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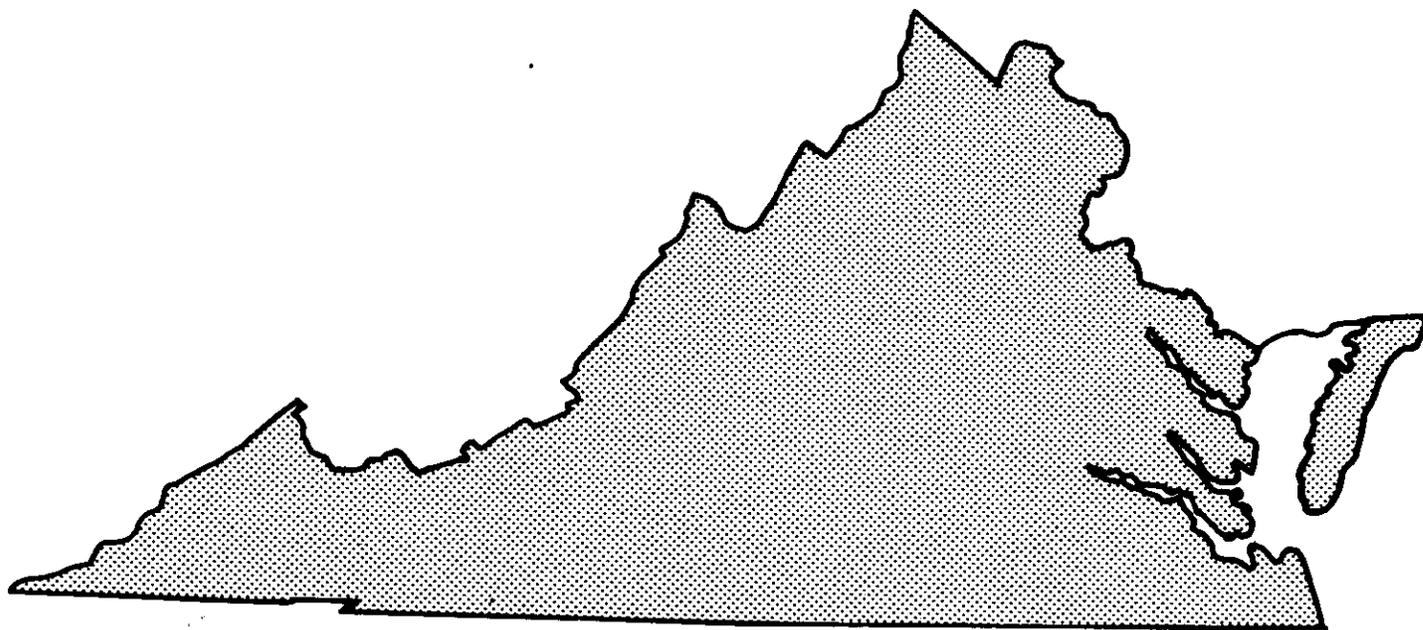
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# Changes in Output of Industrial Timber Products in Virginia, 1976-1978

by Richard L. Welch and Thomas R. Bellamy

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# Changes in Output of Industrial Timber Products in Virginia, 1976-1978

by

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and

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*Abstract.* — Almost 360 million cubic feet of industrial roundwood products were harvested from Virginia's forest in 1978, and an estimated 137 million cubic feet of wood residues were left in the forests. Virginia shipped 41 million cubic feet of roundwood products to plants outside the State, and Virginia plants received 65 million cubic feet of out-of-state wood. Over 75 percent of the 384 million cubic feet of roundwood receipts were converted directly to manufactured products. Over 64 million cubic feet were converted to plant byproducts that were used as roundwood substitutes such as pulpwood chips. Of the remaining plant receipts, 17 million cubic feet became fuelwood, 4 million became nonindustrial byproducts, and 10 million were unused. The total output of industrial timber products amounted to 424 million cubic feet, or 9 million cubic feet more than in 1976.

Between detailed timber surveys, which are made at approximately 10-year intervals in the Southeastern States, the easiest way to keep track of timber harvesting in a State is to conduct periodic canvasses of primary wood-using plants to determine the amount and source of their receipts. Such a canvass was made in Virginia in 1976 as part of a detailed timber survey which included a utilization study to determine the volume of logging residues. Together, the two studies provided information on the total harvesting drain on Virginia's forests. In 1978 another industry canvass was made to determine changes in Virginia's timber products output. This Bulletin with Appendix report the findings of the 1978 canvass and the major changes from the 1976 study. No utilization study was made in 1978; however, utilization factors from the 1976 study were used to estimate logging residues generated in 1978.

## BACKGROUND

In 1957 the second survey of Virginia's forest resources showed that timber growth was adequate to provide forest industries with the amount and kind of timber they were using. The survey also pointed out that low-quality hardwoods were replacing pine over a wide area in the State and that a shortage of

pine timber could develop if this trend continued. Pine growth exceeded removals by only a slight margin at that time. The hardwood encroachment problem was being aggravated by increasing pulpwood production and decreasing fuelwood production. The primary source of pulpwood was pine timber, while the fuelwood was coming from low-quality hardwoods.

Very few major changes were found in the 1957 trends when the third survey was completed in 1966. The hardwood forest had expanded and the softwood declined. Softwood growth was well below the level of removals. The most serious overcut was in the Coastal Plain Region (fig. 1). The softwood product output had decreased slightly but not enough to have any real positive effect on the slumping pine inventory. The volume of softwood pulpwood entering the State from neighboring states was roughly equal to the volume that was leaving the State. The hardwood products output was unchanged from that in 1957. The output of hardwood fuelwood continued to decline.

The fourth survey, completed in 1977, showed that hardwoods were still replacing pines and that the hardwood inventory was still increasing. The softwood inventory, which had been declining, was on the increase. The increase in the softwood inventory was attributed to a sharp rise in the



output throughout most of the period between surveys. This downward trend in timber products output, however, appeared to end and be reversed in 1976. Although the statewide picture for softwoods was improving in 1976, removals were still exceeding growth in the Coastal Plain Region. The net exchange of softwood products between Virginia and its neighbors shifted so that by 1976 Virginia was receiving over twice as much wood as it was shipping out. A similar change in the net exchange of hardwoods occurred. The output of all major hardwood products except veneer logs increased. The most outstanding gains were in the production of hardwood pulpwood and fuelwood.

### STATEWIDE TRENDS\*

Virginia's output of industrial timber products amounted to 424 million cubic feet in 1978, 2 percent more than in 1976. All products showed increases with the exception of pulpwood, and most of the increase was from softwoods. Output of roundwood products was 360 million cubic feet, 1 percent more than in 1976, and output of plant by-products was 64 million cubic feet, up 8 percent over 1976.

The proportions of the total output used for various products changed considerably. Pulpwood had replaced saw logs as the leading product in 1976, but due to a 6-million-cubic-foot increase in saw-log production and a 4-million-cubic-foot decline in pulpwood production, saw logs were the leading product in 1978. Saw logs accounted for 47 percent of the total 1978 output, and the increase was limited to softwood roundwood. Pulpwood made up almost 46 percent of the total output; the decline was limited to round pulpwood. The output of veneer logs accounted for 3 percent of the total output, and miscellaneous products such as cooperage bolts, poles, pilings, fence posts, and material for particleboard made up the remaining 4 percent.

Roundwood receipts at Virginia's primary wood-using plants totaled 384 million cubic feet in 1978, 24 million cubic feet more than the roundwood harvest in the State. In 1976, receipts exceeded the harvest by 40 million cubic feet. In 1978 the volume of roundwood products leaving the

State was 41 million cubic feet, or 13 million more than in 1976. The 13-million-cubic-foot increase was 70 percent hardwood and 30 percent softwood. The volume of products entering the State was 65 million cubic feet, or 3 million cubic feet less than in 1976. The decrease was 93 percent softwood and 7 percent hardwood.

Roundwood receipts at non-pulpmills totaled 231 million cubic feet. Of this volume, 129 million cubic feet went to the primary product, 95 million cubic feet to initial residues, and almost 7 million cubic feet to pulpwood chips. The receipts of products, excluding pulpwood, were up by 7 million cubic feet over 1976, and the volume of initial residues produced was up 3 million cubic feet. The volume of unused plant residues dropped from 19 million to 10 million cubic feet. Through improved utilization and the increased output, 12 million cubic feet of additional plant byproducts were produced. Only 5 million cubic feet of the increase were used as roundwood substitutes for industrial timber products; another 5 million went to fuelwood, and the remaining 2 million went to nonindustrial products like animal bedding and mulch. The volume of unused bark residues produced at all primary wood-using plants dropped by 86,486 green tons, and the initial output was up by 22,906 green tons. All of the increased utilization of bark went to miscellaneous nonindustrial products and to pulp. The output of fuel from bark decreased by 82,840 green tons.

No new utilization study was made in 1978 to determine the volume of logging residues produced that year, but utilization factors from the 1976 study were used to estimate 1978 logging residues. Traditionally, the reported volume of logging residues has been limited to wood in the saw-log and upper-stem portions of sawtimber and poletimber trees killed during harvesting. Based on utilization factors from the 1976 utilization study, the 1978 volume of this wood was almost 56 million cubic feet or 9 million more than in 1976. In addition to the wood traditionally referred to as logging residues, there is wood in the stumps, tops, and limbs of sawtimber and poletimber trees as well as in saplings and in rough, rotten, and salvable dead trees that are killed or destroyed during harvesting. Almost 81 million cubic feet of wood from the above-named sources were left in 1978. Of the 137 million cubic feet left following harvests, 62 percent was hardwood.

### REGIONAL CHANGES

The 1976 timber survey of Virginia provided detailed information on the forest inventory, growth,

\*In an effort to conserve fuel, 54 small sawmills that were included in the 1976 study were excluded in 1978. Collectively, these mills received 2 million cubic feet of saw logs, predominantly hardwoods, from Virginia's forests in 1976. The underestimates caused by these omissions had little effect on the trends described in this Bulletin.

and removals for each of five geographic regions. The results of the 1976 and 1978 industry studies are presented by these five regions to take advantage of the available information from the timber survey.

### *Coastal Plain*

The Coastal Plain Region of Virginia is the hub of the State's forest industries. The region accounts for 46 percent of the State's timber products output and 57 percent of the roundwood receipts. The region leads in all softwood products and in all hardwood products except pulpwood and those in the miscellaneous group. Saw logs were the leading product in 1978, accounting for 54 percent of the total output. Pulpwood accounted for 38 percent of the total output, while veneer logs and the miscellaneous group each contributed about 4 percent. The distribution of products output, by species, was 61 percent softwoods and 39 percent hardwoods. Over 80 percent of the total output came from roundwood and the remainder from plant byproducts.

Total output in the region was up by 2 percent since 1976. Gains were made in all products except pulpwood. The output from both species groups was up, as was the output of both roundwood and plant byproducts. The output of softwood saw logs and veneer logs from roundwood was up by about 18 percent, or 11 million cubic feet, while the output of softwood pulpwood and miscellaneous products was down by over 9 million cubic feet. The net result was an increase of 1.4 percent in softwood products output from roundwood. The output of hardwood saw logs and veneer logs from roundwood was up about 14 percent, or 5 million cubic feet, while the output of hardwood pulpwood and miscellaneous products was down by 3 million cubic feet. The net result in the case of hardwood products was a 4-percent increase in total roundwood output.

The output of industrial timber products from plant byproducts was up by only 0.5 million cubic feet or just over 1 percent. All of the increase was in hardwood products. The output of softwood byproducts was down by over 1 million cubic feet. Almost 4.5 million cubic feet of softwood veneer cores that were being used as a roundwood substitute for saw logs in 1976 were diverted to other byproducts in 1978, some of which were not roundwood substitutes.

The roundwood receipts at primary wood-using plants, excluding pulp mills, in the Coastal Plain in 1977 was about 9 million cubic feet more than in 1976. The processing of this material resulted in the production of some 4 million cubic feet of addi-

tional initial plant residues. The volume of unused plant residues dropped by 3 million cubic feet. Combined, the increased production of initial plant residues and the reduction of unused plant residues meant that an additional 7 million cubic feet of plant byproducts were produced in 1978. Only 0.5 million cubic feet were utilized as a roundwood substitute. Another 2.5 million cubic feet were used for miscellaneous products such as mulch and animal bedding, and the remainder went to fuel. The volume of initial plant residues used for fuelwood more than doubled in the 2 years, and almost all of the increase was from softwood residues.

In 1976 the Coastal Plain had a surplus of hardwood growth and an overcut of softwood growth, particularly in the 8- and 10-inch-diameter classes. As the result of intensive forest management, the rate of softwood growth was increasing, but so was the demand for softwood products. The increased output of hardwood products found in 1978 should have had little effect on the large surplus of hardwood growth. Without additional information on the net growth of softwoods, it is difficult to evaluate the effects of the modest increase in softwood harvesting. It is known that the increase in softwood cut was for saw logs and veneer logs that generally come from larger diameter trees where the overcut was not as serious. One thing that seems certain is that it will be some time before the softwood forests in this region will be able to provide the forest industries with all the softwood timber they require.

### *Southern Piedmont*

The total industrial timber products output in the Southern Piedmont was over 128 million cubic feet or 30 percent of the State total in 1978. Almost 115 million cubic feet were from roundwood. Although the region accounted for almost 39 percent of the State's roundwood output, its mills received only 17 percent of the State's total roundwood receipts. Almost 66 million cubic feet of roundwood left the region in 1978, while only 17 million were brought into the region. In 1978, the Southern Piedmont was a major wood supplier for parts of North Carolina and other regions in Virginia. The region led the State in pulpwood production, which accounted for 58 percent of the region's total product output. Saw logs accounted for 34 percent of the region's total output, veneer logs accounted for less than 2 percent, and the rest went to miscellaneous products. Almost 54 percent of the total output was from hardwoods.

The total output in the region was up by 10 percent or 12 million cubic feet over 1976. The

increased output in this region exceeded the net increase for the entire State. Gains were made in the output of all products except veneer logs. The output from both species groups was up, and the output from both roundwood and plant byproducts was up. All roundwood products from both species groups increased except hardwood veneer logs, which showed a slight decline. The output of softwood products from roundwood increased by 8 percent and amounted to almost 54 million cubic feet in 1978. The 1978 output of hardwood products from roundwood was 61 million cubic feet, up 9 percent since 1976.

The output of industrial timber products from plant byproducts was up by 3 million cubic feet or 30 percent, and the increase was equally divided between the hardwood and softwood species. The total output of all kinds of plant byproducts was up by almost 5 million cubic feet: 3 million from increased output of initial residues, and 2 million from improved utilization. In 1978 almost 4 million cubic feet of plant residues were going to fuelwood, an increase of 41 percent over 1976.

In 1976 the net growth of hardwoods was exceeding the removals by a very wide margin, so the increase in the output of industrial timber products from roundwood should have had little effect on the hardwood inventory. The net growth of softwoods was exceeding removals by 17 million cubic feet or 30 percent in 1976. An increase of 4 million cubic feet of softwood products output should still leave a healthy margin of growth over removals in the region.

#### *Northern Piedmont*

The Northern Piedmont accounted for 12 percent or 52 million cubic feet of Virginia's industrial timber products output in 1978. Over 88 percent of the total output came from roundwood; 62 percent was from hardwoods. This region, like the Southern Piedmont, was an exporter of roundwood products. Although there was considerable movement of hardwood products into and out of the region, the receipts of hardwood products equaled production. The receipts of softwood products was about 10 million cubic feet, while the production was over 18 million cubic feet. Pulpwood was the leading product in the region and made up almost 49 percent of the total output. Saw logs accounted for 45 percent of the total output, veneer logs almost 6 percent, and miscellaneous products less than 1 percent.

In this region the total output of industrial timber products dropped by 2 million cubic feet or about 4 percent between 1976 and 1978. The de-

crease was confined to the output of hardwood products, which dropped about 4 million cubic feet, and to the output of roundwood products, which dropped over 2 million. All softwood products output from roundwood increased with the exception of veneer logs. The output of softwood veneer logs remained constant over the 2-year period. There was a big drop in output of hardwood saw logs. The output of hardwood veneer logs was up, and there was comparatively little change in the output of pulpwood and miscellaneous products.

The volume of plant byproducts used as a roundwood substitute in the region increased slightly between 1976 and 1978. The increase was the result of improved utilization of plant residues. The sharp decline in saw-log receipts in the region resulted in a reduction of 2 million cubic feet in the production of initial plant residues. The volume of unused plant residues, however, dropped by 2 million cubic feet, leaving the volume used virtually unchanged. The volume going to fuelwood increased only slightly, while the volume going to other miscellaneous nonindustrial products dropped. The gain in output of industrial timber products was limited to softwoods.

In the Northern Piedmont, softwood growth exceeded removals by 52 percent or almost 13 million cubic feet in 1976. The increase in softwood products output was only 1.5 million cubic feet, so there should have still been a large surplus of growth in 1978. The hardwood growth was exceeding removals by over 80 percent in 1975. Since hardwood products output was down in 1978, the growth surplus was probably even greater.

#### *Northern Mountain*

The Northern Mountain Region accounted for 6 percent or 25 million cubic feet of Virginia's industrial timber products output in 1978. Over 86 percent of the regional total came from roundwood and 83 percent from hardwoods. The roundwood receipts at primary wood-using plants in the region were twice the roundwood products output. Pulpwood — the leading product in the region — made up 57 percent of the total output; saw logs accounted for almost 42 percent. All other products combined made up a little over 1 percent of the total output in the region.

The total output of industrial timber products dropped by over 1 million cubic feet or 5 percent between 1976 and 1978. The decrease was confined to the output of hardwoods and to roundwood products. All products, with the exception of pulpwood, showed increases in total output. Pulpwood from both hardwood and softwood roundwood dropped.

The only industrial timber product produced as a plant byproduct in the region was pulpwood. It showed an increase of 35 percent over 1976. The increase was made possible by both an increase in the volume of initial residues produced and improved utilization. The volume of fuelwood produced from plant residues increased by 21 percent.

In 1976, growth in the region was three times as great as removals. In 1978 the mills in the region received only one-third of their total roundwood receipts from the region's forests. Because of the region's long, narrow shape the normal purchasing area for most mills laps outside the region.

#### *Southern Mountain*

The Southern Mountain Region accounted for about 6 percent or 23 million cubic feet of the State's output in 1978. Over 89 percent of the regional total came from roundwood and 79 percent from hardwoods. The roundwood output in the region was about 21 million cubic feet, and the roundwood receipts at primary wood-using plants were almost 17 million cubic feet. The surplus production in the region went, for the most part, to mills outside the State. Saw logs — the leading product — made up 75 percent of the total output, pulpwood 22 percent, veneer logs 2 percent, and miscellaneous products the remainder.

The total output of industrial timber products in the region dropped by 16 percent or 4 million cubic feet between 1976 and 1978. The decrease was limited to roundwood but occurred in both softwood and hardwood products. Output of softwood pulpwood and miscellaneous products from roundwood increased slightly, as did that of hardwood pulpwood from plant byproducts. The increase in use of plant byproducts for industrial timber prod-

ucts was the result of improved utilization and a reduction in the use of plant residues for fuelwood. The volume of initial plant residue produced in the region actually declined.

#### SHIFTS IN TIMBER PRODUCTS OUTPUT

Output of softwood products from roundwood in Virginia increased by over 6 million cubic feet between 1976 and 1978. The increase was limited to the Coastal and the two Piedmont Regions. The county figures (Appendix table 12) show that the increase was confined to a large area centered around the two Piedmont Regions and overlapping into all the other regions (fig. 2). They also show that there was a large area in the Coastal Region and another in the Northern Piedmont where softwood products output declined. In the case of hardwood products output, the State roundwood totals declined. The decline was in the two Mountain Regions and the Northern Piedmont; the Southern Piedmont and Coastal Regions showed increases.

It should be noted that certain reporting errors are inherent in industry canvasses. Although almost all mills are able to provide accurate data on total mill receipts, some do not have accurate records on the county where the wood was harvested. Certain county figures, therefore, may be in error. It should also be kept in mind that 54 small sawmills were intentionally omitted from the 1978 study. The omission of these mills reduced most of the State and regional trends only slightly, but it could greatly affect county trends. Effects of such errors are greatly reduced when county figures are grouped. It is therefore recommended that county figures only be used in compiling product outputs for groups of counties.

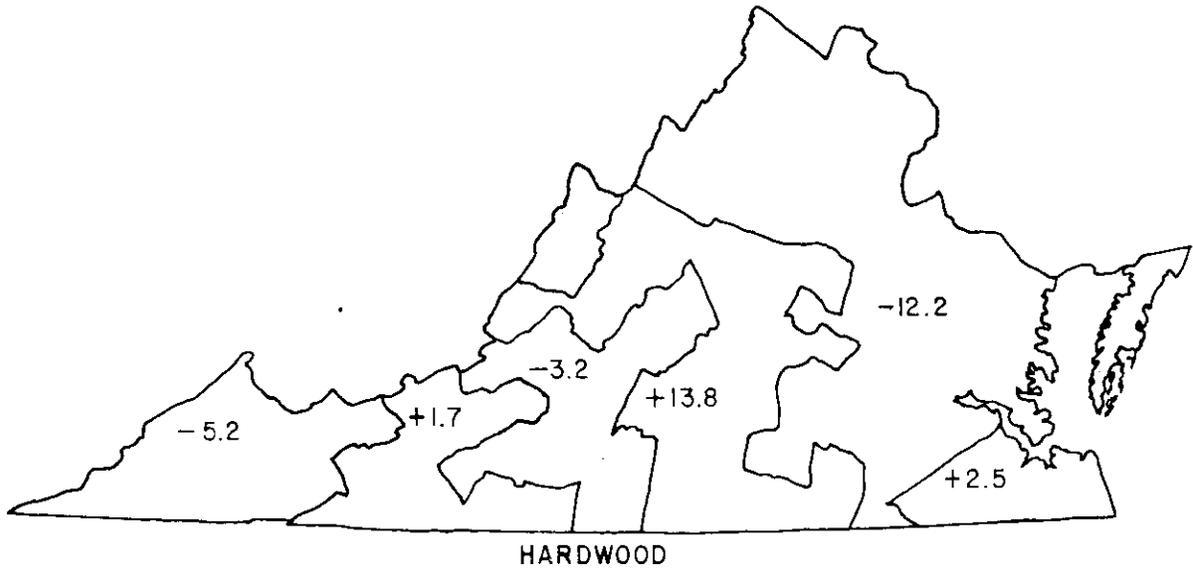
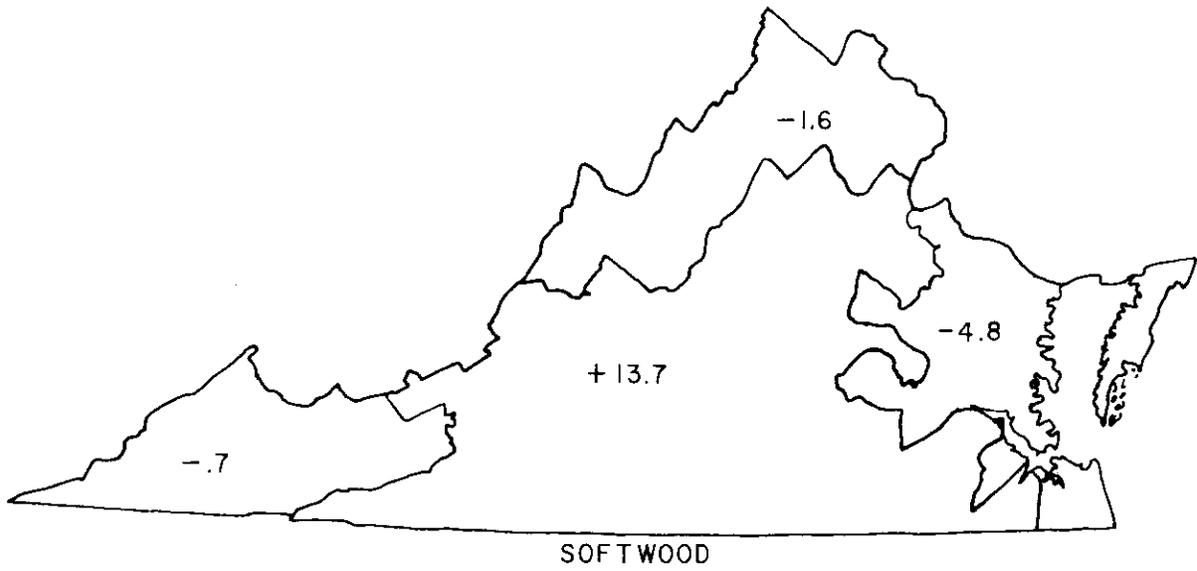


Figure 2.—Changes in timber products output, 1976-1978 (in million cubic feet).

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## APPENDIX

### *Definitions of Terms*

*Coarse residues.* — Wood residues suitable for chipping, such as slabs, edgings, and veneer cores.

*Fine residues.* — Wood residues not suitable for chipping, such as sawdust and savings.

*Growing-stock trees.* — Live trees of commercial species that either contain or are capable of producing at least one 12-foot saw log.

*Growing-stock volume.* — Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. (Net volume in primary forks is included.)

*Hardwoods.* — Dicotyledonous trees, usually broad-leaved and deciduous.

*Industrial wood.* — All roundwood products except fuelwood.

*Logging residues.* — Saw-log and upper-stem portions of sawtimber and poletimber trees killed or destroyed during harvesting.

*Net annual growth.* — The increase in volume for a specific year.

*Plant byproducts.* — Wood products, such as pulp chips, obtained incidentally to production of other manufactured products.

*Primary wood-using plants (industries).* — Those plants or industries that utilized roundwood products in the manufacture of their principal products. (Plants that utilize only plant byproducts as a substitute for roundwood are included.)

*Roundwood products.* — Logs, bolts, or other round sections cut from trees for industrial or consumer uses.

*Softwoods.* — Coniferous trees, usually evergreen, having needles or scalelike leaves.

*Timber products.* — Roundwood products and plant byproducts.

*Timber removals.* — The net volume of growing-stock trees removed from the inventory by harvesting, by cultural operations such as stand improvements, or by land clearing or changes in land use.

*Unused plant residues.* — Wood material from manufacturing plants not utilized for some product.

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Conversion Factors  
Cubic feet of wood per standard unit

Product	Standard unit	Softwood	Hardwood
Saw logs	Thousand board feet <sup>1</sup>	187.913	185.931
Veneer logs	Thousand board feet <sup>1</sup>	162.739	147.030
Pulpwood	Standard cords	73.060	76.350
Other products	Thousand cubic feet	.001	.001

<sup>1</sup>International 1/4-inch rule.

Table 1.--Output of industrial timber products, by source of material, year, product, and species group, Virginia

Product and species group	Total output		Roundwood output		Byproduct output	
	1976	1978	1976	1978	1976	1978
----- Thousand cubic feet -----						
<b>Saw logs:</b>						
Softwood	84,629	91,443	80,157	91,443	4,472	--
Hardwood	109,135	108,358	109,129	108,349	6	9
Total	193,764	199,801	189,286	199,792	4,478	9
<b>Veneer logs and bolts:</b>						
Softwood	8,273	9,390	8,273	9,390	--	--
Hardwood	2,693	4,273	2,693	4,273	--	--
Total	10,966	13,663	10,966	13,663	--	--
<b>Pulpwood:<sup>1/</sup></b>						
Softwood	99,827	96,510	73,875	67,936	25,952	28,574
Hardwood	98,946	98,005	75,064	70,884	23,882	27,121
Total	198,773	194,515	148,939	138,820	49,834	55,695
<b>Miscellaneous:</b>						
Softwood	6,871	9,683	3,918	3,877	2,953	5,806
Hardwood	4,859	6,338	2,949	3,719	1,910	2,619
Total	11,730	16,021	6,867	7,596	4,863	8,425
<b>All industrial:</b>						
Softwood	199,600	207,026	166,223	172,646	33,377	34,380
Hardwood	215,633	216,974	189,835	187,225	25,798	29,749
Total	415,233	424,000	356,058	359,871	59,175	64,129

<sup>1/</sup> For 1976 the roundwood figures include 14,589 thousand cubic feet of softwood and 4,446 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulp mills as a co-product. For 1978 the roundwood figures include 2,946 thousand cubic feet of softwood and 3,766 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulp mills as a co-product.

Table 2.--Output of industrial timber products, by source of material, year, product, and species group, Coastal Plain

Product and species group	Total output		Roundwood output		Byproduct output	
	1976	1978	1976	1978	1976	1978
----- Thousand cubic feet -----						
<b>Saw logs:</b>						
Softwood	58,109	63,316	53,644	63,316	4,465	--
Hardwood	37,667	42,199	37,667	42,199	--	--
Total	95,776	105,515	91,311	105,515	4,465	--
<b>Veneer logs and bolts:</b>						
Softwood	5,190	6,195	5,190	6,195	--	--
Hardwood	830	1,617	830	1,617	--	--
Total	6,020	7,812	6,020	7,812	--	--
<b>Pulpwood:<sup>1/</sup></b>						
Softwood	51,391	43,907	30,003	21,270	21,388	22,637
Hardwood	32,226	30,670	22,743	20,156	9,483	10,514
Total	83,617	74,577	52,746	41,426	30,871	33,151
<b>Miscellaneous:</b>						
Softwood	4,403	5,856	2,013	1,335	2,390	4,521
Hardwood	1,048	1,542	342	260	706	1,282
Total	5,451	7,398	2,355	1,595	3,096	5,803
<b>All industrial:</b>						
Softwood	119,093	119,274	90,850	92,116	28,243	27,158
Hardwood	71,771	76,028	61,582	64,232	10,189	11,796
Total	190,864	195,302	152,432	156,348	38,432	38,954

<sup>1/</sup>For 1976 the roundwood figures include 10,575 thousand cubic feet of softwood and 1,605 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulpmills as a co-product. For 1978 the roundwood figures include 613 thousand cubic feet of softwood and 1,414 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulpmills as a co-product.

Table 3.--Output of industrial timber products, by source of material, year, product, and species group, Southern Piedmont

Product and species group	Total output		Roundwood output		Byproduct output	
	1976	1978	1976	1978	1976	1978
----- Thousand cubic feet -----						
<b>Saw logs:</b>						
Softwood	15,944	17,277	15,937	17,277	7	--
Hardwood	23,776	25,723	23,770	25,714	6	9
Total	39,720	43,000	39,707	42,991	13	9
<b>Veneer logs and bolts:</b>						
Softwood	1,246	1,360	1,246	1,360	--	--
Hardwood	908	792	908	792	--	--
Total	2,154	2,152	2,154	2,152	--	--
<b>Pulpwood:<sup>1/</sup></b>						
Softwood	34,001	36,785	31,031	32,998	2,970	3,787
Hardwood	34,524	37,999	29,071	31,279	5,453	6,720
Total	68,525	74,784	60,102	64,277	8,423	10,507
<b>Miscellaneous:</b>						
Softwood	2,228	3,399	1,681	2,114	547	1,285
Hardwood	3,362	4,702	2,349	3,365	1,013	1,337
Total	5,590	8,101	4,030	5,479	1,560	2,622
<b>All industrial:</b>						
Softwood	53,419	58,821	49,895	53,749	3,524	5,072
Hardwood	62,570	69,216	56,098	61,150	6,472	8,066
Total	115,989	128,037	105,993	114,899	9,996	13,138

<sup>1/</sup> For 1976 the roundwood figures include 3,879 thousand cubic feet of softwood and 2,144 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulp-mills as a co-product. For 1978 the roundwood figures include 1,505 thousand cubic feet of softwood and 1,768 thousand cubic feet of hardwoods chipped at primary wood-using plants other than pulp-mills as a co-product.

Table 4.--Output of industrial timber products, by source of material, year, product, and species group, Northern Piedmont

Product and species group	Total output		Roundwood output		Byproduct output	
	1976	1978	1976	1978	1976	1978
----- Thousand cubic feet -----						
<b>Saw logs:</b>						
Softwood	5,239	5,652	5,239	5,652	--	--
Hardwood	21,850	17,703	21,850	17,703	--	--
Total	27,089	23,355	27,089	23,355	--	--
<b>Veneer logs and bolts:</b>						
Softwood	1,835	1,835	1,835	1,835	--	--
Hardwood	296	1,116	296	1,116	--	--
Total	2,131	2,951	2,131	2,951	--	--
<b>Pulpwood:<sup>1/</sup></b>						
Softwood	10,311	11,896	9,333	10,337	978	1,559
Hardwood	13,920	13,485	9,451	9,052	4,469	4,433
Total	24,231	25,381	18,784	19,389	5,447	5,992
<b>Miscellaneous:</b>						
Softwood	215	266	199	266	16	--
Hardwood	272	94	81	94	191	--
Total	487	360	280	360	207	--
<b>All industrial:</b>						
Softwood	17,600	19,649	16,606	18,090	994	1,559
Hardwood	36,338	32,398	31,678	27,965	4,660	4,433
Total	53,938	52,047	48,284	46,055	5,654	5,992

<sup>1/</sup> For 1976 the roundwood figures include 618 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulp mills as a co-product. For 1978 the roundwood figures include 419 thousand cubic feet of softwood and 564 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulp mills as a co-product.

Table 5.--Output of industrial timber products, by source of material, year, product, and species group, Northern Mountain

Product and species group	Total output		Roundwood output		Byproduct output	
	1976	1978	1976	1978	1976	1978
----- Thousand cubic feet -----						
Saw logs:						
Softwood	822	930	822	930	--	--
Hardwood	9,380	9,706	9,380	9,706	--	--
Total	10,202	10,636	10,202	10,636	--	--
Veneer logs and bolts:						
Softwood	--	--	--	--	--	--
Hardwood	121	267	121	267	--	--
Total	121	267	121	267	--	--
Pulpwood: <sup>1/</sup>						
Softwood	3,447	3,415	3,253	3,019	194	396
Hardwood	13,163	11,205	10,741	8,048	2,422	3,157
Total	16,610	14,620	13,994	11,067	2,616	3,553
Miscellaneous:						
Softwood	--	90	--	90	--	--
Hardwood	48	--	48	--	--	--
Total	48	90	48	90	--	--
All industrial:						
Softwood	4,269	4,435	4,075	4,039	194	396
Hardwood	22,712	21,178	20,290	18,021	2,422	3,157
Total	26,981	25,613	24,365	22,060	2,616	3,553

<sup>1/</sup> For 1976 the roundwood figures include 68 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulp mills as a co-product. For 1978 the roundwood figures include 154 thousand cubic feet of softwood chipped at primary wood-using plants other than pulp mills as a co-product.

Table 6.--Output of industrial timber products, by source of material, year, product, and species group, Southern Mountain

Product and species group	Total output		Roundwood output		Byproduct output	
	1976	1978	1976	1978	1976	1978
----- Thousand cubic feet -----						
Saw logs:						
Softwood	4,515	4,268	4,515	4,268	--	--
Hardwood	16,462	13,027	16,462	13,027	--	--
Total	20,977	17,295	20,977	17,295	--	--
Veneer logs and bolts:						
Softwood	2	--	2	--	--	--
Hardwood	538	481	538	481	--	--
Total	540	481	540	481	--	--
Pulpwood: <sup>1/</sup>						
Softwood	677	507	255	312	422	195
Hardwood	5,113	4,646	3,058	2,349	2,055	2,297
Total	5,790	5,153	3,313	2,661	2,477	2,492
Miscellaneous:						
Softwood	25	72	25	72	--	--
Hardwood	129	--	129	--	--	--
Total	154	72	154	72	--	--
All industrial:						
Softwood	5,219	4,847	4,797	4,652	422	195
Hardwood	22,242	18,154	20,187	15,857	2,055	2,297
Total	27,461	23,001	24,984	20,509	2,477	2,492

<sup>1/</sup> For 1976 the roundwood figures include 135 thousand cubic feet of softwood and 11 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulpmills as a co-product. For 1978 the roundwood figures include 255 thousand cubic feet of softwood and 20 thousand cubic feet of hardwood chipped at primary wood-using plants other than pulpmills as a co-product.

Table 7.--Industrial roundwood movement,  
by year, and species group, Virginia

Species group	1976	1978
-- Thousand cubic feet --		
Softwoods:		
Output	166,223	172,646
Retained	148,697	150,862
Shipped out	17,526	21,784
Shipped in	37,879	35,418
Receipts	186,576	186,280
Hardwoods:		
Output	189,835	187,225
Retained	178,818	167,703
Shipped out	11,017	19,522
Shipped in	30,272	30,079
Receipts	209,090	197,782
All species:		
Output	356,058	359,871
Retained	327,515	318,565
Shipped out	28,543	41,306
Shipped in	68,151	65,497
Receipts	395,666	384,062

Table 8.--Volume of unused plant residues at primary  
wood-using industries, by industry, species group, and  
type of residue, 1978

Species group and type of residue	All industries	Lumber	Veneer and plywood	Other
-- Thousand cubic feet --				
Softwoods:				
Coarse	929	899	--	30
Shavings	68	68	--	--
Other fine	2,542	2,522	--	20
Total	3,539	3,489	--	50
Hardwoods:				
Coarse	979	950	29	--
Shavings	48	48	--	--
Other fine	5,650	5,621	2	27
Total	6,677	6,619	31	27
All species:				
Coarse	1,908	1,849	29	30
Shavings	116	116	--	--
Other fine	8,192	8,143	2	47
Total	10,216	10,108	31	77

Table 9.--Volume of unused plant residues, by species group, year, and Forest Survey Region

Forest Survey Region	All species		Softwood		Hardwood	
	1976	1978	1976	1978	1976	1978
- - - - - Thousand cubic feet - - - - -						
Coastal Plain	5,524	2,514	1,800	841	3,724	1,673
Southern Piedmont	4,545	2,392	1,592	991	2,953	1,401
Northern Piedmont	4,093	1,828	1,074	605	3,019	1,223
Northern Mountain	834	387	139	51	695	336
Southern Mountain	3,907	3,095	936	1,051	2,971	2,044
State	18,903	10,216	5,541	3,539	13,362	6,677

Table 10.--Disposal of bark at primary wood-using plants, by species group, year, and disposition

Disposition	All species		Softwood		Hardwood	
	1976	1978	1976	1978	1976	1978
- - - - - Thousand green tons - - - - -						
Fiber products	12.0	31.3	4.2	10.9	7.8	20.4
Charcoal	4.8	2.8	1.1	.5	3.7	2.3
Industrial fuel	691.2	608.1	293.3	314.5	397.9	293.6
Domestic fuel	45.2	45.6	7.2	11.0	38.0	34.6
Miscellaneous	127.5	303.3	66.6	95.1	60.9	208.2
Not used	236.4	149.9	65.9	37.3	170.5	112.6
Total	1,117.1	1,141.0	438.3	469.3	678.8	671.7

Table 11.--Predicted volume of logging residues by species group and source of material, 1978

Source of material	All species	Softwood	Hardwood
- - - <u>Thousand cubic feet</u> - - -			
Sawtimber trees:			
Saw-log portion	19,956	4,578	15,378
Upper stem	30,870	9,510	21,360
Stump	25,160	13,471	11,689
Tops and limbs	26,106	10,156	15,950
Total	102,092	37,715	64,377
Poletimber trees:			
Upper stem	5,616	1,384	4,232
Stump	3,836	1,514	2,322
Tops and limbs	17,220	9,771	7,449
Total	26,672	12,669	14,003
Sapling-size trees	7,717	980	6,737
Rough, rotten and dead trees	862	194	668
All sources	137,343	51,558	85,785

Table 12.--Roundwood products output, by species group, year, and county, in Virginia--Continued

Survey unit and county	All species		Softwood		Hardwood	
	1976	1978	1976	1978	1976	1978
----- Thousand cubic feet -----						
Northern Piedmont:						
Albermarle	5,632	7,359	1,473	2,360	4,159	4,999
Amherst	4,925	4,145	926	1,042	3,999	3,103
Arlington	186	--	47	--	139	--
Culpeper	1,835	1,337	254	297	1,581	1,040
Fairfax	942	908	851	833	91	75
Fauquier	1,837	723	920	414	917	309
Fluvanna	3,544	4,624	1,728	2,301	1,816	2,323
Goochland	2,559	1,202	1,360	821	1,199	381
Greene	410	230	86	120	324	110
Loudoun	484	296	195	234	289	62
Louisa	3,935	6,704	2,097	2,754	1,838	3,950
Madison	1,075	1,188	225	669	850	519
Nelson	7,720	8,019	1,618	1,947	6,102	6,072
Orange	3,469	1,761	1,298	560	2,171	1,201
Prince William	3,721	1,415	1,492	1,301	2,229	114
Rappahannock	317	323	11	7	306	316
Spotsylvania	3,701	3,665	1,742	1,897	1,959	1,768
Stafford	1,992	2,156	283	533	1,709	1,623
Total	48,284	46,055	16,606	18,090	31,678	27,965
Northern Mountain:						
Alleghany	2,466	3,013	293	380	2,173	2,633
Augusta	2,841	3,144	572	427	2,269	2,717
Bath	3,091	1,960	421	136	2,670	1,824
Botetourt	2,493	3,024	378	1,057	2,115	1,967
Clarke	249	142	--	5	249	137
Craig	1,528	1,101	308	154	1,220	947
Frederick	1,211	801	585	417	626	384
Highland	2,410	1,383	241	38	2,169	1,345
Page	87	10	4	2	83	8
Roanoke	150	405	13	217	137	188
Rockbridge	4,299	4,683	585	725	3,714	3,958
Rockingham	2,059	1,181	260	156	1,799	1,025
Shenandoah	710	514	208	166	502	348
Warren	771	699	207	159	564	540
Total	24,365	22,060	4,075	4,039	20,290	18,021
Southern Mountain:						
Bland	1,425	712	399	76	1,026	636
Buchanan	1,361	630	216	32	1,145	598
Carroll	2,968	3,138	1,114	1,257	1,854	1,881
Dickenson	1,140	492	11	22	1,129	470
Floyd	2,858	2,655	994	1,056	1,864	1,599
Giles	724	812	31	35	693	777
Grayson	1,622	2,105	850	1,238	772	867
Lee	1,454	700	91	50	1,363	650
Montgomery	135	657	38	202	97	455
Pulaski	518	844	181	134	337	710
Russell	1,074	905	12	41	1,062	864
Scott	952	465	85	43	867	422
Smyth	3,220	1,654	181	151	3,039	1,503
Tazewell	1,181	1,070	140	24	1,041	1,046
Washington	2,492	1,490	313	168	2,179	1,322
Wise	1,041	1,144	18	8	1,023	1,136
Wythe	819	1,036	123	115	696	921
Total	24,984	20,509	4,797	4,652	20,187	15,857

Table 12.--Roundwood products output, by species group, year, and county, in Virginia

Survey unit and county	All species		Softwood		Hardwood	
	1976	1978	1976	1978	1976	1978
	----- Thousand cubic feet -----					
<b>Coastal Plain:</b>						
Accomack	1,853	2,194	1,643	2,078	210	116
Brunswick	12,647	13,369	8,848	9,124	3,799	4,245
Caroline	7,205	7,722	3,599	4,074	3,606	3,648
Charles City	3,723	3,001	1,728	1,439	1,995	1,562
Chesapeake	4,167	3,237	2,348	1,723	1,819	1,514
Chesterfield	9,472	7,708	7,071	5,577	2,401	2,131
Dinwiddie	11,892	10,780	6,008	6,508	5,884	4,272
Essex	3,669	2,967	2,011	1,685	1,658	1,282
Gloucester	2,592	2,194	1,704	1,047	888	1,147
Greensville	7,395	6,604	3,938	3,406	3,457	3,198
Hampton	--	--	--	--	--	--
Hanover	5,260	5,089	2,530	2,517	2,730	2,572
Henrico	969	1,944	358	1,319	611	625
Isle of Wight	5,699	6,043	4,386	4,169	1,313	1,874
James City	2,520	948	1,393	425	1,127	523
King and Queen	5,460	8,006	2,705	4,503	2,755	3,503
King George	1,669	2,389	604	441	1,065	1,948
King William	2,952	5,488	1,789	1,519	1,163	3,969
Lancaster	1,021	864	364	337	657	527
Mathews	1,269	450	753	283	516	167
Middlesex	1,664	1,853	812	1,038	852	815
New Kent	3,716	3,917	1,676	1,941	2,040	1,976
Newport News	2	9	2	4	--	5
Northampton	680	1,516	311	1,235	369	281
Northumberland	1,068	1,360	586	433	482	927
Prince George	7,276	5,012	4,236	2,175	3,040	2,837
Richmond	1,825	2,984	1,013	1,569	812	1,415
Southampton	13,286	14,895	8,421	8,526	4,865	6,369
Suffolk	8,841	10,069	6,191	6,820	2,650	3,249
Surry	5,345	5,331	3,004	3,249	2,341	2,082
Sussex	11,517	14,024	7,506	10,761	4,011	3,263
Virginia Beach	1,499	1,634	705	706	794	928
Westmoreland	3,030	2,384	1,700	1,208	1,330	1,176
York	1,249	363	907	277	342	86
<b>Total</b>	<b>152,432</b>	<b>156,348</b>	<b>90,850</b>	<b>92,116</b>	<b>61,582</b>	<b>64,232</b>
<b>Southern Piedmont:</b>						
Amelia	7,022	6,199	3,508	3,594	3,514	2,605
Appomattox	6,334	7,237	2,900	3,102	3,434	4,135
Bedford	5,803	6,162	1,038	1,527	4,765	4,635
Buckingham	11,238	12,683	3,952	3,979	7,286	8,704
Campbell	6,407	6,675	3,401	3,220	3,006	3,455
Charlotte	5,315	6,461	2,725	2,607	2,590	3,854
Cumberland	3,765	4,613	2,173	2,873	1,592	1,740
Franklin	3,638	4,569	926	2,023	2,712	2,546
Halifax	9,261	13,663	5,337	6,871	3,924	6,792
Henry	4,539	5,483	1,931	2,538	2,608	2,945
Lunenburg	9,466	6,546	5,053	2,363	4,413	4,183
Mecklenburg	8,411	8,850	4,846	5,134	3,565	3,716
Nottoway	6,643	4,171	3,812	2,861	2,831	1,310
Patrick	3,162	3,826	617	1,187	2,545	2,639
Pittsylvania	10,014	9,671	5,173	6,084	4,841	3,587
Powhatan	1,298	3,118	549	1,387	749	1,731
Prince Edward	3,677	4,972	1,954	2,399	1,723	2,573
<b>Total</b>	<b>105,993</b>	<b>114,899</b>	<b>49,895</b>	<b>53,749</b>	<b>56,098</b>	<b>61,150</b>

Continued

Welch, Richard L., and Thomas R. Bellamy.

1980. Changes in output of industrial timber products in Virginia, 1976-1978. USDA For. Serv., Resour. Bull. SE-54,21p. Southeast. For. Exp. Stn., Asheville, N.C.

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**KEYWORDS:** Industrial timber products, plant residues, logging residues.

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