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15-YEAR RESULTS OF IMPROVEMENT CUTTING IN BOTTOMLAND HARDWOODS

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That severely depleted bottomland stands can be returned to quality hardwood production is being demonstrated on a representative tract in the Delta Experimental Forest which was given an improvement cutting about 15 years ago.

In 1940, 90 acres of deteriorated bottomland hardwoods were divided into nine 10-acre plots. Three plots were given an improvement cut intended to be light, three were cut more heavily, and three were left uncut as check plots. Cutting was based on rules which classified trees according to size class and species desirability.

The heavy cut removed all trees six inches in diameter and larger which lacked promise of a standard lumber log, or which were unthrifty, or which were not of the most desirable species group. The light cut left trees less than 14 inches d. b. h.. (diameter measured 4½ feet above the ground) unless they were damaged, poor risks, or interfering and larger trees were cut if they were of species deemed ill-adapted to the site and incapable of developing factory lumber logs. These treatments resulted in the "cut" figures shown in table 1.

Results

The total basal area growth during the first 15 years of observation was greater on the treated plots than on the check. (Basal area per acre is the cross-sectional surface of all trees on an acre measured 4-½ feet above the ground.) The relative productivity of the uncut plots has been decreasing steadily (fig. 1).

The trend of net board foot volume growth has been upward on the treated plots, downward on the check. By 1954 growth on thinned plots far surpassed that in the uncut stand (fig. 2). The effects of 4 years of growing-season drouth are reflected in the 1950-1954 data. Heavy mortality during this last remeasurement period contributed to the sudden drop in the production of the check plots.

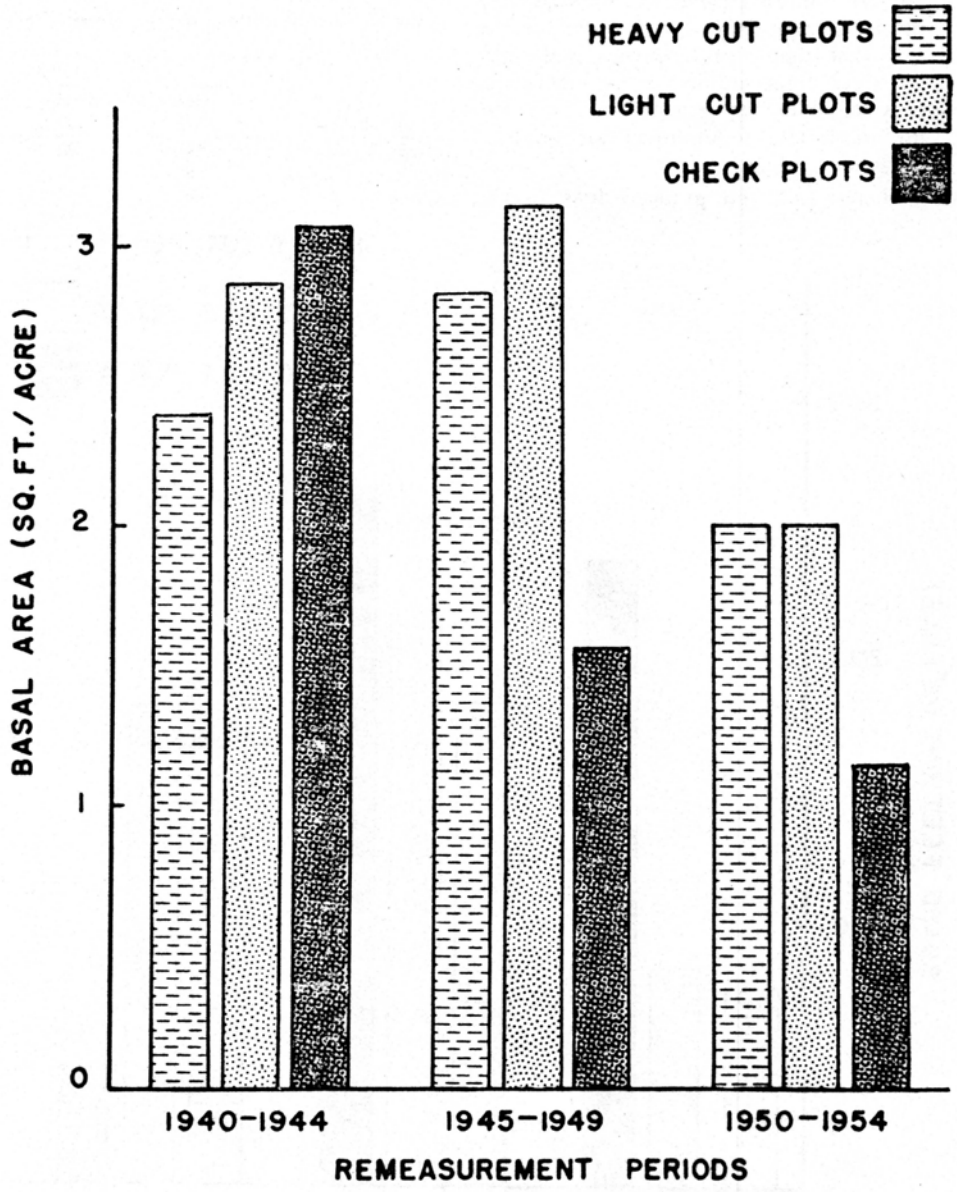

Figure 1. Mean annual basal area growth per acre in trees 5.6 inches d.b.h. and larger, by treatment.

[1]Southern Forest Experiment Station, Forest Service, U. S. Dept. of Agriculture, in cooperation with Mississippi Agricultural Experiment Station.

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Thinning apparently improved the ability of the trees to withstand the effects of the dry years. Table 2 presents the complete mortality data. Although some of the loss could have been salvaged by a costly, continuous operation, many of the trees were ruined by stain and insects before the salvage crews could have reached them.

Returns as measured by log grade improvement are shown in table 3. Plots given a light cut now have nine times as many board feet in grade 1 and 2 logs as they did in 1940. The heavily cut plots have six times as much board-footage in grades 1 and 2, and the uncut plots only three times as much. Quality improvement in the treated plots is temporarily still obscured by the fact that many prospectively high-quality trees must attain several more inches of diameter growth to meet the minimum size requirement for grade 2 or grade 1 logs.

Heavy gains on grade 3 logs in the treated plots reflect ingrowth of thrifty, desirable species into the small sawlog sizes. The bulk of these will become grade 2 and 1 logs as they attain larger sizes during years to come. Much of the grade 3 volume in check plots is in logs for which clear cuttings, not size, are the limiting factor; in these not much improvement in grade can be expected.

Table 1. Average stand per acre in 1940.

Treatment	Cut		Left to grow	
	Basal area[1]	Volume[2]	Basal area[1]	Volume[2]
	Sq. ft.	Bd. ft.	Sq. ft.	Bd. ft.
Heavy cut	51	1,455	12	337
Light cut	39	962	18	316
Check (uncut)	—	—	63	1,815

[1]In trees 5.6 inches d.b.h and larger.
[2]International 1/4-inch rule, in trees 13.6 inches d.b.h. and larger.

Table 2. Number of trees larger than 5.6 inches d.b.h. dying by 5-year period and by treatment.

Treatment	1940-1944		1945-1949		1950-1954	
	No.	Percent[1]	No.	Percent[1]	No.	Percent[1]
Heavy cut	1	0.1	3	0.5	64	6.0
Light cut	1	0.1	6	0.3	118	6.0
Check	53	4.6	38	2.9	465	22.2

[1]Percent of trees present at beginning of 5-year period.

Table 3. Net board-foot volume (International 1/4-inch log rule) per acre after treatment, by log grade.

Treatment	1940			1954		
	Grade 1	Grade 2	Grade 3	Grade 1	Grade 2	Grade 3
Heavy cut	140	90	102	776	696	1,115
Light cut	85	59	172	628	750	1,364
Check	469	437	909	1,393	1,041	2,126

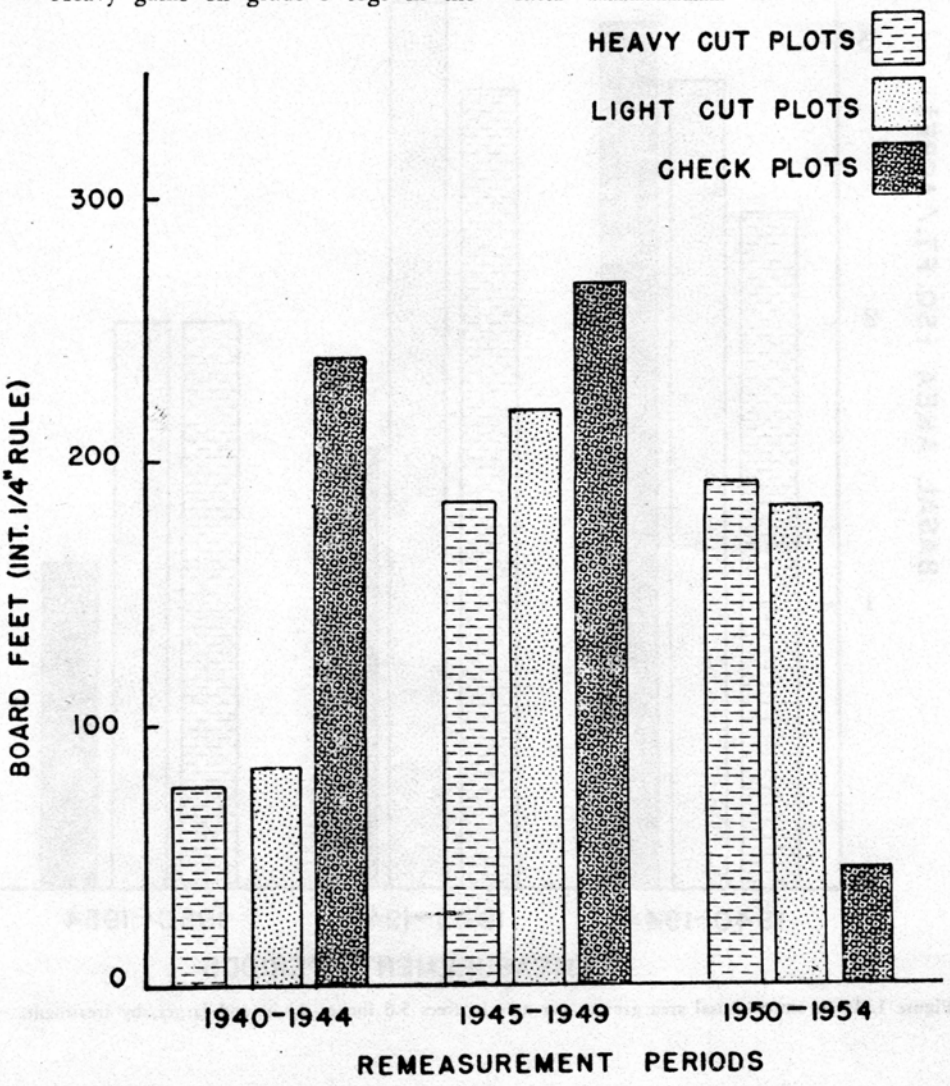

Figure 2. Mean annual board-foot growth per acre in trees 13.6 inches d.b.h. and larger, by treatment.

Conclusions

Fifteen years have elapsed since this study was installed. Fifteen more will be required before the ultimate benefits of the improvement cut can be realized. Unfortunately, no studies were started 30 years ago to guide foresters in marking increasingly valuable hardwood stands. The preliminary trends revealed by this study are, therefore, helpful to those interested in hardwood management.

Obviously, the cuts improved the growth and value of the stands. It appears likely, however, that even the light cut reduced growing stock to somewhat below optimum. The 1940 marking rules strongly favored certain species that were then considered especially desirable. Some of the trees that were cut because they were not of the "best" species were vigorous and well formed, and might have become valuable components of the stand. Modern marking technique is based more on the quality of the individual tree than on its species.

Thus neither the heavy nor the light cut would be considered ideal by today's standards. But both were far better than no cutting.