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Silviculture Prescription

Myles Standish Complex Ten Year Pine Barrens Restoration

Year 1

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Southeast District
Myles Standish State Forest
Plymouth and Wareham, MA

Prepared by:

Paul Gregory – Management Forester – Southeast District
Massachusetts Department of Conservation and Recreation
194 Cranberry Rd. – P.O. Box 66, South Carver, MA 02366
paul.gregory@mass.gov – 508–866-2580 ext. 39372

December 18, 2018

Approved by:

Management Forestry
Program Supervisor _____ Date: January 3, 2019
William N. Hill, CF

The Year 1 units prescribed in this silvicultural prescription are part of a larger joint project with MassWildlife to restore nearly 2,400 acres of pine barrens across Myles Standish State Forest, the Camp Cachalot Conservation Easement, Maple Springs Wildlife Management Area, and the Southeast Pine Barrens Wildlife Management Area.

Background

In 1914, the State Forest Commission was formed to acquire and restore unproductive waste lands to commercial forests, to protect the soil, and regulate water flow. In 1916 the State Forest Commission purchased the 5,700-acre Game Sanctuary Association property, creating Myles Standish State Forest (MSSF). By the end of the 1920s, the state had purchased the majority of the land we now know as MSSF. Today, MSSF has approximately 12,437 acres, and is the largest public recreation area in southeastern Massachusetts.

As a result of colonial wood utilization and wild fires, most of the original forest was cleared and burnt over by the mid-1800s. The Massachusetts Game Sanctuary Association initiated reforestation efforts in 1912 by planting 30,000 white pines around Barrett Pond and East Head Reservoir (Rothman, 1996).

After acquiring the land the state continued the reforestation program over the next 40 years. With the help of state unemployed crews and Civilian Conservation Corps crews in the 1930s, approximately 1.9 million white, red, Austrian, jack and Scots pines, spruce and other species were planted in the forest between 1916 and 1937.

MSSF itself has had its share of wildfires. Over 50% of MSSF has seen a wildfire since becoming a state forest in 1916. A large wildfire occurred in 1964 around Charge Pond burning over 6,300 acres. Year 1 units were part of this wildfire.

Site Data

Geology and Landforms

The project area, like most of the state forest, consists mainly of glacial outwash sands. The project area is flat to rolling terrain.

Myles Standish State Forest is located in Cape Cod Coastal Lowland & Islands Ecoregion. This region was formed by three advances and retreats of the Laurentide ice sheet. The resulting terminal moraines. outwash plains, and coastal deposits characterize the area with their sandy beaches, grassy dunes, bays, marshes, and scrubby oak-pine forests. There are numerous kettle hole ponds, swamps, and bogs. Much of the surface water is highly acidic.

Climate

The climate of MSSF is more moderate than inland areas because of its proximity to Cape Cod Bay and Buzzards Bay. Spring and summer temperatures are somewhat cooler than inland areas, favoring outdoor recreation. Winter temperatures are slightly warmer with less snow accumulation as the ocean slowly cools in autumn. Average monthly temperatures range

from approximately 32.0°F in January to 68.9°F in July (Aizen and Patterson, 1995). In general, annual precipitation ranges from 42 to 50 inches, with peaks typically in early spring and mid to late fall. Variations in precipitation from year to year can cause drought or flooding with as much as a five-foot variation in the water table level. The growing season ranges from 146 to 174 days, but within topographic depressions (i.e., frost pockets) frost can occur throughout the year (Epsilon, 2001).

Soils

Year 1 units' soils are sandy and excessively well-drained coarse sands. Rain percolates too rapidly through the sandy soils to be fully available to plants. The soils were derived from the outwash plain from the Laurentide ice sheet. The thin layer of organic topsoil in the coarse sand is a limitation to the number and type of plant species that will grow in this area. However, there are specialized plants well adapted to this dry, sandy substrate.

Hydrology and watershed

The water resources of Myles Standish State Forest are dominated by groundwater-related features such as kettle hole ponds and vegetated wetlands. Rainfall is rapidly absorbed into the sandy soil, contributing to the underlying aquifer, and relatively little water results in surface runoff. The groundwater table can be seen in the various kettle hole ponds that intersect the aquifer within the forest. Fifty-eight kettle hole ponds ranging in size from approximately one to 86 acres are located within MSSF. Twenty-one of these ponds are named and 37 ponds are unnamed and relatively small in size (typically less than three acres) (DCR, 2011). No ponds or wetlands are in close proximity to the year 1 units.

Potential Vegetation

Year 1 units are populated with the native forest species of southeastern Massachusetts. Pitch pine (*Pinus rigida*), eastern white pine (*Pinus strobus*), red pine (*Pinus resinosa*), white oak (*Quercus alba*), and red maple (*Acer rubrum)* were found. The majority of existing shrub species present in year 1 units are scrub oak (*Quercus ilicifolia*), black huckleberry (*Gaylussacia baccata*), and low bush blueberry (*Vaccinium angustifolium*).

Site Productivity

The sandy, excessively well drained soils as described above have very low productivity. The extraction of timber from the MSSF area for ship building, fuelwood, and charcoal with repeated burning of the landscape for nearly 3 centuries reduced the forest cover to pitch pine and scrub oak which significantly reduced the ability of the forest to build soil "capital".

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). This analysis found that 53% of the Myles Standish ranks in the lower 1/3 and 82% ranks in the lower ½ of the productivity scale created from the analysis.

Cultural and Archeological Analysis

No known or significant historic or archaeological resources exist in the project area as reviewed by DCR's archeologist.

Stand Data

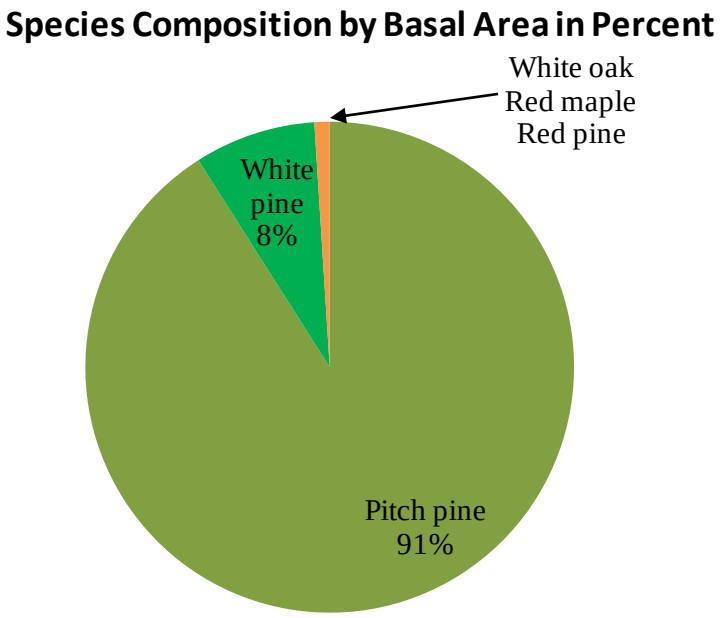
Forest Stand Attributes

Year 1 units consists of 211 acres of upland forest comprised mainly of pitch pine (Table 1 and Figure 1). The forest in this project area is approximately 54 years old as these units were burned over in the 1964 wildfire. There are a total of 179 overstory trees per acre of which 172 are pitch pine. The project area has a relative density of 71. Relative density is defined as the number of trees actually in a stand divided by the maximum number of trees of that average size that could exist (Smith, et al., 1997). As relative density increases, competition between trees increases, leading to mortality of some trees as the growing space is occupied by fewer trees typically of larger size. The total basal area is 57 ft^2/acre. The median overstory tree diameter is 9.2 inches.

Table 1 – Stocking Diagnostics for Year 1 units

Species	Total trees/acre	Total BA/acre	% BA/acre by species	Relative density
Pitch pine	171.9	51.9	91%	68.6
White pine	5.1	4.6	8%	1.8
White oak	1.6	0.6	1%	0.6
Red maple	0.3	0.1	<1%	<0.1
Red pine	0.3	0.1	<1%	<0.1
Total	179.2	57.2	100%	71

Figure 1. Stand Species Composition for Year 1 units.



Wildlife Habitat Conditions

Year 1 units are within priority habitats of rare species. The pitch pine-scrub oak barrens within MSSF provide habitat for a diversity of state-listed animals and plants, including 13 species of moths and butterflies: Barrens Daggermoth (*Acronicta albarufa*), Frosted Elfin (*Callophrys irus)*, Gerhard's Underwing Moth (*Catocala herodias Gerhard*), Melsheimer's Sack Bearer (*Cicinnus melsheimer)*, Slender Clearwing Sphinx Moth (*Hemaris gracilis*), Barrrens Buckmoth (*Hemileuca maia*), Buchholz's Gray (*Hypomecis buchholzaria*), Coastal Swamp Metarranthis Moth (*Metarranthis pilosaria*), Pink Sallow Moth (*Psectraglaea* carnosa), Pine Barrens Speranza (*Speranza exonerate*), Pine Barrens Zale (*Zale Lunifera*), Pine Barrens Zanclognatha (*Zanclognatha martha*) and one other moth species*; two tiger beetle species: Purple Tiger Beetle (*Cicindela purpurea*), and one other tiger beetle species*; and two species of plant: Reed Bentgrass (*Calamagrostis pickeringii*) and New England Blazing Star (*Liatris scariosa* var. *novaeanglia*). * Natural Heritage and Endangered Species Program (NHESP) does not publicly reveal the name or location of this species in property-specific documents.

Most of these barrens species rely on habitat with an open vegetation structure, such as scrub oak shrublands and heathlands. A few of the “barrens” species prefer even more open habitat, perhaps more accurately described as savanna or sandplain grassland. Per the 2007 Biodiversity of Myles Standish State Forest report from NHESP, pine barrens management it is a

high priority to improve and maintain habitat quality for pine barrens species, and to reduce the potential for wildfire.

Myles Standish State Forest is also an Important Bird Area as designated by Mass Audubon. An Important Bird Area is a site providing essential habitat to one or more species of breeding, wintering, and/or migrating birds. The state forest is a significant breeding site for the regional high conservation priority species such as: Whip-poor-will, Brown Thrasher, Prairie Warbler, Eastern Towhee, and Field Sparrow, all of which will benefit from the proposed treatment.

Refer to pages 165 to 179 of the Massachusetts Wildlife Action plan at: https://www.mass.gov/service-details/state-wildlife-action-plan-swap. This document provides detailed description of animals found in Pitch pine-Oak Upland forests.

Water Resources

No wetland resources occur in the year 1 units. Year 1 units are not within 100 feet of a certified vernal pool according to the NHESP datalayer downloaded December 17, 2018 available from MassGIS.

Recreational and Aesthetic Resources

Basketball, bicycling, boating, canoeing/kayaking, dog walking, fishing, geocaching, hiking, horseback riding, hunting, nature study, picnicking, running/jogging, skiing- cross-country, snowmobiling, snowshoeing, swimming, and volleyball occur in Myles Standish State Forest throughout the year.

Several forest roads and the Charge Pond Loop hiking trail are abutting or located within the year 1 units. These roads and trail will be closed during mulching activity. Legal trails will be reestablished once the unit is treated.

Tree density will be significantly reduced to promote native pitch pine, scrub oak, and shrubs. As mulching of the forest canopy will occur, the resulting landscape will have a dramatic change in appearance from a high density forest to a more open woodland and shrubland savanna.

To minimize adverse aesthetic impact to recreational users of the area, all forest roads and the hiking trail will be cleared of all debris following operations. Given the objective to reduce most of the tree canopy there will be no retention of road or trail buffers.

Forest Protection Concerns

Southern pine beetle (*Dendroctonus frontalis* Zimmermann) is expanding its range north to include Massachusetts. Southern pine beetle (SPB) is a primary tree killer (i.e., attacks and kills healthy trees) and is responsible for widespread tree losses throughout the southeastern U.S. In Massachusetts, it has been repeatedly captured in detection traps at low numbers since 2015. No infested trees have been located in Massachusetts (as of June, 2018) even though large areas of susceptible hosts exist in the southeastern portion of the state.

Large losses in pitch pine forests have been documented over the last decade in the New Jersey Pinelands, and in the Central Pine Barrens on Long Island since 2014. SPB infested trees were also located at several locations in Connecticut in 2015. The multi-generational SPB forms infestations (commonly referred to as "spots") that expand during summer months and can quickly proliferate in dense stands of host trees from only a few trees to hundreds or thousands of trees in one summer. Within only a short period of time an entire stand can be killed by SPB. Its ability to quickly kill large numbers of healthy trees makes it an imminent threat to pine forests.

> "Pine barrens ecosystems, especially those that have gone unmanaged, are at particular risk to SPB infestation. The combination of restricted species distributions, SPB's ability to quickly kill overstory trees, and lack of pine regeneration in many of these stands makes the future of these forests uncertain. Natural resource managers responsible for hard pine stands should consider SPB as a near-term threat when developing management plans. Stand structure objectives of maintaining pine barren habitats are generally in line with reducing SPB hazard and include thinning and prescribed fire to open canopies and reduce understory competition…Aggressive management of SPB is needed, and should include suppression efforts and proactive stand management where appropriate."(Dodds et al. 2018)

Evaluation of Data and Projected Results

Objectives

The principal objective is to complete ecological restoration of pitch pine and scrub oak natural communities. These communities are often referred to as 'pine barrens', and this silvicultural prescription is also designed to reduce hazardous fuel loads and thereby reduce the risk and/or spread of wildfire. Pine barrens are globally rare, fire-dependent, shrub dominated communities with scattered trees and occasional openings, occurring on dry, poor, sandy soils. They provide habitat for many rare species. Future prescribed burning will be employed to maintain these unique communities. Human effort to exclude fire in these pine barrens over the past half-century has favored the development of dense tree canopies of pitch pine and white pine, and has favored the growth of white pine over pitch pine and scrub oak in some areas.

The project was selected for forest management at this time because:

- For pine barrens management it is a high priority to improve and maintain habitat quality for pine barrens species, and to reduce the potential for wildfire – as discussed in the 2007 Biodiversity of Myles Standish State Forest report from NHESP;
- The (draft) Myles Standish Planning Area Fire Management Plan recommends implementing fuels reduction around campgrounds at Charge Pond to restore pine barrens habitat and the reintroduction of fire to help achieve habitat restoration goals;
- It will build upon previous pine barrens restoration work on the Southeast Pine Barrens WMA and the Camp Cachalot Conservation Easement;

- High fuel loads exist in close proximity to the Charge Pond campground.

The project endeavors to:

- Use a combination of mechanical fuel reduction and prescribed fire to restore native pitch pine-scrub oak barrens, to provide habitat for a diversity of endangered species as well as common species;
- Reduce fuel loads;
- Demonstrate harvesting techniques and silvicultural operations that restore native communities; and
- Fulfill management approaches for Reserves as directed by the Forest Futures Visioning Process (2010) and subsequent Management Guidelines (2012). From page 20 of the Guidelines "…Fire adapted Reserves in Southeastern Massachusetts may require active restoration and management to maintain habitat for rare species and reduce the risk of catastrophic wildfire that can threaten human health and safety."

Silvicultural Prescription

The primary silvicultural goal is to restore and maintain native pitch pine and scrub oak natural communities with a focus on a savannah condition of individual, larger diameter, full-crowned pitch pine trees in the overstory with a dense understory of scrub oak and other native shrubs. The pitch pine-scrub oak barrens are a disturbance dependent globally rare ecosystem. This ecosystem depends on disturbance, historically fire, to maintain its open structure. To that end to sustain the function and two storied structural composition of the pine barrens, reduction in overstory density through mowing operations followed by prescribed burns are needed.

This will be accomplished through targeted mowing/mulching in place of pitch pine, white pine, and occasional hardwoods to achieve an approximate 70 -80% reduction in tree canopy cover. The largest diameter, most full-crowned pitch pine will be retained.

From page 22 of the Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines (2012) "Habitat manipulation, silvicultural treatments and commercial harvesting operations are not permitted in Reserves. However, if deemed appropriate by DCR and reviewed by the Forest Reserves Science Advisory Committee (FRSAC), the following exceptions may be allowed: a) Implementation of NHESP recommendations to restore, maintain or enhance habitat for rare and endangered species and exemplary natural or rare communities." The FRSAC has reviewed and approved this action.

The secondary goal is to reduce the fuel load thereby reducing the wildfire danger and enabling the application of prescribed fire. The resulting savannah condition will be maintained with disturbance generated from prescribed fire and mechanical mowing.

Specifications

Any and all trees less than 14" in diameter at breast height (dbh) not marked or otherwise identified for retention will be mowed to within 1" of the ground. Trees greater than or equal to 14" dbh will be cut at 15-20' high, with tree boles left standing and tops mulched in place. These trees will provide habitat for a variety of animals including many invertebrates and birds. Shrub cover greater than 4' in height will be mowed to within an inch of the ground. Portions of the shrub canopy less than 4' tall will not be treated. Mowing of tall shrubs will lessen the fire danger during follow up treatment of prescribed burns.

The canopy will be thinned to approximately 20-30% cover, with retained canopy trees being comprised of pitch pine and tree oak. Spacing between retained overstory trees will range from approximately 30-60 feet between trunks whenever feasible. Tree oaks will be favored for retention. Pitch pine retention will focus on large, fullest-crowned trees. All white pine, red maple, and red pine will be mowed/mulched in place.

To facilitate future prescribed burning, fuel breaks will be established as part of the year 1 mulching project. For unit 1-a, a 32 ft fuel break will be created on the west and south sides of the unit. A 16 ft fuel break along Haynes Road will be created on the east side of unit 1-a. There exists a small strip of trees between Haynes Road and the gas line. Expect in portions near the Charge Pond campground, this strip will be mulched in place to reduce fire danger and firefighter safety. For unit 1-b, all sides of the unit will have a 16 ft fuel break except for the northern line which will have a 32 ft fuels buffer. Maple Springs Road and Spring Road will have a 16 ft fuels buffer on both sides within unit 1-b. All trees and shrubs greater than 1' in height will be mowed to within an inch of the ground level for the fuel breaks. In addition, trees greater than or equal to 14" dbh that are within 100' of a road, or fuel break will be cut.

Desired and Expected Results

The desired future condition is an open canopy of large pitch pine and tree oaks above a dense understory of scrub oak, heath, and interstitial grassy glades. This will allow for the safe application of prescribed fire. The project will directly reduce wildfire risk to Charge Pond campground.

Figure 2a – Pre mulching example

Figure 2b - Post mulching example

Anticipated Future Treatments:

This project will promote regeneration of pitch pine, scrub oak and heath vegetation. Future silvicultural treatments will be prescribed burning, mowing, and a combination thereof to kill white pines that typically regenerate in such areas and to stimulate sprouting and growth of native shrubs. Active management using these methods will be planned in coordination with NHESP and done at variable frequencies and intensities to encourage a mosaic of pine barrens, shrublands, and woodland communities. DCR has applied for a US Forest Service Wildfire Risk Reduction grant to mitigate fuel loads within the Charge Pond Campground.

Logging System Requirements

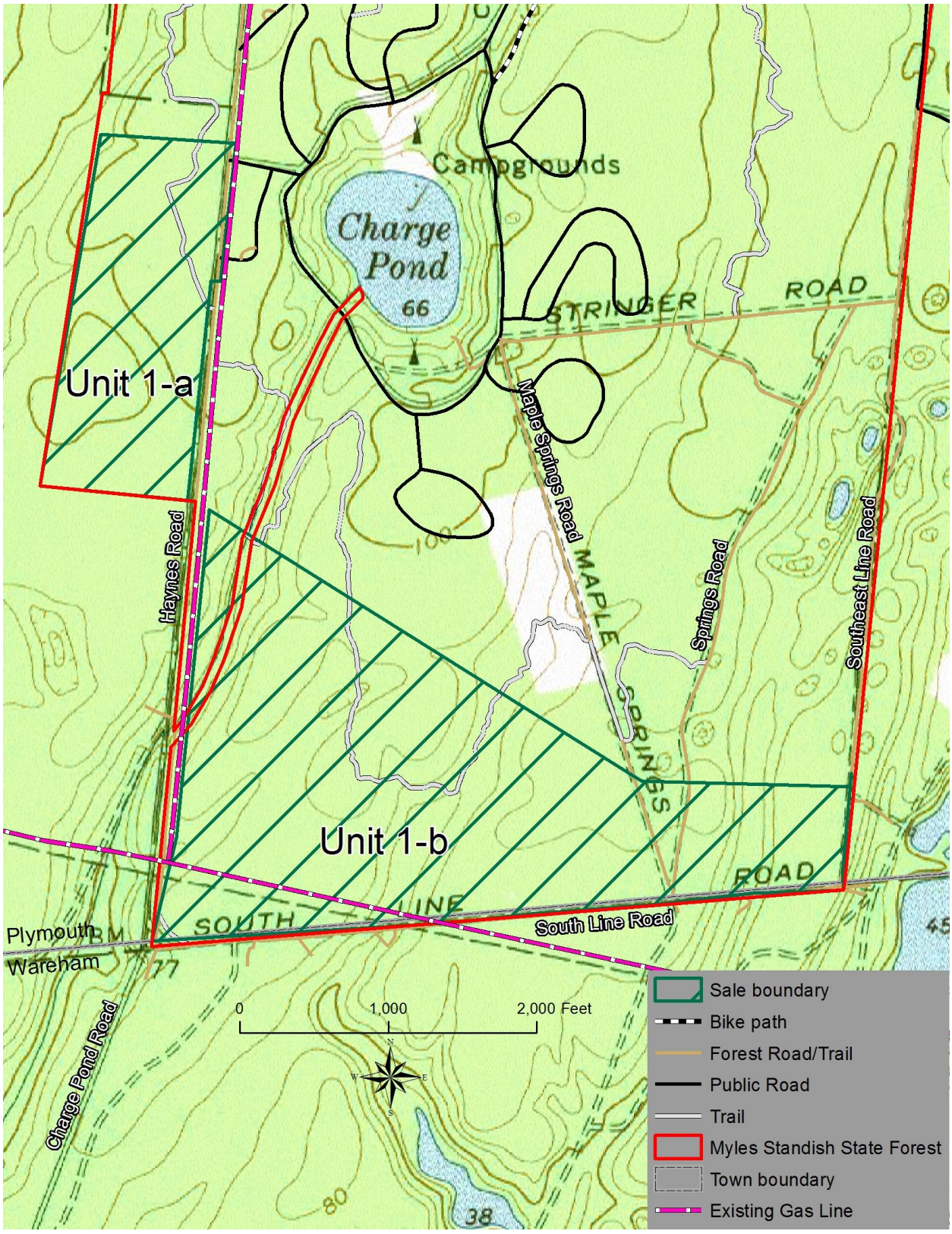
In order to facilitate post-treatment prescribed burning, resulting mulch from the mulching operations will need to consist of shredded, non-compacted woody material (generally <3" deep) that will minimize packing and will maintain air space to promote drying and decomposition. A Fecon-type mulching head on a rubber-tired tractor is the preferred type of equipment for mulching stems up to about 6" dbh, and a forestry mulching head mounted on a tracked excavator is the preferred type of equipment for mulching stems greater than 6" dbh. Use of a tracked chipper is prohibited as the product produced by this equipment is not optimal for implementing prescribed fire post treatment.

Prescription Documentation

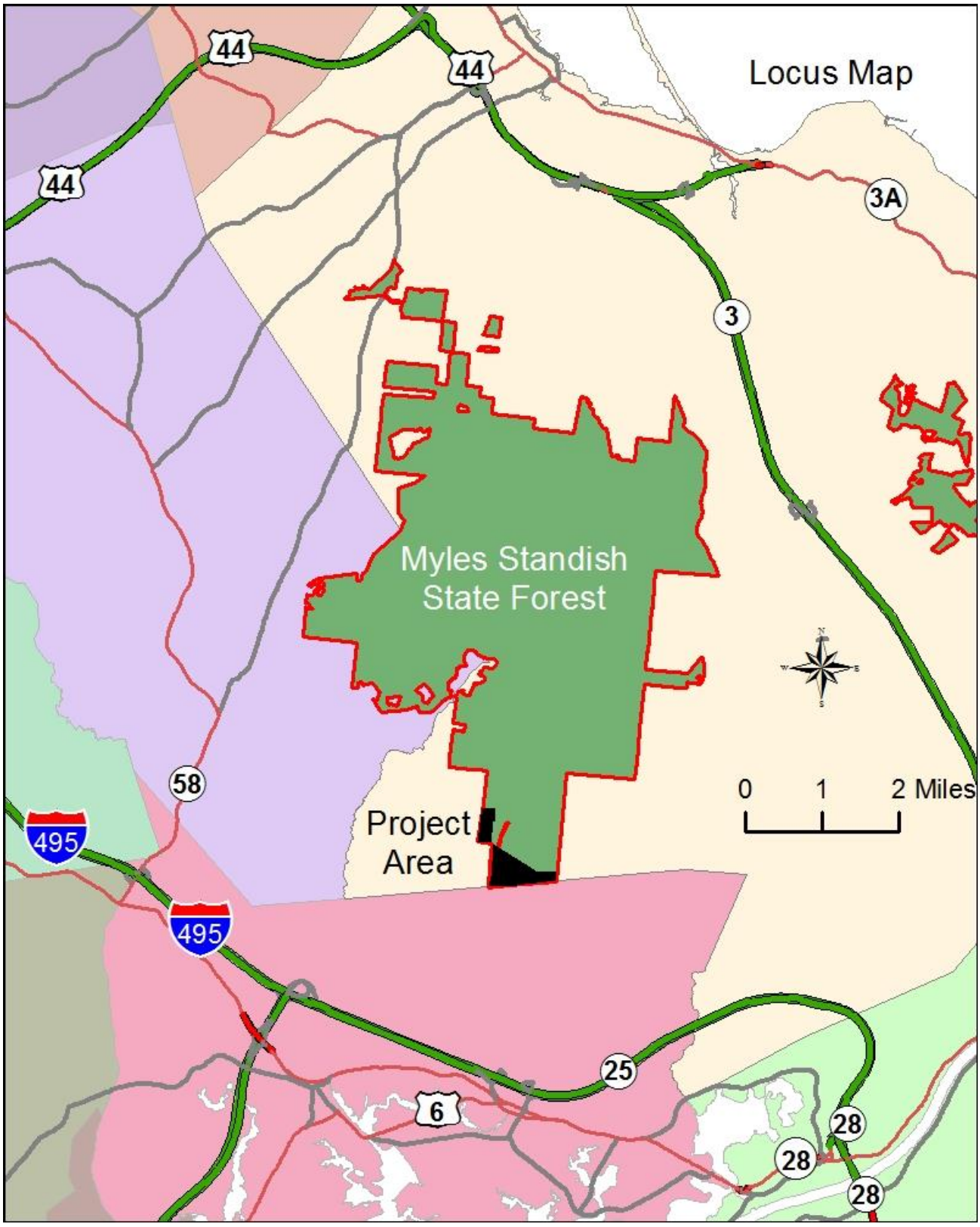
Timber Marking Guidelines

A portion of the trees will be designated for removal with the "Save Tree" marking method. Trees to be retained will be marked/painted with red paint to provide the contractor with familiarity of what spacing and size of trees to be retained across the units. All other trees will be mulched in place.

Myles Standish Complex Ten Year Pine Barrens Restoration Harvest Map Year 1



Myles Standish Complex Ten Year Pine Barrens Restoration Locus Map Year 1



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