

Horticulture Farm
Quigley Forestry Demonstration Area/TSAS Harvesting Class

Background

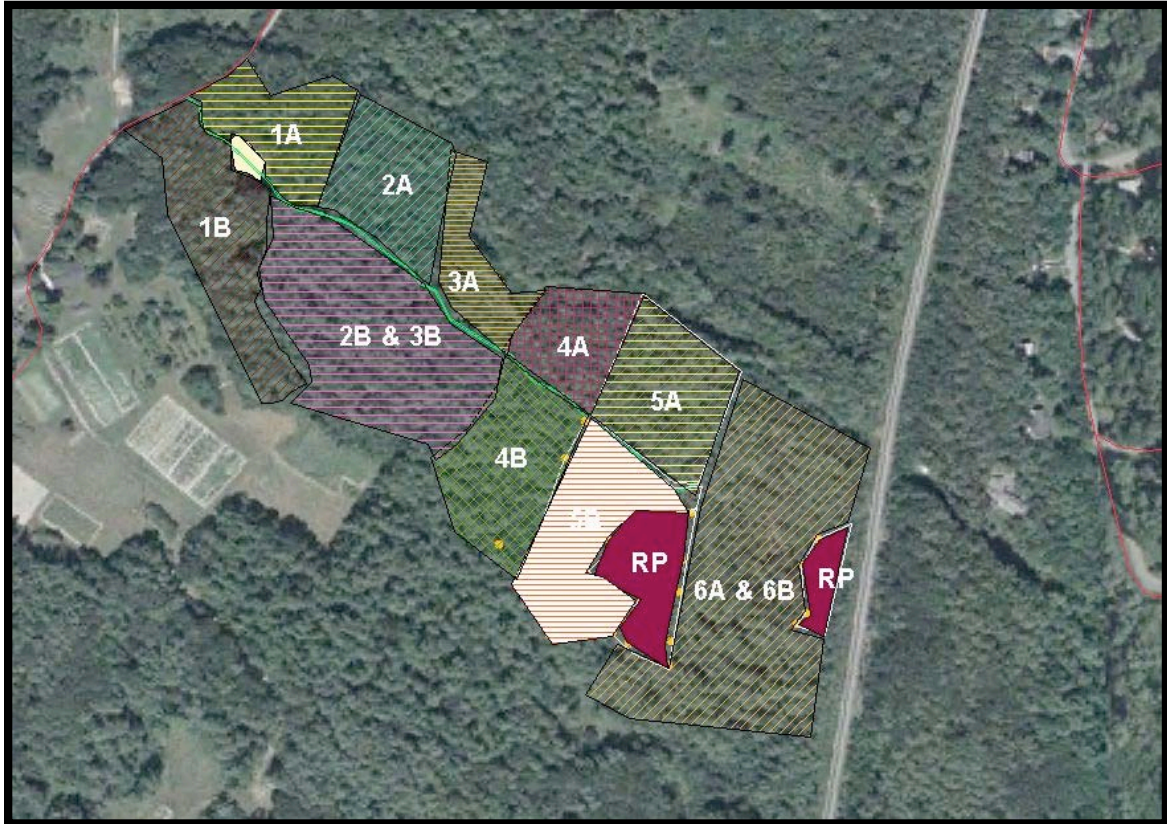
In 2002, a broad prescription for Compartment A was written in preparation for the TSAS Forestry program's use of this area for logging instruction. The area was divided into 6 paired blocks (1a, 1b, 2a, 2b.....) Further consideration has brought forth the combination of several blocks. The combination of two units allows some flexibility in the demonstration of harvesting techniques that two small blocks would not.

At this time, 5A has been determined as the block that will remain untreated and as a representation of "natural" forest progression. This block contains examples of conditions in most other blocks such as regeneration, dominant tree species, terrain, etc.

Timber Production and Forestry Demonstration

As with other UNH properties good land stewardship and ecological awareness are the overriding rules for all harvesting decisions. The goals following this are education, timber production, and wildlife habitat maintenance.

The intent of this area is to demonstrate a variety of harvesting methods to achieve the above goals. What will be stressed here is using the method that is most appropriate for the current stand conditions while considering the need to regenerate a new age class.



Plot Conditions

Soil Type:

CsB : This demonstration is almost entirely Charlton very stony fine sandy loam. This soil is well drained and generally considered of good quality for production of all tree species; there are only slight limitations on equipment use and little windthrow hazard.

Some scantic soils (ScA) are present on the fringes of the unit and in the rear blocks (especially 6b). Limitations on this soil (especially equipment use) can be severe but should not impact operations because of the well-placed skid access and the timing of the harvests (winter). Scantic soils are generally considered poor to fair in productivity for desirable pine and hardwood species.

Terrain:

This area is in part bounded on both long sides by streams and wet areas. The southeastern boundary is the railroad track, the northwestern boundary is the Woodman/Horticulture Farm access road. The landing is accessed from this road and along a skid trail that bisects the demonstration area lengthwise. The ground is rough and rocky and is generally rolling with numerous mounds and knolls.

Plot Conditions, Suggested Treatments and the Prescription

The following treatments should be considered flexible and implemented in accordance with yearly fluctuations in factors such as seed production, market demand or variations in weather.

As long as close record is kept, this demonstration area prescription should be viewed as a guideline only and as a document that will both adapt to and keep track of the applications that smart forestry practices require.

Horticulture Farm Demonstration area Timeline

2003 Block 3A group selections

2004 Block 3A group selections

2005 Block 4b Front shelterwood cut/TSI

Block 4b Rear Crop tree removal/TSI

2006 Block 5B Uneven-aged management (single tree selection)

2007 Block 5B Uneven-aged management (single tree selection)

Commercial operator : 6B Thinning

2008 Block 2B and 3B strip clearcut system paired with TSI

2009 Block 2B and 3B strip clearcut system paired with TSI

2010 Block 1B Sugarbush release operations

2011 Block 1B Sugarbush release operations

2012 Block 1A/2A "Best Tree"

2013 Block 1A/2A "Best Tree"

2014

2015

2016 Block 5B Uneven-aged management (single tree) second application

2017 Block 5B Uneven-aged management (single tree) second application

2018 Block 1B Sugarbush release operations

2022 Block 1A/2A "Best Tree"

2023 Block 1A/2A "Best Tree"
2025 Block 4b front crop tree removal
2026 Block 5B Uneven-aged management (single tree selection)
2027 Block 6B Commercial Thinning/precut
2028 Block 1B Sugarbush release operations
2029 Block 3A Group Selections
2030 Block 3A Group Selections
2031 Block 1A/2A "Best Tree"
2032 Block 1A/2A "Best Tree"
2033 Block 2B and 3B strip clearcut system paired with TSI
2034 Block 2B and 3B strip clearcut system paired with TSI
2035 Block 4b front Pre-Commercial Thinning
2038 Block 1b Sugarbush Release operations Final Release
Cut/precommercial
thinning
2041 Block 1A/2A "Best Tree"
2042 Block 1A/2A "Best Tree"
2055 Block 4b rear commercial thinning
2055 Block 6b Regeneration Cut(1st stage of 2 step Shelterwood)
2058 Block 2B and 3B strip clearcut system paired with TSI
2059 Block 2B and 3B strip clearcut system paired with TSI
2060 Block 4b front Commercial Thinning
2075 Block 6b Crop Tree Removal
4b Rear Second Commercial Thinning
2105 Block 4b Crop Tree Removal
2125 Block 4b Front Crop Tree Removal

Block Descriptions and prescriptions:

1a & 2a

The vegetative composition and site conditions of 1a and 2a are very similar. The combination of these two units allows us some flexibility in demonstration of harvesting techniques that two small blocks would not.

Species composition: Predominant: Hemlock, black birch. Subordinate: Red Oak, poplar, white pine.

Regeneration: Sparse, some hemlock.

Basal Area:

Volume Estimate:

Suggestion: Use "best tree" crown thinning method where competing dominant trees are removed based upon individual tree quality and not species. Thinning guidelines should vary according to specific species requirements (wider spacing for hardwoods). Since this stand is composed mostly of pole sized and small sawtimber trees, it should respond well to this thinning and support two more harvests (thinning and regeneration establishment cut) prior to final

removal harvest. Groups of large diameter aspen should be removed to induce regeneration that will benefit wildlife.

Non-Commercial:

Pruning should be done on some of the younger white pine stems (dbh 9-12). Using Brush saws, discriminate against hemlock regeneration where it is competing with less abundant species (and new conditions allow other species to establish a competitive advantage).

1b

Species composition: White pine, sugar maple, beech, white ash, black birch, hemlock.

Regeneration: Sugar maple, mixed hardwoods.

Basal Area:

Volume Estimate:

Suggestion:

Commercial:

Stand level: 1/3 of all volume should be removed per harvesting cycle.

Harvesting cycles should be spaced at 10 year intervals until the final harvest.

Tree Level: Use single tree and small group selection harvesting methods.

Target poorly formed stems to favor final crop trees and to encourage vigorous sugar maple regeneration. Where sugar maple is not already established and especially where species such as white pine are, harvesting techniques should be varied to favor these sun loving species (mostly through larger group

selections). These approaches should ultimately produce a stand dominated by sugar maple while maintaining a slight measure of diversity.

Non-Commercial: Brush saw work should be performed so as to encourage vigor of desired regeneration.

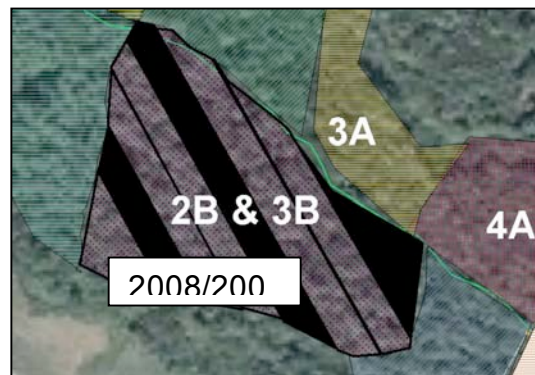
2b/3b

Species composition: White Pine, large sawtimber, wide range of mixed hardwoods. Some very good quality red oak and sugar maple in the rear.

Regeneration: Mostly black birch, hemlock and maple.

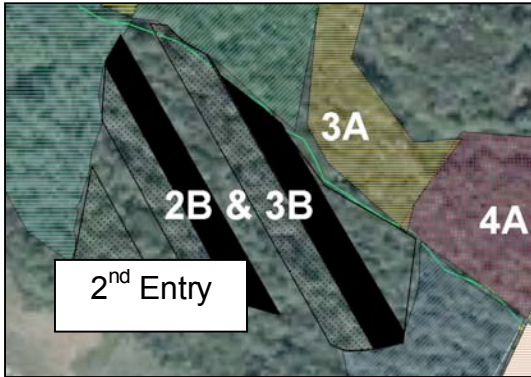
Basal Area:

Volume Estimate:



Suggestion:

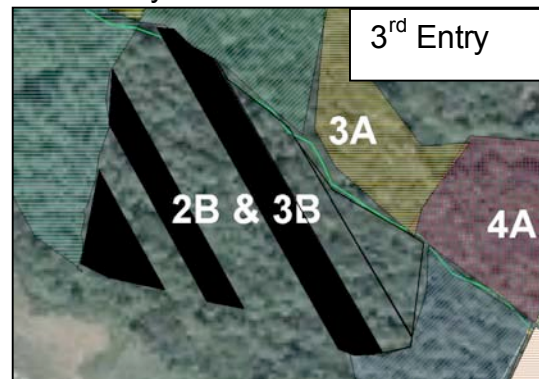
The composition of 2b and 3b are very similar. The combination of these two units allows us some flexibility in demonstration of harvesting techniques two small blocks would not.



As with a large portion of this demonstration area, the predominant regeneration that is present is shade tolerant. For purposes of species diversity, this block should be treated in a manner that shall maintain some of the current regeneration while attempting to introduce some percentage of more intolerant species. Using a strip-shelterwood system we should be able

to both manipulate the reaction to opening these areas up as well as take advantage of current regen conditions.

By clearcutting this block in strips we are able to accomplish several objectives. First, by configuring a number of strips within this block we can vary the post harvest treatment to demonstrate how well these techniques promote the introduction of sun loving trees to the mix. Second, during subsequent harvests we work adjacent to the regeneration strip and can perform precommercial work in it without driving over and destroying the new growth.



Non-Commercial: Immediately following harvest, various techniques should be used to demonstrate how intervention can change the regeneration of these strips. One suggestion would be

- leave strip one unaffected
- remove half of the established regeneration in strip two
- remove all of the regeneration in strip three.

3a

Species composition:

Regeneration:

Basal Area:

Volume Estimate:

Suggestion:

This Unit may be too small to demonstrate any methods that require a portion of the block be harvested. It may be used as a demonstration of a clearcut, left intact as a comparative block or be an area that faculty may use for demonstrations that require felling trees.

4a

Species composition: Mature White Pine, Hemlock and Mixed Wood
Regeneration: Low levels of hemlock and low value mixed hardwoods
Basal Area: unknown preharvest
Volume Estimate: unknown preharvest

Suggestion: (2003 and 2004) Group selection of mature individuals in patches of up to ½ acre should be used to regenerate the higher valued species of lower tolerance (ie. white pine). These patches should be strategically placed so as to enable future harvest of untreated areas. Reentry should occur

4b

This block is different enough from front to back so that it will be considered as two different stands.

Front

Species composition: Mature White Pine and Hemlock, few mixed hardwoods.
Regeneration: Small pockets of young hemlock.
Basal Area: 100 sq ft/acre
Mean Diameter: 17in.
Suggestion:

Thin to less than 60 sq ft per acre leaving the best crop/seed trees for a final harvest in approximately 20 years. Final stand structure should resemble a standard shelterwood cut, focusing upon making enough space for young white pine to regenerate while still providing enough shade so as to reduce weevil damage. Final removal cut should be after regeneration has grown to one full log height. (est. 2025) Care should be taken so as to reduce damage to tops when felling and stems when skidding.

As with other blocks, TSI should be performed following the harvest so as to promote desirable regeneration and pole sized future crop trees. Operations should include brush saw work on the younger stems and possibly girdling or felling and leaving the larger stems.

Rear

Species composition: Mature White Pine with mixed hardwood understory.
Regeneration: Mixed Hardwoods.
Basal Area: 100 sq ft per acre.
Suggestion:

The majority of the older white pine stems have butt logs of moderate to poor quality (large dead branches, early weevil damage). These trees have little

relative future potential for adding value. Since the understory is densely populated by advanced regeneration and pole sized hardwoods, these trees have little use as a seed source for white pine establishment in this area. Fortunately the opportunity exists to promote the pole-sized red oak in the understory. This offers a unique possibility of developing a high quality red oak dominated stand.

The suggestion is to remove the majority of mature white pines in the area. Scattered individuals should be left for wildlife habitat and structural stand diversity. In addition to this, lesser quality mixed hardwoods should be removed to reduce competition with higher quality individuals.

As with other blocks, TSI should be performed following the harvest so as to promote desirable regeneration and pole sized future crop trees. Operations should include brush saw work on the younger stems and possibly girdling or felling and leaving the larger stems. In this area this means discriminating against black birch and red maple in favor of primarily red oak and sugar maple second. In areas where these undesirables are actually keeping the lower stems clear of branches they should be left as nurse trees until the next commercial thinning (approx. 2055)

5a

Species composition: Hemlock, White Pine

Regeneration: Hemlock, age unknown

Basal Area: 160 sqft./acre

Volume Estimate: N/A

Suggestion: This area will be left as a comparative example to the other, treated blocks.

5b

Species composition: Hemlock, White Pine, MXD Hardwoods (primarily Black Birch, Red Oak)

Regeneration: Hemlock, some tolerant mixed hardwoods.

Basal Area: 160 SQ ft/Acre

Volume Estimate: 11595 bf/acre sawtimber
3260 cuft/acre

Harvest Guidelines:

Winter 2006-2007

Cut: 20 Total Trees lowest quality of all species first.

8mbf Pine/1.5 Hemlock Sawlog, 10 CDS Pulp

Leave: Favor White Pine and Red Oak seed trees.

Protect true regeneration and younger age classes of all species.

Winter 2007-2008

Cut: 20 Total Trees lowest quality of all species first.

8mbf Pine/1.5 Hemlock Sawlog, 10 CDS Pulp

Leave: Favor White Pine and Red Oak seed trees. Protect true regeneration and younger age classes of all species.

Stand Description and Prescription:

This stand is roughly 2.7 acres. The dominant species are hemlock and white pine; there are some mixed hardwoods. Although white pine and red oak are the species present with the highest financial value, availability of hemlock stands for their important contribution to forest-wide diversity of tree species, unique wildlife habitat and for research purposes obligate us to include in our regeneration goals the nurturing of young, vigorous stands dominated by hemlock.

Single tree selection as a method strongly favors shade-tolerant species

Diameter Class	Actual Basal Area/Acre
0-4"	10.00045
6-10"	42.49102
12-14"	17.50952
16+"	90.77419

such as hemlock and beech, and discriminates strongly against other species including the birches, oaks, and white pine. The latter groups typically fail to regenerate in a single-tree selection system in all but the poorest sites. Although the main goal here would be to produce hemlock continually and sustainably, the promotion of other

species on a smaller scale is also considered favorable.

By comparing a desired diameter distribution to the makeup of this stand ($q=1.5$), we see that this stand is presently even or two-aged. The success of conversion of this stand will depend upon varying harvesting techniques according to specific, on-the-ground biological evidence. The guidelines for harvest are:

- In areas where there is hemlock in a cohort younger than those trees in the dominant canopy all efforts should be made to promote this growth.
- After the initial entry two more entries at ten year intervals will be made. These follow-ups will again focus upon reducing the growing space occupied by the older age classes and focus on establishing areas for regeneration. As we near a desired Basal Area of 60-80 sq. ft/acre entries will be made roughly every ten to twenty years as conditions dictate.

Since these harvests will most likely occur during winter, scarification may be limited. It may be productive to test efforts that would result in the promotion of regeneration in hemlock dominated stands (scarification through fire or mechanical means).

By comparing the actual and desired basal area we can see that

Diameter Class	Basal Area/Acre	Desired BA/Acre
0-4"	10.00045	12
6-10"	42.49102	44
12-14"	17.50952	29
16+"	90.77419	27

according to our prescription, we should be focusing on removing some of the larger diameter classes so as to promote recruitment into younger age classes and to encourage growth of the younger classes into the age class that appears to be lacking (12-14").

This diameter class (12-14") is most likely just smaller individuals of the same age as the dominants, and we may be subject to the "two-age

syndrome” that these conversion efforts usually produce. Nevertheless, by continually attempting to recruit into the youngest age class and intelligently applying harvesting techniques this stand will eventually move towards uneven-aged.

6a and 6b

Species composition: White Pine, Hemlock, Spruce, Red Pine, Balsam Fir, Mixed Hardwoods

Regeneration: Hemlock, Fir, Spruce and Mixed Hardwoods

Basal Area: 160 sqft/acre

Avg. Diameter: 13 in.

Suggestion:

With a high basal area and average diameter, this area should be thinned to approximately 100 sq feet per acre. Favor should be given to the unusual species that were planted here, including spruce and balsam fir. Following those priorities, white pine and red pine should be favored; in areas with hardwoods, red oak should be favored. In areas thick with aspen, marketability should be weighed against possible wildlife use if regenerated through patch cut. (ie. it would be useful to cut these for wildlife, but don't if you can't sell them).

Individual stems should be left based upon lower log value, potential for growth as well as crown health and size. Typical trees to cut have defects in the butt log, are competing with healthy dominants and have sparse crowns with little chance to grow if thinned around.

Canopy density requires that care should be taken when felling to leave crop tree crowns intact. Bumper trees should be chosen carefully and left until final harvest. Trees of less than 8 inches that are competing with more promising individuals should either be felled or girdled. Care should be taken in leaving regeneration of favorable and unique species undamaged. In areas where advanced regeneration is not already present a shelterwood or other regenerative cut should be planned for approximately 2055.

Red Pine Stands:

There are two areas of planted red pine that may or may not be grouped into the treatments used in blocks 6 and 5. As their own they offer a unique opportunity to demonstrate a variety of silvicultural techniques including:

- Regenerating through harvesting techniques.
- Regenerating through fire.
- Underplanting of unusual species.

These areas are large enough so a treatment within here could be compared to Red Pine stands throughout the campus woodlands network.