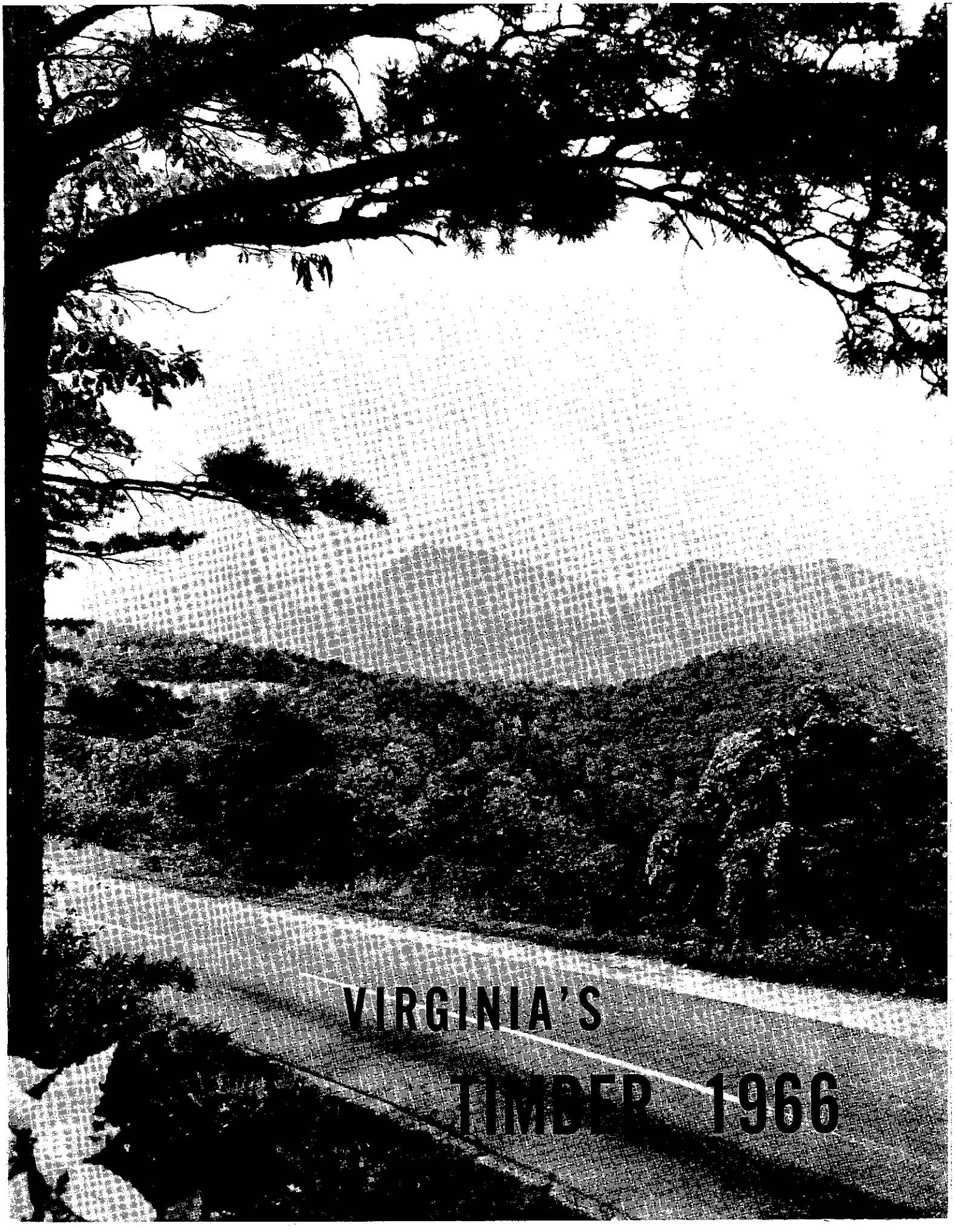
VIRGINIA'S
TIMBER 1966

Foreword

This report presents the principal findings of the third Forest Survey of Virginia's timber resource. The resurvey was started in November 1964 and completed in August 1966. Findings of the two previous surveys, completed in 1940 and 1957, provide the basis for measuring the changes that have occurred and the trends that have developed during the past 26 years.

The Virginia Forest Survey is part of the nationwide effort to maintain a current inventory of the Nation's timber supply as authorized by Congress in the McSweeney-McNary Forest Research Act of 1928. The regional experiment stations of the U. S. Forest Service conduct the periodic surveys that are necessary to keep basic information up to date.

The Southeastern Forest Experiment Station gratefully acknowledges the cooperation received from the Virginia Division of Forestry which provided personnel and equipment for one field crew in this latest resurvey. The Station also wishes to acknowledge the assistance received from personnel of the George Washington and Jefferson National Forests in the collection of field data on National Forest lands. Appreciation is expressed to all Station personnel who participated in the field and office work.

Joe P. McClure, project leader of the Forest Survey in the Southeast, organized and coordinated the various phases of the Virginia Survey. William H. B. Haines was in charge of computations and also supervised the preparation and interpretation of aerial photographs used to determine land use and the sample locations. Richard L. Welch was responsible for compiling timber cut and product information. Noel D. Cost supervised the collection of all field data, and Herbert A. Knight was in charge of the analysis and reporting.

The discussion of other recognized forest values in Virginia—water, fish and wildlife, and recreation—is beyond the scope of this report. The purpose of this publication is to appraise the timber situation.

Walton R. Smith

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U. S. FOREST SERVICE
RESOURCE BULLETIN SE-8

VIRGINIA'S TIMBER, 1966

by

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and

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U. S. DEPARTMENT OF AGRICULTURE

FOREST SERVICE

SOUTHEASTERN FOREST EXPERIMENT STATION

ASHEVILLE, NORTH CAROLINA

1967

Contents

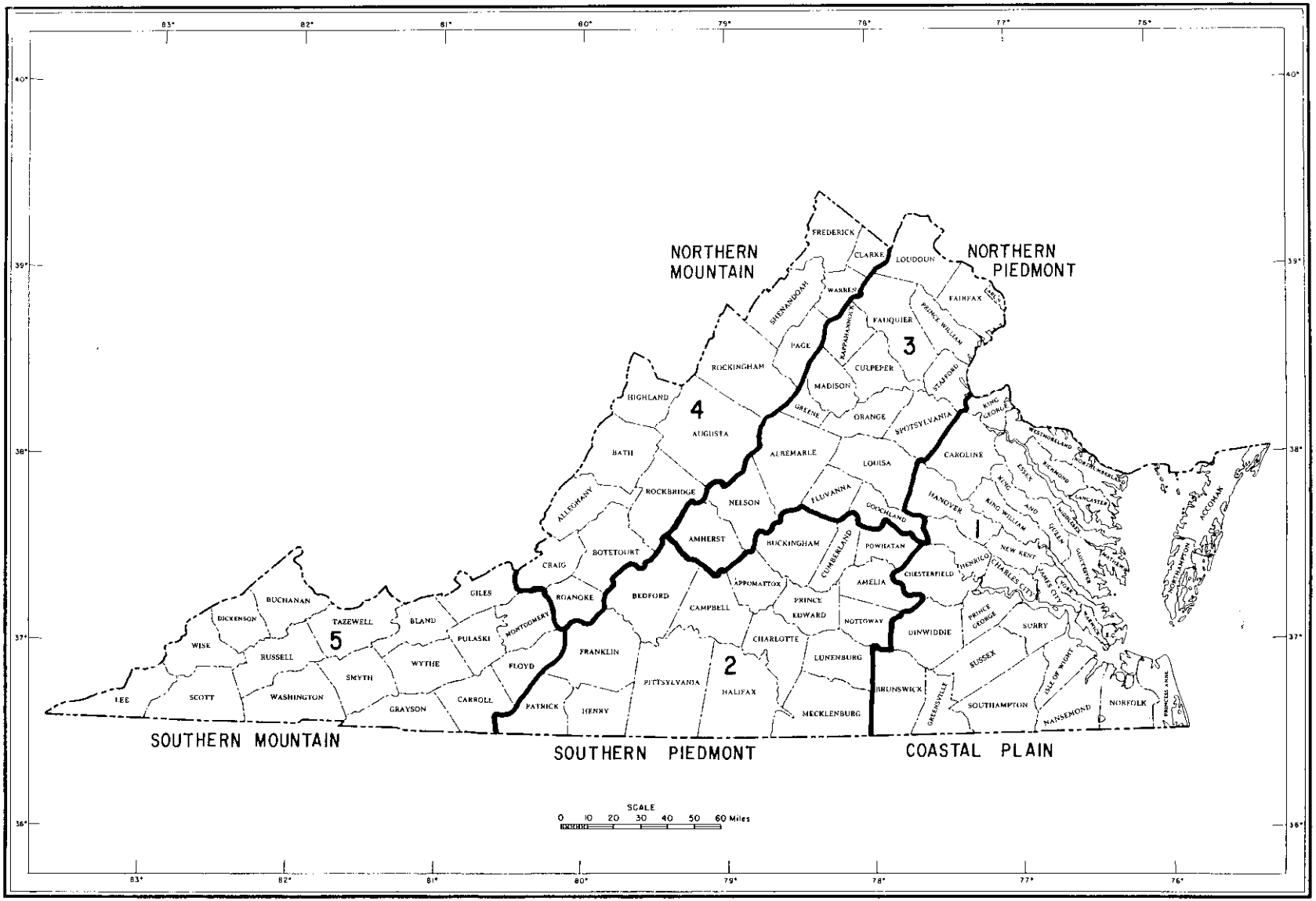


Figure 1. *Forest Survey Units in Virginia.*

Highlights

Since the second Forest Survey in Virginia was completed in 1957—

—area of commercial forest has increased from 15.4 to 15.8 million acres, a gain of 2 percent. New forest lands have hardly more than replaced the loss of almost ½ million acres of commercial forest to other land uses. Gains over losses were substantial only in the Southern Mountains, Forest Survey Unit 5 (fig. 1).

—ownership of about 3 million acres of commercial forest land has shifted from farmers to other nonindustrial private owners. These other owners include business and professional people, landholding companies, wage earners, and housewives, most of whom are engaged in occupations or enterprises not directly connected with timber growing. Other changes in forest ownership indicate that forest industries have increased their holdings from 1.2 to 1.6 million acres, and that public holdings have increased from 1.5 to almost 1.7 million acres.

—hardwoods have either replaced or partially replaced the softwoods on an estimated 0.7 million acres of commercial forest land. In addition to the natural succession toward hardwood cover types, many former pine and oak-pine stands now consist principally of low-quality hardwoods following logging.

—condition of the average stand has improved very little. The average stand contains about 100 more live trees 1.0 inch d.b.h and larger per acre, but most stands are still inadequately stocked with desirable trees. These are trees that have no serious defects in quality which limit present or prospective use. Across the State, rough and rotten trees which have limited or no merchantability potential occupy about 30 percent of the growing space.

—volume of hardwood growing stock has increased from 9.5 to 10.5 billion cubic feet, a gain of 10 percent. Average volume of hardwood growing stock per acre increased from 617 to 664 cubic feet. The oaks produced over one-half of the volume increase; however, light-seeded species, such as yellow-poplar and maple, made the greatest percentage gains.

—volume of softwood growing stock dropped from over 4.4 to less than 4.3 billion cubic feet, a loss of 3 percent. Volume of Virginia pine and white pine increased, but not enough to offset decreases in the volumes of loblolly and shortleaf pine. One significant aspect of this trend in softwood volume is that practically all the decrease has been in diameter classes 6 through 12 inches, which indicates an extremely heavy cut of small trees.

—volume of hardwood sawtimber has increased from 24.0 to almost 26.3 billion board feet, an increase of 9 percent. The increase was about equally distributed across all diameter classes. This increase in hardwood sawtimber has occurred in spite of a general upward trend in hardwood lumber production over the remeasurement period.

—there has been little change in the volume of softwood sawtimber, which totals 11.8 billion board feet. An increase in the larger diameter classes offset a decrease in small sawtimber. There was a downward trend in softwood

lumber production over the remeasurement period.

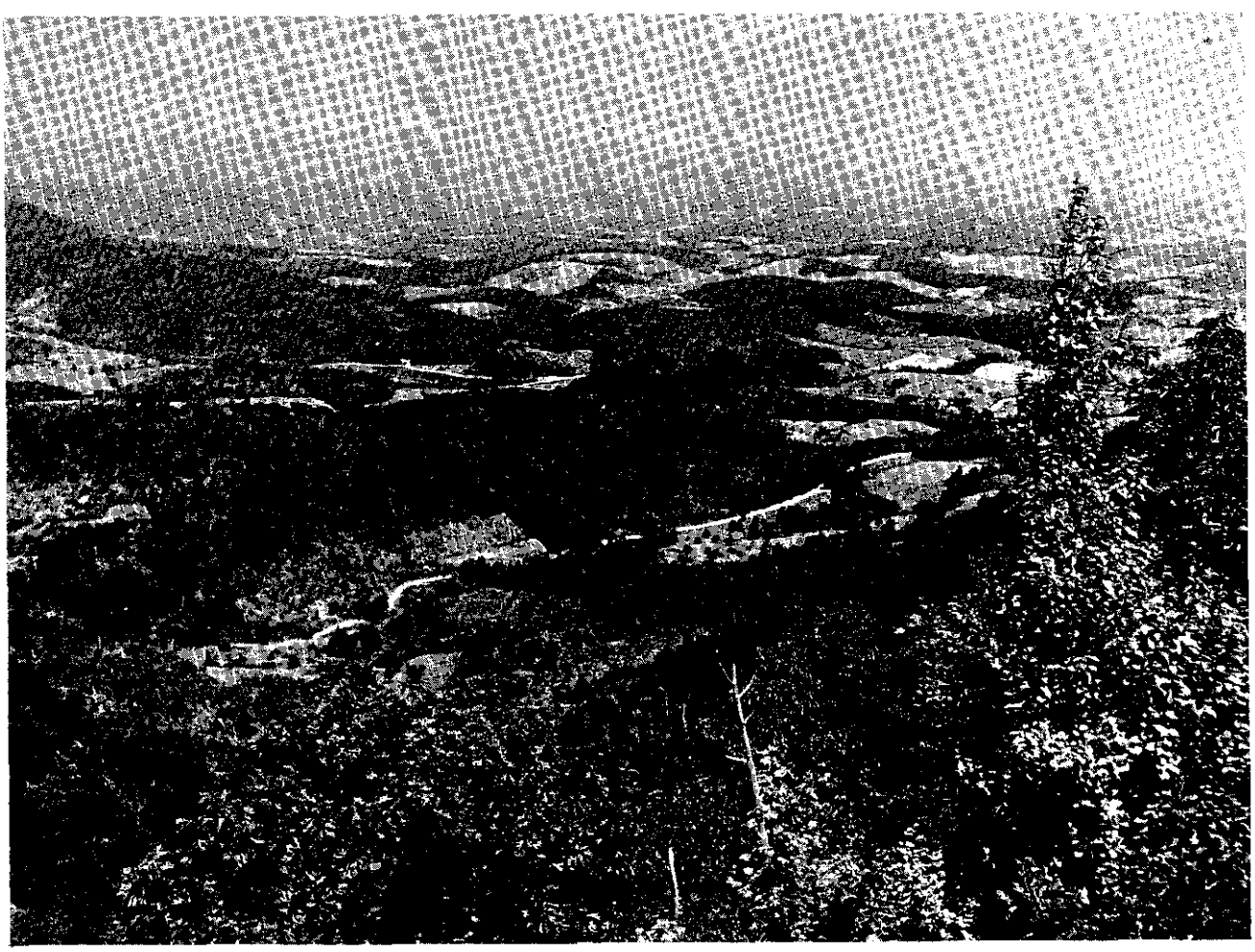
This latest Forest Survey in Virginia also shows that—

—there is a poor balance between annual timber growth and cut. The annual cut of softwood growing stock now exceeds net growth by 15 percent. Until this imbalance is corrected, further decreases can be expected in both the softwood inventory and growth. In contrast to the softwood situation, net annual growth of hardwood growing stock exceeds the cut by almost 38 percent.

—net growth averages only about one-half the potential yield which could be obtained if present stands were adequately stocked with desirable trees. There are numerous opportunities, through better timber management, to reduce the gap between present and potential growth. Neither the timber owners nor the timber users should be encouraged to believe that the present level of productivity will satisfy future timber needs. All indications are that it will not.

—cut from growing stock in 1965 totaled 466.1 million cubic feet, 13 percent above the cut at time of last survey. In contrast to the past, annual cut of hardwood is now greater than the annual cut of softwood. Output of timber products from softwood, however, still exceeds the output from hardwood because of differences in logging waste.

—annual pulpwood production has increased from 1.4 million cords in 1958 to 2.4 million cords in 1965, a 67-percent increase. Four of the State's 7 pulpmills have increased their pulping capacities substantially since 1958. Although the number of active sawmills declined from about 1,200 to 870 over the same period, annual lumber production has remained around 1.1 billion board feet. In addition, the new southern pine plywood industry has moved into the State with one large plant already in operation in the Coastal Plain.



Timber Trends

LITTLE NET CHANGE IN FOREST AREA

Total area of forest land in Virginia has increased from 16.1 to 16.3 million acres since 1957. Today, 15.8 million acres are classed as commercial forest, compared to about 15.4 million acres in 1957; the other half million acres of forest land are noncommercial because of ownership or adverse site conditions.

The apparent increase of almost 360,000 acres in commercial forest land must be evaluated carefully, however, to obtain a clear picture of the trend in forest area. For a true change, this increase must be discounted by 190,000 acres which were classified as noncommercial during the second survey because they were considered economically inaccessible. With present road systems and equipment, no forest land is now considered noncommercial because of inaccessibility. Therefore, these lands are now classified as commercial but represent no real gain. It is also well to examine the diversions of forest land to other uses along with the addition of new forest lands (table I).

Since 1957, almost 650,000 acres of nonforest land have been planted or naturally restocked with trees. During the same period, however, 480,000 acres of commercial forest land have been reserved or cleared for other land uses. Land clearing for improved pasture or other agricultural use was substantial throughout the Piedmont. Urban expansion into previously forested areas was most evident in the Northern Piedmont. In the Southern Mountains, 210,000 acres of new forest were added through the reversion of idle and abandoned land to forest, compared to a loss of only 18,000 acres of forest land to other uses.

Table I.—*Changes in area of commercial forest land, by survey unit, Virginia, 1957-1966*

Survey Unit	Area of commercial forest land in—		Net change	Changes							
				Total gain	Additions from—		Total loss	Diversions to—			
	1966	1957			Nonforest	Noncommercial forest		Noncommercial forest	Agriculture	Urban and other	Water
	Thousand acres										
Coastal Plain	4,090.7	4,067.1	+ 23.6	96.6	67.8	28.8	73.0	—	20.8	48.7	3.5
Southern Piedmont	3,775.5	3,747.3	+ 28.2	191.0	191.0	—	162.8	3.8	112.0	23.5	23.5
Northern Piedmont	2,448.9	2,492.5	— 43.6	129.1	116.0	13.1	172.7	23.4	81.0	64.6	3.7
Northern Mountain	2,503.4	2,398.0	+105.4	158.4	64.3	94.1	53.0	24.7	14.8	13.5	—
Southern Mountain	2,990.8	2,745.0	+245.8	264.1	209.9	54.2	18.3	4.4	4.0	8.6	1.3
State	15,809.3	15,449.9	+359.4	839.2	649.0	190.2	479.8	56.3	232.6	158.9	32.0

Currently, over 64 percent of the total land area in Virginia is forested. By survey unit, the portion forested ranges from a low of 59 percent in the Northern Piedmont to a high of 68 percent in the Southern Piedmont.

OWNERSHIP PATTERNS CHANGE

Individuals and private companies continue to hold almost 90 percent of the commercial forest land in Virginia, but there have been major ownership changes within these private holdings. Perhaps the most significant of these changes has been the shift of about 3 million acres of timberland from farm owner-

ship to a variety of other nonindustrial private owners. This trend was found throughout the State, but was most evident in the Coastal Plain and Southern Piedmont.

Because conditions of forest lands, the amount and kind of forest management applied, prospective timber growth, and availability all depend to a great extent upon the decisions of the owners and managers of the forests, such large-scale changes in the ownership pattern are of major interest. Currently, the average condition of stands owned by the miscellaneous private group does not differ significantly from the average condition of stands owned by farmers. As might be expected, both are generally found in poorer condition than stands owned by forest industry or public agencies. One likely result of the present trends in forest ownership is that future forestry programs will be subjected to a wider range of interests and attitudes.

Other changes in forest ownership since 1957 include an increase of over 320,000 acres in forest industry holdings, which are now extensive in all parts of the State except the Northern Mountains. Most of the 145,000-acre increase in public holdings occurred in the two Mountain Survey Units.

HARDWOODS OCCUPY MORE AREA

Hardwoods have occupied an increasing share of the growing space in Virginia since the first Forest Survey in 1940. Oak-hickory is now the predominant forest cover type on 9.8 million acres across the State. Oak-pine is the second leading forest type and now occupies over 2.5 million acres. In this type, southern pine makes up at least 25 but less than 50 percent of the live-tree stocking.[1]

Because of the heavier demand that has generally been placed upon pine stands and the pine component in mixed stands, hardwoods have been left to take over many areas following logging. Where there has not been an adequate pine seed source, hardwoods have also occupied a large share of the idle and abandoned farmland as it reverted back to forest. Natural hardwood encroachment remains a problem throughout most of the State, because some of the most prolific hardwoods are not desirable species in today's market.

Loblolly pine and Virginia pine are the leading softwood forest types and occupy 1.1 and 1.2 million acres, respectively. Virginia's expanding tree planting program, first started in 1917, has distributed more loblolly pine seedlings than all other species combined, but still the loblolly pine forest type has suffered a substantial loss in acres. It seems almost inevitable that hardwoods will take over more and more of the natural forests unless pine management is greatly intensified or cutting practices drastically changed in pine forest types.

AVERAGE STAND STILL IN POOR CONDITION

In general, Virginia's forests are still in poor condition and are producing far below their potential. Only about 3 out of every 5 acres of commercial forest land are 70 percent or better stocked with trees that qualify as growing stock. Most stands are fairly well stocked with live trees, but the problem is that 30 percent of the growing space is occupied by rough or rotten trees that currently have limited or no merchantability potential.

Planting, natural regeneration, and an outstanding fire control record have contributed to a 21-percent increase in the number of 2- and 4-inch trees since 1957. The average stand now has 632 sapling-size trees per acre. Only about one-half of these small trees qualify as growing stock that can be expected to contribute to the development of better stocked and more productive stands of timber.

Since 1957, average basal area per acre of all live trees 5.0 inches d.b.h. and larger has increased from 57 to 59 square feet. Average volume of all timber has increased from 1,110 to 1,156 cubic feet per acre. Net annual growth per acre averages only 43 cubic feet, which is about one-half the growth potential if all of the present stands were fully stocked with desirable trees.

MORE TIMBER VOLUME BUT LESS SOFTWOOD

Since 1940, volume of growing stock has increased 25 percent with hardwoods accounting for practically all of the increase (fig. 2). This favorable trend in volume is somewhat depressed in the Coastal Plain and Southern Piedmont where volume of softwood growing stock has declined 7 percent since 1957. In these areas, two of Virginia's most important species, loblolly and shortleaf pine, seemed to have been overcut, particularly in diameter classes 6 through 12 inches.

[1] A map detailing the major forest types in the South is available, upon request, from the Southeastern Forest Experiment Station.

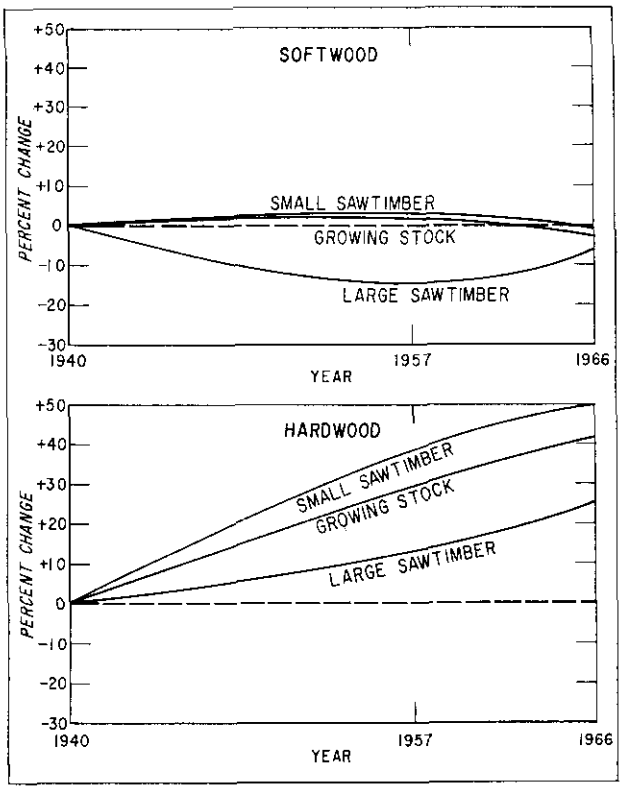


Figure 2. *Percent change in timber volume in Virginia since 1940.*

Since 1940, the board-foot volume of sawtimber has increased about 20 percent and is up 6 percent from 1957. Here again, hardwoods have provided most of the increase, but the larger softwood trees have fared better than poletimber and small sawtimber trees. To provide a basis for comparisons, adjustments have been made to allow for differences in volume tables and sawtimber merchantability specifications used in previous surveys.

Species composition, average volume per acre, and changes in volume vary across the State. Highest volumes are found in the Coastal Plain where sawtimber averages 3,372 board feet per acre, very close to the average in 1957. There, softwoods comprise about one-half the sawtimber volume, and loblolly pine, with 5.9 billion board feet, is by far the predominating species. Volume in oak, hickory, and beech totals 3.4 billion board feet. Sweetgum, blackgum, tupelo, yellow-poplar, soft maple, and ash, with 3.2 billion board feet, account for almost 46 percent of the hardwood sawtimber.

Lowest sawtimber volumes are found in the Southern Piedmont where the average is 1,890 board feet per acre, compared to 1,845 board feet in 1957. About 35 percent of the stands in the area are sapling and seedling stands—the highest proportion in the State. Shortleaf pine, with 1.1 billion board feet, is the leading softwood species. Oak, hickory, and yellow-poplar, with almost 4.0 billion board feet, account for 79 percent of the hardwood sawtimber.

In the Northern Piedmont, average volume per acre has increased from 1,987 to 2,246 board feet. Virginia pine is the most common softwood species in the area; however, the volume of all softwood sawtimber totals less than 1.0 billion board feet. As for the hardwoods, species composition differs little from that found in the Southern Piedmont. Volume in oak, hickory, and yellow-poplar is 3.9 billion board feet, almost 86 percent of the hardwood total.

The greatest increase in sawtimber volume since 1957 has occurred in the Northern Mountains where average volume per acre has increased from 1,992 to 2,287 board feet. Volume of softwood sawtimber totals over 1.0 billion board feet with pitch pine the leading softwood species. White pine is also an important species in the area. Volume of hardwood sawtimber totals 4.5 billion board feet, with chestnut oak alone accounting for almost 1.2 billion board feet.

In the rugged Southern Mountains, volume of sawtimber averages 2,048 board feet per acre compared to 1,942 board feet in 1957. Here, hardwoods dominate the forests to a greater extent than in any other part of the State (fig. 3). Besides oak, hickory, and yellow-poplar, a substantial quantity of beech, sugar maple, red maple, and basswood sawtimber is present. Hardwood sawtimber totals almost 5.4 billion board feet in the area. Although hardwoods far outnumber the softwoods, volume of softwood sawtimber has increased 13 percent since 1957 and now totals 0.7 billion board feet. White pine, hemlock, and pitch pine are the leading species.

IMBALANCE BETWEEN GROWTH AND CUT

The relationship of annual growth to annual cut is the most fundamental piece of knowledge that can be used to predict trends in the timber supply. When all species are grouped in Virginia, net growth of growing stock exceeds cut by 16 percent; however, a crucial imbalance between the growth and cut of softwood has now taken shape. The latest

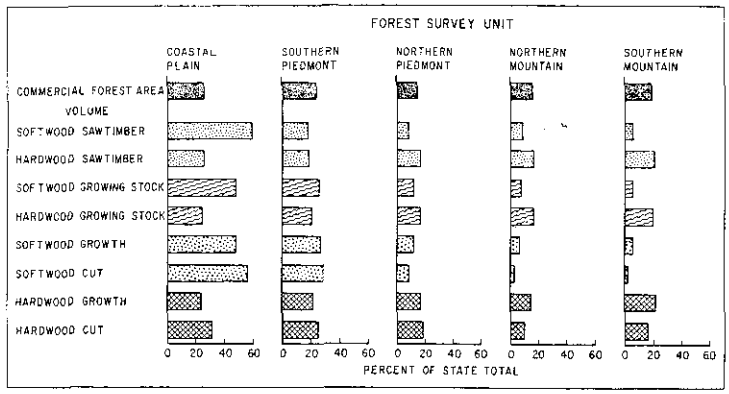


Figure 3. *Relative importance of forest resource by Survey Unit, Virginia, 1966.*

findings indicate that cut from softwood in 1965 exceeded growth by 15 percent (fig. 4).

These latest findings should come as no real surprise, but they do deserve further discussion. For many years the share of total timber cut in Virginia that has come from softwood growing stock has exceeded the proportion of softwood in the total inventory. The 1957 survey indicated that the margin between softwood growth and cut had become extremely narrow and that any increase in the cut of softwood could result in some depletion in the inventory. Although the recent findings do not show any increase in softwood cut, the inventory has begun to decrease slightly.

Between 1957 and 1966 the growth rate (growth as a percent of inventory) itself apparently declined. This decline could possibly have resulted from increased stand densities with improper spacing, climatic factors, and the fact that current methods of measuring growth are more accurate than those previously used. For example, in 1957 growth estimates were based entirely upon increment cores extracted from sample trees. In the latest survey, however, growth estimates are based upon diameter remeasurements of these same sample trees that were still present.

Because of the decline in rate of growth from 4.3 to 3.7 percent, volume growth has changed little when all species are grouped, in spite of the increase in total volume of growing stock. In 1965, net growth totaled 541 million cubic feet, compared to 549 million cubic feet in 1956. Even with the decrease in growth rate, hardwood growth has just about offset the loss in softwood growth because of the larger hardwood inventory.

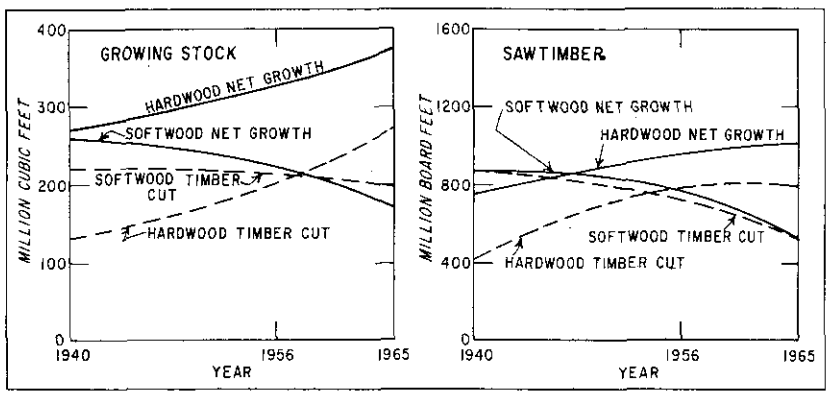


Figure 4. *Trend in net growth and timber cut in Virginia since 1940.*

Total annual cut of growing stock has increased from 412 million cubic feet in 1956 to 466 million cubic feet in 1965. All of the increase in cut has come from hardwood, which can support a heavier cut. For the first time, total cut from hardwood growing stock exceeds the total cut from softwood.

All of these trends and the supporting statistics seem to lead to one conclusion: the softwood timber supply in Virginia is in danger of further depletion unless even more of the total cut can be shifted to hardwood until timber managers can improve the softwood situation.

Timber Products Output

In 1965, timber products from Virginia's forests totaled 443 million cubic feet, compared to 456 million cubic feet in 1956. Pulpwood, including output from plant byproducts, increased from 113 to 173 million cubic feet, but this increase was offset by decreases in saw logs, veneer logs, fuelwood, and other miscellaneous products.

Although the output of timber products is down slightly, total timber cut from growing stock in 1965 was 13 percent greater than in 1956. The reason for this apparent inconsistency is that volume in logging residues more than doubled. These logging residues include woods waste on logging operations as well as timber removed in land clearing and cultural operations that was not used for any product. A greater share of the cut now comes from hardwoods where woods waste tends to run considerably higher than for softwoods. In 1965, volume of growing stock which was cut, girdled, poisoned, or destroyed and not used for any product totaled 108 million cubic feet. About 89 percent of this total was hardwood.

SAW LOGS ARE STILL THE LEADING PRODUCT

Although the number of active sawmills in Virginia declined from about 1,200 to 870 between 1958 and 1965, saw logs are still the leading timber product removed from the forests in terms of volume when all species are included. In 1965, output of saw logs totaled 182 million cubic feet. Hardwoods provided almost 55 percent of this total output.

Lumber production has fluctuated from year to year, but has averaged around 1.1 billion board feet annually since 1957 (fig. 5). Production of hardwood lumber exceeded the production of softwood lumber for the first time in 1963. As this report was being written, a temporary decline in new housing construc-

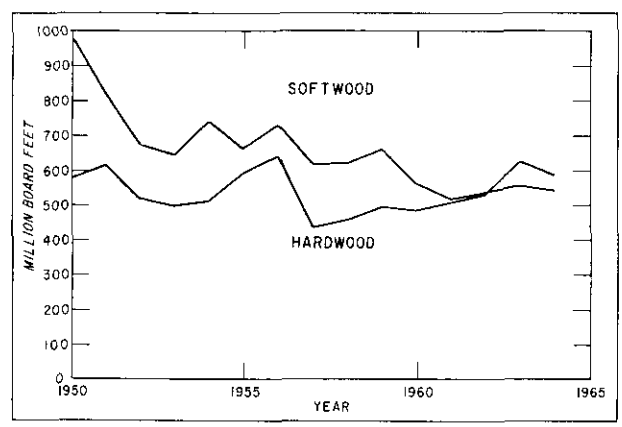
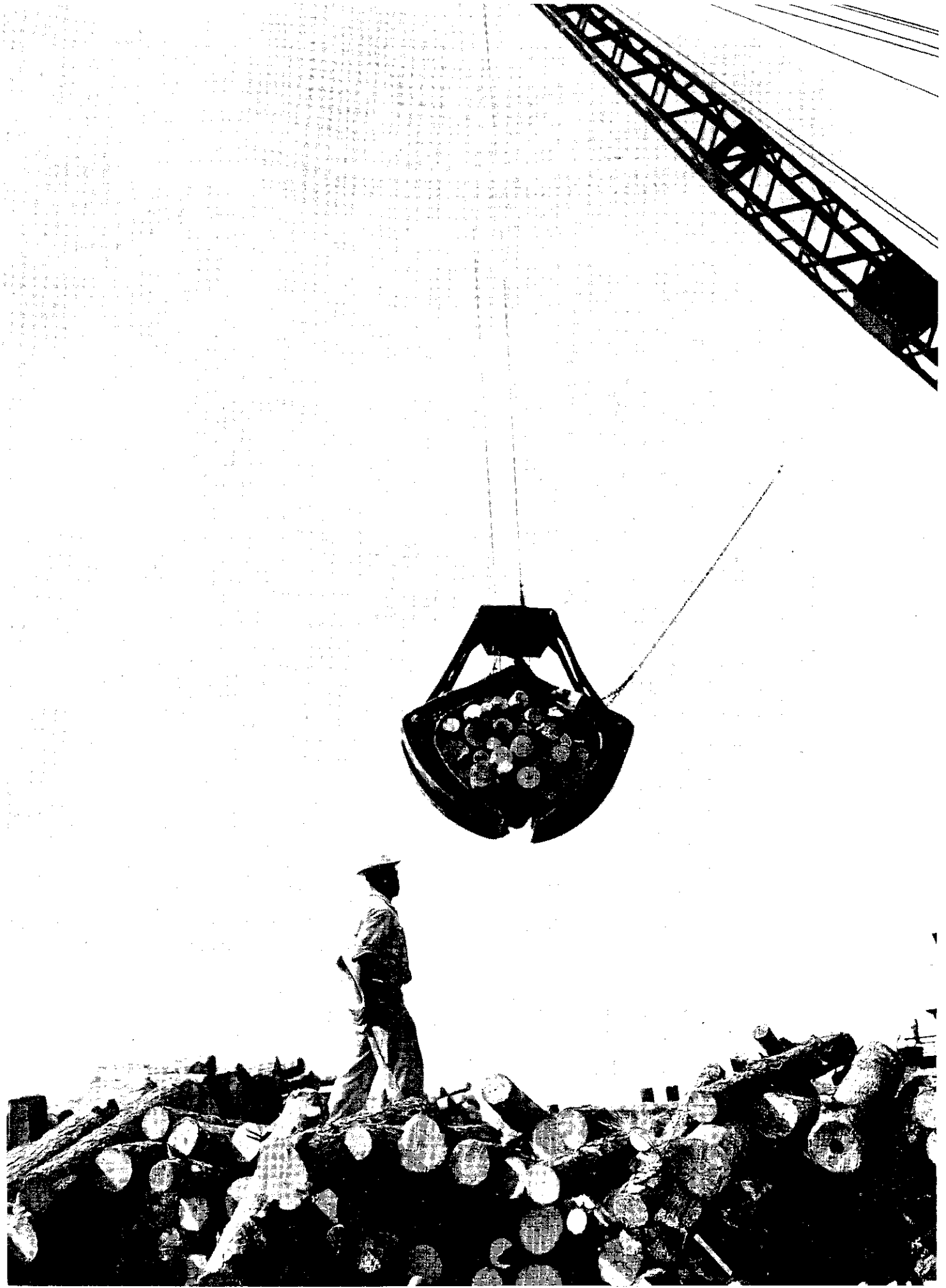


Figure 5. *Lumber production in Virginia, 1950 to 1965. Source: Bureau of the Census (Data for 1965 are not available)*

tion was causing some cutbacks in lumber production. These temporary cutbacks, however, should have little effect on the long-term trends in lumber production.

PULPWOOD PRODUCTION AT AN ALL-TIME HIGH

Since 1958, four of Virginia's seven pulpmills have increased their pulping capacities substantially. In 1965, output of pulpwood reached 173 million cubic feet, or 2.4 million cords, an all-time high (fig. 6). Pines provided about two-thirds of this total output. It might come as a surprise, but it is estimated that more pine timber in Virginia is now cut for pulpwood than for saw logs.



Some very impressive statistics are available to describe the increase in pulpwood production over the past 15 years. In 1950, production in Virginia totaled 1,044,000 cords, comprised of 775,000 cords of pine, 250,000 cords of hardwood, and 19,000 cords of dead chestnut. Chestnut as a source for pulpwood gradually faded out of the picture, but an entirely new source of wood was tapped a few years later—plant byproducts from sawmills and veneer mills. The introduction of debarkers and chippers at sawmills served as the master key to this new wood supply. By 1960, annual pulpwood production had risen to 1,833,000 cords, comprised of 1,278,000 cords of pine, 437,000 cords of hardwood, and the equivalent of 118,000 cords from these byproducts. Pulpwood from all of these sources continued to increase. In 1965, the latest year for which statistics are available, production reached 2,421,000 cords, comprised of 1,424,000 cords of pine, 670,000 cords of hardwood, and the equivalent of 327,000 cords from byproducts.

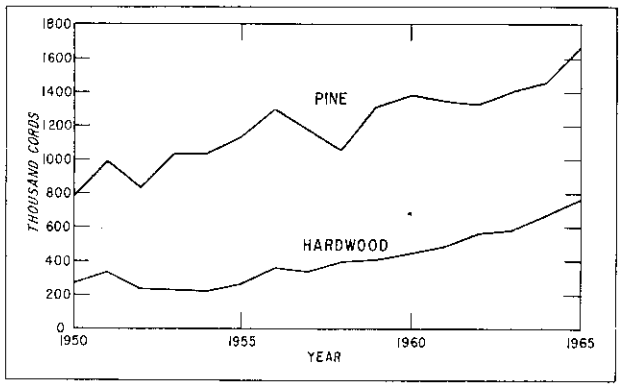


Figure 6. *Pulpwood production in Virginia, including byproducts, 1950 to 1965.*

OUTPUT OF VENEER LOGS IS DOWN

In 1965, there were 22 active hardwood veneer and plywood plants in Virginia, and the first southern pine plywood plant in the State was completed. Output of veneer logs totaled less than 8 million cubic feet, compared to 10 million cubic feet in 1956. Most of the veneer logs were hardwood because the new pine plywood plant was not completed until near the end of the year. Based on the announced capacity of this new plant, its annual timber requirements could approach 40 million board feet, or over 7 million cubic feet.

MISCELLANEOUS PRODUCTS

In addition to the sawmills, pulpmills, veneer, and plywood plants, there are approximately 45 other primary wood-using plants in Virginia. These plants produce miscellaneous products that range from poles, piling, posts, and mine timbers to cooperage, handle stock, particle board, pallets, and excelsior. In 1965, output of all these miscellaneous products totaled about 19 million cubic feet. The source for these products was divided about equally between softwood and hardwood.

PLANT RESIDUES

The primary wood-using industries in Virginia produced an estimated 94 million cubic feet of wood residues in 1965. Slightly less than one-half of these residues were either used in the manufacture of fiber products, specialty items, or for fuel and litter. It is estimated that about 50 million cubic feet were not used for any purpose. Of the amount not used, about 35 million cubic feet were fine residues, such as sawdust and shavings, which have very limited use at this time.

INDUSTRY CONCENTRATED IN COASTAL PLAIN AND SOUTHERN PIEDMONT

A large share of the forest industry in Virginia is concentrated in the Coastal Plain and Southern Piedmont (fig. 7). The physiographic features and pine timber resources, among other factors, have attracted a variety of wood-using industries into these areas. Fewer plants and timber markets are found in the mountains where hardwoods prevail, probably because of the poor transportation facilities and less available labor.

FUELWOOD CONSUMPTION CONTINUES TO DECLINE

Volume of fuelwood used in Virginia in 1965 was estimated to total about 61 million cubic feet, compared to 86 million cubic feet in 1956 and over 200 million cubic feet in 1940. About three-fourths of the 1965 estimate was roundwood and the other one-fourth came from plant byproducts. Although the use of wood for fuel continues to decrease, fuelwood still ranks third among all timber products in terms of volume.

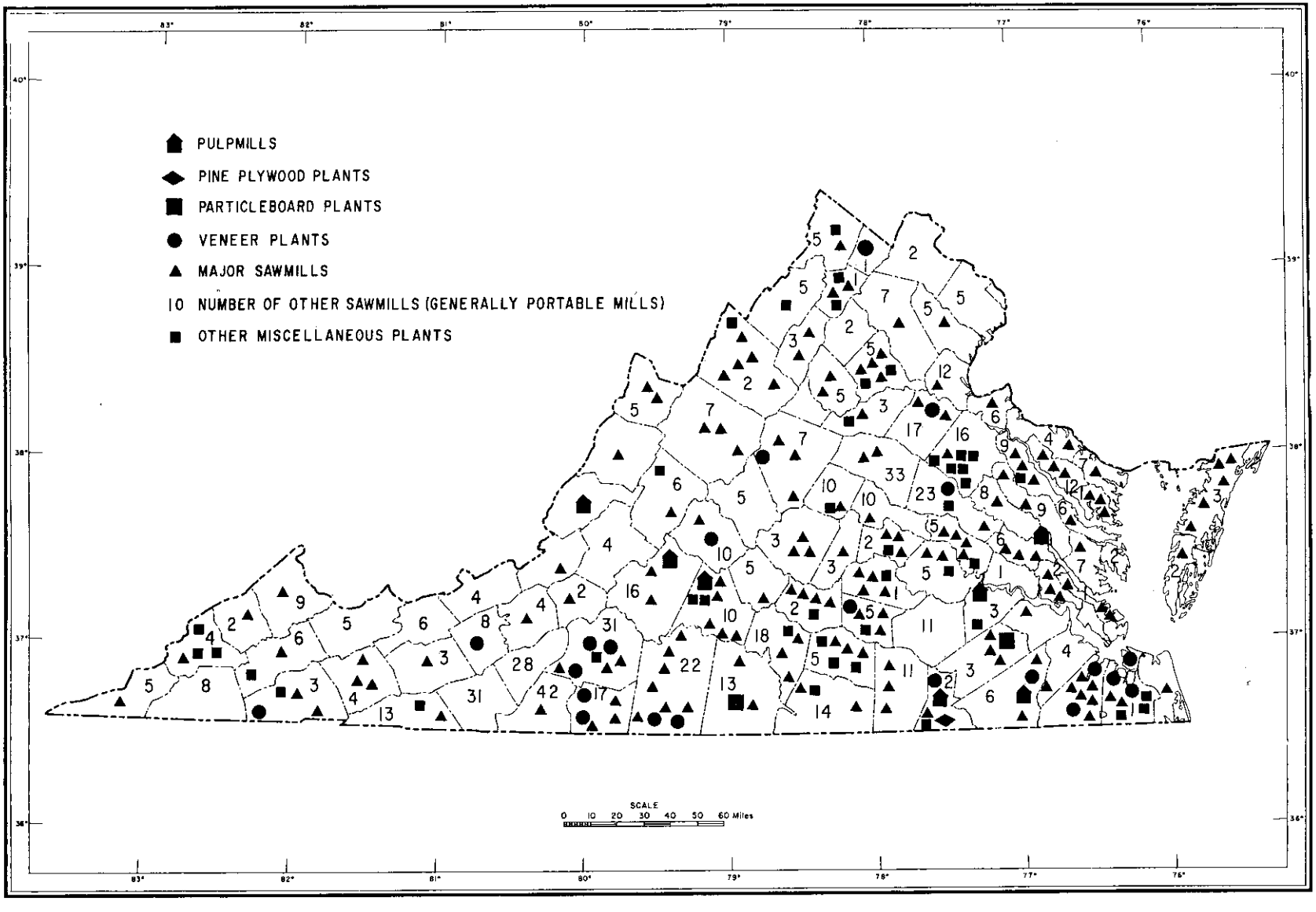


Figure 7. *Location of primary wood-using industries in Virginia, 1966.*

Timber Supply Outlook

Any long-term projection of timber supply is subject to many uncertainties, and the results largely reflect the assumptions that must be made about future forest area, levels of protection, and other management activities. Nevertheless, by introducing some reasonable assumptions, it is possible to estimate the prospective volume of timber that will be available if the current trend in forest management continues. This estimate can also be compared to the potential volume of timber that would be available annually if the present inventory were improved so that near maximum timber production could be obtained from Virginia's forest land. The results of projections made for Virginia and the assumptions used are described in this section. No attempt is made to project the timber supply beyond 50 years or to project timber demand. In this report, the projected trends are illustrated to the year 2000.

PROSPECTIVE AVAILABLE CUT

This first projection was made to obtain estimates of the volume of timber that will be available to forest industries annually, based on assumptions that the difference in cut and growth will gradually diminish until growth equals cut in 50 years, and that the current trend in forest management will continue. This assumes that forest protection, planting, stand improvement, thinning, stand conversion, and improved utilization will counteract any tendency for mortality to increase and radial growth to decrease in response to higher stand densities.

Because of the present deficit of softwood growth as related to cut, no realistic projection of present trends and conditions can be expected to show an increase in available softwood cut in the immediate future. The projection used here indicates that by the year 2000, available cut from softwood growing stock and sawtimber will likely decrease by 7 and 1 percent, respectively (fig. 8). This means that the present cut from softwood growing stock might have to be reduced from 197 to 182 million cubic feet per year, or slightly lower, to bring cut into balance with anticipated growth.

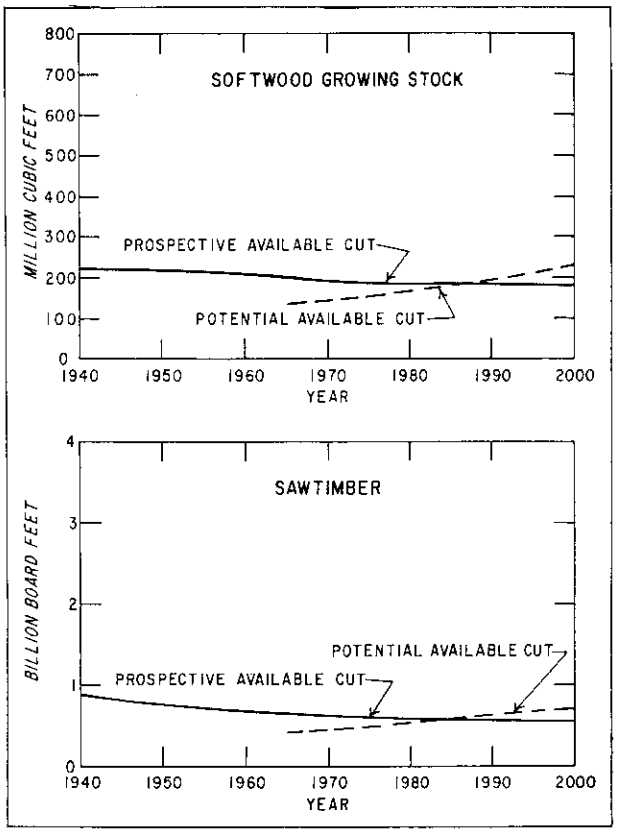


Figure 8. *Prospective and potential available cut, softwood, 1965-2000, Virginia.*

The increase in acres of forest planting in recent years provides the most encouraging prospect for improvement in the softwood situation (table II). Most of these acres have been planted with pines, and the successful plantations should start contributing substantially to the softwood timber supply within the next 20 years. In the meantime, further depletion of the softwood inventory seems almost inevitable.

The hardwood projection shows an entirely different picture from that described for softwood. Indications are that available cut from hardwood growing stock will likely more than double by the year 2000, and that available cut from hardwood sawtimber can be expected to increase by 56 percent (fig. 9). This means that the annual cut of hardwood growing stock could conceivably be increased from 269 to nearly 600 million cubic feet if present trends continue.

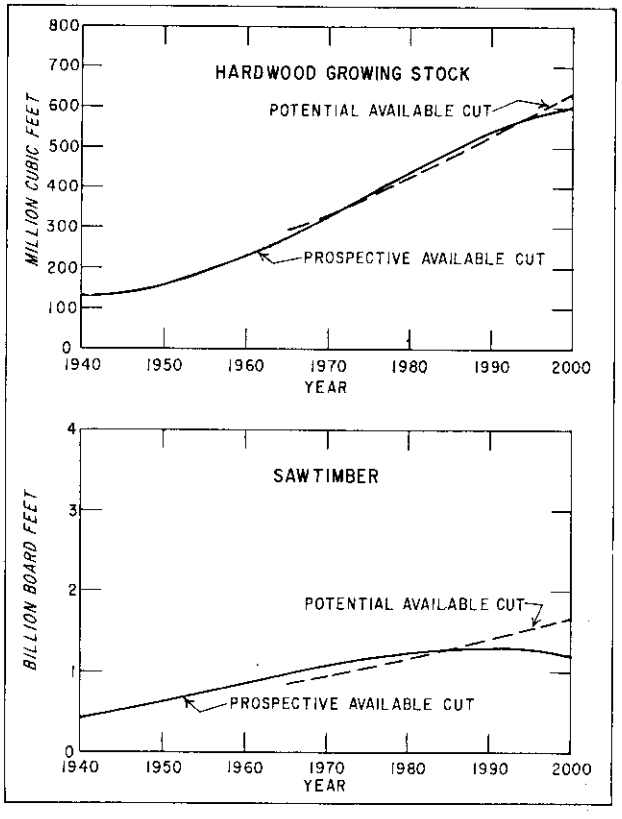


Figure 9. *Prospective and potential available cut, hardwood, 1965-2000, Virginia.*

The encouraging outlook for hardwood is largely attributed to the highly successful fire protection program in Virginia over the past several years. Between 1955 and 1965, the area burned annually by wildfire has averaged only 13,000 acres (table III). The result has been the establishment of abundant hardwood reproduction across the State. It is generally recognized that entirely too much of this reproduction is comprised of undesirable species which cannot be developed into stands of high quality timber that will satisfy the needs of the more demanding hardwood industries. Because of advancement in hardwood utilization, however, the timber supply outlook for industries dependent primarily upon wood fiber, without regard to quality, looks reasonably bright.

Table II.—*Acres of forest planting,* [1] *by ownership class, Virginia, 1956-1966*

Fiscal year	Ownership class				All ownerships	Accumulative total
	National Forest	Other public	Forest industry	Other private		
	Acres					
1956	183	535	9,769	9,866	20,353	20,353
1957	405	432	15,573	15,862	32,272	52,625
1958	131	1,116	18,601	19,527	39,375	92,000
1959	218	900	17,371	20,258	38,747	130,747
1960	332	602	10,804	23,448	35,186	165,933
1961	459	2,809	15,581	23,256	42,105	208,038
1962	538	1,520	24,195	19,870	46,123	254,161
1963	530	1,432	27,671	18,193	47,826	301,987
1964	1,270	1,729	39,023	22,570	64,592	366,579
1965	1,424	1,312	42,377	28,689	73,802	440,381
1966	2,418	1,707	35,039	25,603	64,767	505,148

[1] Includes acres of planting by direct seeding. Source: U. S. Department of Agriculture, Forest Service, *Tree Planters' Notes,* 1956-1966.

Table III.—*Forest area under fire protection, protected area burned, number of fires, and average size of fires, Virginia, 1955-1965*

Year	Forest area protected		Protected area burned		Fires	Average size of fires
	Thousand acres	*Percent* [1]	*Thousand acres*	*Percent*	*Number*	*Acres*
1955	14,650	100	18	0.12	1,564	11
1956	14,665	100	10	0.07	1,461	7
1957	15,728	100	4	0.03	1,077	4
1958	15,729	100	5	0.03	1,198	4
1959	15,731	100	16	0.10	2,466	7
1960	15,738	100	7	0.05	1,559	5
1961	15,736	100	4	0.03	1,193	4
1962	15,742	100	9	0.06	1,678	5
1963	15,746	100	49	0.31	3,427	14
1964	15,752	100	8	0.05	1,725	4
1965	15,702	100	16	0.10	2,496	7

[1] Percent of commercial forest area.

This discussion has pointed out that a major hardwood problem is inferior quality rather than quantity, but it would be negligent not to emphasize the tremendous opportunities with hardwood under good forest management. In both softwood and hardwood there may be areas where deficiencies will occur in select species, tree sizes, and quality timber.

POTENTIAL AVAILABLE CUT

A second projection was made to obtain estimates of the volume of timber that could be available to forest industries annually, based on the increase in production that could result from intensified forest management. The assumptions for this projection call for an acceleration of management over the next 50 years to develop the inventory needed to sustain a level of productivity that would more nearly reflect the capacity of Virginia's forest land.

Results from this projection show a potential available cut from softwood growing stock of about 270 million cubic feet at the end of 50 years. Potential available cut from softwood sawtimber over the same period could approach 0.9 billion board feet. A comparison between this potential and the prospective available cut from softwood provides a crude measure of the opportunities that are available for improving the softwood situation. Any immediate reduction in softwood cut through better utilization or hardwood substitution that can be accomplished will certainly make a softwood recovery easier, but a stepped-up planting program is obviously necessary.

Potential available cut from hardwood growing stock could increase to over 800 million cubic feet at the end of 50 years. The potential available cut from hardwood sawtimber could approach 2 billion board feet annually. To reach this potential, however, would require a major timber stand improvement program to remove and replace existing poor quality hardwoods with more desirable and thrifty trees. Although better hardwood utilization has advanced, the practical implementation of a timber stand improvement program of the magnitude required challenges the entire timber-based industry as well as timber owners and managers.

BASIS FOR PROJECTIONS

In these projections for Virginia, one basic assumption is that land equivalent to the present area occupied with commercial forests will be available to grow timber. A large part of 660,000 acres of idle agricultural land might possibly be converted back to forest, but present trends indicate that diversions of forest land to other uses will likely counterbalance the addition of new forest land. Although indications are that additional agricultural lands will not be needed for several years, urban and other encroachments into forests are expected to continue.

A second basic assumption in both projections is that an area equivalent to that currently 30 percent or better stocked with softwood can be perpetuated with softwood cover types. To retain this balance between the two broad species groups, softwoods and hardwoods, would necessitate a greater control than has been exerted in the past over hardwood encroachment upon the upland sites that are better suited for growing pines.

In the first projection, the current growth, cutting, and mortality rates were applied with only one significant exception—cut and growth are gradually brought into balance over the next 50 years. The ingrowth rate into the 2-inch diameter class each year, important in long-term projections, was based on the net change in numbers of trees in this diameter class between the last two surveys. Because of the stepped-up planting program in recent years, an ingrowth rate for softwoods determined on this basis is probably conservative.

In the second projection, the development of timber inventories that would sustain the potential available cut assumes that, starting now, timber management efforts could be greatly accelerated over the next 50 years. To sustain the potential available cut of softwood described earlier in this chapter would require approximately 4.7 million acres of well-stocked softwood stands carrying an average basal area of 90 square feet per acre. Stand structures would also need to be developed which would provide a greater proportion of trees in the larger diameter classes, 15.0 inches d.b.h. and up.

To provide the potential available cut of hardwood would require about 11.1 million acres of well-stocked hardwood stands carrying an average basal area of 120 square feet per acre. Assumptions here are that stand conditions could be corrected to prevent further proliferation of noncommercial and other undesirable trees. One encouraging fact is that evidence is already available that points toward greater interest in better hardwood management, which has long taken second place to pine management.

TIMBER QUALITY

Before leaving the subject of timber supply outlook, the existing and prospective deficiencies in timber quality, especially in hardwood, deserve closer examination. Currently, the volume of hardwood timber in Virginia totals almost 13.7 billion cubic feet. When this total is divided into the various size and quality classes, however, it becomes less impressive. First of all, 23 percent, or 3.2 billion cubic feet, is in rough and rotten trees which do not meet minimum standards for growing stock. Seventy-five percent of this 3.2 billion cubic feet is in trees that do not qualify as growing stock, primarily because of roughness and poor form. Another 19 percent is in trees that do not qualify as growing stock, primarily because of internal rot. Finally, about 6 percent is in trees of noncommercial species—blackjack oak, sourwood, sassafras, redbud, ailanthus, blue beech, etc. At best, most of this material can be used only for fiber products, fuelwood, or other local consumption.

Another 29 percent of the total volume is in trees less than 11.0 inches d.b.h., the minimum size considered for sawtimber. When another 7 percent is deducted to account for the volume in the upper-stem portions of sawtimber trees, only 41 percent of the original total remains. This means that the maximum volume of hardwood in the present inventory that can be manufactured into lumber, ties, timbers, and veneer totals less than 5.6 billion cubic feet, or about 26.3 billion board feet.

Because timber requirements differ for the various products, the volume of hardwood sawtimber can be further broken down on the basis of log grades (fig. 10). About 39 percent of the sawtimber volume is in grade 4 material suitable only for the manufacture of ties and timber. For these products, size and strength are the important characteristics

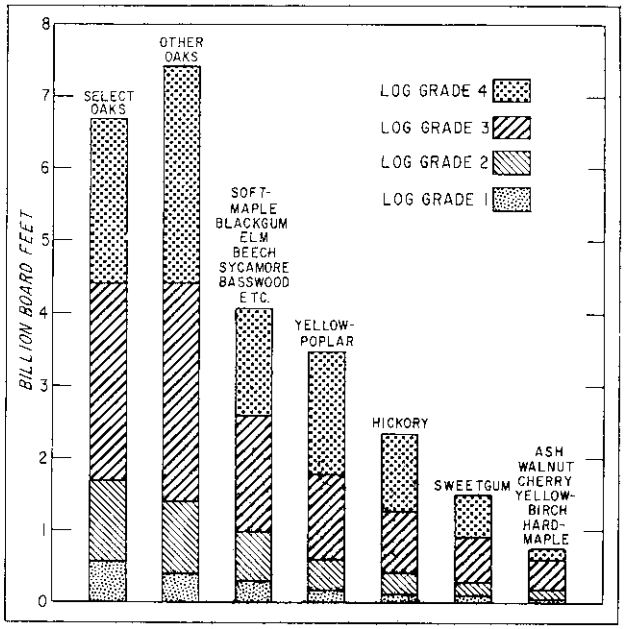


Figure 10. *Volume of hardwood sawtimber, by species groups and log grade, Virginia, 1966.*

rather than clear surfaces. Another 40 percent of the total volume is in grade 3 material suitable only for the poorer grades of lumber. This leaves less than 5.6 billion board feet, or 21 percent of the total volume of hardwood sawtimber, to provide the present needs for veneer, plywood, flooring, and top quality lumber.

Because so many of the hardwood stands have been high-graded in the past, to attain substantial improvement in timber quality will require intensive forest management in the years ahead. Quality is also a problem in the softwoods, but to a lesser extent than in hardwoods. The practical solution to the entire quality problem probably lies somewhere between making out with the kinds of timber available and taking whatever actions are needed to grow better quality timber.

Management Opportunities

GROWTH FAR BELOW POTENTIAL

In the earlier chapters of this report, the objectives have been to describe trends in the timber supply and timber products output and to provide a realistic estimate of the quantity of timber that will be available over the next 30 to 35 years. The objective in this chapter is to identify some of the opportunities available to timber managers for improving the timber supply in Virginia. Currently, net growth of growing stock across all site classes averages only about 34 cubic feet per acre, or about one-half the potential yield which could be obtained.

Over 11.0 million acres, or 70 percent, of the commercial forest land in Virginia are capable of producing 50 cubic feet or more wood per acre each year at culmination of mean annual growth when fully stocked with desirable trees. Over 2.1 million of these acres are capable of producing 85 cubic feet or more per acre. Unfortunately, relatively few stands are fully stocked with desirable trees; therefore, the gap remains wide between attained and potential growth.

As best determined from the survey, slightly over 2.5 million acres are adequately stocked with desirable trees free from competition and overtopping that would impede growth, or have conditions favorable for natural improvement of stocking without special treatment (Condition Classes 10 and 30). An additional 0.2 million acres are overstocked with desirable trees but would require only periodic thinning to increase prospective yields (Condition Class 20). In general, the present condition of the remaining stands offers opportunity for considerable improvement.

STAND IMPROVEMENT

About 8.9 million acres, 60 percent or better stocked with growing stock trees, generally have little prospect for improvement without special treatment, such as cull tree removal (Condition Classes 40, 50, and 60). In these stands, rough and rotten trees occupy up to one-third the growing space. The removal of the rough and rotten trees, and thinning to favor the better quality trees and more desirable species, could greatly improve both the quality and volume of timber expected from these stands in coming years. The amount and kind of treatment given these stands will particularly influence the hardwood timber supply over the next several decades. Treatment of the better stocked stands in these conditions, if approaching rotation age, would usually be postponed until harvest.

REGENERATION

On the 4.3 million acres that are less than 60 percent occupied with growing stock, present conditions generally offer little prospect for improvement short of site preparation and regeneration (Condition Class 70). Rough and rotten trees occupy almost one-half the growing space in these stands. Also included among these stands, however, are most of the nonstocked areas that can be planted without site preparation. Control over the stands during the critical regeneration period is especially important, however, to assure that the reproduction is desirable for the particular site or type of land involved.

PLANTING OPPORTUNITY

Plantations probably provide the most direct approach to fully stocked stands of desirable timber species. As was pointed out

earlier in this report, there are 660,000 acres of idle agricultural land in Virginia. Most of this land could be planted with seedlings with little or no site preparation. An additional 440,000 acres scattered within the commercial forests are nonstocked and can be added to the total land available for planting without site preparation.

If these 1.1 million acres of idle and nonstocked land are to contribute materially to timber supplies by the year 2000, reforestation should be completed by 1980. To accomplish this job will require planting about 85,000 acres annually, or some 20,000 more acres than have been planted during recent seasons.

Of course, a large share of these lands will eventually seed in through natural regeneration, but many of the stands produced will have less than optimum growth potential. A proliferation of poorly stocked stands in the past through natural regeneration is in fact contributing to the low growth yields experienced today.

BETTER PROTECTION

The reduction of timber losses caused by fire, insects, disease, and other natural destructive agents represents another opportunity to increase future timber supplies. In 1965, mortality of growing stock was down 11 percent from 1956, but still amounted to 78.7 million cubic feet, almost 17 percent of the volume of growing stock cut for all purposes.

In many instances, field crews were unable to determine the exact cause of death because of the 8- to 10-year remeasurement period involved. Trees which died during the earlier part of the remeasurement period left little evidence as to cause of death. A substantial amount, 5 million cubic feet, of the softwood loss is attributed to pine bark beetles, mostly in the Southern Piedmont and Coastal Plain. Individual tree suppression was one of the leading causes of death identified for both softwoods and hardwoods. In addition, many rot fungi plague the hardwoods throughout the State and, although they are not leading causes of death, have the greatest impact of all the diseases on net increment and the reduction in quality of individual trees.

Because of the excellent fire control record in Virginia, timber losses to wildfire have been small. All forest lands in the State are protected from fire, and the success of the program has certainly reduced the risk of widespread loss. Continued cooperation from the general public, particularly during prolonged periods of drought, is essential to protect and encourage the efforts required for intensive timber management.

MORE COMPLETE UTILIZATION

In 1965, logging and plant residues combined totaled over 150 million cubic feet. Although full economic use of the entire volume of woods and plant residues is not presently feasible, further advances in timber utilization can be expected. One pulpmill in Virginia is already successfully producing a small share of its pulp from pine sawdust that is blended with long fiber pulp. Many progressive firms in Virginia are today selling all of their wood residues, including bark and have closed down their residue burners. There is promise that other plants will follow suit and thus help to reduce the strain on standing timber by more complete utilization. Greater use of the 2.9 billion cubic feet in rough trees could also stretch existing timber supplies and at the same time facilitate corrective management practices.

GENERAL OUTLOOK

In the past, the wealth of Virginia's forests has been considered to be mainly in its pine timber, and the State's forest industry has been developed to capitalize on this wealth. The pines have served Virginia well but are now in danger of being slowly and continuously depleted in volume, growth, and area unless positive steps are taken to alter present trends. The positive steps must include extensive planting of abandoned land suitable for pine, as well as cultural measures to maintain pine stands on sites where pine is more suitable. Otherwise, low-value hardwoods will displace the pines on these sites, particularly if nature is allowed to follow the normal ecological pattern of establishing hardwood climax forest type.

During the past decade, the forest economy in Virginia has shifted to some extent from pine dominated to a hardwood oriented economy. For the first time in its history, more hardwood is being cut than softwood. Because of the greater logging waste generally associated with the harvesting of hardwood, however, output of timber products from softwood still exceeds the output from hardwood.

All of the trends from softwood to hardwood are not necessarily bad. Virginia has the land capable of producing fine hardwood

and it has the industry capable of using them. Good hardwoods bring prices equal to and often much greater than pine. Regeneration of hardwoods is more positive and less expensive than pine, but management and development of quality in hardwoods is more difficult and not so well understood as pine management.

The large volume of hardwood growing stock and its margin of growth over cut offer the opportunity for plant expansion and new industries, and efforts can well be directed along these lines. The immediate effort, however, should be directed to increasing the use of rough hardwood trees for fiber products, thus providing growing space for better quality trees. Markets for hardwoods are ever broadening, and Virginia can capitalize on its natural wealth of hardwoods if it rises to the challenge of developing an aggressive hardwood forestry program.

Appendix

ACCURACY OF THE SURVEY

Sample points systematically spaced on aerial photographs were classified to provide preliminary estimates of forest area by county. Field crews then examined 7,217 of these points on the ground to adjust for misclassification and changes in land use since the date of aerial photography. Estimates of timber volume and growth are based on measurements recorded at 4,669 of the ground check points classed as forest land.

Statistical analysis of the data indicates a sampling error of ±0.4 percent for the estimate of total forest area, 1.2 percent for total cubic volume, and 1.8 percent for total cubic-volume growth. As these totals are broken down by forest type, species, tree diameter, and other subdivisions the possibility of error increases. The order of this increase is suggested in the following tabulation which shows the sampling error the estimates are liable to, two chances out of three.

Forest area	Sampling error [1]	Cubic volume	Sampling error [1]	Net cu. ft. growth	Sampling error [1]
Thousand acres	*Percent*	*Million cu. ft.*	*Percent*	*Million cu. ft.*	*Percent*
16,339.0	0.4				
2,746.6	1.0	14,785.2	1.2	541.1	1.8
686.6	2.0	4,973.7	2.0	483.3	2.0
305.2	3.0	2,210.6	3.0	194.8	3.0
171.7	4.0	1,243.4	4.0	109.6	4.0
109.9	5.0	795.8	5.0	70.1	5.0
27.5	10.0	198.9	10.0	17.5	10.0
12.2	15.0	88.4	15.0	7.8	15.0
6.9	20.0	49.7	20.0	4.4	20.0
4.4	25.0	31.8	25.0	2.8	25.0

[1] By random-sampling formula.

HOW THE FOREST INVENTORY IS MADE

The basic data presented in this report were obtained by a sampling procedure designed for use, with some regional variation, by Forest Survey units throughout the Nation. The method of survey is intended to provide reliable statistics primarily at the State level, and to assure that these statistics have a certain degree of comparability with similar data collected across the Nation. The basic steps of the procedure used in Virginia were as follows:

1. Initial acreage estimates of forest land and other land-use classes were obtained by classifying grid points printed on the latest aerial photographs available for each county.

2. Each land-use class, excluding reserved forest land, was subsequently sampled proportionally on the ground. In the ground check, maximum use was made of permanent sample locations established during the second Forest Survey in Virginia, completed in 1957. In counties where there were not enough permanent sample locations to meet established limits of error, additional sample plots were selected from the grid points on the aerial photographs. The initial estimates of area within land-use classes obtained from the aerial photographs were either verified or adjusted on the basis of the ground check.

A 10-point cluster of plots systematically spaced on an acre was measured at each sample location using a basal-area factor of 37.5 square feet per acre. Trees less than 5.0 inches d.b.h. were tallied on fixed-radius plots around the point centers. All the new inventory information is based on the measurements and data collected on the 10-point clusters.

3. The permanent sample plots established in 1956 and 1957 were reconstructed where possible, and their remeasurement provided the primary estimates of growth, cut, and mortality. Approximately 100 active logging

operations in Virginia were sampled to relate timber utilization to timber inventory.

4. Equations prepared from detailed measurements collected on the trees tallied at one out of every ten sample locations were used to compute the volumes of individual tally trees. A mirror-caliper and sectional, aluminum poles were used to obtain the additional measurements on standing trees required to construct the volume equations. The same 10-percent subsample of plots used for the tree-volume study also served as a quality control of field measurements.

5. Ownership information was collected from local contacts, correspondence, and public records. In those counties where the sample missed a particular ownership class, temporary sample plots were added and measured to describe the forest conditions within the ownership class.

6. All field data were sent to Asheville for editing and were punched in cards for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

On National Forest lands the procedure as described was altered slightly to take full advantage of the cooperation received from the George Washington and the Jefferson National Forests.

DEFINITIONS OF TERMS

Land Use Classes

Forest land.—Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use.

Commercial forest land.—Forest land which is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Includes areas suitable for management to grow crops of industrial wood generally capable of producing in excess of 20 cubic feet per acre of annual growth. Includes both accessible and inaccessible areas.

Noncommercial forest land.—Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive forest land withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved forest land.—Productive public forest land withdrawn from timber utilization through statute or administrative regulation.

Unproductive forest land.—Forest land incapable of yielding crops of industrial wood because of adverse site conditions. Includes sterile or poorly drained forest land and steep rocky areas where topographic conditions are likely to prevent management for timber production.

Nonforest land.—Land that has never supported forests and lands formerly forested where use of timber is precluded by development for nonforest uses, such as crops, improved pasture, residential areas, and city parks. Also includes improved roads and adjoining rights-of-way, powerline clearings, and certain areas of water classified by the Bureau of the Census as land. Unimproved roads, streams, canals, and nonforest strips in forest areas must be more than 120 feet wide, and clearings in forest areas must be more than one acre in size, to qualify as nonforest land.

Cropland.—Land under cultivation within the past 24 months, including orchards and land in soil improving crops, but excluding land cultivated in developing improved pasture. Also includes idle farmland that has not been tended within the past 24 months but is less than 10 percent stocked with trees.

Pasture and range.—Land which is currently improved for grazing by cultivation, seeding, irrigation, fencing, or clearing of wood or brush growth, including land forested but developed for pasture, and open natural rangeland not 10 percent stocked with trees.

Ownership Classes

National Forest.—Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service.

Other Federal.—Federal lands other than National Forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and miscellaneous Federal agencies.

Indian lands.—Tribal lands held in fee by the Federal Government but administered for Indian tribal groups, and Indian trust allotments.

Miscellaneous Federal.—Federal lands other than National Forests, lands administered by the Bureau of Land Management, and Indian lands.

State.—Lands owned by States, or lands leased by States for more than 50 years.

County and municipal.—Lands owned by counties or municipalities, or lands leased by these governmental units for more than 50 years.

Forest industry.—Lands owned by companies or individuals operating wood-using plants.

Farmer-owned.—Lands owned by operators of farms. (A farm is defined as a place operated as a unit of 10 or more acres from which the sale of agricultural

products totaled $50 or more annually, or a place operated as a unit of less than 10 acres from which the sale of agricultural products totaled $250 or more annually during the previous year.)

Miscellaneous private.—Privately owned lands other than forest industry or farmer-owned.

Stand-Size Classes

Sawtimber stands.—Stands at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding that of sawtimber stocking.

Sapling-seedling stands.—Stands at least 10 percent stocked with growing-stock trees with more than half of this stocking in saplings and seedlings.

Nonstocked areas.—Commercial forest lands less than 10 percent stocked with growing-stock trees.

Stocking

A measure of area occupancy by trees of specified classes based on a minimum standard of 75 square feet of basal area per acre. Three categories of stocking are considered in the Survey: (1) all live trees, (2) growing-stock trees, and (3) desirable trees. Stocking in terms of all live trees is used in the delineation of forest land and forest types. Stocking in terms of growing-stock trees is used in stand-size and age classifications. Stocking in terms of desirable trees is used in delineating area condition classes.

Basal area.—The area in square feet of the cross section at breast height of a single tree or of the trees in a stand, usually expressed as square feet per acre.

Forest Type Groups

White pine-hemlock.—Forests in which 50 percent or more of the stand is eastern white pine or hemlock, singly or in combination. (Common associates include birch and maple.)

Spruce-fir.—Forests in which 50 percent or more of the stand is spruce or true firs, singly or in combination. (Common associates include whitecedar, tamarack, maple, birch, and hemlock.)

Loblolly-shortleaf pine.—Forests in which 50 percent or more of the stand is loblolly pine, shortleaf pine, or other southern yellow pines except longleaf or slash pine, singly or in combination. (Common associates include oak, hickory, and gum.)

Oak-pine.—Forests in which 50 percent or more of the stand is hardwoods, usually upland oaks, but in which southern pines make up 25-49 percent of the stand. (Common associates include gum, hickory, and yellow-poplar.)

Oak-hickory.—Forests in which 50 percent or more of the stand is upland oaks or hickory, singly or in combination, except where pines comprise 25-49 percent, in which case the stand would be classified oak-pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-gum-cypress.—Bottom-land forests in which 50 percent or more of the stand is tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, except where pines comprise 25-49 percent, in which case the stand would be classified oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-cottonwood.—Forests in which 50 percent or more of the stand is elm, ash, or cottonwood, singly or in combination. (Common associates include willow, sycamore, beech, and maple.)

Maple-beech-birch.—Forests in which 50 percent or more of the stand is maple, beech, or yellow birch, singly or in combination. (Common associates include hemlock, elm, basswood, and white pine.)

Tree Species

Commercial species.—Tree species presently or prospectively suitable for industrial wood products; excludes so-called weed species, such as blackjack oak and hawthorn.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous. Soft-textured hardwoods include boxelder, red and silver maple, buckeye, hackberry, loblolly-bay, silverbell (in Mts.), butternut, sweetgum, yellow-poplar, cucumbertree, magnolia, sweetbay, water tupelo, blackgum, sycamore, cottonwood, black cherry, willow, basswood, and elm. Hard-textured hardwoods include Florida and sugar maple, birch, hickory, dogwood, persimmon (forest-grown), beech, ash, honeylocust, holly, black walnut, mulberry, all commercial oaks, and black locust.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Site Quality Classes

Site classes represent a classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean annual growth of growing stock (not including thinnings) attainable in fully stocked stands at culmination of mean annual growth. Height-age relationships are used as indicators of the specified volume-site classes. Five site-quality classes are recognized:

Class 1.—Sites capable of producing 165 or more cubic feet per acre annually.

Class 2.—Sites capable of producing 120 to 165 cubic feet per acre annually.

Class 3.—Sites capable of producing 85 to 120 cubic feet per acre annually.

Class 4.—Sites capable of producing 50 to 85 cubic feet per acre annually.

Class 5.—Sites incapable of producing 50 cubic feet per acre annually, but excluding unproductive sites.

Area Condition Classes

A classification of commerical forest land based upon stocking by desirable trees and other conditions affecting current and prospective timber growth.

Class 10.—Areas 100 percent or more stocked with desirable trees and not overstocked. Stands in this category generally do not require any treatment at present to maintain high level of growth.

Class 20.—Areas 100 percent or more stocked with desirable trees and overstocked. Stands in this category need a treatment, such as thinning, to produce maximum levels of growth of desirable trees.

Class 30.—Areas 60 to 100 percent stocked with desirable trees and with less than 30 percent of the area controlled by acceptable growing-stock trees, rough or rotten trees, inhibiting vegetation, slash, or nonstockable conditions. Stands in this category generally have conditions favorable for natural improvement of stocking without special treatment.

Class 40.—Areas 60 to 100 percent stocked with desirable trees and with 30 percent or more of the area controlled by other trees, or conditions that ordinarily prevent occupancy by desirable trees. Stands in this category generally have little prospect for improvement in desirable tree stocking without special treatment.

Class 50.—Areas less than 60 percent stocked with desirable trees, but with 100 percent or more stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree stocking without special treatment. Stands almost to rotation age would usually not be treated.

Class 60.—Areas less than 60 percent stocked with desirable trees, but with 60 to 100 percent stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree stocking without special treatment.

Class 70.—Areas less than 60 percent stocked with desirable trees and with less than 60 percent stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable-tree or growing-stock stocking without treatment.

Class of Timber

Growing-stock trees.—Sawtimber trees, poletimber trees, saplings, and seedlings; that is, all live trees except rough and rotten trees.

Sawtimber trees.—Live trees of commercial species 9.0 inches and larger in diameter at breast height for softwoods and 11.0 inches and larger in diameter at breast height for hardwoods, and containing at least one 12-foot saw log.

Poletimber trees.—Live trees of commercial species at least 5.0 inches in diameter at breast height but smaller than sawtimber size, and of good form and vigor.

Saplings.—Live trees of commercial species 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Seedlings.—Live trees of commercial species less than 1.0 inch in diameter at breast height that are expected to survive, according to regional standards.

Desirable trees.—Growing-stock trees with no serious defects in quality limiting present or prospective use; of relatively high vigor and containing no pathogens that may result in death or serious deterioration before rotation age. They include the type of trees forest managers aim to grow; that is, the trees left in silvicultural cutting or favored in cultural operations.

Acceptable trees.—Trees meeting the specifications for growing stock but not qualifying as desirable trees.

Rough trees.—Live trees that do not contain at least one 12-foot saw log now or prospectively, primarily because of roughness, poor form, or noncommercial species.

Rotten trees.—Live trees that do not contain at least one 12-foot saw log now or prospectively, primarily because of rot.

Salvable dead trees.—Standing or down dead trees that are considered currently or potentially merchantable.

Saw-log Specifications

Saw-log portion.—That part of the bole of sawtimber trees between the stump and the merchantable top.

Merchantable top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. Minimum merchantable top is 7.0 inches d.o.b. for softwoods, and 9.0 inches d.o.b. for hardwoods.

Saw log.—A log meeting minimum approved log-grade specifications, or for species for which approved log grades are lacking; at least 8' long, with a minimum d.i.b. of 6", and with deduction for defect no greater than two-thirds the gross volume.

Log grades.—A classification of logs based on external characteristics as indicators of quality or value.

White pine quality classes are based on the revised trial specifications for white pine log grades prepared by the Northeastern Forest Experiment Station in 1960. Other softwood quality classes are based on standards presented in "Forest Service Log Grades for Southern Pine," issued by the Southeastern Forest Experiment Station in 1964.

Hardwood quality classes are based on "Hardwood Log Grades for Standard Lumber," issued by the Forest Products Laboratory under the designation D1737 in 1949. Hardwood log grades include, in addition to the log grades for standard lumber, a grade 4 tie and timber log. A grade 4 hardwood log must be sound internally, and no single knot or group of knots within a 6-inch section of the log can exceed one-third the log diameter at that point. Rotten defects or holes can be present on the surface of the log, but they must not extend more than 3 inches into the potential tie or timber. Sweep departure cannot exceed one-fourth the log scaling diameter per 8 feet of length.

Diameters

D.b.h. (Diameter at breast height).—Tree diameter in inches, outside bark, measured at 4½ feet above ground.

Diameter classes.—The 2-inch diameter classes extend from 1.0 inch below to 0.9 inch above the stated midpoint. For example, the 6-inch class includes trees 5.0-6.9 inches d.b.h., inclusive.

Volume

Volume of sawtimber.—Net volume of the saw-log portion of live sawtimber trees in board feet International 1/4-inch rule.

Volume of growing stock.—Volume of sound wood in the bole of sawtimber and poletimber trees from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Volume of timber.—The volume of sound wood in the bole of growing stock, rough or rotten, and salvable dead trees 5.0 inches and larger in diameter at breast height, from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Standard cord.—A stacked pile of round or split bolts of wood, including bark, encompassing 128 cubic feet. See "Conversion Factors" for cubic-foot content of solid wood per average cord.

Growth and Timber Cut

Net annual growth of growing stock.—The annual change in volume of sound wood in live sawtimber and poletimber trees resulting from natural causes.

Net annual growth of sawtimber.—The annual change in net board-foot volume of live sawtimber trees resulting from natural causes.

Mortality of growing stock.—The volume of sound wood in live sawtimber and poletimber trees dying annually from natural causes.

Mortality of sawtimber.—The net board-foot volume of sawtimber trees dying annually from natural causes.

Timber cut from growing stock.—The volume of sound wood in live sawtimber and poletimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber cut from sawtimber.—The net board-foot volume of live sawtimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber products.—Roundwood products and byproducts of wood manufacturing plants.

Conversion Factors

Cubic feet of wood per average cord (excluding bark)

D.b.h.	Pine	Other softwoods	Hardwood
6	61.2	64.9	59.8
8	68.0	71.2	68.3
10	72.9	76.9	73.3
12	76.5	81.3	76.3
14	79.3	83.3	78.4
16	81.5	85.7	79.8
18	83.3	88.5	80.8
20	84.7	89.4	81.6
22-28	86.6	92.2	82.6
30+	90.2	97.3	83.9
Average	72.5	80.0	74.4

Rough cords per M cubic feet (without bark) $= a + b\left(\frac{1}{\text{D.b.h.}}\right) + c\left(\frac{1}{\text{D.b.h.}}\right)^2$

Where		*Pine*	*Other softwoods*	*Hardwood*
a	=	10.01850	9.15960	11.68410
b	=	34.42135	28.75793	3.74431
c	=	22.73994	25.54418	157.39417

INDEX TO DETAILED TABLES

Table 1.—*Area by land classes, Virginia, 1966*

Land class	Area
	Thousand acres
Forest land:	
Commercial	15,809.3
Productive-reserved	313.5
Unproductive	216.2
Total	16,339.0
Nonforest land:	
Cropland	3,604.9
Pasture and range	3,588.3
Other[1]	1,970.0
Total	9,163.2
All land [2]	25,502.2

[1] Includes swampland, industrial and urban areas, other nonforest land, and 136,400 acres classed as water by Forest Survey standards but defined by Bureau of Census as land.

[2] From U. S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2.—*Area of commercial forest land, by ownership classes, Virginia, 1966*

Ownership class	Area
	Thousand acres
National Forest	1,202.8
Other Federal:	
Indian	0.5
Miscellaneous Federal	233.9
Total other Federal	234.4
State	181.6
County and municipal	53.1
Forest industry	1,562.3
Farmer-owned	6,958.2
Miscellaneous private	5,616.9
All ownerships	15,809.3

Table 3.—*Area of commercial forest land, by stand-size and ownership classes, Virginia, 1966*

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
			Thousand acres		
Sawtimber	5,293.5	619.5	199.6	492.9	3,981.5
Poletimber	5,966.9	492.5	199.9	481.0	4,793.5
Sapling and seedling	4,452.4	75.8	69.3	582.6	3,724.7
Nonstocked areas	96.5	15.0	0.3	5.8	75.4
All classes	15,809.3	1,202.8	469.1	1,562.3	12,575.1

Table 4.—*Area of commercial forest land, by stand-volume and ownership classes, Virginia, 1966*

Stand volume per acre[1]	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
			Thousand acres		
Less than 1,500 board feet	7,794.8	499.1	164.1	776.7	6,354.9
1,500 to 5,000 board feet	5,819.4	562.7	212.8	495.9	4,548.0
More than 5,000 board feet	2,195.1	141.0	92.2	289.7	1,672.2
All classes	15,809.3	1,202.8	469.1	1,562.3	12,575.1

[1] Volume, International ¼-inch rule.

Table 5.—*Area of commercial forest land, by area-condition and ownership classes, Virginia, 1966*

Area-condition class	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
			Thousand acres		
10	1,025.7	19.9	33.2	174.2	798.4
20	173.4	—	13.6	42.8	117.0
30	1,478.2	74.3	47.0	229.3	1,127.6
40	1,643.8	201.2	77.3	206.2	1,159.1
50	1,469.5	43.0	55.3	199.6	1,171.6
60	5,749.7	283.3	174.1	418.9	4,873.4
70	4,269.0	581.1	68.6	291.3	3,328.0
All classes	15,809.3	1,202.8	469.1	1,562.3	12,575.1

Table 6.—*Area of commercial forest land, by stocking classes based on alternative stand components, Virginia, 1966*

Stocking percentage	Stocking class					
	All live trees	Growing stock	Rough and rotten trees	Inhibiting vegetation	Non-stocked	Non-stockable
			Thousand acres			
160	3.0	—	—	—	—	—
150-160	30.4	—	—	—	—	—
140-150	337.2	20.9	—	—	—	—
130-140	1,884.5	181.0	5.3	—	—	—
120-130	3,129.8	418.6	6.7	—	—	—
110-120	3,536.0	784.5	41.8	—	—	—
100-110	2,709.8	1,343.3	57.9	—	—	—
90-100	1,787.4	1,949.2	138.7	—	5.9	—
80-90	1,070.5	2,306.9	257.6	—	3.6	—
70-80	524.4	2,364.3	420.8	—	23.8	—
60-70	310.7	2,171.6	874.7	3.5	64.1	29.9
50-60	169.4	1,661.7	1,473.5	3.5	77.6	14.8
40-50	125.2	1,102.5	2,278.6	39.2	132.0	25.2
30-40	119.5	711.2	3,041.6	50.4	174.7	66.8
20-30	29.5	452.5	3,033.4	105.9	455.3	183.6
10-20	29.0	244.5	2,703.1	423.8	1,540.4	252.4
Less than 10	13.0	96.6	1,475.6	15,183.0	13,331.9	15,236.6
All areas	15,809.3	15,809.3	15,809.3	15,809.3	15,809.3	15,809.3

Table 7.—*Area of commercial forest land, by site and ownership classes, Virginia, 1966*

Site class	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
			Thousand acres		
165 cu. ft. or more	126.1	—	1.7	3.2	121.2
120 to 165 cu. ft.	289.3	7.1	10.5	18.2	253.5
85 to 120 cu. ft.	1,699.2	38.4	76.5	203.1	1,381.2
50 to 85 cu. ft.	8,929.5	608.3	276.9	961.9	7,082.4
Less than 50 cu. ft.	4,765.2	549.0	103.5	375.9	3,736.8
All classes	15,809.3	1,202.8	469.1	1,562.3	12,575.1

Table 8.—*Area of commercial forest land, by forest types and ownership classes, Virginia, 1966*

Type	All ownerships	Public	Private
		Thousand acres	
Softwood types:			
White pine-hemlock	61.3	8.5	52.8
Loblolly-shortleaf pine:			
Loblolly pine	1,115.9	38.3	1,077.6
Shortleaf pine	339.0	15.2	323.8
Virginia pine	1,245.7	71.3	1,174.4
Eastern redcedar	121.0	—	121.0
Pitch pine	63.6	31.2	32.4
Table-Mountain pine	32.8	12.9	19.9
Pond pine	2.6	—	2.6
Total	2,920.6	168.9	2,751.7
Total softwoods	2,981.9	177.4	2,804.5
Hardwood types:			
Oak-pine	2,537.3	210.5	2,326.8
Oak-hickory	9,823.8	1,259.8	8,564.0
Oak-gum-cypress	254.7	6.1	248.6
Elm-ash-cottonwood	116.4	—	116.4
Maple-beech-birch	95.2	18.1	77.1
Total hardwoods	12,827.4	1,494.5	11,332.9
All types	15,809.3	1,671.9	14,137.4

Table 9.—*Area of noncommercial forest land, by forest types, Virginia, 1966*

Type	All areas	Productive-reserved areas	Unproductive areas
		Thousand acres	
White-red-jack pine	2.0	2.0	—
Spruce-fir	0.4	0.4	—
Loblolly-shortleaf pine	16.1	11.4	4.7
Oak-pine	68.8	56.0	12.8
Oak-hickory	431.2	233.6	197.6
Oak-gum-cypress	9.7	9.7	—
Maple-beech-birch	1.5	0.4	1.1
All types	529.7	313.5	216.2

Table 10.—*Number of growing-stock trees on commercial forest land, by species and diameter classes, Virginia, 1966*

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 & larger
					Thousand trees						
Softwood:											
Shortleaf pine	110,644	49,492	33,529	17,357	6,971	2,268	673	250	59	41	4
Loblolly pine	179,216	66,302	43,239	29,600	18,563	11,369	5,668	2,705	1,179	568	23
Virginia pine	191,200	104,273	55,378	21,152	7,572	2,187	469	134	35	—	—
Pond pine	811	221	114	187	96	117	21	26	24	5	—
Table-Mountain pine	7,378	3,966	1,043	1,476	533	212	115	22	8	3	—
Pitch pine	27,140	10,738	7,018	4,559	2,689	1,258	620	182	50	26	—
Eastern white pine	17,259	7,050	4,573	2,139	1,544	892	484	270	148	148	11
Spruce and balsam fir	76	—	22	33	16	—	5	—	—	—	—
Hemlock	7,483	2,939	1,592	1,021	796	320	338	234	102	112	29
Cypress	1,691	198	149	406	322	251	106	111	50	82	16
Redcedar [1]	13,286	9,396	2,291	994	390	171	15	14	15	—	—
Total	556,184	254,575	148,948	78,924	39,492	19,045	8,514	3,948	1,670	985	83
Hardwood:											
Select white oaks[2]	167,919	70,126	37,251	24,675	15,890	9,920	5,020	2,516	1,242	1,127	152
Select red oaks [3]	53,795	19,472	11,152	8,016	5,271	3,756	2,373	1,453	912	1,235	155
Other white oaks	134,074	57,603	31,335	17,486	11,015	7,418	4,123	2,099	1,286	1,586	123
Other red oaks	175,706	70,968	44,883	24,858	16,279	9,039	4,687	2,525	1,114	1,221	132
Hickory	92,764	38,846	22,272	13,301	8,105	4,913	2,799	1,389	605	498	36
Hard maple	8,163	3,971	1,875	681	635	421	230	187	49	100	14
Soft maple	68,497	37,181	15,912	6,441	4,372	2,024	1,165	643	379	350	30
Beech	13,816	4,812	2,649	1,896	1,311	1,167	783	605	223	347	23
Sweetgum	65,982	30,906	15,142	8,740	5,314	2,949	1,356	774	456	321	24
Tupelo and blackgum	35,384	15,333	8,461	4,451	2,954	2,041	1,102	554	226	236	26
Ash	14,837	6,348	3,288	2,333	1,368	598	404	232	135	118	13
Cottonwood	416	281	39	23	21	13	—	26	13	—	—
Yellow birch	1,540	653	639	137	50	28	16	4	4	9	—
Basswood	7,140	2,774	1,782	1,025	644	389	230	141	66	89	—
Yellow-poplar	102,904	36,697	24,658	17,633	10,291	6,287	3,607	1,931	945	781	74
Black walnut	6,248	2,033	1,703	1,153	546	413	145	166	58	31	—
Elm	10,078	4,888	2,503	1,201	712	409	214	52	39	58	2
Sycamore	7,491	2,565	1,934	890	791	508	285	204	143	152	19
Black cherry	3,192	1,678	852	309	163	126	38	—	17	9	—
Other eastern hardwoods	52,319	27,537	12,010	5,933	3,326	1,592	920	452	308	222	19
Total	1,022,265	434,672	240,340	141,182	89,058	54,011	29,497	15,953	8,220	8,490	842
All species	1,578,449	689,247	389,288	220,106	128,550	73,056	38,011	19,901	9,890	9,475	925

[1]Includes 128,000 white-cedar trees.
[2]Includes white, swamp white, swamp chestnut, and chinkapin oaks.
[3]Includes cherrybark, Shumard, and northern red oaks.

Table 11.—*Volume of timber on commercial forest land, by class of timber and by softwood and hardwood, Virginia, 1966*

Class of timber	All species	Softwood	Hardwood
	- - - *Million cubic feet* - - -		
Sawtimber trees:			
Saw-log portion	8,191.1	2,636.8	5,554.3
Upper-stem portion	1,135.2	193.1	942.1
Total	9,326.3	2,829.9	6,496.4
Poletimber trees	5,458.9	1,457.6	4,001.3
All growing-stock trees	14,785.2	4,287.5	10,497.7
Rough trees:			
Sawtimber-size trees	1,281.6	136.0	1,145.6
Poletimber-size trees	1,606.8	186.3	1,420.5
Total	2,888.4	322.3	2,566.1
Rotten trees:			
Sawtimber-size trees	519.5	12.7	506.8
Poletimber-size trees	82.6	1.9	80.7
Total	602.1	14.6	587.5
Salvable dead trees:			
Sawtimber-size trees	1.7	1.2	0.5
Poletimber-size trees	2.2	0.6	1.6
Total	3.9	1.8	2.1
Total, all timber	18,279.6	4,626.2	13,653.4

Table 12.—*Volume of growing stock and sawtimber on commercial forest land, by ownership classes and by softwood and hardwood, Virginia, 1966*

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	- - - *Million cubic feet* - - -			- - - *Million board feet* [1] - - -		
National Forest	1,075.3	174.8	900.5	3,011.8	615.4	2,396.4
Other public	533.2	186.9	346.3	1,358.9	520.2	838.7
Forest industry	1,570.1	722.7	847.4	4,157.7	2,165.0	1,992.7
Farmer and misc. private	11,606.6	3,203.1	8,403.5	29,507.5	8,468.1	21,039.4
All ownerships	14,785.2	4,287.5	10,497.7	38,035.9	11,768.7	26,267.2

[1] International ¼-inch rule.

Table 13.—*Volume of growing stock on commercial forest land, by species and diameter classes, Virginia, 1966*

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 & larger
	Million cubic feet										
Softwood:											
Shortleaf pine	755.3	112.6	204.9	200.7	129.7	60.1	25.6	12.7	4.3	3.9	0.8
Loblolly pine	1,788.1	128.1	231.8	315.4	335.1	304.7	210.0	133.2	74.8	51.1	3.9
Virginia pine	1,135.6	269.4	358.4	267.0	150.4	62.4	18.2	7.2	2.6	—	—
Pond pine	11.5	0.4	0.7	1.7	1.5	2.8	0.9	1.2	1.9	0.4	—
Table-Mountain pine	47.8	9.6	5.9	14.4	7.9	4.8	3.6	1.1	0.4	0.1	—
Pitch pine	203.2	19.7	35.4	41.7	42.4	29.4	21.2	8.3	2.8	2.3	—
Eastern white pine	157.2	14.4	22.3	20.8	22.9	21.8	16.4	12.9	9.1	14.5	2.1
Spruce and balsam fir	0.7	—	0.1	0.3	0.2	—	0.1	—	—	—	—
Hemlock	90.8	5.9	7.2	8.8	14.2	7.9	12.0	11.9	6.4	11.2	5.3
Cypress	46.8	0.7	1.0	4.5	7.1	8.0	4.1	6.5	3.6	8.0	3.3
Redcedar [1]	50.5	18.2	10.9	9.2	6.6	3.9	0.6	0.4	0.7	—	—
Total	4,287.5	579.0	878.6	884.5	718.0	505.8	312.7	195.4	106.6	91.5	15.4
Hardwood:											
Select white oaks [2]	1,799.2	172.4	227.0	283.4	299.4	276.0	191.8	126.6	81.3	107.7	33.6
Select red oaks [3]	780.1	46.7	67.9	91.8	97.6	102.1	90.8	71.8	59.6	120.7	31.1
Other white oaks	1,282.4	125.3	170.9	176.3	178.0	177.6	135.6	92.5	71.2	132.9	22.1
Other red oaks	1,729.6	166.1	264.7	271.0	288.2	236.3	171.0	122.4	68.9	115.7	25.3
Hickory	891.9	81.6	120.7	139.6	145.3	131.7	104.8	71.9	40.2	49.3	6.8
Hard maple	86.1	9.5	11.9	7.4	11.6	10.9	8.6	9.1	4.1	10.6	2.4
Soft maple	551.8	97.0	99.4	74.8	81.8	57.6	45.5	31.8	25.1	33.0	5.8
Beech	217.2	11.9	15.9	20.8	23.2	31.2	29.4	31.6	14.7	33.9	4.6
Sweetgum	622.1	61.7	89.2	103.6	110.1	89.4	57.7	42.1	31.7	31.5	5.1
Tupelo and blackgum	366.4	33.0	49.1	50.0	56.4	58.1	44.1	29.4	15.4	24.4	6.5
Ash	155.0	16.3	18.7	27.2	26.5	15.8	16.3	12.0	8.6	11.1	2.5
Cottonwood	3.9	0.8	0.2	0.3	0.2	0.3	—	1.2	0.9	—	—
Yellow birch	11.4	2.5	4.2	1.4	1.0	0.9	0.4	0.2	0.2	0.6	—
Basswood	86.7	7.2	12.0	13.2	13.4	11.9	9.1	7.2	4.9	7.8	—
Yellow-poplar	1,246.4	93.2	154.8	210.9	197.5	181.8	145.6	103.5	65.8	77.9	15.4
Black walnut	55.5	4.2	7.8	10.7	7.7	8.9	4.6	7.0	2.6	2.0	—
Elm	83.2	10.7	14.3	12.9	13.7	11.2	8.6	2.8	2.5	6.0	0.5
Sycamore	106.9	7.1	12.0	10.6	15.8	13.9	10.4	9.8	8.9	14.8	3.6
Black cherry	21.5	4.1	5.0	3.2	2.9	3.2	1.4	—	0.9	0.8	—
Other eastern hardwoods	400.4	64.8	68.2	62.2	58.8	43.3	34.6	22.8	20.2	21.8	3.7
Total	10,497.7	1,016.1	1,413.9	1,571.3	1,629.1	1,462.1	1,110.3	795.7	527.7	802.5	169.0
All species	14,785.2	1,595.1	2,292.5	2,455.8	2,347.1	1,967.9	1,423.0	991.1	634.3	894.0	184.4

[1] Includes 0.4 million cubic feet of Atlantic white-cedar.
[2] Includes white, swamp white, swamp chestnut, and chinkapin oaks.
[3] Includes cherrybark, Shumard, and northern red oaks.

Table 14.—*Volume of sawtimber on commercial forest land, by species and diameter classes, Virginia, 1966*

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 & larger
	Million board feet								
Softwood:									
Shortleaf pine	1,729.0	703.6	541.1	265.5	114.9	59.7	20.1	20.3	3.8
Loblolly pine	6,234.9	1,103.0	1,440.0	1,407.9	1,005.0	645.6	367.5	248.2	17.7
Virginia pine	1,818.4	873.4	575.1	252.4	75.4	30.3	11.8	—	—
Pond pine	46.8	6.7	6.7	11.9	3.8	5.5	9.9	2.3	—
Table-Mountain pine	132.9	54.0	33.3	21.0	16.6	5.2	1.9	0.9	—
Pitch pine	630.9	147.6	179.7	136.1	100.0	41.5	14.5	11.5	—
Eastern white pine	536.8	72.6	96.1	101.5	79.5	61.9	44.2	70.4	10.6
Spruce and balsam fir	2.1	1.1	0.7	—	0.3	—	—	—	—
Hemlock	368.2	28.4	58.7	37.5	58.9	61.5	34.2	58.9	30.1
Cypress	203.4	10.8	29.9	37.0	19.1	32.6	17.5	39.0	17.5
Redcedar	65.3	25.5	21.9	11.7	2.3	1.7	2.2	—	—
Total	11,768.7	3,026.7	2,983.2	2,282.5	1,475.8	945.5	523.8	451.5	79.7
Hardwood:									
Select white oaks [1]	4,374.8	—	1,004.7	1,104.3	789.6	534.3	343.6	451.5	146.8
Select red oaks [2]	2,328.2	—	327.2	405.3	364.3	306.0	251.1	531.1	143.2
Other white oaks	3,284.5	—	615.6	706.2	557.7	402.5	303.0	597.5	102.0
Other red oaks	4,136.4	—	985.2	950.2	727.7	533.3	311.1	521.1	107.8
Hickory	2,332.1	—	513.5	545.7	467.7	337.6	190.5	243.8	33.3
Hard maple	235.4	—	40.9	43.0	38.4	36.7	19.4	47.0	10.0
Soft maple	1,042.2	—	260.1	216.0	174.4	127.9	97.4	142.4	24.0
Beech	713.3	—	84.5	124.8	122.5	139.2	61.7	156.8	23.8
Sweetgum	1,502.1	—	378.2	364.2	253.2	192.0	149.6	142.5	22.4
Tupelo and blackgum	883.0	—	165.2	213.3	176.4	120.6	66.6	108.5	32.4
Ash	347.9	—	80.5	56.6	63.7	49.6	39.7	46.3	11.5
Cottonwood	11.3	—	0.9	0.9	—	5.3	4.2	—	—
Yellow birch	13.3	—	4.1	3.5	1.5	0.7	0.9	2.6	—
Basswood	228.7	—	48.9	44.2	39.8	32.7	25.3	37.8	—
Yellow-poplar	3,492.4	—	716.3	798.9	691.0	509.5	317.4	383.1	76.2
Black walnut	124.8	—	26.2	34.0	18.2	27.3	11.4	7.7	—
Elm	147.2	—	41.0	35.6	28.8	9.9	9.8	19.7	2.4
Sycamore	320.9	—	54.5	58.6	44.3	41.2	37.8	68.6	15.9
Black cherry	31.4	—	10.2	11.1	4.9	—	2.7	2.5	—
Other eastern hardwoods	717.3	—	169.2	144.4	126.8	87.6	77.9	93.1	18.3
Total	26,267.2	—	5,526.9	5,860.8	4,690.9	3,493.9	2,321.1	3,603.6	770.0
All species	38,035.9	3,026.7	8,510.1	8,143.3	6,166.7	4,439.4	2,844.9	4,055.1	849.7

[1] Includes white, swamp white, swamp chestnut, and chinkapin oaks.
[2] Includes cherrybark, Shumard, and northern red oaks.

Table 15.—*Volume of sawtimber on commercial forest land, by species and log grade, Virginia, 1966*

Species	All grades	Grade 1 logs	Grade 2 logs	Grade 3 logs	Grade 4 logs
	Million board feet				
Softwood:					
Yellow pines	10,592.9	213.6	1,592.2	5,877.4	2,909.7
Eastern white pine	536.8	20.2	56.0	301.3	159.3
Spruce and balsam fir	2.1	0.2	0.9	0.7	0.3
Cypress	203.4	30.7	87.9	82.8	2.0
Other eastern softwoods	433.5	5.6	27.7	235.1	165.1
Total	11,768.7	270.3	1,764.7	6,497.3	3,236.4
Hardwood:					
Select white and red oaks	6,703.0	566.2	1,111.4	2,747.1	2,278.3
Other white and red oaks	7,420.9	414.2	967.6	3,001.9	3,037.2
Hickory	2,332.1	115.9	313.7	828.1	1,074.4
Yellow birch	13.3	0.7	1.8	9.8	1.0
Hard maple	235.4	14.7	31.4	106.0	83.3
Sweetgum	1,502.1	95.5	194.3	614.8	597.5
Ash, walnut, and black cherry	504.1	37.7	108.4	285.4	72.6
Yellow-poplar	3,492.4	187.4	403.0	1,177.9	1,724.1
Other hardwoods	4,063.9	305.0	676.0	1,599.4	1,483.5
Total	26,267.2	1,737.3	3,807.6	10,370.4	10,351.9
All species	38,035.9	2,007.6	5,572.3	16,867.7	13,588.3

Table 16.—*Net annual growth and cut of growing stock on commercial forest land, by species, Virginia, 1965*

Species	Net annual growth	Annual timber cut [1]
	Million cubic feet	
Softwood:		
Yellow pines	156.1	188.3
Eastern white pine	7.0	5.1
Spruce and balsam fir	(2)	—
Cypress	1.6	0.9
Other eastern softwoods	6.0	2.6
Total	170.7	196.9
Hardwood:		
Select white and red oaks	89.5	70.0
Other white and red oaks	113.0	70.2
Hickory	22.1	10.3
Yellow birch	0.5	—
Hard maple	3.1	1.3
Sweetgum	19.1	19.7
Ash, walnut, & black cherry	7.2	6.1
Yellow-poplar	59.3	40.9
Other hardwoods	56.6	50.7
Total	370.4	269.2
All species	541.1	466.1

[1] Annual cut based on trend level between 1957 and 1965 as developed from the remeasurement of permanent sample plots.
[2] Negligible.

Table 17.—*Net annual growth and cut of growing stock on commercial forest land, by ownership classes and by softwood and hardwood, Virginia, 1965*

Ownership class	Net annual growth			Annual timber cut		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet					
National Forest	36.1	5.3	30.8	6.3	—	6.3
Other public	19.5	7.2	12.3	13.8	8.9	4.9
Forest industry	59.2	28.8	30.4	71.6	34.9	36.7
Farmer and misc. private	426.3	129.4	296.9	374.4	153.1	221.3
All ownerships	541.1	170.7	370.4	466.1	196.9	269.2

Table 18.—*Net annual growth and cut of sawtimber on commercial forest land, by species, Virginia, 1965*

Species	Net annual growth	Annual timber cut [1]
	Million board feet [2]	
Softwood:		
Yellow pines	467.0	508.3
Eastern white pine	29.4	24.4
Spruce and balsam fir	(3)	—
Cypress	7.3	5.1
Other eastern softwoods	16.5	7.2
Total	520.2	545.0
Hardwood:		
Select white and red oaks	269.1	202.4
Other white and red oaks	284.6	206.2
Hickory	64.8	29.4
Yellow birch	0.4	—
Hard maple	6.2	5.3
Sweetgum	57.4	50.1
Ash, walnut, and black cherry	16.9	13.1
Yellow-poplar	199.8	136.5
Other hardwoods	115.6	148.4
Total	1,014.8	791.4
All species	1,535.0	1,336.4

[1] Annual cut based on trend level between 1957 and 1965 as developed from the remeasurement of permanent sample plots.
[2] International ¼-inch rule.
[3] Negligible.

Table 19.—*Net annual growth and cut of sawtimber on commercial forest land, by ownership classes and by softwood and hardwood, Virginia, 1965*

Ownership class	Net annual growth			Annual timber cut		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million board feet					
National Forest	96.0	18.1	77.9	19.6	—	19.6
Other public	54.7	19.5	35.2	41.4	26.8	14.6
Forest industry	180.0	93.8	86.2	207.4	109.5	97.9
Farmer and misc. private	1,204.3	388.8	815.5	1,068.0	408.7	659.3
All ownerships	1,535.0	520.2	1,014.8	1,336.4	545.0	791.4

Table 20.—*Annual mortality* [1] *of growing stock and sawtimber on commercial forest land, by species, Virginia, 1965*

Species	Growing stock	Sawtimber
	Million cubic feet	*Million board feet*
Softwood:		
Yellow pines	27.8	52.5
Eastern white pine	0.3	0.1
Spruce and balsam fir	—	—
Cypress	0.2	1.5
Other eastern softwoods	0.8	2.0
Total	29.1	56.1
Hardwood:		
Select white and red oaks	7.7	21.5
Other white and red oaks	16.1	33.9
Hickory	3.5	7.8
Yellow birch	—	—
Hard maple	0.2	0.8
Sweetgum	4.8	10.5
Ash, walnut, and black cherry	1.5	3.4
Yellow-poplar	3.8	11.8
Other hardwoods	12.0	29.6
Total	49.6	119.3
All species	78.7	175.4

[1] Based on annual mortality between 1957 and 1965 from the remeasurement of permanent sample plots.

Table 21.—*Annual mortality of growing stock and sawtimber on commercial forest land, by ownership classes and by softwood and hardwood, Virginia, 1965*

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*		
National Forest	3.4	0.4	3.0	10.5	0.5	10.0
Other public	3.7	2.0	1.7	9.8	5.1	4.7
Forest industry	9.4	5.2	4.2	25.1	10.4	14.7
Farmer and misc. private	62.2	21.5	40.7	130.0	40.1	89.9
All ownerships	78.7	29.1	49.6	175.4	56.1	119.3

Table 22.—*Annual mortality of growing stock and sawtimber on commercial forest land, by causes and by softwood and hardwood, Virginia, 1965*

Cause of death	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*		
Fire	2.3	0.9	1.4	6.3	3.1	3.2
Insects	5.2	5.2	—	12.5	12.5	—
Disease	2.6	0.7	1.9	11.5	2.7	8.8
Other	21.3	9.7	11.6	27.6	6.7	20.9
Unknown	47.3	12.6	34.7	117.5	31.1	86.4
All causes	78.7	29.1	49.6	175.4	56.1	119.3

Table 23.—*Total output of timber products, by product, by type of material used, and by softwood and hardwood, Virginia, 1965*

Product and species group	Unit	Total output		Output from roundwood		Output from plant byproducts	
		Standard units	*M cu. ft.*	*Standard units*	*M cu. ft.*	*Standard units*	*M cu. ft*
Industrial products:							
Saw logs:							
Softwood	M bd. ft.[1]	508,023	82,300	508,023	82,300	—	—
Hardwood	M bd. ft.[1]	613,707	99,424	613,707	99,424	—	—
Total	M bd. ft.[1]	1,121,730	181,724	1,121,730	181,724	—	—
Veneer logs and bolts:							
Softwood	M bd. ft.[1]	1,441	217	1,441	217	—	—
Hardwood	M bd. ft.[1]	47,412	7,214	47,412	7,214	—	—
Total	M bd. ft.[1]	48,853	7,431	48,853	7,431	—	—
Pulpwood:							
Softwood	Std. cds.[2]	1,650,918	114,265	1,423,972	93,840	226,946	20,425
Hardwood	Std. cds.[2]	770,074	58,971	670,174	49,980	99,900	8,991
Total	Std. cds.[2]	2,420,992	173,236	2,094,146	143,820	326,846	29,416
Miscellaneous industrial:							
Cooperage:							
Softwood	M bd. ft.[1]	—	—	—	—	—	—
Hardwood	M bd. ft.[1]	12,496	1,686	12,496	1,686	—	—
Total	M bd. ft.[1]	12,496	1,686	12,496	1,686	—	—
Piling:							
Softwood	M linear ft.	4,435	1,774	4,435	1,774	—	—
Hardwood	M linear ft.	1,108	673	1,108	673	—	—
Total	M linear ft.	5,543	2,447	5,543	2,447	—	—
Poles:							
Softwood	M pieces	104	1,248	104	1,248	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	104	1,248	104	1,248	—	—
Mine timbers (round):							
Softwood	M cu. ft.	55	55	55	55	—	—
Hardwood	M cu. ft.	495	495	495	495	—	—
Total	M cu. ft.	550	550	550	550	—	—
Posts (round and split):							
Softwood	M pieces	358	251	358	251	—	—
Hardwood	M pieces	105	74	105	74	—	—
Total	M pieces	463	325	463	325	—	—
Other:[3]							
Softwood	M cu. ft.	4,869	6,163	4,869	4,869	—	1,294
Hardwood	M cu. ft.	5,790	6,650	5,790	5,790	—	860
Total	M cu. ft.	10,659	12,813	10,659	10,659	—	2,154
All miscellaneous industrial:							
Softwood	—	—	9,491	—	8,197	—	1,294
Hardwood	—	—	9,578	—	8,718	—	860
Total	—	—	19,069	—	16,915	—	2,154
All industrial:							
Softwood	—	—	206,273	—	184,554	—	21,719
Hardwood	—	—	175,187	—	165,336	—	9,851
Total	—	—	381,460	—	349,890	—	31,570
Fuelwood:[4]							
Softwood	Std. cds.	286,164	20,580	235,183	15,992	50,981	4,588
Hardwood	Std. cds.	538,160	40,518	448,266	32,428	89,894	8,090
Total	Std. cds.	824,324	61,098	683,449	48,420	140,875	12,678
All products:							
Softwood	—	—	226,853	—	200,546	—	26,307
Hardwood	—	—	215,705	—	197,764	—	17,941
Total	—	—	442,558	—	398,310	—	44,248

[1] International ¼-inch rule.
[2] Rough wood basis (includes chips converted to equivalent standard cords).
[3] Includes particleboard wood, excelsior bolts, handle stock, etc.
[4] Includes plant byproducts used for industrial and domestic fuel.

Table 24.—*Total output of roundwood products, by product, by source, and by softwood and hardwood, Virginia, 1965*

Product and species group	All sources	Growing-stock trees [1]			Cull trees [1]	Salvable dead trees [1]	Other sources [2]
		Total	Saw-timber	Pole-timber			
	Thousand cubic feet						
Industrial products:							
Saw logs:							
Softwood	82,300	78,576	69,776	8,800	718	876	2,130
Hardwood	99,424	90,414	82,357	8,057	4,516	—	4,494
Total	181,724	168,990	152,133	16,857	5,234	876	6,624
Veneer logs and bolts:							
Softwood	217	211	209	2	—	—	6
Hardwood	7,214	6,739	6,739	—	—	—	475
Total	7,431	6,950	6,948	2	—	—	481
Pulpwood:							
Softwood	93,840	84,940	37,374	47,566	1,265	182	7,453
Hardwood	49,980	43,343	18,348	24,995	1,874	—	4,763
Total	143,820	128,283	55,722	72,561	3,139	182	12,216
Miscellaneous industrial:							
Cooperage:							
Softwood	—	—	—	—	—	—	—
Hardwood	1,686	1,686	1,686	—	—	—	—
Total	1,686	1,686	1,686	—	—	—	—
Piling:							
Softwood	1,774	1,774	1,774	—	—	—	—
Hardwood	673	673	673	—	—	—	—
Total	2,447	2,447	2,447	—	—	—	—
Poles:							
Softwood	1,248	1,248	1,248	—	—	—	—
Hardwood	—	—	—	—	—	—	—
Total	1,248	1,248	1,248	—	—	—	—
Mine timbers (round):							
Softwood	55	42	26	16	—	—	13
Hardwood	495	467	226	241	11	—	17
Total	550	509	252	257	11	—	30
Posts (round and split):							
Softwood	251	194	122	72	—	—	57
Hardwood	74	52	11	41	22	—	—
Total	325	246	133	113	22	—	57
Other:							
Softwood	4,869	4,624	3,002	1,622	64	8	173
Hardwood	5,790	5,629	1,316	4,313	161	—	—
Total	10,659	10,253	4,318	5,935	225	8	173
All miscellaneous industrial:							
Softwood	8,197	7,882	6,172	1,710	64	8	243
Hardwood	8,718	8,507	3,912	4,595	194	—	17
Total	16,915	16,389	10,084	6,305	258	8	260
All industrial:							
Softwood	184,554	171,609	113,531	58,078	2,047	1,066	9,832
Hardwood	165,336	149,003	111,356	37,647	6,584	—	9,749
Total	349,890	320,612	224,887	95,725	8,631	1,066	19,581
Fuelwood:							
Softwood	15,992	13,557	3,535	10,022	817	34	1,584
Hardwood	32,428	24,009	8,922	15,087	4,900	—	3,519
Total	48,420	37,566	12,457	25,109	5,717	34	5,103
All products:							
Softwood	200,546	185,166	117,066	68,100	2,864	1,100	11,416
Hardwood	197,764	173,012	120,278	52,734	11,484	—	13,268
Total	398,310	358,178	237,344	120,834	14,348	1,100	24,684

[1] On commercial forest land.

[2] Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas, or material from noncommercial forest land or nonforest land such as fence rows and suburban areas.

Table 25.—*Annual timber cut from growing stock on commercial forest land, by product and logging residues, and by softwood and hardwood, Virginia, 1965*

Product and residues	All species	Softwood	Hardwood
	Thousand cubic feet		
Roundwood products:			
Saw logs	168,990	78,576	90,414
Veneer logs and bolts	6,950	211	6,739
Pulpwood	128,283	84,940	43,343
Cooperage logs and bolts	1,686	—	1,686
Piling	2,447	1,774	673
Poles	1,248	1,248	—
Mine timbers	509	42	467
Posts	246	194	52
Other	10,253	4,624	5,629
Fuelwood	37,566	13,557	24,009
All products	358,178	185,166	173,012
Logging residues:			
Harvesting	75,605	8,096	67,509
Land clearing	28,134	3,406	24,728
Cultural operations	4,200	267	3,933
Total	107,939	11,769	96,170
Timber cut	466,117	196,935	269,182

Table 26.—*Annual timber cut from live sawtimber on commercial forest land, by product and logging residues, and by softwood and hardwood, Virginia, 1965*

Product and residues	All species	Softwood	Hardwood
	Thousand board feet [1]		
Roundwood products:			
Saw logs	809,645	301,502	508,143
Veneer logs and bolts	48,683	903	47,780
Pulpwood	234,885	161,493	73,392
Cooperage logs and bolts	12,493	—	12,493
Piling	11,817	7,665	4,152
Poles	5,393	5,393	—
Mine timbers	1,016	112	904
Posts	571	527	44
Other	21,092	12,972	8,120
Fuelwood	50,963	15,275	35,688
All products	1,196,558	505,842	690,716
Logging residues:			
Harvesting	38,986	11,208	27,778
Land clearing	90,800	27,983	62,817
Cultural operations	10,102	—	10,102
Total	139,888	39,191	100,697
Timber cut	1,336,446	545,033	791,413

[1] International ¼-inch rule.

Table 27.—*Volume of unused wood material at primary manufacturing plants, by industrial source and type of residue, and by softwood and hardwood, Virginia, 1965*

Industrial source	Type of residues								
	All species			Softwood			Hardwood		
	Total	Coarse [1]	Fine [2]	Total	Coarse [1]	Fine [2]	Total	Coarse [1]	Fine [2]
	Thousand cubic feet								
Lumber industry	48,550	14,019	34,531	21,281	6,147	15,134	27,269	7,872	19,397
Veneer and plywood industry	204	113	91	6	5	1	198	108	90
Other primary industries	773	240	533	247	94	153	526	146	380
All industries	49,527	14,372	35,155	21,534	6,246	15,288	27,993	8,126	19,867

[1] Unused material, such as slabs, edgings, and veneer cores.
[2] Unused material, such as sawdust and shavings.

Table 28.—*Timber growth, available cut, and inventory of sawtimber and growing stock, by softwood and hardwood, Virginia, 1965 to 1995* [1]

Species group	1965	Projections		
		1975 (Inventory year plus 10 years)	1985 (Inventory year plus 20 years)	1995 (Inventory year plus 30 years)
	GROWING STOCK (In thousand cubic feet)			
Softwood:				
Cut	196,900	184,700	184,300	182,900
Growth	170,700	169,200	172,500	174,600
Inventory [2]	4,287,500	4,116,600	3,981,800	3,882,800
Hardwood:				
Cut	269,200	380,000	490,300	572,300
Growth	370,400	467,900	553,500	612,900
Inventory [2]	10,497,700	11,496,500	12,235,700	12,742,700
Total:				
Cut	466,100	564,700	674,600	755,200
Growth	541,100	637,100	726,000	787,500
Inventory [2]	14,785,200	15,613,100	16,217,500	16,625,500
	SAWTIMBER (In thousand board feet)			
Softwood:				
Cut	545,000	624,000	588,000	553,300
Growth	520,200	510,200	488,300	468,900
Inventory [2]	11,768,700	10,574,600	9,514,500	8,606,600
Hardwood:				
Cut	791,400	1,194,900	1,287,800	1,261,300
Growth	1,014,800	996,800	1,040,000	1,052,200
Inventory [2]	26,267,200	25,064,800	22,708,200	20,382,700
Total:				
Cut	1,336,400	1,818,900	1,875,800	1,814,600
Growth	1,535,000	1,507,000	1,528,300	1,521,100
Inventory [2]	38,035,900	35,639,400	32,222,700	28,989,300

[1] Based on the assumption that cut starting at the 1965 level will be in balance with the growth by year 2015, and that forestry progress will continue at the rate indicated by recent trends.
[2] Inventory as of January 1 of the following year.

Table 29.—*Volume of growing stock and sawtimber on commercial forest land, by stand-size classes and by softwood and hardwood, Virginia, 1966*

Stand-size class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*		
Sawtimber	7,891.6	2,325.5	5,566.1	26,217.8	8,330.4	17,887.4
Poletimber	5,642.6	1,558.9	4,083.7	9,321.5	2,654.5	6,667.0
Sapling and seedling	1,247.0	402.0	845.0	2,485.7	780.2	1,705.5
Nonstocked areas	4.0	1.1	2.9	10.9	3.6	7.3
All classes	14,785.2	4,287.5	10,497.7	38,035.9	11,768.7	26,267.2

Table 30.—*Basal area per acre of growing-stock and rough and rotten trees 5.0 inches d.b.h. and larger, by forest type and Survey Unit, Virginia, 1966*

Forest type	State	Coastal Plain	Southern Piedmont	Northern Piedmont	Northern Mountain	Southern Mountain
	Square feet					
White pine-hemlock:						
Growing stock	56.3	—	—	78.3	77.8	42.6
Rough and rotten trees	18.7	—	—	26.0	21.5	16.4
All trees	75.0	—	—	104.3	99.3	59.0
Loblolly-shortleaf pine:						
Growing stock	51.3	64.1	44.0	40.5	32.8	27.7
Rough and rotten trees	8.0	9.7	4.3	6.0	17.3	10.8
All trees	59.3	73.8	48.3	46.5	50.1	38.5
Oak-pine:						
Growing stock	40.7	44.8	41.0	38.4	35.9	34.0
Rough and rotten trees	12.7	13.1	6.3	7.9	23.3	16.2
All trees	53.4	57.9	47.3	46.3	59.2	50.2
Oak-hickory:						
Growing stock	41.8	42.9	42.3	45.2	41.5	38.1
Rough and rotten trees	16.9	17.3	9.4	12.9	24.7	18.4
All trees	58.7	60.2	51.7	58.1	66.2	56.5
Oak-gum-cypress:						
Growing stock	61.5	61.6	44.2	96.8	29.8	—
Rough and rotten trees	29.9	30.3	11.1	22.1	25.8	—
All trees	91.4	91.9	55.3	118.9	55.6	—
Elm-ash-cottonwood:						
Growing stock	53.7	70.8	50.6	39.1	26.1	25.7
Rough and rotten trees	17.8	25.9	14.2	12.1	7.5	33.2
All trees	71.5	96.7	64.8	51.2	33.6	58.9
Maple-beech-birch:						
Growing stock	48.0	—	—	41.7	81.2	47.1
Rough and rotten trees	25.1	—	—	23.5	35.8	24.5
All trees	73.1	—	—	65.2	117.0	71.6
All types:						
Growing stock	43.9	50.7	42.7	43.3	40.5	37.6
Rough and rotten trees	14.9	15.1	7.6	11.0	24.1	18.0
All trees	58.8	65.8	50.3	54.3	64.6	55.6

Table 31.—*Number of growing-stock and rough and rotten trees 1.0-4.9 inches d.b.h. per acre, by forest type and Survey Unit, Virginia, 1966*

Forest type	State	Coastal Plain	Southern Piedmont	Northern Piedmont	Northern Mountain	Southern Mountain
			Number of trees per acre			
White pine-hemlock:						
Growing stock	317	—	—	27	281	354
Rough and rotten trees	44	—	—	5	56	33
All trees	361	—	—	32	337	387
Loblolly-shortleaf pine:						
Growing stock	685	708	779	636	467	581
Rough and rotten trees	104	88	86	108	266	159
All trees	789	796	865	744	733	740
Oak-pine:						
Growing stock	315	401	387	277	182	219
Rough and rotten trees	351	366	306	272	393	358
All trees	666	767	693	549	575	577
Oak-hickory:						
Growing stock	232	260	265	196	163	231
Rough and rotten trees	349	334	327	276	391	407
All trees	581	594	592	472	554	638
Oak-gum-cypress:						
Growing stock	319	361	213	379	101	—
Rough and rotten trees	352	345	172	470	218	—
All trees	671	706	385	849	319	—
Elm-ash-cottonwood:						
Growing stock	149	335	108	33	73	213
Rough and rotten trees	225	429	133	46	174	375
All trees	374	764	241	79	247	588
Maple-beech-birch:						
Growing stock	181	—	—	237	214	124
Rough and rotten trees	273	—	—	334	511	217
All trees	454	—	—	571	725	341
All types:						
Growing stock	305	366	383	276	187	246
Rough and rotten trees	327	331	291	260	379	378
All trees	632	697	674	536	566	624

Table 32.—*Average net volume per acre on commercial forest land, by area description and species group, Virginia, 1966*

Area description	Softwood		Hardwood		Total	
	Cubic feet	*Board feet*	*Cubic feet*	*Board feet*	*Cubic feet*	*Board feet*
Pine types: [1]						
Site classes 1 and 2						
Growing stock	1,160.6	2,919	191.2	369	1,351.8	3,288
Rough and rotten trees	88.0	—	74.1	—	162.1	—
Total	1,248.6	2,919	265.3	369	1,513.9	3,288
Site class 3						
Growing stock	1,413.7	4,383	239.4	604	1,653.1	4,987
Rough and rotten trees	56.5	—	77.5	—	134.0	—
Total	1,470.2	4,383	316.9	604	1,787.1	4,987
Site class 4						
Growing stock	796.9	2,139	171.0	359	967.9	2,498
Rough and rotten trees	55.4	—	54.7	—	110.1	—
Total	852.3	2,139	225.7	359	1,078.0	2,498
Site class 5						
Growing stock	505.7	1,037	95.1	208	600.8	1,245
Rough and rotten trees	65.8	—	61.5	—	127.3	—
Total	571.5	1,037	156.6	208	728.1	1,245
Oak-pine type:						
Site classes 1 and 2						
Growing stock	487.3	1,418	460.7	924	948.0	2,342
Rough and rotten trees	47.6	—	186.8	—	234.4	—
Total	534.9	1,418	647.5	924	1,182.4	2,342
Site class 3						
Growing stock	625.4	1,967	592.5	1,522	1,217.9	3,489
Rough and rotten trees	23.7	—	171.4	—	195.1	—
Total	649.1	1,967	763.9	1,522	1,413.0	3,489
Site class 4						
Growing stock	414.1	1,160	445.4	948	859.5	2,108
Rough and rotten trees	27.1	—	136.9	—	164.0	—
Total	441.2	1,160	582.3	948	1,023.5	2,108
Site class 5						
Growing stock	272.2	722	303.5	625	575.7	1,347
Rough and rotten trees	59.2	—	157.6	—	216.8	—
Total	331.4	722	461.1	625	792.5	1,347
Oak-hickory type: [2]						
Site classes 1 and 2						
Growing stock	176.0	628	1,079.8	2,987	1,255.8	3,615
Rough and rotten trees	9.0	—	233.2	—	242.2	—
Total	185.0	628	1,313.0	2,987	1,498.0	3,615
Site class 3						
Growing stock	107.2	363	1,096.1	3,147	1,203.3	3,510
Rough and rotten trees	7.6	—	264.0	—	271.6	—
Total	114.8	363	1,360.1	3,147	1,474.9	3,510
Oak-hickory type: [2]						
Site class 4						
Growing stock	76.1	238	914.0	2,374	990.1	2,612
Rough and rotten trees	6.2	—	254.6	—	260.8	—
Total	82.3	238	1,168.6	2,374	1,250.9	2,612
Site class 5						
Growing stock	63.8	191	689.9	1,649	753.7	1,840
Rough and rotten trees	9.9	—	274.1	—	284.0	—
Total	73.7	191	964.0	1,649	1,037.7	1,840
Oak-gum-cypress: [3]						
Site classes 1 and 2						
Growing stock	—	—	1,886.5	4,618	1,886.5	4,618
Rough and rotten trees	—	—	310.0	—	310.0	—
Total	—	—	2,196.5	4,618	2,196.5	4,618
Site class 3						
Growing stock	160.8	679	1,656.2	4,375	1,817.0	5,054
Rough and rotten trees	3.2	—	364.4	—	367.6	—
Total	164.0	679	2,020.6	4,375	2,184.6	5,054
Site class 4						
Growing stock	209.9	844	1,291.5	3,399	1,501.4	4,243
Rough and rotten trees	15.9	—	413.4	—	429.3	—
Total	225.8	844	1,704.9	3,399	1,930.7	4,243
Site class 5						
Growing stock	205.6	850	1,156.2	2,974	1,361.8	3,824
Rough and rotten trees	26.3	—	508.1	—	534.4	—
Total	231.9	850	1,664.3	2,974	1,896.2	3,824
All types:						
Site classes 1 and 2						
Growing stock	598.3	1,622	631.8	1,599	1,230.1	3,221
Rough and rotten trees	46.1	—	166.7	—	212.8	—
Total	644.4	1,622	798.5	1,599	1,442.9	3,221
Site class 3						
Growing stock	588.6	1,853	784.5	2,197	1,373.1	4,050
Rough and rotten trees	24.7	—	197.9	—	222.6	—
Total	613.3	1,853	982.4	2,197	1,595.7	4,050
Site class 4						
Growing stock	275.6	774	698.7	1,764	974.3	2,538
Rough and rotten trees	19.5	—	199.2	—	218.7	—
Total	295.1	774	897.9	1,764	1,193.0	2,538
Site class 5						
Growing stock	159.5	405	563.4	1,335	722.9	1,740
Rough and rotten trees	25.4	—	234.0	—	259.4	—
Total	184.9	405	797.4	1,335	982.3	1,740

[1] Includes all softwood types.
[2] Includes maple-beech-birch types.
[3] Includes elm-ash-cottonwood types.

Table 33.—*Average net volume and growth per acre on commercial forest land, by ownership, tree class, and species group, Virginia, 1966*

Ownership and tree class	Net volume per acre						Net growth per acre					
	Softwood		Hardwood		Total		Softwood		Hardwood		Total	
	Cubic feet	*Board feet*	*Cubic feet*	*Board feet*	*Cubic feet*	*Board feet*	*Cubic feet*	*Board feet*	*Cubic feet*	*Board feet*	*Cubic feet*	*Board feet*
National Forest:												
Growing stock	145.3	512	748.7	1,992	894.0	2,504	4.2	15	26.0	66	30.2	81
Rough and rotten trees	34.7	—	479.4	—	514.1	—	1.3	—	19.3	—	20.6	—
Total	180.0	512	1,228.1	1,992	1,408.1	2,504	5.5	15	45.3	66	50.8	81
Other public:												
Growing stock	398.4	1,109	738.2	1,788	1,136.6	2,897	14.0	44	26.0	75	40.0	119
Rough and rotten trees	24.5	—	201.2	—	225.7	—	1.1	—	8.2	—	9.3	—
Total	422.9	1,109	939.4	1,788	1,362.3	2,897	15.1	44	34.2	75	49.3	119
Forest industry:												
Growing stock	462.6	1,386	542.4	1,275	1,005.0	2,661	19.6	66	20.5	56	40.1	122
Rough and rotten trees	28.7	—	136.0	—	164.7	—	1.6	—	6.0	—	7.6	—
Total	491.3	1,386	678.4	1,275	1,169.7	2,661	21.2	66	26.5	56	47.7	122
Farmer-owned:												
Growing stock	263.8	689	648.7	1,627	912.5	2,316	11.2	35	22.0	63	33.2	98
Rough and rotten trees	19.4	—	173.5	—	192.9	—	1.1	—	6.8	—	7.9	—
Total	283.2	689	822.2	1,627	1,105.4	2,316	12.3	35	28.8	63	41.1	98
Misc. private:												
Growing stock	243.5	654	692.5	1,730	936.0	2,384	9.9	31	23.8	67	33.7	98
Rough and rotten trees	18.4	—	189.3	—	207.7	—	1.0	—	7.6	—	8.6	—
Total	261.9	654	881.8	1,730	1,143.7	2,384	10.9	31	31.4	67	42.3	98
All ownerships:												
Growing stock	271.2	744	664.0	1,662	935.2	2,406	10.9	35	23.0	64	33.9	99
Rough and rotten trees	21.3	—	199.5	—	220.8	—	1.1	—	8.0	—	9.1	—
Total	292.5	744	863.5	1,662	1,156.0	2,406	12.0	35	31.0	64	43.0	99

Table 34.—*Land area, by class and major forest type, Virginia, 1940, 1957, and 1966*

Land class and forest type	1940	1957	1966	Change 1957-1966
		Thousand acres		
Commercial forest land:				
Pine and oak-pine type	6,230.4	5,909.4	5,519.2	— 390.2
Hardwood type	8,181.6	9,540.5	10,290.1	+ 749.6
Total	14,412.0	15,449.9	15,809.3	+ 359.4
Noncommercial forest land:				
Productive-reserved	235.9	259.4	313.5	+ 54.1
Unproductive	184.4	404.2	216.2	— 188.0
Total	420.3	663.6	529.7	— 133.9
Nonforest land:				
Cropland	6,334.8	4,650.0	3,604.9	—1,045.1
Pasture and range	3,424.3	3,506.2	3,588.3	+ 82.1
Other	835.0	1,137.2	1,833.6	+ 696.4
Total	10,594.1	9,293.4	9,026.8	— 266.6
All land [1]	25,426.4	25,406.9	25,365.8	— 41.1

[1] Excludes all water areas.

Table 35.—*Volume* [1] *of sawtimber, growing stock, and all timber, by species group and diameter class, Virginia, 1940, 1957, and 1966*

Species group	Year	All classes	Diameter class (inches at breast height)								
			5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0 & larger
			SAWTIMBER (In million board feet, International ¼-inch rule)								
Softwood	1940	12,089.5	—	—	2,994.5	3,070.7	2,279.7	1,487.0	919.7	559.1	778.8
	1957	11,682.7	—	—	3,087.8	3,203.2	2,221.9	1,326.2	765.7	496.6	581.3
	1966	11,768.7	—	—	3,026.7	2,983.2	2,282.5	1,475.8	945.5	523.8	531.2
Hardwood	1940	19,524.4	—	—	—	3,761.8	3,828.3	3,156.7	2,636.4	1,984.1	4,157.1
	1957	24,045.8	—	—	—	5,065.7	5,445.3	4,195.2	3,294.7	2,129.6	3,915.3
	1966	26,267.2	—	—	—	5,526.9	5,860.8	4,690.9	3,493.9	2,321.1	4,373.6
			GROWING STOCK (In million cubic feet)								
Softwood	1940	4,406.3	635.4	872.4	875.6	739.2	506.4	316.4	190.2	114.0	156.7
	1957	4,441.5	672.1	947.9	901.5	770.2	492.1	281.7	158.2	101.4	116.4
	1966	4,287.5	579.0	878.6	884.5	718.0	505.8	312.7	195.4	106.6	106.9
Hardwood	1940	7,404.5	676.8	893.6	1,049.1	1,110.5	955.3	747.0	599.9	450.6	921.7
	1957	9,536.7	839.4	1,280.0	1,470.6	1,492.7	1,358.2	992.7	750.6	484.0	868.5
	1966	10,497.7	1,016.1	1,413.9	1,571.3	1,629.1	1,462.1	1,110.3	795.7	527.7	971.5
			ALL TIMBER (In million cubic feet)								
Softwood	1940	4,729.1	714.2	979.0	940.3	772.1	519.4	324.1	193.3	116.6	170.1
	1957	4,790.9	753.1	1,070.9	973.7	807.5	505.4	288.5	160.8	103.9	127.1
	1966	4,624.4	652.5	993.3	959.6	754.2	519.9	320.1	198.9	109.2	116.7
Hardwood	1940	9,607.6	991.6	1,208.9	1,386.6	1,386.5	1,153.6	906.9	727.1	562.2	1,284.2
	1957	12,356.6	1,231.7	1,733.7	1,951.2	1,867.0	1,640.4	1,203.4	913.0	604.2	1,212.0
	1966	13,651.3	1,494.6	1,920.5	2,087.4	2,043.1	1,766.6	1,348.9	966.2	661.2	1,362.8

[1] In order to provide a basis for valid comparisons, adjustments have been made to allow for differences in volume tables and sawtimber specifications used in previous surveys.

Table 36.—*Volume of all timber, by species group and Survey Unit, Virginia, 1940, 1957, and 1966*

Species group and Survey Unit	1940	1957	Change 1940-1957	1966	Change 1957-1966
	Million cu. ft.	*Million cu. ft.*	*Percent*	*Million cu. ft.*	*Percent*
Softwood:					
Coastal Plain	2,383.1	2,372.9	— 0.4	2,186.6	— 7.9
Southern Piedmont	1,292.2	1,243.5	— 3.8	1,158.1	— 6.9
Northern Piedmont	562.6	529.9	— 5.8	540.8	+ 2.1
Northern Mountain	289.6	398.1	+37.5	443.4	+11.4
Southern Mountain	201.6	246.5	+22.3	295.5	+19.9
All units	4,729.1	4,790.9	+ 1.3	4,624.4	— 3.5
Hardwood:					
Coastal Plain	2,893.8	3,342.0	+15.5	3,454.7	+ 3.4
Southern Piedmont	1,926.8	2,451.4	+27.2	2,617.2	+ 6.8
Northern Piedmont	1,494.7	1,963.3	+31.4	2,127.3	+ 8.4
Northern Mountain	1,529.0	2,217.7	+45.0	2,600.7	+17.3
Southern Mountain	1,763.3	2,382.2	+35.1	2,851.4	+19.7
All units	9,607.6	12,356.6	+28.6	13,651.3	+10.5

County Tables

The tables that follow are intended for use in compiling forest resource estimates for groups of counties. Because the sampling procedure used by the Forest Survey in Virginia was intended primarily to furnish inventory data for the State as a whole, individual county estimates have limited and variable accuracy. As totals are broken down by various subdivisions, the sampling error increases and is greatest for the smallest items. The order of this increase is suggested in the tabulation on page 21. For example, table 41 of this report shows that net growth of growing stock in Southampton County totals 13.1 million cubic feet with 6.7 million cubic feet in softwood. For this particular county, the total growth estimate is subject to a sampling error of ±11.6 percent and the softwood estimate is subject to an error of ±16.2 percent.

Table 37.—*Land area and commercial forest, by county,*[1] *Virginia, 1966*

County	All land	Commercial forest		County	All land	Commercial forest	
	Thousand acres	*Thousand acres*	*Per-cent*		*Thousand acres*	*Thousand acres*	*Per-cent*
Accomack	300.8	97.9	32.5	Lancaster	90.9	46.0	50.6
Albemarle	480.6	267.2	55.6	Lee	280.3	162.2	57.9
Alleghany	289.3	227.2	78.5	Loudoun	330.9	99.1	29.9
Amelia	234.2	170.1	72.6	Louisa	330.9	232.5	70.3
Amherst	298.9	209.4	70.1	Lunenburg	283.5	202.9	71.6
Appomattox	219.5	159.7	72.8	Madison	209.3	91.9	43.9
Arlington	20.5	—	—	Mathews	55.7	29.7	53.3
Augusta	641.3	294.4	45.9	Mecklenburg	396.7	247.8	62.5
Bath	345.6	273.7	79.2	Middlesex	84.5	54.0	63.9
Bedford	488.1	305.6	62.6	Montgomery	256.0	159.4	62.3
Bland	236.2	182.0	77.1	Nansemond	255.5	168.0	65.8
Botetourt	350.7	254.2	72.5	Nelson	299.5	226.2	75.5
Brunswick	370.1	285.6	77.2	New Kent	135.7	107.9	79.5
Buchanan	325.1	281.7	86.7	Norfolk	263.7	138.7	52.6
Buckingham	368.7	281.9	76.5	Northampton	144.6	31.4	21.7
Campbell	352.7	226.7	64.3	Northumberland	128.0	77.5	60.5
Caroline	348.2	270.2	77.6	Nottoway	197.1	132.3	67.1
Carroll	317.5	173.0	54.5	Orange	227.2	130.4	57.4
Charles City	117.8	86.8	73.7	Page	202.3	85.7	42.4
Charlotte	298.9	202.6	67.8	Patrick	299.7	230.4	76.9
Chesterfield	306.4	222.0	72.5	Pittsylvania	652.7	396.1	60.7
Clarke	111.4	32.8	29.4	Powhatan	171.5	123.9	72.2
Craig	215.0	165.2	76.8	Prince Edward	228.5	153.7	67.3
Culpeper	249.0	110.1	44.2	Prince George	185.0	126.9	68.6
Cumberland	186.9	128.3	68.6	Prince William	220.8	108.2	49.0
Dickenson	214.4	177.1	82.6	Princess Anne	163.2	48.3	29.6
Dinwiddie	329.0	246.0	74.8	Pulaski	209.3	111.0	53.0
Elizabeth City	36.5	3.4	9.3	Rappahannock	170.9	65.9	38.6
Essex	160.0	100.4	62.8	Richmond	122.9	80.8	65.7
Fairfax	264.9	111.4	42.1	Roanoke	193.9	115.1	59.4
Fauquier	422.4	176.1	41.7	Rockbridge	388.5	238.4	61.4
Floyd	245.1	129.5	52.8	Rockingham	557.4	239.2	42.9
Fluvanna	180.4	122.6	68.0	Russell	309.1	158.6	51.3
Franklin	459.5	299.5	65.2	Scott	345.0	218.3	63.3
Frederick	279.0	150.2	53.8	Shenandoah	324.5	168.4	51.9
Giles	232.3	164.9	71.0	Smyth	278.4	169.4	60.8
Gloucester	144.0	98.4	68.3	Southampton	388.5	256.1	65.9
Goochland	184.9	128.5	69.5	Spotsylvania	266.8	193.4	72.5
Grayson	291.0	160.1	55.0	Stafford	173.5	126.6	73.0
Greene	97.9	49.4	50.5	Surry	179.2	135.7	75.7
Greensville	192.6	138.1	71.7	Sussex	317.4	247.7	78.0
Halifax	513.3	341.0	66.4	Tazewell	334.1	199.5	59.7
Hanover	301.4	201.6	66.9	Warren	140.2	70.6	50.4
Henrico	162.7	87.4	53.7	Warwick	48.0	19.2	40.0
Henry	252.0	173.0	68.7	Washington	372.3	181.9	48.9
Highland	266.2	188.3	70.7	Westmoreland	151.0	86.4	57.2
Isle of Wight	204.1	118.9	58.3	Wise	265.6	210.0	79.1
James City	96.6	68.8	71.2	Wythe	294.4	152.2	51.7
King and Queen	203.5	158.1	77.7	York	78.7	43.7	55.5
King George	113.9	79.8	70.1				
King William	177.9	129.3	72.7	Total	25,502.2	15,809.3	62.0

[1] Includes independent cities.

Table 38.—*Commercial forest land, by county and ownership, Virginia, 1966*

County	All ownerships	National Forest	Other public	Forest industry	Farmer	Misc. private
	Thousand acres					
Accomack	97.9	—	1.0	11.2	67.0	18.7
Albemarle	267.2	—	2.1	22.7	131.9	110.5
Alleghany	227.2	105.5	2.2	5.3	51.6	62.6
Amelia	170.1	—	—	38.9	110.0	21.2
Amherst	209.4	43.0	0.4	9.5	115.0	41.5
Appomattox	159.7	—	9.0	34.9	69.5	46.3
Arlington	—	—	—	—	—	—
Augusta	294.4	147.8	11.0	—	81.4	54.2
Bath	273.7	130.2	15.1	—	77.0	51.4
Bedford	305.6	8.9	1.5	16.7	212.7	65.8
Bland	182.0	19.4	0.5	3.2	61.1	97.8
Botetourt	254.2	58.0	6.9	11.3	72.0	106.0
Brunswick	285.6	—	9.1	52.6	143.9	80.0
Buchanan	281.7	—	0.1	45.5	17.6	218.5
Buckingham	281.9	2.7	9.8	69.9	120.5	79.0
Campbell	226.7	—	—	26.3	112.7	87.7
Caroline	270.2	—	60.1	22.5	93.8	93.8
Carroll	173.0	3.7	0.9	3.9	91.0	73.5
Charles City	86.8	—	(1)	34.9	17.3	34.6
Charlotte	202.6	—	1.9	48.2	90.8	61.7
Chesterfield	222.0	—	8.8	44.3	49.5	119.4
Clarke	32.8	—	0.7	1.8	16.8	13.5
Craig	165.2	101.0	0.5	1.0	37.6	25.1
Culpeper	110.1	—	—	8.3	59.1	42.7
Cumberland	128.3	—	15.5	24.6	58.8	29.4
Dickenson	177.1	8.5	2.6	58.2	19.3	88.5
Dinwiddie	246.0	—	6.6	60.2	88.1	91.1
Elizabeth City	3.4	—	—	—	—	3.4
Essex	100.4	—	0.4	6.9	72.4	20.7
Fairfax	111.4	—	8.5	—	16.1	86.8
Fauquier	176.1	—	4.4	5.5	109.6	56.6
Floyd	129.5	—	(1)	—	105.2	24.3
Fluvanna	122.6	—	—	21.9	44.3	56.4
Franklin	299.5	—	2.7	10.4	153.9	132.5
Frederick	150.2	4.0	—	—	83.0	63.2
Giles	164.9	48.6	1.2	—	39.7	75.4
Gloucester	98.4	—	—	16.3	55.7	26.4
Goochland	128.5	—	(1)	13.3	49.9	65.3
Grayson	160.1	11.9	0.1	0.4	103.8	43.9
Greene	49.4	—	1.2	1.2	36.9	10.1
Greensville	138.1	—	0.4	35.2	79.7	22.8
Halifax	341.0	—	9.7	13.4	248.5	69.4
Hanover	201.6	—	1.6	14.3	105.3	80.4
Henrico	87.4	—	0.7	0.9	42.9	42.9
Henry	173.0	—	1.5	9.6	59.7	102.2
Highland	188.3	46.2	17.6	4.4	42.4	77.7
Isle of Wight	118.9	—	0.8	28.2	67.4	22.5
James City	68.8	—	2.2	4.3	15.6	46.7
King and Queen	158.1	—	0.4	39.8	63.7	54.2
King George	79.8	—	1.1	1.6	44.5	32.6
King William	129.3	—	0.5	22.9	56.3	49.6
Lancaster	46.0	—	—	6.0	21.5	18.5
Lee	162.2	9.4	0.1	2.1	83.7	66.9
Loudoun	99.1	—	6.9	—	66.4	25.8
Louisa	232.5	—	0.1	22.4	96.9	113.1
Lunenburg	202.9	—	0.1	41.8	77.0	84.0
Madison	91.9	—	7.0	0.9	46.2	37.8
Mathews	29.7	—	—	4.9	15.5	9.3
Mecklenburg	247.8	—	25.7	17.6	147.2	57.3
Middlesex	54.0	—	(1)	1.9	37.6	14.5
Montgomery	159.4	17.3	2.7	—	35.8	103.6
Nansemond	168.0	—	2.0	59.1	67.2	39.7
Nelson	226.2	9.8	1.1	25.9	91.3	98.1
New Kent	107.9	—	0.3	35.6	20.6	51.4
Norfolk	138.7	—	3.9	20.1	35.1	79.6
Northampton	31.4	—	(1)	0.4	28.4	2.6
Northumberland	77.5	—	—	2.1	59.0	16.4
Nottoway	132.3	—	14.3	22.8	79.3	15.9
Orange	130.4	—	0.3	12.8	73.7	43.6
Page	85.7	16.7	—	—	36.5	32.5
Patrick	230.4	—	10.9	13.5	131.8	74.2
Pittsylvania	396.1	—	0.9	11.9	294.0	89.3
Powhatan	123.9	—	3.1	21.2	55.8	43.8
Prince Edward	153.7	—	6.8	21.5	80.4	45.0
Prince George	126.9	—	3.3	41.4	41.1	41.1
Prince William	108.2	—	22.4	—	41.3	44.5
Princess Anne	48.3	—	3.4	2.6	19.9	22.4
Pulaski	111.0	18.0	3.6	—	31.3	58.1
Rappahannock	65.9	—	—	0.4	49.1	16.4
Richmond	80.8	—	(1)	9.7	47.4	23.7
Roanoke	115.1	0.9	9.5	—	57.7	47.0
Rockbridge	238.4	48.9	27.7	5.5	87.7	68.6
Rockingham	239.2	94.7	3.4	—	70.5	70.6
Russell	158.6	—	7.3	18.5	91.3	41.5
Scott	218.3	30.9	—	1.5	123.9	62.0
Shenandoah	168.4	57.7	0.1	—	46.4	64.2
Smyth	169.4	57.8	8.6	—	41.2	61.8
Southampton	256.1	—	1.8	51.0	150.7	52.6
Spotsylvania	193.4	—	—	36.2	52.4	104.8
Stafford	126.6	—	29.3	2.7	28.4	66.2
Surry	135.7	—	1.1	34.9	68.4	31.3
Sussex	247.7	—	0.2	89.7	109.9	47.9
Tazewell	199.5	5.2	5.0	0.3	70.4	118.6
Warren	70.6	4.9	1.4	—	37.8	26.5
Warwick	19.2	—	4.4	—	—	14.8
Washington	181.9	17.2	6.4	1.5	87.6	69.2
Westmoreland	86.4	—	—	3.3	71.6	11.5
Wise	210.0	26.9	3.6	12.2	17.2	150.1
Wythe	152.2	47.1	1.9	—	65.0	38.2
York	43.7	—	17.2	—	6.6	19.9
Total	15,809.3	1,202.8	469.1	1,562.3	6,958.2	5,616.9

[1] Less than 50 acres.

Table 39.—*Volume of sawtimber and growing stock, by county and species group, Virginia, 1966*

County	Sawtimber					Growing stock				
	All species	Yellow pine	Other softwood	Soft hardwood	Hard hardwood	All species	Yellow pine	Other softwood	Soft hardwood	Hard hardwood
	Million board feet					*Thousand cords*				
Accomack	307.0	257.3	—	31.8	17.9	1,434	1,023	—	239	172
Albemarle	664.1	76.8	14.4	182.9	390.0	3,342	523	56	718	2,045
Alleghany	331.7	54.2	21.8	33.6	222.1	1,958	286	70	169	1,433
Amelia	529.4	199.9	—	151.1	178.4	2,986	1,071	9	785	1,121
Amherst	279.0	27.0	26.0	60.6	165.4	1,724	248	79	356	1,041
Appomattox	310.2	91.4	0.9	50.9	167.0	1,870	608	5	257	1,000
Arlington	—	—	—	—	—	—	—	—	—	—
Augusta	672.0	117.6	24.4	39.0	491.0	3,435	555	74	165	2,641
Bath	585.0	65.6	21.0	44.2	454.2	3,307	309	79	309	2,610
Bedford	588.0	65.3	7.4	165.0	350.3	3,421	867	27	923	1,604
Bland	300.6	24.9	24.9	38.8	212.0	1,645	114	104	277	1,150
Botetourt	568.9	72.2	35.9	141.7	319.1	2,626	397	110	519	1,600
Brunswick	747.0	439.8	1.5	162.8	142.9	3,887	1,994	11	883	999
Buchanan	739.9	0.6	37.7	175.5	526.1	3,425	2	105	1,012	2,306
Buckingham	426.4	100.9	0.7	41.6	283.2	3,307	759	8	434	2,106
Campbell	412.5	101.8	—	53.2	257.5	2,324	763	2	288	1,271
Caroline	664.9	275.7	—	160.1	229.1	3,368	1,327	1	775	1,265
Carroll	260.9	13.0	61.6	39.9	146.4	1,742	120	255	316	1,051
Charles City	412.1	254.7	1.4	44.7	111.3	1,785	853	3	371	558
Charlotte	349.9	109.7	0.8	88.5	150.9	2,532	990	23	547	972
Chesterfield	601.7	256.1	2.1	122.0	221.5	2,933	1,016	8	651	1,258
Clarke	62.7	—	—	18.1	44.6	338	12	—	92	234
Craig	271.1	94.4	10.0	16.4	150.3	1,435	400	38	79	918
Culpeper	235.8	53.6	1.4	31.1	149.7	1,307	329	14	204	760
Cumberland	240.8	43.6	0.6	45.0	151.6	1,549	566	10	297	676
Dickenson	486.7	10.1	19.4	98.3	358.9	2,220	34	49	557	1,580
Dinwiddie	842.8	474.5	0.7	142.7	224.9	3,942	1,819	14	744	1,365
Elizabeth City	2.3	0.8	—	—	1.5	18	4	—	—	14
Essex	228.3	125.7	0.5	41.6	60.5	1,058	479	2	206	371
Fairfax	505.3	52.0	—	115.1	338.2	2,112	354	—	450	1,308
Fauquier	355.6	84.7	1.3	72.3	197.3	2,130	605	18	365	1,142
Floyd	260.7	2.6	96.5	32.3	129.3	1,332	52	333	249	698
Fluvanna	189.0	68.7	—	42.4	77.9	1,376	539	14	243	580
Franklin	546.2	108.1	59.1	116.7	262.3	3,348	867	226	823	1,432
Frederick	317.6	10.6	5.7	14.8	286.5	1,729	132	36	109	1,452
Giles	349.6	13.4	18.9	68.2	249.1	1,677	83	42	391	1,161
Gloucester	302.8	167.4	1.0	74.0	60.4	1,184	578	3	325	278
Goochland	200.9	21.0	—	65.8	114.1	1,350	333	9	340	668
Grayson	265.3	4.6	21.5	41.0	198.2	1,513	18	120	263	1,112
Greene	120.1	2.4	—	52.7	65.0	651	66	—	253	332
Greensville	544.6	230.6	1.2	159.7	153.1	2,422	915	5	733	769
Halifax	660.4	298.6	2.0	141.6	218.2	4,341	1,904	53	983	1,401
Hanover	543.2	207.4	—	118.8	217.0	2,818	1,176	10	623	1,009
Henrico	220.6	78.5	—	47.3	94.8	1,152	336	—	229	587
Henry	291.4	131.9	0.7	45.1	113.7	2,280	1,220	2	385	673
Highland	664.5	30.1	88.3	84.5	461.6	3,079	100	261	521	2,197
Isle of Wight	564.6	313.8	4.7	115.3	130.8	2,228	1,107	20	542	559
James City	215.3	88.8	0.9	25.0	100.6	1,007	358	10	147	492
King and Queen	453.0	238.7	6.7	57.8	149.8	2,171	1,153	21	297	700
King George	178.3	26.0	2.2	43.7	106.4	983	219	13	299	452
King William	386.5	178.6	1.3	80.8	125.8	1,698	763	8	318	609

Table 39.—*Volume of sawtimber and growing stock, by county and species group, Virginia, 1966* (Continued)

County	Sawtimber					Growing stock				
	All species	Yellow pine	Other softwood	Soft hardwood	Hard hardwood	All species	Yellow pine	Other softwood	Soft hardwood	Hard hardwood
	Million board feet					*Thousand cords*				
Lancaster	60.0	41.8	—	7.3	10.9	360	198	—	47	115
Lee	368.4	7.5	17.5	86.5	256.9	1,861	43	101	432	1,285
Loudoun	405.8	15.3	—	72.3	318.2	1,692	107	5	251	1,329
Louisa	365.7	106.1	2.1	64.4	193.1	2,712	812	28	501	1,371
Lunenburg	437.1	142.2	0.7	120.2	174.0	2,948	912	24	791	1,221
Madison	227.8	19.5	5.1	53.6	149.6	1,222	215	20	254	733
Mathews	71.0	36.6	—	10.2	24.2	324	163	—	53	108
Mecklenburg	371.0	135.1	1.6	89.1	145.2	2,860	930	17	792	1,121
Middlesex	126.3	77.6	—	31.0	17.7	618	298	—	177	143
Montgomery	185.1	24.1	23.3	31.1	106.6	1,360	248	150	178	784
Nansemond	835.4	359.2	10.6	336.5	129.1	3,384	1,090	33	1,704	557
Nelson	448.2	18.9	27.1	125.0	277.2	2,400	292	83	623	1,402
New Kent	413.2	131.7	—	92.0	189.5	1,899	645	—	422	832
Norfolk	494.5	228.3	15.5	181.9	68.8	2,111	685	32	1,094	300
Northampton	54.8	40.5	—	5.5	8.8	289	176	1	56	56
Northumberland	191.9	88.1	—	37.0	66.8	867	396	—	145	326
Nottoway	322.6	132.0	—	86.0	104.6	1,796	798	4	428	566
Orange	285.2	39.9	3.0	59.1	183.2	1,657	376	41	277	963
Page	202.2	44.2	3.5	13.7	140.8	1,088	275	9	49	755
Patrick	356.8	42.0	14.7	68.0	232.1	2,328	389	62	625	1,252
Pittsylvania	786.4	225.5	3.3	197.6	360.0	4,855	1,741	26	1,136	1,952
Powhatan	263.7	66.8	0.8	62.1	134.0	1,553	401	17	359	776
Prince Edward	231.6	54.5	0.6	74.0	102.5	1,811	563	5	464	779
Prince George	443.0	214.0	13.9	119.1	96.0	2,052	955	33	517	547
Prince William	337.2	57.6	—	42.6	237.0	1,682	300	8	199	1,175
Princess Anne	140.8	35.1	—	68.0	37.7	664	112	—	341	211
Pulaski	134.2	51.8	8.6	8.3	65.5	799	225	27	66	481
Rappahannock	166.2	3.6	2.6	67.7	92.3	866	41	9	312	504
Richmond	206.2	61.8	—	65.5	78.9	1,021	306	—	353	362
Roanoke	129.1	38.4	13.0	18.1	59.6	760	196	50	117	397
Rockbridge	578.6	52.9	41.2	72.8	411.7	2,791	285	152	319	2,035
Rockingham	676.9	41.7	67.8	75.1	492.3	3,179	211	255	277	2,436
Russell	309.2	0.9	10.4	98.7	199.2	1,758	3	32	536	1,187
Scott	459.6	10.6	9.8	123.5	315.7	2,034	82	41	540	1,371
Shenandoah	374.5	60.8	11.1	17.6	285.0	2,157	426	37	112	1,582
Smyth	431.2	40.8	26.7	50.7	313.0	2,289	205	87	334	1,663
Southampton	1,318.3	590.4	108.3	366.9	252.7	5,021	2,037	289	1,608	1,087
Spotsylvania	317.5	126.6	—	58.1	132.8	2,443	1,076	8	494	865
Stafford	375.7	70.2	—	89.9	215.6	2,136	608	5	466	1,057
Surry	576.2	304.5	13.9	118.2	139.6	2,530	1,255	42	542	691
Sussex	1,125.4	637.4	28.1	220.3	239.6	4,755	2,435	54	1,084	1,182
Tazewell	306.1	5.2	8.6	60.9	231.4	1,643	15	21	435	1,172
Warren	106.6	16.0	—	23.3	67.3	823	119	—	122	582
Warwick	101.2	63.1	—	18.2	19.9	373	207	—	76	90
Washington	362.4	40.7	10.6	82.5	228.6	2,198	216	31	605	1,346
Westmoreland	162.6	64.4	—	34.8	63.4	834	304	—	185	345
Wise	540.3	4.5	17.3	146.4	372.1	2,623	43	32	915	1,633
Wythe	348.7	48.2	26.1	23.1	251.3	1,911	250	88	133	1,440
York	246.3	108.6	1.3	54.6	81.8	985	383	5	243	354
Total	38,035.9	10,592.9	1,175.8	7,865.0	18,402.2	199,821	54,394	4,324	42,850	98,253

Table 40.—*Annual cut of growing stock and sawtimber, by county, Virginia, 1965*

County	Growing stock			Sawtimber			County	Growing stock			Sawtimber		
	All species	Soft-wood	Hard-wood	All species	Soft-wood	Hard-wood		All species	Soft-wood	Hard-wood	All species	Soft-wood	Hard-wood
	Million cubic feet			*Million board feet*				*Million cubic feet*			*Million board feet*		
Accomack	1.4	0.8	0.6	4.1	2.9	1.2	Lancaster	4.7	2.6	2.1	14.5	8.3	6.2
Albemarle	4.7	1.6	3.1	8.8	4.2	4.6	Lee	0.3	—	0.3	0.8	—	0.8
Alleghany	3.3	0.4	2.9	8.9	1.6	7.3	Loudoun	3.0	0.7	2.3	8.1	1.6	6.5
Amelia	3.4	2.2	1.2	9.0	5.3	3.7	Louisa	6.9	1.7	5.2	12.4	4.5	7.9
Amherst	3.4	1.1	2.3	6.6	1.3	5.3	Lunenburg	5.1	2.4	2.7	14.6	6.7	7.9
Appomattox	2.3	1.0	1.3	5.5	1.0	4.5	Madison	1.7	0.6	1.1	5.3	3.1	2.2
Arlington	—	—	—	—	—	—	Mathews	0.6	—	0.6	1.4	—	1.4
Augusta	5.2	0.9	4.3	10.5	1.0	9.5	Mecklenburg	9.7	4.3	5.4	23.8	9.0	14.8
Bath	4.5	0.2	4.3	13.8	0.7	13.1	Middlesex	3.3	2.6	0.7	12.0	8.9	3.1
Bedford	8.8	3.8	5.0	18.4	5.1	13.3	Montgomery	1.6	—	1.6	4.4	—	4.4
Bland	1.2	0.2	1.0	2.8	1.0	1.8	Nansemond	5.7	2.2	3.5	26.8	10.7	16.1
Botetourt	4.4	0.6	3.8	15.7	1.6	14.1	Nelson	2.5	0.2	2.3	7.1	0.7	6.4
Brunswick	12.8	9.8	3.0	29.0	24.1	4.9	New Kent	5.4	2.3	3.1	16.7	7.4	9.3
Buchanan	4.6	—	4.6	14.4	—	14.4	Norfolk	2.2	0.3	1.9	8.3	1.4	6.9
Buckingham	6.0	1.5	4.5	14.4	3.9	10.5	Northampton	2.4	2.1	0.3	9.8	8.8	1.0
Campbell	7.6	2.6	5.0	14.2	4.4	9.8	Northumberland	2.5	2.0	0.5	4.9	3.2	1.7
Caroline	10.9	6.4	4.5	34.3	18.7	15.6	Nottoway	2.1	0.8	1.3	5.2	2.4	2.8
Carroll	8.3	2.7	5.6	35.0	13.3	21.7	Orange	4.6	2.8	1.8	7.4	3.7	3.7
Charles City	5.3	3.3	2.0	16.2	11.9	4.3	Page	0.2	—	0.2	0.9	—	0.9
Charlotte	7.6	4.2	3.4	17.8	8.5	9.3	Patrick	8.4	3.5	4.9	25.3	12.5	12.8
Chesterfield	13.2	7.3	5.9	41.5	25.2	16.3	Pittsylvania	17.3	8.8	8.5	39.0	14.1	24.9
Clarke	0.2	0.2	—	0.8	0.8	—	Powhatan	5.4	2.4	3.0	16.4	7.3	9.1
Craig	—	—	—	—	—	—	Prince Edward	3.5	1.7	1.8	5.5	1.1	4.4
Culpeper	4.2	1.8	2.4	9.8	7.3	2.5	Prince George	4.6	2.1	2.5	12.3	5.9	6.4
Cumberland	4.4	3.0	1.4	7.5	3.7	3.8	Prince William	3.7	2.4	1.3	9.8	6.7	3.1
Dickenson	5.7	0.2	5.5	21.5	0.3	21.2	Princess Anne	3.5	1.2	2.3	10.3	5.7	4.6
Dinwiddie	11.6	6.8	4.8	38.4	23.8	14.6	Pulaski	1.5	1.1	0.4	1.1	1.1	—
Elizabeth City	—	—	—	—	—	—	Rappahannock	2.8	(1)	2.8	7.3	0.1	7.2
Essex	7.4	4.8	2.6	24.5	14.3	10.2	Richmond	4.6	2.3	2.3	12.7	5.4	7.3
Fairfax	5.7	2.2	3.5	12.2	5.8	6.4	Roanoke	0.5	0.2	0.3	1.0	1.0	—
Fauquier	2.8	0.5	2.3	7.5	2.3	5.2	Rockbridge	5.9	1.3	4.6	24.2	4.6	19.6
Floyd	2.2	0.8	1.4	6.5	2.6	3.9	Rockingham	3.2	0.9	2.3	12.7	3.6	9.1
Fluvanna	6.8	0.4	6.4	12.8	1.1	11.7	Russell	4.3	—	4.3	14.8	—	14.8
Franklin	18.6	5.9	12.7	48.8	10.3	38.5	Scott	2.8	—	2.8	9.8	—	9.8
Frederick	4.3	0.8	3.5	12.3	2.2	10.1	Shenandoah	0.4	0.3	0.1	1.3	0.9	0.4
Giles	0.7	—	0.7	2.8	—	2.8	Smyth	1.5	—	1.5	5.8	—	5.8
Gloucester	8.5	3.5	5.0	34.8	13.9	20.9	Southampton	13.1	6.0	7.1	42.5	20.2	22.3
Goochland	3.4	1.4	2.0	5.8	1.9	3.9	Spotsylvania	7.9	0.8	7.1	16.1	2.0	14.1
Grayson	3.2	0.2	3.0	11.3	0.7	10.6	Stafford	2.1	0.6	1.5	4.2	1.4	2.8
Greene	1.1	—	1.1	2.7	—	2.7	Surry	5.9	5.1	0.8	16.3	12.9	3.4
Greensville	4.3	3.2	1.1	15.9	11.5	4.4	Sussex	8.6	4.9	3.7	30.3	17.9	12.4
Halifax	8.6	5.5	3.1	22.5	13.6	8.9	*Tazewell*	2.5	0.2	2.3	8.7	—	8.7
Hanover	11.9	6.6	5.3	34.8	17.5	17.3	Warren	0.7	0.1	0.6	3.2	—	3.2
Henrico	2.4	0.8	1.6	7.5	2.6	4.9	Warwick	—	—	—	—	—	—
Henry	4.8	3.1	1.7	7.0	2.7	4.3	Washington	0.5	(1)	0.5	1.2	0.1	1.1
Highland	0.8	(1)	0.8	3.2	0.1	3.1	Westmoreland	3.7	2.4	1.3	12.4	7.4	5.0
Isle of Wight	5.6	4.0	1.6	22.7	17.0	5.7	Wise	7.1	—	7.1	25.1	—	25.1
James City	2.1	0.2	1.9	7.5	0.9	6.6	Wythe	1.3	0.4	0.9	6.1	2.1	4.0
King and Queen	11.5	5.8	5.7	35.1	12.8	22.3	York	2.4	2.0	0.4	10.1	8.2	1.9
King George	3.0	1.8	1.2	7.7	4.1	3.6							
King William	7.2	4.5	2.7	21.7	12.9	8.8	Total	466.1	196.9	269.2	1,336.4	545.0	791.4

[1] Negligible.

Table 41.—*Net annual growth of growing stock and sawtimber, by county, Virginia, 1965*

County	Growing stock			Sawtimber			County	Growing stock			Sawtimber		
	All species	Soft-wood	Hard-wood	All species	Soft-wood	Hard-wood		All species	Soft-wood	Hard-wood	All species	Soft-wood	Hard-wood
	Million cubic feet			*Million board feet*				*Million cubic feet*			*Million board feet*		
Accomack	4.8	3.8	1.0	14.2	12.0	2.2	Lancaster	0.9	0.5	0.4	3.7	1.7	2.0
Albemarle	10.7	1.9	8.8	25.6	4.2	21.4	Lee	5.0	0.3	4.7	13.6	0.5	13.1
Alleghany	4.4	0.8	3.6	11.1	2.6	8.5	Loudoun	3.5	0.2	3.3	13.2	0.6	12.6
Amelia	7.9	3.3	4.6	24.8	6.7	18.1	Louisa	7.1	2.4	4.7	14.8	4.2	10.6
Amherst	5.7	1.5	4.2	11.1	3.1	8.0	Lunenburg	8.0	2.4	5.6	21.3	7.0	14.3
Appomattox	5.5	1.9	3.6	13.4	5.3	8.1	Madison	2.8	0.5	2.3	9.4	1.3	8.1
Arlington	—	—	—	—	—	—	Mathews	1.3	0.8	0.5	4.0	2.2	1.8
Augusta	8.7	1.3	7.4	20.3	4.9	15.4	Mecklenburg	7.8	2.6	5.2	18.6	7.5	11.1
Bath	7.4	0.9	6.5	19.2	2.8	16.4	Middlesex	1.7	0.9	0.8	5.0	3.1	1.9
Bedford	11.5	3.9	7.6	24.9	5.5	19.4	Montgomery	4.7	1.3	3.4	11.8	2.4	9.4
Bland	5.5	0.6	4.9	10.4	2.7	7.7	Nansemond	8.0	2.9	5.1	26.4	13.1	13.3
Botetourt	6.6	1.1	5.5	19.9	2.6	17.3	Nelson	7.0	1.3	5.7	19.7	2.9	16.8
Brunswick	12.8	7.4	5.4	35.8	22.6	13.2	New Kent	5.5	2.2	3.3	18.1	4.8	13.3
Buchanan	8.4	0.4	8.0	21.3	1.4	19.9	Norfolk	5.4	1.8	3.6	18.4	10.0	8.4
Buckingham	9.2	2.0	7.2	18.8	4.9	13.9	Northampton	1.2	0.7	0.5	2.9	2.5	0.4
Campbell	6.1	2.0	4.1	17.8	5.3	12.5	Northumberland	2.3	1.1	1.2	9.9	4.5	5.4
Caroline	9.8	4.8	5.0	31.3	13.4	17.9	Nottoway	5.0	2.7	2.3	15.3	6.1	9.2
Carroll	6.0	1.5	4.5	15.4	4.8	10.6	Orange	4.6	1.6	3.0	10.0	1.6	8.4
Charles City	4.9	2.2	2.7	15.1	9.3	5.8	Page	2.7	0.5	2.2	6.9	1.8	5.1
Charlotte	7.7	3.4	4.3	16.6	7.7	8.9	Patrick	6.3	1.2	5.1	19.1	2.0	17.1
Chesterfield	8.1	3.3	4.8	25.4	11.1	14.3	Pittsylvania	12.5	4.5	8.0	32.0	13.2	18.8
Clarke	0.8	(1)	0.8	1.7	—	1.7	Powhatan	5.0	1.5	3.5	9.4	2.8	6.6
Craig	3.5	0.9	2.6	7.8	2.9	4.9	Prince Edward	4.6	1.4	3.2	9.9	2.9	7.0
Culpeper	3.3	1.0	2.3	8.6	1.9	6.7	Prince George	6.0	2.8	3.2	19.7	11.9	7.8
Cumberland	4.2	1.8	2.4	6.6	1.5	5.1	Prince William	4.0	0.6	3.4	14.7	3.5	11.2
Dickenson	5.2	0.3	4.9	16.5	1.6	14.9	Princess Anne	2.1	0.3	1.8	6.1	1.1	5.0
Dinwiddie	10.6	5.2	5.4	39.5	19.5	20.0	Pulaski	4.5	0.7	3.8	4.3	2.0	2.3
Elizabeth City	0.1	(1)	0.1	0.1	(1)	0.1	Rappahannock	2.0	0.1	1.9	5.3	0.4	4.9
Essex	2.8	1.4	1.4	8.5	4.9	3.6	Richmond	2.6	1.0	1.6	8.3	2.8	5.5
Fairfax	4.4	0.7	3.7	19.9	2.3	17.6	Roanoke	3.0	0.8	2.2	4.5	1.3	3.2
Fauquier	5.2	1.2	4.0	16.8	4.8	12.0	Rockbridge	6.5	1.4	5.1	18.2	2.5	15.7
Floyd	3.9	1.2	2.7	11.0	5.4	5.6	Rockingham	6.8	1.3	5.5	23.4	4.0	19.4
Fluvanna	3.3	1.3	2.0	10.7	2.8	7.9	Russell	5.4	0.1	5.3	16.7	0.4	16.3
Franklin	9.7	3.2	6.5	27.8	11.1	16.7	Scott	5.5	0.7	4.8	18.1	0.8	17.3
Frederick	3.5	0.5	3.0	13.2	1.3	11.9	Shenandoah	4.8	0.9	3.9	14.3	2.0	12.3
Giles	4.2	0.3	3.9	17.2	2.8	14.4	Smyth	6.1	0.9	5.2	17.0	2.5	14.5
Gloucester	3.2	1.9	1.3	12.0	6.6	5.4	Southampton	13.1	6.7	6.4	50.3	30.9	19.4
Goochland	4.2	1.9	2.3	10.3	1.1	9.2	Spotsylvania	7.3	3.4	3.9	15.4	7.2	8.2
Grayson	3.7	0.3	3.4	9.9	0.9	9.0	Stafford	5.2	1.2	4.0	16.4	4.4	12.0
Greene	1.6	0.2	1.4	4.1	0.2	3.9	Surry	6.5	3.6	2.9	23.0	14.3	8.7
Greensville	6.7	3.0	3.7	25.4	11.8	13.6	Sussex	12.1	6.6	5.5	44.0	27.9	16.1
Halifax	10.6	4.3	6.3	24.2	10.3	13.9	Tazewell	4.8	0.1	4.7	10.6	0.4	10.2
Hanover	8.2	3.6	4.6	20.7	10.5	10.2	Warren	2.1	0.3	1.8	3.6	0.5	3.1
Henrico	3.3	1.1	2.2	9.6	3.6	6.0	Warwick	1.0	0.5	0.5	3.9	2.2	1.7
Henry	6.1	3.3	2.8	14.2	5.7	8.5	Washington	6.7	0.6	6.1	17.1	1.8	15.3
Highland	6.8	0.9	5.9	19.3	3.4	15.9	Westmoreland	2.3	1.1	1.2	9.9	3.3	6.6
Isle of Wight	5.8	3.0	2.8	20.0	12.2	7.8	Wise	6.7	0.2	6.5	17.7	0.6	17.1
James City	3.2	1.8	1.4	8.4	3.8	4.6	Wythe	6.2	0.9	5.3	11.7	3.3	8.4
King and Queen	5.0	2.7	2.3	17.3	9.7	7.6	York	2.3	0.9	1.4	9.3	4.6	4.7
King George	3.1	0.7	2.4	7.3	0.9	6.4							
King William	4.7	2.0	2.7	17.1	8.5	8.6	Total	541.1	170.7	370.4	1,535.0	520.2	1,014.8

[1] Negligible.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