# Central Hardwood Forests: Recent Trends in a Robust Resource

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Abstract: Re-inventories completed for each of four Central Hardwood States (Kentucky, Ohio, Pennsylvania, and West Virginia) show that forest area is increasing and stocking hit new highs; there is 27 percent more growing-stock volume than a decade ago. Large increases in volume have been recorded for all but the smallest diameter classes. Volume in trees 15 inches in diameter and larger is up 48 percent. There is more high quality hardwood sawtimber. The extent to which the resource is needed and utilized will depend on the same complex set of interrelated factors that it always has. These factors include trends in the tastes and preferences of the owners of forest land; technological changes in the production, marketing, and utilization of wood products and their substitutes; economic forces; attitudes of forest-land owners and other citizenry toward timber management and cutting; and attractiveness of local business climates. Only time will tell how it all works out. But for now, physical supplies of timber reveal a potential opportunity for significant expansion in wood use.

Forests of the Central Hardwood Region have been very good to us. They supported our pioneer forefathers in the development of a new Nation and fueled an industrial revolution, the likes of which we may never see again. They helped us through many a grueling skirmish, including two world wars. Through it all, they have never stopped yielding the kind of timber, water, recreation, and other treasures that contribute to one of the highest standards of living on earth. They did it while suffering through the constraining effects of wildfire, chestnut blight, gypsy moth, drought, air polution, diebacks, declines, and other pestilence.

You could argue, and with good reason, that our central hardwood forests are more vital to us now than ever before. Many of the region's well-stocked and maturing timber stands offer sorely needed opportunities for economic development. The wood-using industry has taken notice. Log exporters and domestic mill operators are looking to the resource for more of its high-quality oak, maple, cherry, walnut, ash, yellow-poplar, and other species. And more of the small and low-grade material that has had limited markets in the past is finding its way into pulpwood, strand board, and other products. But it's more than just timber and dollars. Several other concerns of the day—water quality, air polution, global climate change, biodiversity, the need to get away from it all—are linked with and have generated a growing interest in the "health" of the forest. It behooves us to keep close tabs on its condition and development.

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Fortunately, comprehensive forest inventories have been completed for four states: Kentucky 1988, Ohio 1991, Pennsylvania 1989, and West Virginia 1989 in the heart of central hardwoods country. Results give us a solid basis for evaluating the state of the resource (DiGiovanni 1990, Alerich 1990, 1993; Griffith et al. 1993).

## FOREST AREA HOLDING ITS OWN

New inventories tell us that forest area has increased in Kentucky, Ohio, Pennsylvania, and West Virginia. There have been changes in land use from forest to urban and from forest to strip mines, but these losses have been more than offset by farm land returning to forest. Areas with the most dramatic increases were central Kentucky and northeastern and western Ohio. Nearly 50 million acres (52 percent) of the total land area in the four state region is now in forest; and in many counties, more than four-fifths of the land area is in forest (Figure 1). Counties with less than 20 percent of their land in forest are rare except in the Bluegrass Region of Kentucky and the corn belt of western Ohio. Virtually all of the forest is classified as timberland, that is, forest land capable of producing crops of industrial wood and not withdrawn from timber utilization. However, the area of reserved forest land has been increasing. In Pennsylvania it increased faster than the area reverting to forest—producing a net loss in timberland between inventories.

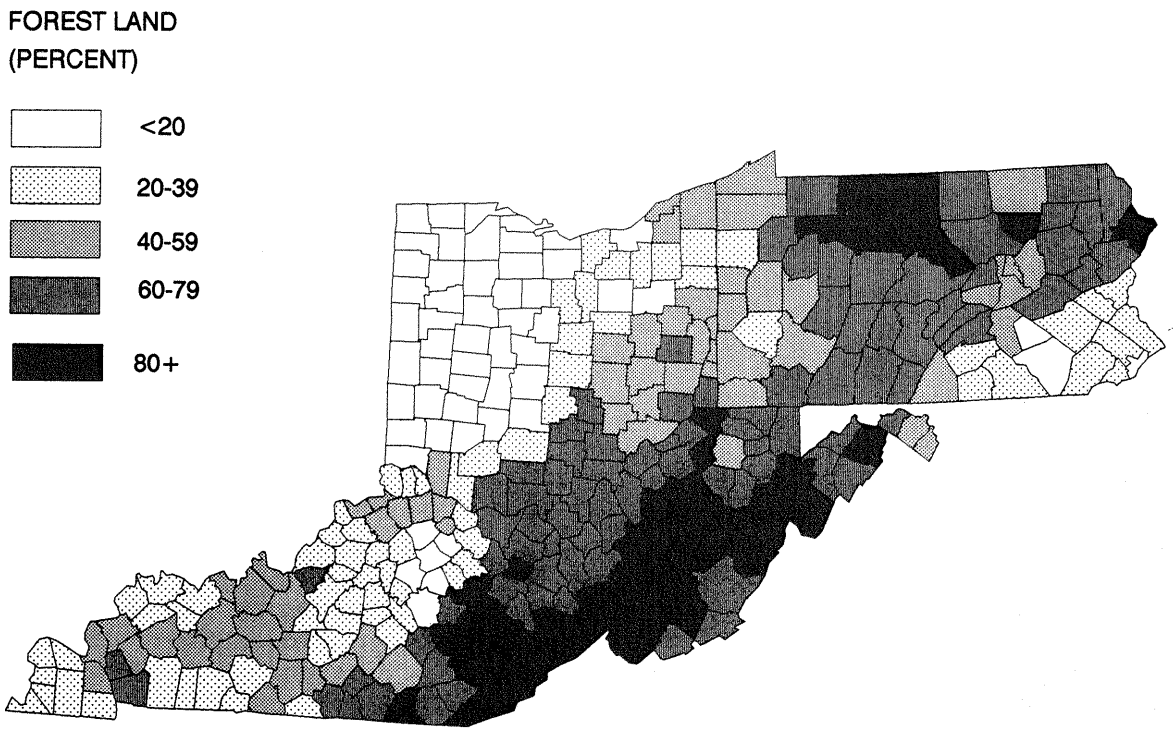


Figure 1.—Percent of land in forest, by county, Central Hardwood States.

The total volume of growing stock increased by more than 27 percent in the 12 to 14 years between inventories and now totals nearly 70 billion cubic feet. That translates to nearly 1,500 cubic feet per acre of timberland. A few counties now support more than 2,000 cubic feet of growing stock per acre (Figure 2).

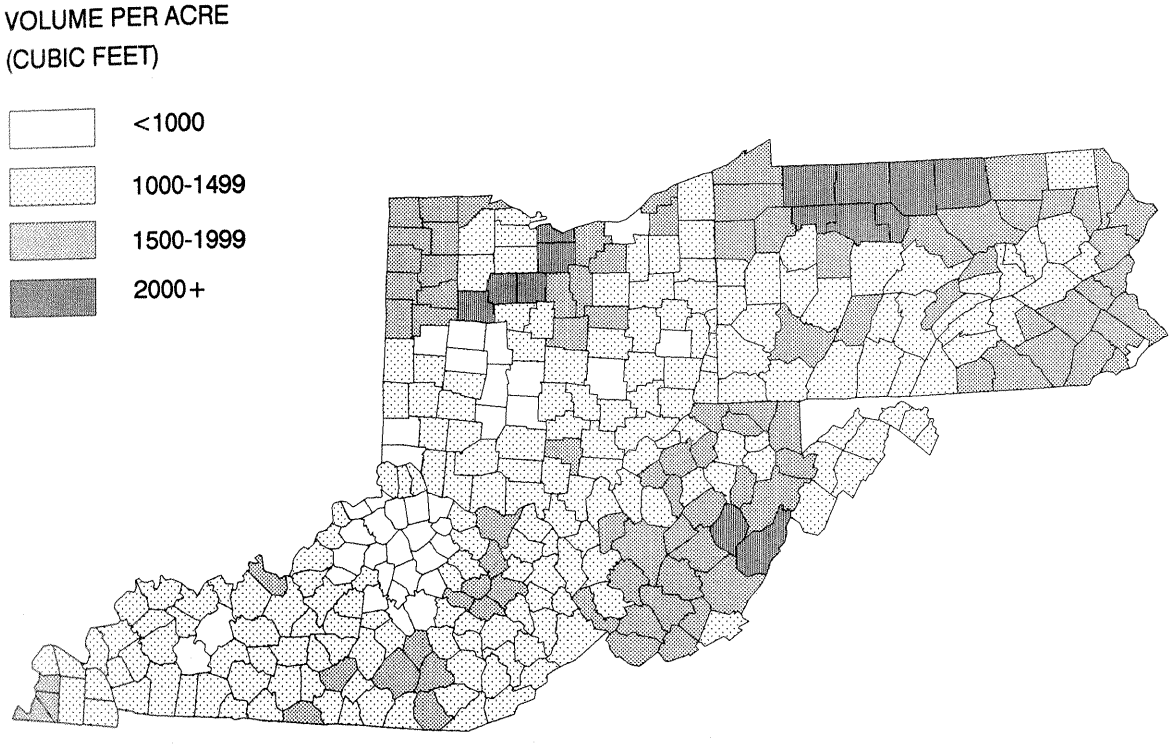


Figure 2.—Total growing-stock volume per acre of timberland, by county, Central Hardwood States.

Hardwood timber now averages 1,351 cubic feet per acre, a 25-percent increase in about 12 years. All major hardwood species shared in the volume gains (Figure 3). The oaks (white and red combined) still account for the largest share of the resource, but other species such as yellow-poplar, maple, and ash recorded impressive gains. Yellow-poplar volume increased by 54 percent to more than 6.6 billion cubic feet. Soft maple growing stock increased by 53 percent to 7.5 billion cubic feet.

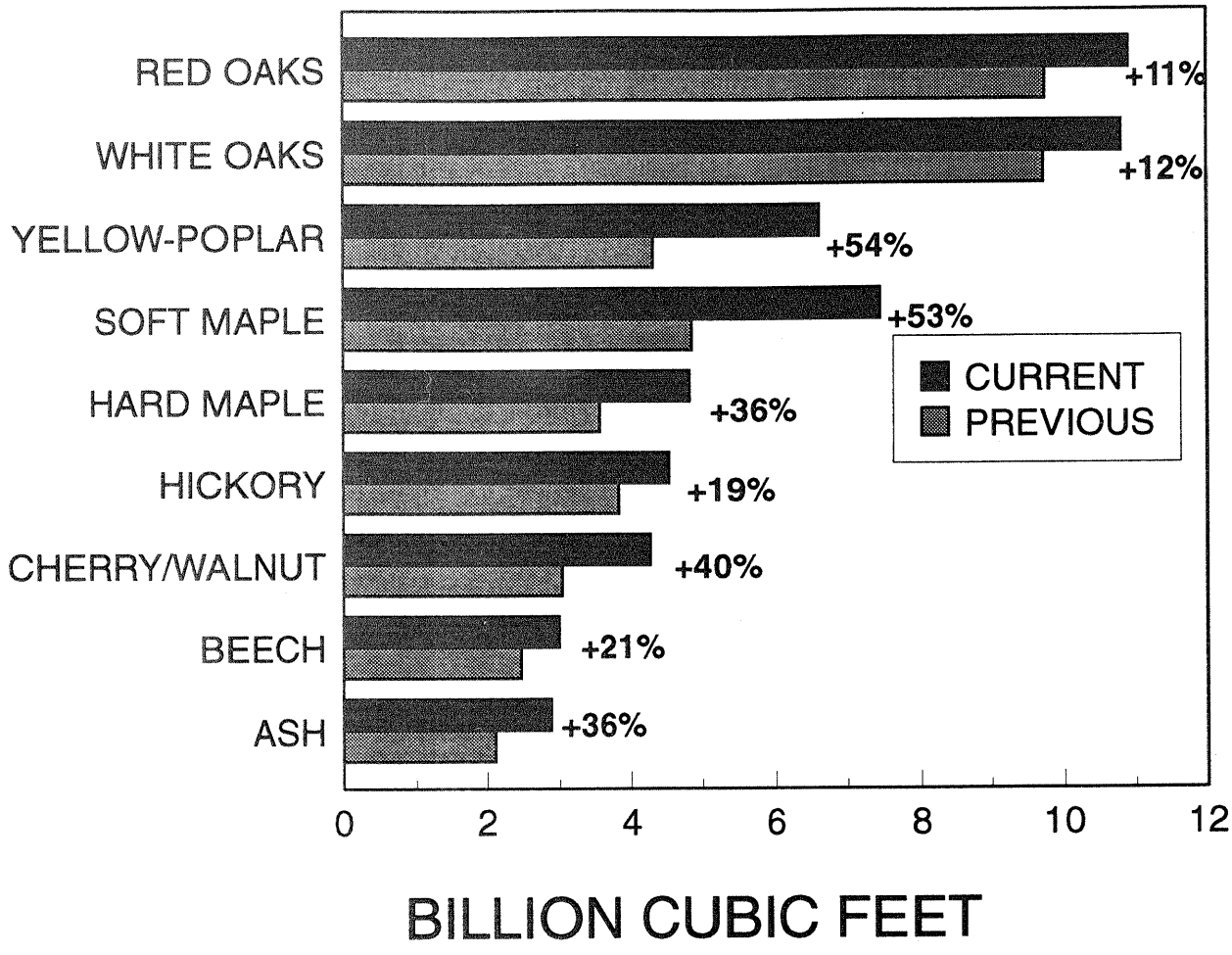


Figure 3.—Change in hardwood growing-stock volume by major species group, previous and most recent inventories, Central Hardwood States.

### BIGGER TREES MEAN MORE HIGH-QUALITY TIMBER

The average size of hardwood timber is larger. Significant increases in volume were recorded for all but the smallest diameter classes (Figure 4). Volume in trees 15 inches and larger is up 48 percent (Figure 5). Not surprisingly, hardwood sawtimber volume also has increased substantialy and now averages nearly 4,000 board feet per acre.

Along with the increases in timber size have come increases in the volume of high-quality timber, though there is still a lot of lower grade material out there. Much of it is sound wood that is too small to grade out higher. Even so, the amount of sawtimber qualifying as log grade II or better is up significantly and now represents more than one-fourth of the total hardwood sawtimber inventory (Figure 6). Of course, quality varies by location, species, and size. For example, three-fourths of West Virginia's northern red oak sawtimber is in trees 16 inches and larger, and nearly half of that big red oak volume is log grade II or better material.

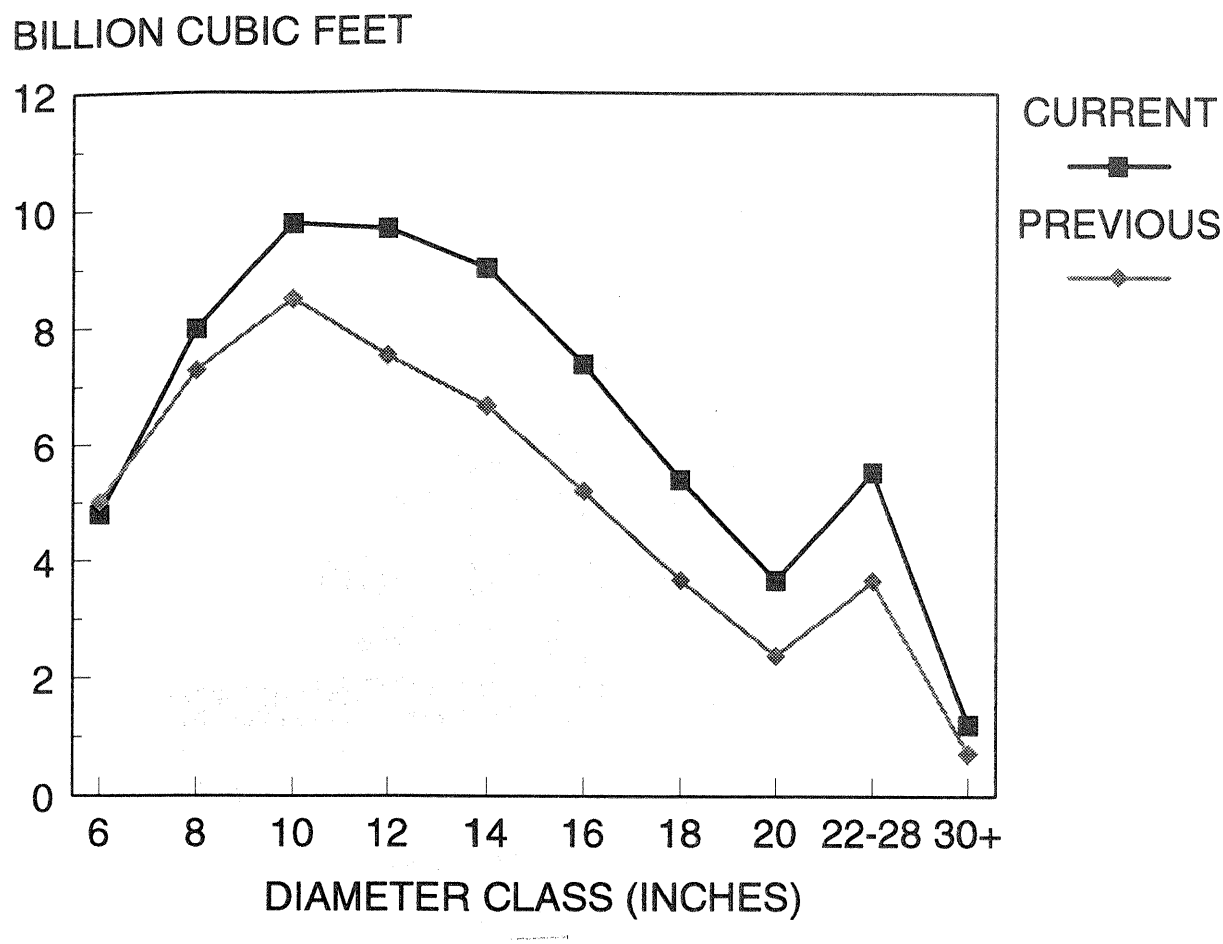


Figure 4.—Change in hardwood growing-stock volume, by DBH class, Central Hardwood States.

## INVENTORIES CONTINUE TO BUILD

On average, hardwood growing-stock volume is dying at an annual rate of 0.5 percent (Table 1.) Growth put on by surviving trees, plus ingrowth of small trees into the inventory base, more than offsets this mortality. Average annual net growth amounts to 2.6 percent of the inventory; removals average 1.0 percent. Growth is thus more than 2 1/2 times removals, and hardwood growing-stock continues to increase at a rate of about 1.6 percent per year.

The balance between growth and removals varies among species. For example, soft maples, with relatively high growth rates and lower removal rates, have a large growth-to-removal ratio ratio. That is good news for users of red maple! But the gap is small for species with higher rates of use, such as white oaks, which also were hit hard by gypsy moth in Pennsylvania.

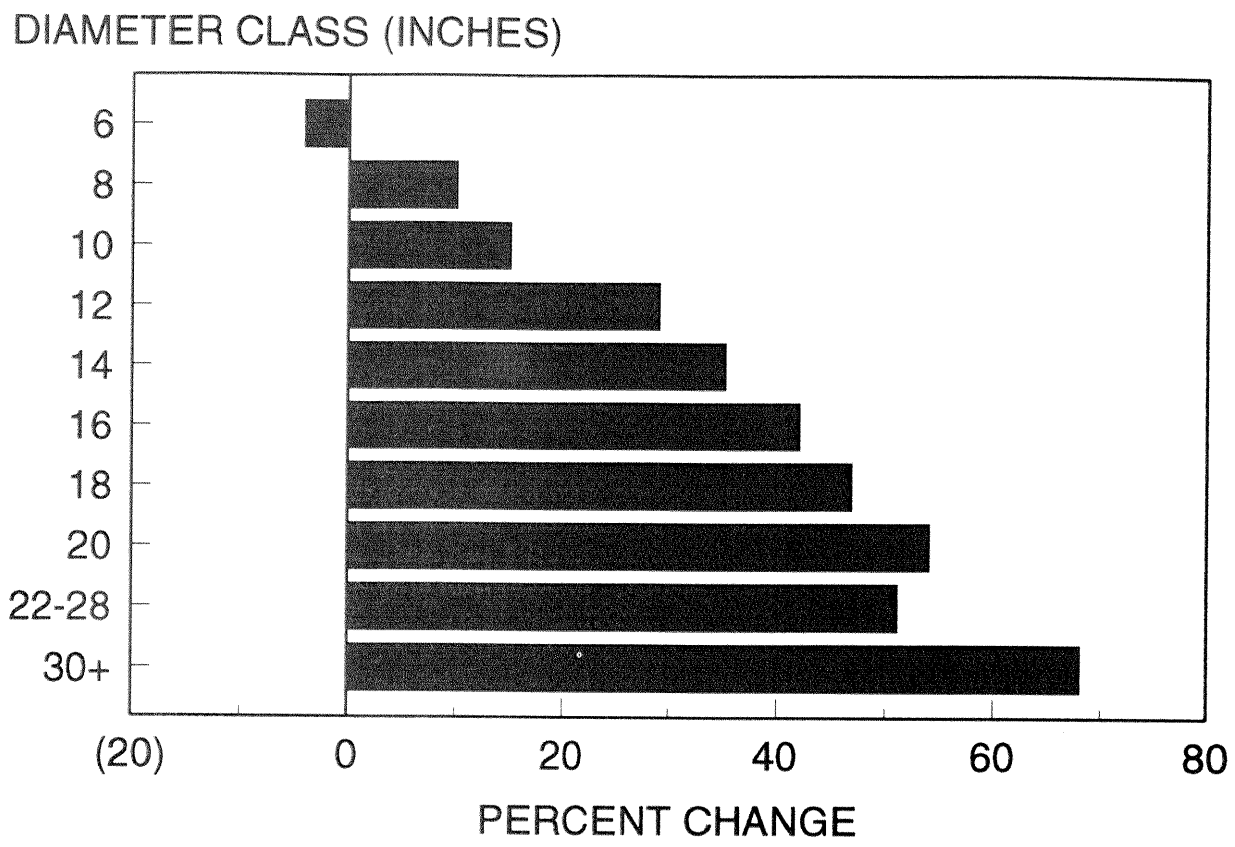


Figure 5.—Percent change in hardwood growing-stock volume between inventories, by DBH class, Central Hardwood States.

Table 1.—Average annual mortality, net growth, and removals of hardwood growing-stock volume as a percent of inventory, and growth-to-removals ratio, by species group

| Species group | Mortality | Net growth (NG) | Removals (R) | Ratio (NG/R) |
|---|---|---|---|---|
| White oaks | 0.6% | 1.9% | 1.4% | 1.3 |
| Red oaks | 0.7 | 2.3 | 1.4 | 1.7 |
| Yellow-poplar | 0.2 | 3.5 | 0.9 | 3.8 |
| Soft maple | 0.3 | 3.2 | 0.7 | 4.6 |
| Hard maple | 0.4 | 2.8 | 0.8 | 3.3 |
| Hickory | 0.6 | 1.9 | 0.9 | 2.1 |
| Ash | 0.5 | 2.9 | 1.0 | 2.8 |
| Sweetgum | 0.2 | 3.0 | 2.1 | 1.4 |
| Tupelo and blackgum | 0.1 | 2.0 | 0.5 | 4.1 |
| Beech | 0.4 | 2.1 | 0.9 | 2.2 |
| Cherry and walnut | 0.4 | 3.2 | 1.2 | 2.7 |
| All hardwoods | 0.5 | 2.6 | 1.0 | 2.7 |

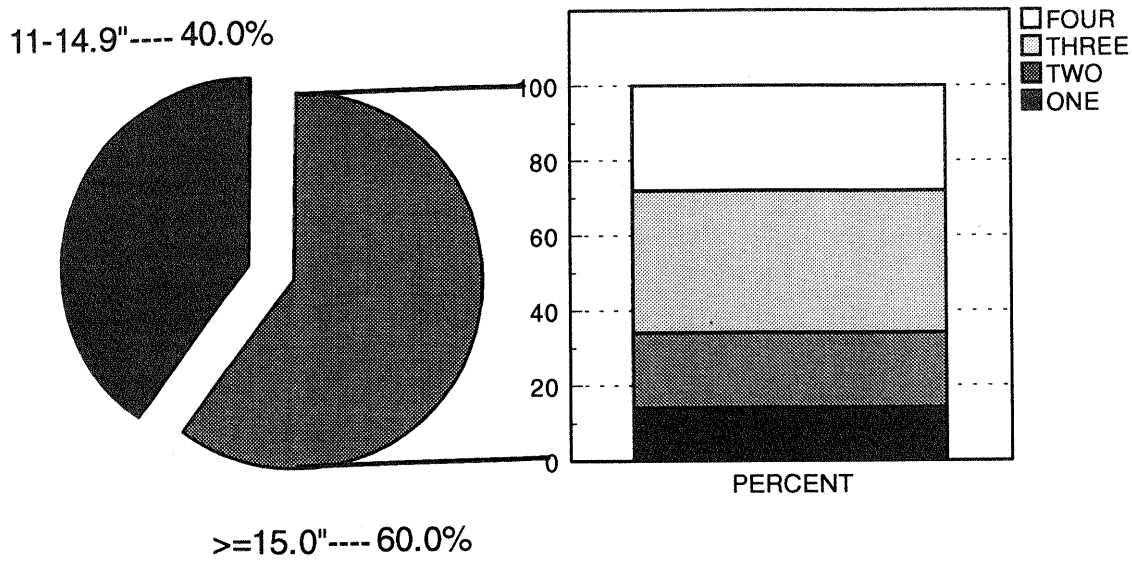


Figure 6.—Percentage of hardwood sawtimber volume by size class and log grade, three Central Hardwood States (Kentucky, Pennsylvania, and West Virginia).

## PRIVATE FOREST-LAND OWNERS CONTROL THE RESOURCE

The social and economic characteristics of private forest-land owners and their objectives must be considered when looking at the central hardwood resource. In general, the individual private forest-land owner is younger, better educated, and has a higher income level than the owner of a decade ago (Birch 1992). The regional pattern describes a growing population of younger families moving into previously rural surroundings. However, in some portions of the region, population densities have declined between 1980 and 1990 (U.S. Bureau of Census 1991).

There has been a dramatic change in attitudes toward and experience with timber harvesting in the region. In 1976, in Kentucky and West Virginia, 30 percent of the private owners with 58 percent of the private timberland had harvested trees from their land (Birch 1992). A little over a decade later in 1989, 47 percent of the owners have harvesting experience and they control 66 percent of the private forest.

There is very little documentation of what type of management and cutting is taking place in the region's forests. In West Virginia, remeasured plot data indicates that 24 percent of that State's timberland had cutting disturbance between inventories (Birch et al. 1992). Four-fifths of the cutting took place on one-tenth of the timberland. About 8 percent of the basal area in live trees 5.0 inches and larger in d.b.h. was removed. The average annual cutting rate was about 0.6 percent per year. On 2 percent of the timberland, harvesting amounted to more than four-fifths of the origional basal area. But on 86 percent of the land, removals amounted to less than one-fifth of the basal area (Table 2). Clearly, partial cutting methods dominate in West Virginia and clearcutting is relatively rare.

Table 2.—Percentage of West Virginia timberland with cutting disturbance between inventories, by amount of origional basal area removed, 1977 and 1989

| | Basal area removed | | | | | |
|---|---|---|---|---|---|---|
| State | 1-19 | 20-39 | 40-59 | 60-79 | 80+ | Total |
| West Virginia | 10 | 6 | 4 | 2 | 2 | 24 |

Timber harvesting remains a laissez-faire activity throughout the region as economics, more than textbook silviculture determines the kind of cutting that takes place. Some landowners are practicing forestry and consider "cultural treatment" a prime reason for harvesting timber. Many have cleaned up defective trees while harvesting fuelwood to offset the high cost of energy. Some of that motivation has lessened as energy prices fell. However, "selective" cutting methods such as diameter-limit cutting dominate in designating what trees are cut. Few silviculturists condone this practice. Moreover, remeasured plot data indicate that much of the region's timberland remains overstocked with small and low-grade trees that could be thinned to improve species composition and quality. Also, many acres of mature forest are ready for harvest, and understocked forests that are not expected to reach acceptable levels of stocking in the near future could be regenerated. These actions would result in dramatic increases in production.

## A STOREHOUSE OF ECONOMIC POTENTIAL

To get a better fix on timber supply potential, a special analysis of silvicultural cutting opportunities in oak-hickory forests of West Virginia was conducted. The study encompased 9.2 million acres of timberland. The effects of timber prices, ownership objectives, woodland accessibility, and other factors that influence the economic availability of timber were not considered in this analysis. The objective was simply to identify the acreage of timberland and yields of timber associated with recommended silvicultural cutting practices for the oak-hickory timber type.

The estimated cut from silviculturally sound thinning, regeneration, and harvest practices totals 100 million cords, or 60 times the current annual harvest of growing-stock volume from the State (Arner et al. 1991). On the stump, the tree conversion value of this material totals $2.4 billion. Also, the good housekeeping associated with all of this silviculture would improve timber productivity and quality. There is no denying that physical supplies of timber reveal a potential for significant expansion in wood use.

Such a rosy picture might tempt some to sit back, take credit, and rest on their laurels. But several not-so-subtle events do not allow complacency. Examples include the gypsy moth, which continues to plague the oak forests of the region, high deer numbers, and continued land fragmentation that may be threatening certain valuable plant and animal communities.

The extent to which the timber resource of the region is needed, managed, and utilized in the future will depend on a complex set of interrelated factors that operated in the past. These factors include trends in the tastes and preferences of the owners of forest land; technological changes in the production, marketing, and utilization of wood products and their substitutes; strength of the American dollar in the world market, trade deficits, inflation, and other economic forces; attitudes of forest-land owners and other citizenry toward timber harvesting and management; and attractiveness of local business climates and living environments. Only time will tell how this all works out. In the meantime, some watchful monitoring of the resource backed by good stewardship will help guarantee a continued flow of the products and services we have come to expect from the forests of the region.

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