Hardwood Projections For Southeastern U.S.

By William Bechtold

Much of what is covered here is based on data collected by the Forest Inventory and Analysis (FIA) Work Unit of the Forest Service Southeastern Forest Experiment Station. Southeast FIA is responsible for monitoring the forest resources of Florida, Georgia, North Carolina, South Carolina and Virginia. The first survey of the Southeast began in Florida in 1934. Our field crews are presently well into the sixth survey cycle of the Southeast, and have recently completed the sixth inventory of Florida.

This paper is organized into two sections. The first is devoted mainly to an overview of the current hardwood resource as it exists today. Data was compiled from the latest inventory of each of the five states. Although referenced as if gathered at one point in time, they were actually collected over a seven-year time span ranging from the latest inventory of Georgia, begun in 1980, to the latest inventory of Florida, completed in 1987. The midpoint year of the numbers used to describe the current resource would thus be 1984.

The second segment describes past trends and future projections. These numbers were developed during a major study titled "The South's Fourth Forest, Alternatives for the Future." This study was conducted as a joint effort by the USDA Forest Service, the 12 Southern states, forest products industry, universities and forestry consultants. Trends between 1952 and 1984 were developed for timber inventories, growth, removals and timberland area. Based on assumptions agreed upon by the various cooperators, these were then projected to the year 2030. Unlike the data used to describe the current hardwood resource, trend information in the Forest Service study was updated to several common points in time. For this reason, there may be some minor discrepancies between the numbers extracted from the most recent inventories of each state and those reported for the year 1984 in "The South's Fourth Forest."

Hardwood Acreage

About 85 million acres, or 57% of the total land area in the Southeast, are presently classed 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. References to hardwood acreage include 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.

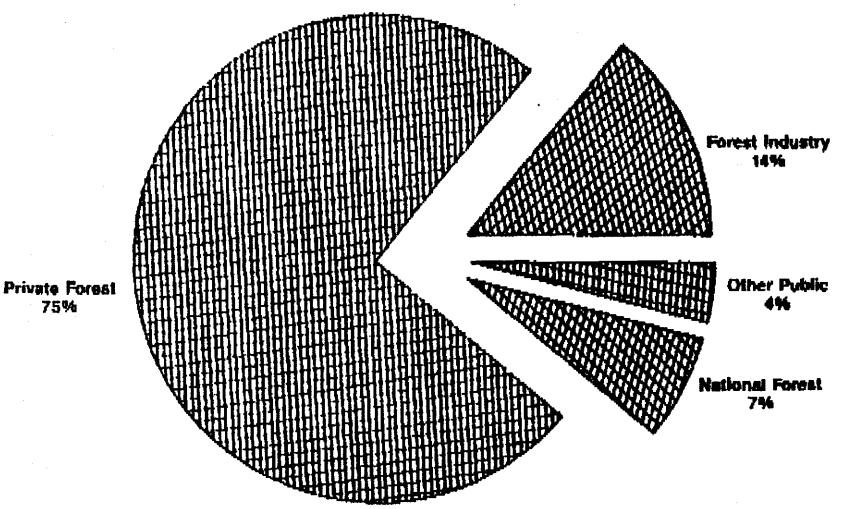
Georgia, North Carolina, and Virginia each contain 24% of the hardwood acreage in the Southeast. Another 15% is located in Florida, and 13% in South Carolina. These statewide distributions belie the high concentrations of hardwood stands in Virginia and North Carolina. Over three-fourths of the total 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 in the Southeast grows on nonindustrial private forestland (NIPF). These stands are owned by farmers, miscellaneous private individuals, and corporations other than forest industry. About 14% of the hardwood resource is owned or leased by forest industry, 7% is on National Forest land, and 4% on land held by other public owners such as the military, states, counties and municipalities.

Most prominent feature of the hardwood resource is that nearly 12 million acres presently lack a manageable stand of timber. To put this in perspective, 12 million acres is 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. While some of these stands will eventually improve on their own, many will remain unproductive 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, close to 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, coupled with a dramatic improvement in subsequent rates of regeneration.

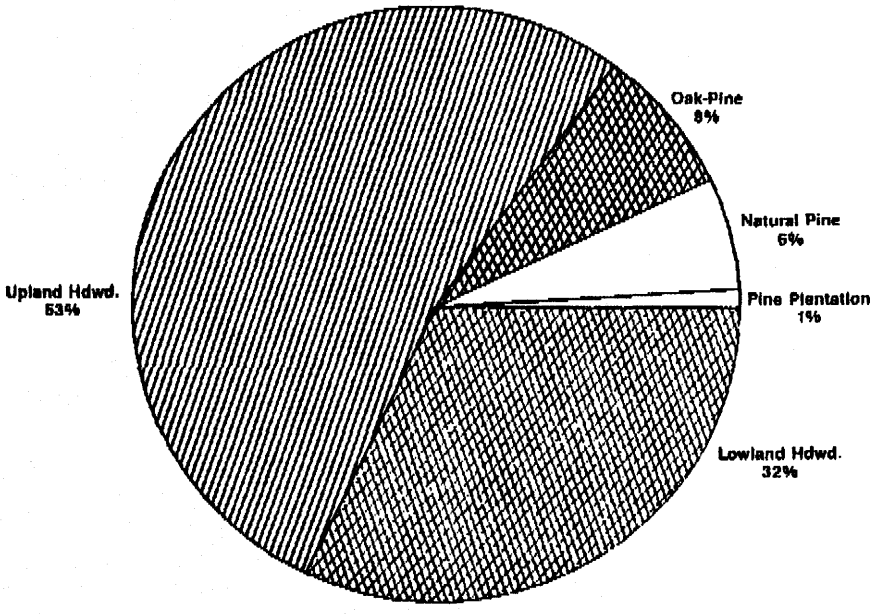
Hardwood Acreage By Ownership



Hardwood Volume

The volume of solid wood in all live hardwoods 5 in. DBH and larger now totals 72 billion cu. ft. About 53% of this volume is concentrated in upland hardwood stands, 32% in lowland hardwood,

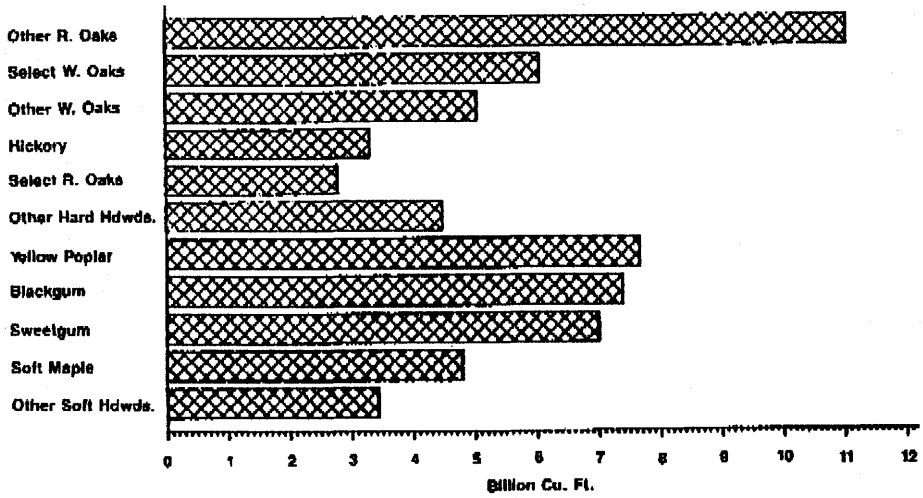
Hardwood Volume By Forest Type



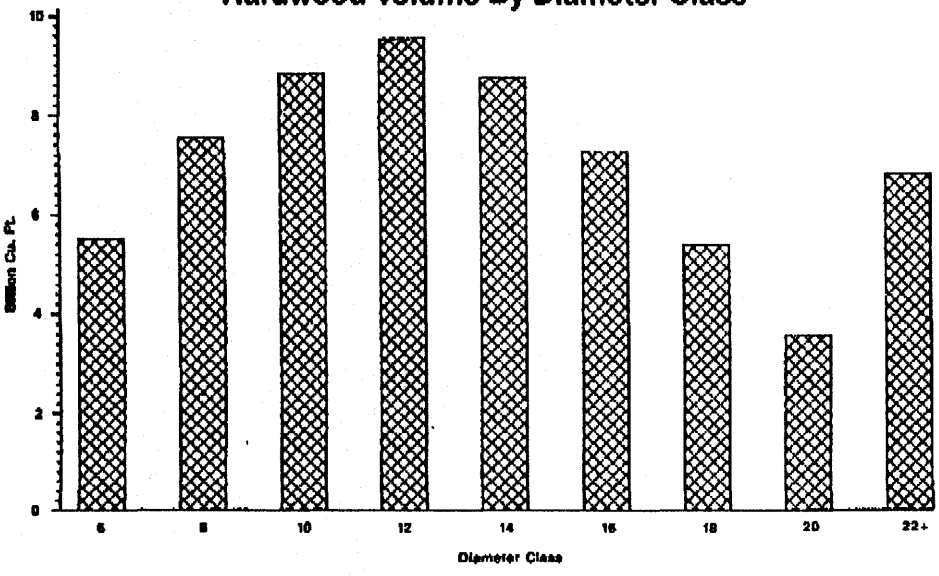
and 9% in oak-pine stands. The remaining 6% occurs as scattered hardwoods in natural pine stands and pine plantations.

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

Hardwood Volume By Species



Hardwood Volume By Diameter Class



By 2 in. diameter class, hardwood growing stock volume is normally distributed and peaks at the 12 in. class. This signifies a considerable number of hardwoods are harvested when they reach 12-14 in. DBH. In line with the aging of the resource, we have also witnessed an increase in both volume and numbers of large sawtimber-size trees. During the past decade, numbers of all-live hardwoods larger than 15 in. DBH have increased by 22%. On the other hand, numbers of saplings have declined by 10%.

The resource is almost evenly split between hard-textured and soft-textured species. About 52% of the total hardwood growing stock volume is hard-textured, while 48% consists of soft-textured 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-textured species. Each of these contributes about 12% to total hardwood growing stock. Red maple is another significant species, responsible for 8% of the total.

Hardwood Inventory

Between 1952 and 1984, inventory of hardwood growing stock in the Southeast expanded steadily—increasing from 38 to 63 billion cu. ft., or by 67%. It's expected to continue increasing through year 2000, when it will culminate at 67 billion cu. ft. Beyond

2000, inventory of hardwood is projected to fall back to 62 billion cu. ft. by the year 2030.

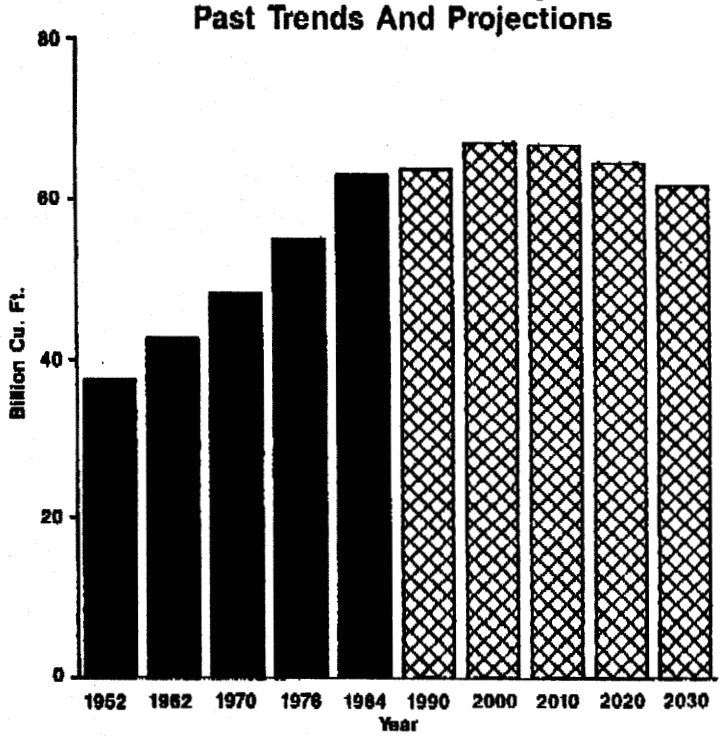
Current hardwood inventory is the largest ever measured in the history of Southeast FIA. Even so, this is not consistent with the perception of many hardwood procurement agents, who sometimes encounter difficulty obtaining the volume necessary to meet production schedules. The perception of a shrinking hardwood resource is largely due to hardwood markets that have, at least until recently, been highly specialized. Many hardwood producers are able to utilize only a limited range of species and tree sizes. This situation has not only made it difficult for producers to locate stands with sufficient quantities of trees that are economically harvestable, but has also 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 the 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 cu. ft. of hardwood growing stock, the inventory was progressively discounted for:

- 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 nonforest land use such as water or urban development.
- Stands with less than 4MBF per acre of sawtimber volume.

This series of screenings reduced the initial 63 billion cu. ft. of inventory to only 16 billion cu. ft., 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 ahead and should always be considered when anticipating future inventory volumes.

Hardwood Inventory
Past Trends And Projections



Growth and Removals

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. 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 conditions 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, there were substantial changes in output by product. Throughout the period, production of hardwood lumber, flooring, railroad ties, cooperage and fuelwood trended downward. These losses were offset by corresponding increases in the 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 into the future. This is one of the major assumptions behind the hardwood projections. Supporting this assumption is a tight softwood 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 year 2000. Removals exceed growth for the remainder of the period, finally resulting in a total hardwood growing stock inventory volume in year 2030 about equal to the current inventory existing in the Southeast today.

Hardwoods vs. Softwoods

Even though the Southeast is often characterized as a softwood region, the growing stock inventory of hardwood ex-

ceeded that of softwood by almost 25% in 1984. Hardwoods are expected to retain this dominance for the forseeable 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 cu. ft. in 1984 to 115 billion cu. ft. by 2030, except for a slight dip in 1990. The dip in the 1990 combined inventory 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 year 2000, due mainly 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.

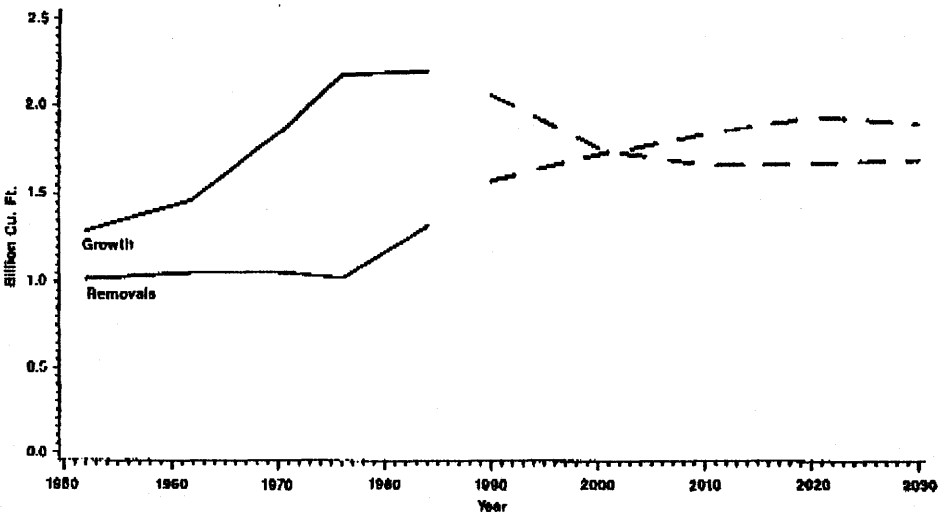
Overall rates of timber removals continue climbing until the final decade of the projection. While this is the case for both softwoods and hardwoods individually, hardwood removals will likely increase more rapidly, finishing out the projection at 43% above the current rate. In comparison, softwood removals between 1984 and 2030 are slated to increase by about 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/South Central

Looking at hardwood resource trends across the entire South, there are some notable differences between the Southeast and South Central regions. The South Central region includes Alabama, Arkansas, Louisiana, Mississippi, Tennessee, Oklahoma and eastern Texas. Hardwood inventory volume in the South Central states is expected to peak around 1990, some 10 years earlier than in the Southeast. Beyond 1990, the South Central inventory declines much more rapidly than in the Southeast. Comparing the year 2030 to 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 10 years sooner than in the Southeast. Between 1976 and 1984, growth of Southeast 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 year 2030, as compared to 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, and result in a wider gap between growth and removals throughout the remainder of the projection period.

Hardwood Growth And Removals
Past Trends and Projections



Summary

Due largely to unfavorable economic conditions, the hardwood resource in the South has generally 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 with steep slopes or year-round water problems. 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 has simply not been valuable enough to bother with. Only about half the 85 million acres of hardwood stands in the Southeast are presently in good condition. One-fourth lack manageable stands of timber and are badly in need of regeneration. The remainder are 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.

It's crucial that increased demand be accompanied by improved hardwood management practices. Mere custodial management will result in rapid depletion of the hardwood inventory. Hopefully, 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 aimed at improved hardwood management should be targeted at NIPF landowners. These owners control three-fourths of the present resource and are expected to maintain this high proportion in future years.

In the shortrun, over 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 we decide to change them. What actually happens could be a lot better, or a lot worse, than the scenario depicted here. □

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