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Research Note

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Status of Privately Owned Harvested Timberland in East Oklahoma, 1976-1986

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SUMMARY

Commercial harvesting impacted 1 million acres, or 27 percent of the privately owned timerland in east Oklahoma between 1976 and 1986. Timberland was harvested in equal amounts on forest industry land and nonindustrial private land. Clearcutting was the preferred method of harvest on forest industry land. Nearly all harvesting on nonindustrial land was conducted as partial cuts. Stocking of pine on all private lands exceeded 60 percent in 58 percent of the pine and mixed pine-hardwood stands harvested during the period.

Additional keywords: Clearcut, high-grading, pine regeneration, timber supply.

INTRODUCTION

The Forest Inventory and Analysis Unit (FIA) of Southern Forest Experiment Station conducts periodic inventories of forest resources in the Midsouth region of the United States. Two aspects of these surveys—harvesting practices and pine regeneration—track the status of privately owned timberland. Monitoring of pine regeneration has become especially important because of recent findings that softwood inventory has declined in southeast Oklahoma where softwood removals now exceed growth, and a finding similar to that for the whole Midsouth region (Birdsey and Bertelson 1987; USDA-FS 1987).

DATA COLLECTION

Data were collected during the 1986 inventory of east Oklahoma (fig. 1). Forest acreage and timber volume data were secured by a systematic sampling method involving both a forest-nonforest classification on aerial photographs and on-the-ground measurements of trees at sample locations. The sample locations were at intersections of a grid of lines spaced 3 miles apart. On-the-ground measurements included data describing crop tree removals, management activity, natural disturbance, and the stocking of well established pine seedlings (6 inches or greater in height). Sample locations were assigned a code describing any harvest since previous measurement in 1976. Field crews used existing plot conditions along with personal judgment to distinguish between harvesting and other management activities such as commercial thinning, precommerical thinning, or stand improvement cuttings.

HARVESTING

The last 10 to 15 years of forestry in east Oklahoma have been characterized by increased harvesting of timberland (Thomas 1985). Twenty-seven percent of the privately owned east Oklahoma timberland surveyed in 1976 showed evidence in 1986 of commercial harvesting (table 1). Commercially harvested timberland included stands that underwent clearcuts or partial cuts. Partially cut stands included those receiving heavy cutting such as diameter-limit cuts (see Definition of Terms section). The 1 million acres harvested was split equally between forest industry and nonindustrial private owners. Forest industry timberland was most heavily impacted, however, as half of the industry's holdings showed signs of harvest. This finding is in line with conditions on forest industry land in the 1986 forest survey of east Texas (McWilliams and Skove 1987). Less than 20 percent of the east Oklahoma nonindustrial private timberland was harvested.

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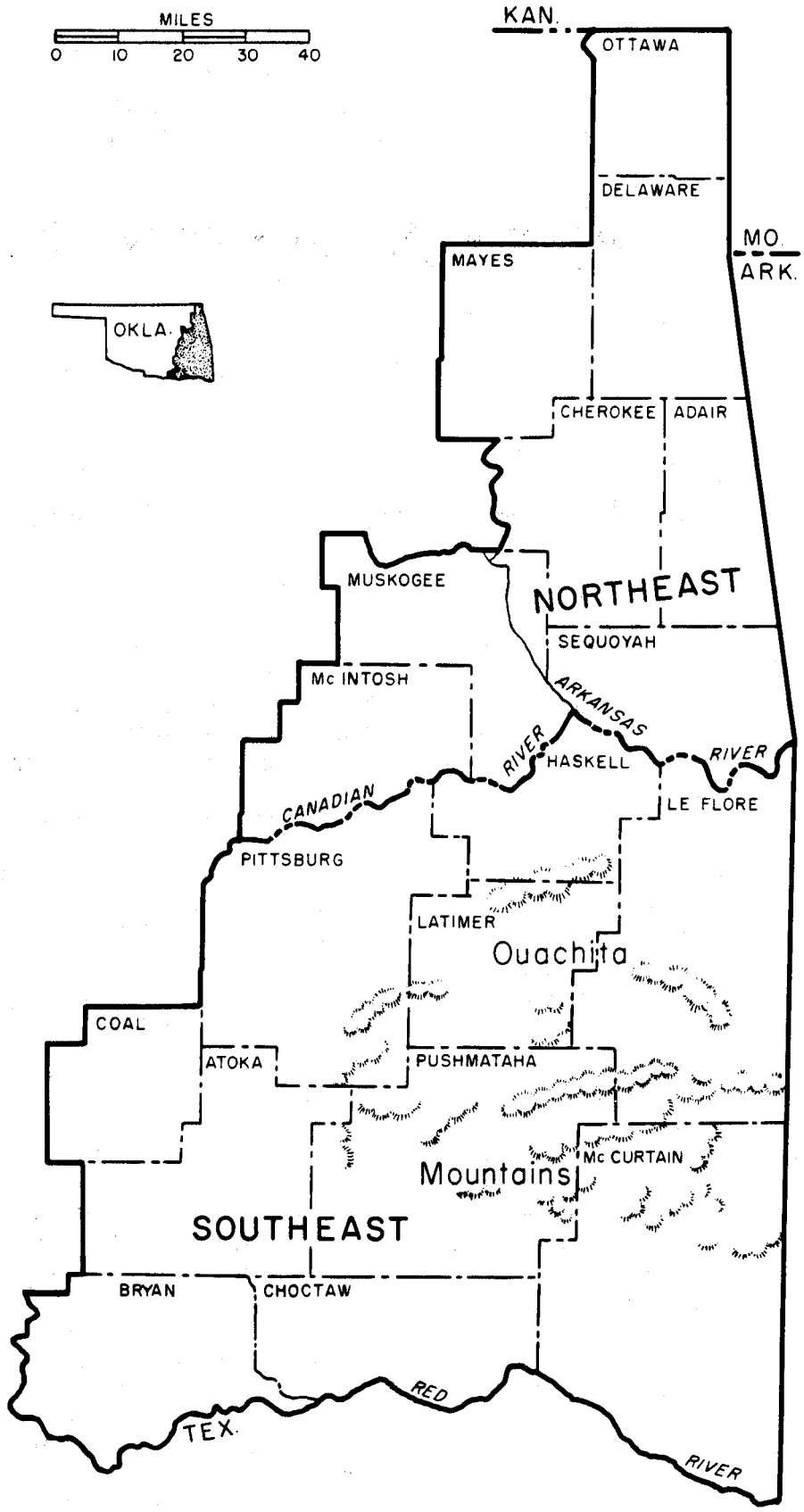

Figure 1.—*The forest survey regions of east Oklahoma.*

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Table 1.—*Area of timberland harvested*[1] *by ownership class, past forest type, and method of harvest for private owners, east Oklahoma, 1976-1986*

Ownership class and past forest type	Total past timberland	Total timberland harvested	Method of harvest	
			Clearcuts	Partial cuts[2]
	Thousand acres			
Forest industry				
Pine types	436.0	254.4	184.1	70.3
Mixed pine-hardwoods	281.2	150.4	126.7	23.7
Hardwood types	274.1	92.4	63.2	29.2
Total	991.3	497.2	374.0	123.2
Nonindustrial private				
Pine types	265.4	92.4	16.5	75.9
Mixed pine-hardwoods	337.1	66.7	12.4	54.3
Hardwood types	2,167.0	369.1	17.1	352.0
Total	2,769.5	528.2	46.0	482.2
Total private				
Pine types	701.4	346.8	200.6	146.2
Mixed pine-hardwoods	618.3	217.1	139.1	78.0
Hardwood types	2,441.1	461.5	80.3	381.2
Total	3,760.8	1,025.4	420.0	605.4

[1]Excludes precommercial thinnings, commercial thinnings in poletimber stands, and single-tree selection.

[2]Includes pine selection, diameter-limit, and salvage cuts. Thinnings in poletimber stands are excluded; heavy thinnings of dominant trees in sawtimber stands are included.

Cutting patterns of the two ownerships varied considerably in terms of forest types affected and harvest method used. Nearly two-thirds of harvest activity on forest industry timberland involved clearcuts in pine and mixed pine-hardwood stands.

Harvesting on nonindustrial private land was oriented towards partial cutting. More than 90 percent of the cutting was conducted in this manner. Almost three-fourths of the partial cuts occurred in hardwood stands. Most of the partial-cut hardwood stands were "high-graded". High-grading occurs when the most valuable trees of a stand are selectively removed. Both the value and vigor of a healthy forest stand are destroyed by high-grading. This practice caused a significant decline in the percentage of pine and select-oak sawtimber volume remaining in partial-cut hardwood stands on nonindustrial land (fig. 2).

For both ownerships combined, the areas harvested for each of the three forest types were roughly equal, but stands containing pine timber were most heavily cut. Forty-three percent of the timberland in pine and mixed pine-hardwood types was harvested. Only 19 percent of the hardwood type timberland was cut.

PINE REGENERATION

Stocking is quantified by comparing existing tree stocking, in terms of numbers of trees or basal area, to "normal" stocking standards used by FIA (see Definition of Terms section). Inventory plots are characterized as understocked or overstocked in relation to this standard. Pine regeneration on harvested sites can be assessed by examining the degree of pine stocking following harvest.

The extent of pine regeneration on harvested pine and mixed pine-hardwood stands is an important factor affecting future pine timber supplies. Fifty-eight percent of the 563,900 acres of these stands that were harvested exhibited a high stocking of pine following harvest (table 2). An additional 23 percent was classifed as having medium pine stocking. Stands with medium stocking can often be considered as having adequate pine regeneration since young pine trees usually dominate hardwoods 10 to 15 years after establishment. This process is hastened through hardwood control measures, especially in stands with considerable hardwood competition.

Pine regeneration was more successful on forest in-

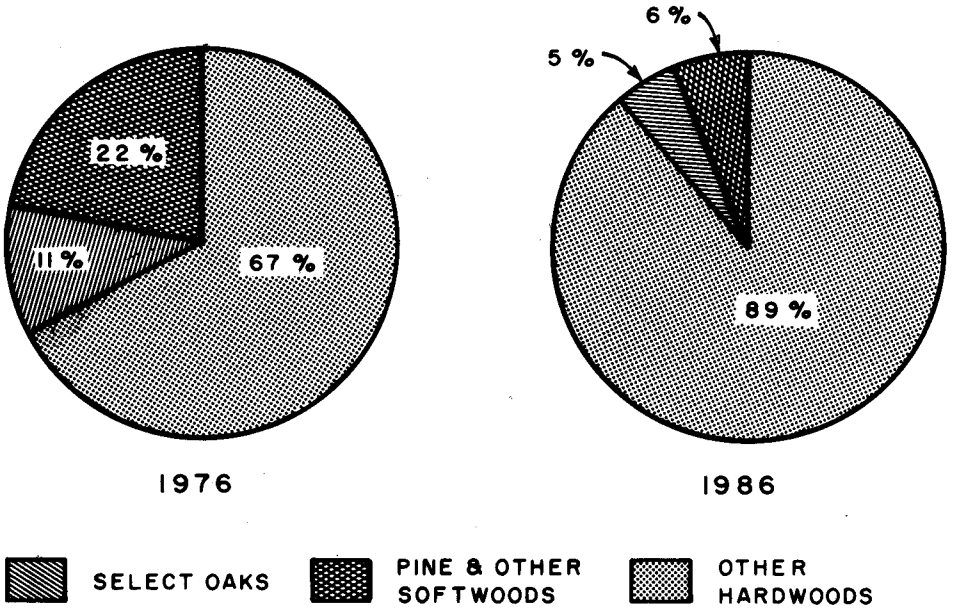

Figure 2.—*Distribution of sawtimber volume by species group in partial-cut hardwood stands on nonindustrial private timberland, east Oklahoma, 1976 and 1986.*

Table 2.—*Area of timberland harvested[1] by ownership class, past forest type, and pine stocking class for private owners, east Oklahoma, 1976-1986*

Ownership class and past forest type	Total	Pine stocking class[2] Low	Medium	High
	Thousand acres			
Forest industry				
Pine types	254.4	22.5	29.2	202.7
Mixed pine-hardwoods	150.4	28.6	58.4	63.4
Hardwood types	92.4	28.9	34.6	28.9
Total	497.2	80.0	122.2	295.0
Nonindustrial private				
Pine types	92.4	18.2	12.0	62.2
Mixed pine-hardwoods	66.7	36.7	30.0	....
Hardwood types	369.1	356.5	12.6	....
Total	528.2	411.4	54.6	62.2
Total private				
Pine types	346.8	40.7	41.2	264.9
Mixed pine-hardwoods	217.1	65.3	88.4	63.4
Hardwood types	461.5	385.4	47.2	28.9
Total	1,025.4	491.4	176.8	357.2

[1]Excludes precommercial thinnings, commercial thinnings in pole-timber stands, and single-tree selection.

[2]Low indicates 0-29 percent stocked with pine (all size classes), medium indicates 30-59 percent stocked with pine (all size classes), and high indicates 60 percent or greater stocked with pine (all size classes).

dustry timberland than on nonindustrial private timberland (fig. 3). Eighty-seven percent of the harvested pine and mixed pine-hardwood timberland owned by forest industry had medium or high stocking, in contrast to 65 percent on nonindustrial tracts.

Regeneration of pure pine stands was quite successful for both ownerships. Only 12 percent of the harvested pine stands had low pine stocking.

Conversion of hardwood type timberland to pine was apparent on forest industry land. More than two-thirds of the harvested hardwood stands (63,500 acres) owned by forest industries had medium or high stocking of pine.

CONCLUSIONS

Information on the status of harvested timberland provides insight into future timber supplies. The heavy concentration of cutting on forest industry timberland will certainly impact future availability. Long-term pine timber supplies from cut-over forest industry stands should be secure due to successful pine regeneration in pine and mixed pine-hardwood stands as well as the conversion of hardwood forests to pine. However, a continued investment in stand management will most likely be needed to ensure future merchantability of regenerated stands. Furthermore, 10 to 15 years will pass before these stands become marketable for timber products. Nonindustrial forests will most likely undergo increased cutting when less supply is available from forest industry timberland in the short-term future.

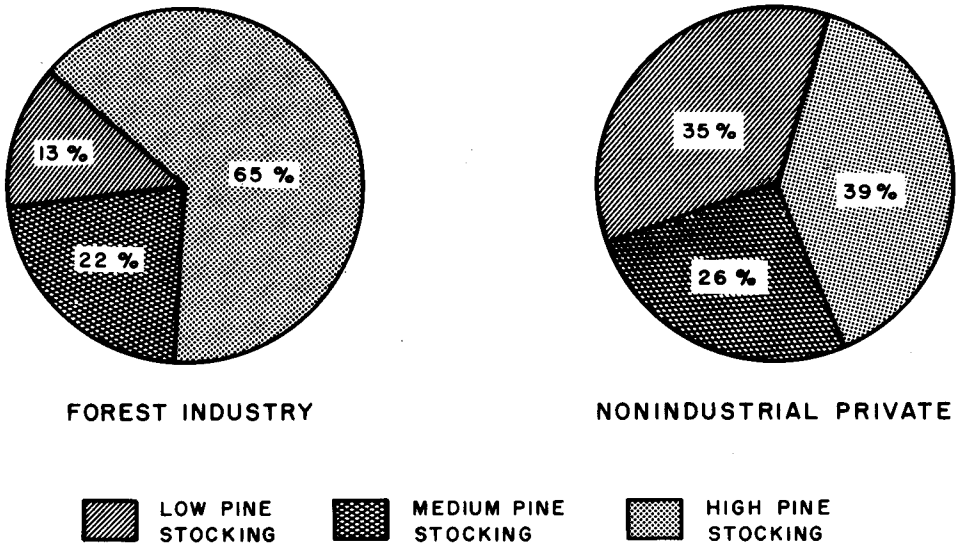

Figure 3.—*Status of privately-owned pine and mixed pine-hardwood type timberland, east Oklahoma, 1976 to 1986.*

DEFINITION OF TERMS

FIA.—Forest Inventory and Analysis unit of the U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Forest type.—A classification of FIA plots according to the relative stocking of pine and hardwood trees tallied.

Pine: Forests in which pine species comprise the plurality of all live tree stocking.

Mixed pine-hardwoods: Forests in which pines comprise 25 to 50 percent of the stocking, and hardwood species comprise the plurality of all live tree stocking.

Hardwood: Forests in which hardwood species, singly or in combination, comprise a plurality of all live tree stocking, except where pines comprise 25 to 50 percent of the stocking (see previous definition for mixed pine-hardwoods).

Harvesting.—A classification assigned to FIA plots that have undergone some form of crop tree removal since the last survey. Precommercial thinnings, commercial thinnings in poletimber stands, and the removal of a small number of trees for firewood, posts, or other products are excluded.

Clearcut: Stands that undergo removal of all utilizable and/or nonutilizable trees.

Seed tree and shelterwood: Heavy cutting of a stand with a small number of crop trees left to provide seed or shade to establish a new stand.

Partial cut: Pine-selection cuts, diameter-limit cutting, highgrading, or any other sawtimber cutting practice that leaves a residual stand of potential crop trees and/or cull trees. Thinnings in poletimber stands are excluded; heavy thinnings of dominant trees in sawtimber stands are included.

Salvage: Removal of damaged or salvable dead trees, often leaving a gap in the stand.

Pine stocking class.—A classification of timberland according to the degree of live pine tree stocking. All size classes are included.

High stocking: 60 percent or greater stocked with pine.

Medium stocking: 30 to 59 percent stocked with pine.

Low stocking: 0 to 29 percent stocked with pine.

Stocking.—A measurement of the extent to which the growth potential of the site is utilized by trees or preempted by vegetative cover. Stocking is determined by comparing the stand density in terms of number of trees or basal area with a specified standard. The tabulation below shows the density standard in terms of trees per acre, by size class, required for full stocking:

D.b.h. (inches)	Number of trees per acre
seedlings	600
2	560
4	460
6	340
8	240
10	155
12	115
14	90
16	72
18	60
20	51
22	42
24	36
26	31
28	27
30	24

Timberland.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having such tree cover, capable of producing crops of industrial wood. Land that is currently developed for nonforest use or withdrawn from timber utilization through statute or administrative regulation is excluded.

LITERATURE CITED

Birdsey, R. A.; Bertelson, D. F. 1987. Forest statistics for southeast Oklahoma counties. Resour. Bull. SO-119. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station; 30 p.

McWilliams, W.H.; Skove, D. J. 1987. Status of privately owned harvested timberland in east Texas 1975-1986. Res. Note SO-338. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station; 6 p.

Thomas, C. E. 1985. Oklahoma midcycle survey shows change in forest resource trends. Resour. Bull. SO-100. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station; 19 p.

U.S. Department of Agriculture, Forest Service. The South's fourth forest: alternatives for the future. Govt. Print. Off., Washington, D.C. (in press).