern New England Coastal Plains and Hills ecoregion. The landforms of the ecoregion are irregular plains with low hills and some open high hills with relief of about 100 to 400 feet. Bedrock types are mostly granites, schist and gneiss. Historically, forests were dominated by a mix of oaks, American chestnut, hickories, other hardwoods, and some hemlock and white pine. Forests today are mainly central hardwoods with some transition hardwoods and some elm-ash-red maple and red and white pine. Many major rivers drain this area. (Swain and Kearsley 2011, Griffith et. al., 2009).

Climate

The yearly precipitation average from 1954 to 2014 of the DCR Foxborough rain gauge is 48.6 inches. Monthly precipitation averages range from 3.5 inches in July to 4.6 inches in December. The average January temperature is 27 degrees Fahrenheit, and the average July temperature is 72.5 degrees Fahrenheit (Hall et al. 2002). There were 67 hurricanes in New England that occurred from 1620 to 1997, averaging one storm every 6 years. The mean recurrence for southern coastal New England is 85 years for a storm capable of blowing down entire stands (Lorimer & White 2003).

Soils

Due to the project being a relatively narrow strip, soils are classified mainly as well drained to moderately well drained with areas of stoniness and rock outcrops having been derived from glacial till. The four main series are: Woodbridge; Hollis/Charlton complex; Paxton; and Canton (Map 1). The soil series are thick layers of fine sandy loam with the exception of the Hollis series being comprised of relatively shallow sandy loam (14" to 18") over bedrock. The frequency of flooding and ponding is none for all series (NRCS 2015).



Hydrology and watershed

The project area and the state forest as well fall in the Taunton River watershed. The state forest has many intermittent streams and scattered wooded and shrub swamps. The only water body is Sunset Lake located in the most eastern part of the state forest. Wetlands are not in the project area but are nearby.

Historical context

The home fuelwood program has occurred for several years and is based on the previous Cut-A-Cord program. The major difference is participants in the home fuelwood program have their own designated area, whereas in the Cut-A-Cord program participants cut trees in a more general area. The Cut-A-Cord program started back in 1915 (Foster, 1998) and also become popular during the 1970s energy crisis.

Site Description

The project area consists of 5 separate sections totaling 21 acres: 9 acres in the town of Wrentham; and 12 in the town of Foxborough. The sections range from 2 acres up to 5 acres. All sections are abutting High Rock Road and extend approximately 100 feet from High Rock Road. A small section, 25 feet from High Rock Road on either side of the road, exists at the intersection of High Rock Road and The Warner Trail. High Rock Road is the main east to west forest road of the State Forest. High Rock Road is paved from its western end abutting Route 1 for approximately 4,800 feet southeast to a small parking lot. Furthering east, High Rock Road is a gravel forest road. Elevation is approximately from 230 to 400 feet across the project area.

The dominant tree species observed within the project area are red oak (*Quercus rubra*), black oak (*Quercus velutina*), white oak (*Quercus alba*), black birch (*Betula lenta*), red maple (*Acer rubrum*), and eastern white pine (*Pinus strobus*). Much of the understory throughout the project area is dominated by eastern white pine, sassafras (*Sassafras albidum*), red maple, white oak, black oak, and black birch. Several past timber harvests have been conducted within several of the sections with the most recent occurring in 2000. Approximately 4.6 acres of the project area were within previous timber harvests. These timber harvests span from 1978 to 2000.

Parts of the State Forest is surrounded by the town of Foxborough conservation land. The Harold B. Clark Town Forest and Cocasset Brook Greenbelt are to the north, and the Wolf Meadow Conservation Area to the south.

Insects


Jon Yuschock, Bugwood.org

The 2015 Gypsy moth (*Lymantria dispar*) larvae feeding season was heavier than previous years and along with Winter moth (*Operophtera brumata*) the oak species within the project area and the state forest have had major defoliation. Winter moth and Gypsy moth are non-native species.

Tree species diversity, age class distribution, and overall health and vigor of forests and trees are affected by gypsy moth defoliation. During outbreaks, gypsy moth caterpillars often completely consume host tree foliage, causing trees to expend energy reserves to produce new leaves. Repeated defoliations in subsequent years weaken trees, leading to extensive areas of dieback and mortality, which permit other tree and plant species (including invasive plants) to grow and change the overall characteristics of the affected area. Oak species are the most highly favored hosts of the gypsy moth, and the impacts of gypsy moth outbreaks and defoliation on forest condition are particularly dramatic in oak-dominated forests. Localized mortality, growth decline, and reduction in wood quality can occur in oak stands (Fajvan and Gottschalk, 2012).

Cultural and Archeological Features

The project area had an archeological review and evaluation by DCR's archeologist. Stone walls are within or abutting the project area. Some small stretches consist of only base stones. A small section of granite outcrop with quarry marks was found during the stand exam. It will be flagged and along with stone walls, will be avoided during cutting operations.

Project Data

Forest Project Attributes

The overstory is composed mainly of northern red oak, black oak, eastern white pine, red maple, black birch, white oak, and scarlet oak (*Quercus coccinea*) (Table 1).

Table 1 Overstory (trees greater than 5" dbh)

Species	Relative density	Total trees/acre	Total basal area/acre	Percent basal area/acre by species	% AGS
N. Red oak	25.5	26.1	29.0	22%	80%
Black oak	25.1	42.0	30.0	23%	70%
E. white pine	19.7	102.0	44.8	35%	50%
Red maple	8.4	22.5	10.0	8%	38%
Black birch	6.4	27.5	7.1	6%	53%
White oak	4.6	20.4	4.8	4%	20%
Scarlet oak	0.9	1.5	1.0	1%	100%
Total	91.0	247.4	129.5	100%	60%

Having been cut over during the early part of the twentieth century the project area is mainly even aged. The project area is near being fully stocked having a relative density of 91. The total basal area was 130 ft^2/acre. The median overstory tree diameter is 12.0 inches. The trees in the most northern section nearest to Route 1 are approximately 100 years old. The other sections are approximately 70 to 80 years old. The understory is patchy and the most abundant tree species (based on stem count) are small saplings of Eastern white pine, sassafras, and red maple (Table 2). The median dbh of the understory was 0.5 inches and the median height was 8 feet. Other understory species include oak species, American beech (*Fagus grandifolia*), hickory (*Carya* sp.), and hop-hornbeam (*Ostrya virginiana*).

Table 2 Understory (tree less than 5" dbh)

	All species	E. white pine	sassafras	red maple	white oak	black oak	black birch	A. beech	hickory	hop-hornbeam
stems per acre	842.9	285.7	228.6	128.6	71.4	42.9	42.9	14.3	14.3	14.3
Basal area (sq.ft./ac)	7.6	4.0	2.5	0.2	0.2	0.1	0.4	0.0	0.3	0.0
relative density (%/ac.)	11.3	6.5	3.2	0.3	0.5	0.3	0.5	0.0	0.0	0.0
average dbh (in)	0.91	1.235	0.97	0.53	0.625	0.67	1.04	0	2	0.25

Shrubs cover 61 percent of the project area with a ground layer covering 26 percent. The major shrubs species are black huckleberry (*Gaylussacia baccata*) and lowbush blueberry (*Vaccinium angustifolium*). Other shrub species were highbush blueberry (*Vaccinium*

corymbosum), beaked hazelnut (*Corylus cornuta*), spicebush (*Lindera benzoin*), wild raisin (*Viburnum nudum*), winterberry (*Ilex verticillata*), maleberry (*Lyonia ligustrina*), and witch-hazel (*Hamamelis virginiana*). The ground cover tree species consists of Eastern white pine, sassafras, red maple, oak species, black birch, black gum (*Nyssa sylvatica*), American beech, and American chestnut (*Castanea dentata*). Non-tree ground species consisted of bellwort (*Uvularia sessilifolia*), Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), ferns, lady slipper (*Cypripedium acaule*), spotted wintergreen (*Chimaphila maculata),* wintergreen (*Gautheria procumbens*), grass, Indian cucumber root (*Medeola virginiana*), and partridgeberry (*Mitchella repens*). Vines present were poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and grape (*Vitis* sp.). Glossy buckthorn (*Frangula alnus*) was observed in two areas with a small number of stems in each area.

Wildlife Habitat Conditions

Tree tops will be left on site creating fine and coarse woody materials which are beneficial to a variety of insects and for nutrient cycling. Given the limited intensity and extent of the project, no substantial impacts on current wildlife habitat are anticipated. In the near term, songbirds may take advantage of the temporary canopy openings to forage for insects and other foods. Over time, production of acorns and other mast for wildlife will likely increase on retained legacy trees within the project area. Animals noted through observation or observed signs were deer, skunk, milk snake, garter snake, squirrel, snow fleas, and several bird species.

The Massachusetts Department of Fisheries and Wildlife (DFW) data indicate that forestland in the wildlife management zone 11 (Southeast Massachusetts) has approximately 15 white-tailed deer (*Odocoileus virginianus*) per square mile. This density of deer is close to the threshold of having negative impacts on native plant communities. Deer may have an impact on regeneration of hardwoods.

The Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines propose maintaining a minimum of a least 256 cubic feet of down coarse woody material. On average 205 cubic feet of coarse woody material (CWM) per acre were recorded in inventory transects. This material is greater than three inches in diameter and three feet in length. This volume of down coarse woody material may be lower than the surrounding areas of the state forest due to snags and down trees being removed along roadsides for safety concerns. Tree tops will remain on site to increase down coarse woody material.

Down woody material decomposes slowly, making it a long-term source of nutrients. Large pieces of down wood material, dead logs, serve as a seed bed for tree and plant species (Evans & Kelty 2010). Dead down woody material provides essential hiding and foraging habitat for at least 50 vertebrate species in New England (DeGraaf et al. 2006). Examples include: Ruffed grouse, many salamanders, snakes, voles, shrews, and mice.

The oak and eastern white pine overstory prevalent in the project area provides structural and forage features required as nesting and feeding habitat by species such as warblers and squirrels. Hardwoods provide hard mast (acorns and beech nuts) and soft mast/fruits, nesting structures, and snags required by wildlife species such as squirrels, blue jays (*Cyanocitta cristata*) and owls. Mast and fruits are high energy foods required by many wildlife species,

including many species of migrating songbirds where high energy sources are of key importance during fall migration. All shrubs were deciduous. Shrub cover provides essential breeding and feeding cover for species that utilize this vertical layer of habitat, including many songbirds and small mammals, such as Eastern Towhees, Deer mice (*Peromyscus maniculatus*), and Ruffed grouse. Woods roads provide openings, usually seeded to grass, sedge, and other herbaceous species, that provide additional sources of food (vegetation and insects) for wildlife, such as voles and wild turkeys (*Meleagris gallopavo*).

Throughout the stand there is an average of 9.1 snags per acre, with the majority being oak species. Snags help maintain populations of wildlife that require cavities. Snags grow lichen, mosses, and fungi which many small mammals forage. All existing snags will be saved. Exceptions may occur due to removing snags near trails and roads for public safety and for the safety of participants. Snags determined to be a threat to human safety will be cut and retained on site as coarse woody material. The Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines propose retaining a minimum of five snags greater than 10 inches in diameter.

Slash from the home fuelwood project provides low canopy hiding and nesting cover for songbirds and small mammals, such as hermit thrushes (*Catharus guttatus*) and rabbits. Slash also protects seedlings from browsing damage by deer when deer density exceeds levels where damage occurs. Removing existing competition from large living oak trees that have healthy crowns will help increase production of acorns for a variety of animals and lessen stress to increase vigor to help combat any future insect infestations.

Rare species

The project area is not within priority habitats of rare species as those published in the current 13th Edition of the Massachusetts Natural Heritage Atlas (http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/regulatory-maps-priority-and-estimated-habitats/natural-heritage-atlas-book.html).

Vernal pools and Wetlands

The project area is not within 300 feet of a certified or potential vernal pool according to the Natural Heritage & Endangered Species Program (NHESP) datalayers accessed September 10, 2015 and dated December 2000 respectively, available from MassGIS. Wetlands exist to the south of the project area for the two most eastern sections. They are approximately 25 feet to their nearest point. Massachusetts Forestry Best Management Practices concerning wetlands will be followed.

Recreational and Aesthetic Resources

The State Forest is supported by the State Forests Advisory Council. The council's mission statement is to assist the State Forest staff to maximize the recreational uses of the F. Gilbert Hills, Franklin and Wrentham State Forests. The council was established in 1987 to facilitate public participation in the management of the three state forests.

Cross-country skiing, geocaching, hiking, horseback riding, hunting, mountain biking, seasonal motorcycle riding, and snowmobiling, occur in F. Gilbert Hills State Forest. There are 23 miles of trails. A portion of the Warner Trail runs through the state forest. The Warner Trail is a long-distance trail starting in Sharon Massachusetts and travels more than 30 miles southwest to Cumberland, Rhode Island. One geocache exists within the project area.

A paved road, forest roads, and hiking trails are abutting or located within the proposed project area. The proposed forest management project will reduce the number of dead and dying trees that could potentially have an impact to travel on the adjacent forest road. There is minimum impact to recreational activities within the state forest. All work is done by hand with limited power equipment.

Existing legal trails will have 50' wide corridors, where home fuelwood activities will occur, and will be designed to promote large-diameter trees, forest structures, forest health, a safe recreation experience, and quality scenery. Slash within 25 feet of forest roads and trails will be managed to result in a light and natural appearing forest ground cover. Trees will be felled away from trails to minimize any residual damage.

In the final report of the Technical Steering Committee of the Forest Futures Visioning Process, scenic roads in Woodlands were recommended to have management guidelines to protect their integrity and scenic quality. High Rock Road is not a designated scenic road.

Evaluation of Data and Projected Results

Objectives

The proposed management activities are consistent with management guidelines outlined in the Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines. F. Gilbert Hills State Forest has been designated as a Woodland. Woodlands conserve a range of forest ecosystems, where recreation activities and sustainable forest management will continue.

The SE Home Fuelwood 2015 forest management project objectives are:

1. Provide local forest products to local residents.
2. Protect public safety through the proactive removal of dead, declining, and hazardous trees along High Rock Road.
3. Increase growth and vigor on large legacy trees.
4. Reduce the import of non-native insects by providing locally grown wood.

The areas were selected for forest management at this time because:

It offers an opportunity to demonstrate and fulfill objectives for DCR Woodlands. Among these objectives are:

1. The sustainable production of wood products,
2. To continue the home fuelwood program,
3. To provide a market for low quality wood.

Silvicultural Prescription

The forest in the project area is even aged consisting mostly of oak species and eastern white pine. The project area will be managed to favor the development of the more vigorous trees through their release from competition. The project area will be thinned or reduced by approximately 40 sq. ft. of basal area. Thinning is direct intervention in the allocation of site resources by eliminating some individuals and thereby adding to the competitive strength of the remaining trees. One of the main effects of thinning is to increase the vigor of the remaining trees by giving each tree more growing space. Increased vigor increases the tree's ability to respond to most insect attacks. Thinning can also be used to improve growing conditions to increase site resources (e.g. light, water, nutrients) and hence improve growth rates to residual trees after insect defoliation. (Smith et. al., 1997, Fajvan and Gottschalk, 2012).

Large tree distribution will be for the most part a dispersed distribution where individual trees are scattered across the stand area. An aggregate distribution may occur in areas with unique features, i.e. areas with large diameter trees, rocky outcrops, or patch of snags.

Hardwood tree species located within the project area will be selected for cutting due to their potential to reduce competition, increase growth on larger trees, increase mast production and to increase public safety. Trees that are suppressed, showing signs of decay or disease, and have smaller crowns will be targets to favor remaining canopy trees with large crowns and better form. All slash will be disposed of according to the Massachusetts Slash Law. Silvicultural recommendations from the GOALS planning process states a Home Fuelwood program could be used to improve the composition, growth, and quality of trees in mixed hardwood and mixed oak stands.

Desired and Expected Results

The retention of legacy trees will serve as future late-successional structure as they are left to grow, develop into snags, fall over and become large downed logs (D'Amato and Catanzaro 2009). The long term desired condition of the project area is the presence of healthy stems with large crowns providing mast for wildlife and a source for regeneration.

Future silvicultural treatments could increase oak regeneration and aid in the development of differences in tree sizes and multiple age classes through an irregular shelterwood system. The irregular shelterwood system allows one to manage on an ecosystem-based method to bring back the vertical and horizontal structural diversity once seen in northeast forests (Raymond et al. 2009).

Harvest Methods and Sale Layout

Participants in the program will pull up their vehicles alongside the forest road near their respective lots. They will cut marked trees with chainsaws and carry cut material back to their vehicles. Participants will be allowed to use wheel barrows to transport cut material to their vehicles. There will be no typical landing areas for home fuelwood lots. Only trees less than or equal to 16" at their base will be cut due to the chainsaw blade length of your typical home owner. Participants will be required to cut slash to no more than 2 feet above the ground. No slash will be permitted to remain closer than twenty feet from the outer edge of High Rock Road and existing legal trails in the project area.

Signs will be displayed to make the public aware of the sale area during the project. The state forest has an excellent network of paved and unpaved public and forest roads to easily enable access for this project.

Stone walls will be avoided during harvest operations by providing participants with maps if their respective lots contain stone walls. These limitations conform to cultural resource protection limitations by DCR's archeologist. The use of limited power equipment will keep limbs and tops in the state forest as whole tree harvesting will not be allowed. This will augment the existing coarse woody material amounts mentioned in the Wildlife section above.

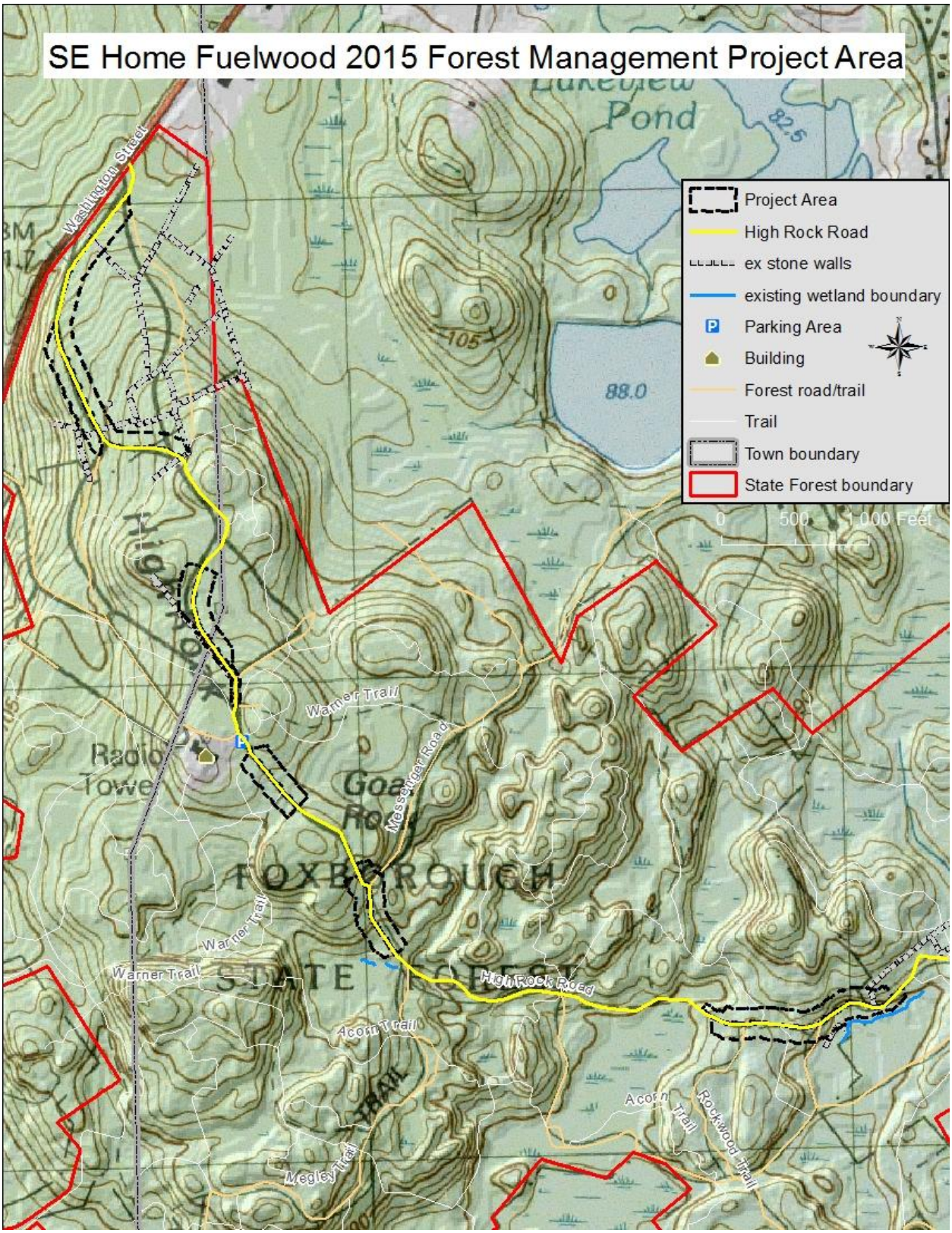
Prescription Documentation

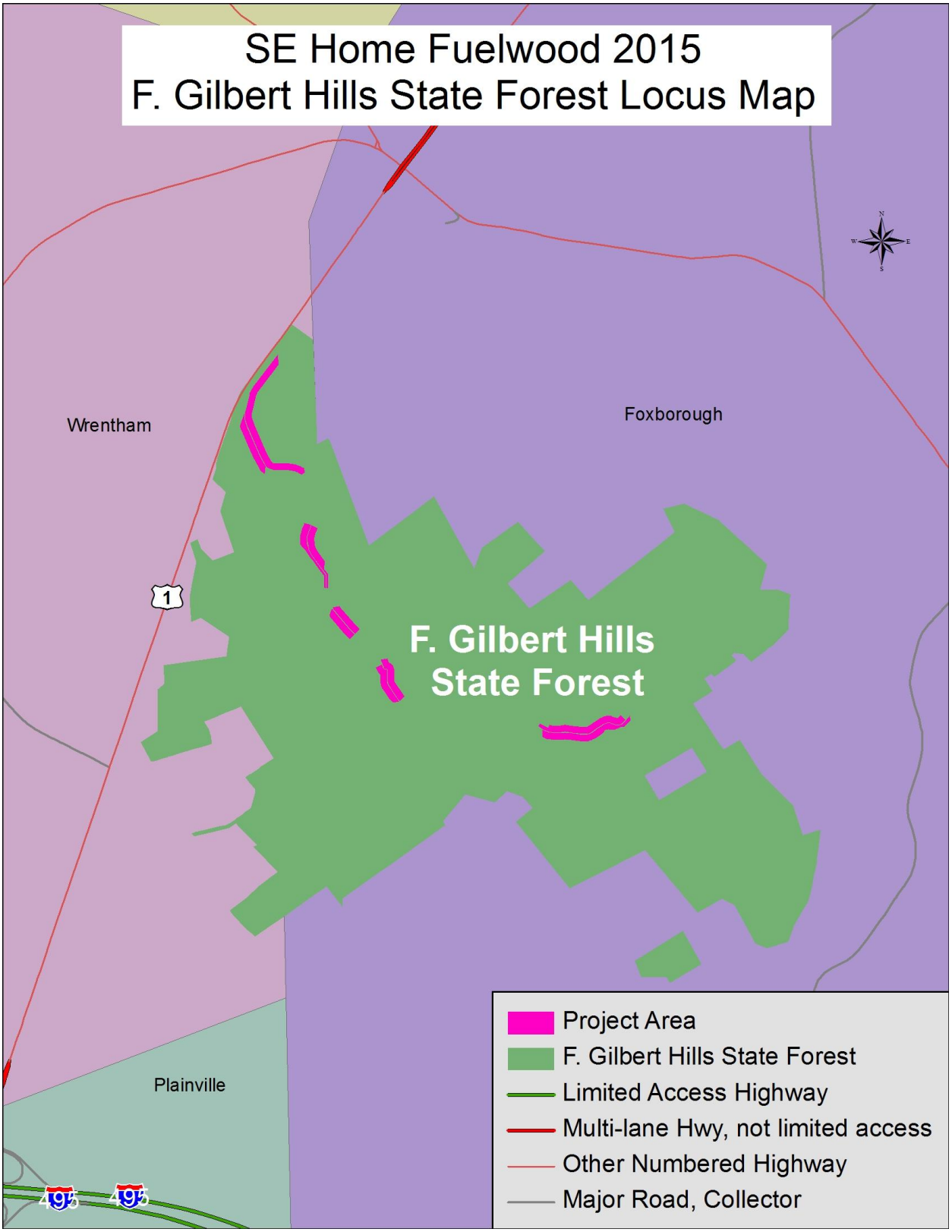
Timber Marking Guidelines

Tree marking is a management tool that allows foresters to achieve multiple benefits, such as maintaining an aesthetic appearance, providing habitat for wildlife, and maintaining and creating structural diversity. Trees will be designated for removal with the "Take Tree" marking method. Trees to be cut and/or removed will be marked/painted at breast height and stump. All other trees will be retained.

Firewood will be marked with a vertical line in blue or orange paint. Abutting lots with have different colored paint. The boundary of the forest management project will be flagged so as not to confuse participants. All trees to be cut will have a stump mark in blue or orange paint. The stump mark is to ensure only marked trees are being cut. Trees that pose a hazard, e.g. a dead tree along a road or trail, will be marked and will be removed. Trees will only be marked on the opposite facing side from High Rock Road to maintain aesthetics.

Trees with large crowns, good vigour, and low mortality risk will be chosen for retention. These trees will generally contribute to the future structure and quality of the stand by providing future mast and seed for regeneration. Existing snags, wildlife trees, and less common species, will be retained as well.


SE Home Fuelwood 2015 Forest Management Project Area
Project Area
High Rock Road
ex stone walls
existing wetland boundary
Parking Area
Building
Forest road/trail
Trail
Town boundary
State Forest boundary
0
500
1,000 Feet
Pond
Washington Street
Warner Trail
Messenger Road
FOXBOROUGH
STATE FOREST
High Rock Road
Acorn Trail
Rockwood Trail
Megley Trail
105
88.0
82.5


SE Home Fuelwood 2015
F. Gilbert Hills State Forest Locus Map
Wrentham
Foxborough
Plainville
1
F. Gilbert Hills
State Forest
Project Area
F. Gilbert Hills State Forest
Limited Access Highway
Multi-lane Hwy, not limited access
Other Numbered Highway
Major Road, Collector

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