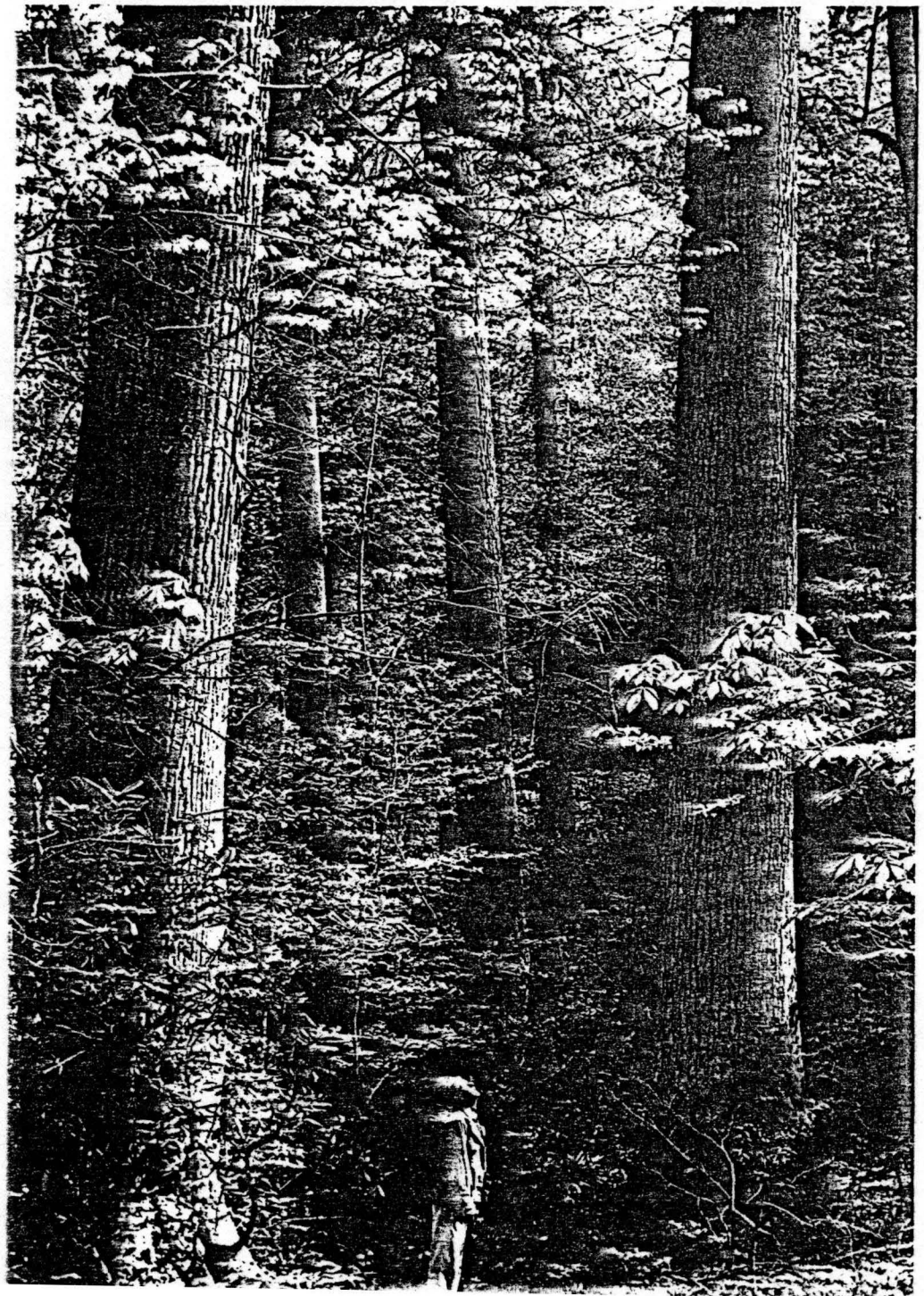
*Reprinted from:* Forest Farmer 44(3): 6-7. Jan. 1985.

# Hardwood management options hold promise

By ROBERT L. JOHNSON and DR. ROY C. BELTZ
*U.S. Forest Service*

## Good hardwoods are becoming scarce and valuable



Since the 1950s, dramatic changes have occurred in the hardwood resources of the Midsouth—Arkansas, Louisiana, Mississippi, and Tennessee. Thousands of acres of upland hardwood forests have been converted to pasture for beef cattle. Clearing for agricultural crops, mainly soybeans, has removed more than 4 million acres of prime hardwoods in the bottomlands.

Although some areas are reverting to hardwood forests, clearing more than offsets the gains. Rate of clearing has dropped substantially during the past five years because less acreage is considered suitable for farming and because owner objectives have changed. For example, wildlife interests in hardwood forests are becoming increasingly important. In addition to the many thousands of acres purchased for wildlife habitat by state and federal agencies, numerous hardwood tracts have been acquired by individuals or groups for private hunting, fishing, and recreation. Fortunately, some degree of timber harvesting is still part of most wildlife management programs.

Other land-use changes adversely affecting hardwood timber production include areas where reservoirs have flooded choice lands capable of producing preferred hardwood species. Water impoundments may be a boon to sport fishing and other water-based recreation, but they totally eliminate fine hardwood forests.

In spite of the losses, there are still 42,285,000 acres of commercial forest land in the Midsouth. Forty-three percent is upland hardwoods, 27 percent bottomland hardwoods, and 16 percent pine-hardwoods. Nearly pure pine and a small acreage of eastern redcedar account for the remaining 14 percent (See table). About 90 percent of the acreage is privately owned, most of it controlled by nonindustrial timberland owners.

### Stand Quality and Stocking

Assessment of the hardwood resource must include tree or log quality which is so important to timber values. Tree size and physical attributes such as knots, holes, and even bird pecks affect tree quality. Moreover, species diversity within southern hardwoods is much greater than in southern softwoods and serves further to cloud the quality issue.

When conducting statewide forest assessments, survey crews assign the butt log of each sawtimber size tally tree (about 11.0 inches d.b.h.) a log grade. Upper stem log grades are estimated by equations developed during felled tree studies. In the Midsouth states, the distribution of hardwood board foot volume by grade is fairly consistent. (Hardwood logs are graded on a scale of 1 to 4, with grade 1 being the best and most valuable, and grade 4 least valuable.) About 47 percent of the sawtimber is in log grade

3, 26 percent is in grade 4, 17 percent is grade 2, and 10 percent is in log grade 1.

In the four-state area, about one-third of the grade 1 volume is in Tennessee, the state with the highest share of its hardwood volume in grade 1 (12 percent). We cannot offer a rule-of-thumb for estimating relative values of grades 1, 2, and 3 logs because of differences among species, and Midsouth forests have 60 to 70 species that are considered commercial. But, for just one group, red oaks, grade 1 logs currently are about 1.5 times more valuable than grade 2 logs, which are nearly twice the value of grade 3 logs.

Tree size (log size) is an important determinant of hardwood log quality. Minimum scaling diameter for grade 1 butt logs is 13 inches (inside bark at small end) if all other criteria are met. Diameters at breast height must be 16 to 18 inches to qualify for grade 1. Volume by diameter class distribution indicates that only one-third of the trees qualify on the basis of size alone. For log grade 1, half of the volume is in trees 22 inches d.b.h. and larger.

Species and hardwood tree quality are loosely related. Good sites tend to produce better quality logs; poor sites produce poor-quality logs. Thus management to favor desirable species on good sites offers an opportunity to improve quality in the long run. In the most recent forest surveys of each state, logs graded number 1 were tabulated by individual species. In three of the four states, the single species with the largest volume of grade 1 volume was sweetgum.

The exception was Tennessee where white oak claimed number 1, but sweetgum was still in the Top 10. Other species prominent in the grade-1 Top 10 were cherrybark oak, yellow-poplar, northern red oak, and other species generally regarded as quality hardwoods. There were a few surprises in the Top 10. Hickory, like sweetgum, was in the Top 10 for each of the states. Another surprise, water tupelo, was number 2 in Louisiana; willow was number 3. Cottonwood was prominent in all but Tennessee. Overcup oak comprised 10 percent of the grade 1 material in Arkansas.

Limited markets are an indirect cause for the gradual reduction in hardwood tree quality and, on better sites, for gradual stand conversion toward more shade-tolerant, less desirable species. Markets exists for the largest and best trees, but if such are the only ones cut, stand deterioration in terms of species and quality is inevitable. Another effect of frequent harvests of only higher quality sawtimber trees is the gradual reduction in annual value production brought about by lowering the volume base.

Low board-foot volumes per acre can be compared to a low balance savings account. Even at relatively high rates of interest, returns are modest. Stands should be allowed to develop a base volume of at least 4,000 board feet per acre, a level found on only about 20 percent of our current stands. An annual growth of 7 to 8 percent which is attainable in well-stocked, managed stands amounts at today's prices to perhaps $30 per acre or more annually. Compare this with the 2 to 3 percent return from stands that have a high proportion of cull trees and a base growing stock volume of less than 1,500 board feet per acre.

## Outlook

Acreage capable of producing marketable hardwoods is expected to continue declining due to the economic advantages of growing alternative crops such as soybeans or graze for beef cattle. One important impetus that could slow the decline of hardwood forests and improve rundown stands may come from finding uses and adding value to inferior growing stock. Industries that use hardwoods for reconstituted board products offer an important expanding market. Fuelwood is another but still cloudy market for low-quality trees.

Research has already demonstrated forest management techniques that could improve production of both bottomland and upland forests. One measure is to release desirable stems by removing overtopping trees either through cutting or deadening. Where necessary, good species can be established either by converting existing stands or by establishing new stands in open areas. Two options are available: planting or seeding.

Hardwood plantations are relatively new to the Midsouth, but the acreage planted still exceeds that in all other sections of the nation. Cottonwood plantings cover more than 50,000 acres, mostly on extremely productive sites in the Mississippi River batture. Generally, they have replaced stands of relatively low-value species, primarily boxelder, that were growing at about one-fifth the rate of planted cottonwood. Research at Stoneville, Mississippi shows that on a good site annual production of a 10-year old cottonwood planting would average about 300 cubic feet per acre. Up to 10,000 board feet per acre of sawtimber cottonwood is attainable in 20 years, depending on the spacing between trees.

Plantations of sycamore, sweetgum, and green ash cover perhaps 15,000 acres of productive bottomland sites. Early indications are that sycamore may average about two-thirds and green ash and sweetgum about one-half the annual volume production of cottonwood.

Oaks will continue to be among the most important tree species in the Midsouth. On poor sites oaks will likely persist as a major component of post-harvest stands. But competition from trees of faster-growing species clouds the future for establishment and development of oaks on good sites. For those willing to invest, oaks can be successfully planted. A less expensive method to establish oaks in forest openings or in abandoned fields is direct seeding of acorns. At Stoneville excellent 10- to 15-year-old test stands of oak have grown from field-sown acorns. Commercial seedings on open fields of two wildlife refuges in the Midsouth area had promising results.

There is an obvious trend upward for multiple resource management in hardwood forests. Timber management will likely be slightly altered in consideration of other resources, particularly wildlife. The most obvious change may be longer rotations for mast-bearing species. It is conceivable that very soon income from wildlife ventures could match or exceed the landowner's income from timber harvest.

The landowner with high-quality hardwoods or with sites that have the potential to grow good hardwoods is in a position to capitalize on the future. Based on the condition of today's stands, good hardwoods are going to become scarce and consequently even more valuable for products and for wildlife habitat. □

**Commerical forest land in the Midsouth by state and timber type.**

| State | Timber Type | | | | |
|---|---|---|---|---|---|
| | Bottomland hardwoods | Upland hardwoods | Pine-hardwoods | Pine[1/] | Total |
| | *Thousands of acres* | | | | |
| Arkansas | 2,628 | 5,174 | 2,034 | 1,784 | 11,620 |
| Louisiana | 4,960 | 1,314 | 1,551 | 1,724 | 9,549 |
| Mississippi | 3,224 | 3,324 | 2,217 | 1,939 | 10,704 |
| Tennessee | 790 | 8,204 | 954 | 464 | 10,412 |
| Total | 11,602 | 18,016 | 6,756 | 5,911 | 42,285 |

1/ Includes a small acreage of eastern redcedar.