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Silviculture Prescription
Hadley Aiken Lot

Massachusetts Department of Conservation and Recreation
Bureau of Forestry

Mid State District
Templeton State Forest – Hadley Aiken Lot
Templeton, MA

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Approved by:

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Program Supervisor _____ Date: May 2, 2014

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SITE DATA

Cultural and Historical

The Hadley Aiken lot is part of the Templeton State Forest complex and is located in the western half of the town of Templeton. It is a conglomeration of several parcels that were acquired by the state over the past 100 years, resulting in a fairly irregularly shaped parcel of land. To the south it is bound by Route 2, and the remainder of the abutters includes the Templeton Developmental Center (TDC) owned by the Commonwealth of Massachusetts Department of Developmental Services to the northwest, private ownership to the south, northeast and southwest, and the United States Army Corps of Engineers to the southeast. It is believed that this parcel remained active as agricultural land until it was planted in the early part of the 20th century.

The condition of the Hadley Aiken lot is a function of its past use and disturbance. Historically speaking, this property has undergone significant agricultural use, forest cutting/clearing and abandonment followed by reforestation plantings. In this case red pine (*Pinus resinosa*) was the primary species used along with scotch pine (*Pinus sylvestris*) and eastern white pine *(Pinus strobus)*. The intent was to periodically thin these plantations in order to maintain a stand of healthy vigorous trees with the ultimate goal of harvesting for wood products. After decades of neglect, many of these plantations have stagnated and become susceptible to diplodia tip blight (*Sphaeropsis sapinea*), a fungus, and red pine scale (*Matsucoccus resinosae*), an insect. The three stands present in this particular harvest differ mainly due to harvesting activity that has taken place within the last 30 years.

Cultural resources that have been located within the project area are almost entirely limited to a series of stonewalls, some delineating the state forest boundary and some interior walls that line old farm roads. A water hole that was constructed by the CCC is located in the western portion of the property. All cultural features that have been identified will remain intact and undisturbed.

Geology and Soils

The terrain varies dramatically throughout the harvest area, containing slopes that range from slight to very steep and plateau shaped landforms called kames. The western portion of the harvest area is dominated by an east facing slope, which levels out to a relatively flat area located in the southwestern corner of stand 3. The eastern half of this harvest area is where the kame landform exists. These kames resulted from glacial deposits and resemble the shape of a small plateau; bearing moderately steep slopes on all sides and being relatively flat on the top. There are three kames with slopes ranging from 15% to greater than 50%. The stand delineation in this portion of the harvest area is dictated by the past management which was greatly affected by the landforms present. The steepest slopes present are east facing and located on the far eastern boundary. These slopes exceed 50% slope and will not be harvested.

The property is underlain by an outwash plain of mostly droughty soils that varies from moderately well drained to excessively well drained. Harvesting operations will only take place where the soils are suitable for the use of machinery. The use of harvesting equipment will be limited to specified crossings where soils are described as poorly or very poorly drained; otherwise the use of machinery will be prohibited within areas where wet soils exist. There are five soil types that make up the upland portion of the project area which will support harvesting operations. Additionally there are two soil types which are located in the project area that underlie wetlands which will not support harvesting operations. The

different soil types present within the project area span multiple stands. The soil descriptions and maps were derived from the NRCS Web Soil Survey (see Soils Map).

The majority of the project area is underlain by the Colton gravelly loamy sand. This soil type is divided into 4 groups based on slope (282B = 3 to 8 %; 282C = 8 to 15%; 282D = 15 to 25%; 282E 25-35%). Despite the difference in slope the soil properties are identical across the 4 groups. This is an excessively well drained, deep soil (being more than 80 inches to a restrictive feature), which has a very low available water capacity that is comprised of sandy and gravelly glaciofluvial deposits derived from granite. It encompasses nearly 50% of the total harvest area, much of which is located in stands 2 and 3, and the northern portions of stand 1. The next most prevalent soil is the Allagash fine sandy loam (281B = 3 to 8% slopes; 281C = 8 to 15% slopes) which encompasses over 20% of the total harvest area. This soil type is well drained with a depth that ranges from 15 to 35 inches and is primarily located in stand 1. The Becket-Monadnock association (900E = 15 to 45% slopes) is located only in stand 3 and encompasses approximately 16% of the total harvest area. Being an association, this soil is comprised of two major soil types. Both soil types are well drained and moderately deep with a low available water capacity. Particularly noteworthy is the Monadnock soil which has 9% of its surface area covered with cobbles, stones, or boulders. The less prevalent soil types include the Croghan loamy fine sand (284A = 0 to 3% slopes; 284B = 3 to 8% slopes), which is moderately well drained and is more than 80 inches deep with a low water capacity and is partially located in stand 3. Adams loamy sand (280B = 3 to 8% slopes) is described as being an excessively drained, very deep soil (more than 80 inches) that has a low available water capacity and is present in stands 1 and 2.

Lastly, the Bucksport and Wonsqueak mucks (59A = 0 to 3% slopes) is another association of two major soil types. The Bucksport soil is a very poorly drained, deep soil (more than 80 inches), which has a very high available water capacity. The Wonsqueak soil is described very similarly, with the only difference being in the parent material and profile. Both soils are derived from highly decomposed herbaceous organic material, with the Wonsqueak soil having a layer of gravelly fine sandy loam where the Bucksport soil does not. This soil underlies the wetlands on the edge of the project area. The soils map delineates a small portion of stand 3 as Bucksport and Wonsqueak muck, although ground conditions are upland and dry throughout the year. The Searsport loamy sand (28A = 0 to 3% slopes) is a very poorly drained, very deep soil that has a low available water capacity, which is comprised of a shallow layer of highly decomposed plant material lying on loamy sand. It is located underneath the larger wetland located centrally within the project area.

Site Productivity

Soil productivity varies greatly throughout the harvest area, but seems to favor the development of upland plant species communities which are suited for these droughty soil types (USDA-NRCS). The two most prominent soil types, Colton gravelly loamy sand (50% of harvest area) and Allagash fine sandy loam (21% of harvest area) support the growth of white pine in comparison to other species. The Colton gravelly loamy sand has a site index of 62 for eastern white pine, 61 for sugar maple (*Acer saccharum)* and 52 for red pine. The Allagash fine sandy loam has a site index of 72 for eastern white pine, 71 for red pine, and 52 for white spruce (*Picea glauca*). The Becket-Monadnock soil follows the same trend, with a site index of 69 for eastern white pine, 60 for sugar maple, and 71 for paper birch *(Betula papyrifera)*. The less prevalent soils that are well drained favor the growth of eastern white pine over any other species, while the poorly drained soils support more of a spruce/cedar/fir forest type. The overall average for the entire harvest area for eastern white pine is about 64, where as other species were much lower.

The DCR Management Guidelines of 2012 state that forest stands will be "classed… and considered for silvicultural treatments that generally fit their productivity, structural complexity (or potential thereof) and diversity". As analysis of stands 1-3 of the Hadley Aiken site history (land use; agriculture/logging) and conditions (soil types, productivity; vegetation cover) suggests that these even-age lower complexity stands on poorer soils led themselves to even-age management (Goodwin and Hill, 2012).

Climate

For this area, the United States Department of Agriculture's Natural Resource Conservation Service (USDA-NRCS) gives a mean annual temperature between 43 and 54 degrees Fahrenheit with a mean annual precipitation between 45 and 54 inches annually. The National Oceanic and Atmospheric Administration (NOAA) more specifically states that the mean annual temperature of this project area is 47.9 degrees Fahrenheit with a mean annual precipitation of 42.78 inches. There have been no significant disturbances of the project area due to weather. The December 2008 ice storm caused minimal crown damage to overstory trees.

As is typical for New England, wind and therefore weather patterns in Massachusetts vary greatly from season to season and even day to day. It is typical in the summer and spring for winds to come from the southeast and southwest. It is common for weather patterns to come down from the north and northeast in fall and winter. These weather patterns can contain both high or low pressure systems and any form of weather historically common to New England. Weather can be a major disturbance in this area of Massachusetts. Hurricanes, wind and ice have had major impacts on this landscape in the past and will continue to do so in the future.

Hydrology and Watershed

The Hadley Aiken lot is located in the southern portion of the Millers River Watershed. This watershed encompasses nearly 310 square miles and is located in north central Massachusetts, extending slightly into southern New Hampshire. The headwaters of the Millers River are located in Ashburnham, MA and the river continues through several towns including Winchendon, Royalston, Athol, among others, and westward until it reaches the Connecticut River, which flows into Long Island Sound. The harvest area lies within fairly close proximity to two tributaries to the Otter River which is itself a tributary to the Millers River. The closest of which lies just east of the harvest boundary and is referred to as Trout Brook. This is fairly slow moving stream with a predominantly muddy bottom and is considered as priority habitat for the wood turtle by the Natural Heritage and Endangered Species Program (NHESP). No harvesting activity will take place within the priority habitat zone. This stream flows in a northerly direction eventually meeting Crow Hill Brook, prior to reaching the Otter River two miles north of the harvest area. The other stream is located north and west of the harvest area and is referred to as Crow Hill Brook. This stream flows in a northeasterly direction eventually meeting Trout Brook, which flows into the Otter River.

There are several water resources located within close proximity to, as well as within the harvest area boundary. A large mixed species wooded swamp lies in the western portion of the state forest. This system consists of a series of wetlands, both large and small that flow south and east across varied topographical conditions. In some cases, the system narrows into stream channels. As an example, a stream crossing in stand 3 to access a small, 6 acre patch of red pine will be implemented (see Harvest Map). Also in stand 3 are two potential vernal pools. The western most pool is drained by an

intermittent stream that flows southward and eventually fans out. There is another large mixed wooded swamp located centrally in the harvest area along the edges of stands 1 and 3. A perennial stream connects both of these larger wetland systems (see Harvest Map). Another stream crossing in stand 3 will utilize an existing crossing underlain by a metal culvert. Two additional crossings will depend on the access of tractor trailer trucks to the landings and will be highly dependent on operator preference. Both of these crossings are existing and are underlain by culverts. Either one or the other will be utilized; it is unlikely that both will be needed. All stream crossings will comply with the latest version of the Massachusetts Forestry Best Management Practices Manual (BMP's). The stream crossing in stand 3 to access the small section of plantation is the only crossing which will need to be installed. It will be temporarily bridged and corduroy will be placed at the approaches on each side of the stream to help stabilize and protect the stream banks. The crossing will be pulled and the stream banks will be stabilized and restored to a non restricted flowing state upon completion of harvesting activities.

All actions taken within a watershed will have some impact on the water quality, rates of flow, sedimentation and several other factors pertaining to hydrology. Full consideration has been given to impacts that this particular timber harvesting operation will have within the Millers River Watershed. No more than 50% of the basal area will be harvested within 50 feet from the edge of any stream or wetland. There will be no harvesting in wetlands. Appropriate measure will be taken in order to mitigate and prevent erosion (i.e. water bars, seeding, slashing of skid roads, etc.). Slash will be left on site not only to provide nutrients to the soil and habitat purposes, but to also slow overland flow of water and to promote percolation of water into the soil.

Current Vegetation

Currently this site is dominated by red pine which was planted by the CCC. It is most likely that CCC Camp S-63 (Company 1102) planted these trees. This particular camp was established at Otter River in 1934 and their initial projects included forestry, road construction and water hole establishment for fire protection (Berg, 1999). The plantation is mature, fully stocked and has stagnated in growth. These stand conditions often bring about a higher susceptibility of disease and infestation. Red pine scale and diplodia tip blight often infest and infect declining stands of red pine and is capable of causing mortality within one growing season. Red pine plantations have faced mortality regionally from these causes in southern Massachusetts, the Quabbin Reservoir and Bear Brook State Park in New Hampshire. Diplodia tip blight is present in the plantation on red pine trees. Although mortality is not occurring widespread from this fungus at this time, if red pine scale infests the plantation, widespread mortality of red pine is likely to occur.

Three forest stand types have been differentiated within the greater plantation due to current species composition and size class from past silvicultural practices or lack thereof. The most common overstory species are red pine and eastern white pine. Other associated species include Scotch pine, red maple (*Acer rubrum*) and Northern red oak (*Quercus rubra*) (see Harvest Map).

Stand 3 is the most structurally diverse stand within the plantation. The southwestern portion was thinned heavily in 1984 and the remainder in 1988 along with all of stand 1. Because of these thinnings, regeneration is the most prevalent in these areas. White pine and mixed hardwood saplings and poles are common throughout stand 3. Patches of white pine saplings and seedlings are found throughout stand 1. Stand 2 has never been thinned and lacks structural diversity throughout. The ground species are for the majority associates of upland forest communities. Wood ferns (*Dryopteris spp.)*, lowbush blueberry *(Vaccinium angustifolium)*, highbush blueberry (*Vaccinium corymbosum)*, trailing arbutus

(*Epigaea repens)*, northern dewberry *(Rubus flagellaris)* and sheep laurel (*Kalmia angustifolia*) among others are common in the ground layer throughout the project area.

STAND DATA

Stand Descriptions

General

There are three stands in the project area which will be treated, totaling 159 acres. Each stand is structurally even aged. There is no presence of rare, threatened or endangered species located within the project area. As mentioned, a check with the NHESP reveals that a priority habitat area for wood turtle occurs in the eastern portion of the property. This area will not be harvested at this time.

Hiking and hunting are major uses of the project area and the state forest. Illegal off road vehicle (ORV) use has become seriously problematic, resulting in woods road and trail degradation. Severe erosion has occurred as a result of this illegal use. The project area will be closed to the public during active logging hours for safety reasons. Directional felling along the trails in the project area will be made to prevent trees from impeding recreational use. Removal of potentially hazardous trees to aid in public safety will be implemented.

Stand 1

Stand 1 is a 47 acre red pine stand located in three separate locations that are most exclusively the top of kames in the eastern portion of the project area. This stand was thinned in 1989. This treatment is the only thinning done in this part of the plantation since it was planted. The dominant overstory species is red pine. Eastern white pine, scotch pine, red maple and northern red oak also occur in the overstory in lesser amounts (Appendix, Table 1). This stand is roughly 80 years old. Using the red pine stocking chart (Benzie, 1977), the stand is currently overstocked (at the A line), with 189.2 square feet of basal area per acre of which 92% consists of red pine. The average stand diameter is 11.6 inches. Growth response from the 1989 thinning is very minimal suggesting that in 1989 the plantation had stagnated in growth or was beginning to stagnate. The overstory is very uniform and consists of co-dominant trees. There are few trees in the stand that exhibit a dominant crown class. The 1989 thinning removed the majority of trees from the intermediate and suppressed size classes.

Regeneration occurs in the understory throughout most of the stand. Areas that were thinned heaviest have the highest density of growth. White pine seedlings and saplings are the most dominant with some patches of mixed hardwood saplings associated. This includes Northern red oak, red maple, black cherry (*Prunus serotina*), gray birch (*Betula populifolia)* and American beech (*Fagus grandifolia)* (Appendix, Table 2). Red pine seedlings and saplings do occur in areas with full sun. Ground species present in this stand are associated with upland forest ecosystems and include mostly lowbush blueberry, Canada mayflower *(Maianthemum canadense),* northern dewberry, trailing arbutus and brackenfern *(Pteridium)*, among others. Eastern white pine seedlings account for 42.83% of the total ground species along with 13.94% of red maple, 5.58% of northern red oak and lesser amounts of eastern hemlock (*Tsuga canadensis*), American beech, black cherry and gray birch (Appendix, Table 3).

There were no snags inventoried in this stand. There is an estimated volume of 102.8 cubic feet per acre of coarse woody debris in the stand (Appendix, Table 4). A large wooded swamp abuts a small portion of stand 1 on the western side. No more than 50% of the basal area within 50 feet of the wetland will be harvested (see Harvest Map).

Stand 2

Stand 2 is 36 acre red pine plantation that is located primarily along the slopes of the kames located in the eastern portion of the project area. Unlike the majority of this plantation, this stand has received no previous treatment since planting and is currently overstocked with a basal area of 250 square feet per acre (Benzie, 1977). The mean stand diameter is 10.4 inches with 407 stems per acre. The dominant species present is red pine, which consists of 98% of the total overstory basal area, with an occasional occurrence of eastern white pine (Appendix, Table 5). The close proximity at which these trees were planted (5 feet by 5 feet) and the lack of thinning through the years has resulted in a high level of competition and crowding, leaving the overstory trees with thin crowns and stagnated growth. Mortality can be seen throughout the stand due to these close growing conditions and high level of competition which has allowed for limited amounts of regeneration to take hold.

There is regeneration present throughout the stand despite the minimal availability of sunlight to the forest floor. Small patches of standing dead red pine and small disturbances have allowed for the regeneration of several species, including predominantly red pine and eastern white pine, with occurrences of northern red oak, red maple, American beech, gray birch and eastern hemlock (Appendix, Table 6). The majority of this regeneration is located where disturbances and overstory mortality have allowed for an increase in sunlight, as well as along roads where breaks in the overstory exist. Ground species present in this stand are associated with upland forest ecosystems and include mostly trailing arbutus, brackenfern, Canada mayflower and lowbush blueberry. Eastern white pine seedlings account for 65.06% of the ground layer along with red maple, northern red oak, gray birch, American beech and red pine in very small amounts. Glossy buckthorn is also present in this stand and is considered an invasive species (Appendix, Table 7).

There are 68 snags per acre in this stand, all of which are red pine. Approxiamtely 51 snags per acre are in the <6" dbh size class and 17 snags per acre are in the 6"-12" dbh size class. There is an estimated 186.60 cubic feet of downed woody debris (Appendix, Table 8). There are no wetland resource areas in stand 2 (see Harvest Map).

Stand 3

Stand 3 is a 76 acre red pine – white pine stand that is located along the western side of the project area. This southwestern portion of the stand was heavily thinned in 1984 and the remainder was thinned in 1989 along with stand 1. The dominant overstory species are red pine and white pine. Red maple and northern red oak also occur in the overstory in lesser amounts (Appendix, Table 9). This stand is roughly 80 years old. Using the red pine stocking chart (Benzie, 1977), the stand is currently overstocked with 198.8 square feet of basal area per acre of which 79.7% consists of red pine and 10% consists of white pine. The average stand diameter is 12.6 inches.

Growth response from the thinning in 1984 and 1989 are most discernible in this stand. The regeneration present in the understory is abundant and diverse. Patches of white pine seedlings, saplings and small poletimber are present throughout the stands understory. Mixed hardwood saplings are also present including black cherry, paper birch, red maple, American beech and northern red oak (Appendix, Table 10). Eastern white pine seedlings account for 35.7% of the ground layer and red maple at 14.4%. Other species occurring in lesser amounts include northern red oak, black birch (*Betula lenta*), black cherry, gray birch and American beech. Ground species present in this stand are associated with upland forest ecosystems and include mostly lowbush blueberry, Canada mayflower, Northern dewberry, trailing arbutus and wood ferns among others (Appendix, Table 11).

There were 21 snags per acre tallied in this stand. There is an estimated volume of 92.37 cubic feet per acre of coarse woody debris in the stand (Appendix, Table 12). Two large swamps, two potential vernal pools, an intermittent stream and a perennial stream are associated with stand 3. No more than 50% of the basal area will be harvested within 50 feet of any of these resources. An existing stream crossing will be utilized and a temporary stream crossing will be used in stand 3 (see Harvest Map).

EVALUATION OF DATA AND PROJECTED RESULTS

Project Objectives

There are several overall objectives of this project:

1.) Demonstrate even age silvicultural regeneration management techniques to prepare an even aged plantation of red, white and scotch pine for the regeneration of a mixture of native tree species including white pine, hemlock and deciduous hardwoods that are associated with upland forest ecosystems.
2.) Release advanced regeneration of native tree species present in portions of the plantation which have undergone past forest management.
3.) Increase vegetative diversity and structural complexity within the project area to include an assortment of native plant species including native shrubs and herbaceous plants.
4.) Demonstrate harvesting techniques and BMP's that protect forest productivity, soil and water resources.
5.) Address illegal ORV use by using project revenues and contractual requirements to repair damage to roads and trails and to prevent future damage from occurring, including gate installations and movement of existing gates for better functionality.
6.) Provide a small supply of timber to the sawmill at Otter River State Forest for in-kind use to repair the park buildings and other infrastructure at the Otter River State Forest and Lake Dennison campgrounds and day use areas.

Silvicultural Prescription and Desired Results

Stand 1

Stand 1 will undergo the second stage of a three-stage even aged shelterwood regeneration system. The purpose of this cutting is to thin the overstory so that more light can permeate to the understory and ground layers to partially release advanced regeneration which became established from past treatments as well as establish new regeneration. Maintaining the right amount of shade from the overstory is essential to the survival of germinating and existing seedlings, particularly for white pine which is moderately shade tolerant. The operator is to disturb wherever possible the ground conditions to bare mineral soil which will better enable white pine seedlings to become established. This will also be beneficial for some hardwood tree species, particularly oak, to seed in. Advanced regeneration will be protected where present. Glossy buckthorn is present in this stand. The forester will hand pull as much glossy buckthorn as possible prior to the harvest. Post harvest monitoring will take place to delimit the presence and any spread of this invasive species.

To help guide the management decisions in this stand, reference was made to the red pine stocking chart (Benzie, 1977). Stocking charts are developed based on intensive long term research of a species and can help make decisions based on stand density and growth within a stand. The stocking chart informs the forester if a stand is overstocked (A level), fully stocked (B level) or understocked (C level). Stand 1 stocking is currently above the A level, or overstocked. The objective is to reduce the basal area

by, on average, 110 square feet of basal area per acre. This will bring the basal area down to about 80 square feet per acre from 189 square feet per acre. Small crowned, poorly formed trees will be targeted for removal while maintaining the healthiest and best formed overstory trees. Trees that exhibit defects will also be targeted for removal.

The short term desired future condition is to increase the amount of light to the understory to partially release advanced regeneration, provide an opportunity for new regeneration to become established and to begin the process of removing the overstory. Greater vertical complexity and species diversity will be attained through this thinning by encouraging the growth of healthy native tree and shrub species, especially encouraging deciduous hardwoods and eastern hemlock where present.

Stand 2

The main objective in this stand is to establish a new age class by encouraging regeneration, as well as improve growing conditions for the current overstory. This will be achieved by implementing a commercial thinning, where the less vigorous trees will be selected for removal. This treatment will be the first stage of a three stage shelterwood system. The intent of this first harvest is to increase the amount of light in the understory to establish adequate regeneration of desirable species, as well as improve vigor and growth rates to the remaining overstory trees.

The current basal area of 250 square feet per acre will be reduced by about 50%, leaving approximately 125 square feet per acre. The gaps created in the canopy will have a multitude of effects on the forest, including the increase in available nutrients, light and growing room. Advanced regeneration will be protected where present. Glossy buckthorn is present in this stand. The forester will hand pull as much glossy buckthorn as possible prior to harvesting operations. Post harvest monitoring will be implemented to delimit the presence and any spread of this invasive species

The short-term desired future condition of this stand is a predominantly red pine overstory, with large enough gaps in the overstory to allow for increased regeneration. Although fairly sparse throughout the stand, the advanced regeneration that is present will accelerate in growth and attribute to an increase in species diversity. In the long term, with the majority of the advanced regeneration being white pine, it is very likely that white pine will eventually take over as the dominant overstory species in this stand. Several red pine legacy/reserve trees will remain scattered throughout the stand and it is anticipated that scattered occurrences of hardwood species (such as red maple, red oak, black cherry, etc.) will eventually seed in and account for a small component of the overstory species mix.

Stand 3

Similarly to stand 1, this stand will undergo the second stage of a three stage shelterwood treatment. This initial cut will allow for increased growing room for the residual overstory trees as well as aid in the establishment of a new age class of overstory species. The main objective is to reduce the current red pine density and encourage increased species diversity, while selectively removing specimens that exhibit poor form and vigor to improve overall stand health.

The current basal area of 198 square feet per acre will be reduced to approximately 80 square feet per acre, with the main focus being the removal of red pine. Minimal white pine trees will be harvested, only those exhibiting poor form and vigor. The residual white pine trees will remain as a seed source for future regeneration.

The desired future condition of this stand is a healthy overstory consisting of predominantly red and white pine, with scattered occurrences of hardwood species, such as red maple, red oak, black cherry American beech, and paper birch. The regeneration present is dominated by white pine and red maple, which lends itself to a predominantly white pine stand in the future. Several red pine legacy/reserve trees will remain scattered throughout the stand attributing to overall stand diversity as well as providing and preserving a historical element in regards to past land use.

Logging System Requirements

This harvest will be completed using a fully mechanized operation and will be limited to the use of a cut to length harvester/processer. Skidding will be accomplished using either skidders (grapple or cable) or forwarders or a combination of both. This type of harvesting equipment allows for a level of efficiency that is well suited for processing low value products. It is especially well suited for operating in plantations. Previous harvesting operations on this property utilized whole tree harvesting (WTH) systems, which can severely limit the amount of slash and coarse woody debris left behind. The cut to length system will allow for increased levels of slash and woody material to be left on site, effectively replenishing nutrients to the forest soil, providing cover and habitat for wildlife and mitigating erosion by slowing the overland flow of water.

The minimum goal for downed woody debris to be left on site is 256 ft^3 per acre as directed by current Management Guidelines (Commonwealth of Massachusetts, 2012), which will be easily achieved using the above described system. Currently all three stands are below this threshold with stand 1 having approximately 102 ft^3 per acre, stand 2 having approximately 186 ft^3 per acre and stand 3 having approximately 92 ft^3 per acre.

The slopes in stand 2 will be subjected to minimal equipment operation due to the highly erodible soils. This harvest area is subject to an abundance of illegal ORV use, which will exacerbate erosion, especially on these steeper slopes. It is required that the majority of skid roads created on these slopes and within the harvest area be blocked in attempt to curb ORV use. Only main truck roads will remain open post harvesting.

Due to the soil types that underlay this project area, it is planned that at least 3 cords, or 384 cubic feet per acre of downed woody debris is to be retained. This material will include portions of cull logs and lopped tree tops from processing. The ability to efficiently maintain these levels of downed woody debris will be easier with a cut to length logging system than if a WTH system is used.

At the time of writing of this prescription, access to the lot for the removal of wood products is still being determined and discussed. Access by either the TDC or via a right of way to Route 2A is being evaluated. Access through TDC would utilize 3,370 feet of a legally discontinued county road (formerly Church Road) that connected Route 202 to Templeton Center when Route 2A was not yet established as it appears today. The roadway will need to be upgraded for use of a tractor trailer truck including gravel placement to increase the grade of the road and stabilize the road in some sections. Historically, this road was the main access route to the Hadley Aiken lot. Its upgrade would be advantageous to state officials and local emergency medical services. If used, a gate will be installed along Route 202, with a small parking area for hunters and other state property users for parking (see Harvest Map).

Marking Guidelines

General

1.) The perimeter of the harvest area will be marked on trees with three horizontal lines and will be retained.
2.) The edge of the treatment area will be marked on trees with double horizontal lines and will be retained. This includes all buffer and filter strips.
3.) A leave tree marking system will be implemented for all species. Trees having a single horizontal line marked at breast height are to remain uncut. Trees located within the harvest perimeter and that remain unpainted are designated for removal.
4.) Skid roads will be flagged and painted.
5.) Marked areas will protect pockets of advanced regeneration where appropriate.
6.) Red pine trees are priority for removal followed by white pine and then associated hardwoods that are present in the stand.
7.) Trees which exhibit excellent form, regardless of species and size class will be retained to encourage species diversity.
8.) Trees targeted for removal will be poor in health and vigor, have obvious defects such as crook, sweep, excessive limbiness, decay, epicormic branching and multiple leaders or are suppressed.

Stand 1

1.) This stand will be thinned from a basal area of 200 square feet per acre to an average basal area of 80 square feet per acre. Effort will be made to maintain an even spacing. Trees to be released and retained should be those that are in the dominant and co-dominant size class that exhibit large and healthy crowns and are wind firm.

Stand 2

1.) This stand will be thinned from a basal area of 250 square feet per acre to an average basal area of 125 square feet per acre. Effort will be made to maintain an even spacing. Trees to be released and retained should be those that are in the dominant and co-dominant size class that exhibit large and healthy crowns and are wind firm.

Stand 3

1.) This stand will be thinned from a basal area of 198 square feet per acre to an average basal area of 80 square feet per acre. Effort will be made to maintain an even spacing. Trees to be released and retained should be those that are in the dominant and co-dominant size class that exhibit large and healthy crowns and are wind firm.

EXPECTED RESULTS

General

The expected results of the intended treatments for stands 1, 2 and 3 have been simulated using a software program created by the United States Forest Service (USFS), called NED-2 and a beta version of NED-3. These software programs assist in making sustainable forest management decisions by allowing the land manager to create goals, analyze inventory data and simulate hypothetical management treatments. These simulations are hypothetical and are being used as a guide and may vary given the more realistic conditions in the field. They were run without any other scheduled treatments in the future. Graphic visualizations of what these stands look like were derived from the Stand Visualization

System (SVS) which can be used in conjunction with NED-2 and NED-3 to generate images based on current and simulated stand conditions.

NED and SVS do not model the understory, particularly non-tree vegetation. The expected result in all three stands will be an increase in shrub and ground species growth, particularly those species that are already present in the understory and on the property. The increased light and growing space of these shrub and herbaceous species will enhance their growth and will over time aid to overall species diversity within the stand as well as the structural complexity of the harvest area.

Stand 1

Immediately after the harvest, several conditions in the stand will have changed. There will be an obvious increase in the amount of growing space in the stand. The basal area and relative density will be lower. This will allow for more growing space for overstory trees which were retained, additional growing space and increased light availability for any regeneration which will become established in the understory and for advanced regeneration that is already present. The residual mean stand diameter will be drastically lower due to the removal priority of red pine. However, diameter size of the residual trees will slowly begin to increase throughout the stand, especially for white pine, red maple and northern red oak. It is anticipated that abundant seed will occupy the soil in 2 to 5 years after this treatment.

In twenty years after treatment (2035), it is anticipated that another treatment would be scheduled. Using reserves, this treatment would be the second stage of the two staged shelterwood method. The stands basal area and relative density will have increased and appear similar to the pre-treatment condition in 2015. The major difference however will be that the relative density of red pine will be significantly lower and the density of white pine will have increased. Diameters for all species will have increased dramatically also. There will be an overall higher inclusion of white pine growing in the stand at this time. In comparison to the stocking condition pre-treatment in 2014, when there was a large amount of smaller stems, the stand will have a smaller amount of stems that are generally larger in size. Red pine will still dominate the stands stocking although the rapid growth of white pine will have been a positive response to the preferred growing conditions for the species as a result of the 2015 treatment. Volumes of both sawtimber and pulpwood will have increased as a result of the additional growing space allotted from the 2015 treatment. Pulpwood volumes at this time will reflect a portion of the advanced regeneration present as saplings in 2014, which have since grown into pole sized trees.

A graphic visualization of what this stand will look like pre-treatment (2014), post treatment (2015) and twenty years after treatment (2035) are located in the appendix in figures 1, 2 and 3.

Stand 2

As with stand 1, there will a considerable amount of light and growing space available for regeneration to become established and for the release of advanced regeneration present in the stand. Basal area, relative density and the residual stems per acre for red pine and the overall mean stand diameter will be drastically lower due to the removal priority of red pine. However, diameter size of the residual trees will slowly begin to increase throughout the stand, especially for white pine. It is anticipated that abundant seed will occupy the soil in 2 to 5 years after this treatment.

In twenty years after treatment (2035), it is anticipated that another treatment would be scheduled. This treatment would mimic the treatment in 2015 and remove another half of the projected overstory. The stands basal area and relative density will have increased. The relative density of red pine will be

significantly lower and the density of white pine will have increased. Diameters for all species will have increased dramatically also. However, the mean stand diameter in this stand will remain slightly smaller than stands 1 and 3. There will be an overall higher inclusion of white pine growing in the stand at this time. In comparison to the stocking condition pre-treatment in 2014, when there was a larger amount of smaller stems, the stand this time will have a smaller amount of stems that are generally larger in size. Red pine will still dominate the stands stocking although white pine will continue developing into a more dominant role in the stands stocking. Volumes for both sawtimber and pulpwood will have increased as a result of the additional growing space allotted from the 2015 treatment.

A graphic visualization of what this stand will look like pre-treatment (2014), post treatment (2015) and twenty years after treatment (2035) are located in the appendix in figures 4, 5 and 6. These graphics were derived using the Stand Visualization System (SVS) which can be used in conjunction with NED-2 and NED-3 to generate images based on current and simulated stand conditions.

Stand 3

Immediately after the harvest, the basal area and relative density will be lower which will greatly increase the amount of growing space in the stand. This will allow for more growing space for overstory trees which were retained, additional growing space and increased light availability for any regeneration which will become established in the understory and for the plentiful advanced regeneration that is already present. The residual mean stand diameter will be lower due to the removal priority of red pine. However, the diameter size of the residual trees, especially the trees in the pole and medium size/maturing age classes will have increased in diameter and height significantly as a response to the treatment in 2015. Because crop trees, particularly white pine will have been released by thinning red pine, it is anticipated that abundant seed from these trees will occupy the soil in 2 to 5 years after this treatment.

In twenty years after treatment (2035), it is anticipated that another treatment would be scheduled. As with stand 1, this treatment would be the second stage of the two staged shelterwood method with reserves. The stands basal area and relative density will have increased and appear similar to the pre-treatment condition in 2015. The relative density of red pine will be significantly lower and the density of white pine will have increased. The poletimber and small sawtimber age classes will have increased in diameter and height significantly as a response to the treatment in 2015. The relative density of white pine will be comparable to red pine, if not nearly equal. There will be a lower amount of stems per acre for both red pine and white pine although they will be much larger in diameter than compared with the greater number of smaller stems for each species inventoried pre-treatment in 2014. There will be an overall higher inclusion of white pine growing in the stand at this time. Volumes for both sawtimber and pulpwood will have increased as a result of the additional growing space allotted from the 2015 treatment. Pulpwood volumes at this time will reflect a portion of the advanced regeneration present as saplings in 2014, which have since grown into pole sized trees. Vertical complexity and structural complexity will be greatest in this stand compared to stands 1 and 2.

A graphic visualization of what this stand will look like pre-treatment (2014), post treatment (2015) and twenty years after treatment (2035) are located in the appendix in figures 7, 8 and 9. These graphics were derived using the Stand Visualization System (SVS) which can be used in conjunction with NED-2 and NED-3 to generate images based on current and simulated stand conditions.

APPENDIX

CURRENT CONDITIONS

Table 1. Stand 1 - Red Pine Overstory Data Table (Stems ≥ 5" dbh)

	All species	red pine (*Pinus resinosa*)	eastern white pine (*Pinus strobus*)	red maple (*Acer rubrum*)	Scotch pine (*Pinus sylvestris*)	northern red oak (*Quercus rubra*)
Basal area (sq.ft./ac.)	189.2	176.9	4.6	4.6	1.5	1.5
Percent of stand basal area (%)	100	93.5	2.4	2.4	0.8	0.8
Stems/area (stems/ac.)	247.4	222.2	12.5	10.3	1.4	1
Mean DBH (in.)	11.6	11.9	7.6	9.1	14	17.2
Relative density (%/ac.)	93.6	86.1	2.1	3.3	0.9	1.3
Percent of stand (%)	100	92	2.2	3.5	0.9	1.4
Gross sawtimber volume (bd.ft./ac.)	20,421	19,969	273	0	0	179
Gross pulpwood volume (cords/ac.)	16	14	1	1	0	0

Table 2. Stand 1 – Red Pine Understory Data Table (Stems > 4.5' tall and < 1" dbh)

	All species	eastern white pine (*Pinus strobus*)	red pine (*Pinus resinosa*)
Basal area (sq.ft./ac.)	13.2	10.5	2.7
Percent of stand basal area (%)	100	79.3	20.7
Stems/area (stems/ac.)	557.7	480.8	76.9
Mean DBH (in.)	2	1.9	2.5

Table 3. Stand 1 – Red Pine Ground Species Data Table

Species	Density (mean # stems/acre)	Relative Density	Frequency	Relative Frequency	Percent cover	Relative Percent cover
eastern white pine (*Pinus strobus*)	2239.58	42.83	100	12.24	0	0
lowbush blueberry (*Vaccinium angustifolium*)	250	4.78	91.67	11.22	6.87	22.92
Canada mayflower (*Maianthemum canadense*)	354.17	6.77	83.33	10.2	4.21	14.03
trailing arbutus (*Epigaea repens*)	208.33	3.98	66.67	8.16	5.15	17.15
red maple (*Acer rubrum*)	729.17	13.94	33.33	4.08	0	0
brackenfern (*Pteridium*)	187.5	3.59	50	6.12	2.42	8.06
clubmoss (*Lycopodium*)	93.75	1.79	41.67	5.1	2.56	8.54
northern red oak (*Quercus rubra*)	291.67	5.58	66.67	8.16	0	0
eastern teaberry (*Gaultheria procumbens*)	62.5	1.2	16.67	2.04	2.5	8.33
northern dewberry (*Rubus flagellaris*)	52.08	1	25	3.06	2.19	7.29
red pine (*Pinus resinosa*)	145.83	2.79	33.33	4.08	0	0
sweet fern (*Comptonia*)	62.5	1.2	16.67	2.04	1.08	3.61
groundcedar (*Lycopodium complanatum*)	41.67	0.8	16.67	2.04	0.63	2.08
partridgeberry (*Mitchella repens*)	41.67	0.8	16.67	2.04	0.5	1.67
eastern hayscented fern (*Dennstaedtia punctilobula*)	41.67	0.8	16.67	2.04	0.42	1.39
glossy buckthorn (*Frangula alnus*)	62.5	1.2	16.67	2.04	0.21	0.69
starflower (*Trientalis borealis*)	52.08	1	16.67	2.04	0.23	0.76

Table 3. Stand 1 – Red Pine Ground Species Data Table (Continued)

Species	Density (mean # stems/acre)	Relative Density	Frequency	Relative Frequency	Percent cover	Relative Percent cover
mountain laurel (*Kalmia latifolia*)	20.83	0.4	8.33	1.02	0.63	2.08
gray birch (*Betula populifolia*)	41.67	0.8	16.67	2.04	0	0
eastern hemlock (*Tsuga canadensis*)	41.67	0.8	16.67	2.04	0	0
black cherry (*Prunus serotina*)	41.67	0.8	16.67	2.04	0	0
highbush blueberry (*Vaccinium corymbosum*)	41.67	0.8	8.33	1.02	0.29	0.97
withe-rod (*Viburnum nudum var. cassinoides*)	41.67	0.8	8.33	1.02	0	0
whorled yellow loosestrife (*Lysimachia quadrifolia*)	20.83	0.4	8.33	1.02	0.04	0.14
bristly sarsaparilla (*Aralia hispida*)	20.83	0.4	8.33	1.02	0.04	0.14
blackberry (*Rubus*)	20.83	0.4	8.33	1.02	0.04	0.14
American beech (*Fagus grandifolia*)	20.83	0.4	8.33	1.02	0	0

Table 4. Stand 1 – Red Pine Snag Data Table (No snags were recorded in Stand 1)

dbh range	Total	red pine (*Pinus resinosa*)
< 6.00	0	0
>=6.00 and <=12.00	0	0
>12.00 and <=18.00	0	0
>18.00 and <=24.00	0	0
>24.00 and <=30.00	0	0
> 30.00	0	0

Table 5. Stand 2 - Red Pine Overstory Data Table (Stems ≥ 5" dbh)

	All species	red pine (*Pinus resinosa*)	eastern white pine (*Pinus strobus*)
Basal area (sq.ft./ac.)	250	246	4
Percent of stand basal area (%)	100	98.4	1.6
Stems/area (stems/ac.)	407.8	400.8	7
Mean DBH (in.)	10.4	10.4	9.7
Relative density (%/ac.)	126	124.4	1.6
Percent of stand (%)	100	98.7	1.3
Gross sawtimber volume (bd.ft./ac.)	19,163	19,163	0
Gross pulpwood volume (cords/ac.)	36	35	1

Table 6. Stand 2 – Red Pine Understory Data Table (Stems > 4.5' tall and < 1" dbh)

	All species	red pine (*Pinus resinosa*)	eastern white pine (*Pinus strobus*)	red maple (*Acer rubrum*)
Basal area (sq.ft./ac.)	6.3	5.5	0.5	0.3
Percent of stand basal area (%)	100	87	8.7	4.3
Stems/area (stems/ac.)	250	100	100	50
Mean DBH (in.)	1.8	3	1	1

Table 7. Stand 2 – Red Pine Ground Species Data Table

Species	Density (mean # stems/acre)	Relative Density	Frequency	Relative Frequency	Percent cover	Relative Percent cover
eastern white pine (*Pinus strobus*)	4050	65.06	80	11.76	0	0
Canada mayflower (*Maianthemum canadense*)	250	4.02	70	10.29	11.85	32.07
lowbush blueberry (*Vaccinium angustifolium*)	250	4.02	80	11.76	2.35	6.36
brackenfern (*Pteridium*)	175	2.81	50	7.35	2.85	7.71
trailing arbutus (*Epigaea repens*)	100	1.61	30	4.41	3.95	10.69
partridgeberry (*Mitchella repens*)	75	1.2	30	4.41	2.75	7.44
northern dewberry (*Rubus flagellaris*)	25	0.4	10	1.47	3.25	8.8
highbush blueberry (*Vaccinium corymbosum*)	75	1.2	30	4.41	1.75	4.74
red maple (*Acer rubrum*)	350	5.62	30	4.41	0	0
American hazelnut (*Corylus americana*)	25	0.4	10	1.47	2.5	6.77
eastern teaberry (*Gaultheria procumbens*)	50	0.8	20	2.94	1.75	4.74
northern red oak (*Quercus rubra*)	150	2.41	40	5.88	0	0
eastern hayscented fern (*Dennstaedtia punctilobula*)	25	0.4	10	1.47	2	5.41
starflower (*Trientalis borealis*)	75	1.2	30	4.41	0.25	0.68
clubmoss (*Lycopodium*)	75	1.2	20	2.94	0.6	1.62
withe-rod (*Viburnum nudum var. cassinoides*)	75	1.2	20	2.94	0.45	1.22
lady's slipper (*Cypripedium*)	100	1.61	20	2.94	0.05	0.14

Table 7. Stand 2 - Red Pine Ground Species Data Table (Continued)

Species	Density (mean # stems/acre)	Relative Density	Frequency	Relative Frequency	Percent cover	Relative Percent cover
glossy buckthorn (*Frangula alnus*)	50	0.8	20	2.94	0.2	0.54
gray birch (*Betula populifolia*)	50	0.8	20	2.94	0	0
American beech (*Fagus grandifolia*)	50	0.8	20	2.94	0	0
red pine (*Pinus resinosa*)	75	1.2	10	1.47	0	0
sheep laurel (*Kalmia angustifolia*)	25	0.4	10	1.47	0.25	0.68
bunchberry dogwood (*Cornus canadensis*)	25	0.4	10	1.47	0.15	0.41
eastern hemlock (*Tsuga canadensis*)	25	0.4	10	1.47	0	0

Table 8. Stand 2 – Red Pine Snag Data Table

dbh range	Total	red pine (*Pinus resinosa*)
< 6.00	51.58	51.58
>=6.00 and <=12.00	17.04	17.04
>12.00 and <=18.00	0	0
>18.00 and <=24.00	0	0
>24.00 and <=30.00	0	0
> 30.00	0	0

Table 9. Stand 3 – Red Pine-White Pine Overstory Data Table (Stems ≥ 5" dbh)

	All species	red pine (*Pinus resinosa*)	eastern white pine (*Pinus strobus*)	red maple (*Acer rubrum*)
Basal area (sq.ft./ac.)	198.8	167.5	28.8	2.5
Percent of stand basal area (%)	100	84.3	14.5	1.3
Stems/area (stems/ac.)	215	183.1	24.4	7.5
Mean DBH (in.)	12.6	12.8	13.4	7.4
Relative density (%/ac.)	91.5	79.7	10	1.8
Percent of stand (%)	100	87.1	10.9	2
Gross sawtimber volume (bd.ft./ac.)	27,218	23,912	3,306	0
Gross pulpwood volume (cords/ac.)	11	7	4	1

Table 10. Stand 3 – Red Pine-White Pine Understory Data Table (Stems > 4.5' tall and < 1" dbh)

	All species	eastern white pine (*Pinus strobus*)	red maple (*Acer rubrum*)	northern red oak (*Quercus rubra*)	American beech (*Fagus grandifolia*)	paper birch (*Betula papyrifera*)	black cherry (*Prunus serotina*)
Basal area (sq.ft./ac.)	34.1	16.7	12.6	3.1	0.8	0.7	0.2
Percent of stand basal area (%)	100	49	37	9	2.4	2	0.5
Stems/area (stems/ac.)	1,593.80	875	531.3	93.8	31.3	31.3	31.3
Mean DBH (in.)	1.8	1.7	1.9	2	2.2	2	1

Table 11. Stand 3 – Red Pine-White Pine Ground Species Data Table

Species	Density (mean # stems/acre)	Relative Density	Frequency	Relative Frequency	Percent cover	Relative Percent cover
eastern white pine (*Pinus strobus*)	2515.63	35.7	75	7.55	0	0
woodfern (*Dryopteris*)	281.25	3.99	75	7.55	14.63	28.48
Canada mayflower (*Maianthemum canadense*)	437.5	6.21	93.75	9.43	7.66	14.91
partridgeberry (*Mitchella repens*)	234.38	3.33	75	7.55	6.88	13.39
red maple (*Acer rubrum*)	1015.63	14.41	81.25	8.18	0	0
American hazelnut (*Corylus americana*)	140.63	2	43.75	4.4	5.22	10.16
eastern teaberry (*Gaultheria procumbens*)	156.25	2.22	50	5.03	3.03	5.9
eastern hayscented fern (*Dennstaedtia punctilobula*)	78.13	1.11	25	2.52	3.97	7.73
starflower (*Trientalis borealis*)	187.5	2.66	56.25	5.66	1.19	2.31
northern red oak (*Quercus rubra*)	328.13	4.66	56.25	5.66	0	0
wild sarsaparilla (*Aralia nudicaulis*)	140.63	2	43.75	4.4	1.72	3.35
bunchberry dogwood (*Cornus canadensis*)	500	7.1	12.5	1.26	0.63	1.22
brackenfern (*Pteridium*)	140.63	2	31.25	3.14	1.75	3.41
clubmoss (*Lycopodium*)	93.75	1.33	37.5	3.77	0.84	1.64
lowbush blueberry (*Vaccinium angustifolium*)	109.38	1.55	37.5	3.77	0.59	1.16
northern dewberry (*Rubus flagellaris*)	78.13	1.11	25	2.52	0.63	1.22
trailing arbutus (*Epigaea repens*)	46.88	0.67	12.5	1.26	1.03	2.01

Table 11. Stand 3 – Red Pine-White Pine Ground Species Data Table (Continued)

Species	Density (mean # stems/acre)	Relative Density	Frequency	Relative Frequency	Percent cover	Relative Percent cover
Solomon's seal (*Polygonatum*)	62.5	0.89	25	2.52	0.22	0.43
glossy buckthorn (*Frangula alnus*)	62.5	0.89	25	2.52	0.13	0.24
sweet birch (*Betula lenta*)	109.38	1.55	12.5	1.26	0	0
downy rattlesnake plantain (*Goodyera pubescens*)	46.88	0.67	18.75	1.89	0.09	0.18
mapleleaf viburnum (*Viburnum acerifolium*)	31.25	0.44	12.5	1.26	0.5	0.97
withe-rod (*Viburnum nudum var. cassinoides*)	31.25	0.44	12.5	1.26	0.31	0.61
black cherry (*Prunus serotina*)	46.88	0.67	12.5	1.26	0	0
gray birch (*Betula populifolia*)	78.13	1.11	6.25	0.63	0	0
sheep laurel (*Kalmia angustifolia*)	15.63	0.22	6.25	0.63	0.16	0.3
highbush blueberry (*Vaccinium corymbosum*)	15.63	0.22	6.25	0.63	0.16	0.3
lady's slipper (*Cypripedium*)	15.63	0.22	6.25	0.63	0.03	0.06
eastern hemlock (*Tsuga canadensis*)	15.63	0.22	6.25	0.63	0	0
American witchhazel (*Hamamelis virginiana*)	15.63	0.22	6.25	0.63	0	0
American beech (*Fagus grandifolia*)	15.63	0.22	6.25	0.63	0	0

Table 12. Stand 3 – Red Pine-White Pine Snag Data Table

dbh range	Total	red pine (*Pinus resinosa*)	eastern white pine (*Pinus strobus*)
< 6.00	0	0	0
>=6.00 and <=12.00	18.76	18.76	0
>12.00 and <=18.00	2.17	1.32	0.85
>18.00 and <=24.00	0	0	0
>24.00 and <=30.00	0.31	0	0.31
> 30.00	0	0	0

GRAPHIC VISUALIZATIONS

Figure 1. Stand 1 Red Pine Condition Pre-Treatment 2014 (SVS)

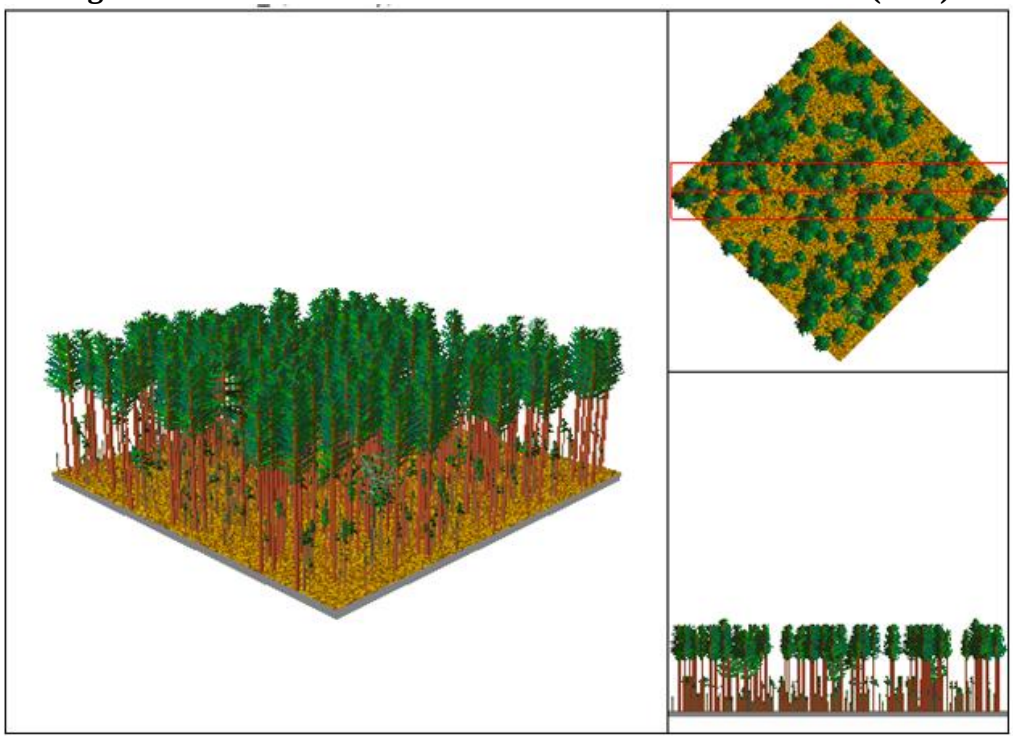


Figure 2. Stand 1 Red Pine Condition Post Treatment 2015 (SVS)

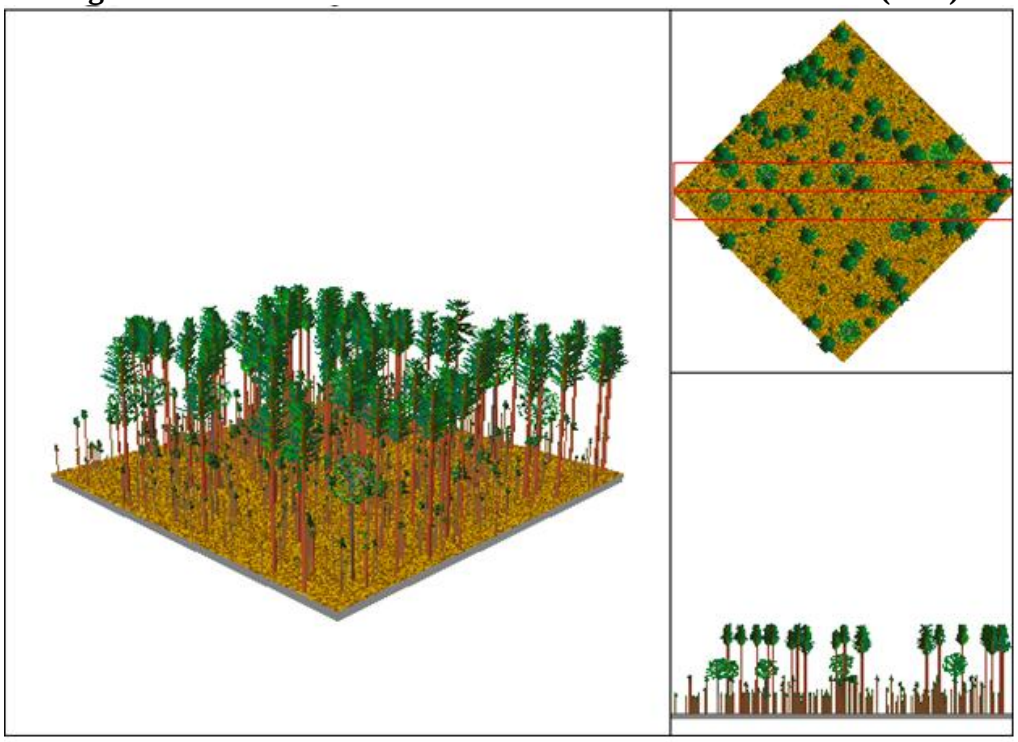


Figure 3. Stand 1 Red Pine Condition Post Treatment 2035 (SVS)

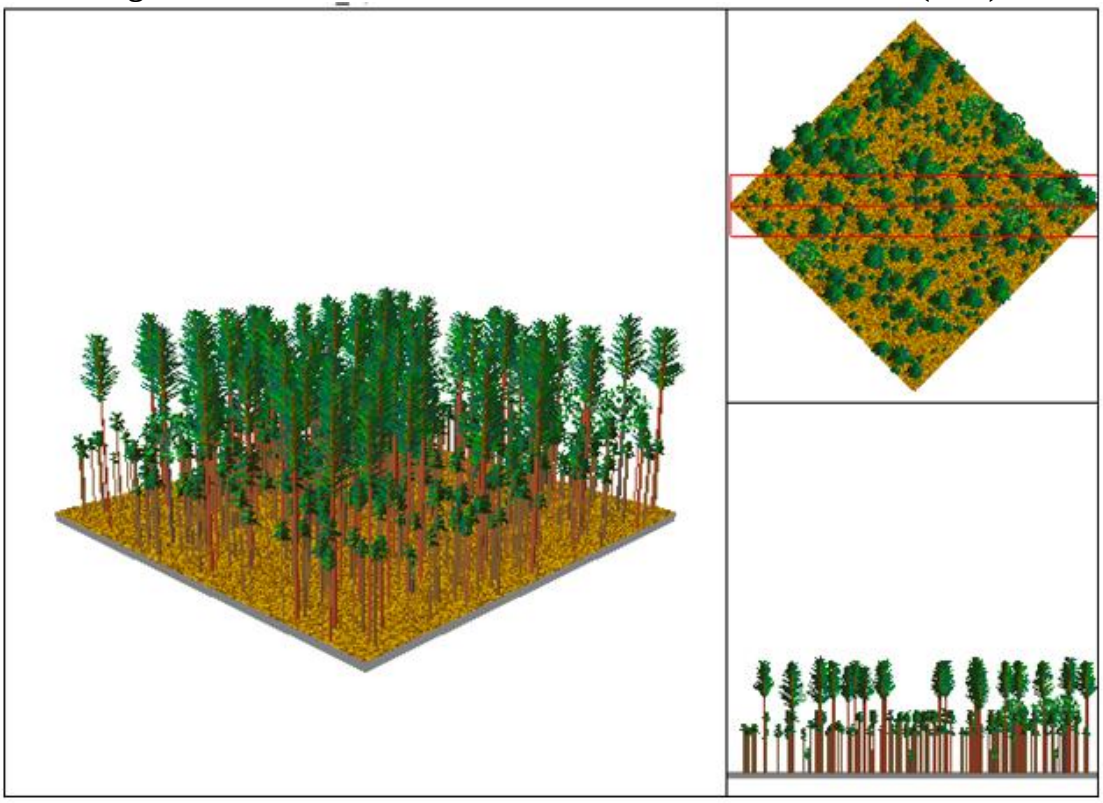


Figure 4. Stand 2 Red Pine Condition Pre-Treatment 2014 (SVS)

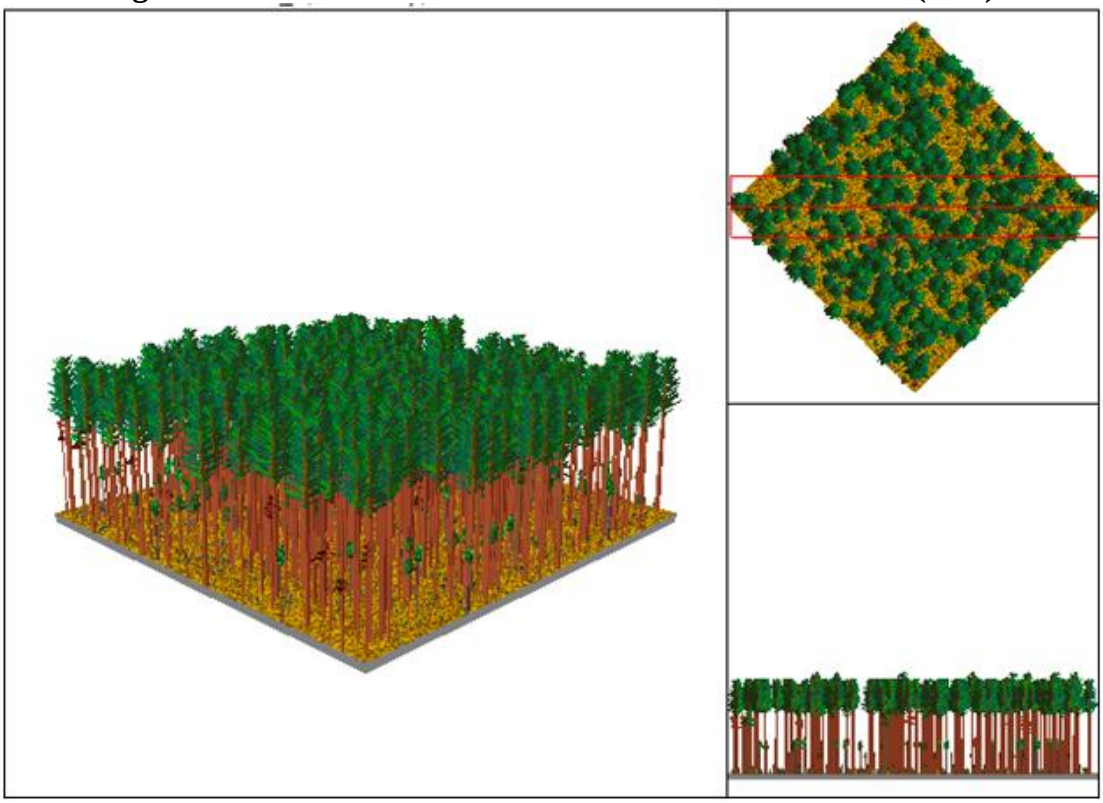


Figure 5. Stand 2 Red Pine Condition Post Treatment 2015 (SVS)

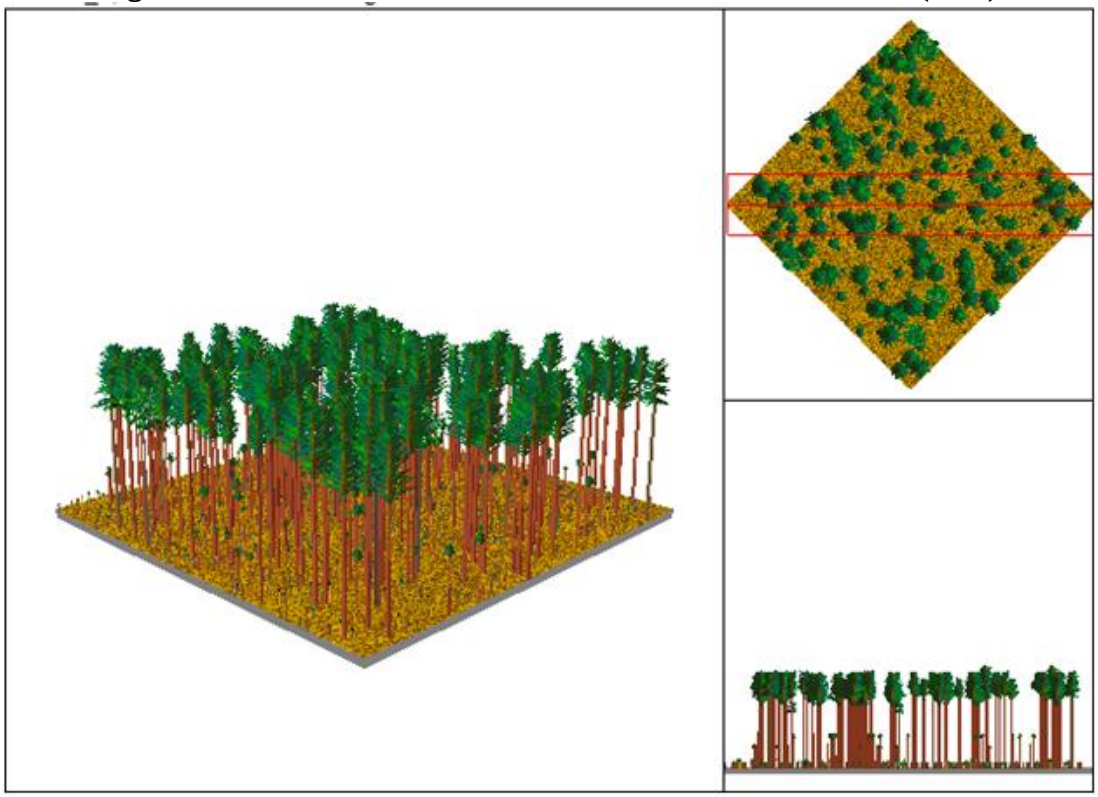


Figure 6. Stand 2 Red Pine Condition Post Treatment 2025 (SVS)

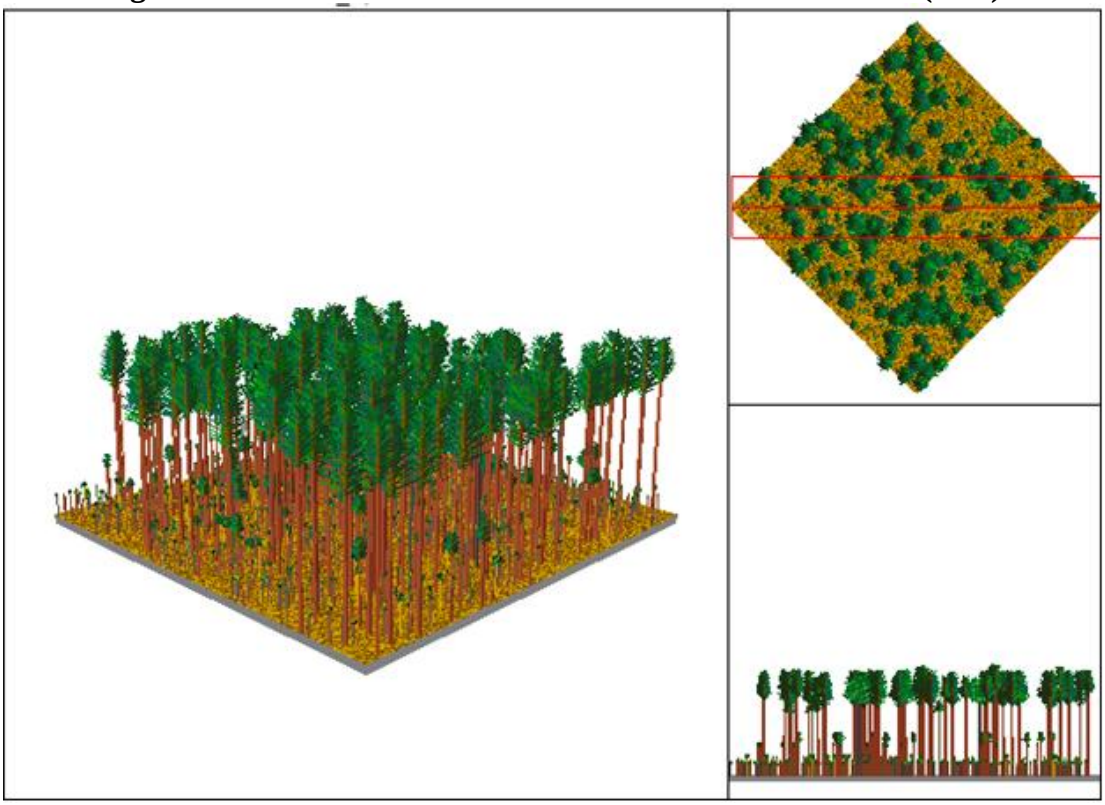


Figure 7. Stand 3 Red Pine-White Pine Condition Pre-Treatment 2014 (SVS)

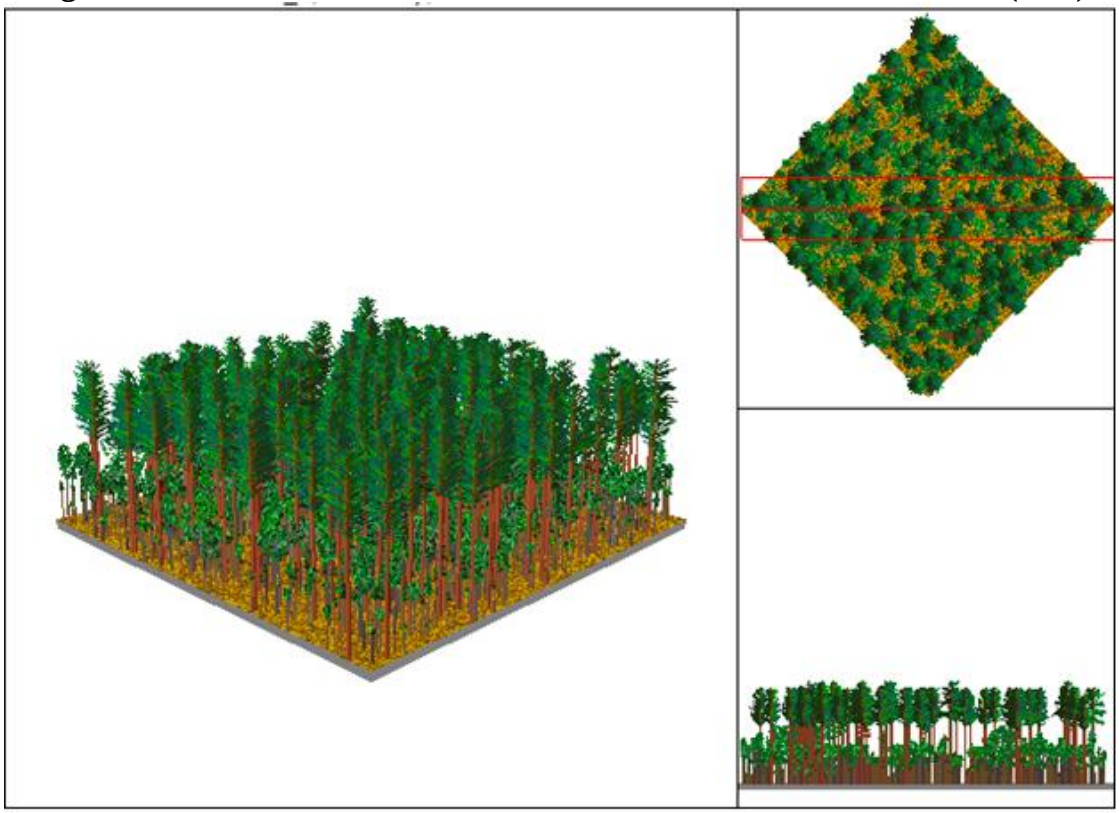


Figure 8. Stand 3 Red Pine-White Pine Condition Post Treatment 2015 (SVS)

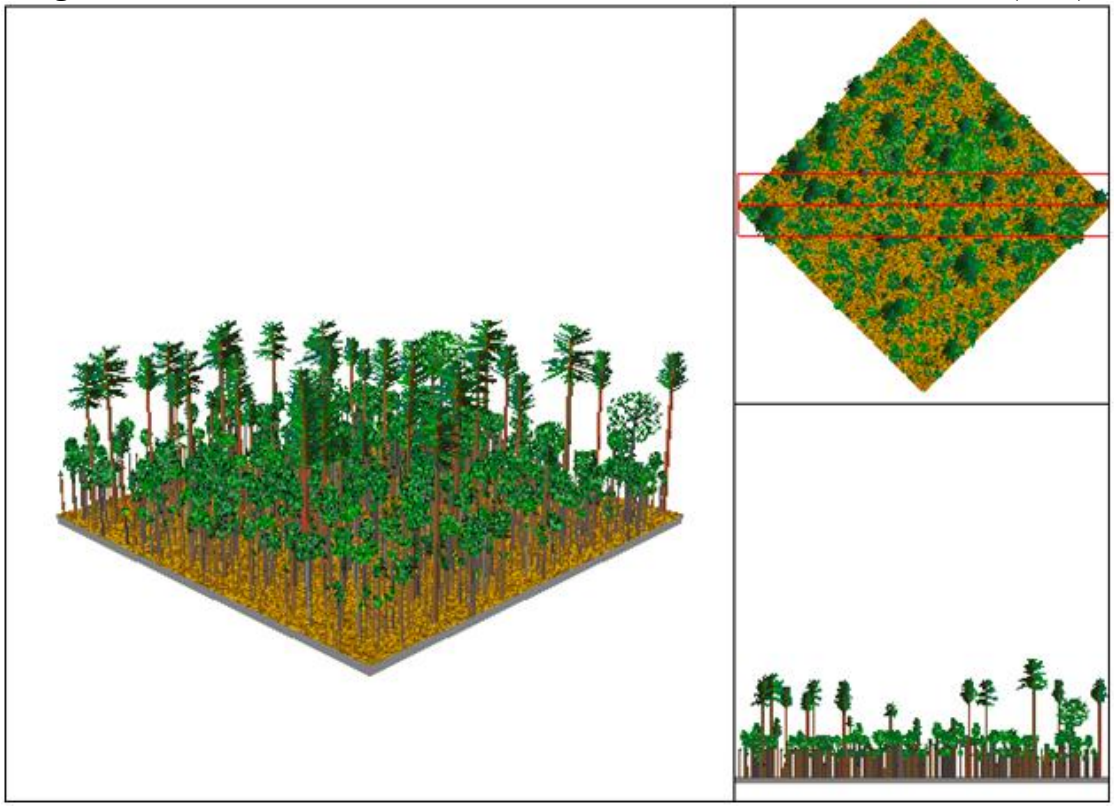
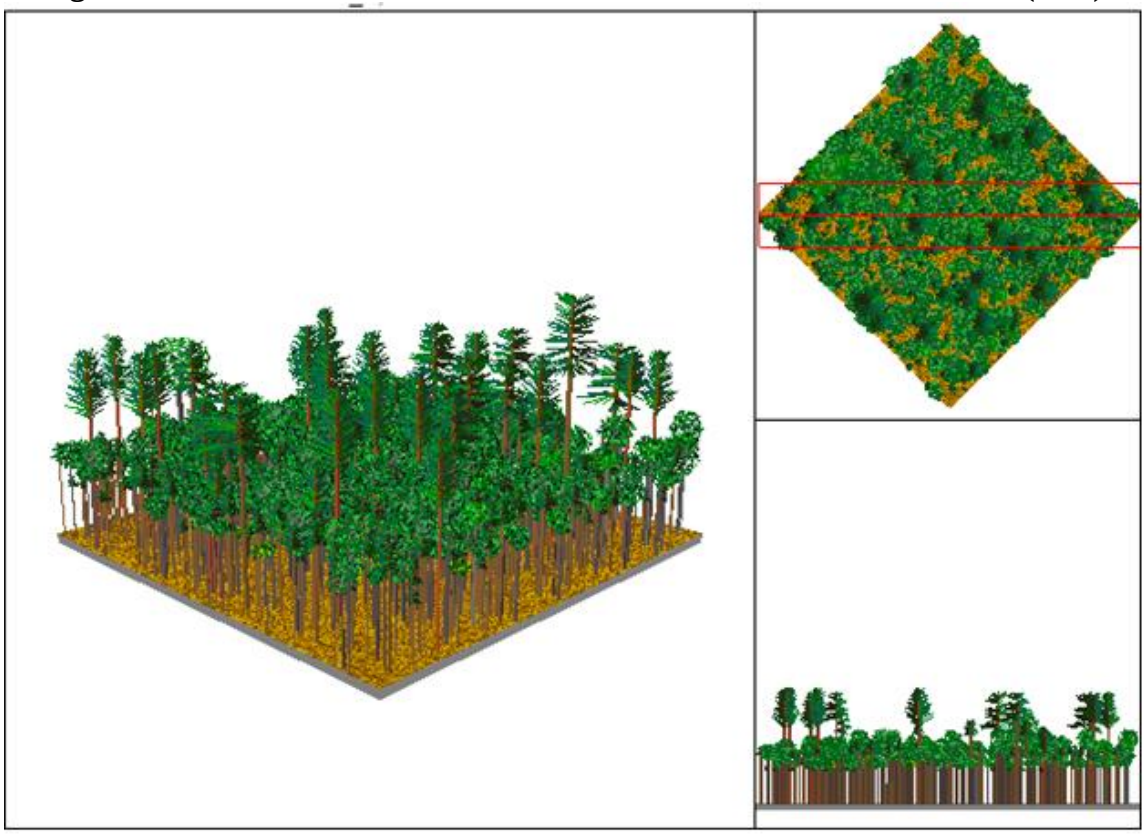


Figure 9. Stand 3 Red Pine-White Pine Condition Post Treatment 2035 (SVS)

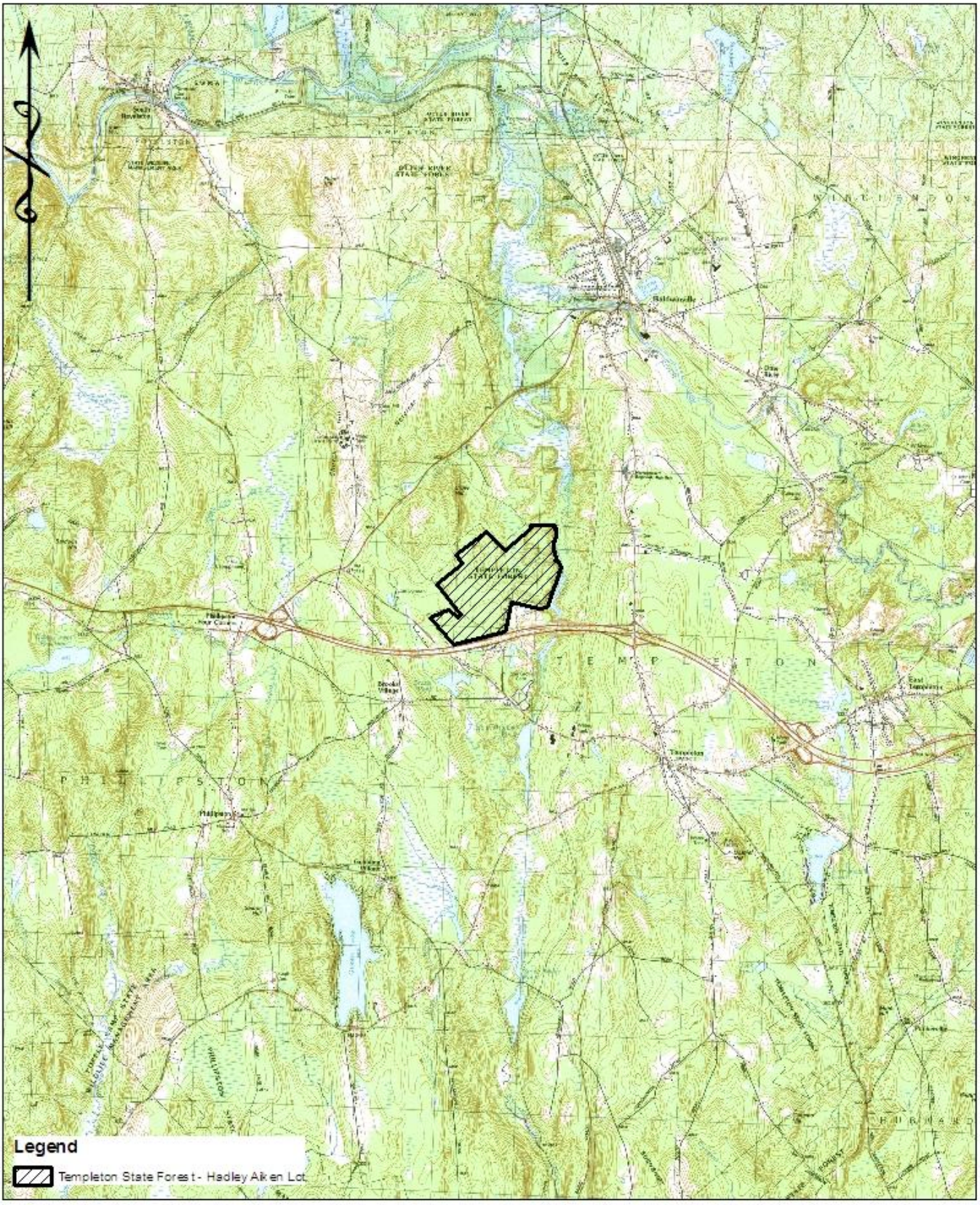


Locus Map

1 inch = 5,000 feet

Hadley Aiken Lot
Templeton State Forest

0 2,500 5,000 10,000 Feet



Joelle Vautour & Keith DiNardo

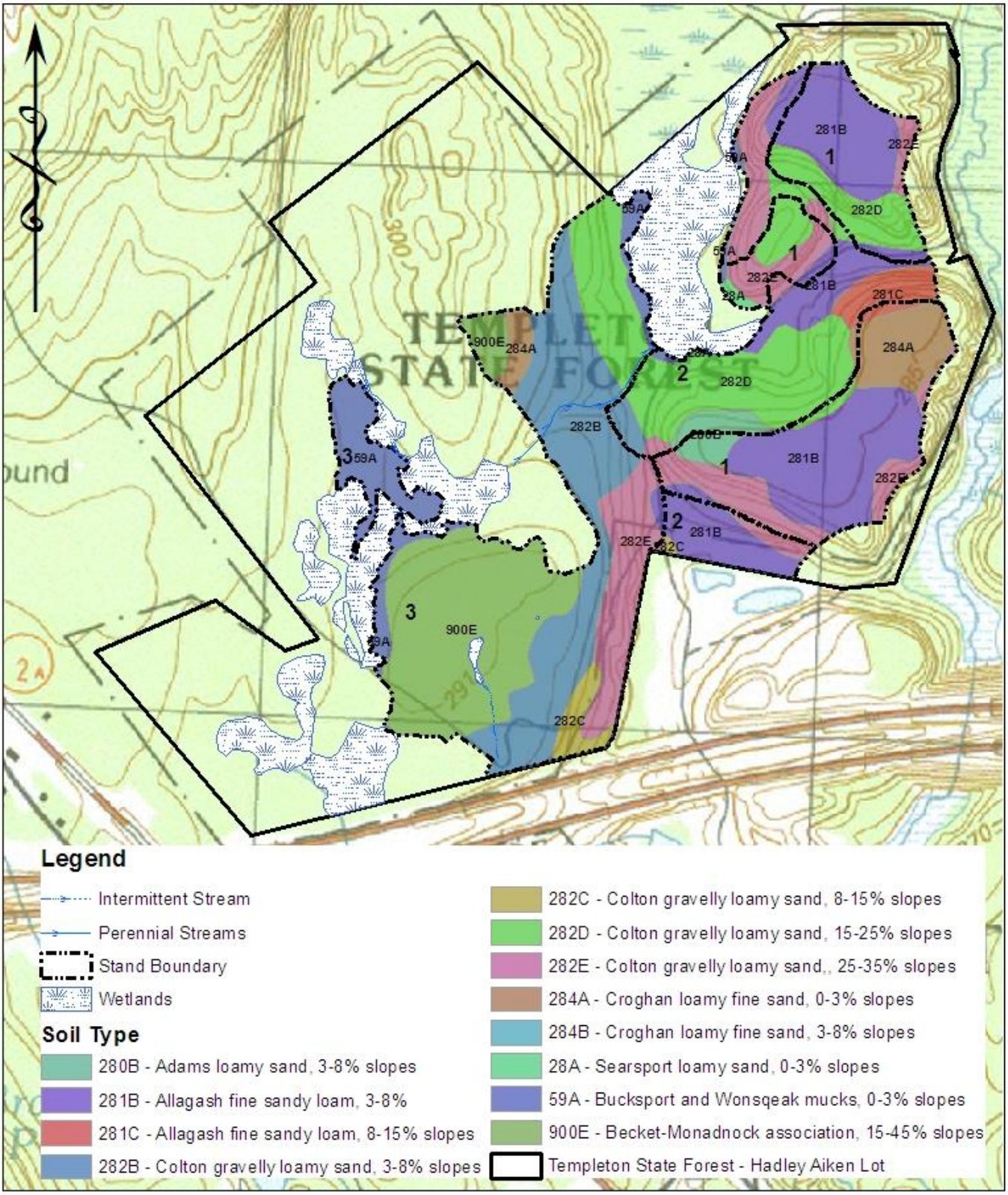
April 2014

Soil Map

Hadley Aiken Lot
Templeton State Forest

1 inch = 750 feet

0 375 750 1,500 Feet



Joelle Vautour & Keith DiNardo

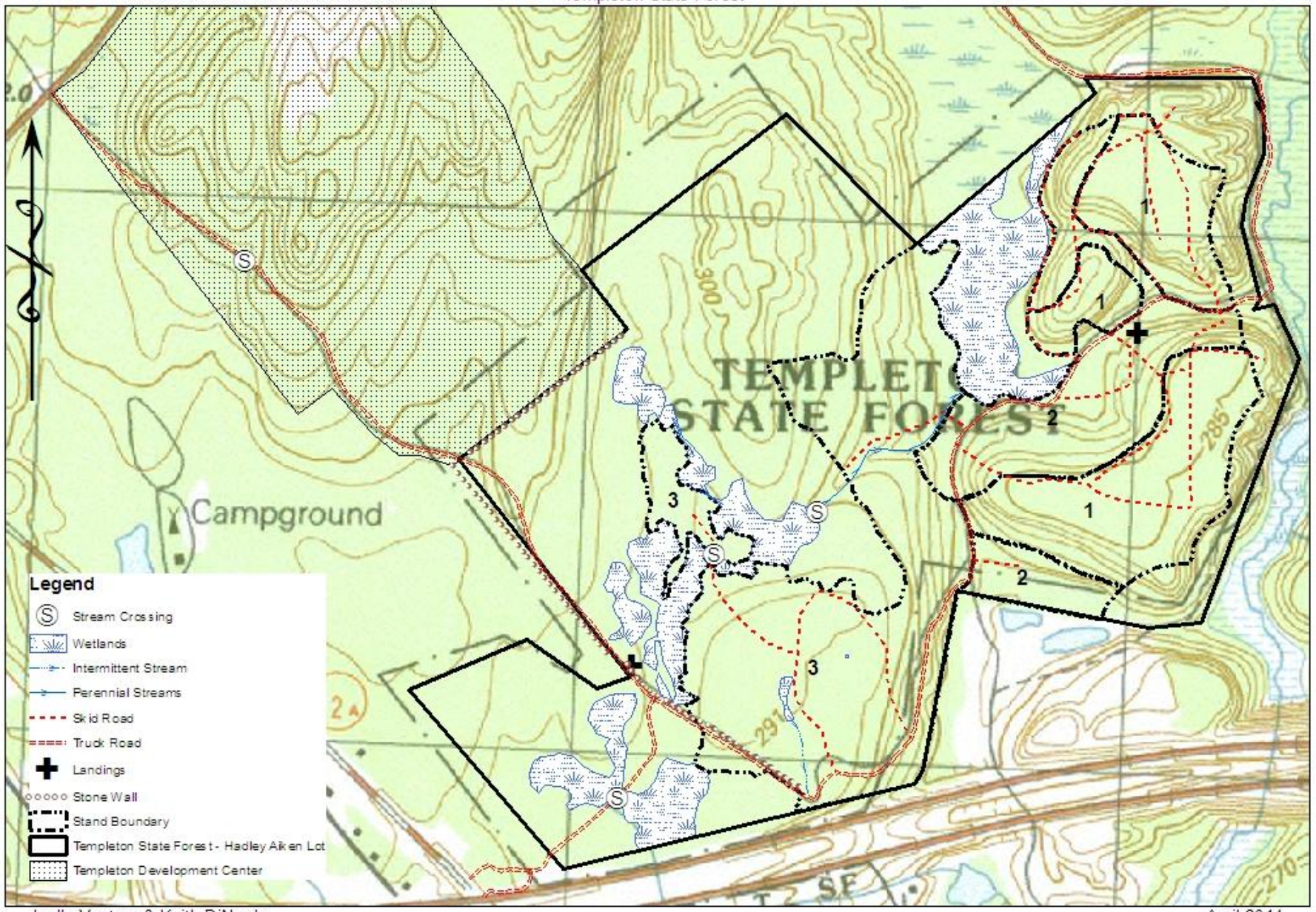
April 2014

Harvest Map

Hadley Aiken Lot
Templeton State Forest

1 inch = 750 feet

0 375 750 1,500 Feet



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