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OHIO Timber Industries— a Periodic Assessment of Timber Output



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Cover Photo

Tree shearing is an uncommon timber harvesting practice in Ohio. It is a highly versatile means of removing timber, especially in the northern and central regions of Ohio where slopes are mostly less than 30 percent. Shearing is particularly adapted to group-selection harvesting systems, which are favored for attaining considerable increases in production over other conventional systems. Production often reaches 20 tons of wood per hour under favorable terrain and stocking conditions. This method may be used for single-tree selection cutting, but the chain saw is generally more efficient and practical.

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Abstract

A periodic evaluation of industrial timber output in Ohio based on a statewide survey of the primary wood manufacturing plants. Contains statistics on the industrial timber harvest and plant wood receipts in 1978, and the production and disposition of the manufacturing residues that resulted. The 74 million cubic feet (ft³) or 2.2 million cubic meters (m³) of industrial wood produced in 1978 represented an 8-percent decrease in production since the previous survey in 1973. Although production of pulpwood, veneer logs, and cooperage logs increased during the period, sawlog and mine timber production decreased. Other trends in industrial product output and use of manufacturing residue are presented.

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HIGHLIGHTS

THE 1978 TIMBER INDUSTRY survey in Ohio showed that since 1973:

- ★ Total timber output has decreased by 8 percent to 74 million ft³.
- ★ Sawlog production has declined by 8 percent to 322 million board feet.
- ★ The number of sawmills in Ohio has increased from 310 to 326—there has been an increase in high-production mills and a decrease in low-production mills.
- ★ Total pulpwood production has increased less than 1 percent to 372,000 cords—total-tree chip production has increased while the use of logs and chipped residues for pulpwood has decreased.
- ★ Veneer- and cooperage-log production has increased by 21 percent to 14.8 million board feet.
- ★ The use of wood manufacturing residues has increased from 79 to 84 percent of the total available.

BACKGROUND

THE FOREST SERVICE of the U.S. Department of Agriculture conducts continuing forest surveys of all states to provide up-to-date information on the Nation's timber and timber-related resources. In the 14-state region served by the Northeastern Forest Experiment Station, all states have now been surveyed at least twice. Ohio has now been inventoried for the third time. A part of the latest survey completed in 1979 included a timber-industry survey to determine the output of timber products and the volume and disposition of primary wood-product manufacturing residues.

This report is the result of a 100-percent canvass of all primary wood-product manufacturers that were operating in Ohio in 1978. Pulpwood production data were gathered as part of the Northeastern Station's annual survey of pulpwood producers in the Northeast. The Ohio Division of Forestry assembled a list of all known primary wood-product manufacturing firms for the canvass. The primary manufacturers were initially contacted through a questionnaire that was mailed from Northeastern Station headquarters. Possible out-of-state consumers of Ohio roundwood also received questionnaires. After three mailings, those mill owners in Ohio who did not respond were contacted in person by Ohio Division of Forestry personnel; nonresponding out-of-state primary manufacturers were contacted by telephone by Station personnel.

This report for the most part deals with statistics for 2 years: 1978, the calendar year of the current timber-industry survey, and 1973, the calendar year of the previous complete canvass. The reader is reminded that these years may not be representative for the various Ohio timber industries covered in this report. When documented production statistics were available for individual timber products for previous or intervening years, they were included for comparative purposes.

Long-term production trends will be forthcoming from future surveys. Until a data base is built up over time, the reader is cautioned to use the current statistics prudently.

CURRENT INDUSTRY TRENDS

Ohio's timberlands contain mostly hardwood trees of valuable species such as red and white oak, black cherry, white ash, hard and soft maple, and yellow-poplar. Statewide, more than 95 percent of the forests are hardwood, mostly oaks, maples, and yellow-poplar. Most of the forests are located in the state's hilly eastern and southern regions, which are noted for fine hardwood timber and good timber-growing sites.

During the late 18th century, most of the timber that was cut was piled and burned to make land available for agricultural purposes. The best timber was used for building, fuel, fencing, and cooperage. Many high-grade oak trees were felled for tanbark. The sawlogs

were cut into lumber at water-powered sawmills.

In the 1800's, industry flourished in Ohio and much hardwood was used to make charcoal, railroad ties, mine timbers, and construction materials. Quality hardwood timber was cut to make furniture, tools, and farm implements. Many of the logs were now sawed into lumber at coal or wood-fired, steam-powered sawmills.

By the 20th century, most of Ohio's timberlands had been cleared. The forest products industry was dominated by small, portable, steam-powered sawmills and lumber production had peaked. Major products in the early 1900's remained much the same as in the 1800's. The markets were larger as population and industry grew.

During the last quarter century, the timber and timber products industry in Ohio changed considerably to provide a more complete use of the timber resource. Larger, more efficient harvesting and processing equipment was developed to provide a larger variety of specialized timber products to larger, more efficient mills producing a variety of secondary products. Chain saws, rubber-tired skidders, mechanical harvesters, knuckle-boom loaders, and total-tree systems were used to provide logs, bolts, and chips to high-capacity sawmills, veneer mills, pallet mills, and pulpmills. A variety of economic opportunities such as energy cost savings, reduction in equipment maintenance, increases in productivity, and changing bark and pulpwood markets have prompted mills to install debarkers, chippers, and wood-burning power plants. Revitalization and upgrading of the rail systems increased demand for wood railroad ties. During the past decade, increased amounts of wood fiber and bark were substituted for oil and gas in home heating plants throughout Ohio. Producers of diverse wood products such as veneer and lumber were consolidated with other local, regional, and national enterprises to add flexibility and financial stability to their operation. A favorable monetary rate stimulated export demand and domestic prices for quality hardwood logs, lumber, and veneer.

Environmental concerns will bring about further future energy needs and new tech-

nology changes in timber harvesting and timber products, markets, and processing. Improved methods of forest management should be developed to provide the most complete use of Ohio's timber resource. More wood fiber from each forested acre should be recovered and channeled to the wood-using industry best suited to convert each class of roundwood into the most profitable products.

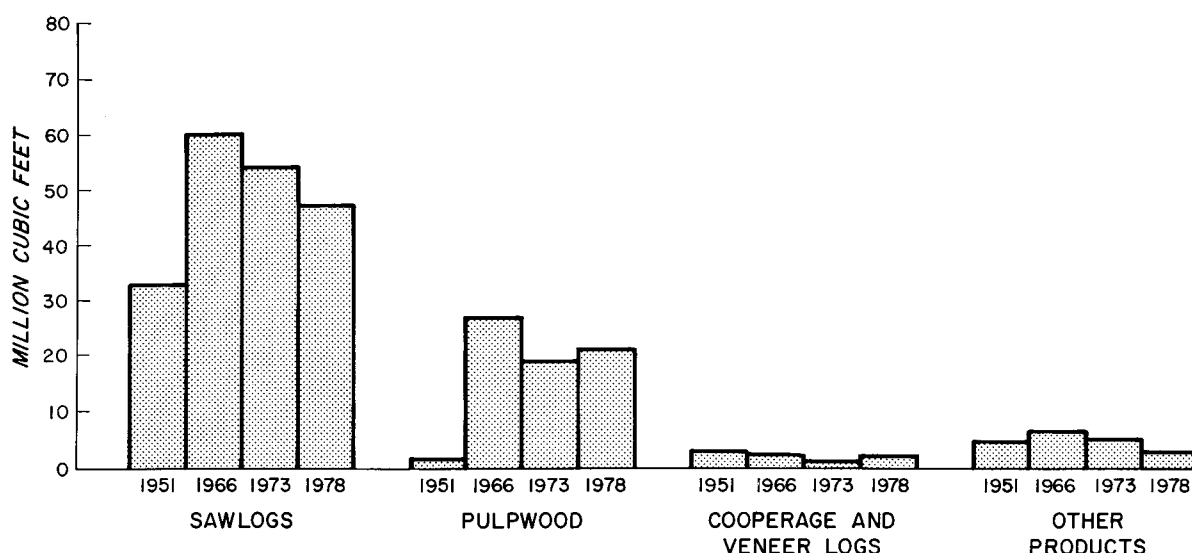
INDUSTRIAL TIMBER HARVEST

In 1978, 74 million ft³ of timber were harvested from Ohio's forests for use by the timber industry. Hardwoods accounted for 97 percent of the harvested timber. Most of the timber was used for sawlogs, which accounted for 64 percent of the total harvest. Pulpwood production made up most of the remaining harvest—29 percent of the total. Veneer logs and cooperage logs each made up about 1½ percent of the harvest. The remaining 4 percent was used for mine timbers and miscellaneous timber products such as handle stock, metallurgical wood, poles, posts, pilings, and guardrails.

The major timber product—sawlogs—was primarily responsible for the 8-percent reduction in harvested timber between 1973 and 1978. The decrease in sawlog production was partially offset by a production increase in pulpwood, Ohio's other major timber product. Together, the cubic-foot volume of timber for sawlogs and pulpwood was 6 percent lower in 1978 than in 1973, a reduction of 4.2 million ft³. Although the production of veneer logs and cooperage logs rose by 11 and 38 percent, respectively, the increase in production amounted to only 400,000 ft³. The production of mine timbers and miscellaneous products decreased by 29 and 51 percent, respectively.

Although timber harvests in Ohio have been declining in recent years, they have continued to remain greater than in earlier years. The harvests of 1973 (80.5 million ft³) and 1978 (74 million ft³) were 83 and 68 percent higher, respectively, than that of 1951 when 44 million ft³ were produced. Cubic-foot

Figure 1.—Trend in industrial timber harvest in Ohio for selected years, by product use.



sawlog production for Ohio in 1978 was about one-fourth less than the recent high of 1966. The downward trend in cooperage and veneer log production appears to have ended (Fig. 1). The production of miscellaneous products such as mine timbers has continued to fluctuate with cyclical increases and decreases in market demand.

In 1951, three-fourths of the timber harvest was in sawlogs and only 4 percent was in pulpwood. By 1966, only 62 percent was in sawlogs—pulpwood had increased to 28 percent of the harvest. Since 1966, the distribution of timber products has changed slightly. In 1978, sawlogs accounted for more of the harvest—64 percent of the total. Pulpwood has stabilized at about a fourth of the total harvest; all other products have remained at less than 8 percent.

For the 1973-78 period, changes in the distribution of Ohio's timber harvest among the various timber products were almost entirely a result of decreases or increases in the volumes of hardwood timber used to make the products. The volume of hardwoods in pulpwood, veneer logs, and cooperage logs showed increases of from 11 to 38 percent. The production of sawlogs, mine timbers, and miscellaneous products decreased by 14 to 69 percent.

During the 1973-78 period, the increases and decreases in the production of hardwood products were virtually offset so there was only a 10 percent decrease in the Ohio hardwood harvest, from 79.6 to 71.8 million ft³. In 1978, the 7.5 million-ft³ decrease in hardwood sawlog production from 53.9 to 46.4 million ft³ accounted for most of the decline in both the hardwood product production and the timber harvest. The 2.9 million-ft³ increase in the production of pulpwood and cooperage and veneer logs from hardwoods nearly offset a 3.2 million-ft³ reduction in miscellaneous hardwood products and mine timbers. Hardwood pulpwood production increased from 18.5 to 21.0 million ft³; hardwood veneer log output increased by 300,000 ft³; and the production of cooperage logs increased by 100,000 ft³. Mine timbers dropped by 300,000 ft³ and miscellaneous hardwood products decreased by 2.9 million ft³.

Most of Ohio's 1978 timber harvest was from the state's south-central, southeastern, and the east-central units (Fig. 2). Each unit accounted for about a fourth of the total harvest. As in 1973, these three units accounted for 73 percent of the timber harvest in Ohio. In 1978, two units showed increases in the timber harvest in Ohio. In 1978, two units

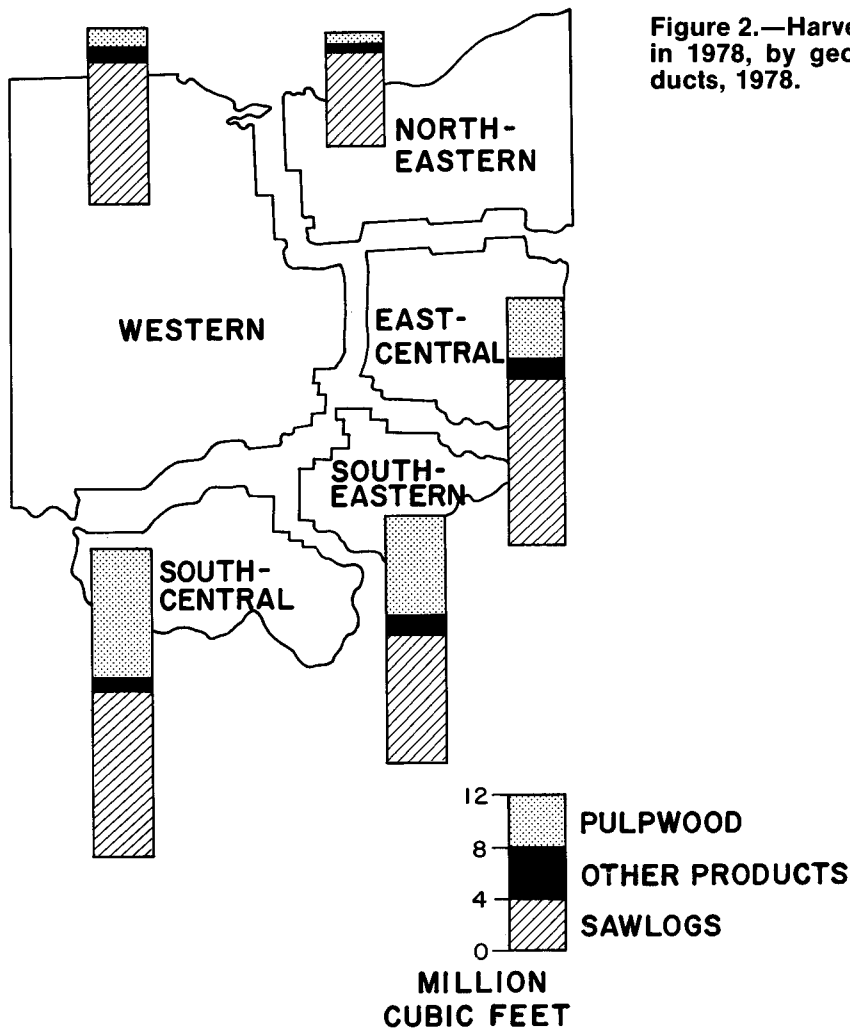


Figure 2.—Harvest of industrial timber in Ohio in 1978, by geographic unit and major products, 1978.

showed increases in the timber harvested over 1973; three units registered declines:

Geographic unit	1973 (million ft ³)	1978 (million ft ³)	Change (percent)
South-Central	22.9	21.0	- 8
Southeastern	15.4	16.9	+10
East-Central	21.0	16.8	- 20
Northeastern	10.7	7.2	- 33
Western	10.5	12.1	+15
Total	80.5	74.0	- 8

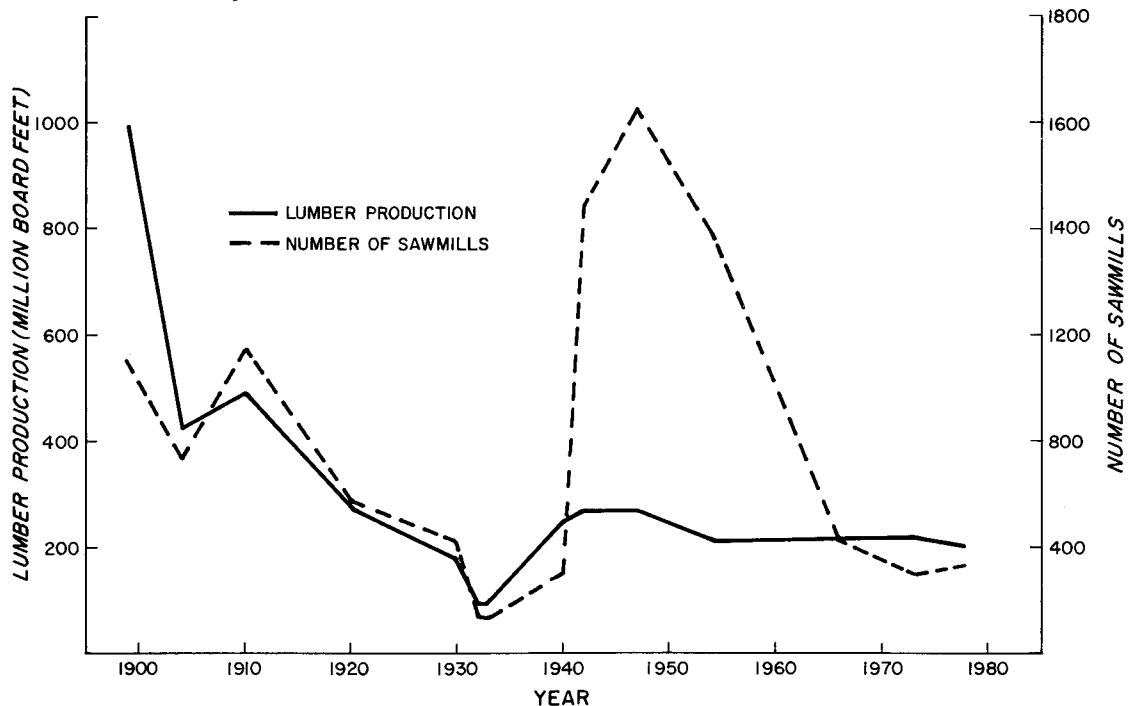
The south- and east-central geographic units had the largest sawlog harvests in 1978. With individual sawlog harvests of slightly over 11 million ft³, each produced nearly 24

percent of the state's sawlogs. Sawlogs accounted for well over half of the timber harvest in each geographic unit—and more than 80 percent of the harvest for the northeastern and western units.

The south-central geographic unit also had the largest pulpwood harvest. Its 8.8 million ft³ of pulpwood accounted for 40 percent of its timber harvest and 40 percent of the state's pulpwood.

Most of the other products harvested in Ohio were rather evenly distributed among the state's five geographic units, with the exception of the northeastern unit. That unit had less than one-tenth of the state's total, while the others had 20 percent or more.

Figure 3.—Lumber production and number of sawmills in Ohio for selected years between 1899 and 1973.



Source: U.S. Dep. Commer., Bur. Census: Census of manufacturers 1961, 1966, 1971;
Current industrial reports 1950, 1957, 1962, 1966, 1970, 1977, 1980; Steer 1948.

LUMBER AND SAWLOG INDUSTRIES

During the last three-quarters of this century, there have been major swings in annual lumber production and in the number of operating sawmills in Ohio (Fig. 3). Throughout most of this period, the number of sawmills operating in Ohio has generally followed fluctuations in lumber production (Steer 1948). In recent years, lumber production has stabilized as fewer mills share most of the annual production.

In 1899, nearly 1 billion board feet of lumber were produced by more than 1,000 sawmills. Much of this large production was a result of removing high-quality timber to clear land for agriculture. Both lumber production and the number of sawmills gradually declined over the next 30 years with the depletion of the original forests. As the Nation's economy collapsed between 1929 and 1933, the lumber production bottomed out. In

1932 and 1933, a low of 100 million board feet of lumber was produced annually by no more than 160 sawmills. In a third of a century, both lumber production and the number of operating sawmills had declined by almost 90 percent.

As the national economy improved, lumber production and the number of sawmills operating in Ohio increased. Stimulated by increased wartime demand for raw materials, lumber production almost tripled by 1942. It reached 270 million board feet and stayed at that level through 1947. By 1947, there were a record 1,644 sawmills.

In the 1950's, the circumstances that were responsible for the rapid changes in lumber demand of the 1930's and 1940's had largely disappeared. Annual production in Ohio reverted to the level of the 1920's where it has remained rather constant for more than 20 years. In 1954, production dropped to 214 million board feet and in 1973 had risen only by 3 percent to 221 million. This level of production represents the demand for lumber in

Ohio under normal economic conditions. During the 1973-78 period, lumber production in Ohio dropped by 9 percent, almost paralleling the drop in the state's sawlog harvest, to 201 million board feet.

While annual lumber production has changed little in recent years, the number of sawmills operating in Ohio has continued to drop until recently. There were 1,369 sawmills in 1954; 411 in 1966; 310 in 1973; and 326 in 1978.

As in most other regions of the country, an increasingly greater proportion of Ohio's lumber is produced by high-production sawmills; more than 1 million board feet of lumber is produced annually. These full-time stationary mills are replacing smaller, portable, part-time mills. From 1966 to 1978, the number of high-production mills increased from 39 to 120, while the number of low-production mills (less than 1 million board feet annually) declined from 146 to 108. In 1978, the 98 mills that were idle or operating only part-time (custom mills) represented less than half of the 226 such mills in 1966.

Three of the five geographic units of Ohio show a decrease in the number of operable sawmills both between 1966 and 1973 and between 1973 and 1978. The declines resulted from reductions in the number of low-production mills in each unit due to a number of these mills becoming idle or closing. Except for the east-central unit, the number of large sawmills increased throughout Ohio for both periods. In the east-central unit, the number of sawmills producing more than 1 million board feet annually increased from 10 to 18 for the 1966-73 period and dropped to 17 by 1978.

Since 1966, oak has accounted for an increasingly larger proportion of Ohio's sawlog harvest. In 1978, oak constituted over half of the annual production:

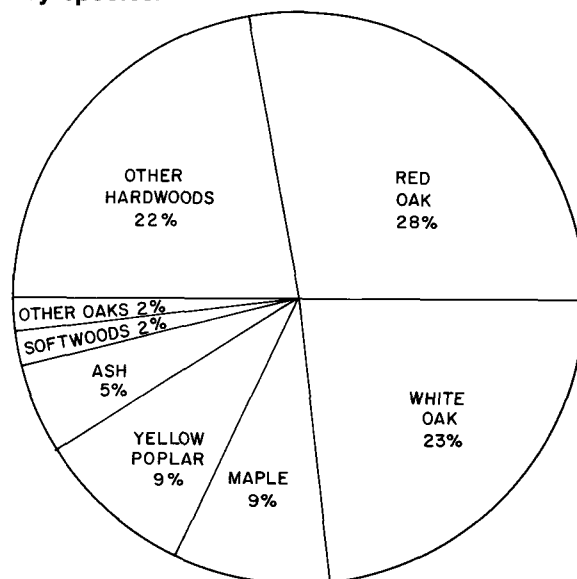
<i>Species</i>	<i>1966</i>	<i>1973</i>	<i>1978</i>
	<i>----- percent -----</i>		
Oak	43	47	53
Maple	14	12	9
Elm	4	2	1
Beech	5	7	4
Yellow-poplar	11	10	9
Other species	23	22	24

The percentage of total sawlog harvest accounted for by maple, elm, and yellow-poplar has declined as oak and other species gain in usage.

Sawlog production in 1978 was 322 million board feet—a drop of 8 percent from 1973 and 17 percent from 1966. In 1978, as in 1973, about half of the state's sawlogs were harvested in the east- and south-central units. The east-central unit accounted for 76.4 million board feet of sawlogs and the south-central unit produced 85.2 million board feet. In the south-central unit, sawlog production has increased by 4 percent since 1973, while dropping by 17 percent from 92 million board feet in the east-central unit. The north-eastern unit had the largest decline—32 percent—from 62 to 42 million board feet, while the southeastern unit had the smallest—14 percent. From 1973 to 1978, the only other increase in sawlog production was in Ohio's western unit, where production rose by 24 percent to 63 million board feet after that unit had experienced the largest decline in the state during the 1966-73 period.

Ninety-eight percent of the total sawlog production in 1978 was from hardwood trees. Red oaks accounted for 28 percent and white oaks made up 23 percent (Fig. 4). Other important species included hard and soft maples,

Figure 4.—Ohio sawlog production in 1978, by species.



ash, yellow-poplar, and beech. Over four-fifths of the hardwood was processed in the same geographic unit from which it was harvested. About 16 percent was transported to other parts of the state for manufacture. The remaining hardwood sawlogs were processed out of the state.

Two-thirds of the softwood sawlog production was from Virginia and other yellow-pines. Most of the remainder was from white and red pine trees. Less than 2 percent was from hemlock and other species. Only 2 percent of the softwood sawlog harvest was processed out of the state. Over half was used in the region of manufacture; 42 percent was used in other parts of the state.

Total sawlog receipts at Ohio sawmills from both within and outside of the state have declined. The 342.5 million board feet received in 1978 was 4 percent less than in 1973 and 12 percent less than in 1966. During the 1973-78 period, sawlog receipts declined throughout the state in all but the south-central unit, where they rose by 32 percent.

The proportion of Ohio's sawlog production to total sawlog receipts also has declined in recent years. In 1966, sawlog production equalled nearly 100 percent of the state's receipts; in 1973, it was 98 percent; and by 1978 the volume of sawlogs produced in Ohio accounted for 94 percent of the sawlogs used in the state.

Ohio's sawmills have been relying more heavily on out-of-state wood. In 1966 and 1973, only 2 percent of Ohio's total sawlog receipts were imported. In 1978, almost 9 percent of the state's sawlog receipts consisted of imported logs.

Except for the western unit, Ohio was a net importer of sawlogs in 1978. Less than 3 percent (8.3 million board feet) of the state's sawlog production was shipped out of the state. Most of the exported sawlogs went to Indiana and West Virginia, while most of the 29 million board feet of imported sawlogs were from West Virginia, Kentucky, and Pennsylvania.

PULPWOOD INDUSTRIES

Total pulpwood production, the roundwood harvest, and the use of chipped manufacturing residues in Ohio have grown over the past decade (Fig. 5). The 252,000 cords of roundwood and 120,000 cord equivalents of pulp chips produced in 1978 represent a gain of more than 24 percent from the 299,000 cords produced in 1969. Most of this rise is attributable to a 76-percent increase in chipped residue production (68,000 cords in 1969). The roundwood harvest increased only by 9 percent during the period.

Although Ohio's pulpwood harvest increased by 29,000 cords since 1973, the net increase in total pulpwood production for 1978 was little more than 2,000 cords. The volume of pulpwood from plant residues decreased by almost 27,000 cords between 1973 and 1978. The availability of plant residues for use as pulp chips is governed by the volume of roundwood processed by the state's wood manufacturers. From 1973 to 1978, the volume of pulp chips from manufacturing residues decreased by 18 percent as a result of a 4-percent decrease in sawlog receipts at Ohio roundwood processing plants. Additionally, use rates of chippable coarse residues were relatively high during the period. About 92 percent of the residues generated were recovered for fuel, pulp chips, charcoal, metallurgical chips, or other byproducts.

Total pulpwood production, chipped residue production, and roundwood production for 1978 were within several thousand cords of their respective averages for the 1973-78 period. In both 1978 and 1973, there were the same six pulpmills operating in Ohio with a combined total daily pulping capacity of 1,820 tons. This tonnage was up from 1,540 tons per day in 1969. The six pulpmills consumed 98 percent of the state's total pulpwood production in 1978. In addition, 126,000 cords of pulpwood were imported from other states. Only 7,000 cords of Ohio pulpwood were shipped out-of-state for pulping.

About 1 percent of Ohio's pulpwood production in 1978 was from softwood trees, two-thirds from hardwoods, and 32 percent from manufacturing residues (Fig. 6). The

Figure 5.—Pulpwood production in Ohio in 1969-78, by source.

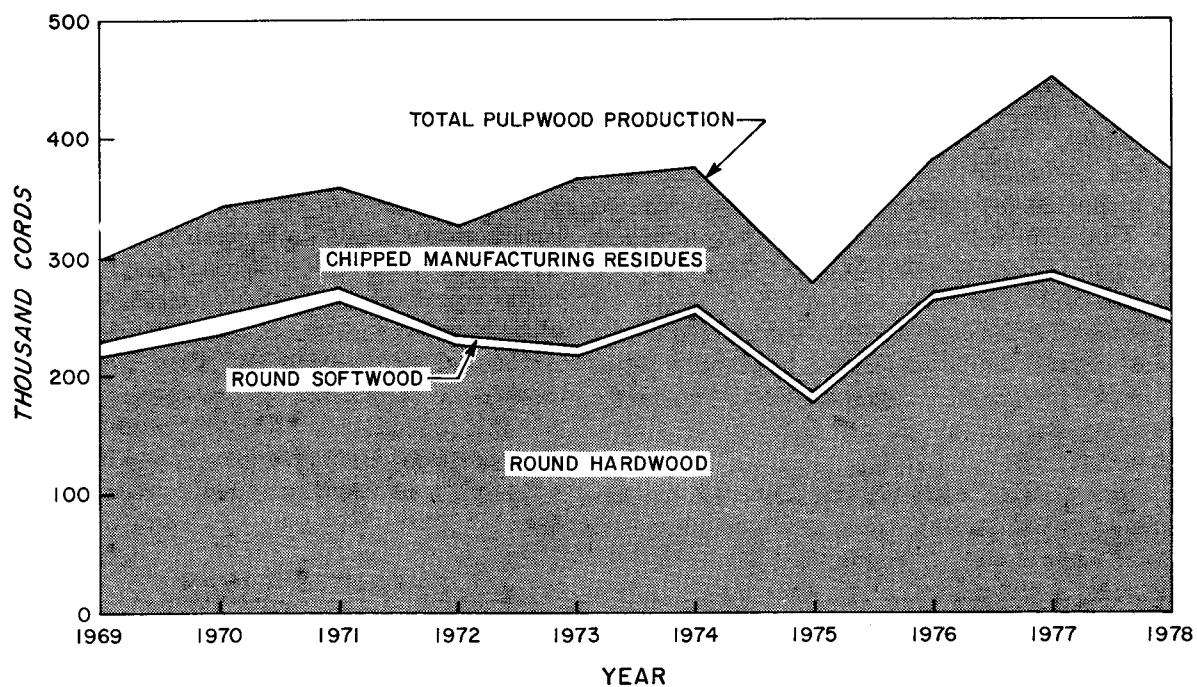
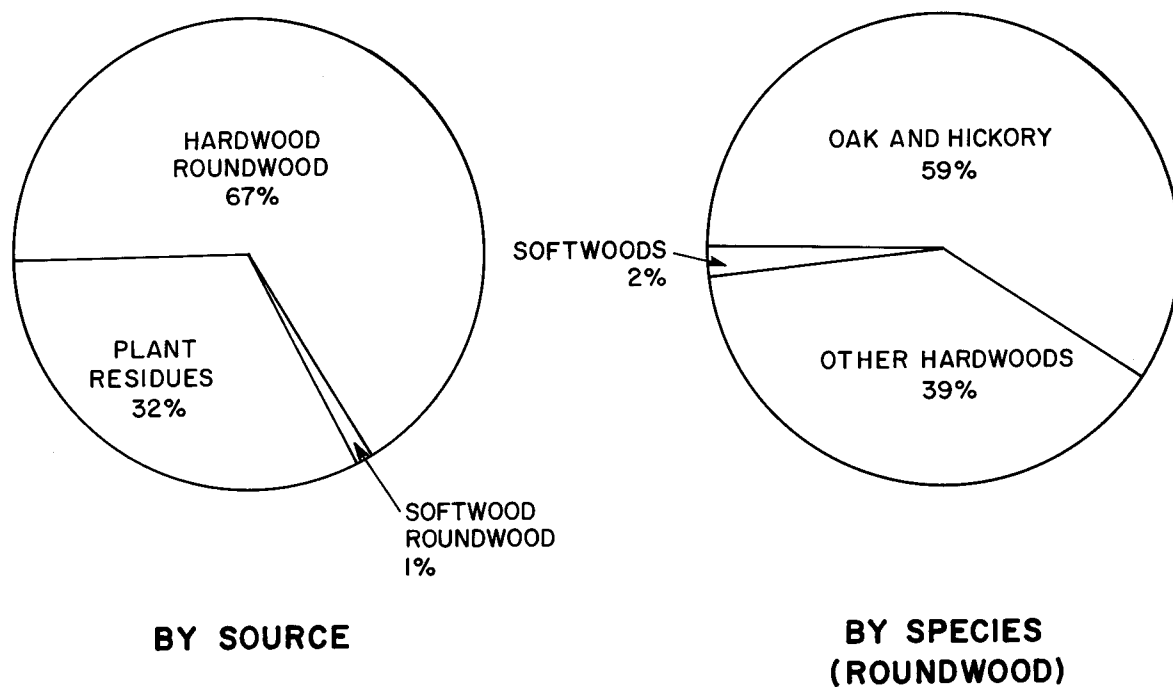


Figure 6.—Ohio pulpwood production in 1978.



entire softwood harvest was pine. Oak and hickory made up 59 percent of the total pulpwood harvest. Aspen, yellow-poplar, maple, beech, and birch accounted for most of the remaining harvest.

Nearly 4 million cords of pulpwood have been harvested from Ohio timberlands during the last 15 years (Table 15), an average of 257,000 cords per year. The 1978 harvest was 252,000 cords. During the last 15 years, the south-central unit has accounted for about 48 percent of the harvest. The southeastern and east-central units are other important pulpwood producing regions, each normally accounting for about one-fifth of the total harvest.

Since 1973, the pulpwood harvest has declined in the south-central unit and increased in the southeastern, accounting for 41 and 31 percent, respectively, of the state's 1978 harvest:

<i>Geographic unit</i>	<i>1973</i>	<i>1978</i>	<i>Change</i>
	<i>(thousand cords) (percent)</i>		
South-central	113.8	103.5	- 9
Southeastern	44.0	79.4	+80
East-central	39.6	48.5	+22
Northeastern	5.0	5.9	+18
Western	20.4	14.5	- 29
Total	222.8	251.8	+13

In 1978, the south-central unit registered 103,500 cords, slightly less than in 1973, and accounted for more of the state's 1978 pulpwood harvest than any other region—41 percent. With 79,400 cords in 1978, the southeastern unit nearly doubled its 1973 production. As in 1973, this region was the second highest producer of pulpwood in Ohio in 1978. From 1973 to 1978, the southeastern region registered the largest volume increase—80 percent—of any of the five regions in Ohio. The volume increase in the southeastern unit was made up entirely of hardwood pulpwood. The increase in hardwood pulpwood for the unit exceeded the total increase in pulpwood production for Ohio by 6,000 cords.

The use of total-tree chips from the stems, branches, and tops of hardwood trees has risen from 74,000 cords in 1974 to 196,000 cords in 1978. During the 1974-78 period, the proportion of total-tree chips to logs used for roundwood in Ohio was reversed. In 1974, total-tree chips accounted for less than one-third of the State's roundwood production; logs made up the remainder. In 1978, production from total-tree chips made up more than three-fourths of Ohio's roundwood production and over half of its pulpwood production. Rapid acceptance of this form of pulpwood has resulted in high per-acre yields of wood fiber, increased worker productivity, and increased recovery of small, rough and rotten trees at the harvest site.

OTHER TIMBER INDUSTRIES

Ohio has several small, stable, wood-using industries that use less than 10 percent of the state's annual timber harvest. Most of the timber harvested for these industries is used for products such as veneer and cooperage logs, handle stock, and mine timbers. Although most of these industries have exacting requirements and are willing to pay a premium for certain species, sizes, and other physical attributes, other users, such as the charcoal and electrometallurgical industries, are lenient in their requirements and even use residues from other wood-using industries.

Veneer logs

Most veneer logs from Ohio are used to make face veneer for furniture; some are used to make veneer for wooden baskets and boxes. In 1978, 7.7 million board feet of these high-quality, high-value hardwood logs were harvested in Ohio—almost one-third more than in 1973. Fifty-six percent of the veneer logs were shipped to four other states and Canada for manufacture, with Indiana receiving over two-thirds of the exported logs.

The four container plants in Ohio used less than one-fifth of the 4.7 million board feet of veneer logs received in Ohio in 1978. Total veneer log receipts of Ohio have decreased by about 20 percent since 1973, while the amount harvested and retained in the state for manufacturer has increased by about 10 percent. Most of the imported veneer logs were from Indiana, Michigan, and Tennessee.

White oak was the most popular veneer species harvested, exported, and used in the state in 1978. White oak logs accounted for almost half of Ohio's total veneer log production and almost one-third of the total receipts. Over half of the white oak harvested in Ohio went to Indiana; about one-fifth remained in Ohio.

Cooperage logs

In the late 1800's and early 1900's, cooperage shops and veneer box and basket plants were common throughout Ohio. They made a variety of wooden containers, such as barrels, baskets, and boxes to hold dry or liquid materials. For the most part, the wooden containers have been replaced by packaging products made from cloth, paper, plastic, glass, and metal; and the volume of wood used by the wooden-container industries in Ohio has declined to about 1 million board feet per year.

There are two types of wooden barrels—tight cooperage and slack cooperage. Tight cooperage is used to hold liquids; slack cooperage holds dry materials. Most wooden barrels made in recent years are tight cooperage made from white oak staves to hold bourbon whisky. Very little cooperage is made for other uses.

Except for the World War II years, national wooden barrel production was about 2.3 million barrels per year from 1934 to 1969. In 1970, federal regulations were enacted allowing the liquor industry to re-use bourbon barrels to make light-whisky. For the next 6 years, wooden barrel production dropped each year from 2.3 million in 1969 to 1.1 million in 1975. During this period, a strong market for light whisky failed to materialize and bourbon warehouse inventories declined. Since 1975, barrel production has increased

each year to meet normal whisky demand and to replenish bourbon inventories.

Activity in the Ohio cooperage industry has been a reflection of national demands. The number of stave mills dropped from 12 in 1964 to 7 in 1973. By 1978, only four mills were operating. Between 1966 and 1973, both cooperage mill production and receipts dropped by more than one-third. Between 1973 and 1978, receipts and production increased—receipts by 7 percent (from 8.2 to 8.8 million board feet) and production by 10 percent (from 6.4 to 7 million board feet). Eighty percent of the 1978 receipts were harvested in Ohio.

Miscellaneous products

There are several small wood-using industries in Ohio whose combined 1978 timber requirements from the state's timberlands were only 3.2 million ft³—4 percent of total harvest.

Although white ash is a minor species in Ohio's most important timber regions, it is the mainstay of one of the state's most stable wood-using industries—handle manufacturing. Ash is used for pulling and lifting tools such as shovels and rakes. Hickory—preferred for striking tools such as hammers and picks—also is harvested for handle stock.

Just over 3 million board feet of ash, hickory, and hard maple logs were harvested in Ohio in 1978 for use as handle stock. Ninety-four percent of the handle stock was ash, more than 5 percent was hickory, and less than 1 percent was hard maple. Handle log receipts in Ohio were 75 percent higher in 1978 than in 1973, while production was one-third less than in 1973 and 15 percent more than in 1962:

Year	Number of plants	Production (million board feet) ^a	Receipts (million board feet) ^a
1962	5	2.7	3.1
1966	5	5.0	5.2
1973	3	4.6	4.0
1978	3	3.1	7.0

^aInternational 1/4-inch rule.

Historically, most of the logs used by the Ohio handle industry have come from within the state. In 1978, almost 60 percent of the

handle stock was imported. Ash from Kentucky and Pennsylvania accounted for more than three-fourths of the imports; ash from New York accounted for nearly 20 percent.

Underground coal mining, which is concentrated in east-central Ohio, has relied on local timber for mine props and shoring material. One million ft³ of local timber used as round and split mine timbers in underground coal mines in 1978, 29 percent less than was required in 1973 when more coal was being produced.

Ohio's charcoal industry has diminished considerably over the years due to stringent air pollution regulations and price increases for roundwood. The state's lone charcoal manufacturer relies solely on wood residues from other wood-manufacturing plants. Since 1961, no roundwood has been used to make charcoal and the use of manufacturing residues has declined:

Year	Roundwood consumed	Residues consumed
	-----thousand cords-----	
1956	0.2	13.2
1961	0.7	13.8
1966	0	12.0
1973	0	11.3
1978	0	D

^D Data withheld to avoid disclosure.

Electrometallurgical wood is used along with coke and coal as a reductant in the smelting of metal-bearing ores. It is used primarily to provide bulk to the mix and to maintain a porous charge to facilitate venting of gases formed during smelting and provide carbon for the chemical reaction.

The two sources of metallurgical wood are chips from roundwood and manufacturing residues. The roundwood chips are moister

and work deeper into the furnace before dissipating. The drier residue chips, which weigh less, are cheaper to transport.

The use of electrometallurgical wood in Ohio has decreased considerably since 1973 as more wood is used as domestic and commercial fuel. In 1978, only two ferro-alloy plants reported using wood in the electrometallurgical process compared with seven in 1973. The use of metallurgical chips from roundwood decreased by 46 percent to 46,000 tons and the use of residues declined by 24 percent to 68,000 tons. Almost all of these chips—98 percent of the roundwood and all but 288 tons of the residues—were from hardwoods.

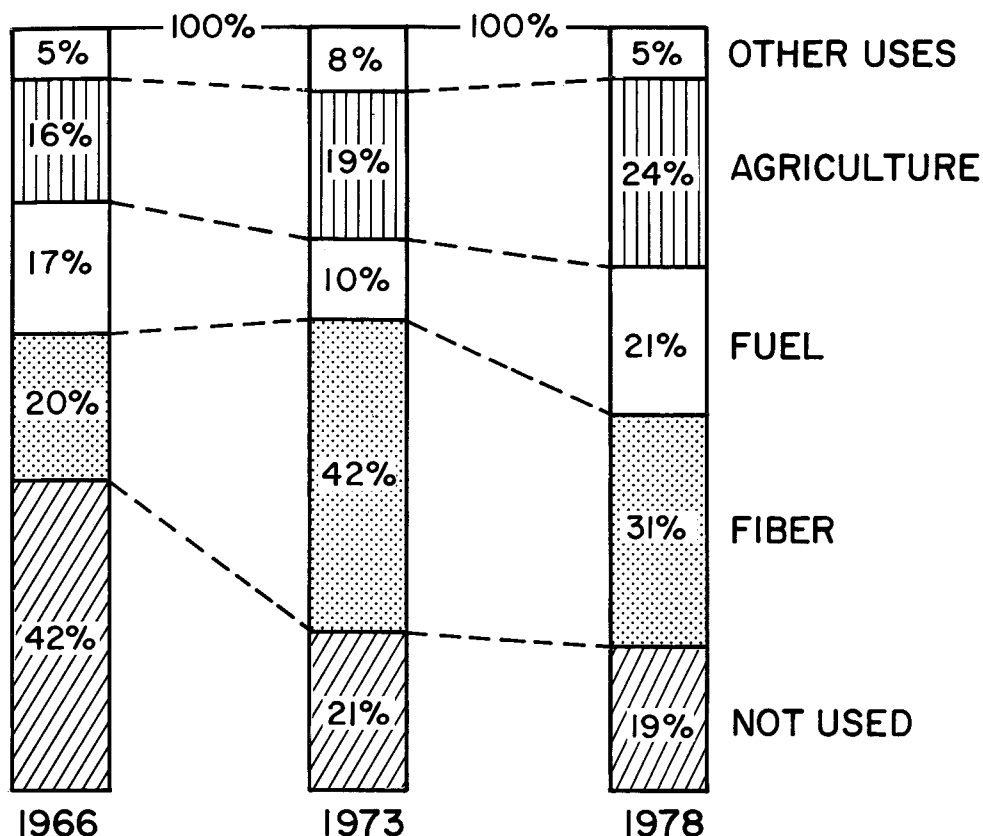
MANUFACTURING RESIDUES

Nearly 34 million ft³ of residues were generated by Ohio's primary wood manufacturers in 1978. Woody material accounted for nearly 27.5 million ft³ of the residue; bark made up about 6.6 million ft³. Nearly half of the wood residue was suitable for conversion into wood chips for fiber products. Eighty-one percent of all residue—27 million ft³—was used. Eighty-four percent of the wood residue and 69 percent of the bark residue were recovered and used.

In 1978, as in 1973, there was heavy demand for coarse residues such as sawmill slabs and edgings. Ninety-two percent of the total available was used for products such as woodpulp, charcoal, and metallurgical wood.

A comparison of the results of the 1978 survey with those of 1966 and 1973 show that more of the manufacturing residues are being used in recent years (Fig. 7):

Figure 7.—Trends in manufacturing residue use in Ohio in 1966, 1973, and 1978. (See table 20 for definition of terms.)



- Much less of the manufacturing residue is being left unused (2 percent less in 1978 than in 1973 and 23 percent less in 1978 than in 1966).
- Much more of the manufacturing residue is being used as fuelwood (11 percent more in 1978 than in 1973 and 4 percent more than in 1966).
- Much more of the manufacturing residue is being used for agricultural purposes (5 percent more in 1978 than in 1973 and 8 percent more than in 1966).
- The proportion of the manufacturing residue for other uses changed little between 1966 and 1978.
- After increasing by 22 percent from 1966 to 1973, the proportion of the manufactur-

ing residue used as pulpwood may be stabilizing (11 percent less than used in 1978 than in 1973).

- Between 1973 and 1978, much more of the total manufacturing residue volume was being used for fuel and agricultural use and less was being left unused or used for other purposes, such as charcoal and electro-metallurgical wood.

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DEFINITION OF TERMS

Species

Softwoods. Coniferous trees, usually evergreen with needles or scalelike leaves.

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

Harvest

Timber products output. Includes roundwood (round timer products harvested from growing stock on commercial forest land; from other sources, such as cull trees, salvable dead trees, limbs and tops, and saplings; from trees to noncommercial and non-forest lands; and from manufacturing plant byproducts.

Industrial timber harvest. Total production of round timber for conversion into wood products.

Logging residues. The unused portions of trees harvested or killed in the process of logging.

Manufacture

Primary wood-manufacturing plant. A plant that converts round timber to wood products such as woodpulp, lumber, veneer, cooperage, and dimension.

Roundwood products. Logs, bolts, and other round timber generated from harvesting trees for industrial or consumer uses.

Sawlog. A roundwood product from which products such as lumber are sawed, and which meets certain minimum standards of diameter, length, and defect, including a minimum 8-foot length and combination of size and defect specified in regional standards.

Pulpwood. Roundwood or plant byproducts cut (into 4- or 5-foot lengths or chipped) and prepared for manufacture into woodpulp.

Residues

Manufacturing plant residues. Wood materials that are generated when round timber (roundwood) is converted into wood products; includes slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and pulp screenings.

Plant byproducts. Wood products, such as pulp chips, recycled from manufacturing plant residues.

Unused manufacturing residues. Plant residues that are dumped or destroyed and not recovered from plant byproducts.

Coarse residues. Manufacturing residues suitable for chipping, such as slabs, edgings, and veneer cores.

Fine residues. Manufacturing residues not suitable for chipping, such as sawdust and shavings.

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Table 1.—Volume of industrial roundwood, by product harvested, Ohio, 1978.

Product	Standard unit	Volume in standard units			Roundwood volume		
		All species	Softwood	Hardwood	All species	Softwood	Hardwood
----- Thousand cubic feet -----							
Sawlogs	M board feet ^a	321,813	5,696	316,117	47,275	877	46,398
Pulpwood	Standard cords ^b	251,846	4,422	247,424	21,403	374	21,029
Veneer logs	M board feet ^a	7,716	—	7,716	1,133	—	1,133
Cooperage logs	M board feet ^a	7,037	—	7,037	1,033	—	1,033
Mine timbers	M cubic feet	1,010	83	927	1,010	83	927
Misc. products ^c	M cubic feet	2,192	880	1,312	2,192	880	1,312
Total	—	—	—	—	74,046	2,214	71,832

^aInternational 1/4-inch rule.

^bRough wood basis equivalent to 85 ft³ of solid wood.

^cIncludes guardrails, handle stock, metallurgical wood, poles, posts, and piling.

Table 2.—Change in timber products output, Ohio, between 1973 and 1978.

Product	All species			Softwoods			Hardwoods		
	1973	1978	Change	1973	1978	Change	1973	1978	Change
	<i>Million cubic feet</i>		<i>Percent</i>	<i>Million cubic feet</i>		<i>Percent</i>	<i>Million cubic feet</i>		<i>Percent</i>
Sawlogs	54.0	47.3	-12	0.1	0.9	(b)	53.9	46.4	-14
Pulpwood	18.9	21.4	+13	.4	.4	—	18.5	21.0	+14
Veneer logs	.8	1.1	+38	—	—	—	.8	1.1	+38
Cooperage logs	.9	1.0	+11	—	—	—	.9	1.0	+11
Mine timbers	1.4	1.0	-29	.1	(c)	—	1.3	1.0	-23
Misc. products ^a	4.5	2.2	-51	.3	.9	(b)	4.2	1.3	-69
Total	80.5	74.0	-8	.9	2.2	(b)	79.6	71.8	-10

^aIncludes guardrails, handle stock, metallurgical wood, poles, posts, and piling.

^bGreater than 100 percent.

^cLess than 100,000 ft³.

Table 3.—Industrial timber harvest^a by geographic unit, softwoods and hardwoods, and products, Ohio, 1978.

(In thousands of cubic feet)

Geographic unit and species group	Sawlogs	Pulpwood	Other products ^b	All products
South-Central				
Softwoods	396	85	451	932
Hardwoods	10,703	8,712	633	20,048
Total	11,099	8,797	1,084	20,980
Southeastern				
Softwoods	412	51	449	912
Hardwoods	8,292	6,698	962	15,952
Total	8,704	6,749	1,411	16,864
East-Central				
Softwoods	21	—	62	83
Hardwoods	11,240	4,123	1,389	16,752
Total	11,261	4,123	1,451	16,835
Northeastern				
Softwoods	40	238	1	279
Hardwoods	6,393	230	365	6,988
Total	6,433	468	366	7,267
Western				
Softwoods	8	—	—	8
Hardwoods	9,770	1,266	1,056	12,092
Total	9,778	1,226	1,056	12,100
All units				
Softwoods	877	374	953	2,214
Hardwoods	46,398	21,029	4,405	71,832
Total	47,275	21,403	5,368	74,046

^aDoes not include fuelwood or removals that were not manufactured into industrial products.

^bIncludes cooperage and veneer logs, handle stock, metallurgical wood, mine timbers, posts and piling.

Table 4.—Number of sawmills, by geographic unit and annual production class, Ohio, 1966, 1973, and 1978.

Geographic unit	Production class ^a											
	More than 1 million board feet			Less than 1 million board feet			Idle and custom mills			Total		
	1966	1973	1978	1966	1973	1978	1966	1973	1978	1966	1973	1978
South-Central	9	18	26	31	18	55	19	21	13	59	57	94
Southeastern	7	18	21	16	8	8	21	9	7	44	35	36
East-Central	10	18	17	24	27	16	33	17	27	67	62	60
Northeastern	5	17	27	33	32	9	57	21	21	95	70	57
Western	8	15	29	42	37	20	96	34	30	146	86	79
All units	39	86	120	146	122	108	226	102	98	411	310	326

^aBased on sawlog receipts or reported annual lumber production capacity.

Table 5.—Sawlog production and receipts relationships, by geographic unit, Ohio, between 1973 and 1978.

Geographic unit	Production			Receipts		
	1973	1978	Change	1973	1978	Change
	<i>Million board feet^a</i>	<i>Million board feet</i>	<i>Percent</i>	<i>Million board feet</i>	<i>Million board feet</i>	<i>Percent</i>
South-Central	82.0	85.2	+ 4	69.7	91.9	+32
Southeastern	64.6	55.7	-14	77.1	73.0	- 5
East-Central	92.2	76.4	-17	92.6	81.0	-13
Northeastern	61.5	41.9	-32	68.2	48.2	-29
Western	50.5	62.6	+24	50.7	48.4	- 5
All units	350.8	321.8	- 8	358.3	342.5	- 4

^aInternational 1/4-inch rule.

Table 6.—Sawlog production, by softwoods and hardwoods, geographic unit, and destination of shipments, Ohio, 1978.

(In millions of board feet)^a

Species group and geographic unit	Retained in unit	Logs shipped to:		Total production
		Other units	Other states	
Softwoods				
South-Central	*	2.4	0.1	2.5
Southeastern	2.9	—	—	2.9
East-Central	.1	*	—	.1
Northeastern	.2	—	—	.2
Western	*	*	—	*
Total softwoods	3.2	2.4	0.1	5.7
Hardwoods				
South-Central	73.0	8.3	1.4	82.7
Southeastern	41.0	10.5	1.3	52.8
East-Central	65.8	10.5	—	76.3
Northeastern	35.0	6.1	.6	41.7
Western	42.2	15.5	4.9	62.6
Total hardwoods	257.0	50.9	8.2	316.1
All species	260.2	53.3	8.3	321.8

^aInternational 1/4-inch rule.

*Less than 50,000 board feet.

Table 7.—Sawlog receipts, by softwoods and hardwoods, geographic unit, and destination of shipments, Ohio, 1978.

(In millions of board feet)^a

Species group and geographic unit	Where produced			Total receipts
	In unit	In state	In other states	
Softwoods				
South-Central	*	—	—	*
Southeastern	2.9	2.4	0.3	5.6
East-Central	.1	—	—	.1
Northeastern	.2	*	—	.2
Western	*	—	—	*
Total softwoods	3.2	2.4	0.3	5.9
Hardwoods				
South-Central	73.0	9.3	9.6	91.9
Southeastern	41.0	14.6	11.8	67.4
East-Central	65.8	12.6	2.5	80.9
Northeastern	35.0	12.1	.9	48.0
Western	42.2	2.3	3.9	48.4
Total hardwoods	257.0	50.9	28.7	336.6
All species	260.2	53.3	29.0	342.5

^aInternational 1/4-inch rule.

*Less than 50,000 board feet.

Table 8.—Sawlog production and receipts in the South-Central geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)^a

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
White and red pine	*	0.7	*	0.7	—	—	*
Yellow pine	—	1.7	0.1	1.8	—	—	—
Total softwoods	*	2.4	0.1	2.5	—	—	*
Ash	1.7	0.2	*	1.9	0.2	*	1.9
Aspen ^b	.3	*	—	.3	.1	—	.4
Basswood	.3	.2	*	.5	.1	*	.4
Beech	1.7	.2	*	1.9	.1	*	1.8
Black cherry	.7	.1	—	.8	.1	*	.8
Elm	*	*	*	—	—	—	*
Hickory	2.6	.4	*	3.0	.3	*	2.9
Black locust	.3	*	—	.3	—	—	.3
Hard maple	1.5	.3	.2	2.0	.2	*	1.7
Soft maple	1.1	.2	—	1.3	.3	*	1.4
White oak ^c	21.2	2.2	.3	23.7	3.2	3.0	27.4
Red oak ^d	20.8	2.5	.1	23.4	1.2	2.8	24.8
Other oaks	1.4	.1	—	1.5	.2	*	1.6
Sycamore	.4	.3	—	.7	.2	*	.6
Black walnut	.5	.2	.4	1.1	.2	*	.7
Yellow-poplar	9.6	.8	*	10.4	2.6	2.8	15.0
Other hardwoods	8.9	.6	.4	9.9	.3	1.0	10.2
Total hardwoods	73.0	8.3	1.4	82.7	9.3	9.6	91.9
All species	73.0	10.7	1.5	85.2	9.3	9.6	91.9

^aInternational 1/4-inch rule.

^bIncludes cottonwood.

^cIncludes chestnut oak.

^dIncludes black oak.

* Less than 50 M bf.

Table 9.—Sawlog production and receipts in the Southeastern geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)^a

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
White and red pine	0.9	—	—	0.9	0.8	0.1	1.8
Yellow pine	2.0	—	—	2.0	1.6	.2	3.8
Total softwoods	2.9	—	—	2.9	2.4	0.3	5.6
Ash	1.4	0.2	1.2	2.8	0.7	0.6	2.7
Aspen ^b	.1	.3	—	.4	.1	—	.2
Basswood	.2	.1	—	.3	.1	.2	.5
Beech	1.3	.3	—	1.6	.6	.3	2.2
Black cherry	.6	.2	—	.8	.1	.2	.9
Elm	.1	*	—	.1	.1	.1	.3
Hickory	1.1	.2	—	1.3	.8	.3	2.2
Black locust	.3	*	—	.3	—	—	.3
Hard maple	1.4	.3	—	1.7	.8	.4	2.6
Soft maple	.7	.2	—	.9	.5	.1	1.3
White oak ^c	11.3	3.3	—	14.6	3.5	3.5	18.3
Red oak ^d	12.6	2.0	—	18.1	4.5	3.5	20.6
Other oaks	.3	.1	—	.4	.1	.4	.8
Sycamore	.7	.1	—	.8	.2	.2	1.1
Black walnut	.5	.2	*	.7	.1	.2	.8
Yellow-poplar	4.8	2.7	.1	7.6	1.4	1.5	7.7
Other hardwoods	3.6	.3	—	3.9	1.0	.3	4.9
Total hardwoods	41.0	10.5	1.3	52.8	14.6	11.8	67.4
All species	43.9	10.5	1.3	55.7	17.0	12.1	73.0

^aInternational 1/4-inch rule.

^bIncludes cottonwood.

^cIncludes chestnut oak.

^dIncludes black oak.

*Less than 50 M bf.

Table 10.—Sawlog production and receipts in the East-Central geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)^a

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
White and red pine	0.1	*	—	0.1	—	—	0.1
Other softwoods	*	—	—	*	—	—	*
Total softwoods	0.1	*	—	0.1	—	—	0.1
Ash	2.5	0.7	—	3.2	0.3	*	2.8
Aspen ^b	.5	*	—	.5	.2	—	.7
Basswood	.2	*	—	.2	.1	—	.3
Beech	2.3	.6	—	2.9	.6	*	2.9
Black cherry	3.0	.1	—	3.1	.5	0.5	4.0
Elm	.8	.1	—	.9	.1	*	.9
Hickory	1.1	.4	—	1.5	.2	*	1.3
Black locust	*	*	—	*	*	—	*
Hard maple	3.4	.5	—	3.9	.6	.1	4.1
Soft maple	3.0	.4	—	3.4	.7	.1	3.8
White oak ^c	12.5	2.2	—	14.7	1.9	.5	14.9
Red oak ^d	22.8	4.0	—	26.8	4.2	.9	27.9
Other oaks	.6	.2	—	.8	.1	—	.7
Sycamore	.8	.1	—	.9	.4	*	1.2
Black walnut	.7	*	—	.7	.1	*	.8
Yellow-poplar	5.6	.9	—	6.5	1.0	.2	6.8
Other hardwoods	6.0	.3	—	6.3	1.6	.2	7.8
Total hardwoods	65.8	10.5	—	76.3	12.6	2.5	80.9
All species	65.9	10.5	—	76.4	12.6	2.5	81.0

^aInternational 1/4-inch rule.

^bIncludes cottonwood.

^cIncludes chestnut oak.

^dIncludes black oak.

*Less than 50 M bf.

Table 11.—Sawlog production and receipts in the Northeastern geographic unit, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)^a

Species	Cut and retained in unit	Out-shipments		Total production	In-shipments		Total receipts
		To other units	To other states		From other units	From other states	
Hemlock	*	—	—	*	—	—	*
White and red pine	0.2	—	—	0.2	*	—	0.2
Total softwoods	0.2	—	—	0.2	*	—	0.2
Ash	2.8	0.1	0.6	3.5	1.0	0.1	3.9
Aspen ^b	.2	*	—	.2	*	—	.2
Basswood	.5	—	—	.5	.2	—	.7
Beech	3.3	.2	—	3.5	1.3	—	4.6
Black cherry	1.0	.2	—	1.2	.2	.1	1.3
Elm	.1	.1	—	.2	*	—	.1
Hickory	.8	.2	*	1.0	.2	—	1.0
Black locust	*	—	—	*	*	—	*
Hard maple	3.0	.1	*	3.1	.8	.1	3.9
Soft maple	2.6	.2	*	2.8	.5	.1	3.2
White oak ^c	4.1	1.0	*	5.1	2.3	—	6.4
Red oak ^d	9.8	2.1	*	11.9	3.9	.2	13.9
Other oaks	.3	*	—	.3	.2	—	.5
Sycamore	.7	.1	—	.8	.1	—	.8
Black walnut	.1	*	—	.1	.1	—	.2
Yellow-poplar	2.4	.3	—	2.7	.4	.1	2.9
Other hardwoods	3.3	1.5	—	4.8	.9	.2	4.4
Total hardwoods	35.0	6.1	0.6	41.7	12.1	0.9	48.0
All species	35.2	6.1	0.6	41.9	12.1	0.9	48.2

^aInternational 1/4-inch rule.

^bIncludes cottonwood.

^cIncludes chestnut oak.

^dIncludes black oak.

*Less than 50 M bf.

**Table 12.—Sawlog production and receipts in the Western geographic unit,
by species and destination of shipment, Ohio, 1978.**

(In millions of board feet)^a

Species	Cut and retained in unit	Out-shipsments		Total production	In-shipsments		Total receipts
		To other units	To other states		From other units	From other states	
Hemlock	*	—	—	*	—	—	*
White and red pine	—	*	—	*	—	—	*
Total softwoods	*	*	—	*	—	—	*
Ash	3.2	1.2	0.5	4.9	0.2	0.2	3.6
Aspen ^b	2.3	.2	*	2.5	.1	.2	2.6
Basswood	.6	.2	*	.8	*	*	.6
Beech	1.7	1.5	*	3.2	.2	.1	2.0
Black cherry	.5	.4	*	.9	.1	*	.6
Elm	.2	*	*	.2	—	*	.2
Hickory	1.7	.5	*	2.2	.2	.1	2.0
Black locust	*	—	—	*	—	—	*
Hard maple	2.6	1.3	.3	4.2	.1	.1	2.8
Soft maple	2.6	1.1	.5	4.2	.1	*	2.7
White oak ^c	11.5	2.6	1.8	15.9	.4	.4	12.3
Red oak ^d	9.6	3.9	.6	14.1	.7	.4	10.7
Other oaks	2.2	.2	.5	2.9	*	.6	2.8
Sycamore	1.1	.4	*	1.5	.1	.1	1.3
Black walnut	1.1	.1	.6	1.8	*	1.5	2.6
Yellow-poplar	.7	.8	*	1.5	.1	.2	1.0
Other hardwoods	.6	1.1	.1	1.8	*	—	.6
Total hardwoods	42.2	15.5	4.9	62.6	2.3	3.9	48.4
All species	42.2	15.5	4.9	62.6	2.3	3.9	48.4

^aInternational 1/4-inch rule.

^bIncludes cottonwood.

^cIncludes chestnut oak.

^dIncludes black oak.

*Less than 50 M bf.

Table 13.—Sawlog production and receipts, by species and destination of shipment, Ohio, 1978.

(In millions of board feet)^a

Species	Cut and retained in state	Exported to:			Total production	Imported from:				Total receipts
		Indiana	Pennsylvania	West Virginia		Kentucky	Pennsylvania	West Virginia	Other states	
Hemlock	*	—	—	—	*	—	—	—	—	*
White and red pine	1.9	—	—	*	1.9	*	—	0.1	—	2.0
Yellow pine	3.7	—	—	0.1	3.8	0.1	—	.1	—	3.9
Other softwoods	*	—	—	—	*	*	—	—	—	*
Total softwoods	5.6	—	—	0.1	5.7	0.1	—	0.2	—	5.9
Ash	14.0	0.5	0.6	1.2	16.3	*	0.1	0.6	0.2	14.9
Aspen ^b	3.9	*	—	—	3.9	*	—	—	.2	4.1
Basswood	2.3	*	—	*	2.3	*	—	.2	*	2.5
Beech	13.1	*	—	*	13.1	*	—	.3	.1	13.5
Black cherry	6.8	*	—	—	6.8	*	.4	.4	*	7.6
Elm	1.4	*	—	*	1.4	—	—	.1	*	1.5
Hickory	9.0	*	*	*	9.0	*	—	.3	.1	9.4
Black locust	.6	—	—	—	.6	—	—	—	—	.6
Hard maple	14.4	.3	*	.2	14.9	*	.2	.5	*	15.1
Soft maple	12.1	.5	*	—	12.6	*	.1	.2	*	12.4
White oak ^c	71.9	1.8	*	.3	74.0	2.6	.3	4.1	.4	79.3
Red oak ^d	90.1	.6	*	.1	90.8	2.6	.8	4.1	.3	97.9
Other oaks	5.4	.6	*	.1	5.9	*	—	.4	.6	6.4
Sycamore	4.7	*	—	—	4.7	.1	—	.2	*	5.0
Black walnut ^e	3.4	.6	—	.4	4.4	.6	—	.3	.8	5.1
Yellow-poplar	28.6	*	—	.1	28.7	2.8	.2	1.7	.1	33.4
Other hardwoods	26.2	*	—	.5	26.7	.9	.3	.5	—	27.9
Total hardwoods	307.9	4.8	0.6	2.8	316.1	9.6	2.4	13.9	2.8	336.6
All species	313.5	4.8	0.6	2.9	321.8	9.7	2.4	14.1	2.8	342.5

^aInternational 1/4-inch rule.

^bIncludes cottonwood.

^cIncludes chestnut oak.

^dIncludes black oak.

^eLess than 50 M bf to Kentucky.

*Less than 50 M bf.

Table 14.—Pulpwood production, by softwoods and hardwoods, Ohio, 1954-78^a

(In thousands of rough cords)

Year	All species	Softwoods	Hardwoods
1954	67.6	—	67.6
1955	79.8	—	79.8
1956	95.3	1.1	94.2
1957	116.8	.8	116.0
1958	140.5	.8	139.7
5-year total	500.00	2.7	497.3
1959	165.3	.8	164.5
1960	214.4	1.5	212.9
1961	246.3	.8	245.5
1962	269.0	.7	268.3
1963	299.6	1.8	297.8
5-year total	1,194.6	5.6	1,189.0
1964	332.3	8.7	323.6
1965	313.1	12.2	300.9
1966	375.5	10.4	365.1
1967	336.0	15.1	320.9
1968	266.1	5.7	260.4
5-year total	1,623.0	52.1	1,570.9
1969	299.4	12.2	287.2
1970	343.8	13.4	330.4
1971	360.1	11.3	348.8
1972	327.9	8.6	319.3
1973	369.4	9.1	360.3
5-year total	1,700.6	54.6	1,646.0
1974	376.8	7.3	369.5
1975	279.1	7.3	271.8
1976	383.0	6.3	376.7
1977	462.3	7.1	455.2
1978	371.6	4.7	366.9
5-year total	1,872.8	32.7	1,840.1

^aIncludes production from roundwood and manufacturing residues.

Table 15.—Pulpwood harvest, by softwoods and hardwoods and geographic unit, Ohio, 1964-78.

(In thousands of rough cords)

Species group and geographic unit	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	All years
Softwoods																
South-Central	4.8	6.8	7.3	9.7	4.3	8.9	8.9	6.6	4.8	4.2	1.9	1.7	1.5	1.2	1.0	73.6
Southeastern	3.8	5.2	2.7	4.2	0.9	2.4	4.3	3.1	0.9	0.4	.9	.7	2.3	1.4	.6	33.8
East-Central	—	—	—	—	0.1	*	*	—	*	0.2	—	—	—	—	—	.4
Northeastern	0.1	0.1	0.1	0.2	0.1	0.6	0.2	—	0.7	—	1.3	1.9	2.5	2.4	2.8	13.0
Western	—	—	0.3	1.0	0.3	0.3	—	—	—	—	—	—	—	—	—	1.9
All units	8.7	12.1	10.4	15.1	5.7	12.2	13.4	9.7	6.4	4.8	4.1	4.3	6.3	5.0	4.4	122.6
Hardwoods																
South-Central	103.1	133.5	142.6	142.2	125.4	136.1	128.4	115.7	115.1	109.6	113.5	71.5	122.3	119.5	102.5	1,781.0
Southeastern	49.9	48.6	62.6	55.2	49.4	27.9	55.2	59.2	56.3	43.6	50.0	44.8	65.1	82.5	78.8	829.1
East-Central	56.3	45.4	82.1	31.4	29.4	33.3	26.7	56.1	26.3	39.4	69.9	51.2	60.1	56.4	48.5	712.5
Northeastern	14.1	7.3	6.0	6.1	5.4	6.6	8.0	10.7	9.5	5.0	8.0	1.9	2.4	2.6	3.1	96.7
Western	23.5	25.5	33.0	31.1	17.3	14.8	20.1	24.6	20.2	20.4	15.7	12.0	14.1	20.5	14.5	307.3
All units	246.9	260.3	326.3	266.0	226.9	218.7	238.4	266.3	227.4	218.0	257.1	181.4	264.0	281.7	247.4	3,726.8
All species	255.6	272.4	336.7	281.1	232.6	230.9	251.8	276.0	233.8	222.8	261.2	185.7	270.3	286.7	251.8	3,849.4

*Less than 50 cords.

Table 16.—Veneer log production^a in Ohio, by species and consuming state, 1978.(In thousands of board feet)^b

Species	Cut and retained in state	Exported to:					Total production
		Indiana	Kentucky	Missouri	Ontario	West Virginia	
Ash	26	33	—	2	2	—	63
Aspen	83	—	—	—	—	—	83
Basswood	19	—	—	—	—	—	19
Beech	807	—	—	—	—	—	807
Black cherry	—	27	—	—	—	—	27
Elm	38	—	—	—	17	—	55
Hickory	68	31	—	—	—	—	99
Hard maple	109	9	—	—	6	—	124
Soft maple	175	—	—	—	—	—	175
White oak	808	2,018	—	148	114	570	3,658
Red oak	—	525	57	—	342	—	924
Pecan	425	—	—	—	—	—	425
Sycamore	265	—	—	—	—	—	265
Black walnut	472	429	7	3	1	—	912
Yellow-poplar	52	—	—	—	—	—	52
Other species ^c	28	—	—	—	—	—	28
All species	3,375	3,072	64	153	482	570	7,716

^aVeneer logs that were handled by brokers for overseas shipment are not included.^bInternational 1/4-inch rule.^cIncludes miscellaneous hardwoods such as yellow birch.

Table 17.—Veneer log receipts in Ohio, by species and producing state, 1978.

(In thousands of board feet)^a

Species	Cut and retained in state	Imported from:						Total receipts
		Indiana	Michigan	Mississippi	Tennessee	Wisconsin	Other states ^b	
Hard maple	109	19	116	—	—	—	53	297
White oak	808	68	83	94	362	—	49	1,464
Pecan	425	—	—	—	—	—	—	425
Walnut	472	84	—	—	63	94	150	949
Other species ^c	1,561	—	86	—	—	—	—	1,561
All species	3,375	171	285	94	425	94	252	4,696

^aInternational 1/4-inch rule.^bIncludes Alabama, Arkansas, Illinois, Iowa, Louisiana, Missouri, New York, West Virginia, and Ontario, Canada.^cIncludes ash, aspen, basswood, beech, black cherry, elm, hickory, red oak, black walnut, yellow-poplar, and miscellaneous hardwoods such as yellow birch.

Table 18.—Veneer log production^a and receipts in Ohio, for selected years, 1956-78.

(In thousands of board feet)^b

Year	Production	Receipts
1956	8,731	5,658
1958	8,035	6,086
1960	11,135	6,739
1963	8,449	5,000
1966	6,712	5,648
1968	7,886	4,781
1972	7,200	6,914
1973	5,866	5,874
1976	7,575	3,685
1978	7,716	4,696

^aVeneer logs handled by brokers for overseas shipment are not included.

^bInternational 1/4-inch rule.

Table 19.—White oak cooperage log and bolt production and receipts and number of operating plants in Ohio, for selected years, 1958-78.

(In thousands of board feet)^a

Year	Number of plants	Production	Receipts
1958	4	8,579	8,600
1960	11	13,598	14,735
1962	10	12,427	12,654
1964	12	16,000	17,303
1966	7	11,000	12,838
1973	7	6,372	8,210
1978	4	7,037	8,780

^aInternational 1/4-inch rule.

Table 20.—Source industry and disposition of manufacturing residues, by type of use and type of residue, Ohio, 1978.

(In thousands of cubic feet)

Disposition	Type of residue			All types
	Bark	Coarse ^a	Fine ^b	
LUMBER				
Fiber ^c	191	9,738	38	9,967
Fuel ^d	1,353	3,735	1,297	6,385
Agriculture ^e	2,703	—	5,288	7,991
Other ^f	178	997	40	1,215
Total, used	4,425	14,470	6,663	25,558
Unused	1,933	926	2,940	5,799
VENEER				
Fiber	—	—	—	—
Fuel	49	276	55	380
Agriculture	36	—	61	97
Other	—	—	—	—
Total, used	85	276	116	477
Unused	—	—	—	—
COOPERAGE				
Fiber	—	481	—	481
Fuel	64	—	51	115
Agriculture	—	—	6	6
Other	—	321	—	321
Total, used	64	802	57	923
Unused	95	—	83	178
OTHER INDUSTRIES ^g				
Fiber	—	77	13	90
Fuel	41	206	9	256
Agriculture	15	—	27	42
Other	—	—	—	—
Total, used	56	283	49	388
Unused	74	375	66	515
ALL INDUSTRIES				
Fiber	191	10,296	51	10,538
Fuel	1,507	4,217	1,412	7,136
Agriculture	2,754	—	5,382	8,136
Other	178	1,318	40	1,536
Total, used	4,630	15,831	6,885	27,346
Unused	2,102	1,301	3,089	6,492

^aIncludes slabs, edgings, trimmings, veneer cores, and other material suitable for chipping.

^bIncludes sawdust, shavings, and other material considered unsuitable for chipping.

^cIncludes woodpulp and composite products.

^dIncludes both domestic and industrial fuel.

^eIncludes livestock bedding and farm and horticultural mulch.

^fIncludes small dimension, charcoal wood, chemical wood, and metallurgical chips.

^gIncludes handles, guardrails, and mine timbers; excludes the woodpulp industry.

Table 21.—Volume of unused sawmill residues, by geographic unit, softwoods and hardwoods, and type of residue, Ohio, 1978.

(In thousands of cubic feet)

Geographic unit	Softwoods			Hardwoods			All species		
	Bark	Coarse	Fine	Bark	Coarse	Fine	Bark	Coarse	Fine
South-Central	*	*	*	925	136	1,386	925	136	1,386
Southeastern	86	—	17	603	585	1,138	689	585	1,155
East-Central	—	—	—	139	5	174	139	5	174
Northeastern	5	4	2	99	104	88	104	108	90
Western	*	*	*	76	92	135	76	92	135
Total	91	4	19	1,842	922	2,921	1,933	926	2,940

*Less than 2,000 ft³.

Round Timber Conversions for Major Products

Softwood logs: M bf (International 1/4-inch rule) = 154.0 ft³ =
4.36 m³

Hardwood logs: M bf (International 1/4-inch rule) = 146.8 ft³ =
4.16 m³

Pulpwood: 1 standard cord = 85 ft³ = 2.41 m³ = 0.369 green
tons

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

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 - **Beltsville, Maryland.**
 - **Berea, Kentucky, in cooperation with Berea College.**
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 - **Kingston, Pennsylvania.**
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