BIRCH MANAGEMENT ON THE WHITE MOUNTAIN NATIONAL FOREST

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THERE ARE 605,000 acres of commercial forest land on the White Mountain National Forest (based on a 1960 timber inventory). Of this, 258,000 acres are classed as northern hardwood timber type. In general, this would include some 27 percent yellow birch, 16 percent sugar maple, and 31 percent beech in trees that are 6 inches and larger.

Timber operations are now highly mechanized, and a small crew can produce relatively large volumes in a short time. Rubber-tired skidders have replaced horses and tractors in skidding, and this has greatly reduced the mileage of truck roads required in the woods. In the mountainous sections, this has done much to reduce erosion and the resultant siltation of streams. Portable chippers and stationary chippers are now producing much of the wood required by pulp mills; a Nicholson Utilizer has been producing such chips on the Forest in appreciable volumes.

Volume and value of timber cut on the White Mountain National Forest for industrial use continues to increase in spite of labor shortages and uncertain markets. In fiscal-year 1968 the cut was nearly 10 million board feet of sawlogs and about 56,000 cords of pulpwood and millwood. Total value of stumpage sold was over $400,000. Both volume and value were the highest ever attained on the Forest.

Much less timber would be cut now if there were no market for hardwood pulpwood. Our average cut of logs last year was about 1,000 board feet per acre. By cutting pulpwood, we are able in many areas to salvage scattered sawlog trees that would otherwise be inoperable.

This increase in cut follows our ten-year plan for the period 1962-72 quite satisfactorily. Planned and actual volumes cut were:

Fiscal-year	*Planned cut*[1] *(million board feet)*	*Volume cut*
1963	22.2	21.2
1964	23.8	31.1
1965	25.5	32.4
1966	27.2	22.4
1967	28.7	30.5
1968	30.3	37.9
Total	157.7	175.5

[1] As planned in 1962.

In addition to the above commercial volumes, we have removed considerable volumes in unmerchantable trees as part of our timberstand-improvement program. Planned and actual acreages treated were:

Year	*Planned (acres)*	*Accomplished (acres)*
1963	7,600	12,146
1964	7,600	15,708
1965	7,600	12,669
1966	7,600	13,190
1967	7,600	8,789
1968	7,600	9,298
Totals	45,600	71,800

The general condition of our northern hardwood stands is poor. Frequent blowdowns, the beech-scale, birch dieback, ice storms, and past logging operations have degraded many stands of timber on the Forest to such an extent that about 70 percent of the timber of operable size is usable only as pulpwood. Clearcutting in summer with heavy equipment that will scarify the soil and prepare a seedbed is the best silvicultural practice for such stands. Last year, about ½ percent of the total Forest area (3,401 acres) was clearcut—most in hardwood stands. However, several factors influence management and cutting practices of all our stands. Among them are: tolerance, multiple use, insects and disease, and logging methods.

Influence of Tolerance

Paper birch is the most valuable species because of stumpage price and rate of growth. Balsam fir would rate second, but it is not a component of the hardwood timber type. At present, yellow birch is probably third and white ash fourth. These birches and white ash require sunlight for regeneration and growth.

Beech and hemlock will prosper with little light, and sugar maple requires relatively little. Of these three, beech and hemlock have long been relatively undesirable as sawlogs, and prices are low.

So it can be said that, on the White Mountain National Forest, if you want to increase the amount of birch and ash, you cut hard; and if you want to do the same for hemlock and beech, you cut lightly. Perpetual uneven-aged stands will have increasing volumes of beech and hemlock. Beech is extremely aggressive and really does not need a forester's help to seize new acreage. Many high, dry mountain slopes are occupied by stands of low-quality beech. The species reproduces prolifically from root sprouts as well as by all other ordinary methods, and under shade it is always present and ready to grow. Hemlock is usually defective, and even good hemlock is relatively hard to sell.

Influence of Multiple Use

Habitat management in hardwood stands on the Forest usually means clearcutting to produce browse for deer and cover for smaller game. There is no limit to the acreage of browse cuttings desired for this. The increasing timber cut over the past 6 or 7 years has helped us to break up stands of old-growth timber to supply browse for deer and small game. Often timber operations are purposely located near deer yards where winter browse is needed.

In recreation zones — such as road and stream sides, and in potential as well as developed recreation sites — single-tree selection is the planned cutting practice. The objective is to maintain or develop an attractive forest setting with an all-aged stand of healthy, well-formed trees. Fortunately beech and hemlock are very desirable in this respect if we are not too demanding in regard to health of the trees. Single-tree selection will perpetuate these species.

There are also some 13,000 acres of commercial forest in scenic areas and wilderness areas where no cutting is done because of aesthetics. And there is considerably more area where trails, roads, and streams are so close together that cutting is impractical.

Some 20 percent of the present commercial forest is in municipal watersheds. Yarding with animals has often been prohibited, and this affects thinning efforts. Siltation of streams is by far the greatest logging problem on the Forest. For that reason logging in some watersheds and on some occasions has been limited to periods when the ground is frozen. This minimizes scarification and is probably about the poorest possible silviculture in our hardwood stands.

Influence of Insects and Disease

Unfortunately beech has not only been less desirable on the market over the years, but for the past 30 years a lot of it has been killed and most of the remainder degraded to pulpwood by the beech scale-nectria complex. As a result of this, death of birch from the dieback, high-grading of stands when they were cut in past years, and a lot of winter logging, most of our stands have only about 70 square feet of basal area in trees 6 inches d.b.h. and larger; and desirable crop trees in pole-size stands are often hard to find. Between 1940 and 1960, probably 70 percent of all sawlog yellow birch and 85 percent of the sawlog size beech were killed or degraded to pulpwood. Birch dieback ceased some 10 to 15 years ago, but the loss of beech continues. Degrading the beech is worse than killing it, for the trees prevent regeneration or growth of others.

Between 1940 and 1960, the two influences just mentioned removed from the sawlog market 30 to 60 percent of the volume on practically every acre of northern hardwood timber on the Forest. Since yellow birch is the species most in demand by industry, the value loss was greater.

Influence of Logging Methods

The first sale of timber from the Forest was in 1916; and from then until 2 or 3 years ago, so-called horse-logging was the common practice—yarding or skidding of logs was done with a single horse. Most hardwood logs had to be cut relatively short, for otherwise they were too heavy for the horse to drag. Hardwood pole stands could be thinned by

this method with relatively little damage to the residual trees.

As recently as 3 years ago, probably 80 percent of our cut of timber was horse-logged. Now there is practically none. Everybody has rubber-tired skidders, and competition urges them to skid fast and recklessly. They can and do haul several of our biggest trees in tree lengths at one time; weight of the log is not a limitation. A good operator can still thin our pole hardwoods and haul from the stump with little damage to the residual stand, but such operators are not common and we are now planning a lot less of such thinning than we were 2 years ago. We think we will be doing less commercial thinning than would have been done with horse skidding. More of it will probably be noncommercial. In total, much less will probably be done.

However, the big skidders are by far the best machines ever used on the Forest for clearcutting. We try to do the maximum amount of such cutting in summer and to encourage tree-length logging. In this way we get scarification. Summer logging in the mountains is more practical with skidders than with horses.

The rubber-tired skidder and other mechanical harvesters are probably here to stay, and silviculture must be adapted to them. Operators are being forced to minimize the amount of labor required to harvest timber, and this will probably mean even more mechanization in the woods.

Relatively few truck roads are needed with skidders, and this is a great improvement over the horse-bulldozer system that it replaced. When all of your land is tilted from 10 to 70 percent and you skid with horses, the timber-sale administrator does well if he keeps truck roads 400 feet apart. The pattern of these parallel roads along the slopes, as they were first used by drag sleds and later by trucks, can be seen from the air or on aerial photos over much of the Forest. They are a horror to water-management people. Main rubber-tired skidder roads can be kept 1,000 feet apart. This by no means eliminates the erosion problem, but it helps.

Summary

All of the preceding discussion points up the desirability of silvicultural clearcuttings in many of our present hardwood stands; that is, cutting every tree over 2 inches except for scattered seed trees. Regeneration is no problem; great numbers of birch, ash, and maple reproduce in these clearcut areas. And scarification increases the amount of birch and ash. There is no silvicultural limit on the size of clearcutting if there are seed trees.

We are fortunate in having the Northeastern Forest Experiment Station's northern hardwood experimental forest on the National Forest, with evidence there of birch and ash regeneration after heavy clearcuttings 35 years ago. They are carrying on research on regeneration of birch on the experimental forest and on a 1½ million board-foot timber sale on the White Mountain Forest. In that sale, we are cutting everything over 2 inches d.b.h. from strips that are 50 feet wide. There are three sets of strips, one to be cut every 2 years. Variations of this method are applied on some other sales up to 4 or 5 million board feet in volume. The technique is adaptable to skidder logging and can hardly fail to regenerate intolerant hardwoods under our conditions. Strip cutting also lends itself to areas where broad-scale clearcuttings might be considered unsightly. If put in on slopes at right angles to the line of sight from highways, the strip cut may be quite concealed.

At the other extreme from clearcutting or strip cutting, single tree selection cutting produces hemlock, beech, and some maple. Aesthetically, these may be among the most desirable species. Spruce is also favored by relatively light cuttings since it is almost always present as advance growth and less of it is damaged by a light cutting. Selection cuttings are most useful in scenic and recreation areas.

From 1916—when the first cuttings were made on the White Mountain National Forest—until about 1936, small volumes of timber per acre, fear of wind damage, and lack of markets resulted in the practice of commercial clearcutting *for sawlogs only* in our hardwood stands. Such cuttings often amounted to single-tree selection cuts, and many pulpwood-quality trees were left to form a residual stand. Income per acre was low and no attempt was made to accomplish a complete silvicultural timber-stand-improvement job since it could not be financed. From 1939 until recent years, single-tree selection cuttings were the planned cutting practice.

Thus, from 1916 until recently, in one way or another, we made light partial cuttings and encouraged the regeneration of beech, hemlock, and maple. During the mid 1950's, we decided that we should be cutting heavier to promote regeneration of birch. The development of a hardwood pulpwood market at about the same time made it possible to do this. We were able to remove a lot more low-quality trees and to open up the stands to encourage intolerant species. During the past 3 years we have been able to require silvicultural clearcutting on our sales. The big skidders have also helped by tearing up the ground (seedbed scarification) and eliminating unwanted trees. Thus, we feel that we are now getting the type of regeneration we want on most of our cutover areas.

As markets improve, we should be able to do more clearcutting. Of course, in the end, we are setting up a big thinning job for the future, but markets and operating methods may change several times before then.

We try to do our clearcutting in summer, with rubber-tired skidders and tree-length logging to insure reproduction. And we want to do our thinning in the winter, skidding short logs (20 feet or less) to minimize damage to residual trees. During the year ending 30 June, 1968, we regenerated 3,401 acres on sales, and had 2,920 acres thinned.

Our increased use of clearcutting and even-aged management is not as complete a change as some seem to think. Although the harvest-regeneration cuttings under even-aged and uneven-aged management are quite different, there really is not any great difference in the woods between the two systems most of the time. One involves a series of two or three thinnings leading up to a reproduction cut while the other is a perpetual series of thinnings. I think the extreme differences we often ascribe to the two systems are largely in the minds of people who speak in very general terms.

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