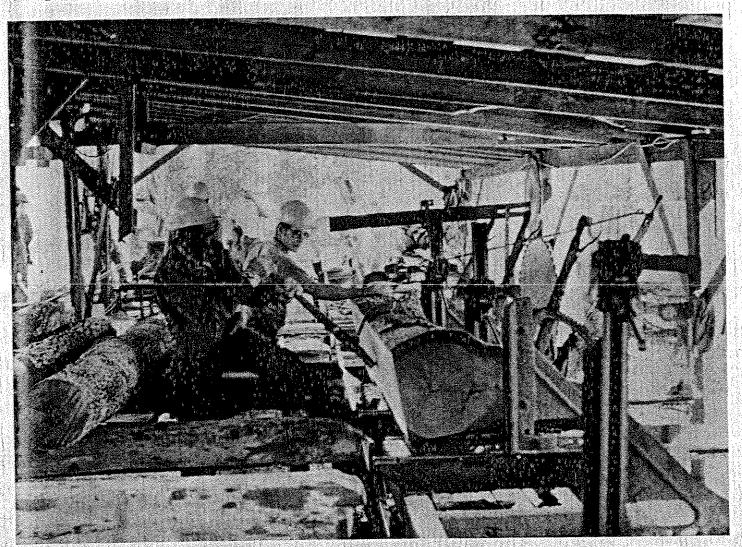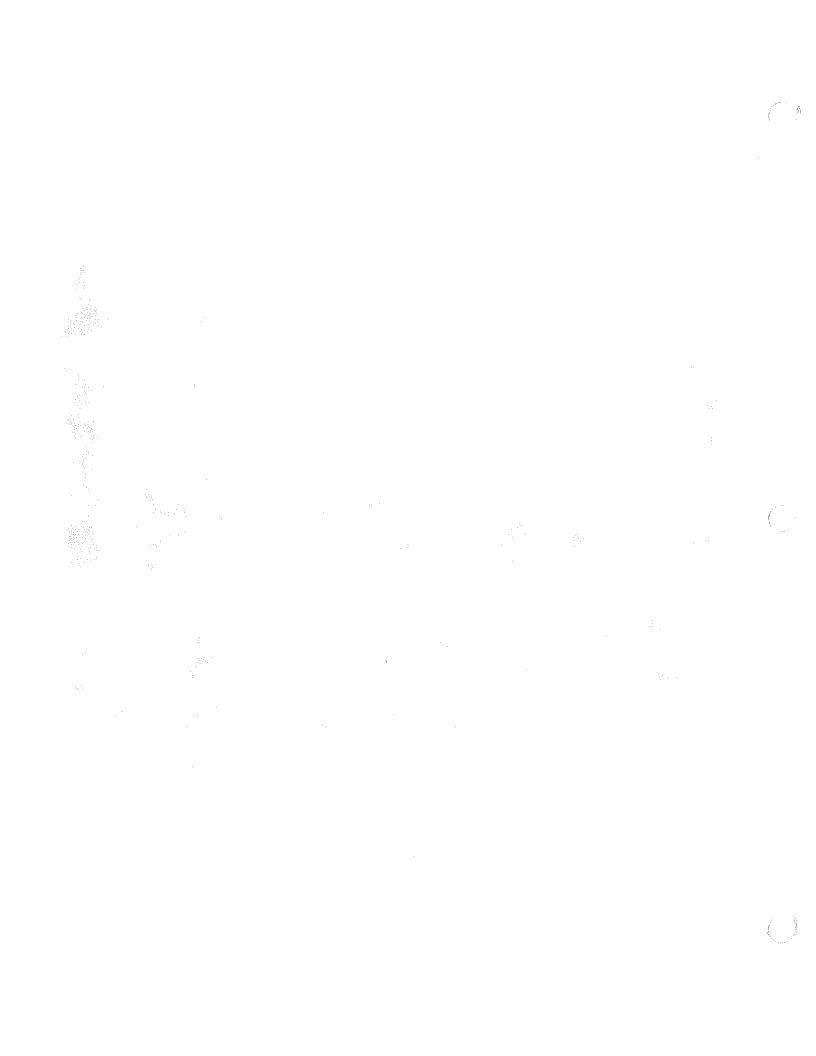# VIRGINIA'S FOREST PRODUCTS INDUSTRY

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VIRGINIA'S FOREST PRODUCTS INDUSTRY

by

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and

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PREFACE

This report presents the results of an economic analysis of Virginia's forest products industry. The report is based on a special survey of wood use by the state's primary wood-using industries in 1976. The survey was a joint effort involving VPI & SU, the U. S. Forest Service, and the Virginia Division of Forestry. Richard Welch and Roger Bellamy of the Southeastern Forest Experiment Station supervised the survey phase of the project. District Foresters of the Virginia Division of Forestry, under the supervision of Elvin Frame, made follow-up visits to all plants that did not respond to either of the two questionnaire mailings. We, the authors of this report, are responsible for the analysis and interpretation of the results.

We wish to take this opportunity to express our sincere appreciation to the members of Virginia's primary forest products industry -- in particular the Lumber Manufacturers Association of Virginia, Inc. -- for their most helpful cooperation. It is our hope that this report will be of use to Virginia's forest products industry and all persons, public and private, concerned with land-use planning in Virginia.

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REPORT HIGHLIGHTS

1. The survey of primary wood-using industries indicated that 486 mills were in operation in Virginia in 1976. These mills produced 528 million cubic feet of timber products, compared to 443 million cubic feet in 1965, an increase of 19 percent. A substantial growth in hardwood pulpwood production accounted for 80 percent of the increase.

2. Pulpwood has surpassed saw logs in total output, but saw logs remain the most important roundwood product in Virginia, accounting for more than 40 percent of total roundwood production. Hardwoods accounted for 58 percent of the saw log output.

3. A substantial increase in the production of softwood chips and residues failed to overcome a 27 percent decline in the production of softwood roundwood, resulting in a 13 percent net decline in softwood pulpwood production.

4. In contrast to softwood, an increase in the production of roundwood as well as chips and residues led to an increase of 40 million cubic feet in hardwood pulpwood production.

5. Plant byproducts accounted for 25 percent of total pulpwood output in 1976, compared to 17 percent in 1965. The majority (86 percent) of these byproducts were coarse residues from sawmills.

6. Virginia is a net importer of primary wood products, importing a balance of over 33 million cubic feet in 1976. Most of these imports (85 percent) are pulpwood, mainly hardwood. Virginia's pulp mills import 27 percent of their pulpwood needs from adjacent states. In turn, about 11 percent of the pulpwood cut in Virginia was exported to mills outside the state.

7. The output of veneer peeler logs was up 48 percent over 1965. All of this increase was attributable to an increase in softwood peeler log production. Hardwood peeler log production declined from 1965, and amounted to less than 3 million cubic feet in 1976.

8. Fuelwood was the State's third leading timber product in terms of volume, with an output of 113 million cubic feet in 1976. This is almost double the 1965 level of 61 million cubic feet. The bulk of the fuelwood (two-thirds) was supplied by hardwoods. Surprisingly, more than half of the total fuelwood output comes from growing stock, mainly hardwood.

9. The survey indicated an improvement in wood utilization. For example, the harvest of 464 million cubic feet of roundwood was achieved by the removal of only 428 million cubic feet of growing stock.

10. Logging residues declined from 75 million cubic feet in 1965 to 47 million cubic feet in 1976; or from about 21 percent of growing stock removals to only 12 percent.

11. Primary wood-using plants generated 19 million cubic feet of unused wood residues in 1976, compared to about 50 million cubic feet in 1965. Almost 80 percent of all wood residues generated were subsequently used, compared to less than 50 percent in 1965.

12. Fine material such as sawdust and shavings accounted for about two-thirds of the unused wood residues. Nearly 80 percent of the bark residue was used, mainly as industrial fuel.

13. Fourteen percent of the total growing stock removed from the forest inventory was for land clearing, and other non-timber purposes.

INTRODUCTION

For a number of reasons, surveys of wood use in Virginia have not been made in the past. In the absence of reliable information on wood use, it has been difficult to relate the Virginia forest survey information to wood use by the state's forest products industry. The lack of data on wood use also has inhibited regional analyses of trends in wood use. For example, the growing importance of the interstate movement of roundwood and chips in the Southeast United States is generally recognized, but without wood use data for Virginia, it has not been possible to make a regional analysis of the net wood balance.

A relatively new need for information on the pattern of wood use in Virginia has been created by the growing demand for non-timber uses of Virginia's forests and the increasing environmental restrictions on timber harvesting and wood processing activity. The competition for the state's forest resources has made it desirable to have information concerning the contribution of the forest industry to lcoal economies.

The present report presents the results of the first survey made in recent eyars of wood use by Virginia's primary forest products industry. The survey procedure and questionnaire format were designed to ensure that the information collected would be fully compatible with industry surveys conducted in the other southeastern states. The survey was timed to coincide with the most recent Virginia forest survey, ensuring comparability of our data with the forest survey data and, at the same time, providing a cross-check on the timber removal data collected by the forest survey. The wood use data is for the year 1976. The possibility that 1976 may or may not have been a typical year for Virginia's forest products industries must be kept in mind when interpreting the data in this report.

For the purposes of this study, the forest products industry is defined as primary wood-using plants, consisting of lumber and wood products (SIC 241, 242, 243, 244 and 249) and paper and allied products (SIC 26); and secondary wood-using plants consisting of wood furniture and fixtures (SIC 2511, 2512, 2521, 2531 and 2541). Excluded are wood buildings and mobile homes (SIC 245) and metal furniture and fixtures (SIC 2514, 2515, 2522, 2542, 2591, 2599).

VIRGINIA'S FOREST PRODUCTS INDUSTRY[1]

Economic Importance

The forest products industry is the largest manufacturing industry

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[1]The basic source of information presented in this section on value added and employment is the Census of Manufacturers for the years 1954 and 1972, published by the U.S. Department of Commerce. Information on employment for other years has been supplied by the Virginia Department of Labor and Industry (1).

in Virginia, whether measured in terms of value added[1] or employment. In 1976 Virginia's forest products industry contributed an estimated $1.3 billion, or 13 percent of total value added by manufacturing. The industry is composed of approximately 1,500 firms employing more than 60,000 workers, to provide one out of every six manufacturing jobs in Virginia.

Although Virginia's forest products industry ranks rather low (12th) nationally, some segments of the state's industry rank among the top. For example, Virginia's wood household furniture industry is second only to North Carolina and accounts for 15 percent of total U. S. value added by the industry. Virginia also ranks high in the production of wood pallets and paperboard.

On a regional basis, Virginia ranks third behind North Carolina and Georgia and accounts for nine percent of total value added by the forest products industry in the South, as shown below by Table 1.

Table 1. Value added in the Manufacture of Forest Products in the South, 1972

(millions of dollars)

State	Lumber and Wood Products	Furniture and Fixtures	Paper and Allied Products	All Forest Products Amount	% of Total
North Carolina	$ 367	$ 831	$ 319	$1,518	16
Georgia	368	125	601	1,094	11
Virginia	275	342	302	918	9
Texas	370	198	342	910	9
Alabama	342	78	472	892	9
Other Southern States	1,587	865	1,976	4,427	46
Total South	$3,309	$2,439	$4,012	$9,759	100

U.S. Dept. of Commerce. 1972 Census of Manufacturers. Bureau of Census, Wash.D.C.

Trends in Employment, Output, and Productivity

The relative importance of the forest products industry in terms of employment and value added has been declining since the early fifties. In 1972, the forest products industry accounted for 17 percent of total manufacturing employment, compared with 22 percent in 1954. The corresponding figures for value added were 15 and 18 percent, respectively. During the

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[1]Value added represents the value of production above the cost of raw materials and is, perhaps, the best practical measure of the economic importance of an industry.

period 1955 to 1976, employment in the forest products industry remained
virtually unchanged, whereas total manufacturing employment increased at
an average rate of almost 2 percent annually.

After adjusting for inflation, value added by Virginia's forest
products industry increased at a rate of 5 percent annually. Based
on this real rate of growth in value added and a 1 percent annual
growth in employment, labor productivity, measured in terms of real value
added per production worker, increased from $6,732 per worker in 1954
to $14,013 per worker in 1972, or a rate of 4 percent annually.

Lumber and Wood Products Industry

The lumber and wood products industry is one of the few industries
in Virginia to experience a decline in employment in recent years. From
a position of primary importance during the first decades of this century,
employment in the lumber industry had slipped to third place by 1955,
and by 1976, industry employment had fallen to eighth place. Lumber and
wood products employment currently accounts for only about 5 percent
of all manufacturing jobs, compared with 10 percent in 1965. In absolute
terms, the industry lost about 5,000 jobs from 1955 to 1976.

Employment in the lumber industry is characterized by a strong
seasonal cycle (Figure 1). Not only is seasonality significantly more
pronounced in the lumber industry, compared with other forest products
industries, but also, the cycle is in almost complete opposition to the
other industries. This peculiar seasonal pattern of employment reflects
the sensitivity of employment in this industry to weather conditions and
the seasonal nature of the housing industry, the major market of lumber.

In contrast to the decline in employment, value added in the manu-
facturing of lumber and wood products increased from $73 million in 1954
to $237 million in 1972, or 7 percent annually. Value added per employee,
adjusted for inflation, increased at a rate of 5 percent annually, from
$3,733 in 1954 to $9,663 in 1972.

The average annual hourly wage in the lumber and wood products
industry in 1976 was $3.38. This was about 75 percent of the average
wage for all manufacturing in Virginia and about 72 percent of the
national average for the lumber and wood products industry. Wage rates
in the industry have increased about 8 percent annually since 1970.

Furniture and Fixtures Industry

The furniture industry is one of the most rapidly growing industries
in Virginia. The major product is wood household furniture. Employment
in this industry increased by almost ten thousand jobs during the period
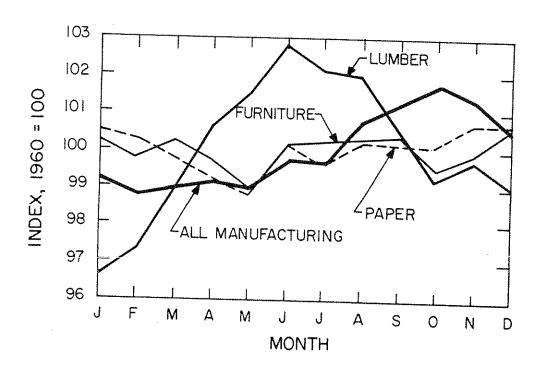1955 to 1976. Most of this increase was attributable to the expansion of

Figure 1. Seasonal Index of Employment in Virginia's Forest
Products Industries, Compared with the Index of All
Manufacturing, Based Upon the Years 1960 to 1976.

relatively large, assembly-line type of plants. Value added in the manufacture of furniture increased from $62 million in 1954 to $270 million in 1972, an average growth rate of 7 percent annually. Output per employee increased from $7,189 in 1954 to $11,735 in 1972 -- about 3 percent annually.

In 1976, the average wage rate in the furniture industry was $3.15 per hour, the lowest for the forest products industry, and only 73 percent of the average for all manufacturing in the state of Virginia. The industry faired better, however, when compared at the national level (80 percent of the national industry average) where wage rates are notably lower in the furniture industry than in other segments of the forest products industry. This helps to explain Virginia's apparent advantage in furniture production.

Furniture is a household durable, and the seasonal pattern of production and employment in the industry reflects the seasonality of consumer's pruchases of durable goods (Figure 1). The Christmas holiday season tends to be the peak period for furniture employment and reflects the heavy consumer buying during that period.

Paper and Allied Products Industry

Virginia's pulp and paper industry is strongly oriented toward the production of paperboard which accounts for about 44 percent of the total value of production by the state's paper and allied products industry. Paper manufacturing accounted for only 3.5 percent of all employment in manufacturing in Virginia in 1976, making the paper industry a relatively minor source of jobs. During the period 1955 to 1976, the paper industry gained only about three thousand jobs, reflecting an annual growth of only 1 percent.

In contrast to the minor importance of the paper industry as a source of employment, the contribution of the industry to state gross product, as measured by value added, is much more significant and accounted for about 5 percent of all valued added by manufacture in Virginia in 1972. Value added through the manufacture of paper and allied products increased from $102 million in 1954 to $304 million in 1972, or an average rate increase of 6 percent annually.

The average hourly wage in the paper and allied products industry in 1976 was $5.34. The wage rate in the paper industry has had the most rapid growth among all the forest industries, increasing at an annual rate of nine percent since 1970. The average rate in 1976 was 24 percent above the average of $4.30 for all manufacturing in Virginia and about equal to the national average for the paper and allied products industry. Only Virginia's chemical and primary metal industries exceeded the paper industry in wage rate, and only the tobacco industry has exhibited a more rapid increase in its wages during the past decade (4).

There were 485 primary forest products plants producing wood products in Virginia in 1976. The bulk of these plants were sawmills. A substantial portion of the sawmills produce less than 1 million board feet annually (Table 2). The number of operating sawmills has declined substantially -- from 870 in 1965 to 452 in 1976. About half of all wood-using plants are located in the Coastal Plains and Southern Piedmont regions.

Production of Timber Products

Virginia's forests produced 528 million cubic feet of timber products in 1976, compared with 443 million cubic feet in 1965 (Table 3). Production was about evenly divided between saw logs and pulpwood and between softwoods and hardwoods. This was in contrast to the situation in 1965 when softwoods and saw logs dominated production. An increase of 40 million cubic feet in hardwood pulpwood production accounted for the bulk of the total increase in output of industrial wood products in 1976. In contrast to the increase in hardwood production, the output of industrial softwood products, especially pulpwood, declined by almost 7 million cubic feet. About 12 percent of the total output of wood products came from plant by-products.

Pulpwood output was 199 million cubic feet in 1976, compared with 173 million cubic feet in 1965 and was Virginia's major timber product in terms of volume. The breakdown of pulpwood production between softwood and hardwood has changed markedly in recent years, with softwood declining from two-thirds of total pulpwood production in 1965 to about half of the total in 1976.

Almost 113 million cubic feet of timber were used for fuelwood in 1976, an increase of 84 percent over the 61 million cubic feet used in 1965 (Table 3). Fuelwood accounted for 21 percent of the total wood output in 1976, compared with 14 percent in 1965.

Sources of Roundwood

Removals from growing stock accounted for about three-fourths of the total volume of roundwood output in 1976 (Figure 2). Other roundwood sources, mainly cull and dead trees, amounted to 16 percent, and plant by-products contributed the remaining 12 percent. Forty-two percent of total softwood removals and 35 percent of total hardwood removals were for saw logs and veneer logs (Figure 3). Pulpwood accounted for 30 percent of total softwood removals and 20 percent of total hardwood removals. Non-industrial uses accounted for 27 percent of total softwood removals and 44 percent of total hardwood removals.

Table 2. Location of Primary Forest Products Plants in Virginia, by Kind of Product and Region, 1976

(number of plants)

Kind of product	Forest Survey Unit[1]					
	Coastal Plains	Southern Piedmont	Northern Piedmont	Northern Mountain	Southern Mountain	All Virginia
Sawmills	92	128	97	48	86	451
> 1 mm/year	84	70	48	20	30	252
< 1 mm/year	8	58	49	28	56	199
Veneer & Plywood	3	4	1	1	1	10
Hardwood	2	4	1	1	1	9
Softwood	1	-	-	-	-	1
Pulp	5	2	1	1	-	9
Treating	5	-	4	-	-	9
Other	2	1	1	2	-	6
Total, all products	107	135	104	52	87	485

[1] See Appendix I for a map of forest survey units.

Table 3. Output of Timber Products in Virginia, by Product,
Softwood and Hardwood, 1965 and 1976

(thousand cubic feet)

Product and species	Year		Change 1965-1976	
	1965 [1]	1976	Volume	Percent
All products	442,558	527,773	85,215	19
Softwood	226,853	239,640	12,787	6
Hardwood	215,705	288,133	72,428	34
Industrial products	381,460	415,231	33,771	9
Softwood	206,273	199,600	- 6,673	- 3
Hardwood	175,187	215,631	40,444	23
Saw logs	181,724	193,764	12,040	7
Softwood	82,300	84,629	2,329	3
Hardwood	99,424	109,135	9,711	10
Veneer logs	7,431	10,966	3,535	48
Softwood	217	8,273	8,056	3,812
Hardwood	7,214	2,693	- 4,521	-63
Pulpwood	173,236	198,771	25,535	15
Softwood	114,265	99,827	-14,438	-13
Hardwood	58,971	98,944	39,973	68
Other	19,069	11,730	- 7,339	38
Softwood	9,491	6,871	- 2,620	-28
Hardwood	9,578	4,859	- 4,719	-49
Non-industrial products	61,098 [2]	112,542 [3]	51,444	84
Fuelwood	61,098	112,542	51,444	84
Softwood	20,580	40,040	19,460	95
Hardwood	40,518	72,502	31,984	79

[1] U.S. Department of Agriculture, Forest Service. Virginia's Timber, 1966. Page 33. (3)

[2] Includes plant by-products used for industrial and domestic fuel.

[3] Excludes plant by-products used for industrial fuel.

PLANT BY-PRODUCTS

12%

CULL AND
DEAD TREES

16%

GROWING
STOCK

72%

Figure 2. Major Sources of Timber Products, Virginia,
1976.

SOFTWOOD

LOGGING RESIDUES

OTHER
10%

6%

FUELWOOD
11%

SAW LOGS
&
VENEER LOGS

42%

MISCELLANEOUS
ROUNDWOOD
(2%)

PULPWOOD
30%

HARDWOOD

OTHER
17%

LOGGING
RESIDUES
12%

FUELWOOD
15%

SAW LOGS
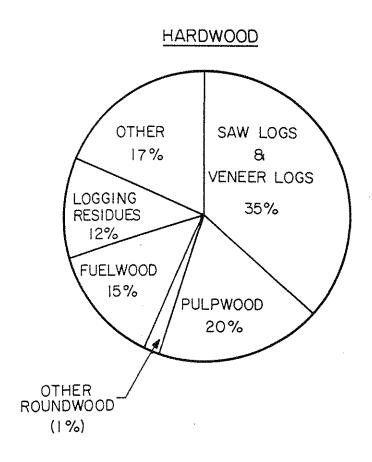&
VENEER LOGS

35%

PULPWOOD
20%

OTHER
ROUNDWOOD
(1%)

Figure 3.   Removals from Growing Stock, by Major Item, Virginia,
1976.

Although the total output of industrial products increased by 9 percent from 1965 to 1976, the output from growing stock decreased by 2 percent (Table 4). This was a reversal of the 1956-65 trend when total output declined and the cut from growing stock increased. The reversal of the earlier trend probably can be attributed to a greater use of mill residues and whole-tree chips for pulpwood.

The volume of growing stock removals for fuelwood in 1976 compared with 1965 showed a 65 percent increase for softwoods and an 83 percent increase for hardwoods. Softwood fuelwood production increasingly is coming from non-growing stock sources, whereas hardwood fuelwood is being cut mainly from growing stock.

Location of Production

Considering all products together, the Coastal Plain and Southern Piedmont regions produced almost three-fourths of the total output of timber products in Virginia in 1976 (Figure 4). Only modest amounts of wood came from the western part of the state.

Sixty-seven percent of all softwood saw log production was in the Coastal Plain region (Table 5). Together with the Southern Piedmont, these two regions accounted for 87 percent of total softwood saw log production and over half of total hardwood saw log production.

The Southern Piedmont was the major softwood pulpwood producing region, accounting for almost half of the state's total softwood pulpwood production; the Coastal Plains account for 33 percent. In 1976, the Coastal Plain and Southern Piedmont together contributed 79 percent of total softwood pulpwood production and 68 percent of total hardwood pulpwood production Only a modest volume of veneer logs was produced in Virginia, and the bulk of this production came from the southeastern corner of the state and from three counties in the extreme northern tip.

Trade with Neighboring States

Virginia is a net importer of roundwood. In 1976, the state imported 67 million cubic feet of roundwood and exported 34 million cubic feet, leaving the state with a net trade deficit of 33 million cubic feet (Table 6). Softwoods made up 56 percent of total net imports and hardwoods, 44 percent.

Virginia's forests fail to supply about 9 percent of the state's annual wood consumption. The breakdown of net imports as a percent age of consumption by major product and species group is as follows:

All species	All Products	Saw logs, veneer logs and misc. products	Pulpwood
	9%	2%	21%
Softwoods	11%	11%	12%
Hardwoods	7%	5%[1]	28%

Plant Residues

Virginia's primary wood-using industries produced an estimated 92 million cubic feet of wood residues in 1976 (Table 7). This represents a slight reduction from 94 million cubic feet in 1965. Virtually all of the wood residues originated from sawmills.

The major use of coarse wood residues was for fiber products (Table 8). Fine residues were used primarily for industrial and domestic fuel, and the bulk of bark residue was consumed as industrial fuel. About 61 percent of all bark residues, 50 percent of all coarse residues, and 58 percent of all fine residues came from hardwoods.

An estimated 19 million cubic feet, or 21 percent, of wood residue went unused (Table 9). This was a substantial improvement over the utilization rate in 1965, when 50 million cubic feet went unutilized. The bulk of the unused residue, 14 million cubic feet, was sawdust and shavings, for which there were limited markets. Over half of the total residue produced in 1976 originated in the Coastal Plain (Table 10). The Southern Piedmont produced 19 percent, the Northern Piedmont produced 13 percent, and the two mountains regions together produced the remaining 16 percent.

The location of unused wood residue was as follows:

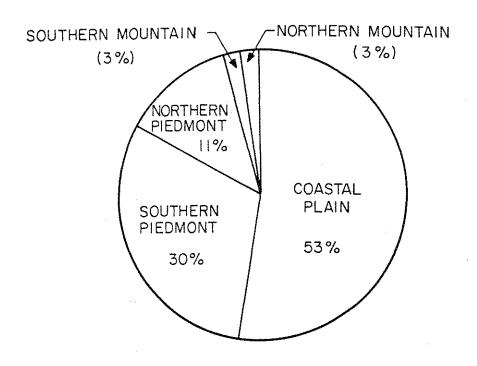| Region	Location of Unused Residue (percent of total)	
	Coarse	Fine
Coastal Plain	20	32
Southern Piedmont	26	24
Northern Piedmont	28	19
Northern Mountain	1	6
Southern Mountain	25	19
Total	100	100

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[1]Percent of net exports.

Table 4. Output of Roundwood Products from Growing Stock in
Virginia, by Product, Softwood and Hardwood,
1965 and 1976

Product and species	(thousand cubic feet)			
	Year		Change 1965-1976	
	1965[1]	1976	Volume	Percent
All products	358,178	380,876	22,698	6
Softwood	185,166	173,449	-11,717	- 6
Hardwood	173,012	207,427	34,415	20
Industrial products	320,612	314,474	- 6,138	- 2
Softwood	171,609	151,030	-20,579	-12
Hardwood	149,003	163,444	14,441	10
Saw logs	168,990	177,776	8,786	5
Softwood	78,576	77,746	- 830	- 1
Hardwood	90,414	100,030	9,616	11
Veneer logs	6,950	10,547	3,597	52
Softwood	211	8,118	7,907	3,847
Hardwood	6,739	2,429	- 4,310	-64
Pulpwood	128,283	120,504	- 7,779	6
Softwood	84,940	62,291	-22,649	-27
Hardwood	43,343	58,213	14,870	34
Other	16,389	5,647	-10,742	-66
Softwood	7,882	2,875	- 5,007	-64
Hardwood	8,507	2,772	- 5,735	-67
Non-industrial products	37,566	66,402	28,836	77
Fuelwood	37,566	66,402	28,836	77
Softwood	13,557	22,419	8,862	65
Hardwood	24,009	43,983	19,974	83

[1]U.S. Department of Agriculture, Forest Service. Virginia's
Timber, 1966. Page 34.(3).

SOFTWOOD

SOUTHERN MOUNTAIN ⎯ ⎯NORTHERN MOUNTAIN
(3%)　　　　　　　　　　(3%)

NORTHERN
PIEDMONT
11%

SOUTHERN
PIEDMONT

30%

COASTAL
PLAIN

53%

HARDWOOD

⎯NORTHERN MOUNTAIN

SOUTHERN
MOUNTAIN

11%

11%

COASTAL
PLAIN

32%

NORTHERN
PIEDMONT
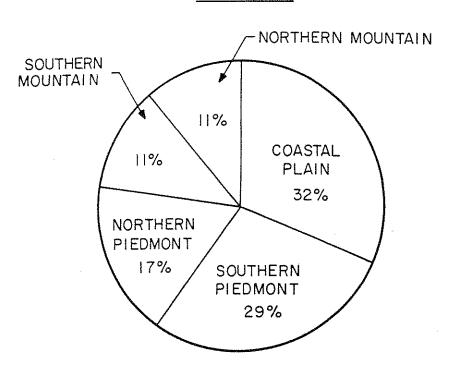
17%

SOUTHERN
PIEDMONT

29%

Figure 4.　Distribution of Output of Timber Products, by Species
Group and Region, Virginia, 1976.

Table 5. Timber Production in Virginia, by Product and Region, 1976

(thousand cubic feet)

Regions and species	All products	Saw logs	Veneer logs	Pulpwood	Misc.
All regions	337,000	189,286	10,966	129,881	6,867
Softwood	151,621	80,157	8,273	59,273	3,918
Hardwood	185,379	109,129	2,693	70,608	2,949
Coastal Plain	140,238	91,311	6,020	40,552	2,355
Softwood	80,265	53,644	5,190	19,418	2,013
Hardwood	59,973	37,667	830	21,134	342
Southern Piedmont	99,963	39,707	2,154	54,071	4,030
Softwood	46,014	15,937	1,246	27,149	1,681
Hardwood	53,949	23,770	908	26,922	2,349
Northern Piedmont	47,665	27,089	2,131	18,165	280
Softwood	16,606	5,239	1,835	9,333	199
Hardwood	31,059	21,850	296	8,832	81
Northern Mountain	24,297	10,202	121	13,926	48
Softwood	4,075	822	0	3,253	0
Hardwood	20,222	9,380	121	10,673	48
Southern Mountain	24,838	20,977	540	3,167	154
Softwood	4,662	4,515	2	120	25
Hardwood	20,176	16,462	538	3,047	129

Table 6. Virginia's Trade Balance in Wood Products, 1976

(thousand cubic feet)

Species and direction of trade	All products	Saw logs, veneer logs, and misc. roundwood	Pulpwood
All species			
Exports	33,711	19,251	14,460
Imports	67,037	24,464	42,573
Balance	-33,326	- 5,213	-28,113
Softwood			
Exports	19,167	8,542	10,625
Imports	37,869	19,478	18,391
Balance	-18,702	-10,936	- 7,766
Hardwood			
Exports	14,544	10,709	3,835
Imports	29,168	4,986	24,182
Balance	-14,624	+ 5,723	-20,347

Table 7. Residues Produced by Primary Wood-Using Plants, Virginia, 1976

			Wood	
Source	All kinds of residues	Bark	Coarse	Fine
	(thousand cubic feet)			
Saw logs	100,928	15,000	53,524	32,404
Veneer	7,402	1,320	5,080	1,002
Pulpwood	17,155	17,155	-	-
Other	1,217	886	264	67
Total	126,702	34,361	58,868	33,473

Table 8. Disposition of Residues from Primary Wood-Using Plants, by Major Use, Virginia 1976

(thousand cubic feet)				
Use of residues	Total residues	Bark	Wood	
			Coarse	Fine
Fiber products	50,203	369	42,701	7,134
Particle board	4,304	0	721	3,583
Charcoal	705	148	290	267
Sawn products	4,478	0	4,478	0
Industrial fuel	28,498	21,250	812	6,437
Domestic fuel	6,432	1,397	6,035	0
Miscellaneous	5,892	3,911	11	1,970
Not used	26,189	7,287	4,821	14,081
Total	126,701	34,361	58,868	33,472

Table 9. Volume of Unused Residues at Primary Wood-Using
Plants by Industry and Type of Residue, Soft-
wood and Hardwood,

(thousand cubic feet)

Species group and type of residue	All industries	Lumber	Veneer and plywood	Other
Softwood	5,541	5,515	--	26
Coarse[1]	1,516	1,490	--	26
Fine[2]	4,025	4,025	--	--
Hardwoods	13,361	13,204	51	106
Coarse[1]	3,305	3,236	8	61
Fine[2]	10,056	9,968	43	45
All species	18,902	18,719	51	132
Coarse[1]	4,821	4,726	8	87
Fine[2]	14,081	13,993	43	45

[1]Material such as slabs, edgings and veneer cores.

[2]Material such as sawdust, shavings and veneer clippings.

Table 10. Disposal of Residue at Primary Wood-Using Plants
by Region and Kind of Residue, Virginia, 1976

(thousand cubic feet)

Region	Total residues	Wood			
		Total	Coarse	Fine	Bark
Coastal Plain	67,497	48,359	32,735	15,624	19,138
Used	59,417	42,836	31,785	11,051	16,581
Not used	8,080	5,523	950	4,573	2,557
Southern Piedmont	23,356	17,833	10,542	7,291	5,523
Used	16,875	13,288	9,307	3,981	3,587
Not used	6,481	4,545	1,235	3,310	1,936
Northern Piedmont	15,416	11,974	7,270	4,704	3,442
Used	9,861	7,880	5,853	2,027	1,981
Not used	5,555	4,094	1,417	2,677	1,461
Northern Mountain	9,842	5,346	3,156	2,190	4,496
Used	8,901	4,513	3,119	1,394	4,388
Not used	941	833	37	796	108
Southern Mountain	10,592	8,829	5,165	3,664	1,763
Used	5,460	4,923	3,983	940	537
Not used	5,132	3,906	1,182	2,724	1,276

HISTORIC TRENDS IN WOOD PRODUCTION
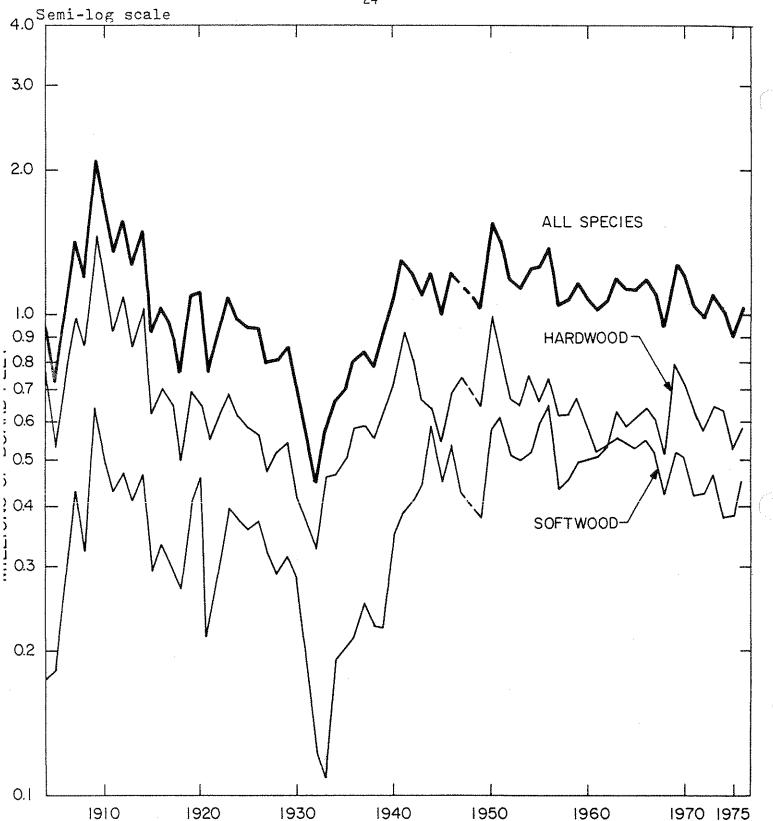
Lumber Production: 1869 to 1976[1]

Lumber production in Virginia increased rapidly during the first decade of the present century, reaching a peak of more than 2 billion board feet in 1909 (Figure 5). Softwood accounted for over two-thirds of total production. Following 1909, production declined almost as rapidly as it had increased, hitting a low of 450 million board feet in 1932. Production began to recover in 1933, thereafter growing at an annual rate of 12.4 percent until it reached a peak of 1.3 billion board feet in 1941. Production then fluctuated around 1.2 billion board feet until 1950, when it reached its all-time high of 1.6 billion board feet. Since 1950, lumber production has declined at a rather steady rate to only slightly more than one billion board feet in 1976.

Virginia has been progressively losing its share of the Nation's lumber market since World War II. In 1961, lumber production at the national level began to slowly recover from a long-term downward trend, but production in Virginia continued to decline. The decline in lumber production in Virginia was due entirely to a decline in softwood lumber production. Hardwood lumber production more or less held its own during this period, and increased its share of production from 37 percent of the total in 1950, to 56 percent in 1976. Hardwood lumber production has exceeded softwood production in Virginia since 1962.

Pulpwood Production 1920 to 1976

In contrast to the long-term decline in lumber production, pulpwood production in Virginia increased at a relatively steady rate of 6 percent annually during the period 1920 to 1965, growing from about 167,000 cords in 1920 to 2.4 million cords in 1965 (Figure 6). Since 1965, production has more or less stabilized at 2.4 million cords annually. During the earlier period 1920 to 1965, national pulpwood consumption expanded at a rate of only 4 percent annually, indicating Virginia was increasing its share of the national market. Virginia's share of the national market reached its peak of 4 percent in 1965. Since 1965, national pulpwood consumption has continued its long-term rate of expansion, whereas Virginia pulpwood production has stabilized, leading to
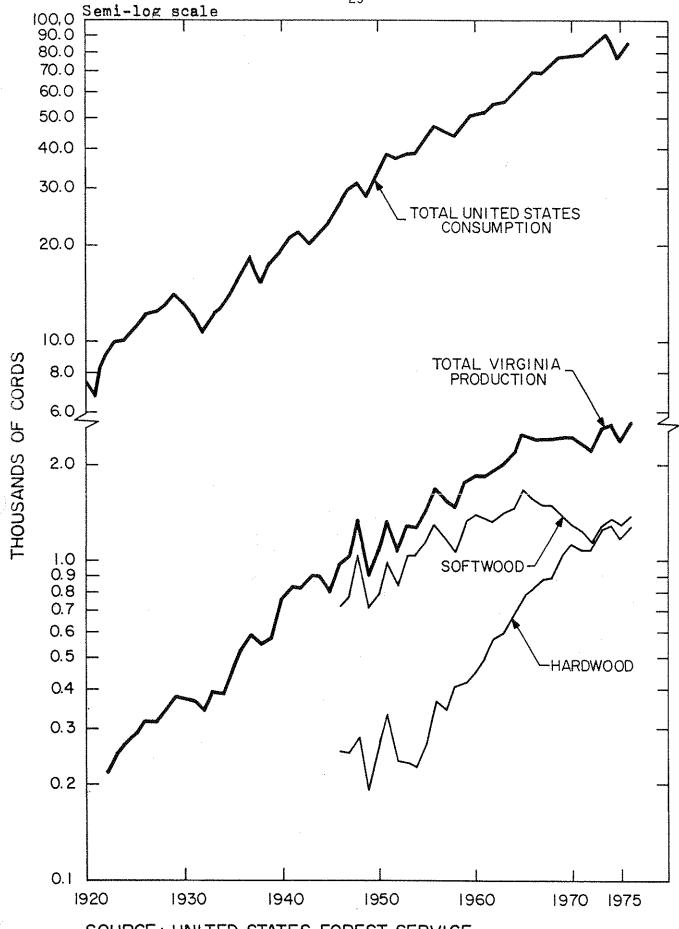
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[1] Information on the historical production of primary forest products in Virginia is scarce and the little data that are available are of questionable accuracy. The two major products are lumber and pulpwood. The Virginia Division of Forestry has compiled historical production series for these two primary products, pieced together from various sources. The following discussion is based on these data.

Semi-log scale

SOURCE: DATA COMPILED BY THE VIRGINIA DIVISION OF FORESTRY FROM
VARIOUS UNITED STATES BUREAU OF THE CENSUS REPORTS AND
THE VIRGINIA FOREST PRODUCTS TAX.

Figure 5. Lumber Production in Virginia, 1905 to 1976.

Figure 6.   Pulpwood Production in Virginia, 1920 to 1976.

a decline in Virginia's share of the national market to 2.6 percent by 1975.

Hardwoods have been steadily replacing pine as the primary roundwood pulpwood species in Virginia. Pien pulpwood production began to decline sharply from an all-time high of 1.4 million cords in 1965 to only half that amount, or 722,000 cords, in 1975. Hardwood production, on the other hand, has maintained a steady growth from 225,000 cords in 1954 to 900,000 million cords in 1970. Hardwood production has grown more slowly since 1970 and reached an all-time high of 934,000 cords in 1973.

Non-roundwood sources of pulp have increased substantially since 1960, supplementing the traditional reliance on roundwood (Figure 7). By 1975, chips and mill residues made up almost 40 percent of total pulpwood production in Virginia. During this same period, production from roundwood declined from 2.1 million cords in 1965 to 1.4 million cords in 1975. The growing supply of pine chips and residues failed to offset the strong downward trend in softwood roundwood production, and total softwood pulpwood production has declined since 1965 (Figure 8). In the case of hardwoods, the expanding production of chips and residues supplemented a steadily growing production in roundwood (Figure 9).

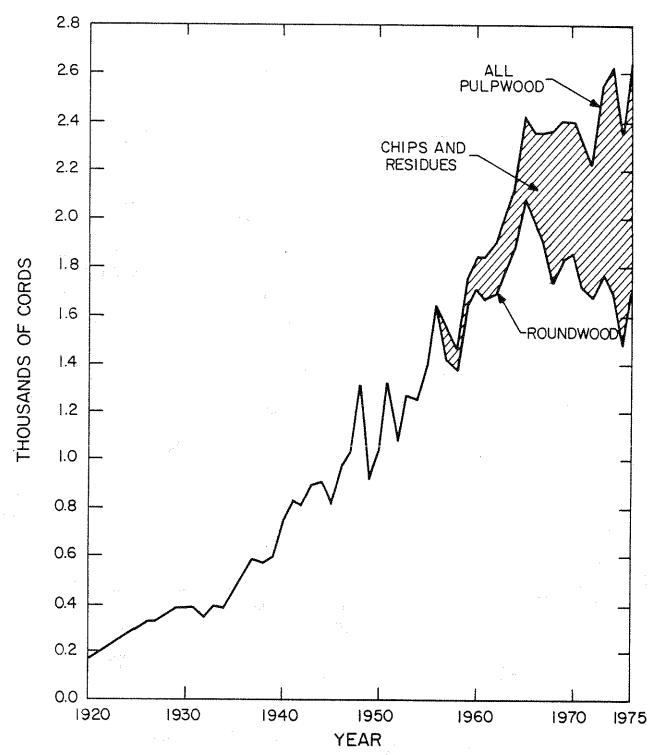## THE IMPORTANCE OF THE FOREST INDUSTRY TO LOCAL COMMUNITIES

Background

There is a growing interest in the contribution of the forest products industry to the economic well-being of local communities. This interest is attributable to the growing number of environmental restrictions on the harvesting and processing of forest products and to the high level of unemployment in many rural areas. The forest industry often represents one of the few employment opportunities in the small rural community. The creation of 22 regional planning districts in Virginia responsible for the preparation of comprehensive regional land-use plans is another reason to develop measures of the contribution of the forest products sector to local communities.
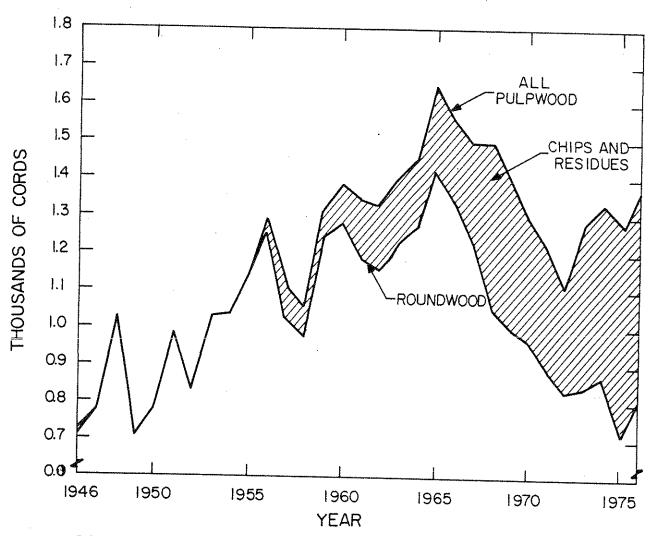
Local Dependence

A small economy, such as a county or group of counties, typically derives its economic livelihood from the production of goods and services for "export" to markets outside the immediate area. The local market generally is too limited to absorb more than a small part of total output. For example, the lumber industry typically sells only a small amount of its total output to local customers. Most of its output is exported to external markets.

Total employment in a small economy can be divided into base employment devoted to the production of goods and services for external
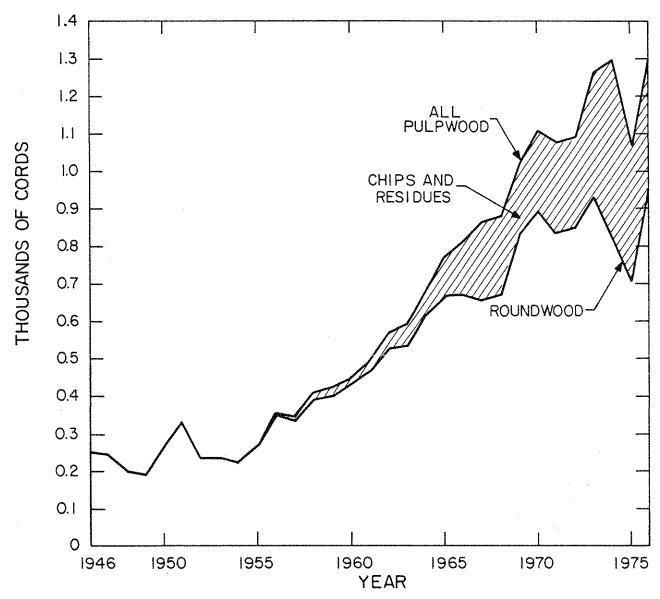
SOURCE: U.S.D.A. FOREST SERVICE, COMPILED BY VIRGINIA
DIVISION OF FORESTRY.

Figure 7.   Roundwood and Chips and Residue Production in Virginia, 1920
            to 1976.

SOURCE: UNITED STATES FOREST SERVICE, COMPILED BY
VIRGINIA DIVISION OF FORESTRY.

Figure 8. Softwood Roundwood and Chips and Residue Production in
Virginia, 1946 to 1976.

SOURCE: UNITED STATES FOREST SERVICE COMPILED BY VIRGINIA DIVISION OF FORESTRY.

Figure 9. Hardwood Roundwood and Chips and Residues Production in Virginia, 1946 to 1976.

markets and local employment devoted to the production of goods and
services for the local market. Base employment is the driving force
of the economy ; local employment is dependent upon the economic
activity generated by base employment. A change in base employment
will induce a change in local employment; thus, the total change in
area employment will be a multiple of the initial change in base
employment.

Because of the importance of base employment as a generator of
economic activity and employment in the community, the percentage of
total employment devoted to production for external markets represented
by the forest products industry is a useful indicator of the dependence of the
economy on the forest products industry. This ratio, called the
"dependency ratio," was as follows for each region in Virginia in 1970:

Region	Forest products industry employment expressed as percent of total base employment
Southern Piedmont	24.2
Southern Mountain	8.5
Northern Mountain	4.7
Coastal Plain	1.1
Northern Piedmont	negligible

About one-fourth of the economic base of the Southern Piedmont is
provided by the forest products industry. Any change in the level of
employment in the forest products industry in this region would have
a significant impact on the local economy. The relatively minor
dependence of the coastal plains region on the forest products industry
is, at first glance, surprising. The explanation is that although the
forest products industry is concentrated in this region, so are many
other industries, and the relative importance of the forest products
industry is not particularly large. In contrast, in the Southern
Piedmont the forest industry is the dominant source of employment.
Forest products dependency ratios for each planning district in Virginia
are shown in Table 11, and for each county, in Appendix IX.

Intra-state Movement of Roundwood

Roundwood cannot be shipped long distances because of the high
transportation costs. Thus, there tends to be a fairly close relation-
ship between the output of timber products and forest products manu-
facturing at the state level. An increase in forest products manu-
facturing in a state can generally be assumed to imply an increase in

Table 11. Virginia Planning Districts Ranked by Dependence
upon the Forest Products Industry, 1970

Rank	Planning District[1]	Percent of base employment dependent on forest industry employment
1	West Piedmont	33.3
2	Piedmont	22.6
3	Mount Rogers	20.8
4	Southside	16.9
5	Middle Peninsula	14.7
6	Thomas Jefferson	13.4
7	Northern Neck	10.8
8	Central Virginia	10.4
9	Radco	9.0
10	New River Valley	6.9
11	Fifth	5.8
12	Crater	5.7
13	Rappahannock-Rapidan	5.0
14	Central Shenandoah	4.8
15	Lord Fairfax	3.3
16	Accomack-Northampton	0.6
17	Cumberland Plateau	0.6
18	Richmond Regional	--
19	Lenowisco	--
20	Southeastern Virginia	--
21	Peninsula	--
22	Northern Virginia	--

[1]See Appendix II for a map showing the boundaires of
each planning district.

the output of timber products in that state. Similarly, a reduction in timber availability in a state is likely to lead to a reduction in the level of forest products manufacturing in that state.

At the local level, however, the relationship between timber output and forest products manufacturing is weak, at best. In Virginia, a significant amount of roundwood movement occurs among counties and planning districts. For example, four of the twenty-two planning districts obtained about half of their roundwood from other districts in 1976 (Table 12). Fourteen of the planning districts exported one-third or more of their roundwood production to other districts. Detailed information on roundwood trade among planning districts is given in Appendix XII. The implication of a significant movement of roundwood among counties is that a change in timber availability in a given county or area is likely to have an impact on employment beyond the boundaries of the particular area in which the timber is located.

SUMMARY AND CONCLUSIONS

The coastal plain of Virginia lies in the path of the southward expansion of economic activity along the eastern corridor of the United States. This region also includes a substantial portion of Virginia's most valuable softwood forests. The economic expansion of this region has intensified the competition for the region's land, water and labor resources. At the same time, the proximity of the state to major population centers and a growing portion of the population in service-related jobs (2), suggests that the recreation demand for Virginia's hardwood forests is likely to increase substantially in the future. This implies increased pressure on these forests for non-timber uses.

Virginia's forest products industry has been losing markets to the rest of the nation since the midfifties. Whether this decline is related to wood supply factors, such as a decline in the availability of raw material, or to an increase in costs of other inputs, such as labor water and land, is not clear. Most likely, the decline reflects the interaction of both of these factors.

In the face of the growing competition for resources, a critical problem facing Virginia's forest products industry is the possibility of a continued decline in the availability of timber from the coastal plain region. A closely related problem is the question of the growth potential of the industry if it must continue to shift farther westward and depend increasingly upon the hardwood forests for its raw material.

The questions facing Virginia are whether the forest resource will continue its decline as a source of timber supply to the state's forest products industry and whether the growth of the industry will be characterized by a need to import increasing amounts of its raw material needs from nearby states.

Table 12.   Movement of Saw Logs and Veneer Logs Among Planning
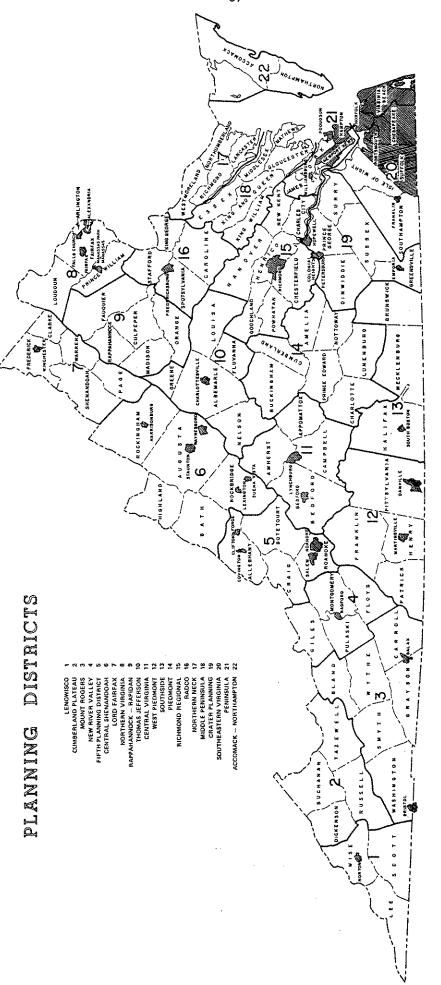Districts in Virginia, 1976

Rank	Planning District	Percent of consumption imported	Percent of production exported
1	Lenowisco	21	8
2	Cumberland and Plateau	29	34
3	Mount Rogers	11	13
4	New River Valley	11	34
5	Fifth	33	54
6	Central Shenandoah	33	19
7	Lord Fairfax	50	3
8	Northern Virginia	0	88
9	Rappahannock-Rapidan	47	39
10	Thomas Jefferson	27	21
11	Central Virginia	32	33
12	West Piedmont	16	15
13	Southside	29	39
14	Piedmont	23	35
15	Richmond Regional	30	37
16	Radco	20	39
17	North Neck	28	2
18	Middle Peninsula	10	29
19	Crater	54	32
20	Southeastern Virginia	53	51
21	Peninsula	29	34
22	Accomack-Northampton	0	0

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2. Department of Labor and Industry. Annual Report, Various Years, 1954 to 1976. Commonwealth of Virginia.

3. Knight, Herbert A. and McClure, J. P. 1967. Virginia's Timber, 1966. USDA Forest Service. Res. Bull. SE-8. Southeastern Forest Experiment Station. Asheville, North Carolina. 47 pp.

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APPENDICES

APPENDIX I

VIRGINIA
FOREST SURVEY UNITS

NORTHERN PIEDMONT

NORTHERN MOUNTAIN

SOUTHERN PIEDMONT

SOUTHERN MOUNTAIN

COASTAL PLAIN

SCALE
0 10 20 30 40 50 60 Miles

Appendix II

PLANNING DISTRICTS

LENOWISCO 1
CUMBERLAND PLATEAU 2
MOUNT ROGERS 3
NEW RIVER VALLEY 4
FIFTH PLANNING DISTRICT 5
CENTRAL SHENANDOAH 6
LORD FAIRFAX 7
NORTHERN VIRGINIA 8
RAPPAHANNOCK – RAPIDAN 9
THOMAS JEFFERSON 10
CENTRAL VIRGINIA 11
WEST PIEDMONT 12
SOUTHSIDE 13
PIEDMONT 14
RICHMOND REGIONAL 15
RADCO 16
NORTHERN NECK 17
MIDDLE PENINSULA 18
CRATER PLANNING 19
SOUTHEASTERN VIRGINIA 20
PENINSULA 21
ACCOMACK – NORTHAMPTON 22

DIVISION OF LOCAL AND REGIONAL PLANNING

Appendix III. Distribution of Sawmills Operating in Virginia, by Size Class and Region, 1976

(number of sawmills)

| Region | Size Class, in million B.F. of Wood Receipts | | | | | |
	Less than 1.0mm	1.0 to 4.9mm	5.0 to 9.9mm	10.0 to 19.9mm	More than 20.0mm	All Mills
Coastal Plain	8	59	13	9	3	92
Southern Piedmont	58	64	5	1	-	128
Northern Piedmont	49	45	3	-	-	97
Northern Mountain	28	16	4	-	-	48
Southern Mountain	56	24	4	2	-	86
State Total	199	208	29	12	3	451

Appendix IV. Output of Softwood Timber Products in Virginia, by County and Product, 1976

(thousand cubic feet)

County	All Products[1]	Saw Logs	Veneer Logs	Pulpwood[1]	Other[2]
Accomack	1643	670	0	743	230
Albemarle	1473	580	0	889	4
Alleghany	293	95	0	198	0
Amelia	3508	1446	374	1688	0
Amherst	926	274	0	652	0
Appomattox	2900	354	0	2546	0
Arlington	47	47	0	0	0
Augusta	572	166	0	406	0
Bath	421	80	0	341	0
Bedford	1038	343	0	693	0
Bland	399	374	0	0	25
Botetourt	378	4	0	374	0
Brunswick	8848	4033	624	4191	0
Buchanan	216	205	0	11	0
Buckingham	3952	439	0	3463	50
Campbell	3401	688	0	2713	0
Caroline	3599	2350	0	1172	77
Carroll	1114	1114	0	0	0
Charles City	1728	869	0	859	0
Charlotte	2725	646	0	1921	158
Chesapeake	2348	881	446	881	140
Chesterfield	7071	5322	249	1500	0
Clarke	0	0	0	0	0
Craig	308	96	0	212	0
Culpeper	254	47	0	207	0
Cumberland	2173	204	0	1881	88
Dickenson	11	11	0	0	0
Dinwiddie	6008	3303	624	2081	0
Essex	2011	1132	0	772	107
Fairfax	851	10	831	10	0
Fauquier	920	22	0	898	0
Floyd	994	849	2	143	0
Fluvanna	1728	571	0	1157	0
Franklin	926	575	0	351	0
Frederick	585	10	0	575	0
Giles	31	31	0	0	0
Gloucester	1704	1374	0	330	0
Goochland	1360	344	0	1016	0
Grayson	850	850	0	0	0
Greene	86	56	0	29	1
Greensville	3938	1495	624	1819	0

(Continued)

[1] Includes 14589 MCF of roundwood that was delivered to non-pulp mills, chipped, then sold to pulpmills as residues.

[2] Includes cooperage, poles, piling, posts, and other miscellaneous industrial products.

Appendix IV. (Continued)

County	All Products[1]	Saw Logs	Veneer Logs	Pulpwood[1]	Other[2]
Halifax	5337	2580	0	1758	999
Hampton	0	0	0	0	0
Hanover	2530	1511	0	961	58
Henrico	358	198	0	160	0
Henry	1931	1405	0	526	0
Highland	241	182	0	59	0
Isle of Wight	4386	2841	374	1003	168
James City	1393	811	0	582	0
King and Queen	2705	1200	0	1352	153
King George	604	420	0	184	0
King William	1789	1005	0	726	58
Lancaster	364	238	0	126	0
Lee	91	70	0	21	0
Loudoun	195	1	194	0	0
Louisa	2097	983	0	1114	0
Lunenburg	5053	1072	374	3607	0
Madison	225	129	0	4	92
Mathews	753	651	0	102	0
Mecklenburg	4846	1543	249	2861	193
Middlesex	812	453	0	359	0
Montgomery	38	35	0	3	0
Nelson	1618	343	0	1275	0
New Kent	1676	1089	0	587	0
Newport News	2	0	0	2	0
Northampton	311	110	0	159	42
Northunderland	586	472	0	114	0
Nottoway	3812	946	249	2617	0
Orange	1298	769	0	427	102
Page	4	0	0	4	0
Patrick	617	529	0	88	0
Pittsylvania	5173	2444	0	2536	193
Powhatan	549	358	0	191	0
Prince Edward	1954	365	0	1589	0
Prince George	4236	2026	374	1836	0
Prince William	1492	200	810	482	0
Pulaski	181	181	0	0	0
Rappahannock	11	10	0	1	0
Richmond	1013	685	0	246	0
Roanoke	13	0	0	13	82
Rockbridge	585	87	0	498	0
Rockingham	260	69	0	191	0
Russell	12	10	0	2	0
Scott	85	69	0	16	0
Shenandoah	208	16	0	192	0

(Continued)

[1]Includes 14589 MCF of roundwood that was delivered to non-pulp mills, chipped, then sold to pulpmills as residues.

[2]Includes cooperage, poles, piling, posts, and other miscellaneous industrial products.

Appendix IV. (Continued)

County	All Products[1]	Saw Logs	Veneer Logs	Pulpwood[1]	Other[2]
Smyth	181	169	0	12	0
Southampton	8421	5532	624	2265	0
Spotsylvania	1742	606	0	1136	0
Stafford	283	247	0	36	0
Suffolk	6191	4425	314	944	508
Surry	3004	1404	249	1351	0
Sussex	7506	4857	624	2025	0
Tazewell	140	140	0	0	0
Virginia Beach	705	491	64	10	140
Warren	207	17	0	190	0
Washington	313	289	0	24	0
Westmoreland	1700	1066	0	384	250
Wise	18	0	0	18	0
Wythe	123	118	0	5	0
York	907	730	0	177	0
Total, all counties	166223	80157	8273	73875	3918

[1]Includes 14589 MCF of roundwood that was delivered to non-pulp mills, chipped, then sold to pulpmills as residues.

[2]Includes cooperage, poles, piling, posts, and other miscellaneous industrial products.

Appendix V. Output of Hardwood Timber Products in Virginia, by County
and Product, 1976

(thousand cubic feet)

County	All Produces[1]	Saw logs	Veneer logs	Pulpwood[1]	Other[2]
Accomack	210	199	0	11	0
Albemarle	4159	2506	83	1510	0
Alleghany	2173	1063	0	1110	0
Amelia	3514	1268	143	2103	0
Amherst	3999	1671	6	2322	0
Appomattox	3434	952	0	2482	0
Arlington	139	139	0	0	0
Augusta	2269	1069	5	1193	2
Bath	2670	766	0	1904	0
Bedford	4765	1687	22	3056	0
Bland	1026	882	16	0	128
Botetourt	2115	210	0	1905	0
Brunswick	3799	2088	108	1603	0
Buchanan	1145	1143	0	2	0
Buckingham	7286	1855	2	5429	0
Campbell	3006	1023	2	1981	0
Caroline	3606	3407	0	127	72
Carroll	1854	1712	142	0	0
Charles City	1995	258	0	1737	0
Charlotte	2590	1316	0	995	277
Chesapeake	1819	723	18	1078	0
Chesterfield	2401	1579	0	781	41
Clarke	249	243	0	6	0
Craig	1220	344	4	872	0
Culpeper	1581	1387	8	108	78
Cumberland	1592	559	0	799	234
Dickenson	1129	1128	0	0	1
Dinwiddie	5884	3015	143	2685	41
Essex	1658	1582	0	76	0
Fairfax	91	37	53	1	0
Fauquier	917	905	3	8	1
Floyd	1864	1002	22	840	0
Fluvanna	1816	1231	0	585	0
Franklin	2712	1425	12	1275	0
Frederick	626	389	3	234	0
Giles	693	670	16	7	0
Gloucester	888	772	0	116	0
Goochland	1199	743	6	450	0
Grayson	772	649	123	0	0
Greene	324	298	3	23	0
Greensville	3457	1902	233	1322	0

Continued

[1] Includes 4446 MCF of roundwood that was delivered to non-pulp mills, chipped, and then sold to pulpmills as residues.

[2] Includes cooperage, poles, piling, posts, and other miscellaneous industrial products.

Appendix V. (Continued)

County	All Products[1]	Saw Logs	Veneer Logs	Pulpwood[1]	Other[2]
Halifax	3924	1533	0	1171	1220
Hampton	0	0	0	0	0
Hanover	2730	2132	0	545	53
Henrico	611	418	0	193	0
Henry	2608	1890	18	700	0
Highland	2169	1594	2	564	9
Isle of Wight	1313	629	0	684	0
James City	1127	670	0	457	0
King and Queen	2755	1935	16	804	0
King George	1065	1031	0	34	0
King William	1163	864	0	246	53
Lancaster	657	656	0	1	0
Lee	1363	762	0	601	0
Loudoun	289	276	10	1	2
Louisa	1838	1506	0	332	0
Lunenburg	4413	1371	143	2772	127
Madison	850	815	35	0	0
Mathews	516	419	0	97	0
Mecklenburg	3565	2175	108	791	491
Middlesex	852	575	0	277	0
Montgomery	97	75	18	4	0
Nelson	6102	3102	9	2991	0
New Kent	2040	1580	0	460	0
Newport News	0	0	0	0	0
Northampton	369	10	0	359	0
Northumberland	482	479	0	3	0
Nottoway	2831	871	143	1617	0
Orange	2171	1947	52	172	0
Page	83	56	23	3	1
Patrick	2545	1738	145	662	0
Pittsylvania	4841	3015	27	1799	0
Powhatan	749	521	0	228	0
Prince Edward	1723	569	143	1011	0
Prince George	3040	1151	0	1848	41
Prince William	2229	1842	3	384	0
Pulaski	337	316	18	3	0
Rappahannock	306	281	25	0	0
Richmond	812	791	0	21	0
Roanoke	137	35	0	102	0
Rockbridge	3714	1844	45	1822	3
Rockingham	1799	954	6	810	29
Russell	1062	1035	0	27	0
Scott	867	659	0	208	0
Shenandoah	502	437	0	63	2

Continued

[1] Includes 4446 MCF of roundwood that was delivered to non-pulp mills, chipped, and then sold to pulpmills as residues.

[2] Includes cooperage, poles, piling, posts, and other miscellaneous industrial products.

Appendix V.   (Continued)

County	All Products[1]	Saw Logs	Veneer Logs	Pulpwood[1]	Other[2]
Smyth	3039	2703	0	336	0
Southampton	4865	2666	0	2199	0
Spotsylvania	1959	1600	0	359	0
Stafford	1709	1504	0	205	0
Suffolk	2650	1263	312	1075	0
Surry	2341	1189	0	1152	0
Sussex	4011	1415	0	2555	41
Tazewell	1041	1001	40	0	0
Virginia Beach	794	708	0	86	0
Warren	564	376	33	153	2
Washington	2179	1691	123	365	0
Westmoreland	1330	1297	0	33	0
Wise	1023	518	0	505	0
Wythe	696	516	20	160	0
York	342	264	0	78	0
Total, all counties	189835	109129	2693	75064	2949

[1]Includes 4446 MCF of roundwood that was delivered to non-pulp mills, chipped, and then sold to pulpmills as residues.

[2]Includes cooperage, poles, piling, posts, and other miscellaneous industrial products.

Appendix VI. Trade in Roundwood Products, Virginia, 1976.

(thousand cubic feet)					
Trade Flow	All Products	Saw Logs	Veneer Logs	Pulpwood	All Other
Softwood:					
output	151,621	80,157	8,273	59,273	3,918
(-) shipments out	17,526	4,970	1,826	10,597	133
(+) shipments in	37,879	10,413	6,519	18,401	2,546
(=) net receipts	171,974	85,600	12,966	67,077	6,331
Hardwood:					
output	185,379	109,129	2,693	70,608	2,949
(-) shipments out	11,017	5,849	1,202	3,966	--
(+) shipments in	30,272	3,424	1,381	25,286	181
(=) net receipts	204,634	106,704	2,872	91,928	3,130
All Species:					
output	337,000	189,286	10,966	129,881	6,867
(-) shipments out	28,543	10,819	3,028	14,563	133
(+) shipments in	68,151	13,837	7,900	43,687	2,727
(=) net receipts	376,608	192,304	15,838	159,005	9,461

Appendix VII. Lumber Production in Virginia, 1869 to 1976.

	(thousand board feet)		
Year	Softwood	Hardwood	Total
1869	112,000	32,000	144,000
1879	222,000	95,000	317,000
1889	266,000	197,000	463,000
1899	717,207	241,912	959,119
1904	773,170	176,627	949,797
1905	531,617	183,580	715,197
1906	796,045	267,196	1,063,241
1907	984,665	427,812	1,412,477
1908	876,661	322,064	1,108,725
1909	1,460,133	641,583	2,101,716
1910	1,162,053	490,139	1,652,192
1911	932,498	427,292	1,359,790
1912	1,099,500	470,497	1,569,997
1913	864,008	409,945	1,273,953
1914	1,027,166	460,904	1,488,070
1915	627,275	292,218	919,493
1916	704,429	331,780	1,036,209
1917	648,697	294,182	942,879
1918	500,265	269,279	769,544
1919	695,112	402,926	1,098,038
1920	656,132	460,212	1,116,344
1921	550,665	214,820	765,485
1922	623,134	301,713	924,847
1923	687,819	399,296	1,087,115
1924	611,192	374,766	985,958
1925	584,650	355,516	940,176
1926	568,771	370,384	939,155
1927	476,556	320,805	797,361
1928	517,577	297,652	805,229
1929	543,808	316,192	860,000
1930	413,382	286,618	700,000
1931	366,294	183,706	550,000
1932	326,490	123,510	450,000
1933	461,899	108,101	570,000
1934	463,981	196,019	660,000
1935	498,619	201,381	700,000
1936	582,876	217,124	800,000
1937	587,906	252,094	840,000
1938	552,254	227,746	780,000
1939	636,854	273,769	910,623
1940	717,445	343,935	1,061,380

(Continued)

Appendix VII.   (Continued)

Year	Softwood	Hardwood	Total
1941	901,513	384,118	1,285,631
1942	813,156	400,741	1,213,897
1943	662,150	435,920	1,098,070
1944	639,722	577,362	1,217,084
1945	547,392	447,272	994,664
1946	683,481	533,879	1,217,360
1947	739,857	426,210	1,166,067
1948	Not Available	--	--
1949	652,026	381,034	1,033,060
1950	983,325	574,089	1,557,414
1951	815,535	612,739	1,428,274
1952	670,000	510,000	1,180,000
1953	642,000	498,000	1,140,000
1954	740,376	511,088	1,251,464
1955	662,000	593,000	1,255,000
1956	730,000	642,000	1,372,000
1957	616,000	434,000	1,050,000
1958	620,419	455,763	1,076,182
1959	660,000	494,000	1,154,000
1960	573,000	500,000	1,073,000
1961	517,000	508,000	1,025,000
1962	535,000	530,000	1,065,000
1963	557,000	627,000	1,184,000
1964	544,000	588,000	1,132,000
1965	530,000	605,000	1,135,000
1966	544,000	635,000	1,179,000
1967	515,000	602,000	1,117,000
1968	425,000	516,100	941,100
1969	517,400	788,000	1,305,400
1970	503,700	716,600	1,220,300
1971	421,600	625,500	1,047,100
1972	424,500	573,600	998,100
1973	463,000	639,400	1,102,400
1974	377,900	630,800	1,008,700
1975	381,700	524,800	906,500
1976	432,045	578,850	1,010,895

(Continued)

Appendix VII.   (Continued)

<u>Source:</u>

From 1869 to 1946 -- "Lumber Production in the United States,
1799-1946," U.S.D.A. Misc. Pub. No. 699,
Henry B. Steer, U.S. Forest Service,
October, 1948.

From 1947 to 1949 -- "Facts For Industry," U.S. Department of
Commerce, Bureau of the Census, August 16,
1951.

1950   -- Study of Forest Resources of Virginia,
Report to the Governor and the General
Assembly of Virginia, 1955.

From 1951 to 1956 -- "Facts For Industry," U.S. Department of
Commerce, Bureau of the Census, May 27,
1953; February 24, 1955; September 27,
1957; June 6, 1958; July 10, 1958.

From 1957 to 1967 -- "Current Industrial Reports," U.S. Depart-
ment of Commerce, Bureau of the Census,
January 19, 1961; August 9, 1962; October 15,
1962; March 28, 1966; May 31, 1967;
January 9, 1968; October 18, 1968.

From 1968 to 1975 -- Volumes determined from State Forest
Products tax data for each year beginning
in 1968.

Compiled by: Virginia Division of Forestry

Appendix VIII. Pulpwood Production in Virginia, 1904 to 1976.

(thousand standard cords)

	Pine			Hardwood			All Species		
Year	Round-wood	Chips & Residues	Total	Round-wood	Chips & Residues	Total	Round-wood	Chips & Residues	Total
1904	NA	0	NA	NA	0	NA	94.1	0	94.1
1905	NA	0	NA	NA	0	NA	89.5	0	89.5
1906	NA	0	NA	NA	0	NA	81.8	0	81.8
1907	NA	0	NA	NA	0	NA	88.5	0	88.5
1908	NA	0	NA	NA	0	NA	61.3	0	61.3
1909	NA	0	NA	NA	0	NA	92.0	0	92.0
1910	NA	0	NA	NA	0	NA	89.6	0	89.6
1911	NA	0	NA	NA	0	NA	98.6	0	98.6
1912	NA	0	NA	NA	0	NA	NA	0	NA
1913	NA	0	NA	NA	0	NA	NA	0	NA
1914	NA	0	NA	NA	0	NA	NA	0	NA
1915	NA	0	NA	NA	0	NA	NA	0	NA
1916	NA	0	NA	NA	0	NA	132.7	0	132.7
1917	NA	0	NA	NA	0	NA	141.6	0	141.6
1918	NA	0	NA	NA	0	NA	129.6	0	129.6
1919	NA	0	NA	NA	0	NA	126.1	0	126.1
1920	NA	0	NA	NA	0	NA	166.5	0	166.5
1921	NA	0	NA	NA	0	NA	NA	0	NA
1922	NA	0	NA	NA	0	NA	219.6	0	219.6
1923	NA	0	NA	NA	0	NA	249.1	0	249.1
1924	NA	0	NA	NA	0	NA	268.1	0	268.1
1925	NA	0	NA	NA	0	NA	288.2	0	288.2
1926	NA	0	NA	NA	0	NA	317.1	0	317.1
1927	NA	0	NA	NA	0	NA	316.0	0	316.0
1928	NA	0	NA	NA	0	NA	342.8	0	342.8
1929	NA	0	NA	NA	0	NA	375.2	0	375.2
1930	NA	0	NA	NA	0	NA	373.4	0	373.4
1931	NA	0	NA	NA	0	NA	368.0	0	368.0
1932	NA	0	NA	NA	0	NA	337.6	0	337.6
1933	NA	0	NA	NA	0	NA	387.5	0	387.5
1934	NA	0	NA	NA	0	NA	381.7	0	381.7
1935	NA	0	NA	NA	0	NA	451.8	0	451.8
1936	NA	0	NA	NA	0	NA	529.5	0	529.5
1937	NA	0	NA	NA	0	NA	587.3	0	587.3
1938	NA	0	NA	NA	0	NA	559.3	0	559.3
1939	NA	0	NA	NA	0	NA	578.0	0	578.0
1940	NA	0	NA	NA	0	NA	751.0	0	751.0

(Continued)

NA = Not Available

Appendix VIII. (Continued)

Year	Pine			Hardwood			All Species		
	Round-wood	Chips & Residues	Total	Round-wood	Chips & Residues	Total	Round-wood	Chips & Residues	Total
1941	NA	0	NA	NA	0	NA	827.0	0	827.0
1942	NA	0	NA	NA	0	NA	806.0	0	806.0
1943	NA	0	NA	NA	0	NA	886.0	0	886.0
1944	NA	0	NA	NA	0	NA	895.0	0	895.0
1945	NA	0	NA	NA	0	NA	798.9	0	798.9
1946	717.8	0	717.8	253.3	0	253.3	971.2	0	971.2
1947	776.3	0	776.3	249.1	0	249.1	1025.4	0	1025.4
1948	1026.9	0	1026.9	280.4	0	280.4	1306.5	0	1306.5
1949	705.3	0	705.3	189.9	0	189.9	895.2	0	895.2
1950	775.1	0	775.1	269.0	0	269.0	1044.1	0	1044.1
1951	989.2	0	989.2	337.1	0	337.1	1326.3	0	1326.3
1952	830.5	0	830.5	238.6	0	238.6	1069.1	0	1069.1
1953	1033.6	0	1033.6	233.7	0	233.7	1267.3	0	1267.3
1954	1033.6	0	1033.6	224.7	0	224.7	1258.4	0	1258.4
1955	1138.1	0	1138.1	268.2	0	268.2	1406.3	0	1406.3
1956	1273.2	22.4	1295.6	356.5	4.2	360.7	1629.7	26.6	1656.3
1957	1080.2	97.0	1177.2	339.1	3.1	341.2	1418.3	100.2	1518.5
1958	981.7	67.0	1048.7	396.0	5.1	401.1	1377.7	72.1	1449.8
1959	1241.8	73.8	1315.6	402.0	10.7	412.7	1643.8	84.5	1728.3
1960	1277.8	105.1	1382.8	437.5	13.0	450.5	1715.3	118.1	1833.4
1961	1190.0	153.7	1343.7	472.2	17.8	490.0	1662.2	171.5	1833.7
1962	1159.5	165.3	1324.8	526.4	42.8	569.3	1695.9	208.1	1894.0
1963	1235.5	165.2	1400.7	536.5	52.9	589.4	1772.0	218.1	1990.1
1964	1273.6	181.5	1455.1	610.2	64.8	675.0	1883.8	246.3	2130.1
1965	1424.0	226.9	1650.9	670.2	100.0	770.2	2094.1	326.8	2420.9
1966	1334.3	217.7	1551.9	673.3	140.2	813.5	2007.5	357.9	2365.4
1967	1230.8	264.5	1495.4	668.0	195.5	863.6	1898.9	460.0	2358.9
1968	1055.0	438.3	1493.3	671.6	207.2	878.8	1726.5	645.5	2372.0
1969	996.4	391.7	1388.1	833.8	187.9	1021.7	1830.2	579.6	2409.8
1970	962.1	326.5	1288.6	899.9	214.8	1114.7	1862.0	541.3	2403.3
1971	873.8	351.8	1225.6	838.1	237.2	1075.3	1711.9	589.0	2300.9
1972	827.7	293.4	1121.1	846.9	238.6	1085.5	1674.6	532.0	2206.6
1973	844.6	437.3	1281.9	934.1	335.4	1269.5	1778.7	772.7	2551.4
1974	875.2	463.6	1338.8	839.3	453.7	1293.0	1714.6	917.3	2631.9
1975	721.8	553.4	1275.2	707.1	354.2	1061.3	1428.9	907.6	2336.5
1976	811.3	554.8	1366.1	924.8	370.9	1295.7	1736.1	925.7	2661.8

(Continued)

Appendix VIII.   (Continued)

Source:

From 1904 to 1935 -- Bureau of Census, U.S. Department of Commerce.
                   -- Wood Used for Pulp, Circular 44, Forest Service, U.S.D.A.
                   -- Consumption of Pulpwood, Circular 120, Forest Service,
                        U.S.D.A.
                   -- Pulpwood Consumption & Wood Pulp Production, Forest
                        Service, U.S.D.A.

From 1936 to 1946 -- "Study of Forest Resources of Virginia" -- Report to the
                        Governor and the General Assembly of Virginia, 1955.

From 1947 to 1975 -- "Southern Pulpwood Production" -- Southern and South-
                        eastern Forest Experiment Station, Forest Service, U.S.D.A.

Prepared by: Virginia Division of Forestry

Appendix IX. Economic Dependence of Counties on the Forest Products
Industry, Ranked by Size of Dependency Ratio, 1976.

County/City	Percent of Base Employment in Forest Products Industry
Louisa	29.48
Greensville	29.01
Sussex	26.92
Franklin	24.21
Fluvanna	22.76
Galax	21.99
Madison	20.33
Henry	19.22
Patrick	18.92
Emporia	18.68
Campbell	18.47
Nelson	17.61
Charlotte	15.09
Caroline	14.19
Bedford	14.18
Brunswick	13.63
Carroll	13.22
Pittsylvania	13.15
Smythe	13.06
Lunenburg	12.53
Appomattox	11.63
Westmoreland	11.50
Martinsville	11.20
Albemarle	10.82
Richmond	10.82
Middlesex	10.66
Cumberland	10.10
Charles City	9.37
Essex	9.09
Franklin	8.89
Frederick	8.11
Nottoway	7.65
Southampton	6.96
Amelia	6.95
Floyd	6.63
Culpeper	6.57
Buckingham	6.32
Prince Edward	6.21
Pulaski	5.80
Halifax	5.70

(Continued)

County/City	Percent of Base Employment in Forest Products Industry
Dinwiddie	5.52
South Boston	5.50
Highland	5.10
King and Queen	4.82
Amherst	4.81
Craig	4.50
Bland	4.34
Winchester	4.20
Grayson	4.18
Goochland	4.18
Powhaton	4.04
New Kent	3.97
Orange	3.68
Mecklenburg	3.31
Bath	2.94
Isle of Wight	2.64
Accomack	2.64
Wythe	2.53
Surry	2.44
Alleghany	2.43
Washington	2.33
Spostylvania	2.28
Hanover	2.23
Augusta	2.21
Gloucester	1.95
Suffolk	1.94
Bedford	1.71
Botetourt	1.67
Northunderland	1.21
Roanoke	1.20
Page	1.18
Giles	1.17
Tazewell	1.03
Covington	1.02
Rockbridge	0.98
Waynesboro	0.91
Chesapeake	0.77
Greene	0.65
Salem	0.63
Buchannon	0.52
Roanoke	0.51
Staunton	0.47
Rockingham	0.41
King George	0.27
King William	0.25
Lee	0.19
Clarke	0.08
Montgomery	0.04
Rappahannock	0.02

Appendix X.   Interregional Movement of Roundwood[1], Virginia, 1976.

(thousand cubic feet)

Destination	Source					
	Coastal Plain	Southern Piedmont	Northern Piedmont	Northern Mountain	Southern Mountain	Other States
Softwood:						
Coastal Plain	54,427	4,010	38	0	0	16,890
Southern Piedmont	731	13,916	27	0	130	605
Northern Piedmont	198	108	5,146	94	0	1,476
Northern Mountain	0	0	82	583	0	347
Southern Mountain	0	0	0	154	4,256	160
Other States	5,530	849	1,991	0	172	NA
Hardwood:						
Coastal Plain	30,720	934	49	0	0	1,476
Southern Piedmont	740	24,663	455	41	149	936
Northern Piedmont	391	638	19,602	373	0	257
Northern Mountain	9	112	2,089	7,969	9	1,500
Southern Mountain	0	0	0	168	15,024	817
Other States	7,008	691	54	1,007	1,949	NA

NA = Not Applicable

[1]All products except pulpwood.

Appendix XI.   Interregional Movement of Roundwood for Pulpwood, Virginia, 1976.

(thousand cubic feet)

Destination	Coastal Plain	Southern Piedmont	Northern Piedmont	Northern Mountain	Southern Mountain	Other States
Softwood:						
Coastal Plain	15,097	21,369	5,705	0	1	18,189
Southern Piedmont	0	55	332	6	0	0
Northern Piedmont	0	0	0	0	0	0
Northern Mountain	2	2,893	1,294	1,892	23	206
Southern Mountain	0	0	0	0	0	0
Other States	4,329	2,840	2,006	1,357	98	NA
Hardwood:						
Coastal Plain	19,997	8,298	1,302	72	4	15,238
Southern Piedmont	0	5,577	2,925	1,982	834	4,378
Northern Piedmont	0	5,022	2,852	97	0	0
Northern Mountain	5	8,024	1,747	7,915	15	5,673
Southern Mountain	0	0	0	0	0	0
Other States	1,169	10	14	615	2,201	NA

NA = Not Applicable

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1. Uncertainty in Forestry Investment Decisions Regarding Timber growing.
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    David C. Guynn and Alfred D. Sullivan, FWS-2-73, 1973 (out of print).

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    F. Thompson, Robert C. Mantie, Alfred D. Sullivan and Harold E. Burkhart,
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17. Virginia's Forest Products Industry. Harold W. Wisdom and Timothy G. Hudspeth, FWS-2-78, 1978.

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