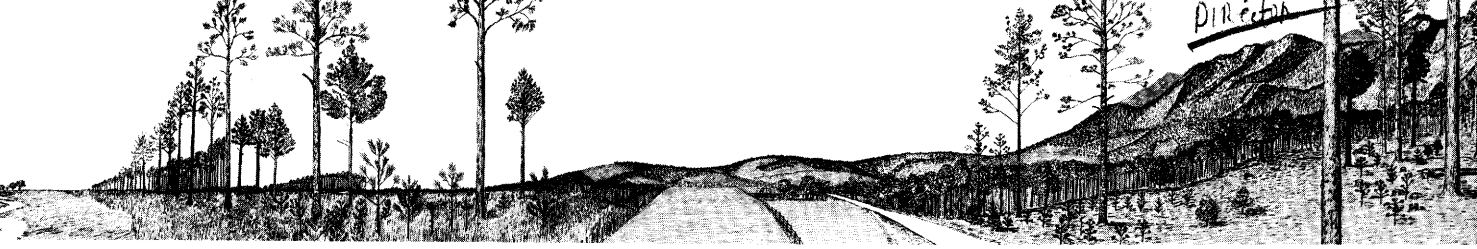

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REGENERATION TRENDS 10 YEARS AFTER CLEARCUTTING OF AN APPALACHIAN HARDWOOD STAND

Abstract.--Ten years after a Southern Appalachian hardwood stand was clearcut, numbers of stems of desirable species appear adequate to restock the area. Yellow-poplar will dominate on the better sites. Some problems are anticipated from grapevines, black locust thickets, and red maple clumps.

In 1963, a 46-acre stand of high-quality mixed hardwoods was harvested on the Bent Creek Experimental Forest. Sawtimber and pulpwood were removed by commercial logging, and leftover material over $4\frac{1}{2}$ feet tall was felled by a contractor. Prior to the cutting, advance regeneration was sampled on each of 46 1-acre plots. Regeneration was then sampled 1 year, 5 years, and now 10 years after the cutting. The 5th-year results indicated that the area would be adequately restocked with desirable hardwood species[1]. However, some problems with red maple (Acer rubrum L.) sprouts and grapevines were anticipated.

RESULTS AND DISCUSSION

The outlook for successful stand establishment continues to be good. There are 379 stems per acre that are free from overtopping vegetation (free to grow). This number includes the most desirable timber trees as well as all other free-to-grow stems, and represents an overall loss of 627 free-to-grow stems in the past 5 years (table 1).

There is now an average of 202 yellow-poplar (Liriodendron tulipifera L.), oak (Quercus spp.), sweet birch (Betula lenta L.) and other desirable timber trees that are free to grow. Nineteen of the 46 plots contain over 200 of these free-to-grow stems, while seven plots have less than 80. Nineteen plots also contain over 200 free-to-grow stems of less desirable species, while 11 plots have less than 80 of these desirable free-to-grow stems.

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[1] McGee, Charles E., and Ralph M. Hooper. 1970. Regeneration after clearcutting in the Southern Appalachians. USDA For. Serv. Res. Pap. SE-70, 12 p. Southeast. For. Exp. Stn., Asheville, N.C.

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Table 1.--Free-to-grow stems on a 46-acre area clearcut in 1963

Species	1968		1973		Five-year change in free-to-grow stems
	Seedlings	Sprouts	Seedlings	Sprouts	
	Number of stems per acre				
Yellow-poplar	79	63	47	37	-58
Northern red oak	20	13	7	3	-23
Black oak	2	0	1	1	0
Chestnut and white oak	20	24	4	13	-27
Sweet birch	226	35	50	18	-193
Black locust	0	247	0	105	-142
Red maple	4	58	4	30	-28
Miscellaneous I[1]	23	34	11	10	-36
Miscellaneous II[2]	23	135	5	33	-120
Total	397	609	129	250	-627

[1] Miscellaneous I includes hemlock, ash, wahoo, black cherry, and basswood.
[2] Miscellaneous II includes witchhazel, sourwood, sassafras, blackgum, and dogwood.

The tallest trees on each plot average 28 feet in height. The tallest species is black locust (Robinia pseudoacacia L.), followed by yellow-poplar, red maple, and sweet birch. The tallest saplings are in almost every case, except black locust, of stump sprout origin.

When this stand was logged, the oaks made up a major portion of the removed material. For example, 510 northern red oak (Quercus rubra L.) distributed over 44 of the 1-acre plots, contained 83,000 board feet and 34 cords of wood. Advance regeneration in 1963 included 1,450 northern red oak seedlings per acre. By 1965 only 408 northern red oak per acre were present. In 1968 the stand contained 33 northern red oak stems per acre that were free to grow. Now the stand contains only 10 free-to-grow red oak stems per acre, and the other oaks have fared about as poorly. It appears that barring some unforeseen happening, northern red oak will only be an occasional inhabitant on the rich northeast-facing slope.

There is now an average of 84 yellow-poplar per acre that are free from overtopping vegetation. These trees are generally well distributed and are growing rapidly. It is likely that these yellow-poplar will continue to dominate so that portions of the stand will become pure yellow-poplar. However, 58 yellow-poplar stems per acre have lost dominance in the last 5 years. Some have lost out to other, faster growing yellow-poplar or to black locust. However, many yellow-poplar stems have been hampered by grapevines. On 15 of the 16 plots where some yellow-poplar stems

lost dominance, grapevines are present and played an important role in the loss of potential yellow-poplar crop trees. Many of the yellow-poplar listed in table 1 as free to grow now contain grapevines. While the physical damage already caused by grapevines is great, the potential for additional damage is greater. If an ice storm occurs in this area in the next 20 to 30 years, the crop trees containing grapevines will be highly susceptible to ice buildup and breakage.

In 1968, sweet birch was the most numerous desirable species and had a relatively strong position in the stand canopy. Sweet birch now appears headed for a secondary role. The species is now reduced to 68 free-to-grow stems per acre, and very few of these are keeping pace with yellow-poplar and other fast-growing species.

Both black locust and red maple can produce desirable timber products; however, in this stand neither species is considered highly desirable. The black locust have reproduced mostly in dense thickets, and most of them will not develop worthwhile stems. Research nearby has shown that when black locust does occur in dense thickets, the growth of yellow-poplar within that thicket is significantly reduced.[2] Most of the red maples on this site are in sprout clumps that occupy considerable space. Few, if any, of the individual red maple sprouts appear capable of developing into high-quality stems. It is significant that the numbers of free-to-grow black locust and red maple sprouts have dropped markedly since 1968.

A big question concerning this stand and all other young Southern Appalachian hardwood stands is the need for precommercial treatments. If stand establishment is the only goal on the study area, there appears to be little justification for precommercial thinning or cleaning, except for some form of crop-tree release from grapevines. The 202 free-to-grow stems of the more desirable timber trees, plus some of the black locust, red maple, and others, almost assures a fully stocked stand. However, cleaning might be justified if a premium is placed upon a change in species composition, better stem distribution, faster growth rate of crop trees, or browse production.[3] The gains from such precommercial activities would have to be high to offset the considerable cost involved.

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[2] Beck, Donald E., and Charles E. McGee. 1974. Locust sprouts reduce growth of yellow-poplar seedlings. USDA For. Serv. Res. Note SE-201, 6 p. Southeast. For. Exp. Stn., Asheville, N. C.

[3] Della-Bianca, Lino. 1975. An intensive cleaning of mixed hardwood saplings--10-year results from the Southern Appalachians. J. For. 73:25-28.

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