

# SOUTHERN HARDWOOD GROWTH-USE GAP CLOSING FAST AS INVENTORIES PEAK

Pulp and paper industry use is increasing, with pulpwood accounting for half of all industrial southern hardwood being harvested

By WILLIAM A. BECHTOLD

The use of hardwood for pulp and paper furnish and other fiber products is steadily increasing in the U.S. Pulpwood now accounts for half of all hardwood roundwood currently harvested for industrial timber products in the Southeast. In addition to domestic consumption, hardwood exports to Europe and Asia are also expanding, and a good portion of these are shipped from the South (see p. 74).

USDA Forest Service timber surveys and supply projections indicate that hardwood inventories in the South have peaked. Although Southern hardwood growth has long outpaced removals, the gap is now rapidly closing. These developments have hardwood producers and managers wondering about future supplies and the implications of these latest trends.

This article provides an overview of the current and projected hardwood resource in the five southeastern states—Florida, Georgia, North Carolina, South Carolina, and Virginia. Much of the information presented here is based on data collected by the Forest Inventory &

Analysis (FIA) Work Unit of the Southeastern Forest Experiment Station.

The future projections were extracted from a major study titled "The South's Fourth Forest: Alternatives for the Future," conducted as a joint effort by the Forest Service, the 12 southern states, forest industries, universities, and forestry consultants. Trends between 1952 and 1984 were compiled for hardwood inventory, growth, removals, and timberland area. Based on assumptions agreed upon by the various cooperators, these were then projected to the year 2030.

**CURRENT ACREAGE.** About 85 million acres, or 57% of the total land area in the Southeast, are currently classified as timberland. Of the timberland acreage, 26% is in natural pine, 15% in planted pine, 11% in oak-pine, 16% in lowland hardwood, and 32% in upland hardwood stands. Hardwood acreage includes the combined acreage of lowland hardwood, upland hardwood, and oak-pine stands. Together, these stands comprise 59% of the 85 million acres of forest in the Southeast.

Georgia, North Carolina, and Virginia each contain 24% of the hardwood acreage in the Southeast. Another

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FIGURE 1: The majority of hardwood acreage is on nonindustrial private forestland (NIPF)—land owned by farmers, private individuals, etc.

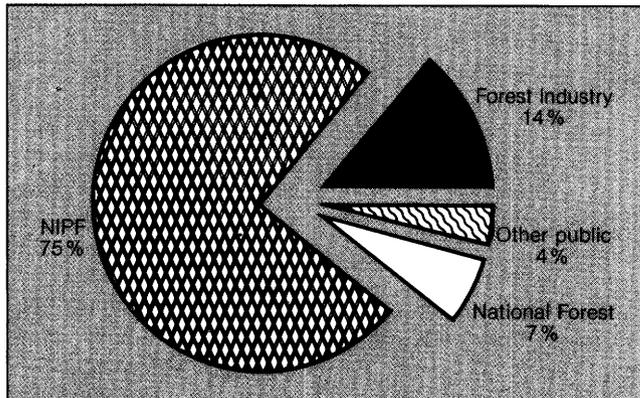
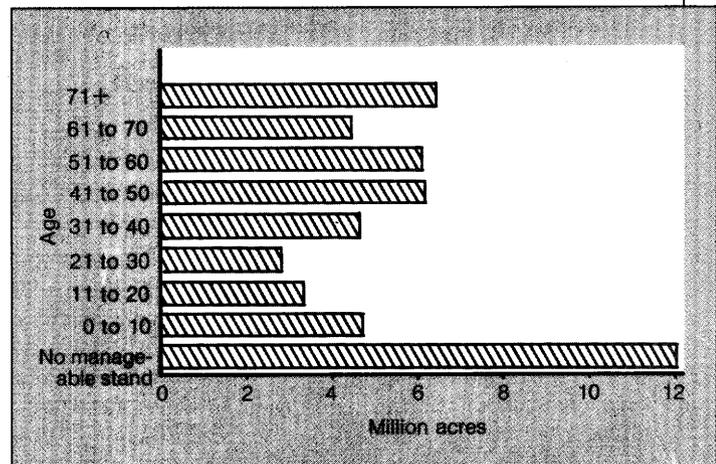
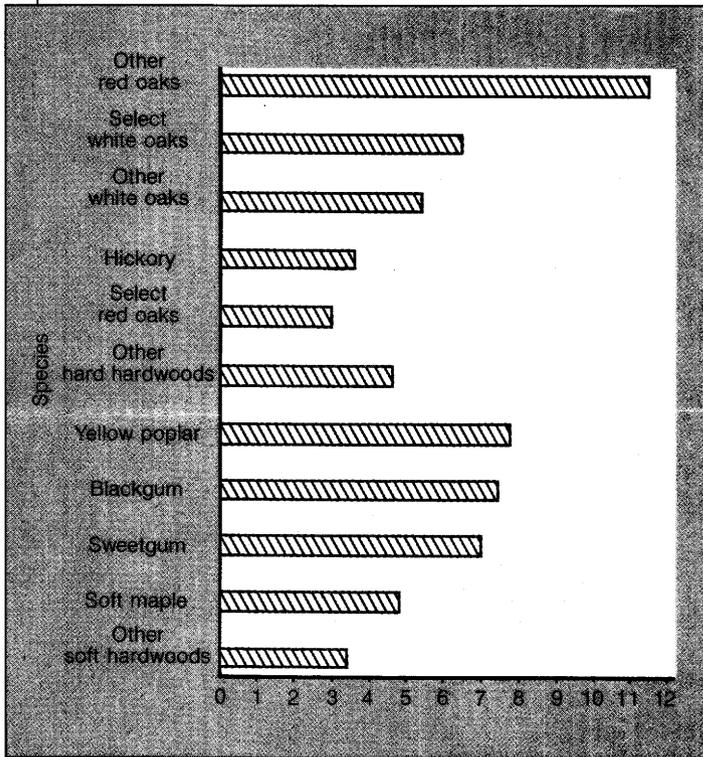


FIGURE 2: The most noticeable feature of hardwood volume in the South is that 12 million acres have no current manageable stand of timber.



**FIGURE 3: By volume, hard-texture hardwoods are dominated by various red oaks, but total volume is split almost evenly between hard- and soft-texture.**



15% is located in Florida and 13% in South Carolina. These statewide distributions belie the high concentrations of hardwood stands in Virginia and North Carolina. More than three-fourths of the total timberland in Virginia and two-thirds of that in North Carolina are composed of hardwood timber types. In comparison, about half the total timberland areas in South Carolina, Georgia, and Florida are in hardwood stands.

Three-fourths of the hardwood resource located in the Southeast grows on nonindustrial private forestland (NIPF). These stands are owned by farmers, miscellaneous private individuals, and corporations other than the forest industry (Figure 1). About 14% of the hardwood resource is owned or leased by the forest industry, 7% is on National Forest land, and 4% is on land held by other public owners, such as the military, states, counties, and municipalities.

Viewing the distribution of hardwood acreage by manageability status and stand age, the most striking feature about the resource is the 12 million acres that currently lack a manageable stand of timber (Figure 2). To put this in perspective, 12 million acres are equivalent to the entire timberland area of South Carolina. These stands are less than 60% stocked with growing-stock trees, and conditions on most of these acres are a direct result of past harvesting practices. Although some of these stands will eventually improve on their own,

many will remain underproductive for decades.

Another prominent feature of the hardwood resource is an accumulation of stands in the older age classes. Excluding those stands that are not manageable, nearly half of all hardwood stands in the region are at least 50 years old. Many of these older stands occur on acres where harvesting operations are restricted by limited access and difficult operating conditions. In addition to limited access, historically low rates of hardwood removals are contributing to maturation of the resource. Proper balancing of the age distribution to achieve a more even flow and sustained yield in years to come will require substantial acceleration of harvesting rates along with dramatic improvement in subsequent rates of regeneration.

**CURRENT INVENTORY VOLUME.** The volume of solid wood in all live hardwoods 5-in. dbh and larger now totals 72 billion ft<sup>3</sup>. About 53% of this volume is concentrated in upland hardwood stands, 32% in lowland hardwood, and 9% in oak-pine stands. The remaining 6% occurs as scattered hardwoods in natural pine stands and pine plantations.

Of the 72 billion ft<sup>3</sup>, 12% is considered cull because of nonmerchantable species, poor form, or rot. The remaining 63 billion ft<sup>3</sup> are classified as growing stock. Volume of hardwood growing stock is divided evenly between pole timber and sawtimber. Hardwood pole timber is defined as the volume in solid wood between a 1-ft stump and a 4-in. top in trees between 5- and 11-in. dbh. Sawtimber is the solid wood volume between a 1-ft stump and a 4-in. top in trees greater than 11-in. dbh. The tops of sawtimber trees (from 9 to 4 in.) are included with pole timber in this breakdown. References to hardwood volume throughout the remainder of this article are based on the 63 billion ft<sup>3</sup> of growing stock.

By 2-in.-dia. class, hardwood growing-stock volume is normally distributed and peaks at the 12-in. class. This signifies that a considerable number of hardwoods are harvested when they reach 12- to 14-in. dbh. In line with the accumulation of aging hardwood stands, an increase in both volume and number of large sawtimber-size trees has occurred. During the past decade, the number of all live hardwoods larger than 15-in. dbh has increased by 22%. On the other hand, the number of saplings has declined by 10%.

The resource is split almost evenly between hard-texture and soft-texture species (Figure 3). About 52% of the total hardwood growing-stock volume is hard-texture, while 48% consists of soft-texture species. Oaks are the most common hardwood species in the region. Collectively, they make up 40% of all hardwood growing stock. With respect to oak species most preferred by hardwood industries, 10% of the hardwood resource consists of select white oaks, such as white oak, swamp white oak, and chinkapin oak, and another 4% is composed of select red oak species, such as cherrybark oak,

northern red oak, and shumard oak. Yellow poplar, blackgum, and sweetgum are the most prevalent soft-texture species. Each of these contributes about 12% to total hardwood growing stock. Red maple is another significant species, responsible for 8% of the total.

**INVENTORY TRENDS AND PROJECTIONS.** Inventory of hardwood growing stock in the Southeast expanded steadily between 1952 and 1984—increasing from 38 to 63 billion ft<sup>3</sup>, or 67%. It is expected to continue increasing through the year 2000, when it will reach 67 billion ft<sup>3</sup>. Beyond 2000, inventory of hardwood is projected to fall back to 62 billion ft<sup>3</sup> by 2030 (Figure 4).

Current hardwood inventory is the largest ever measured in the 55-year history of Southeast FIA. Even so, this is not consistent with the perception of many hardwood procurement agents, who sometimes encounter difficulty obtaining the volume necessary to meet production schedules. The perception of a shrinking hardwood resource is largely due to hardwood markets that have, at least until recently, been highly specialized.

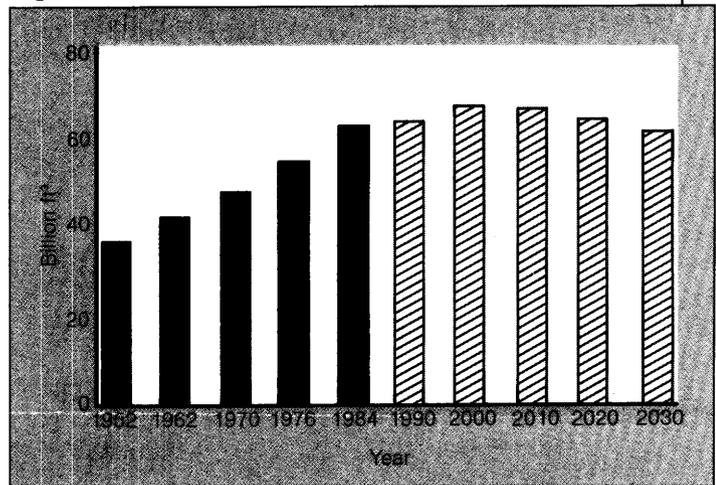
Many hardwood producers are able to use only a limited range of species and tree sizes. This situation not only has made it difficult for producers to locate stands with sufficient quantities of trees that are economically harvestable but also has contributed to the large number of nonmanageable hardwood stands resulting from poor harvesting practices. In addition to specialized markets, physical constraints related to adverse sites also inhibit the availability of hardwood stands for either harvest or management. Substantial quantities of hardwood volume are located on steep slopes in the Southern Appalachians and swamps in the Coastal Plain.

To illustrate this problem, a set of hypothetical screening criteria was imposed on the current hardwood inventory to obtain a better feel for the amount of hardwood volume that might be readily available for harvest. Starting with 63 billion ft<sup>3</sup> of hardwood growing stock, the inventory was progressively discounted for the following:

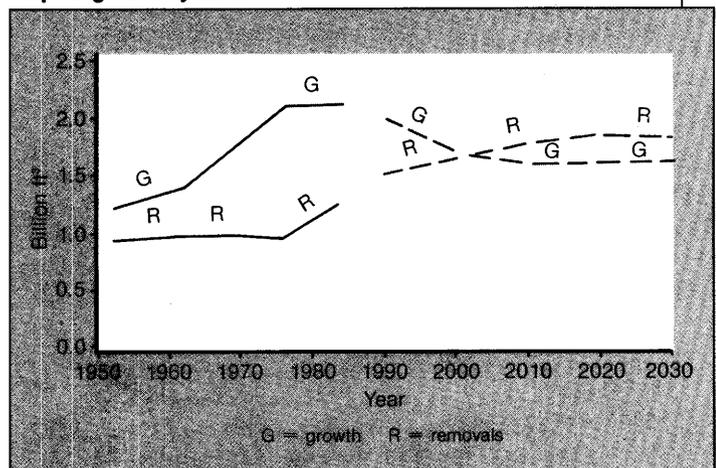
- The volume of hardwoods in pine stands
- Stands with difficult operating conditions (greater than 40% slope or year-round water problems)
- Stands to which access roads would be impractical to build
- Narrow bands of forest in strips or stringers typical of stream margins
- Stands within 200 ft of a nonforestland use, such as water or urban development
- Stands with less than 4 million bd ft/acre of saw-timber volume.

This series of screenings reduced the initial 63 billion ft<sup>3</sup> of inventory to only 16 billion ft<sup>3</sup>, or about one-fourth of the original volume. Added limitations, such as owner attitude and species preferences, restrict hardwood availability even further. Such constraints will likely continue to limit hardwood availability in the years

**FIGURE 4: Hardwood growing stock inventory is expected to continue increasing until it peaks around the year 2000 and then begins to decrease.**



**FIGURE 5: As growth has peaked in the past decade, hardwood removals have increased sharply, and removals are expected to surpass growth by 2000.**

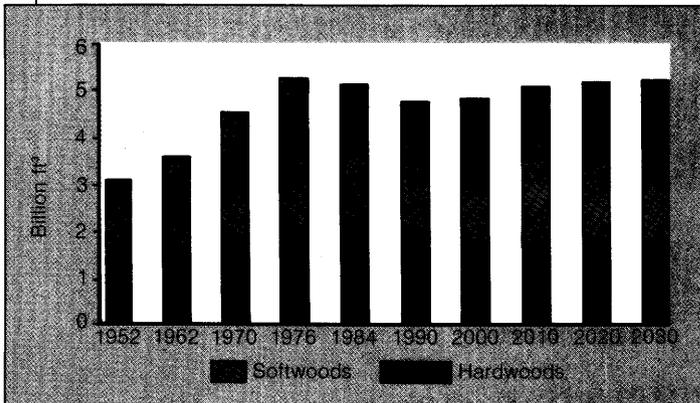


ahead and should always be considered when anticipating future inventory volumes.

**GROWTH: REMOVAL TRENDS AND PROJECTIONS.** The driving force behind the expanding hardwood inventory between 1952 and 1984 is a wide gap between growth and removals. Hardwood growth accelerated especially rapidly between 1952 and 1976. This is attributed to the rebounding of old-growth hardwood stands harvested during the first half of the century and to gains in hardwood acreage caused by encroachment of hardwoods on harvested pine sites (Figure 5).

During the same period, the rate of hardwood removals remained at relatively low levels, allowing the resource to age. Slower growth rates and higher mortality, both related to aging of the resource, have halted the long upward trend in hardwood growth. Stand condi-

**FIGURE 6: Softwood growth reduction is in progress but is expected to recover by 2000, with hardwood beginning to decline in the next decade.**



tions brought about by a long history of poor harvesting and regeneration practices are also adversely affecting hardwood growth. Between 1976 and 1984, hardwood growth leveled off and remained almost constant.

Although removals remained flat between 1952 and 1976, substantial changes in output by product occurred. Throughout the period, production of hardwood lumber, flooring, railroad ties, cooperage, and fuelwood trended downward. These losses were offset by corresponding increases in production of hardwood pulpwood and pallets. Since 1976, removals have increased by nearly a third, primarily due to a twofold increase in fuelwood production. Increased use of hardwoods for fiber products, such as pulpwood and composition board products, is also contributing to the recent acceleration of hardwood removals. Between 1952 and 1984, hardwood production shifted from a market dominated by sawlogs and veneer to a market dominated by pulpwood and fuelwood.

The recent surge in demand for hardwood fiber is expected to continue. This is one of the major assumptions behind the hardwood projections. Supporting this assumption are a tight softwoods growth/removal relationship, technological improvements allowing greater substitution of hardwoods in markets currently dominated by softwoods, and the present abundance of hardwood inventory volume.

Hardwood growth in the Southeast is now at its peak and is beginning to turn downward. Aging stands, past mismanagement, and projected losses of hardwood acreage all point to declining growth until about 2010, after which growth rates will likely stabilize. Hardwood removals are expected to increase throughout most of the projection period and will probably surpass growth shortly after 2000. Removals will exceed growth for the remainder of the period, finally resulting in a total hardwood growing-stock inventory volume in 2030 about equal to the current inventory existing in the Southeast today.

**HARDWOOD VS SOFTWOOD.** Even though the Southeast is often characterized as a softwood region, the growing-stock inventory of hardwood exceeds that of softwood by almost 25%. Hardwoods are expected to retain this dominance for the foreseeable future. Projections show hardwood volume as a proportion of all growing-stock volume rising from 56% in 1984 to 59% in 2000 before falling to 54% in 2030.

Although hardwood inventory culminates and then declines during the projection period, the combined inventory of both softwoods and hardwoods continues to build slowly from 113 billion ft<sup>3</sup> in 1984 to 115 billion ft<sup>3</sup> by 2030, except for a slight dip in 1990 (Figure 6). This dip is caused by a reduction in softwood growth that began between 1976 and 1984.

This softwood growth reduction is still in progress but is expected to recover prior to 2000, mainly due to conversion of natural pine stands to pine plantations. Hardwood growth reductions begin later and do not fully recover by the end of the projection period. The proportion of total growth attributable to hardwoods ranges from 43% at present to 33% in 2030.

Overall rates of timber removals continue climbing until the final decade of the projection. Although this is the case for both softwoods and hardwoods individually, hardwood removals will likely increase more rapidly, finishing out the projection at 43% above the current rate. In comparison, softwood removals between 1984 and 2030 are expected to increase by only 17%. Softwood removals are nearly in balance with growth at the present time, and a tight softwood growth/removals situation is expected to persist throughout the projection period.

**SOUTHEAST VS SOUTH CENTRAL.** By looking at hardwood resource trends across the entire South, notable differences between the southeastern and south central regions can be seen. The south central region includes Alabama, Arkansas, Louisiana, Mississippi, Tennessee, Oklahoma, and east Texas. Hardwood inventory volume in the south central states is expected to peak around 1990, some ten years earlier than in the Southeast. Beyond 1990, south central inventory declines much more rapidly than southeastern inventory. Comparing the year 2030 with 1984, south central hardwoods decline by 21%. Similar projections for the Southeast indicate only a 2% decline from current inventory.

Several factors are responsible for the regional differences. First, growth in the south central states has already peaked and turned sharply downward—some ten years sooner than in the Southeast. Between 1976 and 1984, growth of southeastern hardwoods remained steady, while south central hardwood growth fell by 7%. Second, loss of hardwood acreage in the south central region is expected to be more severe, declining 20% by 2030 as compared with 9% in the Southeast. Finally, more conservative yield models were used for south

central hardwood growth projections. Steeper growth reductions in the south central region cause the growth and removals curves to cross earlier than in the Southeast, resulting in a wider gap between growth and removals throughout the remainder of the projection period.

**FACTORS INFLUENCING HARDWOODS.** Due largely to unfavorable economic conditions, the hardwood resource in the South generally has been mismanaged. Because of softening demand for hardwood sawtimber, veneer, and railroad ties, vast areas of hardwoods cut for these and other roundwood products during the earlier part of the century have again matured. Many of these mature and overmature stands occur on adverse sites, and the more accessible stands have been high graded over the years to satisfy specialized hardwood markets.

Hardwood fiber in small-diameter and poor-quality trees simply has not been valuable enough to harvest. Only about half of the 51 million acres of hardwoods in the Southeast are presently in good condition. One-fourth lacks manageable stands of timber and is badly in need of regeneration. Another one-fourth is either overmature or would benefit from some intermediate treatment.

During the past decade, there has been some evidence of change in the economic climate influencing hardwoods. The tight softwood growth/removal situation has fostered mounting interest in substituting hardwoods for softwoods in southern wood products. Since 1976, we have experienced a significant upturn in hardwood removals, especially for fuelwood and fiber products. Continuation of this upward trend is a major assumption behind the hardwood projections. Expansion of hardwood markets is viewed as a prerequisite to improvement of the resource. This is necessary to balance the hardwood age distribution, increase hardwood diversity, and stimulate growth.

However, it is crucial that increased demand be accompanied by improved hardwood management practices. Mere custodial management will result in rapid depletion of the hardwood inventory. It is hoped that the ability to market low-quality and small-diameter hardwoods for fiber will reduce high grading and create hardwood management opportunities that have previously been impractical. Programs and research aimed at improved hardwood management should target NIPF landowners. These owners control three-fourths of the present resource and are expected to maintain this high proportion in future years.

During the next one or two decades, the future of the resource is pretty much locked in by actions that have already taken place. Beyond that, the long-term future of the resource depends on what we do from now on. These projections are intended to expose what seem to be developing trends, so there is time to act if it is decided to change them. ■