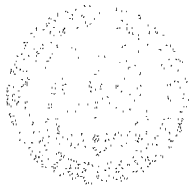
A survey of

Sawmill Residues and Lumber as Raw Materials

for wood-using industries in West Virginia

by Robert M. Frank



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Contents

A LOOK AT OPPORTUNITIES

WEST VIRGINIA has long been a major producer of hardwood lumber. In 1960 about 275 million board feet of hardwood lumber were produced in the State. Other hardwood and softwood sawmill products accounted for an additional 145 million board feet. In all, 420 million board feet of sawmill products were sawed in West Virginia in 1960.

In contrast, other wood-using industries in the State are relatively undeveloped. There are a few secondary wood-using industries, such as flooring and furniture plants. And, besides sawmills, there are a few other primary wood-using plants that produce veneer and charcoal. However, there are no wood-pulp or particle-board plants.

Yet there are opportunities for the introduction and expansion of wood-using industries in West Virginia. Managers of firms in these industries and development agencies in the State are interested in knowing how good these opportunities are.

The availability and cost of materials to wood-using industries influence their opportunities for expansion. Lumber is needed for secondary industries, and sawmill residues can be an important source of material for some types of primary wood-using industries.

To evaluate the opportunities for development of wood-using industries in West Virginia, the Northeastern Forest Experiment Station of the U. S. Forest Service has made a study of the availability and cost of sawmill residues and lumber in West Virginia as raw material. Four areas in West Virginia were selected for evaluation: the Beckley, Elkins, Huntington, and Richwood areas (fig. 1). These areas have been suggested by forestry and economic development officials in West Virginia as four of the more favorable places in the State for expansion of wood-using industries.

Figure 1.—The four areas selected for study. In each case two areas were considered, one including the counties roughly within 25 miles of the city, the other counties roughly within 50 miles.

The reader should bear in mind that the data used in this report are based on a survey made in 1960. Since that time some changes have taken place in the industrial situation in West Virginia, including some changes in markets for wood residues and lumber. In general, though, the conclusions drawn from the survey are still relevant to the current situation.

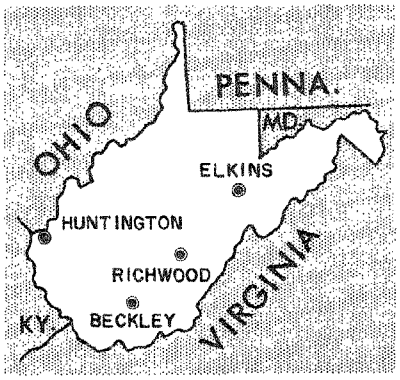
LUMBER FOR FURNITURE AND FLOORING

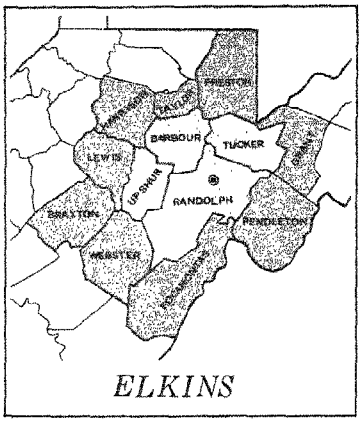
Two of the most important uses of hardwood lumber are for the production of flooring and furniture, including the production of dimension stock, which is used mainly for furniture. The evaluation of raw materials for new flooring and furniture plants depends largely on the present lumber industry in the State.

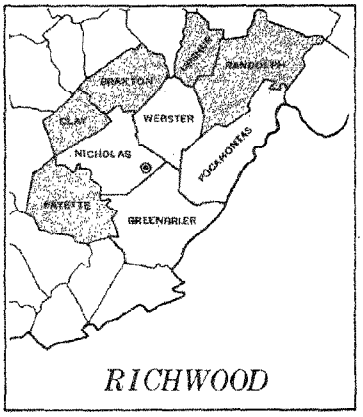
Sawmills in West Virginia are now producing at slightly less than two-thirds of capacity.[1] Approximately two-thirds of the sawmill production is sold to out-of-state markets. Of the volume utilized in West Virginia, about one-half (less than one-fifth of total sawmill output) is sold for remanufacture in flooring and furniture plants.

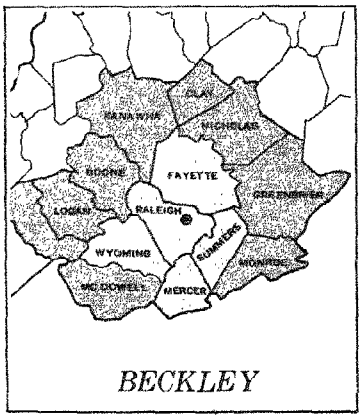
The flooring and furniture industries each require particular grades and species of lumber for use as raw material. At present, most hardwood floors in the United States are being constructed of red oak.[2] Lumber grades No. 2 and

[1] Reid, W. H. and others. PRIMARY WOOD INDUSTRIES OF WEST VIRGINIA. W. Va. Univ. Agr. Expt. Sta. Bull. 461, 35 pp., 1961.
[2] Gregory, G. Robinson. A STATISTICAL INVESTIGATION OF FACTORS AFFECTING THE MARKET FOR HARDWOOD FLOORING. Forest Sci. 6: 123-134, 1960.









25-MILE AREA

50-MILE AREA

3A Common are used most widely in the manufacture of flooring. In furniture manufacture, the species and grade composition of the lumber used is broader. For this use the higher grades (FAS, No. 1, and No. 2 Common) of such woods as hard maple, yellow birch, black cherry, yellow-poplar, and the oaks are generally favored.

This evaluation of the availability and cost of lumber is made with respect to these particular requirements. However, the information presented here is also relevant for other lumber-using industries.

Volume

The volume of lumber production in all four areas is large enough to support remanufacturing facilities at a level substantially above the present level (table 1). In addition, appreciable quantities of ties and heavy mine materials are being produced. Sawmill production figures indicate that the volume of material produced as lumber[3] ranges from 66 percent of the total volume produced by sawmills in the Beckley area to 85 percent in the Huntington and Richwood areas. The total volume of lumber production is greatest in the Beckley and Richwood areas and smallest in the Huntington area.

Species

A major part of the total lumber production is made up of desirable species—oaks, yellow-poplar, hard maple, black cherry, and yellow birch (table 2). Oaks are the major species; they account for 36 percent of the total lumber production and 56 percent of the total production of sawed products other than lumber. Yellow-poplar is next; it makes up an additional 27 percent of the total lumber production. The northern hardwoods account for 15 percent. The species composition is similar for each of the four areas and is

[3] For purposes of this study lumber is defined as a sawmill product less than 4 inches thick.

favorable for supplying both the flooring and furniture industries.

The oaks and other hardwood groups make up a considerable proportion in the production of timbers (table 3). Only a minor part of the maple-cherry-birch group was reported as manufactured into timbers. However, because some of the small sawmills do not segregate production by species, it can be assumed that a part of the production reported for the other hardwoods group consists of these high-value species. Part of the material used in production of timbers is of high enough quality that it could be used in the production of flooring or furniture; this material is a potential source of raw material for remanufactuing.

Quality

Hardwood lumber quality in all four areas is suitable for use in remanufacturing (table 4). This is particularly true with respect to the oak flooring industry requirements. Furniture manufacturers have more demanding grade requirements; nevertheless, large quantities of No. 1 Common and Better lumber of the desired species are available. The lumber quality information in table 4 is based on the grade distribution of lumber only. One may assume that the proportion of material grading No. 2 Common and Poorer would have been greater—perhaps as much as 65 to 75 percent of the total—if all logs passing through the sawmill had been cut into lumber, since much of the structural material is produced from low-grade logs and portions of logs.

Availability

The size of the producing sawmill may affect the availability of lumber to potential buyers. Production of small sawmills is less stable than production from large mills. Small mills may be shut down for long periods each year, particularly during the winter months. Also, larger inventories enable the larger mills to carry a greater variety of species

and grades in substantial quantities. Over half of the lumber production in the Beckley and Richwood areas is from mills that produce more than 2,500,000 board feet per year (table 5). The remainder of the lumber production is about equally divided among the other mill-size classes. In general, ties and heavy mine materials make up a greater proportion of the total cut of small mills than they do at large mills.

Athough it is difficult to make price comparisons from the information that was obtained in this study, lumber prices in West Virginia appear to be competitive with prices in other parts of the Appalachian Region. Prices received in West Virginia (table 6) reflect uses and markets as of 1960. The location of new lumber-using plants in the State would probably have some effect on the lumber price structure.

SAWMILL RESIDUES FOR PARTICLE BOARD AND WOOD PULP

Increasing competition for raw materials has prompted many members of the wood-using industry to take a second look at the so-called wood-waste problem. *Wood residue* is the term now being used to describe the byproducts, such as slabs and edgings, that develop when round logs are converted into square-edged material. Opportunities for profitable utilization of these materials are now an alternative to disposal by burning or dumping.

Species, quantity, and cost of chippable sawmill residues are factors that would be considered by potential buyers of this material for use in producing particle board or wood pulp. Light-weight and light-colored species are generally used in particle-board production. Both the hard hardwoods and soft hardwoods are suitable for some pulping processes. Softwood sawmill residues can be used in both industries. However, at any one location, residues must be available in

sufficient quantities so that efficient handling methods may be used. Finally, the cost of this raw material to the mill must be low enough so it can compete with roundwood.

Volume

About 75 percent of the chippable sawmill residues produced in the four selected areas has been classified as hard hardwoods, about 20 percent as soft hardwoods, and about 5 percent as softwoods (table 7). Thus the volume available to the pulp industry is considerably greater than the volume available to the particle-board industry.

The volume of soft hardwood residues in all areas, with the possible exception of the Huntington area, appears to be sufficiently large to support moderately large-scale particle-board production. However, the volume of residues does not appear to be large enough in any of the areas to support entirely a major pulping facility. Yet, the volume in all areas—again with the possible exception of the Huntington area—is large enough to be considered a major source of raw material to a pulp mill that also uses pulpwood obtained in round form.

Availability

Disposition of chippable sawmill residues—including slabs, edgings, trim, and cull lumber—was as follows in West Virginia in 1960:

	Percent
Not utilized—burned	53
Not utilized—dumped	2
Given away for fuel	4
Given away for manufacture into products	1
Sold for fuel	15
Sold for manufacture into products	12
Used by mill as fuel	12
Used by mill for manufacture into products	1
Total	100

This tabulation shows that direct income was received for only 27 percent of the residues that were produced. About

one-half of this amount was sold for use in charcoal manufacture; a small quantity was sold for use in the ceramic and metallurgical industries. Most residues sold for fuel were purchased for home use—and no expansion of this market is likely. If the 12 percent of the residues used for fuel at the sawmill were sold for other uses, the sawmills would incur a replacement cost for the equivalent in other fuels.

The remaining 60 percent of the residues produces no income for the sawmill owner. In fact, this material still creates a disposal problem. (As shown in the tabulation, 5 percent of the total was given away, which results in an elimination of removal costs and a reduction in fire hazard.) Thus, fairly large quantities of chippable residues would probably be available to new industries in all four areas.

The attractiveness of this supply of residue to potential buyers depends in part on the volume that is available at individual sawmill locations. Sawmills in the largest size class in the Beckley and Richwood areas use nearly half of their production of residues for fuel (table 8). This still leaves, at mills in this size class, substantial quantities that are not utilized or are given away. For all other mill-size classes and areas, the majority of the residues are not now utilized. Stability of supply to the purchaser should not be a problem.

Prices

Prices reported for residues were highest in the Elkins area (table 9). This is probably due to the established charcoal industry in this area. Prices received in other areas were fairly uniform. Differences in reported prices reflect in part services such as cutting-to-length, bundling, and loading. The introduction into these areas of new markets for this material would change the present price structure. For example, material now being used as fuel at the sawmill might be made available for other uses if markets were present. Based on the 1960 structure, prices as low as $1 per ton would enable purchasers to compete for more than half of the total volume of residues.

SUMMARY

The availability and cost of sawmill residues and lumber as raw material in West Virginia are generally favorable for expansion of wood-using industries in the State. Raw-material requirements indicate that there are several opportunities for new flooring and furniture plants that would use lumber produced within the State and for new particle-board and wood-pulp mills that would utilize sawmill residues.

Substantial volumes of lumber from a number of commercially important hardwood species are now being produced in West Virginia. This lumber, a high proportion of which is now being shipped out of the State, could provide raw material for new flooring or furniture plants in West Virginia. Lumber quality and availability are favorable for new plants.

Large volumes of sawmill residues, which could be used in the production of wood pulp or particle board, are produced within the State. Volumes are sufficient to supply new particle-board plants with all necessary raw materials and to supply new wood-pulp mills with an important part of their raw-material requirements. Sixty percent of this material was not being sold or utilized by the sawmills. This material presumably would be available for new plants.

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APPENDIX

I. METHOD OF CONDUCTING SURVEY

Scope

Estimates of lumber and residue production are based on the production of sawmills in the four selected areas in 1960. The selected areas include the counties within approximately 25-mile and 50-mile radii of four towns in West Virginia—Beckley, Elkins, Huntington, and Richwood. The Huntington area includes adjacent sections of Ohio and Kentucky.

Selecting the Sample

The population from which the sample was drawn constituted all sawmills located in the four areas.[4] The list of sawmills was stratified by sawmill size classes. Sample mills were selected at random within each stratification. The proportion of sample mills is greatest in the larger size classes and smaller in the smaller size classes. The total size of the sample was 111 sawmills, including 11 each in Ohio and Kentucky. The 89 mills sampled in West Virginia produced approximately one-third of the volume produced in the State (based on 1957 figures) and accounted for less than 15 percent of the total number of active mills in the areas sampled.

Obtaining the Estimates

Operators of the sample sawmills were interviewed during the summer of 1961 to obtain information on 1960 production. The information obtained in the interviews included production figures, hardwood lumber quality, residue disposition, and lumber and residue prices.

A 1957 canvass of sawmills in West Virginia conducted by the West Virginia Conservation Commission in cooperation with West Virginia University was used as a basis for obtaining 1960 estimates of production. Total 1960 sawmill production in the selected areas in West Virginia was estimated by revising 1957 estimates upward to 1960 on the basis of the present sample of mills. Production figures for counties in Ohio and Kentucky included in this survey are based only upon 1960 information from the sample mills in the area. These figures were expanded on the basis of the proportion of the number of sample mills in each size class to the total number of mills in each size class in these counties. Production classes, based on mill production in 1957, were defined as follows:

Class	*Production (1,000 board feet)*
I	Less than 500
II	500 to 999
III	1,000 to 2,499
IV	2,500 and more

[4] McCauley, Orris D., and Quigley, K. L. MARKETS FOR OHIO TIMBER. U. S. Forest Serv. Central States Forest Expt. Sta. Misc. Release 14, 53 pp., 1957. Also Division of Forestry, West Virginia Conservation Commission DIRECTORY OF SAWMILL OPERATORS IN WEST VIRGINIA, 54 pp., 1959; and unpublished listing prepared by Kentucky Division of Forestry, 1960.

Distribution of species was based on the 1957 canvass. Lumber grade distribution was determined on the basis of 1960 sample mill data. Estimates of grade distribution were obtained for the 50-mile areas; these estimates were then applied to lumber-production figures for the 25-mile areas. Estimates of sawmill output going into lumber and timbers was also based upon 1960 sample-mill data.

Quantities of chippable residue produced were based on estimates of sawmill production. Necessary conversion factors were obtained from a study conducted in Maryland, but based on species similar to those found in West Virginia.[5]

[5] Simmons, Fred C., and Bond, A. R. SAWMILL WASTE IN MARYLAND. U. S. Forest Serv. Northeast. Forest Expt. Sta., Sta. Paper 74, 31 pp., illus., 1955.

II. TABULAR DATA

Table 1.—*Production of lumber and timbers, 1960*
(In millions of board feet)

Area	Product		
	Lumber	Timbers[1]	Total
Beckley			
Within 25-mile area	70	31	101
Within 50-mile area[2]	155	79	234
Elkins			
Within 25-mile area	35	7	42
Within 50-mile area	95	23	118
Huntington			
Within 25-mile area	13	3	16
Within 50-mile area	46	8	54
Richwood			
Within 25-mile area	77	14	91
Within 50-mile area	144	28	172

[1] Ties, mine timbers and other timbers, dimension stock, and miscellaneous sawmill products 4 inches thick and thicker.

[2] Volumes for 50-mile area include volumes for 25-mile area. Areas are defined to include counties within roughly 25 miles and 50 miles of the central towns. Because parts of the areas overlap, the figures are not cumulative.

Table 2.—*Lumber production by species groups, 1960*[1]

(In millions of board feet)

Area	Red oaks	White oaks	Poplar, basswood, cucumber	Maple, cherry, birch	Other hardwoods	Softwoods	All species
Beckley							
25-mile area	16	8	19	7	11	9	70
50-mile area[2]	36	18	41	22	22	16	155
Elkins							
25-mile area	9	3	10	6	7	(3)	35
50-mile area	25	11	23	15	15	6	95
Huntington							
25-mile area	3	2	3	2	3	(3)	13
50-mile area	14	4	16	3	7	2	46
Richwood							
25-mile area	14	9	14	19	9	12	77
50-mile area	31	16	36	28	18	15	144

[1] Sawmill products less than 4 inches thick.
[2] Volumes for 50-mile area include volumes for 25-mile area.
[3] Less than 500,000 board feet.

Table 3.—*Production of timbers, by species groups, 1960*[1]
(In millions of board feet)

Area	Red oaks	White oaks	Poplar, basswood, cucumber	Maple, cherry, birch	Other hardwoods	Softwoods	All species
Beckley							
25-mile area	10	6	3	1	10	1	31
50-mile area[2]	27	15	8	3	24	2	79
Elkins							
25-mile area	11	1	([3])	1	1	([3])	23
50-mile area	10	5	1	2	3	2	23
Huntington							
25-mile area	1	1	([3])	([3])	1	([3])	3
50-mile area	3	1	([3])	([3])	3	([3])	8
Richwood							
25-mile area	5	3	1	1	3	1	14
50-mile area	12	6	2	1	6	1	28

[1] Ties, mine timbers, and other timbers, dimension stock, and other miscellaneous sawmill products 4 inches thick and thicker.
[2] Volumes for 50-mile area include volumes for 25-mile area.
[3] Less than 500,000 board feet.

Table 4.—*Hardwood lumber production, by grades,*[1] *1960*
(In millions of board feet)

Area	FAS, FAS-IF, saps, and selects	No. 1 Common	No. 2 Common and Poorer	All classes
Beckley				
25-mile area	10	20	31	61
50-mile area[2]	24	46	69	139
Elkins				
25-mile area	5	9	21	35
50-mile area	11	22	56	89
Huntington				
25-mile area	2	3	8	13
50-mile area	6	11	27	44
Richwood				
25-mile area	11	20	34	65
50-mile area	22	39	68	129

[1] Includes lumber that was not graded. Grade distribution of ungraded lumber based on information from concentration yards included in sample.
[2] Volumes for 50-mile area include volumes for 25-mile area.

Table 5.—*Sawmill production by products and mill-size class, for 50-mile areas, 1960*

(In millions of board feet)

Area and product	Mill size class, in 1,000 board feet				
	Less than 500	500-999	1,000-2,499	2,500 or more	All classes
Beckley					
Lumber	31	27	15	82	155
Timbers	12	24	37	6	79
Elkins					
Lumber	22	15	32	26	95
Timbers	7	6	6	4	23
Huntington					
Lumber	16	5	21	4	46
Timbers	3	2	2	(1)	8
Richwood					
Lumber	34	18	12	80	144
Timbers	8	2	14	4	28

[1] Less than 500,000 board feet.

Table 6.—*Lumber prices for selected hardwood species and grades, 1960*

(Dollars per 1000 board feet)
(Basis: f.o.b. sawmill, 4/4-inch rough, green to air-dry)

Species	Grade class				
	FAS, FAS-IF, saps, and selects	No. 1 Common	No. 2 Common	No. 2 Common and Poorer	No. 3 Common and Poorer
Red oak					
Range	144-197	91-101	55-64	..	30-54
Average	163	95	58	..	40
White oak					
Range	155-220	86-111	53-64	..	30-54
Average	174	92	57	..	40
Hard maple					
Range	218-247	143-162	..	56-74	..
Average	228	151	..	65	..
Black cherry					
Range	238-281	160-190	..	61-92	..
Average	254	175	..	79	..
Yellow-poplar					
Range	151-184	103-121	..	61-76	..
Average	162	110	..	64	..
Beech					
Range	130-143	101-113	..	46-58	..
Average	137	109	..	52	..

Table 7.—*Production of chippable residues, by species group, 1960*[1]
(In thousands of tons, oven-dry)

Area	Hard hardwoods	Soft hardwoods	Softwoods	All species
Beckley				
25-mile area	50	14	4	68
50-mile area[2]	117	31	9	157
Elkins				
25-mile area	22	6	(3)	28
50-mile area	61	14	4	79
Huntington				
25-mile area	10	2	(3)	12
50-mile area	26	9	1	36
Richwood				
25-mile area	40	9	6	55
50-mile area	81	22	7	110

[1] Slabs, edgings, trim, and cull lumber.
[2] Volumes for 50-mile area include volumes for 25-mile area.
[3] Less than 500 tons.

Table 8.—*Production of chippable residues*[1] *by mill-size class and present use class, 1960*

(In thousands of tons, oven-dry)

Area[2] and mill-size class (in 1,000 board feet)	Present use class			
	Given away or not utilized	Sold	Burned as boiler fuel or manufactured into products	All classes
Beckley				
Less than 500	4	25	([3])	29
500-999	24	10	([3])	34
1,000-2,499	23	11	1	35
2,500 or more	24	4	30	58
Elkins				
Less than 500	13	6	1	20
500-999	8	5	([3])	13
1,000-2,499	18	8	([3])	26
2,500 or more	16	([3])	4	20
Huntington				
Less than 500	11	2	([3])	13
500-999	4	1	([3])	5
1,000-2,499	13	2	([3])	15
2,500 or more	3	([3])	([3])	3
Richwood				
Less than 500	21	6	([3])	27
500-999	5	7	1	13
1,000-2,499	11	6	([3])	17
2,500 or more	26	7	21	54

[1] Slabs, edgings, trim, and cull lumber.
[2] 50-mile areas.
[3] Less than 500 tons.

Table 9.—*Residue price ranges and averages, 1960*
(Basis: f.o.b. sawmill, green)

Area	Unit of measure	Price (in dollars)	
		Average	Range
Beckley	Ton	1.50	0.60-4.00
	Standard cord	3.00	1.50-4.00
Elkins	Ton	1.75	1.00-2.00
	Standard cord	4.00	.50-15.00
Huntington	Ton	2.00	1.00-10.00
	Standard cord	2.50	1.25-3.50
Richwood	Ton	1.25	.60-3.00
	Standard cord	2.50	.50-4.00