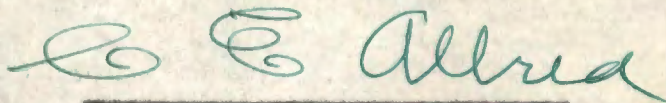


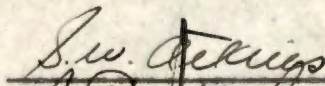
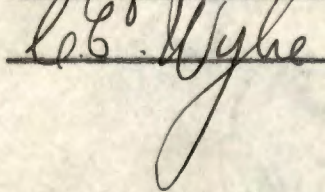
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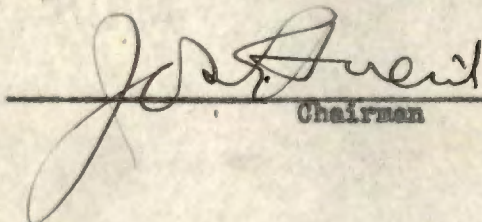
I submit herewith a thesis written by Mr. Frank M. Fitzgerald and entitled "History, Present Status, and Methods of Marketing Tennessee Forest Products", and recommend that it be accepted for eighteen quarter hours credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.


Major Professor

At the request of the
Committee on Graduate Study,
we have read this thesis,
and recommend its acceptance.

Accepted by the Committee


Chairman

**HISTORY, PRESENT STATUS, AND METHODS OF MARKETING
TENNESSEE FOREST PRODUCTS**

-0-

A THESIS

**Submitted to the Graduate Committee
of
The University of Tennessee
in
Partial Fulfillment of the Requirements
for the degree of
Master of Science**

by

FRANK M. FITZGERALD

August, 1936

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INTRODUCTION

Scope of Study

This is a preliminary study of Tennessee's forest situation, having as one of its major objects a reconnaissance survey of the literature dealing with the history, present status, and marketing of forest products.

The first part of this study deals with the history and present status of the timber industry in both Tennessee and the United States and is intended to furnish a background for the marketing study which follows.

Part II is confined to the marketing of timber products, including such phases as marketing channels, industrial demands for the various classes and species of timber, and the methods of estimating quantities of timber. Additional information on lumber grades and specifications, prices, and items of cost in marketing timber has been compiled but are not included in this report. These phases, together with a more detailed study of the methods of marketing forest products in Tennessee, will provide a basis for a future report.

A directory of timber dealers in Tennessee and in bordering counties of adjoining states has been compiled and is available in the

files of the Department of Agricultural Economics, University of Tennessee.

Need of Study

The forest industry of Tennessee is one of the major industries of the state, furnishing direct employment to a large portion of the population besides distributing its benefits indirectly to many others. In certain rural areas, the importance of the wood industries is dominant, the major part of the population being dependent on the purchasing power of those engaged in these industries.

The state and federal governments provide current marketing information for cotton, tobacco, and other crops, some of which are common only to certain sections of the state. However, for farm timber which is found on practically every farm in Tennessee, no such information exists. As a result many farmers have been forced to market their timber at the mercy of the timber dealer. Instances are numerous where farmers have disposed of their timber holdings at a price far below the actual wood value; whereas, had information similar to that published for the other crops been available, he could have marketed his woodland products to a better advantage.

Sources of Information

This report is based principally on a large number of secondary sources, such as the reports on manufactures of the Bureau of the Census; Agricultural Yearbooks, U. S. Department of Agriculture; various

publications of the Forest Service, U. S. Department of Agriculture, and of state agricultural colleges and experiment stations. A limited amount of information has been collected by interviews with certain well-informed persons.

PART I

CRANES



JAPANESE LINEN

MADE IN U.S.A.

CHAPTER I
DEVELOPMENT OF THE TIMBER INDUSTRY IN TENNESSEE AND THE
UNITED STATES

Over three hundred and fifty years ago, when De Soto and his band of adventurous Spaniards cut their way through the dense forest growth of West Tennessee to reach the Mississippi River near the present site of Memphis, Tennessee was covered by a forest area estimated at 25,600,000 acres, or 92 per cent of the total land area of the State.⁽¹⁾ As is true now, nearly every variety of timber found in the United States grew in this forest, due largely to the wide range of elevation and the consequent diversity of climate. Some portions of West Tennessee, particularly Dyer, Obion, Tipton, and Shelby counties, possessed forests of such magnificence that they were unsurpassed in any other part of the United States. We are told by historians that on the rich soils of this section the oak, the sassafras, and the poplar, stimulated into amazing growth by the prevailing humidity and hot suns, attained a size second only to the giant redwoods of California.⁽²⁾

(1) Gould, Clark W., and Hu Maxwell, Wood Using Industries of Tennessee, p. 25.

(2) Killebrew, J. B., Resources of Tennessee, p. 71.

However, it was not until the beginning of the nineteenth century, when the real settlement began along the fertile valleys of East Tennessee, that the immense timber resources of our state were recognized.⁽³⁾ During the early settlement of Tennessee lumbering was recognized as an agricultural industry, both in organization and in character, and it came to be considered as one of the plantations' leading industries.⁽⁴⁾ On many of the large plantations the manufacture of lumber became a winter industry supplementary to the production of cotton, tobacco, and other staple crops. In the alluvial valleys of the Mississippi River and its tributaries, timber was sawed into planks by means of water powered sawmills, which were operated during the three or four months of high water. Occasionally the slaves were sent up stream to cut timber and raft the logs down to either the plantation's sawmills or to New Orleans.

Some Pioneer Lumber Firms

The lumber industry of this state owes its early growth to the pioneer lumbermen of East Tennessee. E. M. Speers and George R. Murray became known as the handlers of the celebrated "Hawkins County Poplar", which was cut within a twenty-mile radius of Rogersville. Two large pioneer firms were also located at Newport, the earliest of which was the W. R. Swagerty Company. Mr. Swagerty was later assisted by his son-in-law, T. M. Eubanks, and together they operated eight or more portable sawmills.

(3) Gould and Maxwell, op. cit., p. 25.

(4) Gray, L. C., History of Southern Agriculture, p. 74.

From a virgin stand in Spruce Flats, in Sevier County, this firm manufactured some of the finest poplar lumber ever cut in Tennessee. Here, some of the poplar logs measured over eight feet in diameter and had to be split in order to be run on the portable sawmill. The second early lumber company located at Newport, was the Scottish Carolina Lumber and Land Company, organized by Alce A. Arthur with capital procured from Glasgow, Scotland, and Cape Town, South Africa.⁽⁵⁾ This company brought hundreds of French Canadians to East Tennessee and Western North Carolina where rather extensive lumbering operations were employed. An expensive boom was constructed on the Pigeon River near the firm's large Newport mill, but during high water it broke and many of the company's logs were lost, which ultimately resulted in the bankruptcy of the firm. Mr. Arthur then moved to Knoxville and reorganized under the firm name of Alexander Lumber Company. Later he moved to Middlesboro, Kentucky, and organized another firm with English capital.

The D. M. Rose and the Vestal Lumber and Manufacturing Companies, both of which are in business at the present time, led in the early lumbering around Knoxville. Other early East Tennessee lumber firms were the J. A. Wilkinson Company of Bristol; the Pittsburg Lumber Company of Braemar, Tennessee; the Knoxville Sawmill Company; and others which have since gone out of business.

The first Tennessee firm to export timber to Europe was the Saxon and Company operated by H. N. Saxton, a young Englishman, and his cousin, F. W. Barth of Bremen, Germany. They confined their early business to poplar

(5) Eubanks, F. C., Early Lumbering in East Tennessee, p. 100.

and walnut logs, many of which averaged five feet in diameter at the small end. During the German Exposition this firm exhibited two logs, one measuring eight feet and the other nine feet in diameter at the small end. The Saxton Company is still conducting a wholesale commission export lumber business at Knoxville. ⁽⁶⁾

Early Timber Markets of Tennessee

Prior to the Civil War Tennessee's exports of wood products were confined chiefly to vast quantities of rivited white oak staves, which were produced along the Mississippi Delta of West Tennessee and its tributaries and shipped to agents of French wine growers and German brewers at New Orleans. Also millions of feet of cedar, grown in middle Tennessee, were shipped to Louisiana to be made into crossties. ⁽⁷⁾ However, following the Civil War the increased production of the wood industries in this country gave rise to demands for other wood products, which resulted in the rapid growth of lumbering within the state. The early demand for Tennessee's hardwoods on the eastern markets, however, was largely confined to poplar, our leading commercial wood, and to a less extent black walnut. Other hardwoods could be furnished much more cheaply by Indiana and Ohio due to more favorable freight rates. By 1870, millions of board feet of poplar lumber was being shipped annually by rail to Cincinnati, New York, and New England Markets, ⁽⁸⁾ and locally it was used more in the construction of houses than any other wood. ⁽⁹⁾ Many of the poplar trees cut within the state at

(6) Babanks, op. cit., p. 100.

(7) Killebrew, op. cit., p. 83.

(8) Babanks, op. cit., p. 100.

(9) Killebrew, op. cit., p. 83.

this early period, each turned out ten thousand or more board feet of lumber. (10) By 1870, fifteen million board feet of poplar logs were being floated down the Cumberland River annually in rafts to Nashville and from there they were distributed to local and distant markets. Black walnut timber was sought after especially by the Singer Sewing Machine Company, who bought this wood far in advance of their needs at a price considerably less than that paid for stumps later on.

As early as 1870, the demand of farmers and exporters had nearly exhausted the supply of cedar in Davidson, Williamson, Sumner, and Rutherford Counties. At this time our best cedar forests were located in Marshall, Wilson, Bedford, and Maury Counties in an area covering in aggregate three hundred square miles. From this stand more than seven hundred thousand board feet of cedar was being shipped annually to St. Louis to be used for fencing purposes, and large numbers of telegraph poles were shipped from Nashville by every railroad. At this time the average annual consumption of Tennessee cedar by the bucket factories amounted to five million board feet. According to Killebrew, some of the solid cedar logs cut in Marshall and Bedford Counties would square twenty-four inches for a distance of over thirty feet. (11)

Following the Civil War, our annual shipments of white oak staves from Hardin, Wayne, Perry, Humphreys, and Stewart Counties amounted to 1,625,000 in number. Also, additional white oak lumber produced in these and surrounding counties was shipped to Memphis and to Paducah, Kentucky. (12)

(10) Eubanks, op. cit., p. 100.

(11) Killebrew, op. cit., p. 74-75.

(12) Ibid., p. 83.

By the turn of the century, sawmills were located in all but four counties -- Jackson, Clay, Hancock, and Cooke. Timber logged or cut in these counties was usually rafted to large markets where the logs often brought more money than the merchantable timber in them would have brought had it been sawed at home.

As late as 1900, ninety per cent of the lumber was shipped from this state to distant points in the rough. (13)

Transportation

The timber industry in Tennessee has witnessed three stages of the development of transportation, namely; waterway, railway, and motor trucks.

The waterways provided the earliest form of transportation. This type of transportation was in vogue during the early development of the State, before the advent of railroads and highways, when the early settlers were forced to rely upon the streams to furnish outlets for the marketing of their farm and forest products. (14) During this period of lumbering, the mill operator could raft logs from a considerable distance with comparatively little effort or expense. Some of the disadvantages encountered in this early period, however, were that only those stands near the streams could be harvested, and, since few of our streams furnished navigation at low water, it was often necessary to wait until rains for suitable boating stages. Still another disadvantage was that heavy hardwoods which would not float could not be transported in this way.

However, with the advent of the railroad during the latter half of the

(13) Killebrew, *op. cit.*, p. 83.

(14) Secretary of War, Inland Water Transportation in Tennessee, p. 227.

nineteenth century, water transportation for most farm products was discontinued to a large extent. Nevertheless, the rivers and other navigable streams continued to be used for transporting timber. To a considerable extent, however, forest products were also diverted to the railroads, and by 1926 the only tributaries of the Tennessee River on which there was any commerce were the Holston, French Broad, Little Tennessee, Clinch, Hiwassee, Duck, and Buffalo Rivers. Table I shows that the Buffalo River carried a timber cargo in 1926 far more valuable than those moved on all the other tributaries of the Tennessee combined.

TABLE I. WATER TRANSPORTATION OF TIMBER PRODUCTS IN
TENNESSEE, 1926

River (15)	Product	Tonnage, number	Value
Holston	Rafted logs	945	\$9,450
Little Tenn.	Timber products	575	3,750
Clinch	Logs and crossties	13,107	148,350
Hiwassee	Rafted logs and crossties	1,000	Not given
Duck	Crossties	21,150	315,000
Buffalo	Crossties	51,718	775,770

Source: Secretary of War, Tennessee River and Its Tributaries, North Carolina, Tennessee, Alabama, and Kentucky, p. 57.

The construction of railroads during the latter half of the 19th Century brought about another change in the development of the lumber industry in Tennessee. This new means of transportation opened to the lumber industry

(15) At present time there is no commerce carried on over the Powell River, although in the past farm and forest produce have been floated over this stream in high water.

vast areas of virgin timber formerly inaccessible, and in many sections of the State, particularly in the upper valley of East Tennessee, lumbering became the principal industry.⁽¹⁶⁾ By the latter part of the nineteenth century the railroads were carrying the bulk of our timber products, whereas water transportation was obtaining only minor consideration. It was during this period of railroad expansion that our best timber was cut for market. The East Tennessee and Georgia Railway incorporated in 1836 was the first successful steam railroad to operate in Tennessee, and by 1859 this state had 1211 miles of railway, with 748 miles in operation.⁽¹⁷⁾ Between 1860 and 1920 the railway mileage in Tennessee increased from 1243 to 4078. However, since 1920 there has been a slight decline in railway mileage in this state.⁽¹⁸⁾

At the present time the lumber industry is undergoing its third stage of development, namely the transportation of wood products by motor truck. Today, our widespread network of county, state, and federal highways covering practically every section of Tennessee, makes available forest areas formerly not accessible to water or rail transportation. Although the majority of our short hauls are being taken care of by motor trucks, long hauls are still confined principally to the railroads. Some of the advantages of motor truck over water and railroad transportation are: it makes available a much wider area; requires less handling of the timber since loading and unloading the freight car is dispensed with; less than carload lots may often be shipped cheaper; and certain necessary farm commodities such as feed, fertilizer, etc., may be brought home on the return trip.

(16) T.V.A., Forestry Division, Forestry Possibilities in Pickwick Region, p. 4.

(17) Scotts, S.E.A., School History of Tennessee, p. 40.

(18) Ibid., p. 45.

Geographic Shifts of the Lumber Industry in
the United States

Since the beginning of the lumber industry in this country, five geographic sections of the United States have been at some time or other the principal source of our timber supply (Figure 1). It seems that those stands nearest the centers of wood consumption were the first to be exploited, whereas the more distant and inaccessible regions were left until later when the timber in the other sections had become virtually exhausted. Today, practically all of the virgin timber stands of the nation have been cut over with the exception of the West Coast, which is at the present time the leading timber producing area.

The Northeastern region (referred to as Northern in Figure 1) composed of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont, was the most important lumber producing region in this country from Colonial times up until 1869, when it produced four and one-half billion board feet of lumber, or 35.7% of the total national production. However, since 1869 this region has experienced a steady decline reaching its lowest limit in 1933 with a production of only four hundred and sixteen million board feet of lumber, or 2.8% of the U. S. total (Figure 1 and Table II). The earliest recognition and development of the timber industry in this country occurred in New England where the tall pines and sturdy oaks were utilized in the construction of ships for His Majesty's

Navy. As early as 1623 a sawmill was reported in operation in York, Maine. New England's early lead in the timber industry may be attributed to its excellent timber stand, its facilities for water transportation and the relative unadaptability of its soil for agricultural purposes. As the demands of the growing timber industries in this section exceeded the available timber supply, the lumber industry moved westward into New York and Pennsylvania. In 1850 New York furnished one-fourth the lumber cut in the United States for that year. However, so rapid and destructive was the lumbering process carried on that by 1855, New York had ceased to be a leading timber export state and was depending on Michigan for her higher grades of lumber. Pennsylvania reached the peak of her lumber production somewhat later than New York, 1860, and by 1870 she was also importing lumber from Michigan.⁽¹⁹⁾

When the states of the Northeast could no longer satisfy the demands of the growing wood industries, the timber resources of the Lake States were called upon to meet these needs. Minnesota, Wisconsin, and Michigan took the lead in lumber production from the Northeastern states between 1870 and 1880 and continued to hold this lead until the turn of the century, when their timber supply became greatly reduced and the lumber industry moved southward into the Southern States (Figure 1). In 1879 the Lake region reached its peak as a lumber producing section with a cut of six and three-tenths billion board feet, or 34.7% of the nation's production. In 1889 the Lake States cut eight and three-tenths billion board feet of lumber which represented 34.6% of the total U. S. production,

(19) Campbell, A. Stewart, Lumber Industry, p. 9-11.

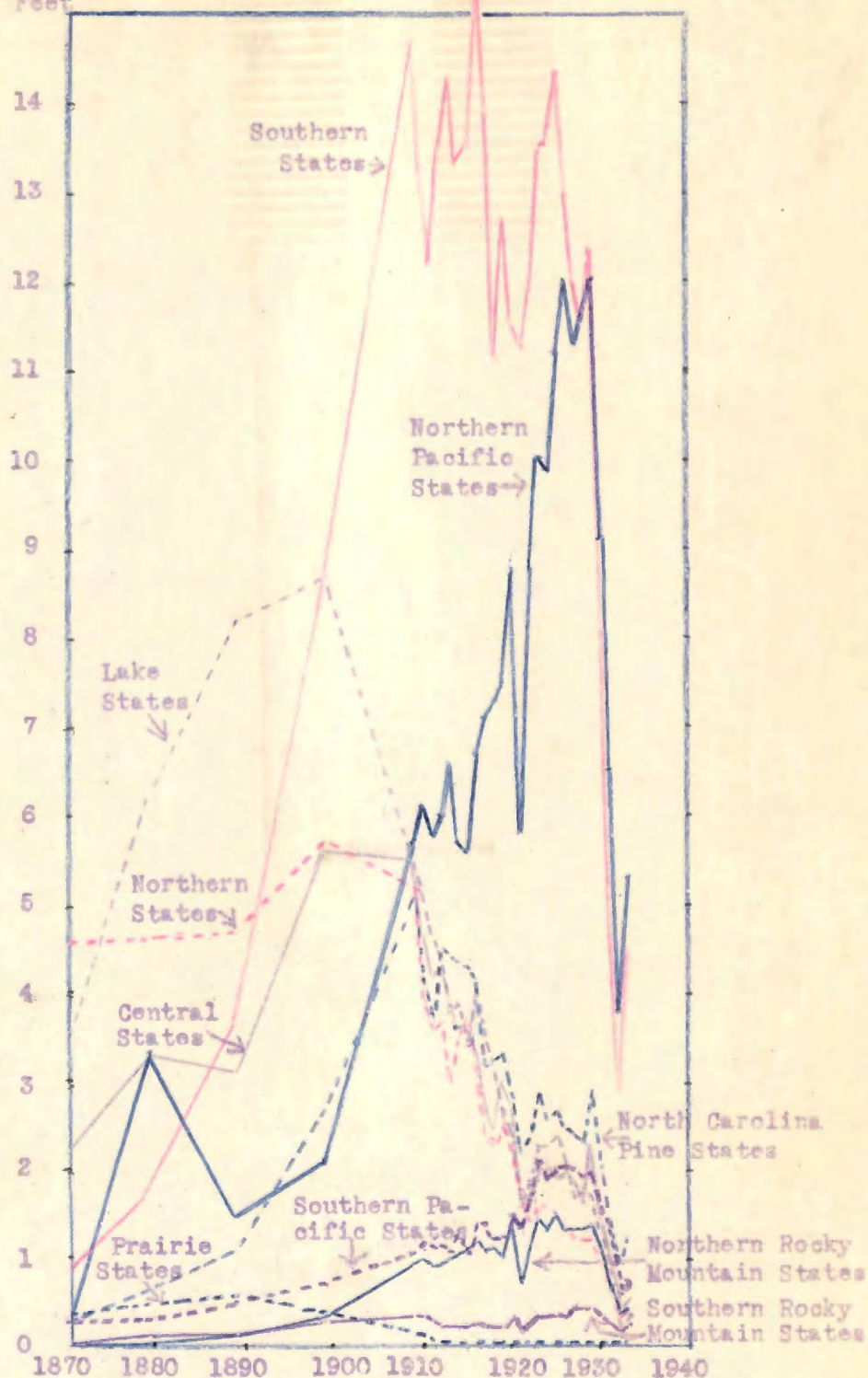


Figure 1. Total Lumber Production, by regions for specified years, 1869-1933.

Source: U. of Fla. Pub. II, "The Lumber Ind.", p. 28 (1869-1930).
U.S.D.A. Yearbook, 1935, p. 710 (1931-33).

TABLE II. TOTAL LUMBER PRODUCTION BY REGIONS FOR SPECIFIED YEARS, 1869-1933 (1)

Year	Northeastern States		Central States		Southern States		North Carolina Pine States		Lake States		North Pacific States		South Pacific States		North Rocky Mtn. States		South Rocky Mountains		Prairie	
	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.	Million bd. ft.	Pot. U.S.
1869	4,557	35.7	2,284	17.9	923	7.2	364	2.9	3,592	28.2	204	1.6	354	2.8	14	.1	45	.4	417	3.3
1879	4,643	25.7	3,349	18.5	1,755	9.7	744	4.1	6,279	34.7	337	1.9	326	1.8	40	.2	114	.6	505	2.8
1889	4,726	19.8	3,130	13.1	3,718	15.6	1,129	4.7	8,251	34.6	1,510	6.3	518	2.2	117	.5	132	.6	612	2.6
1899	5,709	16.3	5,643	16.1	8,404	24.0	2,712	7.7	8,750	24.9	2,164	6.2	738	2.1	321	.9	235	.7	401	1.1
1909	5,197	11.7	5,487	12.3	14,796	33.2	5,177	11.6	5,476	12.3	5,762	12.9	1,144	2.6	954	2.1	338	.8	179	.4
1910	3,954	9.9	4,675	11.7	13,249	33.1	4,184	10.5	5,030	12.6	66,182	15.4	1,255	3.1	1,065	.8	320	.8	104	.3
1911	5,635	9.8	4,238	11.5	12,222	33.0	5,743	10.1	4,714	12.7	5,868	15.9	1,208	3.3	994	2.7	297	.6	85	.2
1912	3,713	9.5	4,338	11.1	13,538	34.6	4,580	11.7	4,424	11.3	6,016	15.4	1,203	3.1	986	2.5	270	.7	90	.2
1913	3,097	8.1	3,931	10.2	14,329	37.3	3,983	10.4	3,866	10.1	6,691	17.4	1,183	3.1	1,011	2.6	236	.6	60	.2
1914	3,553	9.5	3,621	9.7	13,384	35.8	4,417	11.8	3,918	10.5	5,764	15.4	1,303	3.5	1,081	2.9	258	.7	46	.1
1915	3,775	10.2	3,670	9.9	13,590	36.7	4,390	11.9	3,410	9.2	5,640	15.2	1,130	3.1	1,105	3.0	244	.7	58	.2
1916	3,115	7.8	3,315	8.3	15,325	38.5	4,292	10.8	4,050	10.2	6,716	16.9	1,420	3.5	1,234	3.1	290	.7	50	.1
1917	2,488	7.0	2,665	7.4	13,900	38.8	3,265	9.1	3,525	9.8	7,154	20.0	1,417	4.0	1,110	3.1	261	.7	47	.1
1918	2,374	7.4	2,490	7.8	11,135	34.9	2,640	8.3	3,220	10.1	7,313	22.9	1,227	4.0	1,143	3.6	274	.8	52	.2
1919	2,584	7.5	3,016	8.7	12,704	36.8	3,374	9.8	2,692	7.8	7,539	21.8	1,259	3.6	1,053	3.0	246	.7	85	.2
1920	2,198	6.5	2,735	8.1	11,490	34.0	2,872	8.5	2,386	7.1	8,842	26.2	1,513	4.5	1,390	4.1	319	.9	64	.2
1921	1,797	6.7	1,647	6.1	11,322	42.0	2,208	8.2	1,784	6.6	5,654	21.7	1,350	5.0	757	2.8	196	.7	46	.2
1922	1,423	4.5	1,762	5.6	11,975	37.9	2,409	7.6	1,944	6.2	8,860	23.1	1,721	5.5	1,161	3.7	269	.9	45	.1
1923	1,631	4.4	2,045	5.5	13,524	36.4	2,937	7.9	2,392	6.4	10,644	28.6	2,118	5.7	1,500	4.0	311	.8	63	.2
1924	1,619	4.5	2,037	5.7	13,593	37.8	2,646	7.4	2,338	6.5	9,933	27.6	1,996	5.6	1,368	3.8	332	.9	69	.2
1925	1,507	3.9	1,969	5.1	14,418	37.6	2,730	7.1	2,445	6.4	11,244	29.3	2,043	5.3	1,529	4.0	391	1.0	63	.2
1926	1,409	3.8	1,987	5.4	13,003	35.2	2,568	7.0	2,047	5.5	12,001	32.5	2,188	5.9	1,326	3.6	343	.9	63	.2
1927	1,231	3.6	1,829	5.3	12,068	34.9	2,408	7.0	1,795	5.2	11,319	32.8	2,071	6.0	1,320	3.8	428	1.2	64	.2
1928	1,210	3.5	1,663	4.9	11,588	33.9	2,390	7.0	1,803	5.3	11,677	34.3	1,953	5.7	1,365	4.0	424	1.2	68	.2
1929	1,232	3.3	2,347	6.4	12,484	33.8	2,979	8.1	1,771	4.8	12,086	32.8	2,063	5.6	1,418	3.8	425	1.2	81	.2
1930	994	3.8	1,567	5.2	8,140	31.3	1,526	7.7	1,326	5.1	9,156	35.2	1,514	5.8	1,137	4.4	325	1.2	73	.5
1931	603	3.6	820	5.7	4,722	28.6	1,262	7.9	712	4.3	6,532	39.5	958	5.5	658	4.0	215	1.3	37	.2
1932	389	3.3	416	4.1	2,973	29.3	964	9.1	289	2.8	3,865	38.1	681	6.7	359	3.5	195	1.9	20	.2
1933	416	2.9	530	3.8	4,510	32.3	1,255	8.9	395	2.7	5,362	38.4	785	5.6	441	3.1	232	1.7	34	.2

Source: University of Florida, Pub. II, The Lumber Industry, p. 28 (1869-1930)
U. S. D. A. Yearbook, 1935, p. 710 (1931-33)

and in 1899 the same district turned out 24.9% of the total lumber produced or eight and eight-tenths billion board feet. By 1909 this section was producing only 12.3% of our lumber supply, and since 1909 has steadily declined until in 1933 it was producing only 2.7% of the total lumber cut in the United States. In the exploitation of the timber resources of this region, the most careless and destructive lumbering practices were followed with the result that, in the state of Michigan alone, over nine million acres of tax delinquent forest land, or more than one-fourth of the total land area of that state, has been taken over by the state government. (20)

The fourth region to be developed was the south, which includes for this study the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, and Texas. Although some timber was cut prior to the Civil War, it was not until after 1870 that the lumber industry in this section began to develop on a large scale. During the nineties the demand for southern pine increased rapidly and by the end of the century yellow pine was our leading softwood. The peak of the South's lumber production came in 1916 when over fifteen billion board feet of lumber was cut. This was 38.5% of the total of cut lumber for that year. However, in 1921 she reached her most dominant position in the lumber industry by producing 42% of the total lumber supply or eleven and three-tenths billion board feet (Figure 1). The South dominated our lumber industry from the beginning of the century until 1928, when the Northern Pacific Region moved to the front as our leading lumber producing section.

The Northern Pacific States of Washington and Oregon represent the last great timber reserve of the country within which the lumber industry is at

(20) Campbell, op. cit., p. 11.

the present time experiencing its greatest development. In 1889, the states of Washington and Oregon produced 204,000 board feet of lumber, or 1.6% of the total U. S. production. However, since 1889 this region has continued to increase in importance until 1928, when she became our leading lumber region with the production of eleven and seven-tenths billion board feet or 34.5% of the total lumber output of the United States. The five and four-tenths billion feet of lumber produced in these two states in 1933 represented 38.4% of the total lumber production of the United States.

Minor Lumber Producing Regions

The Central States, of which Tennessee is a part and to which also belong the states of Illinois, Indiana, Kentucky, Missouri, Ohio, and West Virginia, produced 18.5% of the total lumber produced in this country in 1879. The importance of this group of states, however, as a lumber producing region has gradually declined relatively since that peak year until 1933, when they produced only 5.8% of the United States total production. (21)

Although the North Carolina Pine States -- North Carolina, South Carolina, and Virginia -- has never been a major lumber producing region, its production, nevertheless, has been of sufficient size to warrant separate consideration. Between 1909 and 1927 this region produced 10% of the total amount of lumber produced in the entire United States. The maximum cut of this section came in 1909, when five and twentenths billion feet of lumber was produced which is 11.8% of the U. S. total cut for that year. The 1933 lumber yield was one and three-tenths billion board feet or 8.9% of this country's production. (22)

(21) Campbell, op. cit., p. 8-16.

(22) This region gets its name from the chief kind of wood produced here which is a different species of pine from the mere common yellow pine of the other Southern States.

West of the Mississippi River there are four minor lumber regions - the Southern Pacific States, the Northern Rocky Mountain States, the Southern Rocky Mountain States, and the Prairie States. The Southern Pacific States of California and Nevada produced 6.7% of the U. S. total lumber output in 1932. Her production in 1933 was seven hundred and eighty-five million board feet, or 5.6% of the total amount of lumber produced.

The Northern Rocky Mountain States of Idaho and Montana have never threatened the supremacy of the other lumber producing sections due to the inaccessibility of their rather large timber reserves. In 1933 this lumber region produced four hundred and forty-one million board feet of lumber, which was over thirty times the 1869 cut of fourteen million board feet.

Our Southern Rocky Mountain States, Arizona, Colorado, New Mexico, Utah, and Wyoming are of little commercial importance since they have never produced as high as 2% of the U. S. total lumber output. In 1933 the production of lumber from these states amounted to two hundred and thirty-two million board feet.

The Prairie States are by far the least important of the lumber producing regions, largely because they are located in the non-forested plains from which the scattered timber has long since been cut. These Prairie States -- Iowa, Kansas, Nebraska, South Dakota, and North Dakota -- produced 3.5% of the nation's lumber production in 1869, but by 1909 they were furnishing only one-fourth of 1% of our total lumber output.

Geographic Shifts of Some Forest Products Industries

The location and development of many of our forest industries has followed

along closely with the regional shifting of the lumber industry. The furniture industry, for instance, began in the Northeast, near the center of population, where an ample supply of local timber existed. However, as the industry expanded and the necessity for a greater abundance of wood became eminent, the furniture manufacturers moved westward into the hardwood forests of the Lake and Central States. However, within recent years the shift has been southward, centering around North Carolina, with our southern hardwoods supplying the major portion of the furniture woods.⁽²³⁾

The veneer industry, although a much newer enterprise, has followed the same regional shifts as the furniture manufacturers. This industry experienced its great growth within the past decade due to an increase in the use of softwood veneers, manufactured particularly from Douglas Fir, Southern Yellow Pine, and Pondroza Pine. Formerly all veneers were made from Northern hardwoods but due to the present scarcity of suitable wood in the North, the industry has turned to the South and West for its veneer woods. Our Southern Yellow Pine ranks third in the quantity of wood consumed in veneer manufacture, and at the present time it is supplying the heavy southern demand for fruit and vegetable crates.⁽²⁴⁾ Red Gum is our leading veneer wood in the United States, with Douglas fir ranking second. Within the past decade the only native species to decrease in veneer consumption were ash, birch, and oak, whereas the total quantity of veneer wood used in the United States has doubled during this same period.⁽²⁵⁾

(23) Secretary of Agriculture, A National Plan for American Forestry, p. 121.

(24) Ibid., p. 194-195.

(25) Ibid., p. 193-194.

Our handle manufacturers formerly obtained their supply of good quality ash from the excellent stands located in the states north of the Ohio River, but when the material in this section became exhausted the lower Mississippi Valley became our principal source of handle timber. The present supply of hickory, our other handle wood, comes from the south where a large part of the better timber has already been cut. (26)

The vehicle industry moved from the East to the Midwest following the agricultural development of the North Central States. However, after the exhaustion of suitable northern hardwoods, this wood industry has turned southward and is now competing with the handle industry for our southern ash and hickory. The vehicle manufacturers are also competing with the furniture, veneer, and other industries for other suitable southern hardwoods. (27)

Formerly the pulpwood industries were confined almost entirely to the New England States, but within comparatively recent years other sections have become important as pulpwood producing regions. Today the South, by means of the sulphate process, is dominating the kraft or wrapping paper industry, and recent discoveries by the Forest Products Laboratory in the bleaching, strength, and general utility of southern pine wood pulp promises to increase the importance of this species as a pulpwood material. (28) The South is believed to be capable of producing stands of southern yellow pine suitable for pulping purposes in twenty-five years, a rate possible only in the Pacific Coast Region. (29)

(26) Secretary of Agriculture, op. cit., p. 194-195.

(27) Ibid., p. 194.

(28) Ibid., p. 195.

(29) Ibid., p. 195.

Trends in Lumber Production in Tennessee

Total Production. In 1909 the peak of lumber production was reached in Tennessee when 1,223,849,000 board feet of lumber was produced (Figure 2, Table III). The long-time production was consistently upward to about 900 million board feet in 1900. A reduction of almost 50 per cent occurred during the next five years but recovery was rapid from 1905-1910. The downward trend from 1910 was checked temporarily during the World War and the post war building boom from 1922 to 1929. The decrease in lumber from 1929 to 1932 was very rapid, due to the widespread collapse of industry in general. An all record low since 1899 was established in Tennessee in 1932 with a production of only 128 million board feet. Some recovery has occurred since 1932 due in part to the increase in construction activity.

A comparison of the annual lumber production in Tennessee with the average for all states shows this state's production to be less than the average for the United States for all years since 1900 except a very few years, notably 1900 and 1909.⁽³⁰⁾ (Figure 2).

Production of Hardwood Lumber. Since Tennessee has always been primarily a hardwood state the trend in the production of this kind of lumber has closely followed the total lumber production (Figure 2 and Table IV). The average annual cut of hardwoods since 1899 has amounted to 528,600,000 board feet, or 82 per cent of the total average annual production. During this period Tennessee's hardwoods have been one of the main sources for supplying northern industries with suitable southern and Appalachian hardwoods.

(30) The average state production for the United States was calculated by dividing the total annual production of both hardwood and softwood lumber by the total number of states.

Million
Bd. Feet

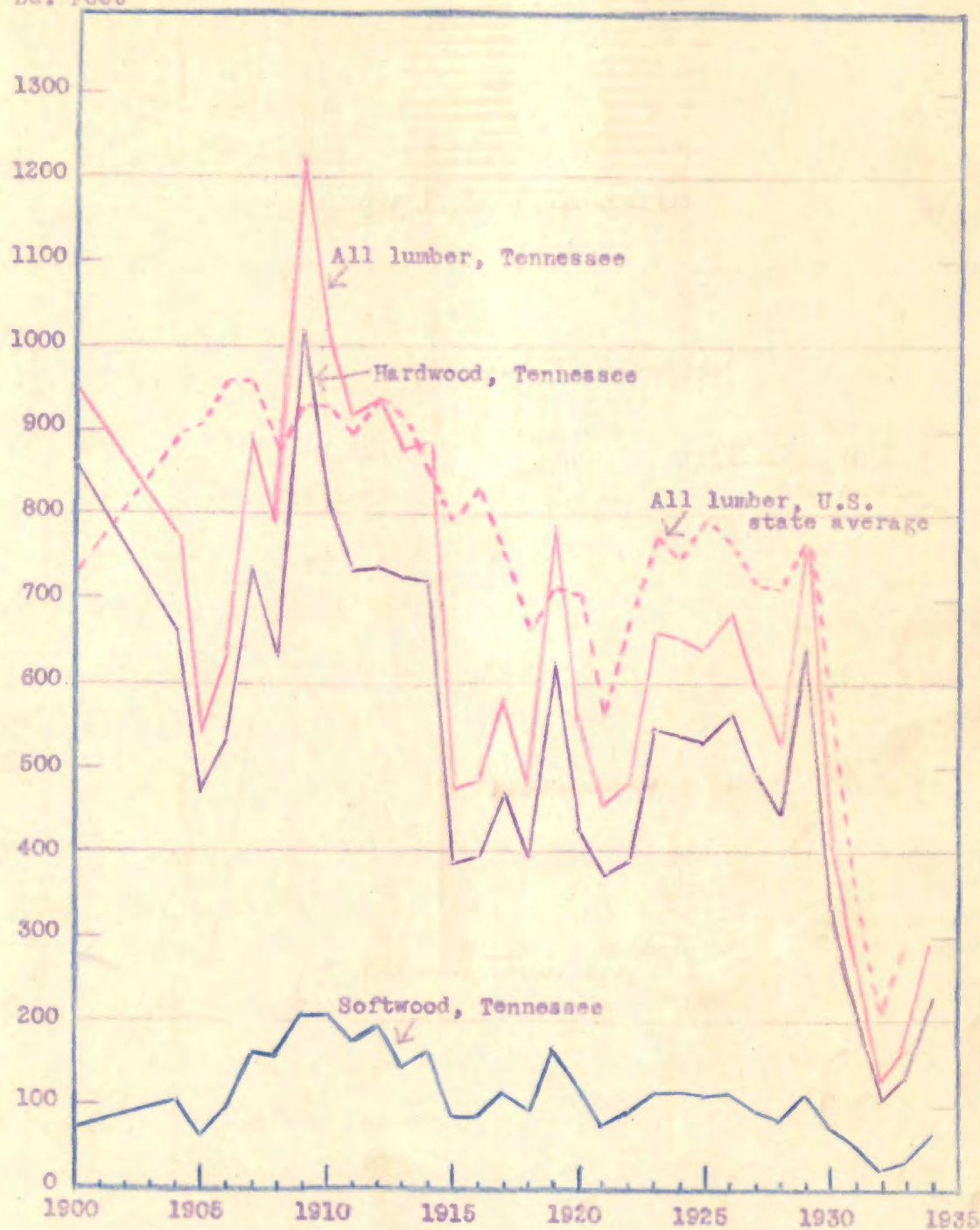


Figure 2. Total Lumber Production: Hardwood and softwood, Tennessee and U. S. average, 1900-1934

Source: U.S.D.A. Statistical Bul. 21, pp. 194-195.
Special Report Forestry Service, 1925-1934.

TABLE III. TOTAL LUMBER PRODUCTION: HARD AND SOFTWOODS
FOR SPECIFIED YEARS IN TENNESSEE, 1899-1934

Rank in U.S.	Date	Softwood 1000 bd. ft.	Hardwood 1000 bd. ft.	Hardwood and softwood 1000 bd. ft.
16	1899	77,589	861,874	950,958
19	1904	109,004	666,881	775,885
20	1905	68,593	472,322	540,920
21	1906	99,472	535,115	634,587
18	1907	162,246	732,722	894,968
18	1908	159,374	631,268	790,642
16	1909	208,126	1,015,723	1,223,849
17	1910	207,614	808,861	1,016,475
17	1911	174,613	735,966	914,579
18	1912	192,948	739,624	932,572
16	1913	144,572	727,739	872,311
18	1914	164,776	720,259	885,035
20	1915	87,006	390,970	477,975
21	1916	88,572	399,670	438,242
20	1917	111,065	470,938	582,003
18	1918	93,802	398,423	492,225
15	1919	170,351	621,781	792,132
14	1920	127,468	427,523	554,991
18	1921	77,834	374,103	451,937
19	1922	93,572	392,407	485,979
17	1923	115,750	545,686	661,436
17	1924	118,257	540,631	658,888
17	1925	111,286	531,073	642,359
15	1926	113,275	565,048	683,323
13	1927	97,030	498,267	595,297
18	1928	85,592	444,714	530,306
15	1929	115,318	648,510	763,828
15	1930	76,523	337,414	413,937
16	1931	55,034	208,418	263,452
16	1932	24,067	104,326	128,398
17	1933	33,647	135,283	168,930
	1934	66,237	233,161	299,398

Source: Yearbook of Agriculture, 1935, p. 711.
Statistical Bulletin 21, U. S. D. A., p. 194-195.

For over a quarter of a century, oak has been Tennessee's principal lumber species. Since 1899 the average annual production has averaged over 268 million board feet, or over three times the average annual cut of yellow poplar and over four times the average annual output of our leading softwood lumber species -- yellow pine. According to a survey conducted by the National Lumber Manufacturers' Association, Tennessee ranked first among the other states in the production of oak lumber in 1930. The peak in the production of this kind of lumber came in 1909 when 546,500,000 board feet were manufactured in this State. Since 1909 the trend has been generally downward with the lowest production of 60,464,000 coming in 1932 (Figure 3).

Yellow poplar, the state's second most important lumber wood in 1899, has declined steadily from 269,862,000 in 1899 to 23,159,000 board feet in 1934. In 1934 yellow poplar ranked fourth in lumber production within the state, being outranked only by oak, yellow pine, and red gum. However, the average annual production of lumber from this species since 1899 has been 84,250,000, or over one-third that of red gum, our third most important hardwood in 1934 (Figure 3).

Red gum, chestnut, hickory, ash, elm, and beech are other important hardwood species in the order named. The average annual production since 1899 has been as follows: red gum, 55 million board feet; chestnut, 33 million; hickory, 17 million; ash, 13 million; elm, 11 million; and beech, 8 million board feet (Figures 3 and 4). The production of red gum lumber has been fairly consistent since the turn of the century with

Million
Bd. Feet



Figure 3. Hardwood Lumber: Annual production of specified species, Tennessee, 1900-1934.

Source: U.S.D.A. Statistical Bul. 21, pp. 194-195.
Also Special Report Forestry Service, 1925-34.

a gradual increase from 52,357,000 to 89,033,000 board feet in 1926. By 1932 the production had declined to 5,329,000 board feet, or approximately one-seventeenth of the 1926 output.

The production of chestnut lumber increased from 10,849,000 board feet in 1899 to 72,190,000 board feet in the peak year 1907. The rapid decline following 1907 was checked by the World War and post-war construction activity. Since 1929 production has fallen off very rapidly due in part to the widespread infestation of chestnut blight, and to the economic depression. At present practically all the chestnut trees in Tennessee have been killed and within the next few years all the suitable timber will have either been harvested or become unfit for lumber production. In 1932, the production amounted to only 5 per cent of the 1907 production.

Hickory, Tennessee's fifth leading hardwood, reached its greatest output in 1909 when over fifty-eight million board feet of lumber were produced. In 1934 our sawmills turned out only 907,000 board feet, or one-sixty-fourth of the 1909 lumber out. Besides hickory, two softwoods, hemlock and cedar, are the only species of commercial importance in Tennessee that had a lower lumber production in 1934 than in 1932.

Ash lumber production reached its height in 1913 with an output of over twenty-two million board feet. Since 1926 the production of this species has decreased rather rapidly.

Elm and beech, two other hardwood species of commercial importance, have never exceeded two million board feet and their average annual production represents only 0.4% and 0.2%, respectively, of the average

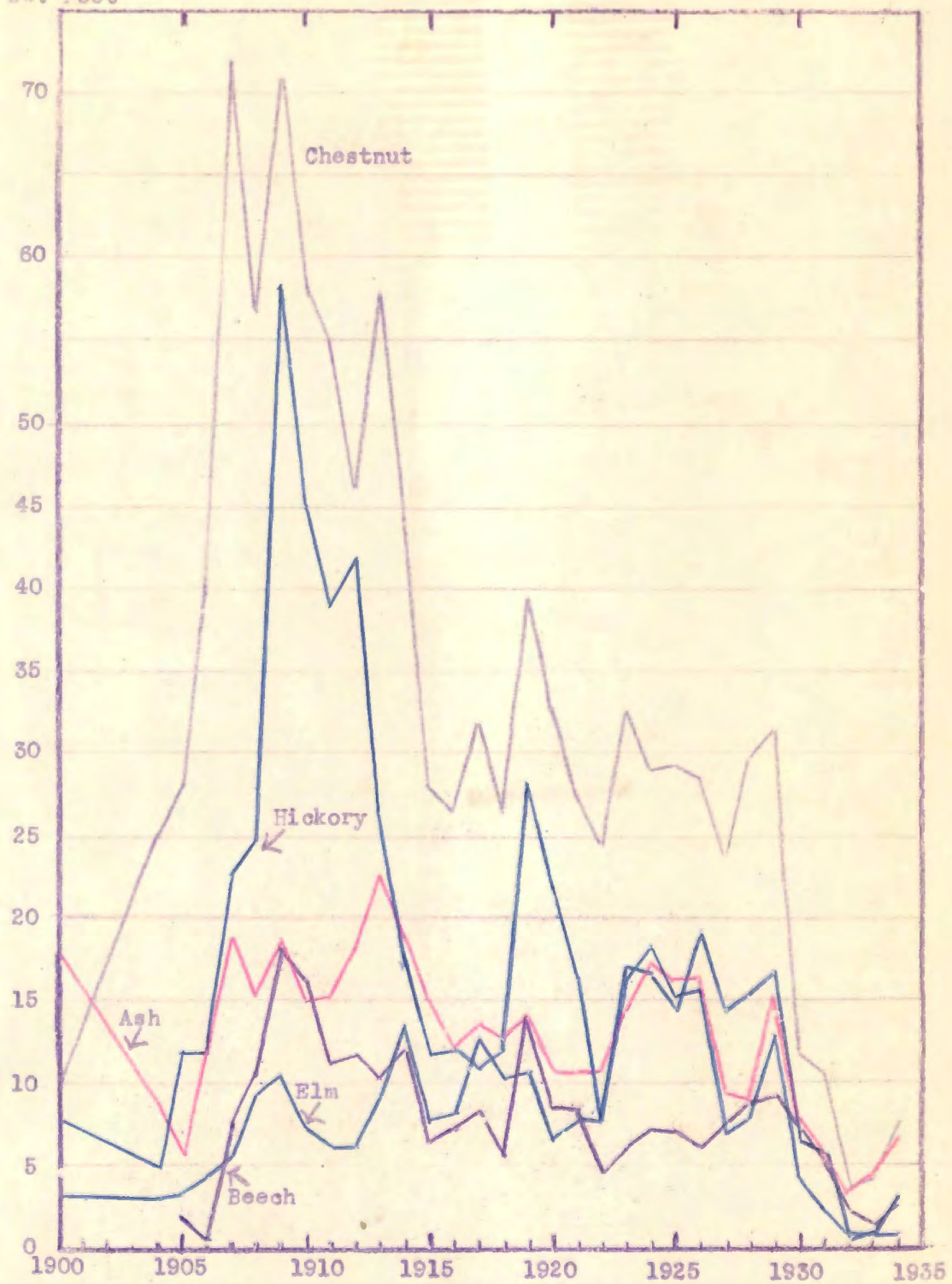


Figure 4. Hardwood Lumber: Total annual production of specified species, Tennessee, 1900-1934.

Source: U.S.D.A. Statistical Bul. 21, p. 194-195 for 1900-1925.
Also special report from Mr. Steer for 1925-1934.

TABLE IV. HARDWOOD LUMBER PRODUCTION: REPORTED BY PRINCIPAL SPECIES FOR SPECIFIED YEARS, TENNESSEE, 1899-1934

(In 1000 bd. ft. measure)

Date	Ash	Beech	Chestnut	Hm	Hickory	Oak	Red Gum	Yellow Poplar
1899	18,100	-	10,849	3,493	7,848	412,116	52,357	269,862
1904	8,860	-	26,816	3,043	4,962	318,729	61,993	220,949
1906	5,819	2,083	28,010	3,369	11,968	207,392	37,147	110,480
1908	12,464	603	40,182	4,513	11,996	274,974	36,250	127,681
1907	19,099	7,641	72,182	5,727	22,869	356,339	68,634	157,933
1909	16,490	10,601	57,392	9,477	24,681	296,603	69,036	120,616
1910	16,043	16,386	68,049	7,226	46,151	421,926	62,461	158,706
1911	16,331	11,387	56,339	6,136	38,793	362,033	68,276	119,034
1912	18,434	11,679	46,987	6,176	42,046	378,747	69,612	107,266
1913	22,943	10,268	68,201	9,219	26,678	396,132	66,620	112,666
1914	16,637	11,919	44,178	13,764	17,002	440,746	46,724	93,241
1915	16,233	6,566	28,484	7,626	11,933	210,966	24,729	46,129
1916	12,020	7,411	26,864	8,230	12,013	226,646	23,917	47,691
1917	13,649	8,379	32,738	12,809	11,064	237,674	64,356	48,426
1918	12,938	5,694	26,741	10,450	12,243	181,712	56,198	41,338
1919	14,008	14,290	39,511	10,766	28,236	349,726	80,026	53,492
1920	10,911	8,711	32,653	6,692	21,993	221,260	62,821	46,436
1921	10,616	8,596	27,460	7,967	16,490	174,260	53,206	48,766
1922	10,663	4,666	24,514	7,600	7,602	187,626	67,786	56,992
1923	14,474	6,437	32,960	17,447	16,300	261,461	84,639	73,377
1924	17,123	7,363	29,047	16,861	18,476	267,666	83,460	69,039
1925	16,179	7,122	29,388	14,673	16,240	263,340	73,391	74,264
1926	16,425	6,133	28,688	19,406	16,792	270,661	89,033	64,897
1927	9,550	7,793	24,121	14,687	6,882	248,990	71,348	66,649
1928	9,013	6,982	29,899	16,526	7,957	196,106	61,641	56,436
1929	16,263	9,306	31,514	16,869	12,841	342,940	79,011	76,078
1930	8,084	7,176	11,974	6,606	4,360	186,641	36,462	47,491
1931	6,919	5,377	10,829	5,723	2,201	106,534	16,914	26,606
1932	3,486	2,308	3,798	626	926	60,464	6,329	17,734
1933	4,621	1,532	4,468	1,032	720	71,964	19,634	13,230
1934	6,986	2,306	7,847	3,368	907	126,094	36,622	23,169
Total	413,000	233,000	1,060,000	347,000	633,000	8,594,000	1,769,000	2,696,000
Av.	12,906	7,767	32,813	10,844	16,666	268,663	56,281	84,260

Source: Figures 3 and 4

annual production of oak in Tennessee (Figure 4). In 1909, 18,341,000 board feet of beech was produced which represents the peak of production for this species. The cut of elm produced in 1926 represented over five times the 1899 yield and thirty-two times the 1932 production. Three and four-tenths million board feet of elm lumber was manufactured in Tennessee during 1934.

Other hardwoods also used for lumber are basswood, birch, cottonwood, sycamore, tupelo, and walnut.

Production of Softwood Lumber. Tennessee's production of softwood lumber is only of minor significance since it represents 17.8 per cent of all the lumber manufactured within the State since 1899. In 1925 and also in 1930 Tennessee ranked 26th among other states in the production of softwood lumber whereas in the production of hardwood lumber we ranked fifth. During 1934 Tennessee's production of lumber from softwoods constituted 23 per cent of the state's total lumber crop as compared with 1909 when all our softwoods represented only 15 per cent of all lumber manufactured in the State (figure 2). Could this increase in the proportion of softwood lumber mean that our supply of suitable hardwoods is becoming scarce and the resulting deficit, to some extent, is being made up by our softwoods?

Since 1900 yellow pine has dominated Tennessee's softwood lumber species and ranks fourth among all of our lumber woods, being exceeded only by oak, yellow poplar, and red gum. The average annual production of yellow pine in the last 35 years has been almost three times that of hemlock, our second most important softwood. In 1909 Tennessee turned

Million
Bd. Feet

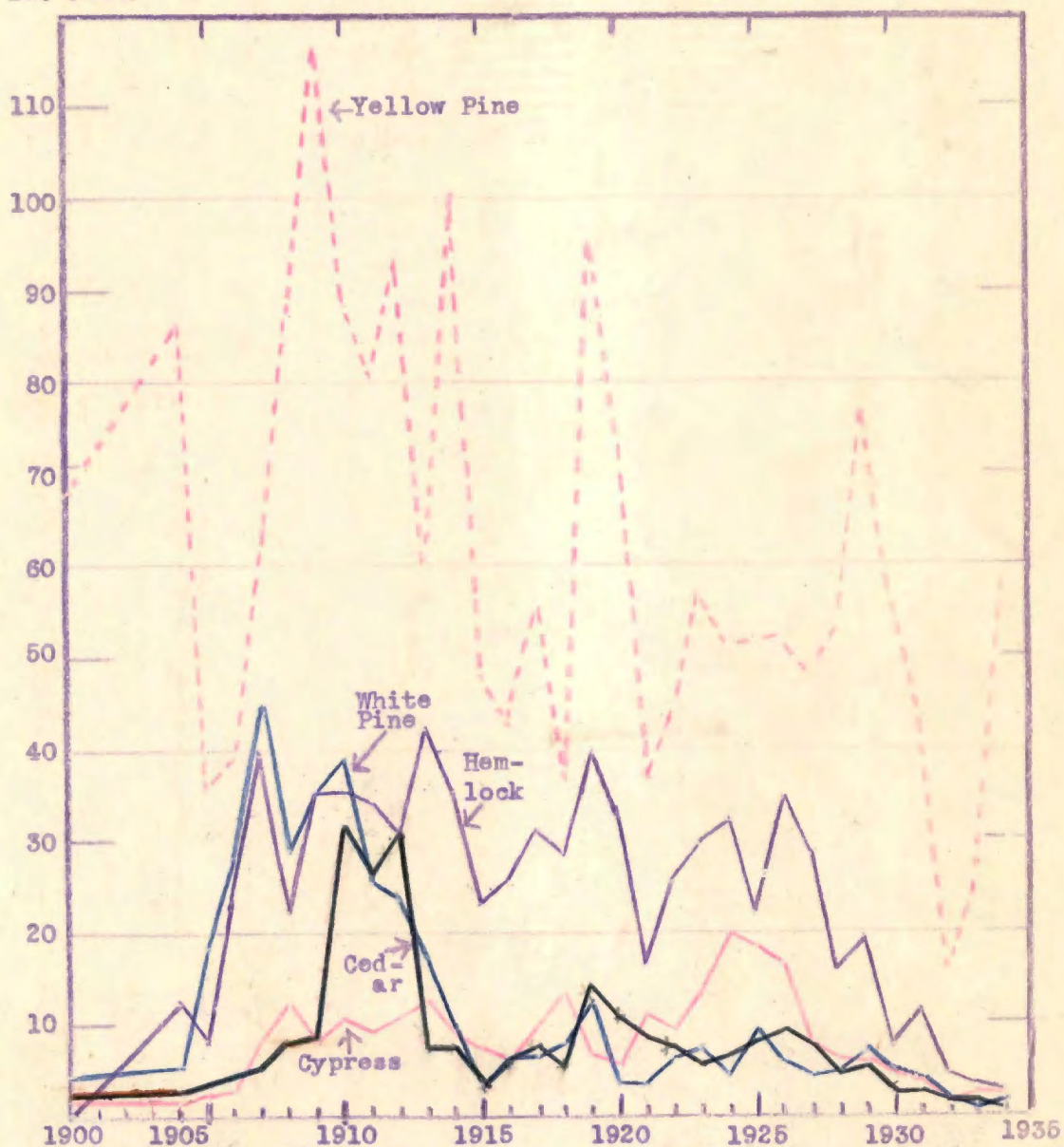


Figure 5. Softwood Lumber: Total annual production of specified species, Tennessee, 1900-1934

Source: U.S.D.A. Statistical Bul. 21, p. 194-195 (1899-1934)
Special Report Forestry Service (1925-1934)

TABLE V. PRODUCTION OF SOFTWOOD LUMBER BY PRINCIPAL SPECIES
FOR SPECIFIED YEARS, TENNESSEE, 1899 - 1925

(In 1000 bd. ft. measure)

Date	Cedar	Cypress	Hemlock	Spruce	White Pine	Yellow Pine
1899	2,321	1,791	565	330	4,103	68,479
1904	2,553	1,719	12,324	-	5,734	86,674
1905	-	2,792	8,845	1,834	13,833	36,294
1906	4,505	3,022	23,666	481	28,600	39,198
1907	5,298	8,123	39,124	1,925	45,335	62,441
1908	8,117	12,048	22,285	228	29,130	87,566
1909	8,927	8,709	35,593	720	35,553	117,135
1910	31,683	10,333	36,744	171	39,387	89,296
1911	26,424	9,090	34,512	1,552	25,835	81,202
1912	31,298	10,537	30,486	2,824	23,646	94,159
1913	7,982	14,502	42,260	2,300	17,891	60,187
1914	7,603	9,089	35,551	1,903	9,758	100,872
1915	3,495	7,220	23,252	335	3,855	48,523
1916	6,675	6,133	25,977	11	6,966	42,697
1917	7,713	10,003	31,182	-	6,617	55,550
1918	5,748	13,581	28,982	-	8,017	37,474
1919	14,708	6,924	40,221	-	12,517	95,979
1920	10,963	5,737	32,721	-	3,880	74,167
1921	8,876	11,291	16,417	-	3,529	37,721
1922	7,646	9,671	25,825	-	6,120	44,110
1923	5,265	13,933	29,814	1,631	7,940	57,167
1924	6,402	20,381	32,034	3,243	4,260	51,937
1925	3,154	18,841	22,163	100	9,749	52,274
1926	9,269	15,892	34,928	20	5,600	52,566
1927	7,790	7,706	28,440	-	4,302	48,792
1928	4,380	6,808	15,887	-	4,746	53,773
1929	5,026	6,752	19,306	-	7,138	77,096
1930	2,511	4,486	7,586	-	5,112	56,829
1931	2,212	3,275	11,422	-	3,732	34,393
1932	1,133	1,237	4,197	5	1,092	16,403
1933	1,209	2,738	3,114	-	766	25,820
1934	866	2,698	2,749	-	1,597	58,327
Av.	7,938	8,313	23,437	-	12,250	60,656

Source: Figure 5.

out 117,135,000 board feet. Since 1909 lumber production from this species has been reduced over one-half. Hemlock, white pine, cypress, and cedar are the only other native softwoods manufactured into lumber within the state of any commercial significance. The average annual lumber production from these species since 1899 has been 23,437,000; 12,250,000; 8,313,000; and 7,938,000, respectively. The peak of hemlock lumber production was reached in 1913 when forty-two million two hundred sixty thousand board feet were produced as contrasted with the two and nine-tenths million board feet manufactured in 1934.

The banner year for white pine lumber came in 1907 when forty-five million three hundred and thirty-five thousand board feet were manufactured. Thirty-one million board feet of cedar were produced in 1910 and also in 1912, but at the present time lumber production from this species is almost nil. The present utilization of cypress and spruce in Tennessee's lumber industries is also very slight.

Relation of Lumber Production and Consumption in the United States

For the last one hundred and fifteen years the total lumber production in the United States has followed closely the trend of consumption. However, starting around 1900, when lumbering within the southern states began in earnest, and up until 1930 lumber production slightly outstripped consumption (Figure 6 and Table VI). Since 1930 the amount of lumber manufactured has been less than the amount consumed due to the drastic curtailment of demand for construction material.

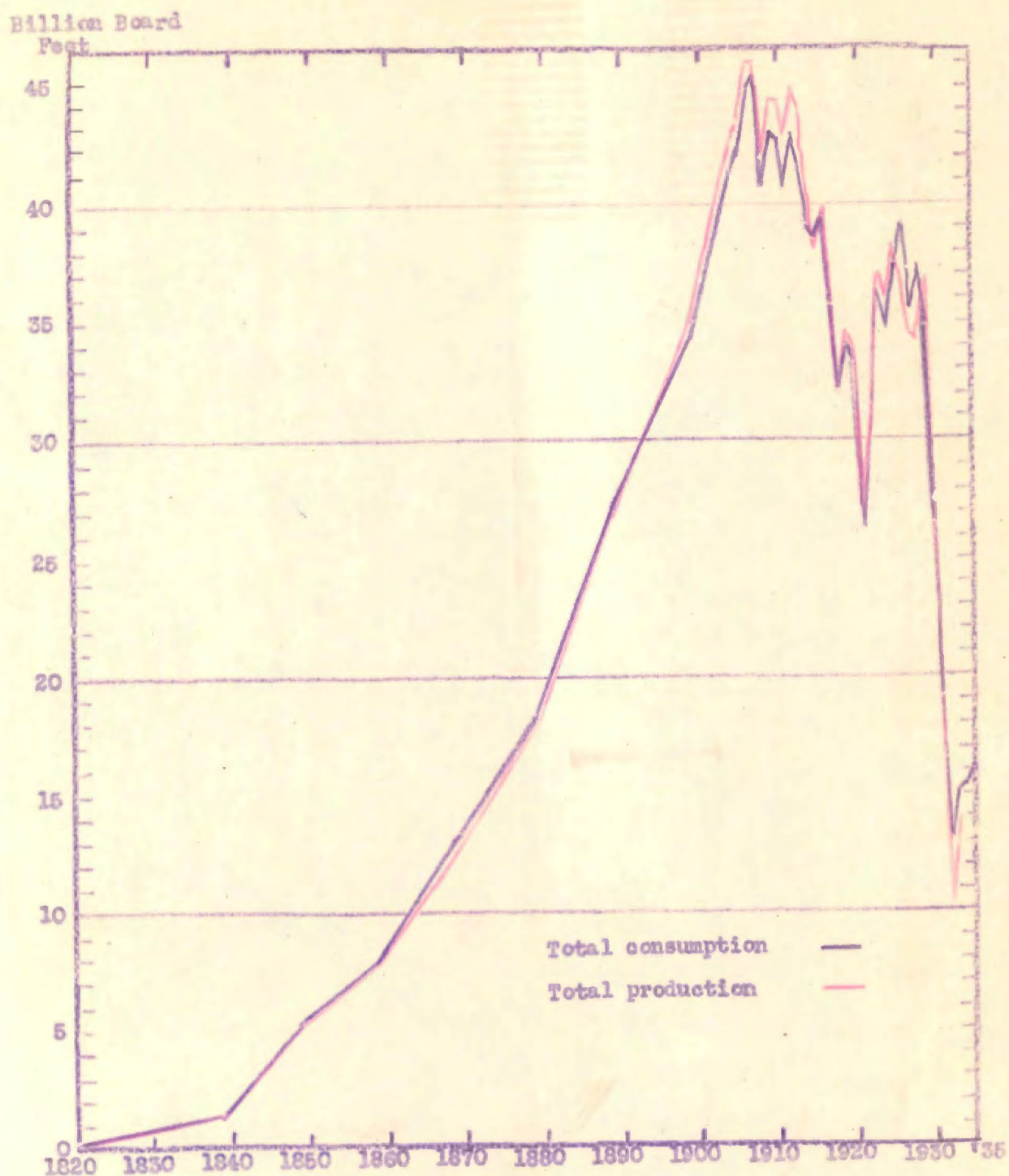


Figure 6. Lumber: Trend in Total Production and Total Consumption, United States, 1820-1935

Source: Table VI

TABLE VI. TOTAL LUMBER CONSUMPTION AND PRODUCTION AND PER
CAPITA CONSUMPTION OF LUMBER IN UNITED STATES,
1809-1934

Year	Total Production	Per Capita Consumption	Total Consumption
	Thousand bd. ft.	Bd. ft.	Thousand bd. ft.
1809	106,000	15	106,000
1819	320,000	35	320,000
1839	1,604,000	95	1,604,000
1849	5,392,000	235	5,392,000
1859	8,029,000	260	8,029,000
1869	12,755,543	350	13,329,411
1879	18,091,356	370	18,354,334
1889	27,038,757	435	27,225,560
1899	35,077,595	460	34,596,700
1904	43,000,000	505	41,589,975
1905	43,500,000	505	42,425,952
1906	46,000,000	525	44,861,224
1907	46,000,000	520	45,555,479
1908	42,000,000	460	40,830,129
1909	44,509,761	475	43,299,537
1910	44,500,000	465	42,865,307
1911	43,000,000	435	40,916,054
1912	45,000,000	455	43,046,547
1913	44,000,000	430	41,719,979
1914	40,500,000	400	39,154,661
1915	38,000,000	380	37,569,669
1916	40,000,000	395	39,694,016
1917	36,000,000	350	35,887,928
1918	32,000,000	310	32,013,006
1919	34,552,076	325	34,065,078
1920	33,800,000	315	33,300,009
1921	26,960,364	245	26,331,684
1922	31,568,888	285	31,168,872
1923	37,165,540	330	36,687,231
1924	35,930,986	310	34,995,643
1925	38,338,641	325	37,575,176
1926	36,935,930	305	39,203,717
1927	34,532,420	280	35,424,526
1928	34,142,123	270	37,233,000
1929	36,886,000	290	35,511,000
1930		217	26,647,000
1931	16,523,000	156	19,070,000
1932	10,151,000	106	13,105,000
1933	13,960,000	124	15,148,000
1934		126	15,467,000
1935		134	16,352,000

Source: U.S.D.A. Yearbook of Agriculture, 1931, p. 1044.

Campbell, J. Stuart, Lumber Industry.

Total Consumption and Per Capita Consumption, 1930-35, from
Southern Pine Association, Graphic Review, 1935, Table III, page. 7.

Beginning in 1907, both our total production and consumption of lumber in the United States has steadily declined, whereas the population of this country has continued to increase. Normally with an increase in population we would expect an increase in the amount of lumber used. This decrease in per capita consumption has been due, in part, to increasing use of substitutes for lumber, an increase in lumber prices, and an increasing scarcity of certain timber species. In 1935 the amount of lumber consumed per person in the United States amounted to 134 board feet, an increase of 20 per cent over the 1932 figure. Our total lumber production and consumption in 1932 was 22 per cent and 29 per cent, respectively, of the 1907 figures.

Approximately two-thirds of our total production of lumber in the United States is made up from our softwoods which are supplied primarily by the South and West.

Changes in Farm Woodland Area

United States. By 1925 the states west of the Mississippi River, with the exception of Iowa, Missouri, Arkansas, Louisiana, and Texas, had shown an increase in farm woodland area over 1880, whereas a decrease occurred throughout the states east of the Mississippi, with the greatest reduction occurring in certain midwestern and southern states (Table VII). In Texas and Connecticut the farm woodlands remained practically unchanged, with a decrease in area of only one per cent and seven per cent, respectively. During this same period, the total farm timber land in the United States decreased one-fourth, or forty-seven million acres as compared with a 50% reduction in Tennessee for the same years. Since 1930

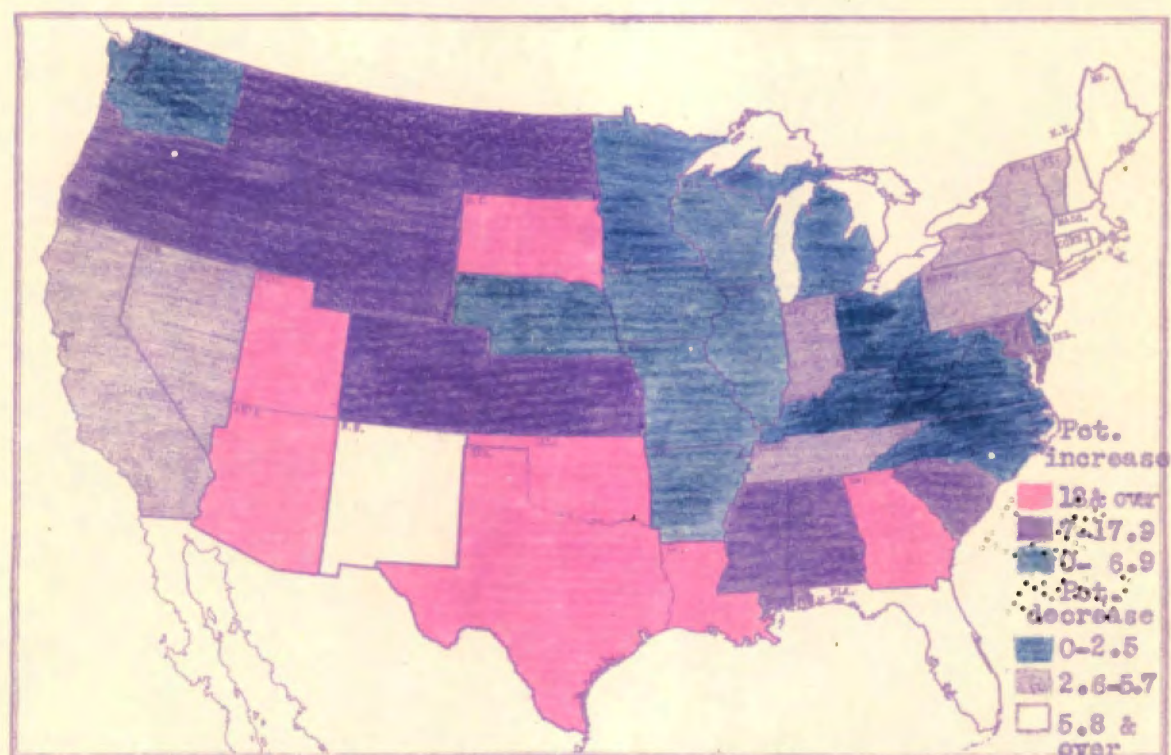


Figure 7 . Percentage Increase or Decrease in Farm Woodland Area, by States, 1925-1930

Source: Table VII

TABLE VII. TOTAL WOODLAND AREA ON FARMS, BY STATES, 1880-1930
(In 1000 acres)

State	1880	1910	1920	1925	1930	Percentage change, 1925-1930	State	1880	1910	1920	1925	1930	Percentage change, 1925-1930
Alabama	10,451	9,445	8,301	5,784	6,486	12.1	Nevada	19	48	29	70	66	- 5.7
Arizona	13	100	524	437	617	41.2	New Hamp.	1,297	1,502	1,300	1,316	1,071	-18.6
Arkansas	7,361	8,512	7,395	5,393	5,443	.9	N.Jersey	703	533	455	297	279	- 6.1
Calif.	1,673	4,542	4,252	4,685	4,503	- 3.5	N.Mexico	219	1,491	1,817	2,315	1,818	-21.5
Colo.	44	892	1,415	1,353	1,542	14.0	N.York	5,196	4,456	4,161	3,806	3,634	- 4.5
Conn.	647	758	634	730	599	-17.9	N.Carol.	13,868	12,452	10,300	8,456	8,326	- 1.5
Delaware	279	252	223	199	204	2.5	N.Dak.	**	422	680	511	558	9.2
D.C.	3	1	1	-	-	-	Ohio	5,983	3,285	3,199	2,827	2,774	- 1.9
Florida	2,187	3,003	2,781	2,292	1,892	-17.5	Okla.	1,424	3,569	4,206	3,430	4,060	18.4
Georgia	15,269	13,003	10,492	7,046	8,373	18.8	Oregon	5,810	2,238	2,310	2,665	3,122	17.9
Idaho	12	585	821	744	860	15.6	Penn.	183	4,281	4,044	3,530	3,364	- 4.7
Illinois	4,936	5,148	3,103	2,636	2,742	4.0	R.I.	7,256	6,339	5,303	3,570	3,903	9.3
Indiana	5,935	3,371	3,141	2,717	2,619	- 3.6	S.Carol.	80	383	536	400	491	22.8
Iowa	2,755	2,314	2,295	2,213	2,214	-	S.Dak.	11,233	8,001	7,080	5,562	5,413	- 2.7
Kansas	991	1,206	1,313	994	1,109	11.6	Tenn.	15,851	27,658	14,533	12,691	15,689	23.6
Kentucky	10,106	6,952	6,018	4,835	4,797	.8	Texas	2	146	213	161	191	18.6
Louisiana	4,557	4,317	3,614	1,406	2,659	89.1	Utah	1,503	1,567	1,428	1,549	1,504	- 2.9
Maine	2,682	2,776	2,448	2,476	2,241	- 9.5	Vt.	9,127	8,415	7,907	6,855	6,695	- 2.3
Maryland	1,634	1,467	1,327	1,133	1,213	9.1	Wash.	438	1,542	1,813	1,856	1,874	1.0
Mass.	1,004	1,065	1,080	1,115	863	-22.6	W.Va.	6,180	3,969	3,469	3,169	3,129	- 1.3
Michigan	4,452	2,928	3,217	3,302	3,235	- 2.0	Wisco.	4,768	5,378	5,402	5,648	5,705	1.0
Minnesota	2,031	3,922	4,483	4,750	4,746	.1	Wyo.	1	252	422	445	516	16.0
Mississippi	9,144	7,884	7,015	5,447	6,224	14.3	Total	190,256	128,866	167,731	142,776	149,945	5.0
Missouri	10,138	8,919	8,554	7,406	7,700	4.0							
Montana	4	596	1,646	1,546	1,820	17.7							
Nebraska	322	803	901	883	941	6.6							

Source: U. S. D. A. Statistical Bulletin 21, p. 8.
U. S. D. A. Yearbook of Agriculture, 1930.

*See South Dakota

the United States has increased her total farm woodland area by approximately five per cent, or seven million acres. From 1925 to 1930 our largest percentage increase in farm woodland took place in South Dakota, Georgia, and the southwest, whereas our heaviest percentage decrease occurred in the northeastern states (Figure 7).

Tennessee. From 1880 to 1930, the total area of woodland on farms in Tennessee had decreased about 52 per cent, or five thousand eight hundred and eighteen acres. However, from 1930 to 1935 our total farm woodland acreage has shown an increase of 14.6%, probably due to the return to forests of much of our submarginal farmland.⁽³¹⁾ Between 1880 and 1930 every county within the state had reduced its forest area on farms with the heaviest percentage decrease taking place along the Mississippi River, in the northern part of the Cumberland Plateau, and in certain mountainous counties in East Tennessee (Figure 8). During this same period, the farm woodland within the Central Basin counties remained practically unchanged.

From 1920 to 1925, only seven counties in the State, located in Middle and East Tennessee, showed an increase in farm woodland area. The total increase in these counties was slight, however, amounting to less than twenty-five thousand acres. The total decrease of farm woodland throughout the state from 1920 to 1925 amounted to one and one-half million acres, or 21.4% of the total 1920 farm timber area (Figure 8).

Between 1925 and 1930, the total area in farm woods in Tennessee

(30) There is also a possibility that some of the increase was due to a difference in interpretation by the Census enumerators of the definition of farm woodland.

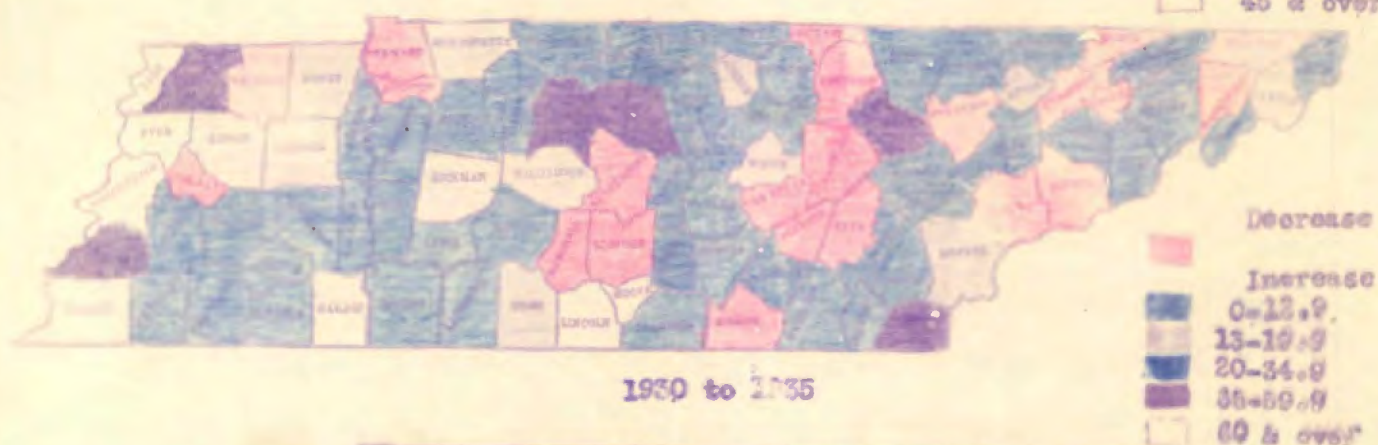
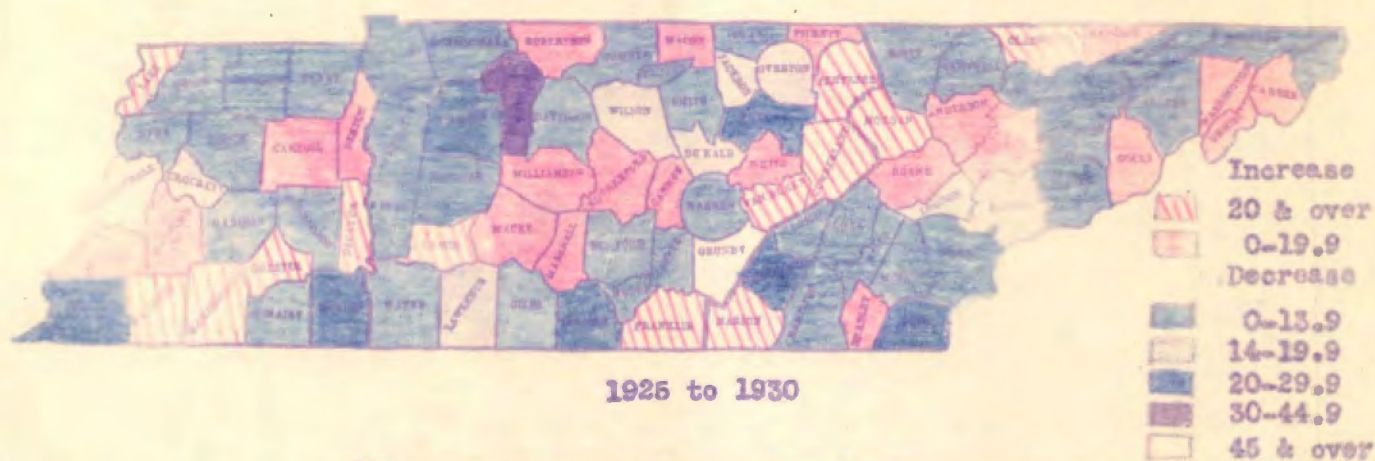


Figure 8 . Area in Farm Woodland: Percentage Change in Tennessee, by Periods

Source: Table VIII

TABLE VIII. TREND IN FARM WOODLAND AREA IN TENNESSEE, BY CENSUS PERIODS, 1880 - 1935

County	1880			1910			1920			1925			1930			1935		
	Area in 1000 acres	% Inc. or dec. 1880-1930	Area in 1000 acres	% Inc. or dec. 1880	Area in 1000 acres	% Inc. or dec. 1910	Area in 1000 acres	% Inc. or dec. 1910	Area in 1000 acres	% Inc. or dec. 1920	Area in 1000 acres	% Inc. or dec. 1925	Area in 1000 acres	% Inc. or dec. 1925	Area in 1000 acres	% Inc. or dec. 1930	Area in 1000 acres	% Inc. or dec. 1935
Ander.	90.3	-41.7	83.0	-8.1	83.3	-23.7	50.3	-20.5	52.6	4.6	52.4	-	52.4	-	52.4	-	52.4	-
Bedf.	86.4	-25.2	76.4	-11.6	170.3	122.8	65.2	-61.7	64.6	-	55.5	-	55.5	-	55.5	-	55.5	-
Bent.	153.1	-49.2	117.3	-23.4	104.2	-11.2	75.3	-27.7	77.7	3.2	98.0	26.1	77.7	3.2	98.0	26.1	98.0	26.1
Blods.	77.6	-40.5	72.4	-6.7	51.5	-28.9	51.6	-	46.2	-10.5	45.3	-	46.2	-10.5	45.3	-	45.3	-
Blount	134.1	-58.2	87.2	-35.0	121.3	39.1	68.5	-43.5	58.8	-14.2	56.7	-	58.8	-14.2	56.7	-	56.7	-
Bradley	79.2	-10.2	87.6	10.6	80.8	-7.8	69.4	-14.1	71.1	2.4	79.4	11.7	71.1	2.4	79.4	11.7	79.4	11.7
Campb.	154.0	-76.3	66.7	-56.7	48.0	-28.0	40.1	-16.5	36.5	-9.0	45.3	24.1	36.5	-9.0	45.3	24.1	45.3	24.1
Cannon	78.5	-40.1	70.4	-10.3	71.2	1.1	41.8	-41.3	47.0	12.4	59.3	26.2	47.0	12.4	59.3	26.2	59.3	26.2
Carroll	168.3	-51.7	120.1	-28.6	108.4	-9.7	70.7	-34.8	81.3	15.0	92.0	13.2	81.3	15.0	92.0	13.2	92.0	13.2
Carter	125.4	-64.9	61.6	-50.9	62.0	-	42.9	-30.8	44.0	2.6	50.6	15.0	44.0	2.6	50.6	15.0	50.6	15.0
Cheat.	76.4	-37.3	69.0	-9.7	68.0	-1.4	68.9	1.3	47.9	-30.5	64.3	34.2	47.9	-30.5	64.3	34.2	64.3	34.2
Chest.	-	100.0	70.7	-	62.1	-12.2	39.4	-36.6	56.9	44.4	57.7	1.4	56.9	44.4	57.7	1.4	57.7	1.4
Clalb.	145.8	-59.5	101.0	-30.7	72.3	-27.9	47.6	-34.6	59.1	24.2	66.6	12.7	59.1	24.2	66.6	12.7	66.6	12.7
Clay	87.4	-26.9	83.7	-4.2	90.3	7.9	69.3	-23.3	64.7	-6.6	65.4	1.1	64.7	-6.6	65.4	1.1	65.4	1.1
Cocks	122.2	-36.2	91.6	-25.0	96.3	5.1	70.9	-24.3	77.9	6.9	82.3	5.6	77.9	6.9	82.3	5.6	82.3	5.6
Coffee	107.8	-37.6	83.9	-22.2	81.1	-3.3	71.3	-12.1	67.3	-5.6	86.7	28.8	67.3	-5.6	86.7	28.8	86.7	28.8
Crock.	69.1	-77.0	38.9	-50.9	26.9	-20.6	18.5	-31.2	15.9	-14.1	14.8	-	15.9	-14.1	14.8	-	14.8	-
Cumber.	128.2	-62.6	72.8	-43.2	62.1	-14.7	31.5	-49.3	48.0	52.4	40.5	-	48.0	52.4	40.5	-	40.5	-
David.	100.5	-31.0	108.7	8.2	94.9	-12.7	79.3	-16.4	69.3	-12.6	109.8	58.4	69.3	-12.6	109.8	58.4	109.8	58.4
Decat.	116.8	-43.8	101.5	-13.1	90.1	-11.2	53.9	-40.2	65.6	21.7	79.4	21.0	65.6	21.7	79.4	21.0	79.4	21.0
DeKalb	90.4	-39.6	80.2	-11.3	60.8	-24.2	64.1	5.4	54.6	-14.8	8.0	24.5	54.6	-14.8	8.0	24.5	8.0	24.5
Dick.	146.3	-48.2	132.4	-9.5	105.2	-20.6	97.4	-7.4	75.8	-22.2	94.7	24.9	75.8	-22.2	94.7	24.9	94.7	24.9
Dyer	121.0	-35.7	43.9	-63.7	39.3	10.5	18.6	-52.9	17.3	-7.0	57.0	229.5	17.3	-7.0	57.0	229.5	57.0	229.5
Payette	146.4	-55.7	84.8	-42.1	79.0	-6.8	50.2	-36.4	64.9	29.3	68.4	5.4	64.9	29.3	68.4	5.4	68.4	5.4
Pentr.	165.3	-73.3	99.6	-39.7	99.7	-	26.1	-73.8	44.2	69.3	42.2	-	44.2	69.3	42.2	-	42.2	-
Frank.	147.2	-55.2	93.1	-36.8	69.0	-25.9	51.3	-25.7	65.9	28.5	73.9	12.1	65.9	28.5	73.9	12.1	73.9	12.1
Gibson	149.4	-76.4	80.2	-46.3	60.0	-25.2	37.3	-37.8	35.3	-5.4	40.7	15.3	35.3	-5.4	40.7	15.3	40.7	15.3
Giles	146.1	-55.2	92.8	-36.4	84.0	-9.5	67.9	-19.2	65.4	-3.7	77.0	17.7	65.4	-3.7	77.0	17.7	77.0	17.7
Grain.	93.0	-40.4	72.6	-21.9	60.9	-16.1	58.5	-3.9	58.4	-	50.0	-	58.4	-	50.0	-	50.0	-
Greene	172.8	-59.1	98.2	-43.2	80.7	-11.7	76.1	-12.2	70.7	-7.1	76.7	8.5	70.7	-7.1	76.7	8.5	76.7	8.5

TABLE VIII. TREND IN FARM WOODLAND AREA IN TENNESSEE, BY CENSUS PERIODS, 1880-1935 (continued)

County	1880		1910		1920		1925		1930		1935	
	Area in 1000 acres	% Inc. or dec. 1880- 1930	Area in 1000 acres	% Inc. over 1880	Area in 1000 acres	% Inc. over 1910	Area in 1000 acres	% Inc. over 1920	Area in 1000 acres	% Inc. over 1925	Area in 1000 acres	% Inc. over 1930
Grundy	50.7	-57.0	49.7	-2.0	50.6	1.8	42.8	-15.4	21.8	-49.1	21.9	.5
Hambl.	35.3	-47.3	26.1	-26.1	22.2	-14.9	19.4	-12.6	13.6	-4.1	13.2	-2.2
Hamilt.	145.4	-50.8	93.0	-36.0	91.5	-1.6	78.9	-13.8	71.6	-9.3	80.5	12.4
Hanc.	74.5	-49.0	56.4	-24.3	55.0	-2.5	42.2	-23.3	44.7	5.9	49.5	-9.4
Hards.	200.8	-46.0	152.4	-24.1	139.3	-8.6	81.6	-41.4	108.5	33.0	137.6	26.8
Hardin	204.5	-36.3	160.5	-21.5	106.6	-33.6	86.8	-18.6	69.9	-20.6	113.9	65.3
Hawk.	148.9	-45.1	114.2	-23.3	96.1	-15.8	84.5	-12.1	81.8	-3.2	89.2	9.0
Hayw.	118.8	-68.0	62.5	-47.4	37.6	-39.8	33.7	-10.4	38.0	12.8	43.0	26.3
Hender.	195.1	-69.7	138.1	-29.2	108.6	-21.4	82.1	-24.4	76.7	-6.6	99.4	29.6
Henry	161.8	-50.9	23.2	-23.9	115.6	-6.2	87.1	-24.7	79.4	-8.8	92.2	16.1
Hickm.	213.5	-58.5	153.9	-27.9	120.1	-22.0	89.5	-25.5	88.6	-1.0	105.4	19.0
Houst.	70.5	-37.0	50.0	-29.1	38.8	-22.4	50.8	30.9	44.4	-12.6	44.0	.9
Humph.	195.0	-47.1	146.1	-25.1	135.4	-7.3	109.5	-19.1	103.2	-5.8	130.0	26.9
Jacks.	104.8	-46.2	82.8	-21.0	78.3	-5.4	68.5	-12.5	56.4	-17.7	67.1	19.0
Jeff.	78.0	-55.8	52.2	-33.1	41.6	-20.3	37.6	-9.6	34.5	-8.2	36.7	6.4
John.	160.5	-71.7	57.8	-64.0	62.2	7.6	45.7	-26.5	45.4	.7	50.3	10.8
Knox	128.0	-53.9	85.2	-33.9	75.4	-11.6	56.1	-25.6	59.5	6.1	63.6	8.9
Lake	56.4	-39.3	9.1	-76.0	7.1	-22.0	1.8	-74.6	3.9	116.7	12.8	228.2
Lauder.	80.9	-66.6	62.2	-23.1	47.2	-24.1	33.2	-29.7	27.0	-18.7	76.6	183.7
Laur.	184.0	-41.7	141.0	-23.4	144.9	2.8	135.9	-13.1	107.3	-14.8	118.7	10.6
Lewis	64.9	-47.0	43.2	-33.4	35.9	-16.9	22.8	-36.5	34.4	50.9	38.5	11.9
Linc.	130.6	-41.0	105.5	-19.2	103.7	-1.7	100.5	-1.2	77.1	-24.8	93.4	21.1
Loudon	74.7	-53.3	53.6	-28.2	46.3	-13.6	41.7	-9.9	34.9	-16.3	38.0	3.2
McMinn	118.8	-41.1	99.1	-16.6	80.8	-18.6	71.2	-11.9	70.0	-1.7	72.8	4.0
McMurry	205.3	-48.5	149.4	-27.2	146.6	-1.9	112.7	-23.1	105.7	-6.2	107.3	1.5
Macon	115.9	-50.9	82.3	-29.0	65.8	-20.0	52.7	-19.9	56.9	8.0	60.3	6.0
Madis.	131.2	-56.7	106.1	-19.1	98.4	-16.7	62.0	-29.9	56.8	-8.4	72.3	27.3
Marion	110.9	-68.8	70.3	-36.6	55.3	-21.3	32.6	-59.1	34.6	53.1	19.5	-43.6
Marsh.	85.6	-27.7	61.1	-28.6	62.0	1.5	54.3	-12.4	61.9	14.0	57.7	-6.8
Maury	125.0	-36.2	94.7	-24.2	84.8	-10.5	73.3	-13.6	79.7	8.7	82.4	3.4
Meigs	69.1	-35.2	56.5	-18.2	54.7	-3.2	51.5	-5.9	44.8	-13.0	54.9	22.5
Monroe	144.5	-58.0	114.3	-21.0	100.8	-12.0	97.7	-12.8	77.5	-11.6	88.2	13.8
Montg.	126.4	-54.3	84.2	-33.4	66.0	-25.6	63.7	-3.5	57.8	-9.3	68.6	18.7

TABLE VIII. TREND IN FARM WOODLAND AREA IN TENNESSEE, BY CENSUS PERIODS, 1880-1935 (continued)

County	1880			1920			1925			1930			1935	
	Area in 1000 acres	% Inc. or dec. 1880- 1930	Area in 1000 acres	% Inc. or dec. 1880	Area in 1000 acres	% Inc. or dec. 1910	Area in 1000 acres	% Inc. or dec. 1920	Area in 1000 acres	% Inc. or dec. 1925	Area in 1000 acres	% Inc. or dec. 1930	Area in 1000 acres	% Inc. or dec. 1930- 1935
Moore	28.6	-44.4	20.7	-27.6	21.5	3.9	17.8	-17.2	15.9	-19.7	28.5	79.2	28.5	79.2
Morg.	107.7	-57.6	85.8	-22.2	77.9	-7.0	24.2	-68.9	45.7	88.8	62.2	56.1	62.2	56.1
Obion	128.0	-65.8	88.5	-30.9	70.1	-20.8	49.9	-28.6	43.8	-12.2	62.9	43.6	62.9	43.6
Overt.	124.8	-28.2	109.0	-12.7	106.5	-2.3	105.8	- .7	89.6	-15.3	90.5	1.0	90.5	1.0
Perry	145.4	-30.0	138.0	-5.1	128.4	-7.6	116.0	-9.7	101.9	-12.2	123.7	21.4	123.7	21.4
Pick.	-	100.0	39.5	-	45.0	13.6	37.1	-17.6	40.3	8.6	36.1	-10.4	36.1	-10.4
Polk	85.6	-59.7	52.3	-38.9	49.1	6.1	44.9	-8.6	34.5	-23.2	49.6	45.6	49.6	45.6
Putn.	140.8	-51.3	108.5	-22.9	95.9	-11.6	88.3	-7.9	68.5	-22.4	73.1	6.7	73.1	6.7
Rhea	179.9	-73.4	57.8	-67.9	49.5	-16.1	49.1	1.2	47.9	-2.4	40.3	-15.9	40.3	-15.9
Roane	128.9	-40.0	96.3	-25.3	79.8	-17.1	70.4	-11.8	77.3	9.8	84.6	9.4	84.6	9.4
Robert.	118.6	-59.0	64.6	-45.5	54.0	-16.4	42.3	-21.7	48.6	14.9	50.2	3.3	50.2	3.3
Ruther.	134.5	-21.7	119.0	-11.5	120.2	1.0	102.4	-14.8	105.3	2.8	101.7	-3.4	101.7	-3.4
Scott	218.2	-83.1	90.2	-59.7	70.2	-22.2	41.6	-40.7	36.9	-11.3	47.3	28.2	47.3	28.2
Sequatch.	42.5	-63.8	34.4	-19.1	19.1	-44.5	20.3	6.3	15.4	-24.1	20.5	33.1	20.5	33.1
Sevier	199.2	-57.8	150.8	-24.4	127.6	-15.3	85.2	-33.2	84.0	-1.4	73.9	-12.0	73.9	-12.0
Shelby	138.5	-77.1	71.3	-48.5	52.1	-26.9	45.0	-13.6	51.7	-29.6	62.3	96.5	62.3	96.5
Smith	76.8	-43.1	60.1	-21.7	41.3	-31.5	47.9	16.0	43.7	-8.8	55.6	27.2	55.6	27.2
Stew.	153.6	-55.8	103.3	-32.7	92.2	-10.7	71.2	-22.8	67.9	-4.6	66.9	-2.9	66.9	-2.9
Sulliv.	122.4	-60.2	70.8	-42.3	62.1	-12.3	51.1	-17.7	48.7	-4.7	47.6	-2.3	47.6	-2.3
Sumner	117.3	-54.5	99.6	-15.1	69.9	-29.8	60.9	-12.9	53.4	-12.3	68.0	27.3	68.0	27.3
Tipton	131.4	-74.7	64.3	-51.1	43.0	-33.1	28.7	-33.3	33.2	15.7	52.7	58.7	52.7	58.7
Trousd.	20.5	-34.6	21.2	3.4	16.8	-20.8	14.4	-14.3	13.4	-6.9	17.3	28.1	17.3	28.1
Unicoi	81.6	-73.8	28.3	-65.3	26.1	-7.8	21.0	-19.5	21.4	1.9	21.8	1.9	21.8	1.9
Union	75.5	-43.6	58.5	-22.5	54.3	-10.6	14.5	-42.7	25.7	77.2	22.8	-11.3	22.8	-11.3
V.Bur.	34.9	-26.4	28.3	-18.9	25.3	-10.6	14.5	-42.7	25.7	77.2	22.8	-11.3	22.8	-11.3
Warren	139.2	-54.4	99.5	-28.5	86.0	-13.6	64.2	-26.3	63.5	-1.1	66.0	3.9	66.0	3.9
Wash.	71.7	-58.9	37.8	-47.3	33.3	-11.9	29.4	-11.7	29.6	.3	27.2	-7.8	27.2	-7.8
Wayne	228.1	-47.8	137.2	-39.9	142.9	4.2	120.8	-15.5	119.0	-1.5	119.6	.6	119.6	.6
Weat.	157.3	-67.6	95.1	-39.5	75.4	-20.7	54.2	-28.1	51.0	-5.9	48.3	-5.3	48.3	-5.3
White	98.7	-49.4	66.4	-32.7	62.4	-6.0	45.7	-26.8	49.9	9.2	56.5	13.2	56.5	13.2
Willi.	147.9	-33.9	110.5	-25.3	111.6	1.0	92.2	-17.4	97.8	6.1	114.9	17.5	114.9	17.5
Wilson	138.2	-35.1	128.7	-6.9	137.0	6.4	109.0	-20.4	89.7	-17.7	126.9	41.5	126.9	41.5
Total	11,232.9	-51.8	8007.7	-28.7	7080.2	-11.6	5562.5	-21.4	5414.3	-2.7	6206.2	14.6	6206.2	14.6

Source: Census of Agriculture, 1880 to 1935.

decreased 2.7%, whereas the United States in general experienced an increase of five per cent. The counties showing the greatest rate of increase were located along the Cumberland Plateau and in certain counties of West Tennessee (Figure 8).

Since 1930 the trend in this state has been upward, the increases occurring in over 70% of the counties (Figure 8). Our largest rate of increase has taken place in Lake, Dyer, Lauderdale, Shelby, and Hardin Counties in West Tennessee; and Lincoln and Moore Counties in Middle Tennessee, whereas those counties showing a decrease were located largely along the Cumberland Plateau and in the upper counties of East Tennessee.

CHAPTER II

PRESENT STATUS OF FOREST AREAS

Commercial Forest Area in the U. S.

The total forest area in the United States consists of approximately 615 million acres, or 32% of the total land area (Table IX). Four-fifths of this forest land is in commercial forests with the remaining one-fifth in non-commercial forests. Of the latter type, approximately eleven million acres are in commercially valuable forests in the form of parks, preserves, etc., which are withdrawn from timber use, and the remaining one hundred nine million acres, located in the West, is valuable chiefly for purposes other than timber (Table IX).

TABLE IX. THE DISTRIBUTION OF LAND AREA BY MAJOR CLASSES IN THE UNITED STATES IN 1930 (1)

	Million acres	Per cent of total land area
Forest land:		
Commercial	495	26.0
Non-commercial	120	6.3
Total	615	
Crop land in farms	413	21.7
Pasture and range		
In farms	379	20.0
Not in farms	317	16.7
Total	696	
Farmsteads, roads, urban, waste, etc.	170	9.4
Total land area of U.S.	1903	100.0

(1) Secretary of Agriculture, A National Plan for American Forestry, p. 121.

Table X shows the regional distribution of commercial and non-commercial forest areas. The South has slightly more than one-third of the commercial area, or about 19 million acres, but only about one-fifth of the non-commercial area, or about 26 million acres.

TABLE X. FOREST AREAS OF THE UNITED STATES BY BROAD CLASSES AND REGIONS
(In thousand of acres)

Region	Total	Commercial*	Non-commercial		
			Total	Withdrawn from timber use**	Chiefly valuable for purposes other than timber***
New England	27,434	27,273	161	79	82
Middle Atlantic	29,770	27,139	2,631	2,467	164
Lake	80,345	55,895	4,450	2,578	1,872
Central	66,059	64,249	1,810	544	1,266
South	216,868	190,758	26,110	589	25,521
Pacific Coast	81,295	66,685	14,610	1,753	12,857
North Rocky Mt.	43,187	32,329	10,858	441	10,417
South Rocky Mt.	89,660	50,570	59,090	2,510	56,520
Total	614,558	494,898	119,660	10,961	108,699

* Land capable of producing timber of commercial size and use.

** Fair to good timber producing land withdrawn from timber use, as in parks.

*** Land characterized by scrubby or inaccessible forest, some of which is withdrawn from timber use.

Source: Secretary of Agriculture, A National Plan for American Forestry, p. 22.

Distribution of Saw-Timber by Regions. Approximately 38 per cent of our total commercial forest area in the United States, or 189 million acres, is in land bearing saw timber which is about equally divided between old and second growth. The old growth timber is located primarily in the West,

whereas the second growth is confined principally to the eastern half of this country with the South far in the lead. In the New England, Middle Atlantic, Central, and Lake States, we have 35 per cent of the total commercial forest land in the United States, but only 9 per cent of our saw timber supply. The South has 39% of the commercial forest area. Four-fifths, or 79%, of the present stand of saw timber in the United States is located in the far West which has only 26% of the total commercial forest area.⁽²⁾ (Figure 9)

TABLE I.A SAW TIMBER STAND BY REGIONS IN THE UNITED STATES,
1935

Region	Per cent
Pacific Coast	62
South	12
North Rocky Mountains	9
South Rocky Mountains	8
New England, Middle Atlantic, Lake, and Central States	each from 2-3

Source: Illick, Joseph, An Outline on General Forestry,
p. 46-47.

The total volume of timber in the United States is estimated at four hundred and eighty-seven billion cubic feet, on which the annual drain is something over sixteen billion cubic feet which is 28.5% of the total annual wood consumption of the world.⁽³⁾ Our cordwood stand of which one-third

(2) Secretary of Agriculture, op. cit., p. 128.

(3) Illick, Joseph, An Outline on General Forestry, p. 46-47.

lies in the Southern States is estimated at two billion three hundred and eighty-two million cords. In general, the total drain of saw timber is about five times greater than its growth, and the drain on the total timber volume is almost twice that of the timber grown. (4)

Ownership of Forest Resources in the United States

Industrial Forest Land. Two hundred seventy million acres, or over half of the commercial forest land in the United States, is owned by industrial concerns, such as land, mining, pulp and paper, and lumber companies, naval store operators, railroads, and miscellaneous individuals or agencies. Industrial ownership of commercial forest land predominates in the East, whereas the majority of western forest land is in public ownership. Eighty six per cent of the total industrial acreage found in this country is located in the East as compared with 14% for the West. The South leads all other regions with nearly 60% of the industrial forest area of the entire country. In the East, with the exception of the Central Region where industrial ownership about equals the area of farm woodland, the industrial forest area is much in excess of farm woodland and publicly owned forest land. (5)

Figure 10 visualizes the distribution of kinds of timber found in industrial forests on an acreage basis. The saw timber stand in the South is

(4) Ibid., p. 37.

(5) Secretary of Agriculture, op. cit., p. 130.

almost three times that found in the industrial forest of the Central region where we have our second largest stand of industrial saw timber. Our Southern industrial forests are about equally divided between saw timber, cordwood, fair to satisfactory restocking, and poor to non-restocking areas. The Lake states, our second largest industrial forest region, has the largest proportion of its forest area in restocking forest land. (6)

TABLE XI. OWNERSHIP OF COMMERCIAL FOREST AREAS OF THE UNITED STATES BY REGIONS, 1953

Region	All areas	Federally owned and managed	State, county, and municipal	Private		
				Total	Industrial	Farm woodland
	1000 acres	1000 acres	1000 acres	1000 acres	1000 acres	1000 acres
			All Areas			
New England	27,273	471	824	25,978	19,576	6,402
N. Atlantic	27,159	347	1,861	24,931	15,470	9,461
Lake	55,895	2,955	3,867	49,073	34,792	14,281
Central	64,249	581	191	63,477	31,319	32,158
South	190,758	3,213	281	187,264	129,398	57,866
Pacific Coast	66,685	31,811	1,837	33,037	27,938	5,099
N. Rocky Mt.	52,329	23,725	1,266	7,338	5,925	1,413
S. Rocky Mt.	30,570	24,924	506	5,141	5,098	43
Total	494,898	88,027	10,632	396,239	269,516	126,723
Saw Timber Areas						
New England	13,860	248	351	13,261	10,834	2,427
N. Atlantic	7,294	30	64	7,200	3,732	3,468
Lake	5,095	474	197	4,424	2,631	1,793
Central	21,224	220	83	20,921	8,763	12,158
South	57,265	1,941	104	55,220	41,491	13,729
Pacific Coast	44,140	24,129	1,104	18,907	17,167	1,740
N. Rocky Mt.	17,026	12,623	849	3,554	3,190	364
S. Rocky Mt.	22,741	19,612	351	2,778	2,744	34
Total	188,645	59,277	3,103	126,265	90,552	35,713

(continued)

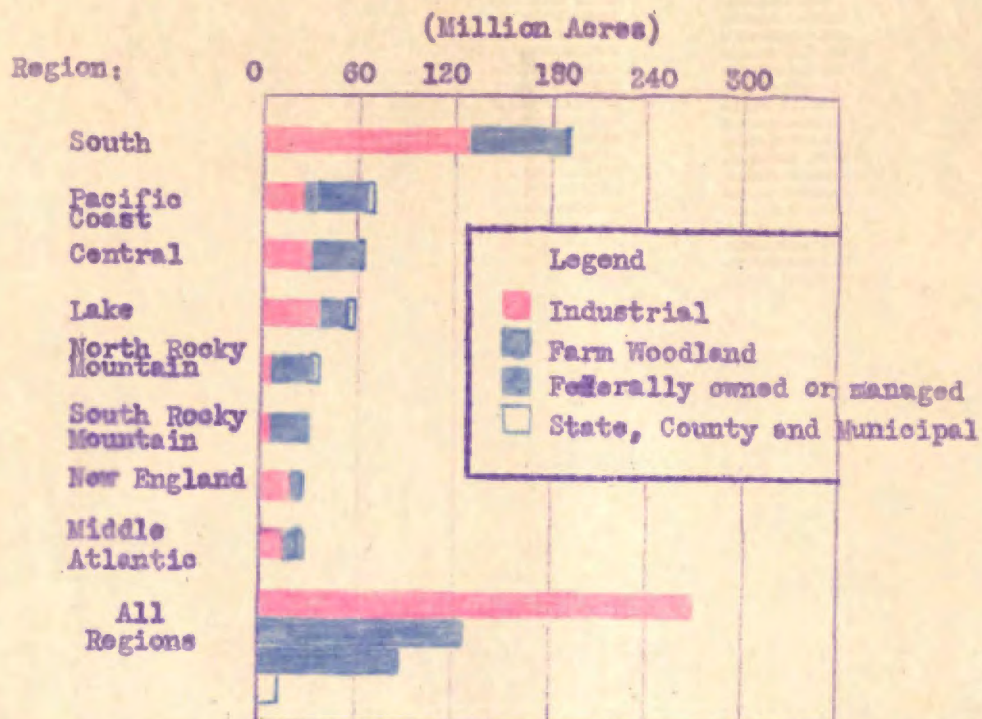


Figure. 9. Ownership of Commercial Forest Area by Regions, United States, 1933.

Source: Table XI.

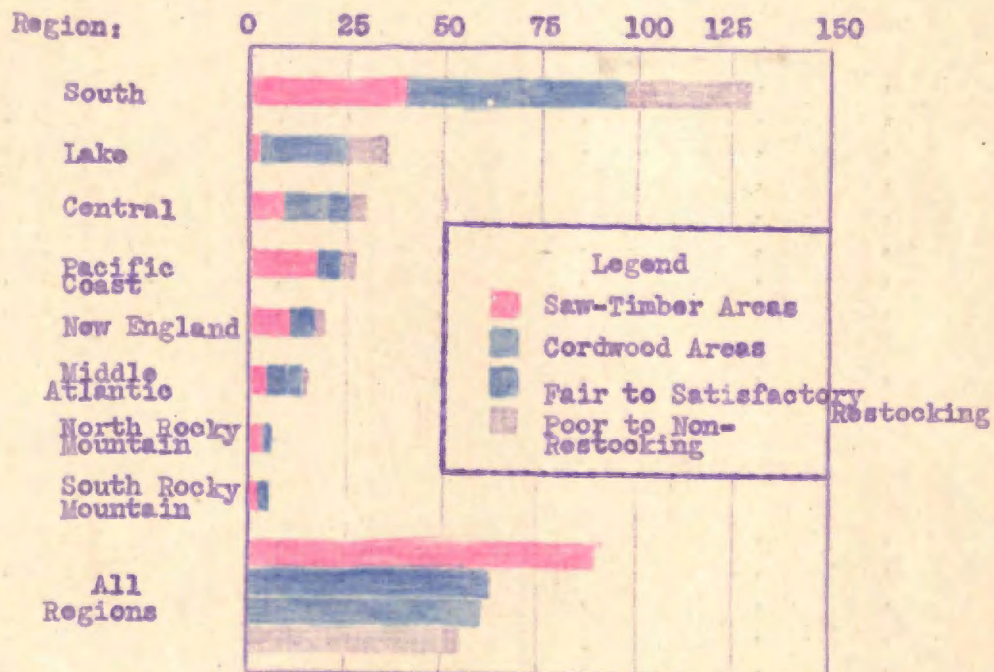


Figure. 10. Industrial Forest Area, by Regions and Character of Growth, United States, 1933.

Source: Table XI,

TABLE XI. OWNERSHIP OF COMMERCIAL FOREST AREAS OF THE UNITED STATES
BY REGIONS, 1933 (cont.)

(In 1000 acres)

Region	All areas	Federally owned and managed	State, county, and municipal	Private		
				Total	Industrial	Farm wood-land
<u>Cordwood Areas</u>						
New England	4,843	112	190	4,541	2,841	1,700
N. Atlantic	10,518	48	772	9,698	6,085	3,613
Lake	8,880	578	462	7,833	3,226	4,607
Central	25,592	158	66	25,368	12,956	12,432
South	52,702	638	61	52,013	32,224	19,789
Pacific Coast	6,683	3,478	109	3,098	2,170	928
N. Rocky Mt.	5,704	4,550	129	1,025	716	309
S. Rocky Mt.	5,959	4,146	127	1,686	1,685	3
Total	120,881	13,706	1,913	106,262	61,881	43,381
<u>Fair to Satisfactory Restocking Areas</u>						
New England	6,145	86	208	5,851	4,279	1,572
N. Atlantic	5,998	140	786	5,072	3,348	1,724
Lake	28,166	1,206	2,276	24,683	19,284	5,399
Central	12,245	133	34	12,078	6,885	5,193
South	37,236	573	61	36,602	24,718	12,084
Pacific Coast	6,190	1,610	256	4,324	3,205	1,119
N. Rocky Mt.	5,933	4,226	167	1,540	1,153	407
S. Rocky Mt.	161	143	2	16	11	5
Total	102,073	7,917	3,790	90,366	62,863	27,503
<u>Poor to Non-Restocking Areas</u>						
New England	2,425	25	75	2,325	1,622	703
N. Atlantic	3,329	129	239	2,961	2,305	656
Lake	13,756	697	925	12,133	9,651	2,482
Central	5,188	70	8	5,110	2,736	2,376

(continued)

TABLE XI. OWNERSHIP OF COMMERCIAL FOREST AREAS OF THE UNITED STATES BY REGIONS, 1933 (cont.)

(In 1000 acres)

Region	All areas	Federally owned and managed	State, county, and municipal	Private		
				Total	Industrial	Farm wood-land
<u>Poor to Non-Restocking Areas (cont.)</u>						
South	43,555	261	65	43,229	30,965	12,264
Pacific Coast	9,672	2,596	368	6,708	5,396	1,312
N. Rocky Mt.	3,666	2,326	121	1,219	886	333
S. Rocky Mt.	1,709	1,023	25	661	860	1
Total	58,299	7,127	1,026	74,346	54,220	20,126

(1) Commercial forest land "includes not only land bearing present timber stands that could be economically utilized, but also other forest land on which present or future timber stands can be economically utilized under future conditions."

(2) Sawtimber denotes areas characterized by trees large enough for saw logs regardless of their actual use.

(3) Cordwood denotes areas characterized by trees too small for sawlogs but large enough for cordwood use, regardless of whether the stand is out for cordwood or held for saw timber.

(4) Good restocking area is characterized by 70% or more of normal restocking with trees for the most part below cordwood size.

Fair restocking area is 40 to 69% of the above.

(5) Poor restocking area is 10 to 39% of the above, and non-restocking area refers to less than 10% of the above.

Farm Woodland. Approximately 20% of the total forest land in the United States, or over one-fourth of the nation's commercial forest area, is found in native woodland on farms. (7) Of the 126,723,000 acres in

(7) Secretary of Agriculture, op. cit., p. 136.

farm woodland in 1933, 95% was found in the eastern part of the United States where it constituted almost a third of the eastern commercial forest area. In the Central Region, to which Tennessee belongs, farm woodland includes about one-half, and in the South and Middle Atlantic Region, it includes about one-third of the total commercial forest area. Only six and four-tenths million acres, or approximately 5% of the total, commercial forest land of the West is in farm woodland. In the South, our most important farm woodland region, there is a higher proportion of poor to non-restocking land than in any other important farm woodland region. The Lake section also has a high proportion of the farm woodland in restocking areas. In the New England, Middle Atlantic, and Central Regions, the farm woodland situation appears favorable since only a small proportion of the total is in restocking forest areas (Figure 11).

Public Forest Land. Twenty per cent of the four hundred ninety-five million acres in commercial forests in the United States, or ninety-nine million acres, are publicly owned. The bulk of this type of forest ownership, or eighty-eight million acres, is owned by the Federal Government; and of the remaining land, nine and one-half million acres are owned by the states; and something over a million acres are owned by the counties and municipalities. ⁽⁸⁾ Of the Federally owned commercial forest land, seventy-five million acres are located in the West and approximately seven million acres are located in the East. Approximately four and

(8) Secretary of Agriculture, op. cit., p. 137.

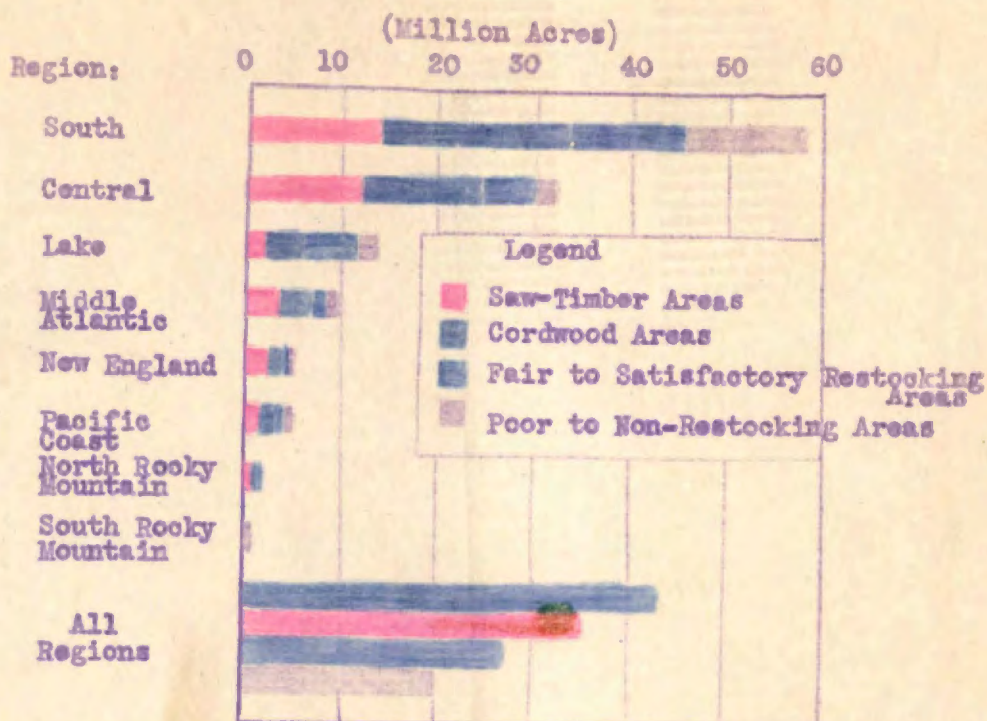


Figure 11. Commercial Farm Woodland Area, by Regions and by Character of Growth, 1933.

Source: Table XI.

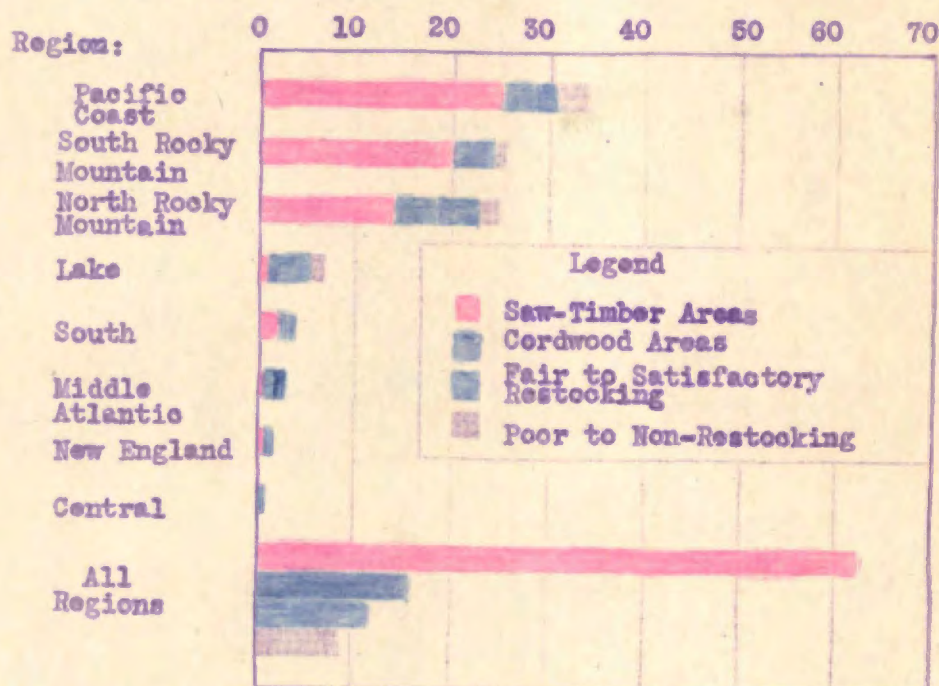


Figure 12. Public Ownership of Forest Areas by Regions and by Character of Growth, 1933.

Source: Table XI.

three-fourths million acres are largely cut-over lands. Thirteen million acres of Federally managed commercial forest land, made up of Indian Reservations and public domain, are located in the West. ⁽⁹⁾

In the eastern part of the United States, our public forests include only 4% of the total commercial forest land. The United States' public-owned forest land is decidedly less than the proportion of similar forest areas in many of the European countries. In Switzerland 72 per cent of the forest land is publicly owned; 52% in Germany; 35% in Italy and France; 28% in Austria; and 24% in Sweden. ⁽¹⁰⁾

Figure 12 shows a marked contrast between the relative amounts of publicly owned forest land in the different regions of the United States. A large proportion of the public forests of the West and South are in saw timber, whereas the public forests in the other regions contain a very high percentage of restocking timber areas.

The Government's purpose of establishing public ownership of commercial forest land was to safeguard and stabilize the timber resources of this nation against speculative and unscrupulous interests. By doing this it has given assurance of future timber supplies making them available in sufficiently large quantities to meet possible future emergencies. ⁽¹¹⁾

Commercial and Non-Commercial Forest Land in Tennessee

The present forests of Tennessee occupy approximately 14,316,000 acres,

(9) Ibid., p. 138.

(10) Ibid., p. 139.

(11) Ibid., p. 138-139.

or over 52% of the state's total land area. Ninety-eight per cent of this land is in commercial forests and the remaining 1.4% is classified as non-commodity forest land. This non-commodity forest land, including lands withdrawn from commercial use and areas not capable of producing saw timber or pulpwood timber in commercial quantities, consists of some 204,000 acres which are distributed as follows:

111,346 acres of acquired land in Smoky Mountain Park area
 1,700 acres in city watersheds
 10,000 acres in farm woodlots
 3,000 acres in municipal parks
 78,000 acres in land capable of producing timber in commercial quantities. (12)

Regional Distribution of Commercial Forest Areas. In general our most extensive commercial forest areas within the state are found in those regions least adapted to agricultural purposes, due to poor soil, rough topography, or poor drainage. (13) Our most extensive forest areas, or those occupying over 70% of the total land area, are located in the Unaka Mountain Range in the extreme eastern part of Tennessee, on the Cumberland Plateau, and on the Western Highland Rim (Figure 13). The smallest percentage of land in commercial forests is found in the valley of East Tennessee, in the Central Basin, and in the northwest corner of West Tennessee, all excellent farming areas. No county, however, has

(12) Tennessee State Planning Commission, Major Rural Land Use Problems in Tennessee, p. 63.

(13) Alfred, C. E., and Atkins, S. W., Tennessee, Economic, Social and Civic, p. 176.



Note.. None under 20.

Figure.13 Percentage of Total Land Area in Commercial Forest in Tennessee, by Counties, 1931.

Source: Carl I. Peterson, Tennessee Forest Service, August 27, 1931.

TABLE XII. COMMERCIAL FOREST LAND: AREA AND SAW TIMBER STAND IN
TENNESSEE, 1931

County	Total area forest land (1000 acres)				% of total land area	Sawtimber in thousand board feet			Cord- wood in cords
	Old growth	Second growth	De- for- est- ed	Total		Soft- wood	Hard- wood	Total	
Ander.	5	141	1	147	67	19,260	142,390	161,650	535
Bedf.	-	106	7	113	34	1,817	54,526	56,343	470
Bent.	16	152	20	188	64	-	350,000	350,000	1,210
Bleds.	7	178	2	187	75	2,075	137,226	139,301	1,049
Blount	1	185	7	193	52	28,200	113,276	141,476	1,180
Bradl.	-	125	12	137	59	1,950	10,550	12,500	513
Campb.	6	207	4	217	74	30,500	401,700	432,000	1,012
Cannon	-	67	3	70	40	-	40,764	40,764	274
Carroll	20	136	42	198	50	-	114,000	114,000	990
Carter	12	138	-	150	66	37,452	123,731	161,183	806
Cheat.	-	123	10	133	75	-	56,993	56,993	530
Cheat.	-	104	11	115	57	-	26,000	26,000	1,053
Claib.	26	143	4	173	58	15,714	146,832	162,546	516
Clay	-	91	1	92	56	-	88,935	88,935	141
Cocke	2	133	-	135	49	20,132	70,916	91,048	793
Coffee	-	155	2	157	55	-	25,500	25,500	833
Creek.	-	38	2	40	23	-	15,000	15,000	505
Cumber.	25	353	2	380	90	65,200	208,820	274,020	1,080
David.	-	145	9	154	47	3,271	18,537	21,808	559
Decat.	-	92	11	103	56	-	118,000	118,000	772
DeKalb	-	65	3	68	34	2,293	43,565	45,858	250
Dick.	-	210	16	226	64	-	352,000	352,000	1,616
Dyer	-	138	3	141	44	12,300	110,700	123,000	755
Fayette	-	117	32	149	37	7,990	71,910	79,900	974
Fentr.	50	219	3	272	87	158,200	324,000	482,200	1,135
Frank.	4	209	1	214	58	1,980	97,020	99,000	1,206
Gibson	-	97	7	104	25	-	26,000	26,000	863
Giles	-	115	7	122	30	-	103,046	103,046	499
Grain.	-	86	4	90	48	12,500	50,000	62,500	528
Greene	4	122	2	128	32	22,201	56,925	79,126	637
Grundy	4	213	-	217	90	5,250	99,750	105,000	1,351
Hambl.	-	19	2	21	20	2,308	9,482	11,790	107
Hamilt.	6	212	6	224	64	11,800	155,200	167,000	1,195
Hanc.	-	71	3	74	51	10,340	41,550	51,890	436
Harde.	-	256	22	278	62	28,160	99,840	128,000	2,282
Hardin	-	239	15	254	68	19,992	146,608	166,600	2,248
Hawkins	-	126	-	126	40	17,680	70,720	88,400	764
Haywood	-	129	5	134	41	7,500	67,500	75,000	2,076

(continued)

TABLE XII. COMMERCIAL FOREST LAND: AREA AND SAW TIMBER STAND IN TENNESSEE, 1931 (cont.)

County	Total area forest land (1000 acres)				% of total land area	Sawtimber in thousand board feet			Cord- wood in cords
	Old growth	Second growth	De- fer- est- ed	Total		Soft- wood	Hard- wood	Total	
Hender.	-	146	38	183	53	-	144,000	144,000	1,534
Henry	26	147	30	203	50	-	127,000	127,000	1,173
Hickm.	-	253	8	261	71	880	117,000	118,000	1,090
Houst.	2	82	2	86	68	-	3,000	3,000	479
Humph.	3	198	2	203	70	-	71,500	71,500	1,437
Jacks.	-	76	1	77	40	-	91,221	91,221	146
Jeff.	-	52	4	56	28	7,304	29,658	36,362	318
John.	8	108	-	116	61	23,395	90,755	119,150	617
Knex	-	112	7	119	37	14,300	65,500	79,800	689
Lake	-	16	1	17	22	1,800	7,200	9,000	132
Lauder.	-	143	5	148	50	13,900	125,100	139,000	1,165
Lawr.	2	221	2	225	57	630	70,370	71,000	2,112
Lewis	-	157	1	158	86	1,860	44,640	46,500	517
Line.	-	127	6	133	35	-	101,672	101,672	578
Loudon	-	42	4	46	33	5,470	21,882	27,352	244
McMinn	-	111	11	122	44	15,620	58,980	74,600	670
McNairy	-	205	34	239	63	10,500	94,800	105,000	1,315
Macon	-	60	1	61	53	-	77,543	77,543	257
Madis.	-	141	13	154	44	-	35,000	35,000	1,323
Marion	11	256	2	269	83	25,080	199,420	224,500	1,403
Marsh.	-	75	4	79	33	1,127	21,414	22,541	262
Maury	-	93	15	108	29	2,326	44,191	46,517	372
Meigs	-	62	10	72	54	90	2,919	3,000	212
Monroe	7	269	6	282	65	63,842	121,038	184,880	1,688
Montg.	-	76	33	109	33	-	10,500	10,500	477
Moore	-	37	1	38	42	-	16,479	16,479	174
Morg.	13	277	10	300	88	118,672	214,948	333,620	1,350
Obion	9	101	8	116	33	7,800	70,200	78,000	907
Overt.	15	148	7	170	59	1,100	200,362	201,462	814
Perry	-	252	5	257	82	1,800	84,954	86,254	831
Pick.	7	57	-	64	62	13,300	83,954	97,254	338
Polk	-	144	15	159	57	30,473	54,773	85,246	1,151
Putn.	1	115	2	118	45	3,000	81,630	84,630	388
Rhea	8	152	-	160	68	23,923	111,747	135,670	877
Roane	-	145	4	149	61	12,493	18,468	28,959	624
Robert.	-	52	21	73	25	-	166,823	166,823	298
Ruther.	-	157	6	163	41	2,945	8,836	11,781	743
Seott	26	259	8	293	83	66,612	215,950	282,562	1,589

(continued)

TABLE XII. COMMERCIAL FOREST LAND: AREA AND SAW TIMBER STAND IN TENNESSEE, 1931 (cont.)

County	Total area forest land (1000 acres)				% of total land area	Sawtimber in thousand board feet				Cord- wood in cords
	Old growth	Second growth	De- for- est- ed	Total		Soft- Wood	Hard- wood	Hard- wood	Total	
Sequat.	12	133	-	145	86	3,750	71,250	75,000	974	
Sevier	-	171	-	171	45	24,880	100,228	125,108	1,061	
Shelby	-	233	24	257	50	16,560	149,040	165,600	2,145	
Smith	-	43	2	45	24	1,312	1,968	3,280	124	
Stew.	4	165	19	188	65	-	154,000	154,000	2,331	
Sulli.	9	102	1	112	40	27,040	89,290	116,330	530	
Sumner	-	93	14	107	30	3,154	17,875	21,029	441	
Tipton	-	108	3	111	39	7,740	69,860	77,400	995	
Trousd.	-	13	3	16	23	134	2,539	2,673	34	
Unicoi	9	95	-	104	80	28,880	90,868	119,748	566	
Union	9	54	4	67	44	1,500	118,800	120,300	508	
V.Bur.	3	157	2	162	87	2,400	77,600	80,000	703	
Warren	5	105	8	118	43	4,300	57,200	61,500	537	
Wash.	-	61	1	62	30	9,381	37,113	46,494	386	
Wayne	2	396	5	403	84	600	29,400	30,000	3,244	
Weak.	17	91	14	122	33	-	82,000	82,000	741	
White	10	103	5	118	50	975	61,525	62,500	503	
Willi.	-	143	11	154	41	4,815	19,257	24,072	650	
Wilson	-	139	3	142	36	2,598	7,796	10,394	633	
Total	408	12,983	723	14,112	52	1,160,826	8,499,103	9,659,929	31,249	

Source: State Division of Forestry, Special tabulation.

less than 20 % of its total land area in commercial forests.

About half of the commercial forest land in Tennessee is in private ownership, other than that found on farms, as compared with 44 % in farm woodlands and approximately 5% in the Cherokee, the Unaka, and the Pisgah National Forests.

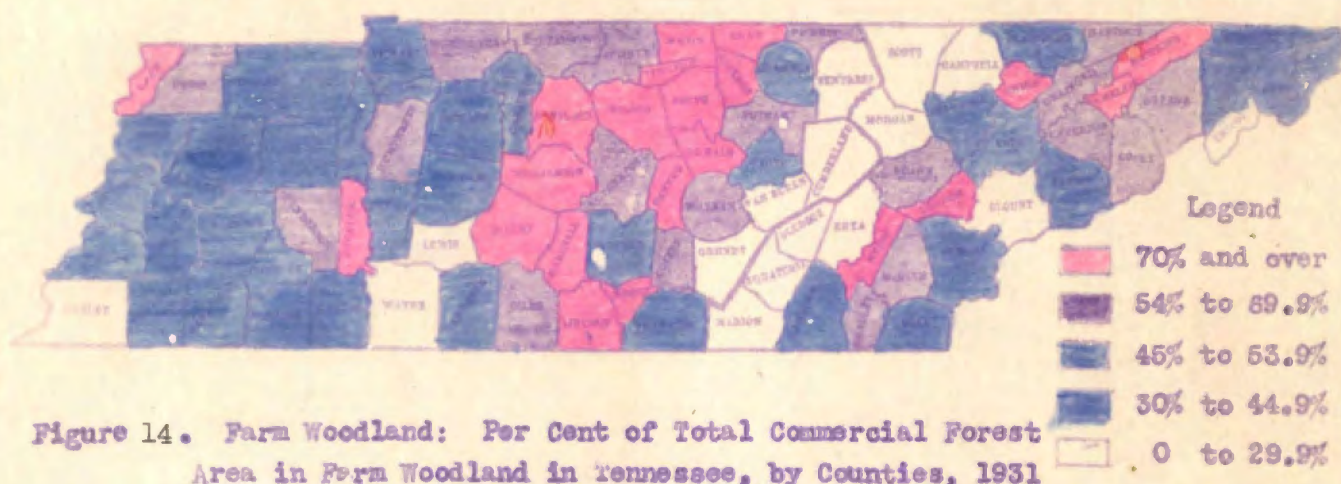


Figure 14. Farm Woodland: Per Cent of Total Commercial Forest Area in Farm Woodland in Tennessee, by Counties, 1931

Source: Tennessee Forestry Service

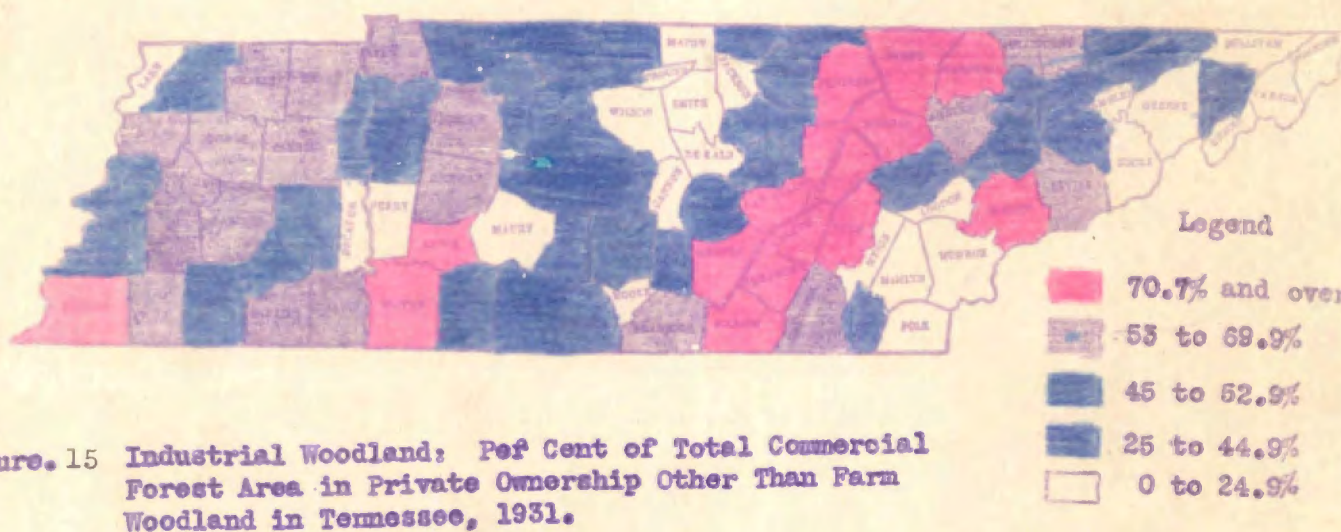


Figure. 15 Industrial Woodland: Per Cent of Total Commercial Forest Area in Private Ownership Other Than Farm Woodland in Tennessee, 1931.

Source: Tennessee Forestry Service.

Private Non-Farm Forests. These forest lands, which includes all privately owned forests other than farm woodland, constitute slightly over 50 per cent of Tennessee's commercial forest area, or 7,207,000 acres. Regions within the state containing the highest proportion of forest land in industrial ownership are found in counties on the Cumberland Plateau, and in Blount, Lewis, Wayne, and Shelby counties (Figure 15). As one would naturally expect, industrial ownership is of only minor significance in those regions having a high percentage of forest land in farm woodland or in National forests. Our largest proportion of industrially owned forest land, or 92.6%, is found in Marion County, whereas in Carter, DeKalb, Greene, Johnson, Macon, Monroe, Polk, Smith, Sullivan, and Trousdale Counties there is no forest land under this type of ownership.

Farm Woodland. Farm woodland in Tennessee is our second most important source of timber, occupying over six million acres, or 44% of our total commercial forest area. This form of ownership predominates largely in the better farming sections of the state, namely in the Central Basin, on the Eastern Highland Rim, in certain valley counties of East Tennessee, and in Lake and Decatur Counties of West Tennessee (Figure 14). The forest land in Smith, Trousdale, Macon, and DeKalb Counties is confined entirely to farm ownership as contrasted to Marion County which has only 7% of its total woodland area on farms. As one would naturally expect, our farm woodland is of most importance in those counties in which commercial and national forests are of minor significance. Figure 16 giving the distribution of farm woodlands in Tennessee by civil districts, 1930, shows in general a scarcity

TABLE XIII. COMMERCIAL FOREST LAND BY TYPE OF OWNERSHIP, TENNESSEE,
(In thousands of acres)

County	Rank	Total (as reported)	Farm (1934) (a)	Private non- farm, 1934 (b)	National forest, 1935 (c)(d)
Anderson	43	147	52	95	
Bedford	185	113	56	57	
Benton	24	188	98	90	
Blodgett	26	187	45	142	
Blount	123	193	57	136	
Bradley	48	137	79	58	
Campbell	17	217	45	172	
Cannon	82	70	59	11	
Carroll	22	198	92	106	
Carter	40	150	51	-	118
Cheatham	64	133	64	69	
Chester	52	115	58	57	
Claiborne	28	173	67	106	
Clay	74	92	65	27	
Cooke	49	135	82	9	44
Coffee	36	157	87	70	
Crockett	91	40	15	25	
Cumberland	2	380	40	340	
Davidson	39	154	118	44	
Decatur	73	103	79	24	
DeKalb	83	68	68	0	
Dickson	14	226	95	131	
Dyer	47	141	57	84	
Fayette	41	149	68	81	
Fentress	7	272	42	230	
Franklin	19	214	74	140	
Gibson	72	104	41	63	
Giles	55	122	77	45	
Grainger	75	90	50	40	
Greene	53	128	77	-	58
Grundy	18	217	22	195	
Hamblen	93	21	18	3	
Hamilton	16	224	81	143	
Hancock	79	74	40	34	
Hardeman	276	278	138	140	
Hardin	12	254	104	150	
Hawkins	54	126	89	37	
Haywood	50	134	48	86	

(continued)

TABLE XIII. COMMERCIAL FOREST LAND BY TYPE OF OWNERSHIP, TENNESSEE,
(continued)

(In thousands of acres)

County	Rank	Total (as reported)	Farm (1934) (a)	Private non- farm, 1934 (b)	National forest, 1935 (c)(d)
Henderson	27	183	99	84	
Henry	20	203	92	111	
Hickman	9	261	105	156	
Houston	76	89	44	42	
Humphreys	21	203	131	72	
Jackson	78	77	67	10	
Jefferson	88	58	37	19	
Johnson	62	116	50	1	65
Knox	58	119	64	55	
Lake	94	17	13	4	
Lauderdale	44	146	77	69	
Lawrence	15	225	119	106	
Lewis	35	158	39	119	
Lincoln	51	133	93	40	
Loudon	89	46	36	10	
McMinn	67	122	73	47	4
McMurry	13	239	107	132	
Macon	87	61	60	1	
Madison	37	154	72	82	
Marion	8	269	80	249	
Marshall	77	79	58	21	
Mary	69	108	82	26	
Meigs	81	72	55	17	
Monroe	5	282	88	-	211
Montgomery	68	109	69	40	
Moore	92	38	29	9	
Morgan	3	300	62	238	
Obion	63	116	63	53	
Overton	30	170	91	79	
Perry	11	257	124	133	
Pickett	85	64	36	28	
Polk	34	159	50	-	252
Putnam	59	118	73	45	
Rhea	33	160	40	120	
Reane	42	149	85	64	
Robertson	80	73	50	23	
Rutherford	31	163	102	61	
Scott	4	293	47	246	
Sequatchie	45	145	20	125	

(continued)

TABLE XIII. COMMERCIAL FOREST LAND BY TYPE OF OWNERSHIP, TENNESSEE,
(continued)

(In thousands of acres)

County	Rank	Total (as reported)	Farm (1934) (a)	Private non- farm, 1934 (b)	National forest, 1935 (c)(d)
Sevier	29	171	74	97	
Shelby	10	257	62	195	
Smith	90	45	56	-	
Stewart	25	188	66	122	
Sullivan	66	112	48	-	69
Sumner	70	107	68	39	
Tipton	67	111	53	58	
Trousdale	95	16	17	-	
Unicoi	71	104	22	8	74
Union	84	67	49	18	
Van Buren	32	162	23	139	
Warren	61	118	66	52	
Washington	86	62	27	29	6
Wayne	1	403	120	283	
Weakley	56	122	46	74	
White	60	118	56	62	
Williamson	38	154	115	39	
Wilson	46	142	127	15	
Total	14,112(d)	14,112(d)	5,206	7,207	901(d)

(a) Special Report of Tennessee Forestry Service, 1931.

(b) Census of Agriculture, 1935.

(c) National Forest Reservation Commission, Letter from the Secretary of War, p. 18, U. S. Government Printing Office, Washington, 1936.

(d) The totals of the three groups of forest land do not check with the grand total as reported by the State Forestry Division in 1931, mainly because the national forest land includes areas which are not in forests -- approximately one-third of the total.

of farm woodland in certain national forest counties of East Tennessee; along the Cumberland Plateau, where there is a concentration of private non-farm commercial forests; and in the western part of West Tennessee, where there is only a scattered stand of commercial timber. (See Appendix



FIGURE 16. - Total Acres of Farm Woodland in Tennessee, 1929.

Source: Census of Agriculture, 1930.

Table I for acres by civil districts.)

National Forests. The third and by far the least important type of commercial forest in Tennessee is found in the national forest areas which are confined entirely to the eastern part of the State. At the

TABLE XIV. NATIONAL FOREST AREA BY COUNTIES, TENNESSEE,
1936 *

National	County	Total Area		
		Acquired area	Net area approved for purchase	Total
Grand total	Tennessee	398,770	502,056	900,826
Unaka	Carter	51,989	66,248	118,237
	Cooke	-	24,589	24,589
	Johnson	32,000	33,109	65,109
	Sullivan	34,081	34,727	68,808
	Union	35,237	38,279	73,516
	Washington	2,762	2,919	5,681
	Total	156,069	199,871	355,940
Pisgah	Cooke	9,425	9,775	19,200
	Greene	27,750	30,653	58,403
	Total	37,175	40,428	77,603
Cherokee	McMinn	1,896	1,950	3,846
	Monroe	78,850	132,598	211,428
	Polk	125,000	127,209	252,209
	Total	205,526	261,757	467,283

*In July of 1936 all the National Forest area in Tennessee was consolidated into the Cherokee Forest thus bringing our federally owned commercial forest land in this State under one administrative unit.

Source: Secretary of War, National Forest Reservation, p. 18.

beginning of the calendar year 1936, the total area acquired and the area approved for purchase in the Unaka, Cherokee, and Pisgah National Forests

of Tennessee was 900,826 acres, two-thirds of which is estimated to be in commercial timber. The Cherokee National Forest occupies over 51% of the federally owned commercial forests in Tennessee, or 467,283 acres, and is located in Polk, Monroe, and McMinn counties in the southeastern part of the State. The Unaka forests, located in portions of Carter, Cocke, Johnson, Sullivan, Unicoi, and Washington counties, occupy approximately 40% of the national forest area of Tennessee. The smallest of the three is the Pisgah National Forest in Cocke and Green Counties, which constitutes only 9 per cent of the combined national forest area in the State.

In 1935 the total national forest area in Tennessee approved for purchase was over a half a million acres as compared with 398,770 acres already in government ownership (Table XIV).

Nature of Timber Growth on Commercial Forest

Areas

The State Forestry Service has divided the commercial forest area in Tennessee into three classifications, namely, old growth, second growth, and deforested forest land.

Old growth timber land, including those areas which are still covered with virgin timber or stands that have been slightly culled, occupied an area estimated at 400,000 acres, or 1.6% of the state's original forested area in 1931. These virgin timber areas are largely confined to the northern Cumberland Plateau and the northeastern counties of West Tennessee (Figure 17).⁽¹⁴⁾ Tennessee's estimated stand of old growth saw timber is

(14) State Forestry Service, Special Report.

approximately 1.6 billion board feet, half of which is in oak. Yellow pine and yellow poplar rank second and third with stands estimated at 160 and 152 million board feet respectively.⁽¹⁵⁾

Second growth forest includes all timber land which has been cut over one or more times, and on which the timber may vary in size from saw timber to young growth too small for commercial use. Our largest areas of second growth timber are located along the Cumberland Plateau and in the lower counties of West and Middle Tennessee adjacent to the Tennessee River (Figure 18). This class of forest land occupies 12,933,000 acres, or 92% of Tennessee's total commercial forest area.

Deforested forest land includes those areas which were once forested but which are not likely to be reforested again with commercial species of trees and in commercial quantities, without artificial aid, within a reasonable length of time. At the present time over 700,000 acres of Tennessee forest land are deforested to this extent. According to Figure 19 the bulk of our deforested timber land lies in those counties along the southern and western border of West Tennessee and in the counties of Stewart, Montgomery, and Robinson in the northwest part of Middle Tennessee. Also another section of deforested land lies in the southeastern part of East Tennessee in Meigs, McMinn, Bradley, and Polk Counties.

(15) Ibid.

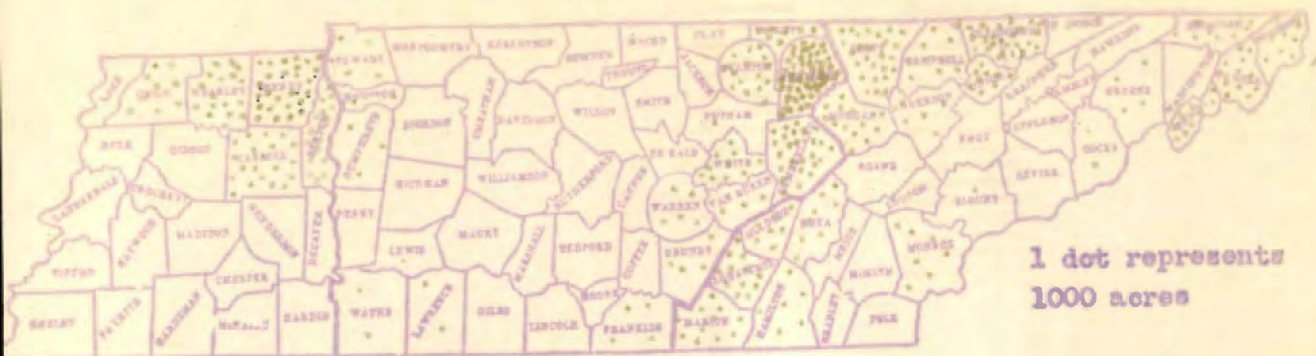


Figure 17. Old Growth: Total Area in Commercial Forest in Tennessee, by Counties, 1931



Figure 18. Second Growth: Total Area in Commercial Forests in Tennessee, by Counties, 1931



Figure 19. Deforested: Area in Commercial Forests in Tennessee, by Counties, 1931

Source: Special Report, Tennessee Forestry Service.

Timber Species in Tennessee

The Extension Forester of the University of Tennessee lists 170 species of trees common to the State, 133 varieties of which are found in East Tennessee, 118 in Middle Tennessee, and 109 in West Tennessee. However, only 44% or 76 varieties are common to all sections of the State. The eastern section of the state, due to her diversified climate, has 37 species not common to any other section, as compared with five for the middle division, and 14 for West Tennessee.

Hardwood Timber Stand. Tennessee is primarily a hardwood timber state with an estimated stand of 8,492,203,000 board feet, or 83% of the state's total saw timber stand. Practically every section of the State produces some hardwood timber. However the areas of greatest concentration are located on the Unaka Range, the Cumberland Plateau, the Western Highland Rim, and in certain counties of West Tennessee (Figure 22). Counties containing more than 300 billion board feet of hardwood timber are Benton and Dickson counties in West and Middle Tennessee respectively, and in Campbell, Fentress and Morgan counties on the Cumberland Plateau. In 1930 Tennessee ranked fifth among all states in hardwood output; being first in the production of oak, hickory, and sycamore and second in the output of poplar lumber.⁽¹⁶⁾

The hardwood species of Tennessee comprise the following proportion of our total hard and softwood timber stand (Figure 20):

Species	Per cent	Species	Per cent
Oak	47.7	Red gum	4.7
Hickory	8.4	Ash	0.9
Yellow poplar	7.5	Tupelo	0.7
Chestnut	5.6	Cottonwood & aspen.	0.4
Beech and maple	5.6	All other hardwoods	6.5
		Total	88.0

(16) Southern Lumberman, Oct. 15, 1932.

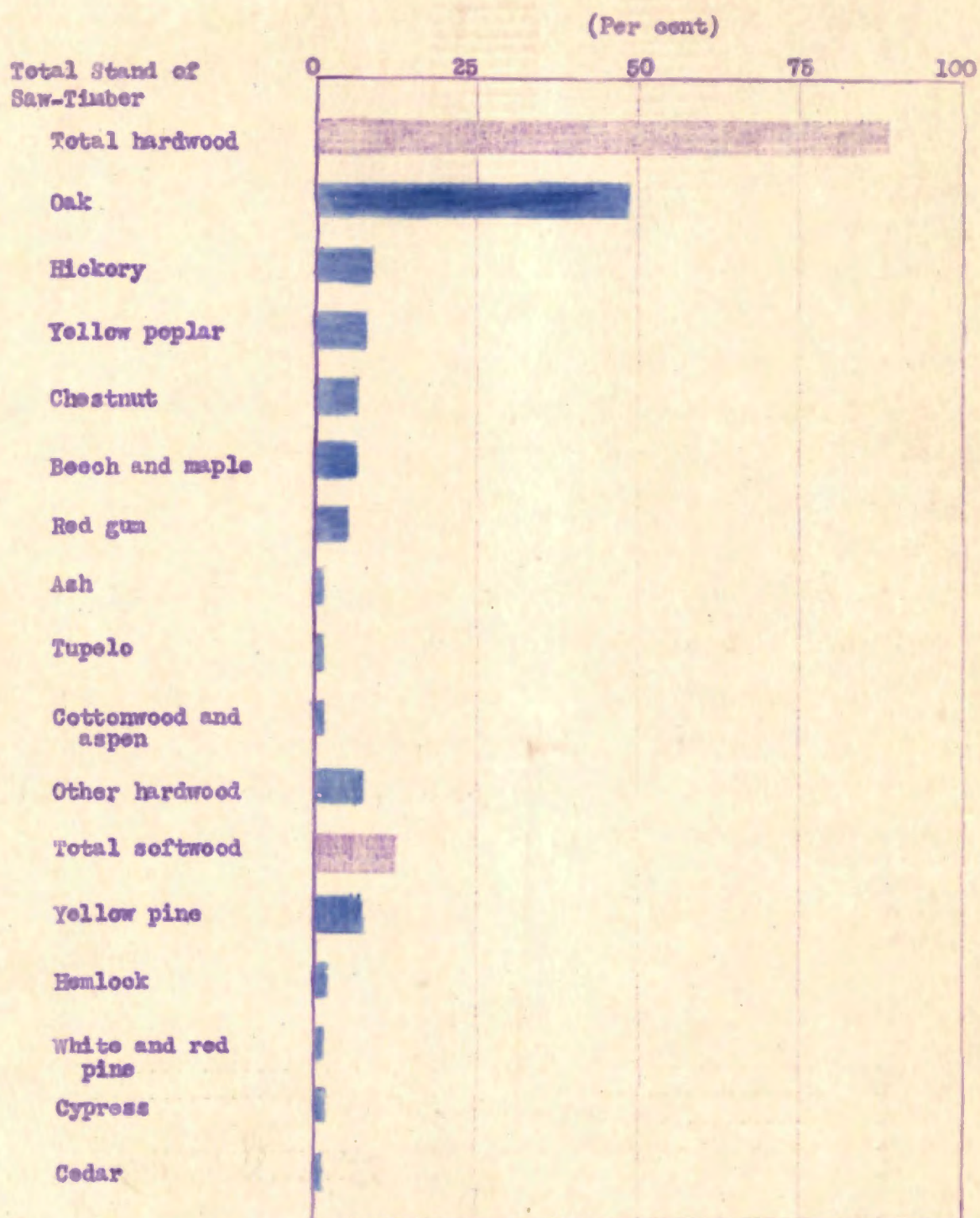


Figure 20. Total Commercial Saw-Timber Stand in Tennessee, by Species, 1931.

Source: Special Report, Tennessee Forestry Service.



Figure 21. Softwood: Total Saw Timber Stand by Counties, Tennessee, 1931



Figure 22. Hardwood: Total Saw-Timber Stand by Counties, in Tennessee, 1931

Source: Tennessee Forestry Service.

Softwood Stand. The distribution of softwood timber in this State is confined chiefly to the counties along the northern part of the Cumberland Plateau, particularly in Fentress and Morgan Counties, with only scattered stands over certain areas in West Tennessee (Figure 21). Counties lying along the western Highland Rim, although heavily wooded in commercial forests, contain practically no softwood timber.

The total stand of softwood saw timber in Tennessee is estimated at 12% of our total saw timber stand, or 1,177,071,000 board feet. Yellow pine, our most abundant softwood lumber species constitutes 63 per cent of the total softwood stand, or 7.6 per cent of all the saw timber found in the State. Other softwood species found in Tennessee of commercial significance are hemlock, cypress, cedar, white pine, and red pine. Of the total softwood stand these compose 15.8 per cent, 8.3 per cent, 2.5 per cent, and 10 per cent respectively. All other Tennessee softwoods are of only slight commercial importance. The proportion that each of our softwood species constitute of the total saw timber stand are: ⁽¹⁷⁾ (Figure 20)

Species	Per cent
Yellow pine	7.6
Hemlock	1.9
Cypress	1.0
Cedar	0.3
White and red pine	1.2
Total	12.0

Sawtimber Stands by Principal Species. Oak is found in practically every wooded section of Tennessee, with the heaviest stands being located

(17) Tennessee forestry Service, Special Report, 1931.



Figure 23. Oak: Total Saw-Timber Stand by Counties, Tennessee, 1931



Figure 24. Red Gum: Total Saw-Timber Stand by Counties, Tennessee, 1931



Figure 25. Chestnut: Total Saw-Timber Stand by Counties, Tennessee, 1931

Source: Special Report, Tennessee Forestry Service.



Figure. 26 Hickory: Saw-Timber Stand by Counties,
Tennessee, 1931.

Source: Special Report , Tennessee Forestry Service.



Figure.27 Ash: Saw-Timber Stand by Counties, Tennessee, 1931.

Source: Special Report, Tennessee Forestry Service.



Figure. 28 Yellow Poplar: Saw-Timber Stand by Counties,
Tennessee, 1931.

Source: Special Report, Tennessee Forestry Service.

in those areas containing our most intensive commercial forests (Figure 23). The counties of Dickson, Campbell, and Fentress contain our largest supply of these species with 246,220 and 180 million board feet respectively. The total stand of oak in Tennessee is estimated at 4,604,466,000 board feet, or nearly one-half of our total saw timber supply.

Red Gum constitutes 5.3 per cent of all our hardwood timber in the state and is confined almost entirely to West Tennessee. The only other stands of any importance are located in Hamilton and Marion Counties (Figure 24).

Chestnut of saw timber size in Tennessee is estimated at one-half billion board feet, which represents over 6 per cent of our present hardwood stand. This species is found in the Appalachian Mountains of East Tennessee with only a few scattered stands in certain counties of Middle and West Tennessee (Figure 25).

Hickory saw timber is found primarily on the Cumberland Plateau and in Stewart and Benton Counties of Middle and West Tennessee, respectively (Figure 26). On the other hand, the mountains of East Tennessee, one of our most densely forested areas, contain only scattered stands of this wood.

Ash represents only 1 per cent of Tennessee's present supply of commercial saw timber with a total stand estimated at 83 million board feet. Benton County in West Tennessee with approximately 16 million board feet contains our heaviest stand (Figure 27).

Yellow poplar ranks fourth among all our lumber species in the amount of available saw timber in the state with approximately 724,270,000 board feet. The largest supplies of this wood are found in Campbell, Scott, Morgan, Fentress, and Cumberland Counties along the northern part of the



Figure 29. Yellow Pine: Total Saw-Timber Stand by Counties, Tennessee, 1931.



Figure 30. Hemlock: Total Saw-Timber Stand by Counties, Tennessee, 1931

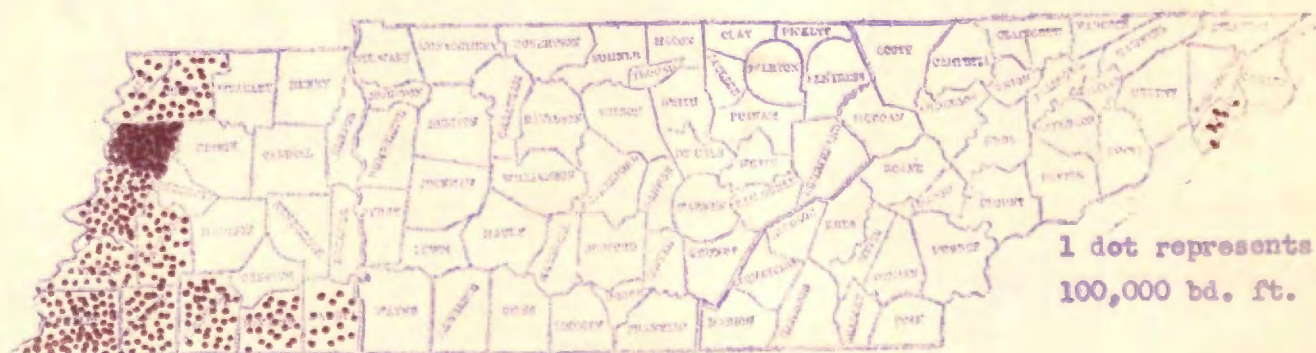


Figure 31. Cypress: Saw-Timber Stand by Counties, Tennessee, 1931



Figure 32. Cedar: Total Saw Timber Stand by Counties, Tennessee, 1931.

Source: Special Report, Tennessee Forestry Service.

Cumberland Plateau and in Benton County, in West Tennessee (Figure 28).

Yellow pine, the most important commercial softwood in Tennessee, is confined almost entirely to the eastern portion of the state. Pentress County has 20 per cent of the state's present supply of this softwood, or an estimated stand of 737,909,000 board feet. Hardeman, Hardin, and McNairy Counties in West Tennessee also contain an appreciable amount of yellow pine (Figure 29).

Henlock is associated almost entirely with mountainous counties of East Tennessee and the northern part of the Cumberland Plateau. The saw timber supply of this species in the state is estimated at 182 million board feet. The largest stands are located in Monroe, Scott, and Campbell Counties (Figure 30).

Cypress timber is grown almost entirely in the western part of the state, with the exception of a small stand in Unicoi County in East Tennessee. In West Tennessee, the largest cypress forests are located in counties adjacent to the Mississippi River and along the southern boundary of that section. The present supply of this softwood is estimated at 94,423,000 board feet, or 1 per cent of the state's total saw timber stand (Figure 31).

Cedar in the form of commercial saw timber represents only $1/159$ of our oak and $1/25$ of our yellow pine stands. Today, practically all of Tennessee's cedar of saw timber size is found in the central basin counties where an estimated volume of 29 million board feet still exist (Figure 32). This is approximately three-tenths of one per cent of our total timber stand.

CHAPTER III
PRESENT STATUS OF THE PRODUCTION OF
FOREST PRODUCTS

The annual growth of the commercial forests in Tennessee is estimated at two and three-fourths billion board feet, whereas the drain on these forests is estimated to be over four and one-half billion feet annually. Firewood represents the most important use of wood, approximately three-fourths of the total timber cut in this state, or around three billion board feet, being used for this purpose. In comparison lumber production amounts to about three-fourths billion board feet, pulpwood 114 million, crossties 33 million, and all other uses plus losses due to fire, disease, etc., 500 million board feet.⁽¹⁾

Wood Industries in United States. The wood using industries in the United States represents an approximate capitalization of 10 billion dollars which represents one-fourth the capitalization of agriculture, half that of the railroads, equal to that of the banks, and almost twice that of the mining industry.⁽²⁾ During 1929 our wood industries employed more than one million employees and the annual value of its products amounts to over three and one half billion dollars, of which 57 per cent of the total value was added by manufacturing in 1929 (Table IV). In this year we had 26,912 wood establishments employing 876,388 employees and paying them a

(1) Cotton, W. P., Economic Aspects of Agriculture, Land Utilization, and Forestry in Tennessee, p. 317-319.

(2) Campbell, A. Stuart, The Lumber Industry, p. 5.

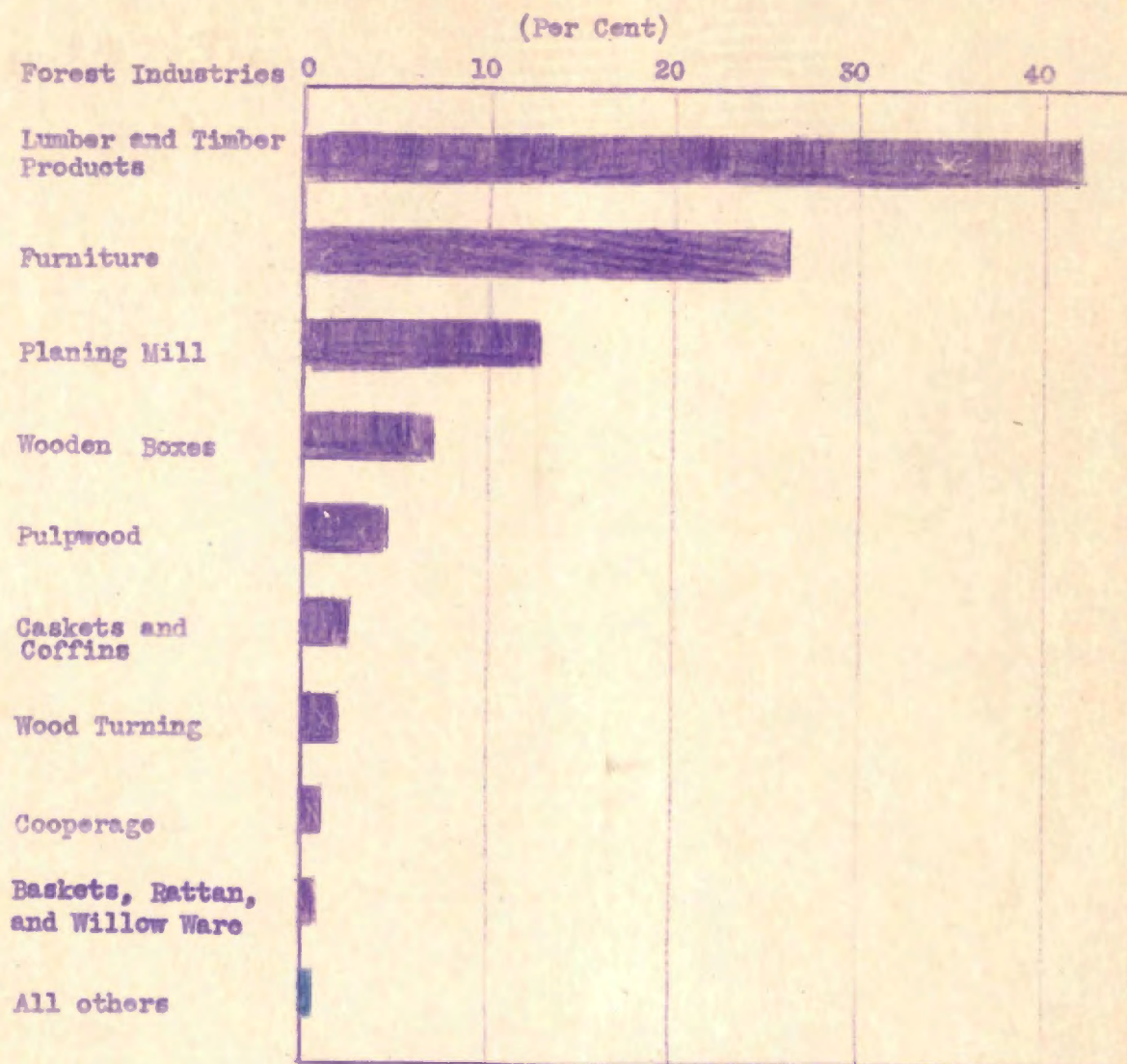


Figure.33 Per Cent of Total Value added by Manufacturing by Specific Forest Industries, United States, 1929.

Source: Table. XV.

wage of almost one billion dollars.

The 12,915 sawmills throughout the United States manufacturing lumber and ^{other} timber products contributed 42 per cent of the total value added by

TABLE XV. FOREST PRODUCTS INDUSTRIES OF THE UNITED STATES, 1929

Industry	Estab- lish- ments, number	Wage earn- ers, number	Wages in 1000 dollars	Value of products in 1000 dollars	Value added by manufacturing in 1000 dollars
Lumber and timber products	12,915	419,084	421,585	1,273,472	853,869
Planing mill products	4,849	90,134	116,423	553,583	257,575
Boxes, wooden	792	30,554	29,194	135,026	60,944
Cooperage	586	10,691	11,706	64,842	23,326
Baskets, rattan and willow ware	273	9,353	6,671	22,851	14,031
Caskets, coffins, burial cases and other mortician goods	414	13,033	16,411	88,282	48,932
Furniture	3,778	193	242,832	948,116	521,662
Wood turning shaping and other wooden goods	894	18,712	18,617	69,620	41,191
Pulpwood and other fiber	198	24,729	32,679	238,928	90,176
Total forest pro- ducts industries	26,912	876,383	939,383	3,591,765	2,005,582

Source: Dept. of Commerce, Census of Manufacturers, 1929, Vol. I, p. 206.

manufacturing to forest products, whereas our 3,778 furniture factories added over 25 per cent of ^{the} (3) ^{the} total value. The per cent of ^{the} total value added by manufacturing to the other principal forest products industries are: planing mill, 13 per cent; wooden boxes, 7.1 per cent; pulpwood and other fiber, 4.5 per cent; caskets and coffins, 2.4 per cent; wood turning, shaping and other wooden goods, 2.0 per cent; cooperage, 1.1; and baskets, rattan and willow ware less than one per cent (Figure 33).

Lumber Industry by States. The relative importance of Tennessee lumber industry in comparison with other states in 1929 is brought out in Table XVI, which gives the number of establishments, number of officers, and employees, the total salaries and wages paid, and the value of the lumber products manufactured. The South had the largest number of lumber firms, due to the predominance of small portable sawmills. Five southern states, Georgia, North Carolina, Alabama, Mississippi and Virginia, ranking in the order named led all other states in the total number of sawmills operating (Figure 34). Tennessee ranked ninth in 1929 after experiencing a 58 per cent decrease in the preceeding decade, whereas the United States as a whole had approximately a 50 per cent decrease in the total number of her lumber establishments for the same period.

In 1929 the largest number of officers and employees, associated with saw and planing mills, were found in Washington and Oregon where large scale lumbering operations are now being conducted. Mississippi, ranking

(3) Value added by manufacturing is the increased value of the finished product over the cost of the raw materials used in its construction.

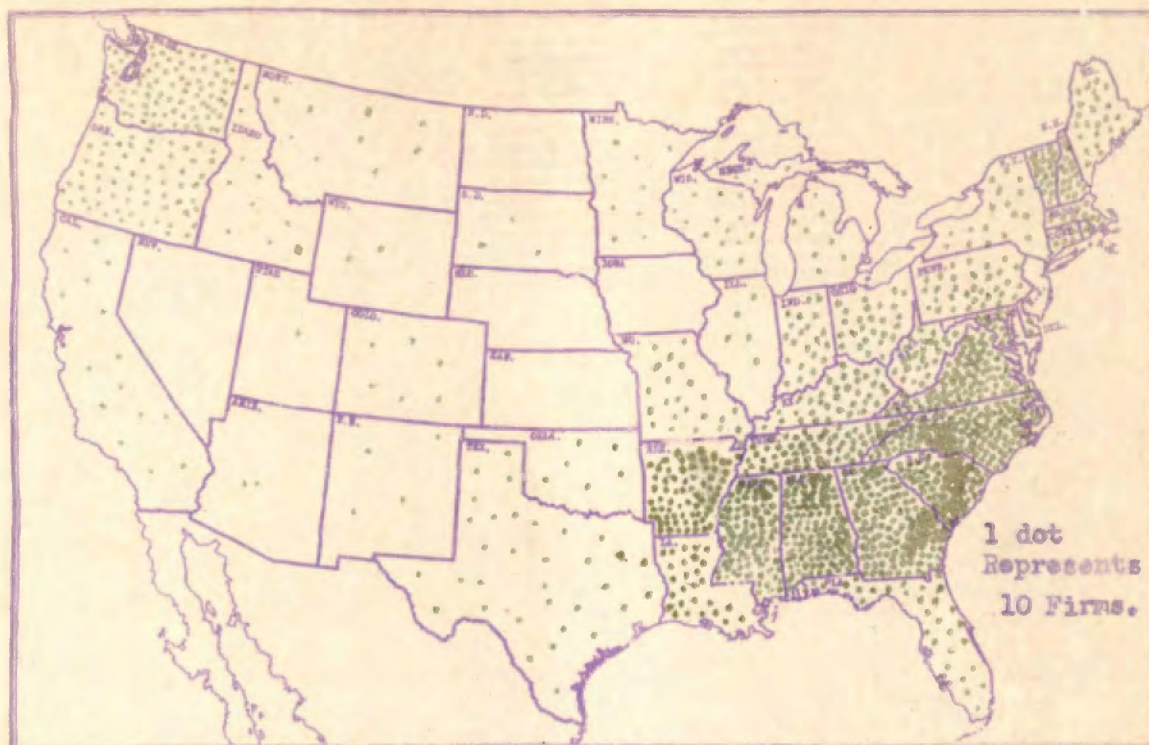


Figure. 34 Total Number of Lumber Establishments by States, 1929.
Source. Table. XVI.

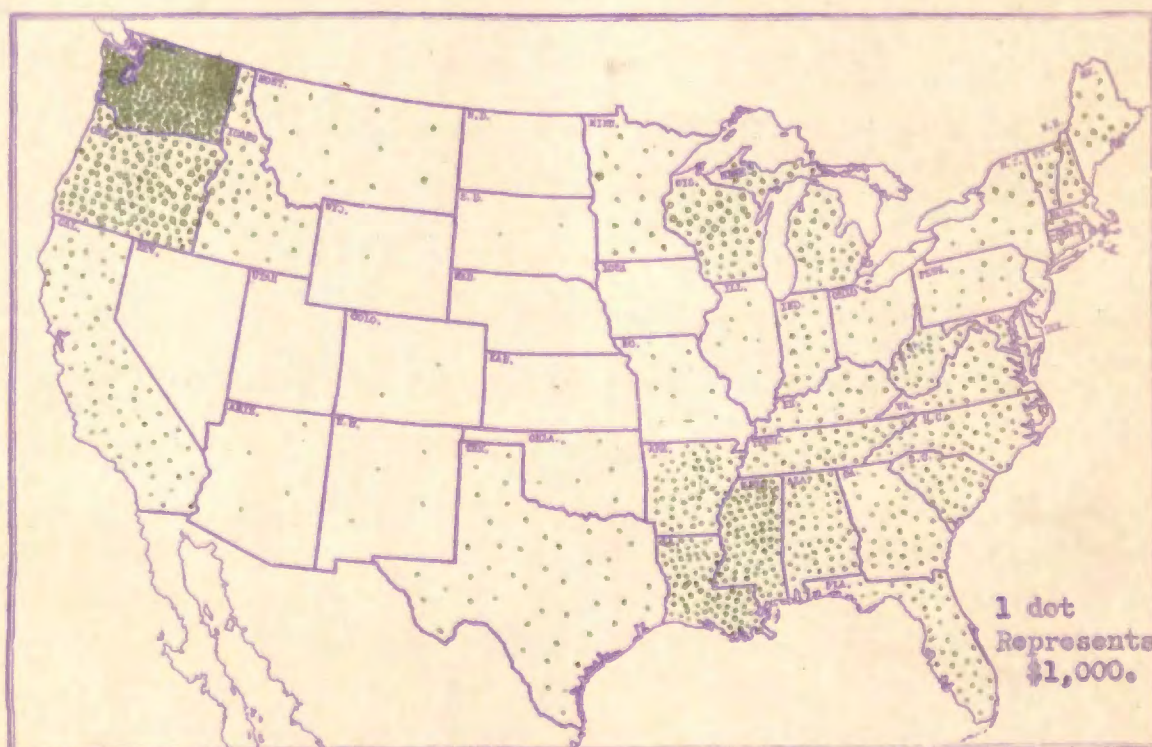


Figure. 35 Total Value of Lumber Products by States, 1929.
Source: Table. XVI.

TABLE XVI. COMPARISON OF ALL LUMBER MILLS, BY STATES, 1929

State	Number estab- lish- ments	Rank	Number of officers and employees	Rank	Salaries and wages (000)	Rank	Total value of products (000)	Rank
Alabama	1,141	3	26,990	5	\$18,715	7	\$51,500	7
Arizona	16	40	2,180	28	2,564	28	4,419	32
Arkansas	625	8	22,843	7	20,708	6	58,063	6
California	148	24	23,228	6	36,234	3	65,198	5
Colorado	61	32	1,296	33	1,593	35	2,279	36
Connecticut	42	35	267	39	296	39	793	40
Delaware	19	39	128	41	89	41	255	41
Florida	302	14	18,223	8	14,681	12	36,913	12
Georgia	1,158	1	16,039	12	10,303	15	31,180	15
Idaho	101	27	11,730	15	17,354	18	33,886	13
Illinois	52	34	1,383	32	1,578	34	5,800	31
Indiana	207	20	3,570	24	4,207	22	16,930	19
Kansas	4	43	145	40	224	40	1,369	39
Kentucky	341	11	4,936	19	4,809	21	15,486	20
Louisiana	274	15	31,996	4	29,037	4	78,753	4
Maine	235	18	3,611	22	3,685	24	11,078	23
Maryland	98	28	852	36	801	38	2,489	35
Massachusetts	82	31	1,096	34	1,362	35	3,910	34
Michigan	110	26	12,106	14	15,450	11	39,100	11
Minnesota	86	29	4,589	20	5,192	20	14,744	21
Mississippi	916	4	32,192	3	28,050	5	84,048	3
Missouri	230	19	3,623	21	3,174	26	8,873	26
Montana	86	29	339	38	5,216	19	11,555	22
N.Hampshire	165	23	2,081	30	2,259	31	8,259	7
N. Mexico	40	36	1,626	31	1,637	22	4,190	33
New York	174	21	2,922	26	3,554	25	10,409	25
N.Carolina	1,150	2	18,183	9	14,225	13	39,360	10
Ohio	258	16	2,161	29	2,331	30	8,181	28
Oklahoma	55	33	3,045	25	2,687	27	5,961	30
Oregon	608	10	36,576	2	53,431	2	136,590	2
Pennsylvania	324	13	3,605	23	3,716	23	10,874	24
R.Island	9	41	66	43	60	43	161	42
S.Carolina	627	7	16,378	11	11,204	14	27,936	16
S.Dakota	34	37	879	35	1,039	37	1,682	37
Tennessee	614	9	10,973	16	9,927	17	32,605	14
Texas	325	12	17,206	10	15,778	10	44,506	9
Utah	8	42	72	42	71	42	130	43
Vermont	174	21	2,494	27	2,489	29	7,291	29
Virginia	811	5	9,017	17	7,189	18	20,657	18
Washington	772	6	61,602	1	93,013	1	262,621	1
W.Virginia	245	17	3,343	18	10,126	16	23,326	17
Wisconsin	139	25	15,380	13	16,186	9	44,894	8
Wyoming	24	38	824	37	1,134	36	1,391	30
Other states	25		588		444		3,819	
Total	12,915		440,798		1,337,471		1,273,472	

Source: Census of Manufacturing, 1929.

third in the United States, was our leading southern state, whereas Tennessee ranked 16th with a total of over 10,000 officers and employees. Since 1919 the United States decreased her number of lumber employees 12 per cent as compared with a reduction of 20 per cent for Tennessee (Table XVI).

Washington led all other states in salaries and wages paid in 1929, whereas Tennessee ranked 17th (Table XVI).

In 1929 Washington, Oregon, Mississippi, Louisiana, and California led all other states in the total value of lumber products produced (Figure 35). Tennessee ranked 14, with a reduction of over 15% of the 1919 value of her lumber products, as compared with an eight per cent decrease for the country as a whole. During this ten-year period the far western states, Washington, Oregon, and California, showed the greatest increase while the southern states as a group showed the greatest decrease. The only two southern states to show any gain during the decade were South Carolina and Georgia, with increases of twenty-one per cent and fifteen per cent respectively.⁽⁴⁾

Forest Industries in Tennessee

Formerly our forest industries led all industries within the state in furnishing employment and in the value added by manufacturing. In 1899 Tennessee's forest products contributed 25 per cent of the total value added by manufacturing within the state compared with 26 per cent in 1909; 15.5 per cent in 1927; and 13.4 per cent in 1929. However, in 1931 this

(4) Campbell, op. cit., p. 35.

this group of industries ranked fourth among all industrial groups in Tennessee in both the total number of persons employed and the value added by manufacturing. ⁽⁵⁾⁽⁶⁾

Nine hundred and nine establishments were engaged in the manufacture of forest products in Tennessee in 1929 which represents 31.8 per cent of all industrial firms in the State. Sawmills constituted 67.5 per cent of all the wood using establishments or over one-fifth of all industrial firms in the state. Planing mills ranked second in total number of establishments whereas wood turning, shaping and other wooden goods not elsewhere classified ranked third and furniture factories fourth.

Approximately one-fifth of all the wage earners employed in Tennessee, in 1929, were engaged in the manufacture of wood products. Sixty-four per cent of all the employees of wood industries were employed by saw and planing mills compared with 15.6 per cent employed in our furniture factories.

One-sixth of all wages paid out by industrial concerns in this state were furnished by this group of industries. The bulk, or 63 per cent, of all wages paid by wood industries were furnished by our saw and planing mills, whereas furniture factories contributed 15 per cent of the total.

Saw and planing mill products accounted for 79.2 per cent of the value added by manufacturing in all forest industries in 1899; 84.7 per cent in 1909; 74.9 per cent in 1919; 73.3 per cent in 1927; ⁽⁷⁾ and 63.4 per cent in 1929.

⁽⁵⁾ Allred, C.E., and Atkins, S.W., Tennessee: Economic, Social and Civic, p. 175.

⁽⁶⁾ Jenkins, A. S., Economic Agencies and Problems, p. 28.

⁽⁷⁾ Ibid., p. 32.

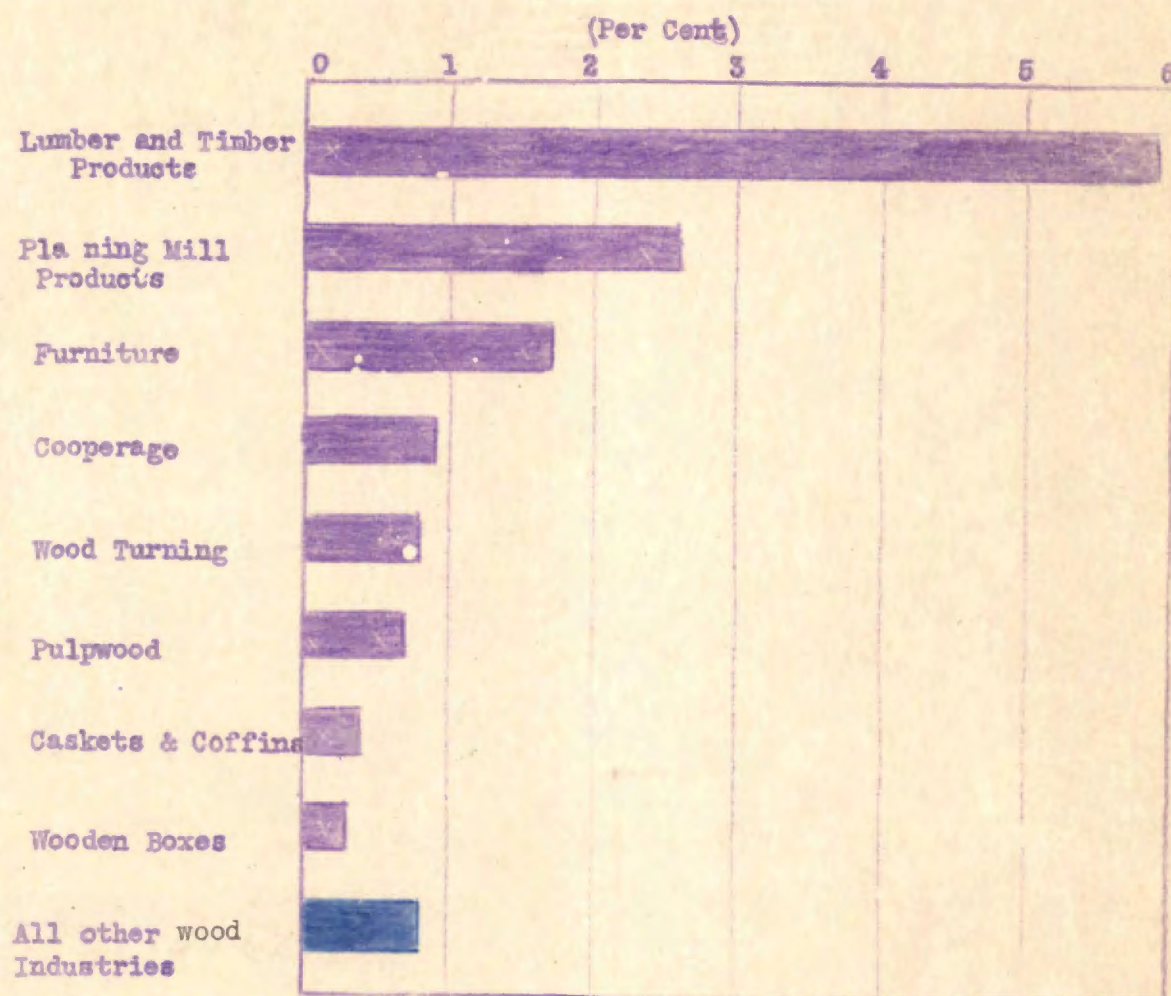


Figure. 36. Per Cent of Total Value added by Manufacturing in each group of Forest Products in Tennessee, 1929.

Source: Census of Manufacturing, State Series, 1929.
Page 6 and 7.

TABLE XVII. FOREST INDUSTRIES IN TENNESSEE,
1929

Industry	Estab- lish- ments, number	Wage earn- ers, number	Wages (000)	Value added by manufac- turing (000)	Total value of product (000)
Total all industries in state (including forest products)	2,856	128,400	\$115,877	\$322,398	\$730,509
Boxes wooden except cigar boxes	16	1,001	704	1,195	2,328
Brooms	10	55	42	102	188
Carriages, wagons, sleighs and sleds	4	93	72	188	366
Caskets, coffins, etc.	15	536	510	1,306	2,415
Cooperage	13	238	172	287	642
Furniture (including store and office fixtures)	50	3,410	2,723	5,491	10,165
Lumber and timber pro- ducts not elsewhere classified)	614	10,304	8,053	19,176	32,605
Pulpwood and other fiber	5	477	490	2,349	5,815
Planing mill products (not made in planing mills connected with sawmills)	124	3,701	3,285	8,248	19,488
Wood distillation and charcoal manufacture	3	665	674	2,048	3,371
Wood turning	52	309	185	328	917
Total all forest in- dustries	909	22,010	17,392	43,321	83,396

Source: Department of Commerce, Census of Manufacturing, 1929.

For the year 1929, Tennessee's saw and planing mills accounted for 8.5 per cent of the total value added by manufacturing to all industries in the state. The furniture industry contributed 12.7 per cent of the total value added by manufacturing in the State, whereas all other forest industries (Figure 36) combined furnished less than one-fourth of the total.

The total value of all wood products manufactured in the State, during this year, amounted to over 83 million dollars or over one-tenth the value of all manufactured products. Here again our saw and planing mill products dominated the forest products industries constituting over 62 per cent of the total value. Furniture manufactured made up 12.2 per cent of the total value of all wood products or 1.4 per cent of the total value of all manufactured products.

Products Cut on Farms in Tennessee,

1929

Quantity and Kind Cut. The principal forest products cut on farms in Tennessee in 1929 were saw and veneer logs, firewood, pulpwood, fence posts, railroad ties, and poles and piling. Approximately 11,000 farms, or 4.6 per cent of the farms of the state, reported sales of saw and veneer logs. The greatest production occurred in Cocke and other valley counties of East Tennessee, in certain counties in South Central Middle Tennessee and in Carroll and Henry Counties of West Tennessee (Figure 37).

Tennessee produced nearly two million cords of firewood with over 55 per cent of all the farms of the state reporting. This product was distributed rather uniformly over the state with a concentration occurring along the north and northeastern Highland Rim and in the eastern part of both West and East Tennessee (Figure 38).

Only 1 per cent of the farms of the state reported the production of pulpwood and these were confined principally to the eastern part of the state near our pulp consuming centers (Figure 39).

Fence post cut on farms is similar to the production of firewood in



Figure 37. Saw and Veneer Logs: Total Number Cut on Farms in Tennessee, by Counties, 1929

Source: Table XVIII.



Figure 38. Firewood: Total Amount Cut on Farms in Tennessee, by Counties, 1929.

Source: Table XVIII.



Figure 39. Pulpwood: Total Amount Cut on Farms in Tennessee, by Counties, 1929.

Source: table XVIII.

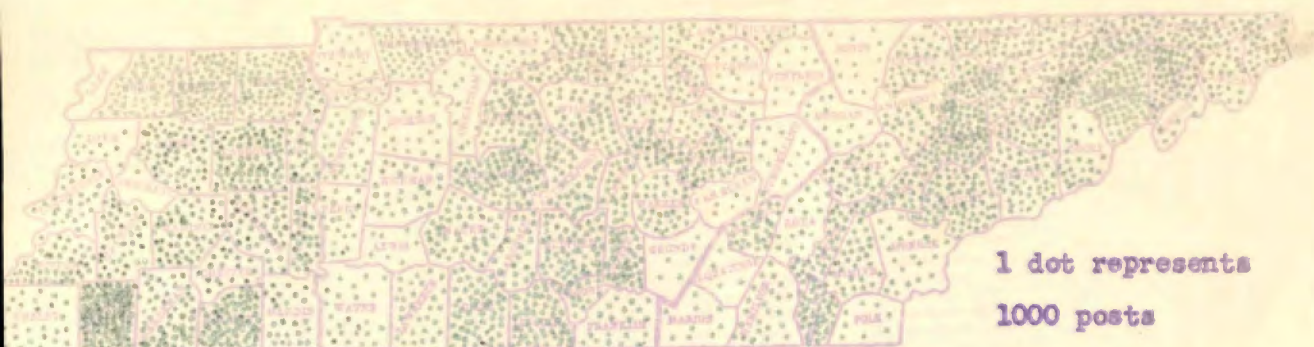


Figure 40. Fence Posts: Total Number Cut on Farms in Tennessee, by Counties, 1929

Source: Table XVIII.



Figure 41. Railroad Ties: Total Number Cut on Farms in Tennessee, by Counties, 1929

Source: Table XVIII.



Figure 42. Poles and Piling: Total Number Cut on Farms in Tennessee, by Counties, 1929

Source: Table XVIII.

that each is rather uniformly distributed over the State. This is to be expected since both of these products are consumed on practically every farm (Figure 40).

Farms in those counties adjacent to the Tennessee River in Middle and West Tennessee furnished 52 per cent of the railroad ties cut in the State in 1929 (Figure 41). The production of poles and piling was confined largely to the Unaka Range and the northern portion of the East Tennessee Valley (Figure 42).

TABLE XVIII. FOREST PRODUCTS CUT IN TENNESSEE BY COUNTIES, 1929

County	Saw logs and ve- neer logs	Firewood cords	Pulpwood cords	Fence posts, number	Railroad ties, number	Poles and piling, number
Ander.	17,277	10,255	3,034	22,696	7,588	5,244
Bedf.	599	20,789	576	51,148	100	3,196
Bent.	796	22,659	1,554	29,730	79,125	523
Bleds.	876	18,123	109	26,457	5,958	132
Blount	4,683	31,328	455	62,250	2,127	338
Bradl.	9,407	17,699	2,378	40,021	4,735	147
Campb.	6,463	14,676	1,441	37,300	18,237	508
Cannon	1,260	15,996	361	21,983	4,569	1,184
Carroll	29,540	31,804	1,253	78,930	50,227	290
Carter	2,741	10,698	1,659	21,087	3,946	6,959
Cheat.	1,336	6,967	169	11,289	7,804	954
Chest.	1,335	12,835	131	18,159	5,859	68
Claib.	3,591	32,755	2,026	45,089	8,186	14,193
Clay	6,211	26,388	113	15,345	32,621	510
Cocke	34,336	22,094	4,835	22,486	17,828	167
Coffee	12,225	19,857	807	31,498	29,614	3,721
Crock .	235	8,324	273	599	700	80
Cumber.	1,241	10,219	246	15,236	17,569	450
David.	1,288	15,652	1,728	47,173	1,970	1,180
Decat.	998	24,145	143	29,561	43,526	458
DeKalb	4,097	22,237	343	30,832	1,557	1,296
Dick.	1,450	29,034	458	20,248	19,023	1,227
Dyer	1,843	4,825	55	9,880	46	54
Fayette	2,065	52,024	1,038	90,810	2,866	455
Fentr.	5,014	22,106	79	8,556	14,961	--
Frank.	7,828	20,346	228	19,056	18,494	411

(continued)

TABLE XVIII. FOREST PRODUCTS CUT IN TENNESSEE BY COUNTIES, 1929
(continued)

County	Saw logs and ve- neer logs	Firewood cords	Pulpwood cords	Fence posts, number	Railroad ties, number	Poles and piling, number
Gibson	3,182	20,203	414	57,237	1,001	85
Giles	4,114	29,576	1,554	56,151	1,575	3,509
Grain.	1,044	24,804	855	23,873	2,613	6,329
Greene	10,457	43,688	1,265	82,914	6,917	4,075
Grundy	1,709	3,831	409	5,077	5,605	--
Hamblen	6,478	9,330	472	28,212	4,032	2,080
Hamilton	8,821	16,300	534	22,619	3,968	750
Hanc.	1,495	16,817	272	18,914	3,273	1,321
Harde.	1,503	23,156	1,073	47,685	9,876	276
Hardin	827	17,180	376	23,267	43,298	5,526
Hawkins	3,536	32,139	2,570	46,065	14,581	1,497
Haywood	1,874	26,508	474	39,800	160	30
Hender.	847	31,018	515	40,637	39,182	142
Henry	14,793	26,311	174	76,751	24,368	5,205
Hickm.	5,291	25,316	954	23,571	4,615	40
Houst.	1,268	12,522	605	10,570	95,675	480
Rumph.	879	13,452	510	26,937	38,698	507
Jacks.	4,609	36,684	1,044	22,443	13,367	1,679
Jeff.	3,575	23,713	729	36,214	1,179	1,325
John.	3,542	17,041	2,365	25,854	11,224	7,149
Knox	12,493	17,987	3,214	77,390	6,165	6,126
Lake	-	201	-	150	-	-
Lauder.	429	16,363	332	30,451	20	50
Lawr.	3,518	36,221	749	27,902	15,572	449
Lewis	436	6,405	515	7,086	9,821	78
Lino.	12,080	31,950	420	49,083	2,172	4,601
Loudon	3,714	15,387	828	22,925	720	3,857
McMinn	11,203	37,581	1,827	27,531	19,822	1,535
McMairy	11,656	27,480	242	68,557	25,506	197
Macon	7,215	27,448	585	20,735	2,804	436
Madis.	884	26,147	503	50,013	17,969	112
Marion	594	3,977	187	8,862	3,227	480
Marsh.	6,495	16,102	150	21,125	-	781
Maury	8,798	29,947	708	43,180	1,322	1,016
Meigs	8,239	8,012	848	29,682	4,062	2,207
Monroe	6,791	33,227	1,336	20,146	4,809	1,091
Montg.	2,996	43,223	443	57,039	3,198	38
Moore	1,384	7,919	200	12,336	298	1,137
Morg.	3,625	13,229	245	11,724	6,737	105
Obion	1,774	14,607	644	53,890	900	66
Overt.	3,691	37,463	1,182	13,194	8,461	2,193

(continued)

TABLE XVIII. FOREST PRODUCTS CUT IN TENNESSEE BY COUNTIES, 1929
(continued)

County	Saw logs and ve- neer logs	Firewood cords	Pulpwood cords	Fence posts, number	Railroad ties, number	Poles and piling, number
Perry	2,267	10,457	28	17,952	41,620	381
Pick.	2,507	11,696	-	9,823	3,169	145
Polk	2,833	10,525	852	8,433	5,865	40
Putnam	4,453	26,016	2,353	26,259	9,481	1,779
Rhea	1,556	15,312	227	15,450	2,199	-
Roane	6,024	23,103	1,126	31,947	2,628	11,688
Robert.	4,570	25,226	71	25,652	1,152	20
Rutherford.	5,639	16,069	370	36,812	1,000	2,222
Scott	4,045	6,364	133	12,080	7,446	-
Sequatch.	932	4,217	10	3,720	3,736	243
Seyler	4,886	37,056	1,329	46,172	1,503	288
Shelby	217	21,439	162	29,597	481	10
Smith	4,593	25,207	233	28,526	131	1,194
Stew.	4,606	33,717	217	16,888	42,028	385
Sulli.	2,553	25,419	1,839	38,455	5,556	168
Sumner	7,146	27,473	1,784	50,617	7,922	803
Tipton	6,434	28,000	611	42,288	-	-
Trousd.	28	6,665	33	5,623	1	359
Unicoi	3,307	3,436	440	8,455	1,955	11,155
Union	31,400	21,528	896	25,688	4,512	3,326
V. Buren	3,313	4,666	24	4,726	165	56
Warren	4,912	21,886	688	29,875	5,683	358
Wash.	6,074	14,168	690	43,949	880	940
Wayne	2,607	21,207	288	22,630	30,227	10,936
Weak.	3,551	22,278	292	75,225	290	397
White	7,994	18,828	426	36,734	3,950	132
Willi.	3,065	23,122	219	67,644	11,455	2,015
Wilson	1,015	31,520	241	41,201	3,020	4,470
Total	478,630	1,960,679	73,366	3,032,576	1,051,371	165,655

Source: 1930 Census of Agriculture, Tennessee, Series II.

Value of Forest Products Cut on Farms. In 1929 over fifty per cent of all the farms in Tennessee reported forest products cut from their farm woodlands which were worth slightly more than 15 million dollars (Table

XIX). One sixth, or 25,734, of these farms reported sales of woodland products which netted \$4,256,302. Firewood was our second most valuable farm woodland product contributing over 41 per cent of the total farm value of forest products compared with 43 per cent for saw and veneer logs, 5 per cent for crossties, 4 per cent for fence posts, 3 per cent for pulpwood and 2 1/2 per cent for poles and piling.

Throughout the United States firewood was the most valuable part of the farm woodland crop, constituting almost 2/3 of the total. The relative importance of other woodland products in the United States are as follows: saw and veneer logs, fence posts, pulpwood, railroad ties and poles and piling.

In 1929 the value of all forest products cut on farms in Tennessee represented approximately one-fourth the total value of forest products out from all commercial forests. (8)

TABLE XIX. FOREST PRODUCTS CUT ON FARMS IN TENNESSEE AND THE UNITED STATES, 1929

Kinds	Tennessee			United States		
	Number of farms reporting	Quantity (000)	Value (000)	Number of farms reporting	Quantity (000)	Value (000)
Total forest products	141,065	-	\$13,021	2,559	-	\$242,042
Firewood (cords)	135,322	1,961	5,391	2,432	34,111	151,245
Fence posts (no.)	24,671	3,003	560	566	98,644	15,316
Pulpwood (cords)	3,694	73	406	44	1,486	11,364
Saw logs and veneer logs (M. bd. ft.)	11,302	479	5,653	179	5,043	47,638
Railroad ties (no.)	6,437	1,052	669	66	15,339	10,001
Poles and piling (no.)	1,752	166	344	22	3,298	6,476

Source: Census of Agriculture, 1930.

(8) Allred and Atkins, *op. cit.*, p. 188.

Cooke and Union Counties ranked highest in the value of forest products cut on farms in 1929. The high ranking regions in this respect are the western part of the East Tennessee Valley, eastern Highland Rim, northern Tennessee River area in Middle and West Tennessee, and also in Fayette and McNairy Counties. On the other hand, areas within the State where forest products are relatively unimportant as a source of farm income are found in West Tennessee, except in those counties along the Tennessee River, and in the Central Basin.⁽⁹⁾ As an illustration, in Lake County in 1929 the value of forest products sold and used on the farm was less than 1/10 of one per cent of the farm value of all other crops, whereas in Union County wood products cut on farms constituted 52 per cent of the total value of all farm crops.⁽¹⁰⁾

Value Per Farm. Areas of the state having the highest value of forest products cut per farm in 1929 were found in Cooke County, southern East Tennessee Valley, Northern Plateau, Van Buren County, Western Highland Rim, northeastern West Tennessee, and McNairy County. "The Western and Eastern Highland Rims have their positions reversed in respect of total value and value per farm of all forest products cut, due to the much smaller size of the average farm on the northeastern Rim."⁽¹¹⁾

Position of Tennessee in the South. In 1929 Tennessee ranked second among the southern states in the total value of forest products cut on farms with North Carolina ranking first and Virginia third (Table XX).

(9) *Ibid.*, p. 188.

(10) *Ibid.*, p. 189.

(11) Setton, *op. cit.*, p. 389.

On the basis of values of quantities actually sold from the farms, the rank among all crops of forest products as a source of cash income was second in Alabama, Arkansas, Mississippi, and Virginia; third in Georgia, North Carolina, South Carolina, and Tennessee; and eighth in Florida, Louisiana, and Texas. For the south as a whole forest products cut and sold from farms in the 12 Southern Cotton States ranked in fourth place of all agricultural crops as a source of cash income, contributing over 82 million dollars. However, for the United States as a whole Tennessee's farm forest products cut in 1929, 1930, 1931 ranked in tenth place⁽¹²⁾

TABLE IX. COMPARISON OF TOTAL VALUE OF FOREST PRODUCTS CUT FROM FARM WOODLAND IN TENNESSEE WITH OTHER SOUTHERN STATES, 1929

State	Total value (000)	Rank
Alabama	\$3,505	8
Arkansas	7,769	8
Florida	1,263	14
Georgia	8,882	5
Kentucky	6,663	9
Louisiana	3,231	11
Maryland	2,270	13
Mississippi	9,281	4
North Carolina	15,184	1
Oklahoma	2,830	12
South Carolina	5,824	10
<u>Tennessee</u>	<u>13,021</u>	<u>2</u>
<u>Texas</u>	<u>8,440</u>	<u>7</u>
Virginia	12,629	3

Sources: Forestry Service, Cash Income from Forest Products Cut and Sold from Farms in the South, 1930, p. 3.

Forest Products as a Farm Crop. Wood products cut on farms constitute one of the farmer's major sources of cash income. From 1929 to 1932 in-

(12) U. S. Department of Agriculture, Forestry Service, Cash Income from Forest Products Cut and Sold from Farms in the South, 1930, p. 1.

clusive the cash income from this source amounted to over 2.4 million dollars per year, and was exceeded only by cotton, tobacco, truck crops and corn.

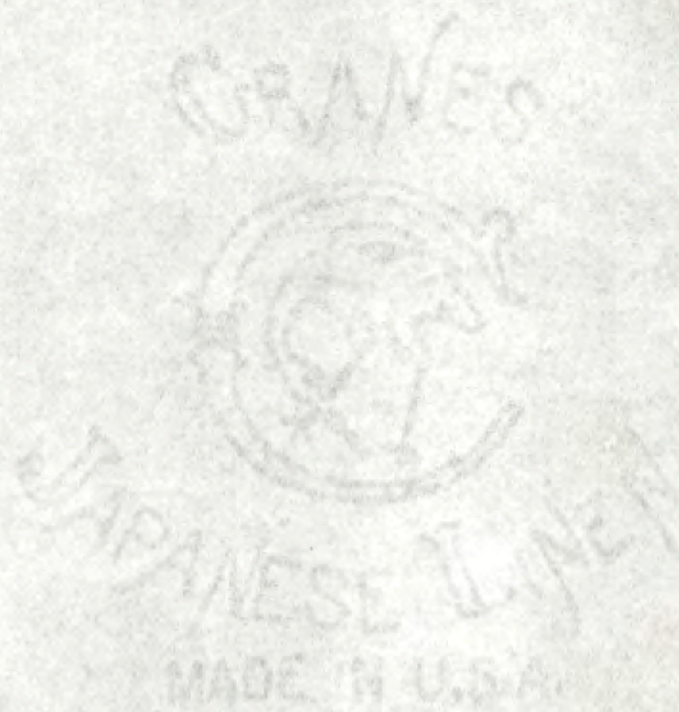
From 1924 to 1934 inclusive the value of all forest products cut on farms in the state represented 7.2 per cent of the farm value of all crops, which is approximately 26 per cent of the value of the corn crop, 38 per cent of the cotton, 63 per cent of hay, and 78.2 per cent of our tobacco crops (Table XXI).

TABLE XXI. PER CENT OF TOTAL FARM VALUE REPRESENTED BY PRINCIPAL CROPS, TENNESSEE, 1924 TO 1934

Year	Corn	Cotton lint and seed	Tobacco	Hay	Forest products cut on farms
1924	31.1	18.9	7.6	12.0	6.6
1925	24.8	23.3	7.2	10.8	7.8
1926	29.8	14.0	5.1	13.6	7.7
1927	31.4	17.8	6.4	12.2	7.2
1928	27.0	19.8	7.5	13.1	7.2
1929	29.3	23.9	10.3	10.3	6.2
1930	24.8	15.1	14.3	10.9	8.2
1931	24.1	16.6	9.2	12.8	6.8
1932	21.4	18.9	13.3	12.0	7.1
1933	29.6	18.0	10.3	10.1	8.0
1934	30.8	21.0	10.3	9.2	6.3
Av.	27.6	18.8	9.2	11.5	7.2

Sources: U. S. Department of Agriculture, Division of Crop and Livestock Estimates, Income Summaries.

PART II



CHAPTER IV

MARKETS AND MARKETING CHANNELS

Lumber Consumption by States

In 1928 the largest lumber consuming states -- those using over a million board feet -- were found in certain Middle Atlantic and North Central states, in Texas, and in the Pacific Coast States. During this year California's industries used over 3 billion board feet of lumber, compared with the second and third ranking states of New York and Illinois which had a consumption of 2.6 and 2.3 billion board feet, respectively. As a lumber consuming state, Tennessee ranked 12th, with a total consumption of 802 million board feet (Figure 43 and Table XXII).

Origin of Lumber Consumed. The largest proportion of lumber used by the states in the northeastern part of this nation was imported from the lumber regions of the South and Far West, whereas our southern and western states depend largely upon their own lumber production to supply local wood industries (Figure 44). States producing 70 per cent or more of all the lumber used within the state are Maine and Vermont, in the northeast; South Carolina, Florida, Mississippi, and Arkansas in the South; and Montana, Oregon, and Washington in the North West. On the other hand, North Dakota, Illinois, Kansas, and Nebraska in the Midwest; Nevada in the Far West, and New Jersey and Rhode Island in the North East furnished less than one per cent of their total lumber consumption.

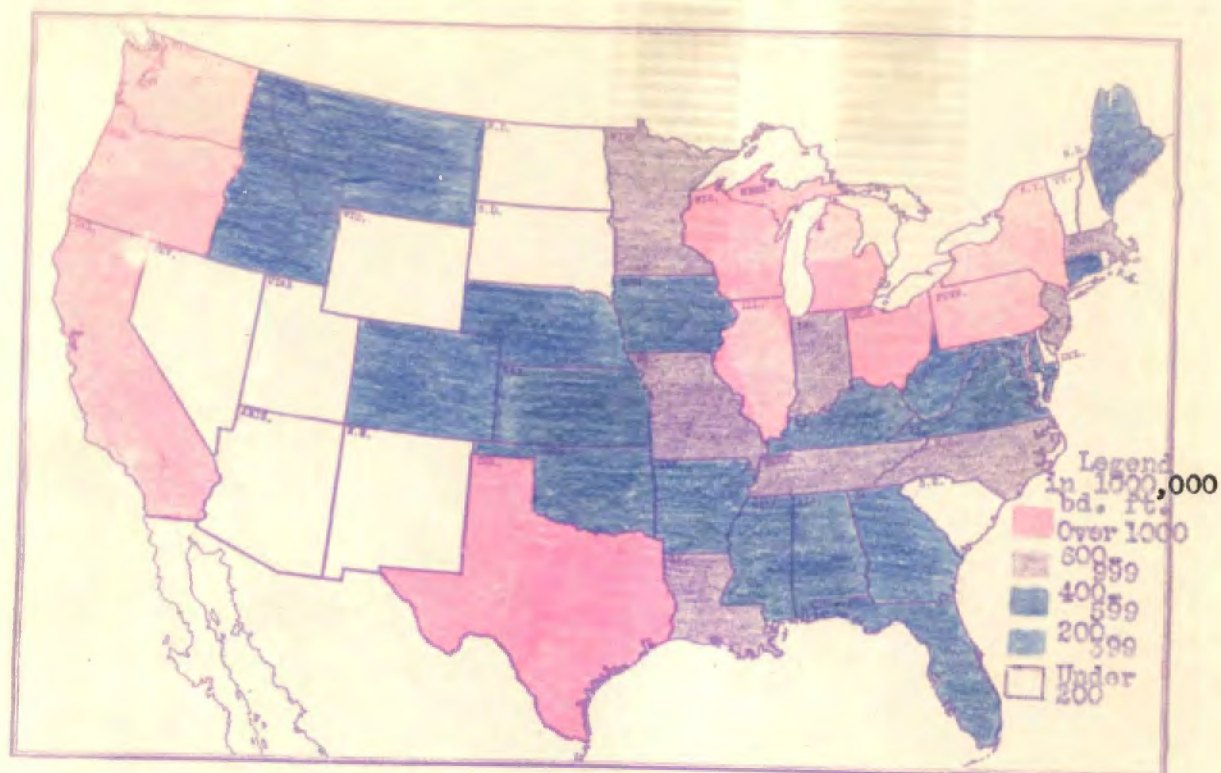


Figure 43. Lumber Consumption, by States, 1928

Source: Table XXII

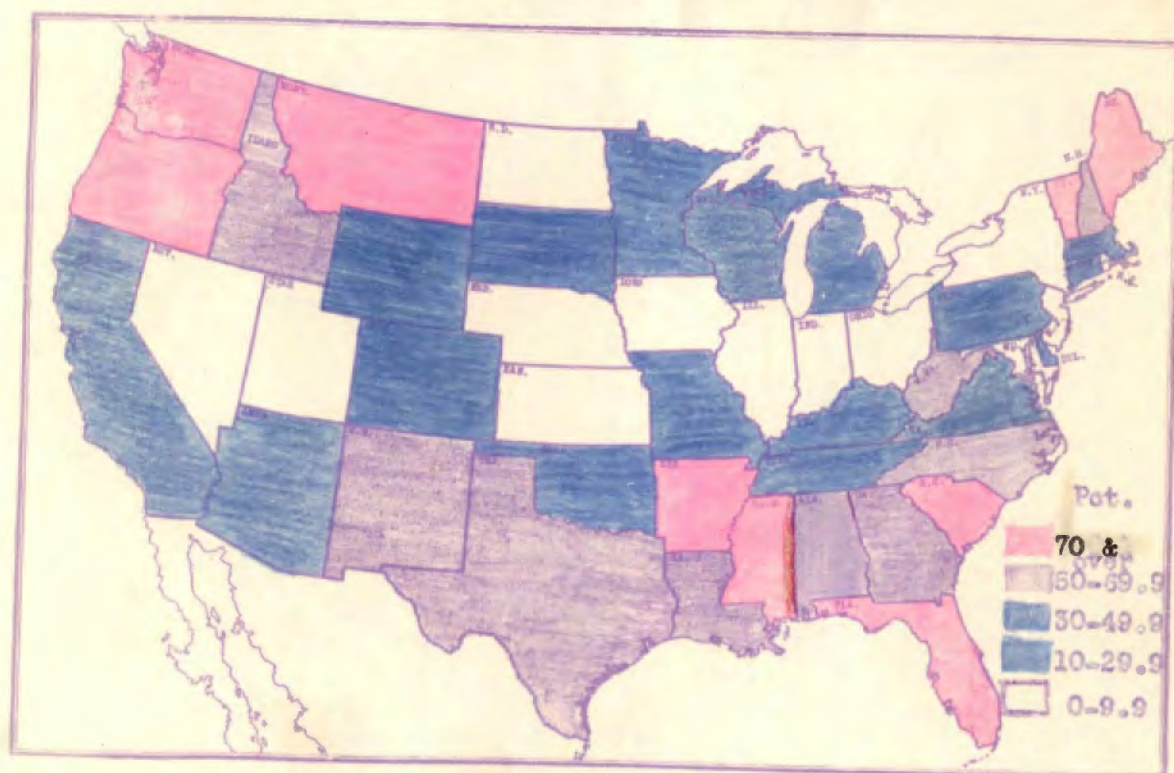


Figure 44. Per Cent of All Lumber Consumed That Was Derived Within Each State, 1928

Source: Table XXII

TABLE XXII. PROPORTION OF LUMBER OBTAINED INTER-STATE AND
INTRA-STATE, BY STATES, 1928

State	Obtained within state	Obtained from other states	Consump- tion, total	State	Obtained within state	Obtained from other states	Consump- tion, total
	Pct.	Pct.	Million bd. ft.		Pct.	Pct.	Million bd. ft.
Alabama	66.8	33.2	526	Nevada	0.2	99.8	54
Arizona	49.9	50.1	84	New Hamp.	66.0	34.0	199
Arkansas	72.3	27.7	401	N. Jersey	0.5	99.5	669
California	32.8	67.2	3,059	N. Mexico	57.2	42.8	110
Colorado	18.5	81.5	227	New York	3.4	96.6	2,573
Connecticut	10.7	89.3	261	N. Carolina	66.6	33.4	618
Delaware	12.0	88.0	48	N. Dakota	-	100.0	137
D. C.	-	100.0	47	Ohio	5.6	94.4	1,466
Florida	94.5	5.5	415	Oklahoma	23.5	76.5	453
Georgia	67.3	32.7	365	Oregon	91.7	8.3	1,044
Idaho	68.1	31.9	211	Penn.	10.4	89.6	1,712
Illinois	0.9	99.1	2,257	R. Island	0.7	99.3	153
Indiana	9.2	90.8	830	S. Carolina	80.2	19.8	127
Iowa	1.6	98.4	549	S. Dakota	16.6	83.4	165
Kansas	0.2	99.8	405	Tennessee	29.8	70.2	802
Kentucky	12.8	87.2	451	Texas	54.1	45.9	1,578
Louisiana	67.5	32.5	708	Utah	6.0	94.0	128
Maine	76.3	23.7	232	Vermont	71.2	28.8	89
Maryland	9.7	90.3	505	Virginia	34.9	65.1	450
Massachusetts	10.0	90.0	697	Washington	90.9	9.1	1,697
Michigan	28.5	71.5	1,624	W. Virginia	50.1	49.9	235
Minnesota	23.8	76.2	701	Wisconsin	44.2	55.8	1,006
Mississippi	89.9	10.1	436	Wyoming	17.9	82.1	135
Missouri	10.6	89.4	759				
Montana	72.2	27.8	266	U.S.			
Nebraska	-	100.0	304	total	32.5	67.5	31,968

Source: U. S. D. A. Yearbook of Agriculture, 1930.

Tennessee's Exports and Imports of Lumber by Major
Types

Tennessee imported from other states in 1932, 27 per cent more lumber of all kinds than was exported. Two-thirds of the imports consisted of softwood,

our imports of this kind of wood exceeding exports by over 200 per cent. Figure 47 shows the comparative volume of Tennessee imports of hardwoods and softwoods by state of origin. On the other hand, Tennessee exported 29 per cent more hardwood than was imported (Table XXIII). The comparative volumes of exports of hardwoods and softwoods are shown in Figure 48, by state of destination.

In 1924 the lumber export and import situation was quite different, the total exports exceeding imports by 3 per cent. Although the state in 1924 imported two-thirds of the softwoods consumed, as was the case in 1932, the excess of exports over imports of hardwoods was relatively greater in 1924 than in 1932 (Figures 45 and 46)

TABLE XXIII. SUMMARY COMPARISON OF EXPORTS AND IMPORTS OF LUMBER, TENNESSEE, 1924 AND 1932

(In thousand feet board measure)

Kind	1932			1924		
	Imports from other states	Exports to other states	Per cent exports are of imports	Imports from other states	Exports to other states	Per cent exports are of imports
Hardwood	56,786	73,112	129	161,341	381,954	237
Softwood	80,339	26,511	33	311,844	104,092	33
Total	137,125	99,623	73	473,185	486,046	103

Source: U. S. D. A. Forestry Service, Lumber Consumption and Distribution, 1932. Also U. S. D. A. Statistical Bulletin 21, American Forest and Forest Products.

Since 1924 our total lumber exports from this state decreased 79.5 per cent with only two states, Maine and Arkansas, increasing their shipments of

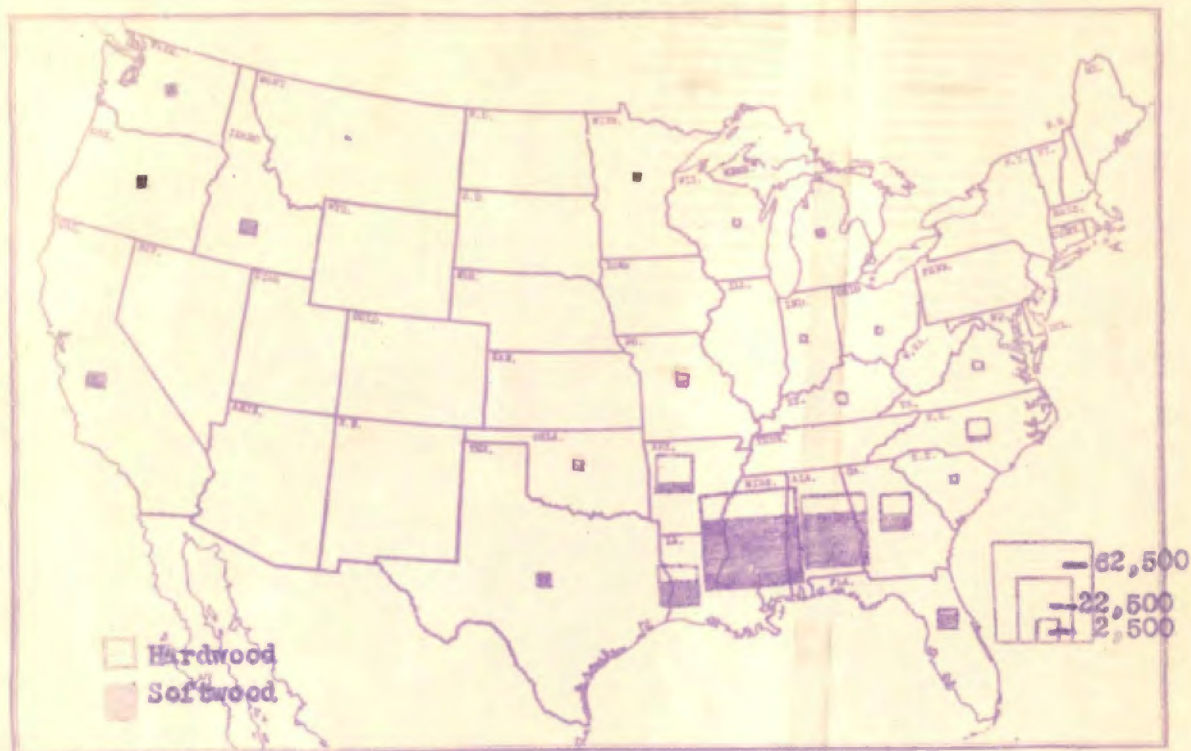


Figure 45. Total Imports of Lumber to Tennessee by State of Origin, 1924.

Source: Table XXIV

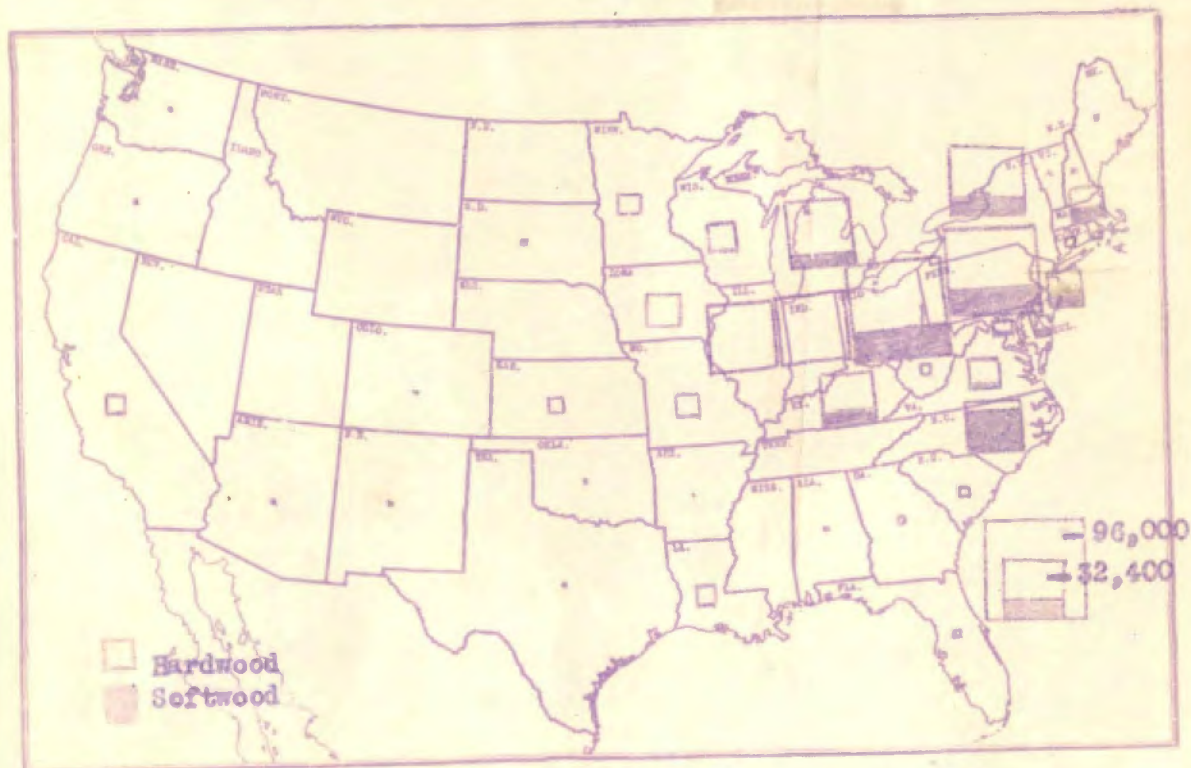


Figure 46. Total Exports of Lumber from Tennessee, by States, 1924

Source: Table XXV

Tennessee lumber.

During 1932 Tennessee imported 137 million board feet of lumber of which 59 per cent was made up of hardwoods, whereas the remaining 41 per cent was softwood. The bulk of the lumber shipped into the state came from the Southern States, principally Mississippi, Alabama, Louisiana, and Arkansas. An additional supply of hardwoods was also furnished by certain midwestern states, while the bulk of our imports from the Pacific Coast consisted mainly of Douglas fir and other western softwoods (Figure 47).

In 1932 Tennessee exported 99 million board feet of lumber to other states and foreign countries of which 73.4 per cent was hardwood. Our foreign exports during this year consisted of 7,383,000 board feet of hardwoods approximately, two-thirds of which was sent to Canada. No Tennessee softwoods, however, were sent out of the United States. The bulk of this state's exports were sent northward into the mid-western and Middle Atlantic States. Our largest lumber markets are located in Ohio, Pennsylvania, Illinois, Kentucky, New York, and Virginia in the order named, which received more than 74 per cent of the state's total exports. Ohio and Virginia are the only principal consumers of Tennessee timber demanding a larger proportion of softwood lumber. In 1932 ninety-eight per cent of our lumber shipments to Illinois, our third largest lumber market, consisted of hardwood species. Although we ship very little lumber to the southern and western states, our exports here are confined to hardwood species since these areas are amply supplied with softwoods (Figure 48).



Figure 47. Imports of Softwood and Hardwood Lumber to Tennessee, by States, 1932

Source: Table XXIV

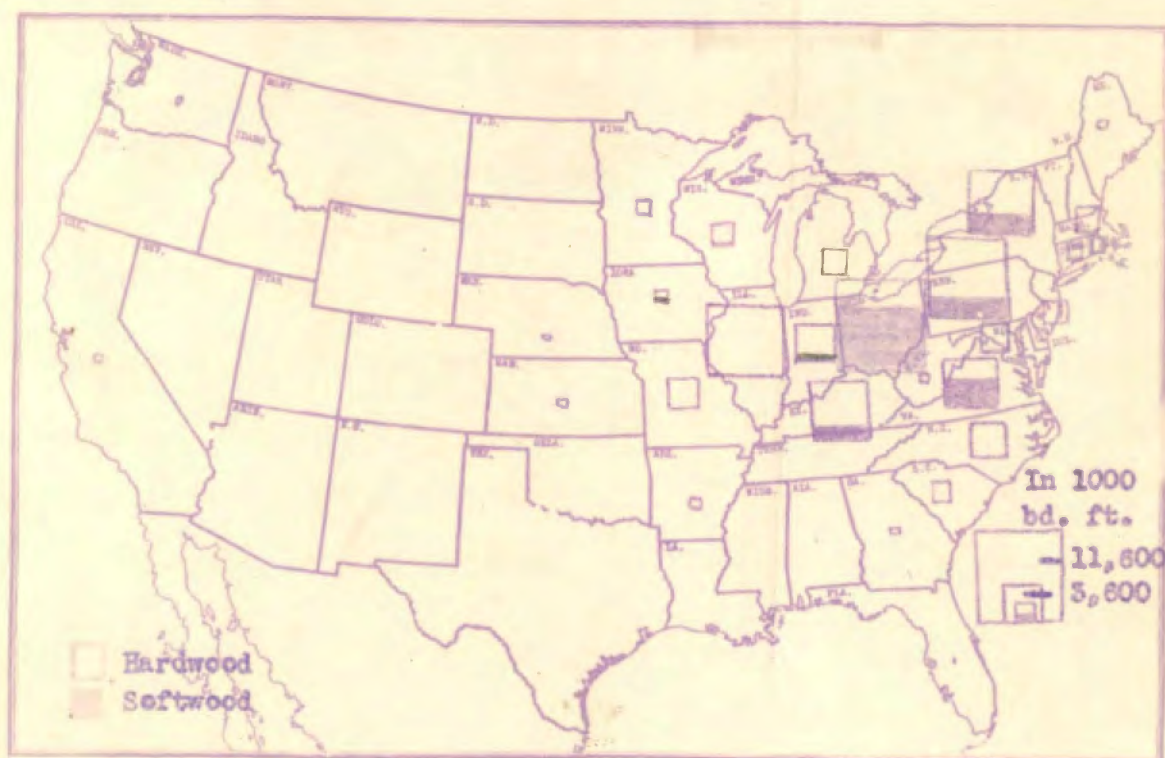


Figure 48. Total Exports of Lumber from Tennessee, by States, 1932

Source: U. S. D. A. Forest Service, Lumber Consumption and Distribution, 1932

TABLE XXIV. IMPORTS OF LUMBER TO TENNESSEE BY STATE OF ORIGIN, 1924 AND 1932

(1000 ft. bd measure)

State of origin	1932			1924		
	Softwood and hardwood	Softwood	Hardwood	Softwood and hardwood	Softwood	Hardwood
Alabama	24,857	22,003	2,854	100,710	76,149	24,561
Arizona	-	-	-	-	-	-
Arkansas	12,990	651	12,339	31,320	4,751	26,569
California	563	563	-	1,745	1,745	-
Colorado	-	-	-	-	-	-
Connecticut	-	-	-	-	-	-
Delaware	-	-	-	-	-	-
Florida	4,276	1,713	2,563	6,027	5,756	271
Georgia	3,284	1,436	1,848	33,074	12,879	20,195
Idaho	98	98	-	768	768	-
Illinois	-	-	-	-	-	-
Indiana	-	-	-	134	-	134
Iowa	-	-	-	-	-	-
Kansas	-	-	-	-	-	-
Kentucky	1,763	-	1,763	5,506	-	5,506
Louisiana	17,552	7,641	9,911	53,267	33,450	19,817
Maine	-	-	-	-	-	-
Maryland	-	-	-	-	-	-
Massachusetts	-	-	-	-	-	-
Michigan	160	-	160	224	176	48
Minnesota	-	-	-	80	80	-
Mississippi	62,025	43,045	18,980	215,645	166,511	49,134
Missouri	722	-	722	1,571	137	1,234
Montana	-	-	-	25	25	-
Nebraska	-	-	-	-	-	-
Nevada	-	-	-	-	-	-
New Hamp.	-	-	-	-	-	-
New Jersey	-	-	-	-	-	-
New Mexico	-	-	-	-	-	-
New York	-	-	-	-	-	-
N. Carolina	3,347	135	3,212	12,003	1,570	10,433
Ohio	147	-	147	56	-	56
Oklahoma	35	-	35	665	418	247
Oregon	792	792	-	1,167	1,167	-
Pennsylvania	-	-	-	-	-	-
Rhode Island	-	-	-	-	-	-

(continued)

TABLE XXIV. IMPORTS OF LUMBER TO TENNESSEE BY STATE OF ORIGIN, 1924 AND 1932 (continued)

(1000 ft. bd. measure)

State of origin	1932			1924		
	Softwood and hardwood	Softwood	Hardwood	Softwood and hardwood	Softwood	Hardwood
S. Carolina	2,791	1,991	800	1,554	355	1,199
S. Dakota	-	-	-	-	-	-
Texas	1,543	130	1,413	4,359	3,726	633
Utah	-	-	-	-	-	-
Vermont	-	-	-	-	-	-
Virginia	-	-	-	1,285	465	820
Washington	141	141	-	1,716	1,716	-
W. Virginia	-	-	-	-	-	-
Wisconsin	39	-	39	484	-	484
Wyoming	-	-	-	-	-	-
Total Tenn. consumption	215,139	87,405	127,734	621,630	334,766	286,864
Total imports to Tennessee	137,125	80,339	56,786	473,185	311,844	161,341
Tenn. production used in Tennessee	78,014	7,066	70,948	148,445	22,922	125,523

Source: U. S. D. A. Forest Service, Lumber Consumption and Distribution, 1932, Also U.S.D.A. Statistical Bulletin 21, American Forest and Forest Products.

TABLE XIV. EXPORTS OF LUMBER FROM TENNESSEE BY STATES, 1924 AND 1932

(1000 bd. ft. measure)

State of origin	1932			1924		
	Softwood and hardwood	Softwood	Hardwood	Softwood and hardwood	Softwood	Hardwood
Alabama	4	-	4	198	-	198
Arizona	-	-	-	36	-	36

(continued)

TABLE XXV. EXPORTS OF LUMBER FROM TENNESSEE BY STATES, 1924
AND 1932 (continued)

(1000 bd. ft. measure)

State of origin	1932			1924		
	Softwood and hardwood	Softwood	Hardwood	Softwood and hardwood	Softwood	Hardwood
Arkansas	363	34	329	33	30	3
California	161	-	161	4,556	-	4,556
Colorado	-	-	-	104	-	104
Connecticut	441	67	374	991	-	991
Delaware	202	202	-	3,582	2,872	710
Florida	19	-	19	512	-	512
Georgia	127	-	127	411	-	411
Idaho	-	-	-	-	-	-
D. C.	-	-	-	710	-	710
Illinois	14,057	253	13,804	40,508	230	40,278
Indiana	3,727	223	3,504	41,283	1,998	39,285
Iowa	475	199	276	7,978	-	7,978
Kansas	187	-	187	1,495	-	1,495
Kentucky	9,493	1,618	7,875	24,324	4,970	19,354
Louisiana	-	-	-	1,937	-	1,937
Maine	374	-	374	65	-	65
Maryland	2,694	337	2,357	2,705	1,075	1,630
Massachusetts	1,397	67	1,330	8,883	4,044	4,839
Michigan	1,914	61	1,853	40,554	663	39,891
Minnesota	564	-	564	2,780	-	2,780
Mississippi	-	-	-	18	-	18
Missouri	2,933	-	2,933	5,723	333	5,390
Montana	-	-	-	-	-	-
Nebraska	22	-	22	-	-	-
Nevada	-	-	-	-	-	-
New Hamp.	-	-	-	174	-	174
N. Jersey	1,932	169	1,763	15,792	5,152	10,640
N. Mexico	-	-	-	203	73	130
New York	9,219	2,797	6,422	53,713	13,815	39,898
N. Carolina	4,068	-	4,068	30,067	21,491	8,596
Ohio	19,359	12,616	6,743	97,734	25,286	72,448
Oklahoma	-	-	-	130	-	130
Oregon	-	-	-	169	-	169
Penn.	15,389	4,431	10,958	76,848	20,825	56,023
R. Island	474	-	474	645	-	645
S. Carolina	1,263	-	1,263	1,539	-	1,539
S. Dakota	-	-	-	39	-	39

(continued)

TABLE XXV. EXPORTS OF LUMBER FROM TENNESSEE BY STATES, 1924
AND 1932 (continued)

(1000 bd. ft. measure)

State of origin	1932			1924		
	Softwood and hardwood	Softwood	Hardwood	Softwood and hardwood	Softwood	Hardwood
Texas	-	-	-	286	-	286
Utah	-	-	-	-	-	-
Vermont	-	-	-	179	-	179
Virginia	6,833	3,437	3,396	8,669	611	8,058
Washington	64	-	64	130	-	130
W. Virginia	153	-	153	1,615	624	991
Wisconsin	1,715	-	1,715	8,708	-	8,708
Wyoming	-	-	-	-	-	-
Total	177,637	33,577	144,060	634,491	127,014	507,477
Exported from Tennessee	99,623	26,511	73,112	486,046	104,092	381,954

Source: U. S. D. A., Forestry Service, Lumber Consumption and Distribution, 1932, Also U. S. D. A. Statistical Bulletin 21, American Forest and Forest Products.

Channels of Lumber Distribution in the United States

In 1929 logging camps, sawmills and affiliated planing mills disposed of 25.6 per cent of their products by value direct to manufacturing concerns, and 24.9 per cent through wholesalers and jobbers. Only about an eighth of our lumber went directly to retailers whereas another eighth was handled by brokers and commission houses. Exports and interplant transfers each handled approximately 1/16 of the total value, whereas sales to local concerns, to railroads, public utility and contracting companies, and wholesale establishments each amounted to about 1/20 of the total (Figure 49).

(Per cent of Value)

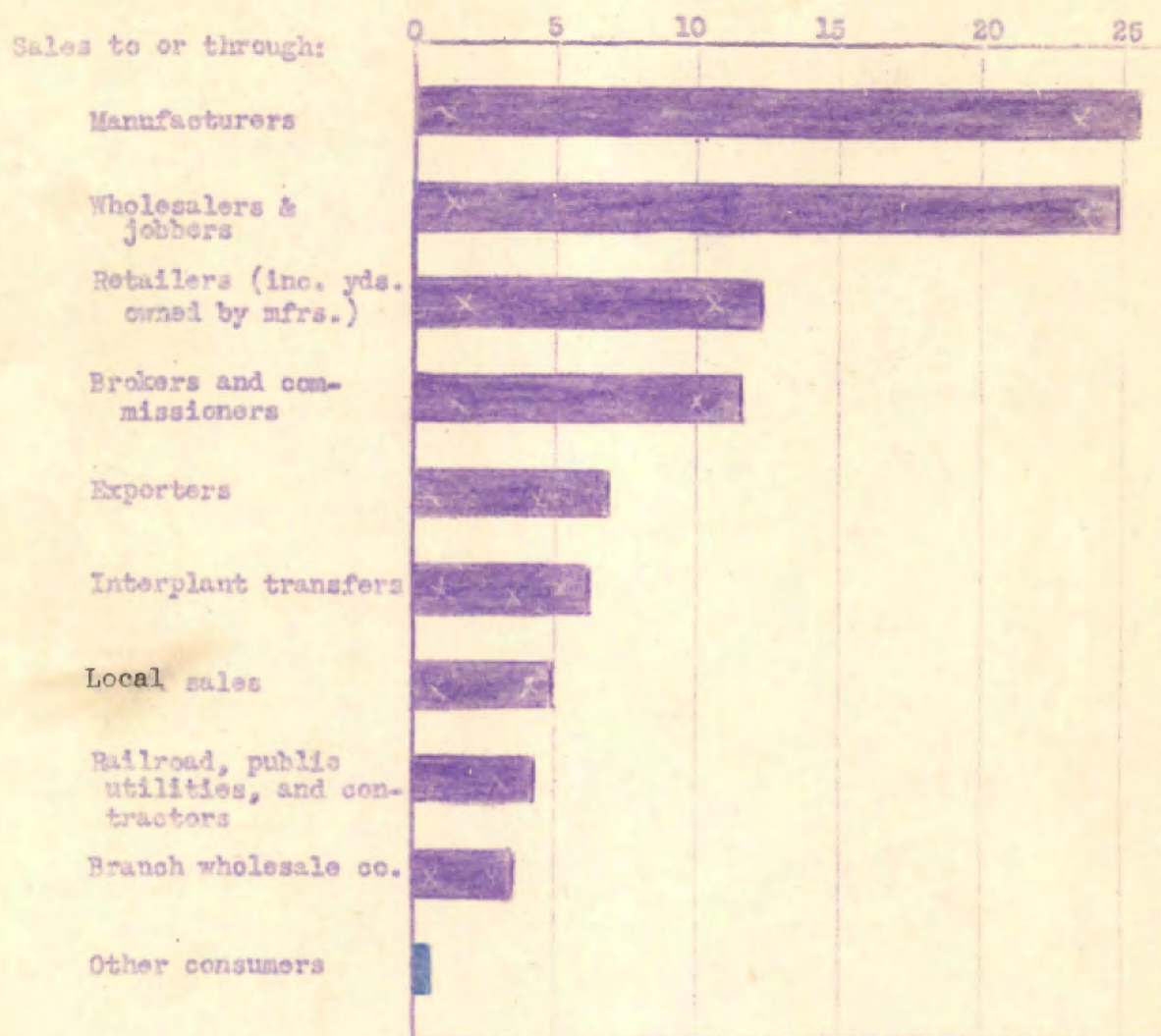


Figure 49. Marketing Channels Through Which U. S. Lumber is Distributed, 1929.

Source: Table XXVI

Considering the actual quantity of wood passing through the various channels, 30 per cent was handled by wholesalers and jobbers, 15 per cent by retailers, and 14 per cent each by manufacturers, commission men and brokers. Exports and local sales handled 8.4 per cent and 4.7 per cent, respectively, of the 1929 production. Our most valuable wood products were handled by manufacturers and sales to other consumers with average values per thousand board feet of \$71.88 and \$96.40, respectively. Our lowest value products, on the other hand, were handled by the branch wholesale establishments with an average value of \$27.74 per thousand board feet measure.

TABLE XXVI. MARKETING CHANNELS FOR THE DISTRIBUTION OF LUMBER IN THE UNITED STATES, 1929

Channels	Per cent (based on value)	Quantity (M. feet board measure)	Total value of products (1000 dollars)	Number Plants	
				Total	Selling exclu- sively as in- dicated
Sales to manufacturers	25.6	3,674,124	264,096	1,963	701
Interplant transfers	6.1	1,162,920	63,440	462	107
Sales to railroads, public utility companies, and contractors	4.2	1,241,447	43,515	1,136	154
Sales through branch whole- sale establishments	3.4	1,246,287	34,571	196	49
Sales through brokers and commission houses	11.5	3,729,967	119,213	803	252
Sales through wholesalers and jobbers	24.9	3,034,956	257,473	1,526	415
Sales for export	6.3	2,254,156	69,721	509	13
Sales to retailers, includ- ing yards owned by the manufacturers	12.2	3,971,719	126,411	658	83
Local sales	4.8	1,250,909	49,949	1,727	327
Sales to other consumers	0.5	50,666	4,884	104	27
Totals	100.0	26,617,151	1,035,273	4,484	-
Sales not distributed	-	-	223,014	8,314	-
Total sales	-	-	1,258,287	12,915	-

Source: U. S. Dept. of Commerce, Distribution of Lumber Sales, 1929.

Marketing Channels in Tennessee

Saw Logs. The principal markets for sawlogs are the portable saw-mills located in the vicinity of the timber to be sold. The stationary mills which are generally found in or near towns where shipping facilities are available, are also important outlets for timber. The operators of the portable mill commonly purchases the stumpage from the farmer, and after manufacturing the product into rough lumber either sells it direct to larger mills or to brokers and other wholesale men. These agencies which also collect timber from other small mills commonly ship in carload lots to large markets.

In Tennessee the farmer is usually paid by the portable mill operators after the stumpage has been manufactured into lumber and the lumber sold. He may, however, accept a share in the manufactured product in exchange for his timber. Many of our portable sawmills in this state are financed by large lumber companies which in turn consume all the lumber produced by these mills.⁽¹⁾

Nature of Sawmills in Norris Dam Area. The T.V.A. Forestry Division found that 86 sawmills were drawing forest products from the Norris Dam watershed in 1934. Of this number, eighty-one were located inside the area and four outside.

⁽²⁾
(1) Custom Sawmills. Fifty-six per cent of these mills operated on a custom basis making a charge of from 4 to 6 dollars per thousand feet, lumber tally, for logs delivered at the mill, or when sawing on a "share

(1) Extension Forester of the University of Tennessee.
(2) Custom sawing refers to the production of specified products from logs brought to the mill by customers.

basis", the mill owner receives one-half of the lumber tally in lieu of cash. One of the greatest advantages of these custom sawmills is that they supply a class of the rural population with lumber who if forced to pay regular retail lumber prices would have to do without.⁽³⁾

(2) Commercial Sawmills,⁽⁴⁾ located in the Norris watershed were operating in most cases with timber purchased in the log and on the stump. Some, however, were using timber cut from their own holdings (Table XXVIA).

A great deal of the lumber exported by the sawmills is sold on the eastern markets through jobbers.⁽⁵⁾

TABLE XXVIA. COMMERCIAL SAWMILLS: CLASSIFICATION OF MILLS IN NORRIS DAM WATERSHED ACCORDING TO METHOD OF OPERATION, 1934

Nature of mill	Number
Mills buying logs	20
Mills cutting their own timber	6
Mills contracting stumpage on a basis of a percentage of the returns of the lumber sold	2
Mills leasing timber	1
Mills buying stumpage	10
Total number	39

Source: T.V.A. Forestry Division, Utilization and Drain of Forest Products from the Norris Dam Watershed in 1934, p. 19.

Veneer Logs. Some of the veneer wood sold in the state is shipped direct from the farmer to the mill. However, many of our large veneer

(3) T.V.A. Forestry Division, Utilization and Drain of Forest Products from the Norris Dam Watershed.

(4) Commercial sawing refers to the production of sawn products by the sawmill operator for market.

(5) T.V.A. Forestry Division, op. cit., pp. 30 and 31.

firms depend upon their purchasing agent, who operates on either a salary or commission basis, to secure the bulk of their veneer wood. (6)

Also appreciable amounts of this wood are handled through brokers who receive one to two dollars above the current price for their services. (7)

Mine Timber. In the Norris Dam Watershed area, the T.V.A. found that the bulk of the mine timbers were obtained from farm woodlots within a fifty mile radius of the mines. These timbers were sold in exchange for either coal, supplies, or cash. A small per cent of the mine timbers produced in this area were also sold to middle men usually rural merchants who pick them up at the logging operations and truck them to the nearest shipping point. Usually the farmer is paid $1/2$ the price of the props f.o.b. shipping point. It has been discovered that certain large concerns in this area find it more desirable to buy their timbers from the farmer than to log their own operations, since they can take advantage of low prices and at the same time conserve their own timber for future use. "The difference in prices paid for mine timbers delivered and f.o.b. cars is scaled so as to cover the cost of transportation only. In other words, there is supposedly no decided advantage gained in trucking mine timbers further than the shipping point." (8)

A number of mines in Tennessee and surrounding states operate on a royalty basis; that is, they pay so much to the owner of the timber reservation per ton of mineral removed. Of the ten mines in Tennessee

(6) One of veneer firms contacted.

(7) Ledewick, J. E., Marketing Woodland Products in Virginia, p. 31.

(8) Forestry Service, op. cit., p. 6.

drawing timber from the Norris Watershed, mine operated on a royalty basis, paying an average price of 10 cents per ton of coal removed. This entitles them to take certain timber necessary to the mining operation, which generally includes all trees (except poplar, black walnut, and wild cherry) below 12" in diameter two feet above the ground.⁽⁹⁾ According to the T.V.A., the average monthly consumption of mine timbers per ton of coal mined was .488 cubic feet for props, collars and cap boards, and .018 cubic feet for ties.

Staves. The bulk of the stave material comes from the highest grade white oak trees and is obtained largely from farm woodlands. Many hand made bourbon staves were manufactured on the home farm in the Norris Dam Watershed area by the use of drawing knives. This work is usually supplementary to regular farm duties and is conducted at the convenience of the producer.⁽¹⁰⁾

The farmer usually sells his staves to the local buyer who supplies an exporter in some outside city. This exporter often exports the staves to some foreign country. It has been estimated, however, that suitable material for stave production will be exhausted in this area in the next 5 years, since the demand for prime bourbon staves greatly exceeds the supply.⁽¹¹⁾

Chemical Wood. Chemical wood, used by the Tennessee Eastman Company located at Kingsport, is drawn from farm woodlands located within a hundred

(9) T.V.A. Forestry Service, op. cit., p. 13.

(10) Ibid., p. 83.

(11) Ibid., p. 85.

mile radius of the plant. One-third of the material produced in the Norris area was trucked to the plant and the remaining two-thirds shipped by rail. In the majority of cases the farmers sold their products direct to the company with whom they held contracts. (12)

Tobacco Sticks. Split tobacco sticks produced in the Norris Watershed were largely confined to the farms on which they were used. However, sawed tobacco sticks were produced by certain sawmills who sold them at the mill to local farmers. (13)

Tan Bark. The tan bark sold in this area was supplied either by sawmills as a by-product or was produced on the farm and sold directly by the farmer to the tannery. In either case the tanning material was delivered to the plant by the producer. (14)

Fuelwood. The bulk of this material produced in the Tennessee River Basin is used on the home farm to supply local needs. However, that portion of the fuelwood marketed in this area is sold locally, since it is a bulky low valued product and consequently can only be shipped short distances. An appreciable amount of fuelwood is sold as a by-product of sawmills from slabbing and other mill waste. (15)

Posts. In the Norris Watershed area posts sold went into either highway guard rails or railroad posts along the right of way. Highway posts are bought directly from the farmer who delivers them either to the

(12) T.V.A. Forestry Division, op. cit., p. 73.

(13) Ibid., p. 79.

(14) Ibid., p. 91-93.

to the highway store house or to the construction job. In producing posts for the railroad, the seller is required to fell the timber and the railway buyer bucks up the posts and does the hauling. Most of the farmers buying posts in this region secured the necessary timber from neighboring farms.(16)

Crossties. The markets for crossties at the present time in this state are restricted to railroads and street railways. In many instances ties are hewn on the home farm and are sold directly to the tie and timber agent of the railroad.(17) In other instances ties were sold through jobbers and other wholesalers. The T.V.A. survey found that many of the portable sawmills produced crossties in conjunction with the manufacture of rough lumber since by manufacturing ties they were able to utilize a greater percentage of the log. In certain sections of Virginia wholesalers received as high as 10 cents per tie for their services.(18)

Extract Wood. A large extract company in this state has purchasing agents working on a commission basis who contact and deal with farmers for suitable wood material. In many instances these agents harvest and haul the timber from the farm woodland to the extract firm. In some cases, however, farmers sell and deliver material direct to the company.(19)

Poles. In Tennessee poles are sold mainly to purchasing agents of railways, telephone, telegraph and electric light and power companies. Also quite a number of wholesalers buy poles from farmers and market them

(16) Ibid., p. 61-61.

(17) Interview with local dealer.

(18) Lodewick, J. L., op. cit., p. 43.

(19) Local extract firm.

to consumers in Tennessee and other states. Since very few sound chestnut poles are to be found in Tennessee, the pole consuming companies are depending more and more upon creosoted southern pine poles which will undoubtedly replace all other species for use in the future. (20)

Pulpwood. Four companies obtained pulpwood material in the Norris Dam area, all of which depended upon the farm woodlot to furnish them with their raw material. The Columbia Paper Company draws its timber by truck from a radius of 50 miles, and by rail 400 miles, from Western Mississippi and vicinity. The Mead Fiber Corporation also draws its material from a very large area -- by rail 150 miles to the north, 200 miles to the South and 400 miles to the west of Kingsport. These companies ship pulpwood long distances in order to maintain contacts and to keep the market open in case the supply of raw material in the surrounding territory becomes depleted. The Harriman Company obtained its raw material from a 110 mile radius of the plant, 25 per cent of which was trucked to the mill. The Southern Extract Company of Knoxville also obtained its material from a 110 mile radius, of which 50 per cent of the material was trucked to the mill.

Pulpwood is purchased in the Norris area by written contracts with farmers and local merchants, who are adjacent to railroad points. These contracts are evenly distributed over the producing area in the spring prior to the peeling season in order to keep the market open in all sections. (21)

The following discussion is on the methods of purchasing pulpwood in Virginia and is perhaps applicable to this study since our Tennessee

(2) T.V.A. Forestry Division, op. cit., p. 88.

(21) Ibid., p. 64.

firms cover certain portions of Virginia.

In Virginia the pulp manufacturer may buy pulpwood direct from the farmer or his employees may do this service for him as well as perform their other duties.

Agents operating in assigned districts and working on a fixed salary or a commission may purchase farm timber. Sub-agents scattered throughout the territory also procure suitable material from farmers and pass it on to the companies' district agent who in turn sends it to the factory. Usually these sub-agents are sawmill operators who charge a fixed rate of 50 cents per cord for the timber handled. Another channel of marketing pulpwood is through the local merchant or retail lumberman who accumulates pulpwood material on the side and sends it on to the company when he has a supply justifying shipment.(22)

Location of Lumber Industries in Tennessee

During this study a classified directory of the wood using industries of the state was compiled for the purpose of aiding the farmer in locating potential markets for woodland products. Although this directory is by no means complete, it is the most detailed list available. It utilizes information contained in previous directories, supplemented with material from other sources.

The principal sources of information used in compiling this directory are listed in Footnote 23. They may be useful in supplying current list

(22) Lodewick, op. cit., p. 55

(23)

of dealers and industries, if later issues are utilized.

The number of each type of wood establishment in the state, as compiled from various sources, are shown in Table XXVII.

TABLE XXVII. NUMBER OF CLASSIFIED WOOD INDUSTRIES REPORTED
IN TENNESSEE, 1936

Industry	Number	Industry	Number
Sawmills	1,638	Flooring	30
Retail lumber firms	541	Caskets	25
Wholesale lumber	221	Handles	21
Crossties, poles, posts	107	Pulp, extract and chemical	
Cooperage	101	wood	21
Furniture	74	Veneer	13
Hardwood dimentions	42	Kegs and barrels *	6
Box	32	Sports goods	6
		Shuttles	5
		Pencils	5
		Industries not otherwise	
		classified	101

* Keg and barrel factories may be classified under cooperage.

Source: See Footnote 23.

(23) Principal sources of information used in compiling the wood products directory.

a. Dun and Bradstreet, Inc., Mercantile Agency, Dun Building, 290 Broadway, New York.

b. Southern Lumberman, Directory of Southern Sawmills, Nashville, Tennessee.

c. Lumberman's Credit Association, Inc., Red Credit Rating Book, 608 South Dearborn Street, Chicago, Illinois.

d. Bell Telephone Company, Classified Directories of the Larger Towns and Cities in Tennessee and Bordering States.

e. T.V.A. Agricultural and Industrial Survey. (Includes only those counties in the Tennessee Valley.)

f. Crosstie Bulletin, Directory of Crosstie Dealers, Publication of the National Association of Railroad Tie Producers, St. Louis, Mo.

g. Southern Pine Association, Buyers Guide for Subscribers to the Southern Pine Association, New Orleans, Louisiana.

h. G. B. Shivery, Directory of Buyers of Woodlot Products in Tennessee, Extension publication of the University of Tennessee.

i. G. B. Shivery, Files of the Extension Forester of the University of Tennessee, Knoxville, Tennessee.

(continued)

Sawmills. According to the best information available, Tennessee has at least 1638 sawmills, many of which are small portable affairs operated only a small portion of each year, and which cater largely to custom sawing (Figure 50). The greatest concentration of sawmills is found in Shelby County around Memphis, in bordering counties of northeastern Mississippi, on the Eastern Highland Rim, and in the southern part of Middle Tennessee, in southeastern East Tennessee, and in certain bordering counties of North Carolina and southwestern Kentucky. Shelby County had approximately twice as many sawmills as any other section in Tennessee, which is to be expected since it is one of the leading lumber markets in the United States. Relatively few mills are found in those counties adjacent to the Mississippi River in West Tennessee (with the exception of Shelby County), along the Western Highland Rim, and in the Central Basin where we have only scattered stands of commercial sawtimber. Also there

(23) continued -

j. T.V.A. Forestry Division, Reports on Polk, Monroe, Meigs, and McMinn Counties.

k. T.V.A. Forestry Division, Utilization and Drain of Forest Products from the Norris Dam Watershed in 1934.

l. Classified advertisements of the various Trade Journals and Lumber Periodicals:

1. Southern Lumberman, Nashville, Tennessee.
2. Southern Lumber Journal, Jacksonville, Florida.
3. Hardwood Record, 537 South Dearborn Street, Chicago.
4. Memphis Lumberman and Southern Woodworker, Memphis.
5. American Lumberman, Chicago, Illinois.
6. The New York Lumber Trade Journal, New York City.
7. Other Lumber trade journals and periodicals.

m. Forest Products Division has mimeographed lists of:

1. Associations of Manufacturers of Lumber and Wood Products.
2. Larger Wholesale and Retail Lumber Dealers Associations.
3. Associations of Manufacturers of Pulp, Paper, and Allied Products.

n. Department of Commerce, Lumber and Paper Directories, Washington,

D. C.

are relatively few mills in the Appalachian mountains of East Tennessee where vast timber acreages are in Federal ownership.

Approximately 1100 or 69 per cent of the total number of sawmills in Tennessee reported the kind of lumber manufactured as to whether it was softwood, hardwood or both. Of the total number of mills reporting, 77 per cent or 854 mills handled hardwoods, 15 per cent handled softwoods, while the remaining 8 per cent used both hardwood and softwood. Seventy-one per cent of the softwood sawmills were located in the western part of East Tennessee, whereas the majority of the hardwood mills were distributed throughout the southwestern part of the state, along the Highland Rim and in certain northeastern counties of East Tennessee. (24)

Retail Lumber. These firms in Tennessee are confined principally to the cities and towns of the state with approximately one-third of the total number being located in the urban counties of Shelby, Davidson, Knox, and Hamilton (Figure 51). Retail firms represent approximately one-third of the total number of sawmills in this state.

Wholesale Lumber. Memphis is by far the principal wholesale lumber market in the state containing approximately one-third of all the wholesale firms in Tennessee. Besides Memphis, Jackson is the other wholesale center in West Tennessee. In the middle division of the state we have Nashville, Sparta, Livingston, and Cookeville, while in the eastern part of the state the largest number of wholesale lumber dealers are found in

(24) It should be noted, however, that the relative importance of lumbering in the different sections of the state cannot be determined on the basis of the total number of sawmills found in these areas, since a wide variation exists as to the size of the mill and the volume of timber handled. A comparison of this nature would be particularly misleading in certain sections on the Plateau and in the mountains of East Tennessee where a number of large sawmills are now being operated.



Figure 51. Location of Retail Lumber Dealers in Tennessee and Adjoining Counties, 1936.
Source: Table XXVIII.

Knoxville, Bristol, Johnson City, Chattanooga, Harriman, and Athens (Figure 52). Many of these firms operate saw- and planing mills in conjunction with their wholesale lumber activities, besides financing many of the small portable mills. On the other hand, lumber brokers who are located mainly in the larger towns conduct large wholesale lumber transactions without even handling the lumber.

Veneer Mills. They are found in only seven counties of the state, with approximately half of this number being located in Shelby County. Two are located in Davidson County and one each in Madison, Cumberland, Rhea, Knox, and Sullivan Counties (Figure 53).

Box Companies. Outside of the four urban counties, the largest number of wooden box companies are located in Gibson and Weakley Counties where quite a large number of fruit and vegetable containers are manufactured (Figure 54). Other counties in the state having box companies are Lauderdale, in West Tennessee; Sumner, Wilson, and Warren in Middle Tennessee; and Rhea, McMinn, Washington, and Johnson in East Tennessee.

Dealers in Railroad Crossties, Poles, Piling, and Fence Posts.

These concerns are found in the largest numbers around Memphis; on the Western Highland Rim, the area having the largest production of crossties from farm woodland; and in the southern part of the Cumberland Plateau (Figure 55). In addition to the sections mentioned, an appreciable number of firms under this classification are found in Davidson, Hamilton, and Knox Counties. Of the 107 dealers in Tennessee, 17 were operating in the western part of the state, 30 in the eastern division and 60 in Middle Tennessee.



Figure 52. Location of Wholesale Lumber Dealers in Tennessee, 1936.
Source: Table XXVIII.



Figure 53. Location of Veneer Mills in Tennessee, by Counties, 1936.
Source: Table XXVIII.



Figure 54. Location of Box Companies in Tennessee, by Counties, 1936.
Source: Table XXVIII.

Hardwood Dimensions. Approximately half of the 42 dealers in hardwood dimension stock in Tennessee are located in Memphis. The remaining firms are found in certain counties of West and Middle Tennessee with practically no firms in operation in the eastern part of the state (Figure 56).

Pulpwood, Extract, and Chemical Wood. Dealers in these wood products are confined chiefly to East Tennessee where 14 firms are located (Figure 57). Only five firms are in Middle Tennessee and three in West Tennessee. Roane County ranks first with four such firms and Knox second with three, the latter being located in Knoxville.

Furniture.⁽²⁵⁾ Tennessee has 74 furniture factories, two-thirds of which are located in East Tennessee, principally in the counties of Hamilton, Knox, Sullivan, and Bradley (Figure 58). Twenty firms are operated in Middle Tennessee whereas West Tennessee has only 11. Generally our largest number of furniture establishments are to be found in the larger cities and towns, partly because of the available labor supply and the transportation facilities. Knoxville has the largest number of furniture factories with eight, Hamilton and Shelby Counties have seven firms each, Davidson six, and Sullivan five.

Handle Factories. Tennessee has 21 establishments manufacturing handles, many of which are small one or two man factories (Figure 59). Seven handle firms are found in West Tennessee as compared with 11 in the middle and 3 in the eastern part of the state.

(25) This classification includes the manufacture of household and office furniture, store cabinets, show cases, and other similar articles.

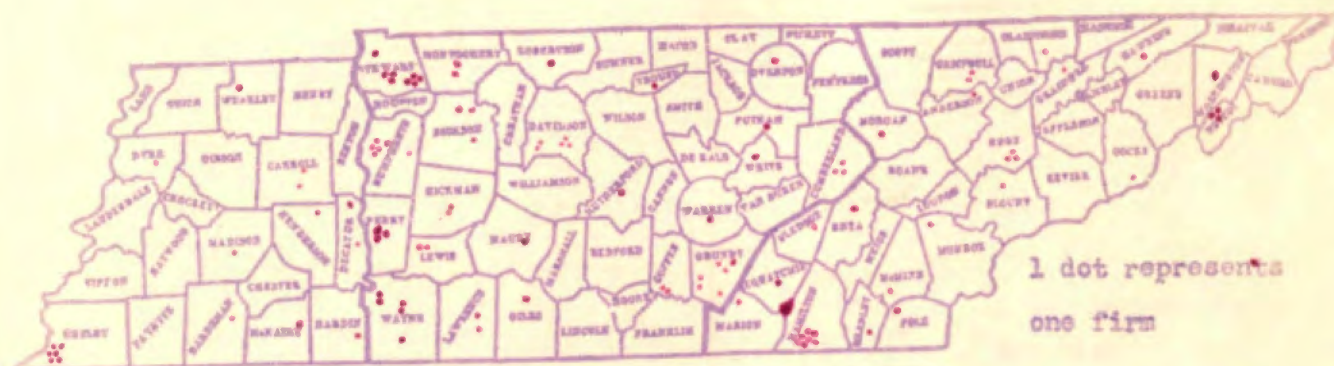


Figure 55. Location of Dealers in Railroad Crossties, Poles, Piling, and Fence Posts in Tennessee, 1936

Source: Table XXVIII.



Figure 56. Location of Dealers in Hardwood Dimension Stock in Tennessee, 1936.

Source: Table XXVIII.

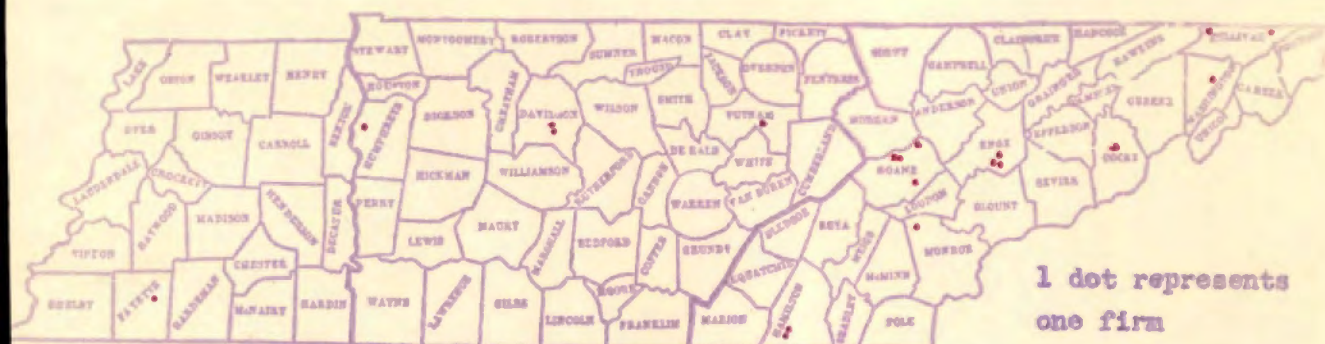


Figure 57. Location of Pulpwood, Extract, and Chemical Wood Companies in Tennessee, by Counties, 1936

Source: Table XXVIII.



Figure 58. Location of Furniture Factories in Tennessee, by Counties, 1936.

Source: Table XXVIII.

Flooring Companies. Thirty firms in Tennessee manufacture flooring which are divided among the different sections as follows: 13 in East, 9 in Middle, and 8 in West Tennessee. Shelby County has 8 flooring firms, as compared with four each for Davidson and Washington Counties, and 3 for Knox County (Figure 60).

Casket Factories. These factories are also concentrated around Memphis. Here we have 8 firms, whereas Nashville has 4 and Knoxville, Athens, and Chattanooga have two each. Ten casket factories are located in East Tennessee, 9 in West Tennessee, and 6 in Middle Tennessee (Figure 61).

Keg and Barrel Companies. There are six factories in Tennessee coming under this classification, three of which are located in Memphis, one in Nashville, one in Crossville, and one in Lebanon (Figure 62). Five of these companies manufacture barrels or kegs. The sixth factory, located in Memphis, confines its operations to the manufacture of barrel bungs.

Sports Goods. Six establishments in Tennessee manufacture sports goods, all of which turn out golf sticks and one company manufactures in addition base ball bats. Two of these firms are located in Memphis, one each in Nashville, Livingston, and Tullahoma, and one in Chattanooga (Figure 62).

Shuttles. There are five firms in the state which manufacture shuttle blocks used in the textile industries (Figure 62). Two small firms are located in Meigs County at Decatur. Cumberland, Washington, and Overton have one firm each.

Pencil Companies. The only pencil companies operated in the state

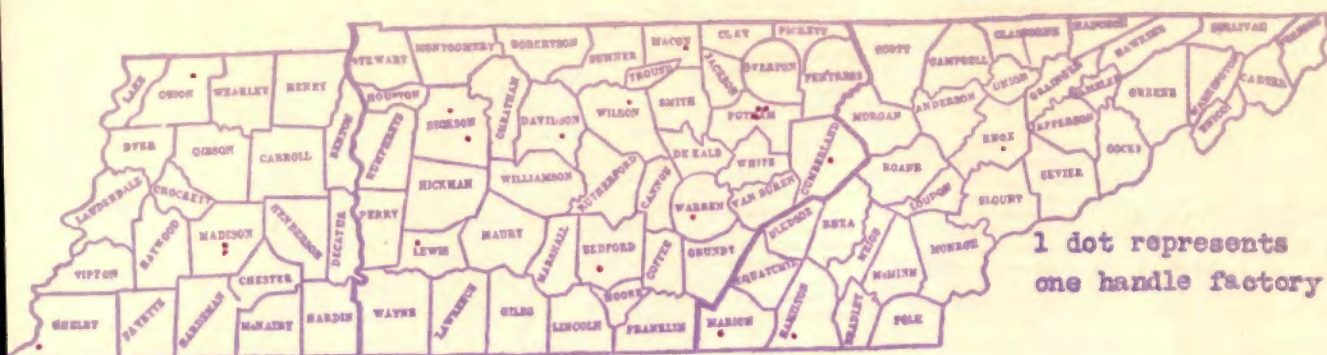


Figure 59. Location of Handle Factories in Tennessee, 1936

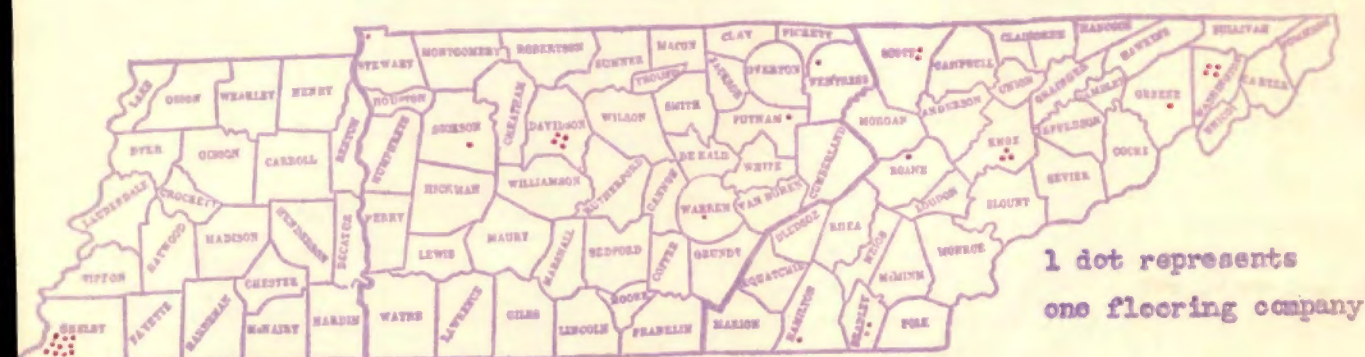


Figure 60. Location of Flooring Companies in Tennessee, 1936



Figure 61. Location of Casket Companies in Tennessee, 1936

Source: Table XXVIII.

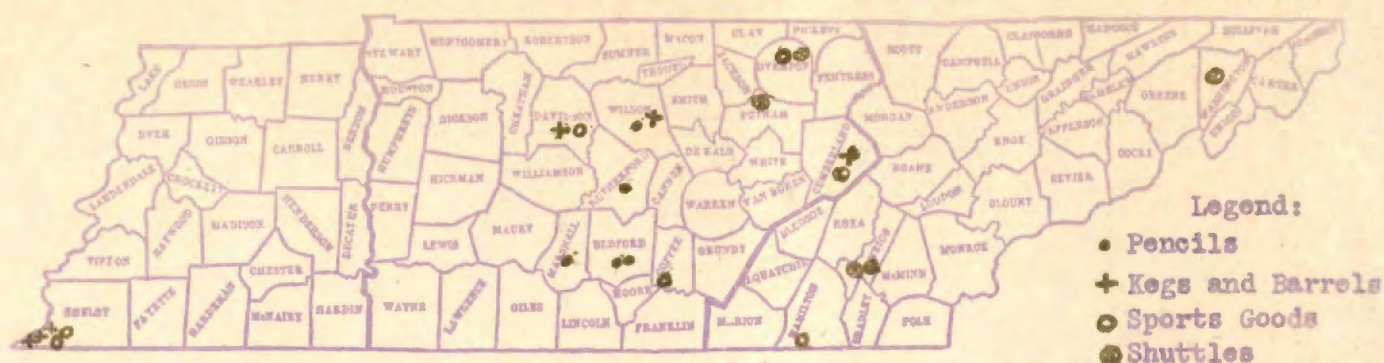


Figure. 62. Location of Pencil, Shuttle, Sports Goods and Kegs and Barrel Companies in Tennessee, 1936.

Source: Table. XXVIII.



Figure. 63. Location of Coopers Companies in Tennessee, by Counties, 1936.

Source: Table. XXVIII.

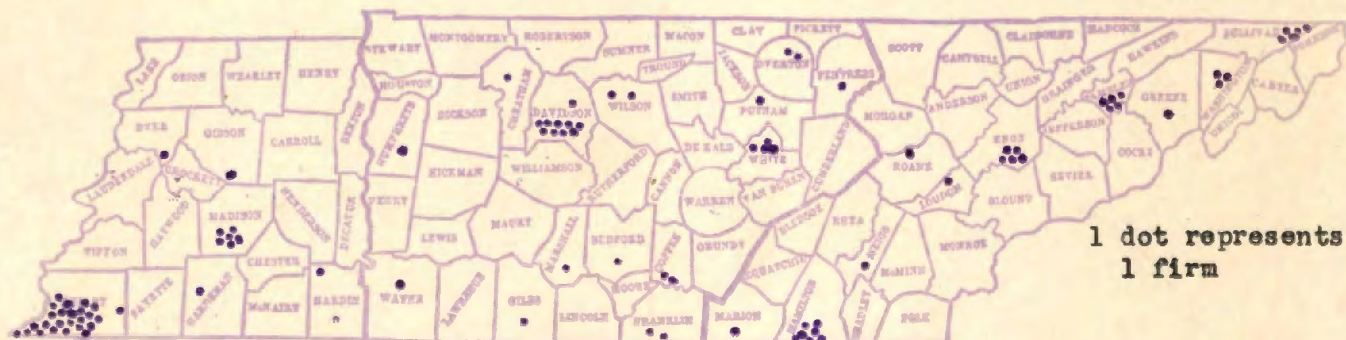


Figure. 64. Location of Industries not otherwise classified in Tennessee, by Counties, 1936.

Source: Table. XXVIII.

are confined to the central basin counties in the center of Tennessee's only important commercial stand of cedar. Two firms located at Shelbyville in Bedford County manufacture finished pencils while the other firms located at Lebanon, Lewisburg, and Murfreesboro turn out pencil slate (Figure 62).

Cooperage Companies. Out of the 101 firms in Tennessee manufacturing cooperage 34 companies are located in West Tennessee, 46 in the middle division, and 20 in the eastern part of the state. Memphis has the largest number of firms under this classification whereas the other centers of concentration are along the northern part of the Cumberland Plateau and in Nashville, Chattanooga, and Knoxville (Figure 63). Articles manufactured under this classification include staves, headings, barrel hoops, and tobacco hogsheads.

Industries Not Otherwise Classified. These include all those wooden products manufactured in the state that would not logically fall under any of the previous classifications (Figure 64). Industrial establishments in Tennessee coming in this category total 101 with the largest number found in Memphis, Jackson, Nashville, Sparta, Chattanooga, Knoxville, Morristown, and Bristol.

TABLE XXVIII. CLASSIFICATION OF LUMBER INDUSTRIES IN TENNESSEE, BY COUNTIES, 1936

County	Saw-mill	Retail lumber dealer	Wholesale lumber company	Veneer mill	Furniture factories	Tox companies	Cooperage companies	Dealers in crossties, poles, etc.
Ander.	15	3	-	-	-	-	-	1
Bedf.	18	3	-	-	-	-	-	-
Benton	9	1	-	-	-	-	2	-
Bleds.	21	-	1	-	1	-	4	1
Blount	16	8	2	-	-	-	-	1

(continued)

TABLE XXVIII. CLASSIFICATION OF LUMBER INDUSTRIES IN TENNESSEE,
BY COUNTIES, 1936 (continued)

County	Saw- mill	Retail lumber dealer	Wholesale lumber company	Veneer mill	Furniture factories	Box com- panies	Cooper- age com- panies	Dealers in cross-ties, poles, etc.
Bradley	44	4	4	-	1	-	-	1
Campb.	25	15	1	-	-	-	-	2
Cannon	19	1	-	-	1	-	-	-
Carroll	22	11	1	-	1	-	3	2
Carter	26	5	1	-	-	-	-	-
Cheat.	1	1	-	-	-	-	-	-
Chester	8	2	-	-	-	-	-	-
Claib.	18	6	1	-	-	-	-	1
Clay	9	-	-	-	-	-	-	-
Cocke	9	2	3	-	-	-	-	-
Coffee	22	8	3	-	2	-	-	2
Crock.	5	5	-	-	-	-	-	-
Cumb.	9	1	1	1	1	-	4	3
David.	23	52	24	2	6	5	6	5
Decat.	10	2	1	-	-	-	-	2
Dick.	17	4	2	-	-	-	4	3
Dyer	14	8	1	-	-	-	3	1
Fayette	22	4	-	-	-	-	-	-
Fentr.	22	3	3	-	-	-	1	-
Frank.	18	4	-	-	-	-	4	-
Gibson	29	13	-	-	-	5	1	-
Giles	18	5	-	-	-	-	1	1
Grain.	14	1	2	-	-	-	-	1
Greene	17	6	1	-	2	-	2	-
Grundy	12	5	-	-	3	-	-	6
Hambl.	6	5	1	-	3	-	-	-
Hamil.	34	41	7	-	7	2	3	7
Hanc.	20	3	-	-	-	-	-	-
Harde.	22	3	1	-	-	-	3	1
Hard'n	32	-	1	-	-	-	-	1
Hawkins	12	6	3	-	2	-	-	1
Hayw.	11	3	-	-	1	-	1	1
Hender.	24	3	-	-	-	-	2	1
Henry	33	4	1	-	-	-	-	-
Hicka.	20	-	-	-	-	-	2	2
Houst.	8	1	-	-	-	-	1	-
Humph.	20	1	-	-	-	-	1	9
Jack.	4	-	-	-	-	-	-	-
Jeff.	5	1	-	-	-	-	-	-
John.	11	1	3	-	1	1	-	-
Knox	17	28	15	1	8	3	2	3
Lake	3	2	-	-	-	-	-	-
Land.	9	5	-	-	-	1	-	-
Lawr.	42	8	4	-	-	-	-	2

(continued)

TABLE XXVIII. CLASSIFICATION OF LUMBER INDUSTRIES IN TENNESSEE,
BY COUNTIES, 1936 (continued)

County	Saw- mill	Retail lumber dealer	Wholesale lumber company	Veneer mill	Furniture factories	Box com- panies	Cooper- age com- panies	Dealers in crossties, poles, etc.
Lewis	17	2	1	-	-	-	-	2
Lincoln	23	3	-	-	1	-	-	-
Loudon	17	7	-	-	2	-	-	-
McMinn	30	7	1	-	2	2	-	2
McNairy	22	3	1	-	-	-	2	-
Macon	26	2	-	-	-	-	1	-
Marsh.	17	3	1	-	-	-	-	-
Marion	27	5	-	-	-	-	-	-
Maury	15	5	1	-	1	-	1	-
Madis.	20	10	5	1	2	-	4	1
Monroe	30	9	2	-	-	-	-	2
Moigs	15	-	-	-	-	-	-	-
Mont.	6	4	1	-	-	-	2	2
Moore	2	2	-	-	-	-	-	-
Morgan	22	3	4	-	-	-	-	1
Obion	15	10	-	-	-	-	-	-
Overt.	18	2	4	-	-	-	4	1
Perry	19	-	-	-	-	-	-	3
Pick.	2	3	-	-	-	-	2	-
Polk	10	5	-	-	1	-	1	1
Putn.	20	9	4	-	1	-	7	1
Rhea	11	1	-	1	-	1	1	1
Roane	28	4	5	-	2	-	1	-
Robert.	13	4	2	-	-	-	2	1
Ruth.	17	4	-	-	-	-	-	-
Scott	9	9	3	-	2	-	5	-
Sequa.	5	-	-	-	-	-	-	1
Sevier	9	2	2	-	3	-	-	-
Shelby	71	62	68	6	7	4	13	6
Smith	12	3	-	-	-	-	-	-
Stew.	6	2	-	-	-	-	-	7
Sulli.	10	7	11	1	5	-	-	-
Sumner	35	7	1	-	-	1	-	-
Tipton	7	4	1	-	-	-	-	-
Trous.	4	1	-	-	-	-	-	1
Unicoi	13	2	2	-	-	-	1	3
Union	6	-	-	-	-	-	-	-
V. Buren	2	-	-	-	-	-	1	-
Warren	35	5	2	-	1	2	2	1
Wash.	14	7	6	-	2	2	-	1
Wayne	25	6	3	-	-	-	-	5

(continued)

TABLE XXVIII. CLASSIFICATION OF LUMBER INDUSTRIES IN TENNESSEE,
BY COUNTIES, 1936 (continued)

County	Saw- mill	Retail lumber dealer	Wholesale lumber company	Veneer mill	Furniture factories	Box com- panies	Cooper- age com- panies	Dealers in crossties, poles, etc.
Weak.	33	6	-	-	-	2	-	1
White	23	6	3	-	1	-	-	1
Wmson.	14	4	1	-	-	-	-	-
Wilson	13	3	-	-	-	1	1	-
DeKalb	-	-	-	-	1	-	-	-
Total	1633	541	221	13	74	32	101	107

TABLE XXVIII A. CLASSIFICATION OF LUMBER INDUSTRIES IN TENNESSEE,
BY COUNTIES, 1936 (continued)

County	Han- dle fac- tory	Floor- ing com- panies	Gas- ket com- pany	Pen- cil com- pany	Keg fac- tory	Sport goods fac- tory	Mfg. shut- tles	Pulp- wood	Hard- wood dimen- sions	Not other- wise clas- sified
Bedf.	1	-	-	2	-	-	-	-	-	1
Blount	-	-	1	-	-	-	-	-	-	-
Brad.	-	2	2	-	-	-	-	-	-	-
Cheat.	-	-	-	-	-	-	-	-	-	1
Cooke	-	-	-	-	-	-	-	1	-	-
Coffee	-	-	-	-	-	1	-	-	-	2
Cumb.	2	-	-	-	1	-	1	-	1	-
David.	1	4	4	-	1	1	-	2	4	10
Dick.	2	1	-	-	-	-	-	-	-	-
Dyer	-	-	-	-	-	-	-	-	-	1
Fayette	-	-	-	-	-	-	-	2	2	-
Fentr.	-	1	-	-	-	-	-	-	-	1
Frank.	-	-	-	-	-	-	-	-	-	1
Gibs.	-	-	-	-	-	-	-	-	-	1
Giles	-	-	-	-	-	-	-	-	-	1
Grain.	-	-	1	-	-	-	-	-	-	-
Greene	-	1	-	-	-	-	-	-	-	1
Grundy	-	-	-	-	-	-	-	-	3	-
Hamb.	-	-	-	-	-	-	-	-	-	5
Hamilt.	1	1	2	-	-	1	-	2	-	9
Hard.	-	-	-	-	-	-	-	-	-	1
Hardin	-	-	-	-	-	-	-	-	-	1

(continued)

TABLE XXVIII A. CLASSIFICATION OF LUMBER INDUSTRIES IN TENNESSEE,
BY COUNTIES, 1936 (continued)

County	Hand- dle fac- tory	Floor- ing com- panies	Cas- ket com- pany	Pen- cil com- pany	Keg fac- tory	Sport goods fac- tory	Mfg. shut- tles	Pulp- wood	Hard- wood dimen- sions	Not other- wise clas- sified
Hayw.	-	-	-	-	-	-	-	-	1	-
Houst.	-	-	-	-	-	-	-	-	1	-
Humph.	-	-	-	-	-	-	-	2	-	1
Jack.	-	-	-	-	-	-	-	-	1	-
Knox	1	3	2	-	-	-	-	3	-	5
Lawr.	-	1	-	-	-	-	-	-	-	-
Lewis	1	-	-	-	-	-	-	-	-	-
Loudon	-	-	-	-	-	-	-	-	-	1
Macon	1	-	-	-	-	-	-	-	-	-
Marion	1	-	-	-	-	-	-	-	1	2
Marsh.	-	-	-	1	-	-	-	-	-	1
Madis.	2	-	1	-	-	-	-	-	1	6
Meigs	-	-	-	-	-	-	2	-	-	1
Monroe	-	-	-	-	-	-	-	1	-	-
Obion	1	-	-	-	-	-	-	-	-	1
Overt.	-	-	-	-	-	1	1	-	2	2
Putn.	2	1	-	-	-	-	-	1	1	1
Roane	-	1	-	-	-	-	-	4	-	1
Ruth.	-	-	-	1	-	-	-	-	-	-
Scott	-	1	-	-	-	-	-	-	-	-
Sequa.	-	-	1	-	-	-	-	-	-	-
Shelby	2	8	8	-	3	2	-	-	19	27
Smith	-	-	1	-	-	-	-	-	-	-
Sulli.	-	-	1	-	-	-	-	2	-	5
Warren	1	1	-	-	-	-	-	-	-	1
Wash.	-	4	-	-	-	-	1	1	-	3
Wayne	1	-	-	-	-	-	-	-	1	1
White	-	-	-	-	-	-	-	-	3	4
Wilson	1	-	1	1	1	-	-	-	-	2
Total	21	30	25	5	6	6	5	21	42	101

Source: See Footnote 23, pp. 117 and 118.

CHAPTER V

INDUSTRIAL USE OF WOOD IN TENNESSEE

In this study of industrial uses of wood in Tennessee and in the United States, both 1928 and 1933 data were available. However, due to the drastic curtailment of the industrial uses of lumber during the past economic depression, 1928 data are used principally in this study since it represents a more normal business period than 1933.

In 1933 the total requirements of wood industries in this state were 217 million board feet which represented approximately one-half of the 1928 wood requirements. During this same period, the total softwood consumption in Tennessee decreased 70 per cent as compared with a 75 per cent decrease in hardwoods. Since 1928 industrial uses of foreign woods decreased 69 thousand board feet. Practically the only wood species experiencing an increase in consumption during the depression were basswood, beech, cherry, elm, and tupelo, all of which are relatively unimportant commercial hardwoods. (Table XXIX).

TABLE XXIX. WOOD USED BY INDUSTRIES BY SPECIES, TENNESSEE,
1933

Kind	Amount (1000 bd.ft.)	Per cent of all wood used	Per cent 1933 consump- tion is of 1928
Softwood total	28,232	13.0	
Cedar	3,625	1.6	55.6
Cypress	1,102	0.5	21.2
Douglas fir	350	0.2	66.7
Southern yellow pine	21,396	9.8	33.1
Western yellow pine	1,006	0.5	32.3
White pine	700	0.3	46.9
Other softwoods	173	0.1	19.2

(continued)

TABLE XXIX. WOOD USED BY INDUSTRIES BY SPECIES, TENNESSEE, 1933
(continued)

Kind	Amount (1000 bd. ft.)	Per cent of all wood used	Per cent 1933 consump- tion is of 1928
Total hardwoods	189,431	86.9	43.9
Ash	3,416	1.6	86.1
Basswood	1,611	0.7	112.3
Beech	4,898	2.2	155.7
Birch	80	-	6.4
Buckeye	385	0.2	70.0
Cherry	85	-	217.9
Chestnut	2,095	1.0	20.8
Cottonwood	4,327	2.0	116.7
Elm	5,441	2.5	352.6
Hickory	14,319	6.6	26.4
Maple	7,436	3.4	60.5
Oak	93,548	42.8	36.8
Persimmon	323	.1	23.5
Red and sap gum	29,039	15.3	46.8
Sycamore	6,844	3.1	300.6
Tupelo	4,946	2.3	104.0
Walnut	317	0.1	40.8
Yellow poplar	5,065	2.3	38.1
Other hardwoods	5,458	2.5	564.4
Total foreign woods	203	0.1	74.6
Grand total	217,866	100.0	50.4

Source: U.S.D.A. Forestry Service, Lumber Used in Manufacture, 1933.

Timber Species Used, by Industries,

1928

All Industries Combined. In 1928 the wood using industries of Tennessee required 514,031,000 board feet of all forms of timber, of which 84 per cent was furnished by hardwood species. Oak as our principal commercial wood supplied one-half of all the timber used by Tennessee's wood industries during this year (Figure 65 and Table XX). Yellow pine, the second most important wood, furnished slightly more than one-eighth, and red and sap

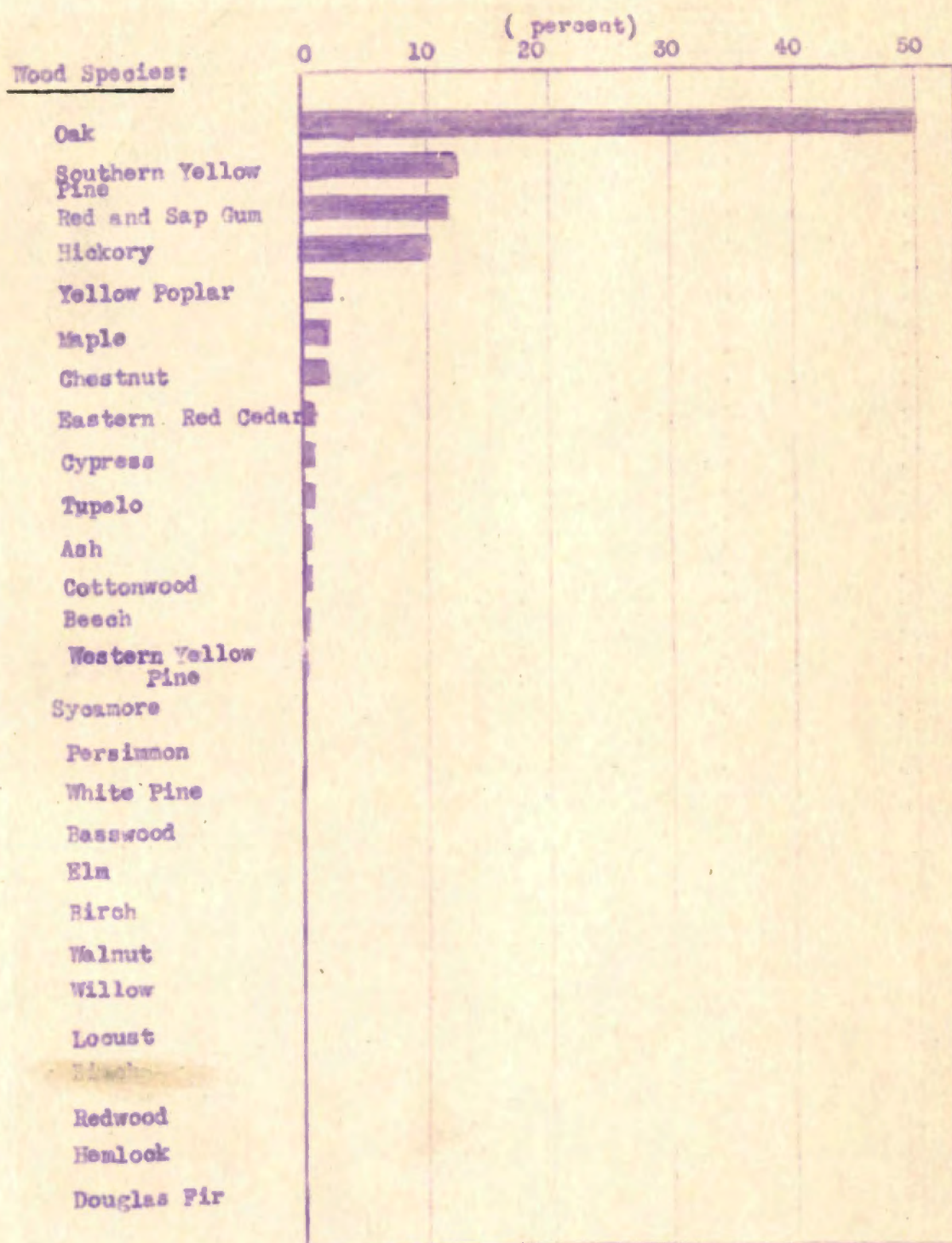


Figure. 65. All Wood Industries: Per cent of wood used by Species in Tennessee, 1928.

Source: Table. XXIX.

TABLE XXX. WOOD USED BY INDUSTRIES BY SPECIES, TENNESSEE,
1928

Species	Amount (1000 bd. ft.)	Per cent of all wood used	Per cent of all softwood used
Softwood			
Cedar	6,341	1.23	7.71
Cypress	5,199	1.01	6.32
Douglas fir	495	.01	.60
Hamlock	396	.01	.48
Southern yellow pine	64,700	12.59	78.68
Western yellow pine	3,116	.61	3.79
White pine	1,493	.29	1.82
Redwood	448	.09	.54
Other native softwood	55	.01	.07
Total native softwood	82,243	16.00	100.00
			Per cent of all hardwood used
Hardwood:			
Ash	3,966	.77	.92
Basswood	1,434	.28	.33
Beech	3,146	.61	.73
Birch	1,256	.24	.29
Buckeye	550	.11	.13
Cherry	39	.01	.01
Chestnut	10,086	1.96	2.34
Cottonwood	3,707	.72	.86
Elm	1,543	.30	.36
Hickory	54,161	10.54	12.55
Locust	667	.13	.15
Maple	12,286	2.39	2.85
Oak	253,866	49.39	58.85
Persimmon	1,375	.27	.32
Red and sap gum	62,019	12.07	14.38
Sycamore	2,277	.44	.53
Tupelo	4,757	.92	1.10
Walnut	777	.15	.18
Willow	300	.06	.07
Yellow poplar	13,304	2.59	3.08
Total native hardwood	431,516	83.95	100.00
Total foreign woods	272	.05	-
Total	431,788	84.00	-
All timber	514,031	100.00	

gum slightly less than one-eighth of our total wood consumption. Outside of hickory, which supplied one-tenth, no other species contributed more than 2 1/2 per cent of our total wood requirements. Importations of western softwoods into the state, consisting of western yellow pine, douglas fir and redwood, were relatively unimportant since they furnished considerably less than one per cent of Tennessee's total wood requirements (Table XXX).

Lumber constituted 85 per cent of all the timber used during this year. Softwood species furnished 16 per cent of the total amount of lumber used, southern yellow pine furnishing 12.5 per cent of all the wood used and almost 79 per cent of all our softwood. Eastern red cedar and cypress were the other most important softwoods, each supplying slightly more than one per cent of our total wood consumption.⁽¹⁾

Baskets and Fruit Packages. This industry consumed only about 3 per cent of all the wood used by Tennessee's industries in 1928. Practically all the wood used was hardwood with softwoods comprising only 1.2 per cent of the total. Approximately three-fourths of our basket and fruit package material was supplied by red and sap gum. One-fifth was supplied by sycamore and tupelo (Figure 66). Less than 11 per cent of the timber used by this industry was in the form of lumber.

(1) Unless otherwise specified, all data in this chapter were taken from U.S.D.A. Forest Service, Lumber Used in Manufacture, Series I, Table I, and Series II, pages 80-81.

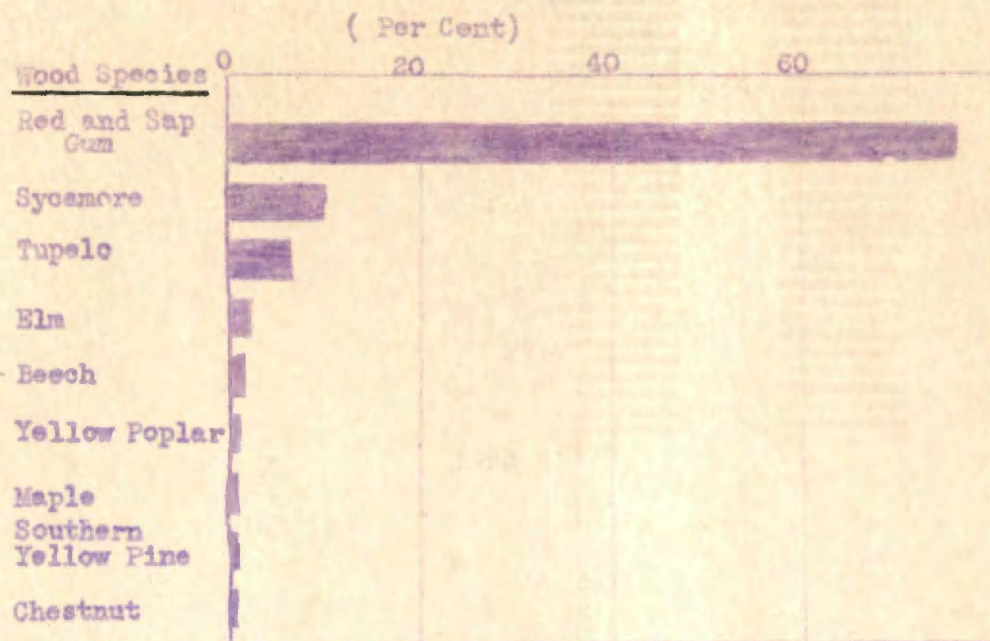


Figure 66. Baskets and Fruit Packages: Per Cent of Wood Species used in Tennessee, 1928

Source: Table: XXXI.

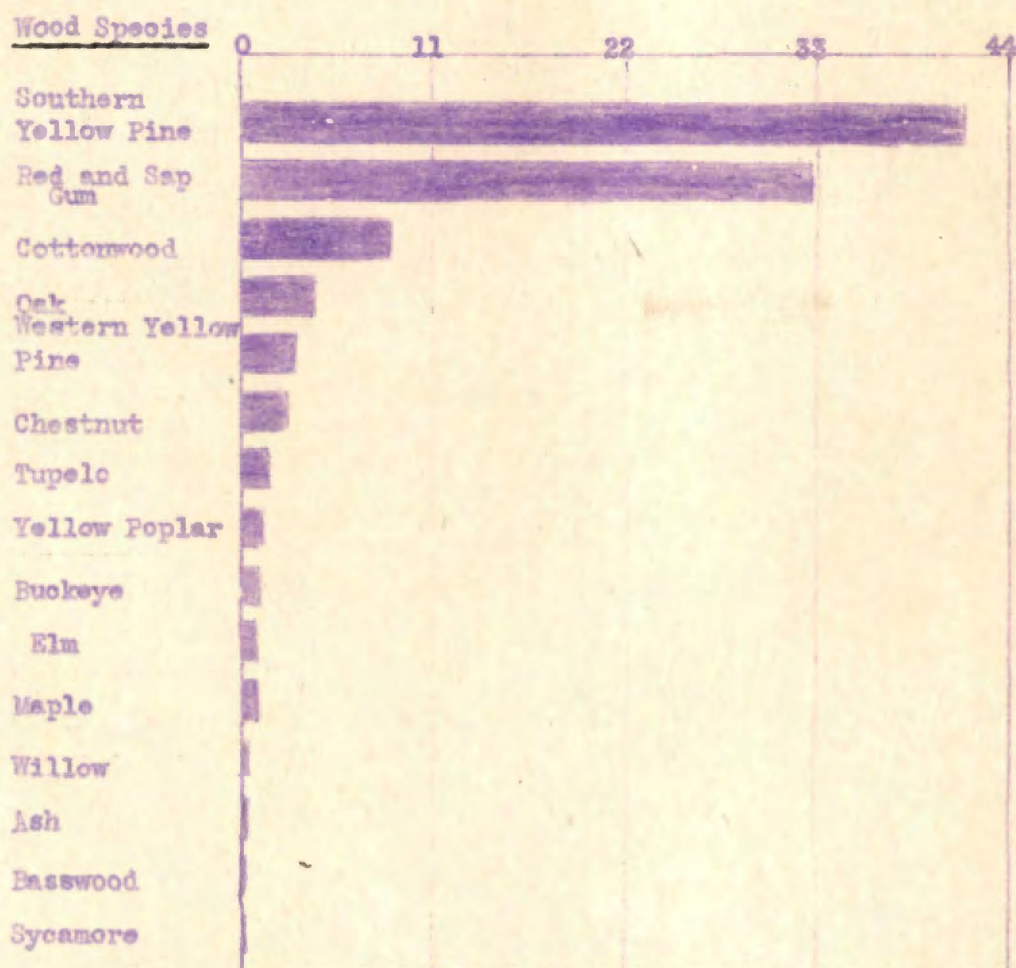


Figure 67. Boxes and Crates: Per Cent of Wood Species used in Tennessee, 1928.

Source: Table: XXXII.

TABLE XXXI. BASKETS AND FRUIT PACKAGES: WOOD SPECIES USED, TENNESSEE, 1928

Wood	Per cent of total
Red and sap gum	75.6
Sycamore	10.1
Tupelo	6.7
Elm	1.9
Beech	1.4
Yellow poplar	1.1
Maple	1.0
Chestnut	0.7
Southern yellow pine	0.7
Cypress	0.6
Total	100.0

Boxes and Crates. The box and crate industry in Tennessee consumed less than 9 per cent of all the wood used in the state's industries in 1928. (See figure 82, page 158 for the importance of this and other wood industries.) Hardwoods supply 54 per cent and softwoods 46 per cent of the total wood used in the manufacture of boxes and crates. Southern yellow pine and red and sap gum were the principal woods in this industry, together supplying over three-fourths of all the box and crate material. The percentage of the total material supplied by the more important woods is shown in Figure 67 and Table XXXII.

TABLE XXXII. BOXES AND CRATES: WOOD SPECIES USED, TENNESSEE, 1928

Wood species	Per cent of total	Wood species	Per cent of total
Southern yellow pine	42.7	Buckeye	1.1
Red and sap gum	32.4	Elm	1.0
Cottonwood	8.0	Maple	0.9
Oak	4.0	Willow	0.7
Western yellow pine	3.3	Ash	0.4
Chestnut	2.3	Basswood	0.4
Tupelo	1.5	Sycamore	0.1
Yellow poplar	1.2	Total	100.0

Vehicles (Non-Motor). This industry is relatively unimportant in Tennessee, consuming only 7,480,000 board feet of timber in 1928 which represents only 1.5 per cent of total wood consumption of all industries. Hickory supplies approximately two-thirds of the material going into this industry, whereas almost a third is furnished by oak (Figure 68).

TABLE XXXIII. VEHICLES (NON-MOTOR): SPECIES USED, TENNESSEE, 1928

Species	Per cent of total
Hickory	61.5
Oak	30.8
Ash	4.7
Maple	2.0
Elm	.7
Southern yellow pine	.2
Total	100.0

Vehicles (Motor). In the construction of motor vehicles in Tennessee approximately all of the wood material is supplied by hickory. The total consumption of this industry in 1928 amounted to 27.5 million board feet of timber which was 5.4 per cent of the state's total wood consumption. The relative importance of the motor vehicle woods are indicated in Figure 69.

TABLE XXXIV. MOTOR VEHICLES: WOOD SPECIES USED IN TENNESSEE, 1928

Species	Per cent of total
Hickory	98.8
Oak	1.0
Southern yellow pine	.1
Total	100.0

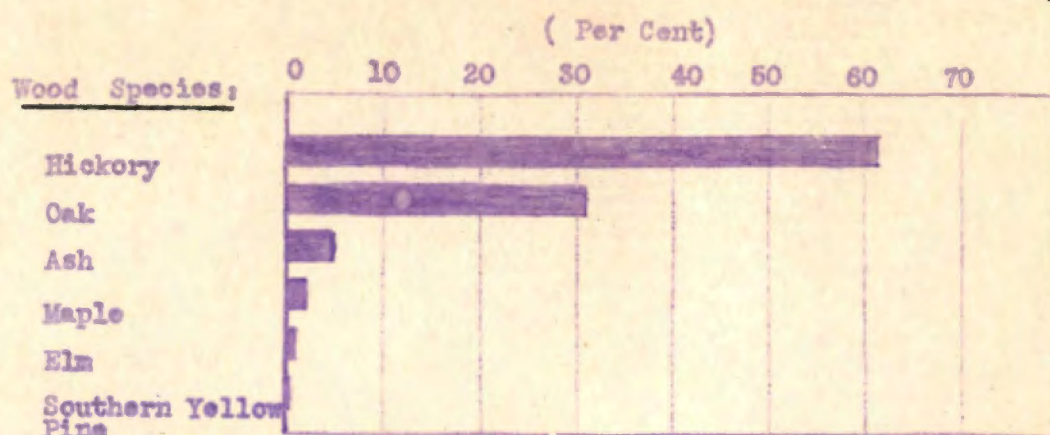


Figure.68.Vehicles (Non-Motor): Per Cent of Wood Species used in Tennessee, 1928.

Source: Table XXXIII.

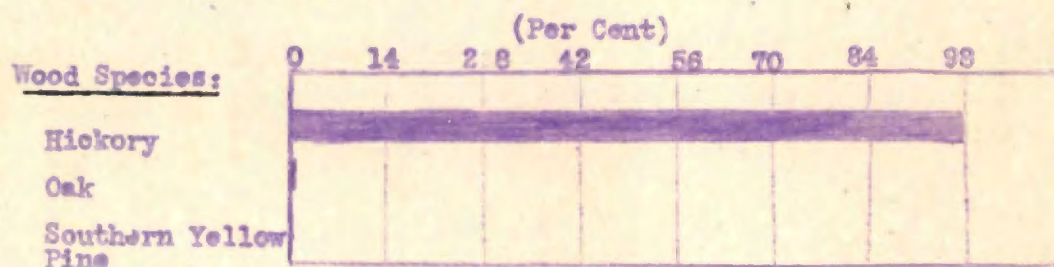


Figure.69. Vehicles (Motor): Per Cent of Wood Species used in Tennessee, 1928.

Source: Table. XXXIV.

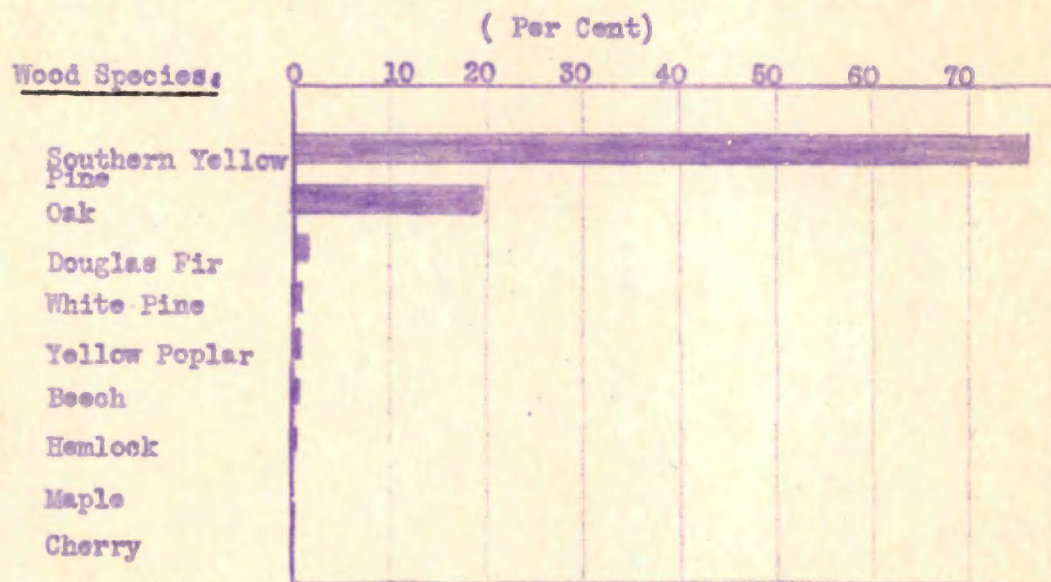


Figure: 70. Car Construction and Repair: Per Cent of Wood Species used in Tennessee, 1928.

Source: Ta ble. XXXV.

Car Construction and Repair Industries. This industry consumed 18,529,000 board feet of lumber in 1928, which represented 3.6 per cent of all the timber consumed by Tennessee's wood using industries. Southern yellow pine furnished over three-fourths of the wood whereas oak, the only other principal car construction and repair wood, furnished approximately 1/5 of the total (Figure 70).

TABLE XXXV. CAR CONSTRUCTION AND REPAIR: WOOD SPECIES, TENNESSEE, 1928

Species	Per cent of total
Southern yellow pine	76.4
Oak	19.4
Douglas fir	1.5
White pine	1.1
Yellow poplar	.7
Beech	.4
Hemlock	.2
Cherry	.1
Maple	.1
Red (and sap) gum	*
Tupelo	*
Ash	*
Basswood	*
Redwood	*
Cypress	*
Total	100.0

* Less than one-tenth of one per cent.

Furniture. Ninety-five per cent of our furniture wood in Tennessee is supplied by hardwoods. Red and sap gum furnished over two-thirds of the total consumption of 43,504,000 board feet in 1928. Furniture factories used 8.5 per cent of all the wood consumed by Tennessee industries in 1928, the larger amount of which was obtained in the form of lumber.

TABLE XXXVI. FURNITURE: WOOD SPECIES USED, TENNESSEE, 1928

Species	Per cent of total
Red and sap gum	66.7
Oak	12.3
Tupelo	5.7
Yellow poplar	4.8
Eastern red cedar	4.5
Chestnut	1.6
Walnut	1.4
Birch	.7
Southern yellow pine	.6
Mahogany	.6
Maple	.4
Sycamore	.3
Basswood	.1
Elm	*
Cherry	*
Total	100.0

Handles. Handle manufacture in Tennessee consumed 4.7 per cent of all the wood used in the wood using industries in 1928, with hickory supplying more than four-fifths^{of} the total handle material (Figure 72). No softwoods were used by this industry. Approximately 24 million board feet were consumed by this industry in 1928 of which one-fourth was supplied in the form of lumber.

Figure 72. Handles: Per Cent of Wood Species used in Tennessee, 1928.

TABLE XXXVII. HANDLES: WOOD SPECIES USED IN TENNESSEE, 1928

Species	Per cent of total
Hickory	85.5
Ash	5.8
Oak	4.1
Maple	2.5
Yellow poplar	2.1
Total	100.0

Figure 73. Working and Athletic Spades: per Cent of Wood Species used in Tennessee, 1928.

TABLE XXXVIII.

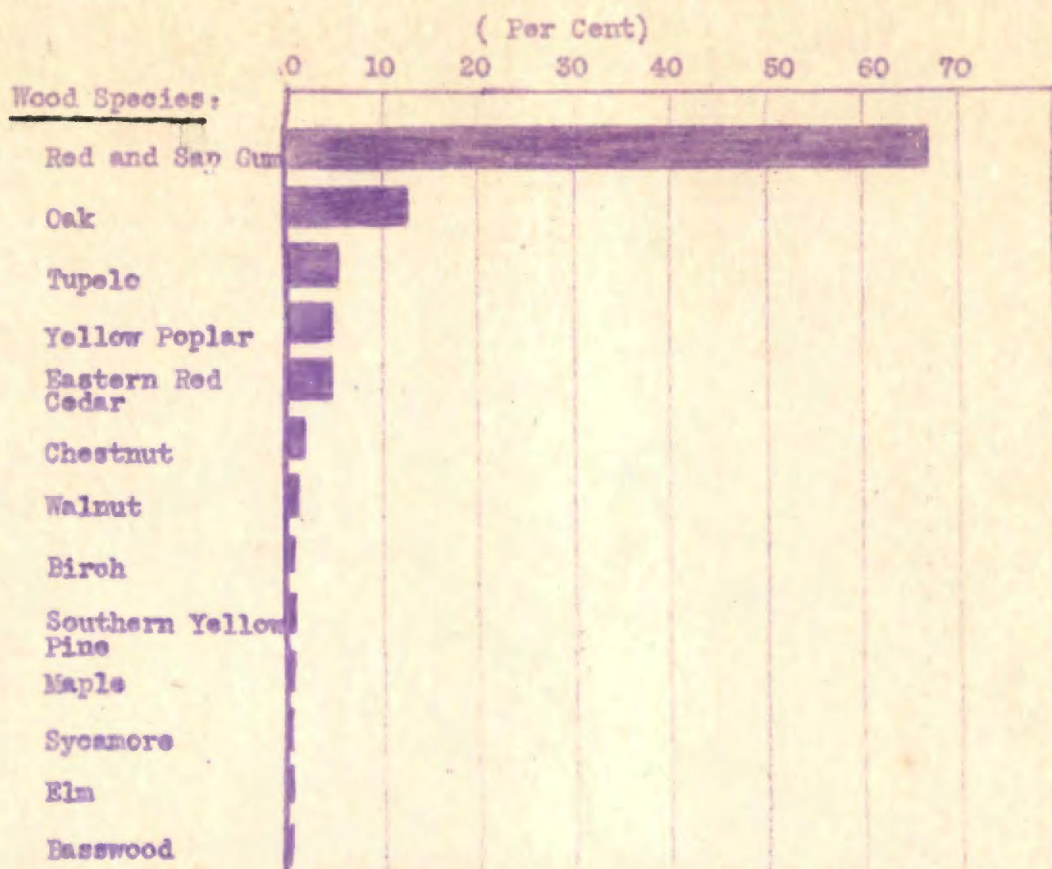


Figure. 71. Furniture: Per Cent of Wood Species used in Tennessee, 1928.
Source: Table. XXXVI.

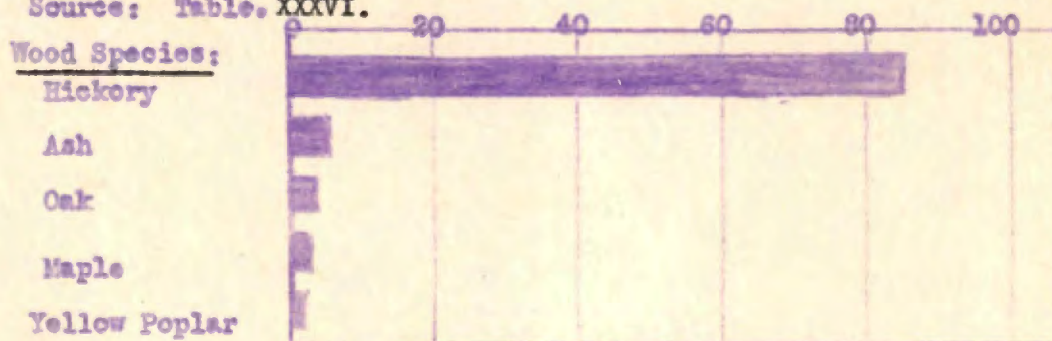


Figure. 72. Handles: Per Cent of Wood Species used in Tennessee, 1928.
Source: Table. XXXVII.

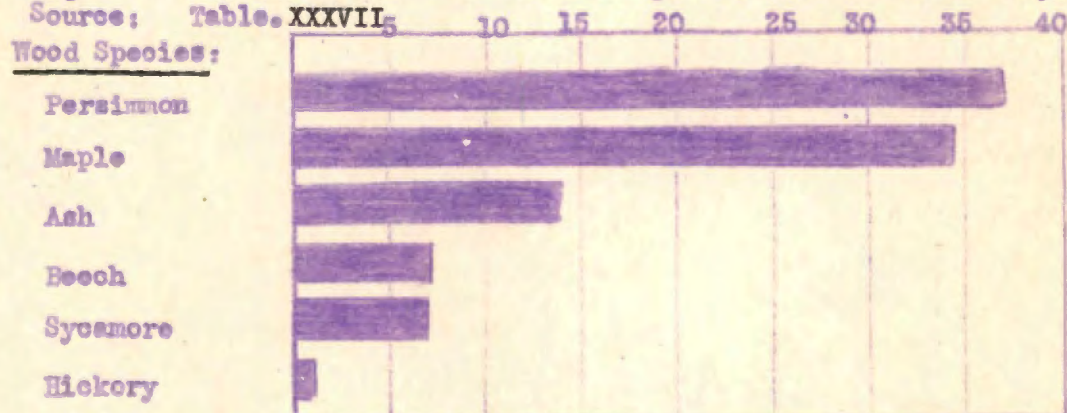


Figure. 73. Sporting and Athletic Goods: Per Cent of Wood Species used in Tennessee, 1928.

Source: Table. XXXVIII.

Sporting and Athletic Goods. Manufacturers of sporting and athletic goods used 2,910,000 board feet of hardwood timber which was less than one per cent of the total amount of wood consumed by industries in the state during 1928. Persimmon and maple each furnished one-third of the material going into sporting and athletic goods. Much smaller amounts of ash, beech, sycamore, and hickory were used as shown in Figure 73.

TABLE XXXVIII. SPORTING AND ATHLETIC GOODS: WOOD SPECIES USED, TENNESSEE, 1928

Species	Per cent of total
Persimmon	36.9
Maple	34.4
Ash	14.1
Beech	6.9
Sycamore	6.9
Hickory	.9
Total	100.0

Caskets and Coffins. The casket and coffin industry in this state consumed 9,699,000 board feet of timber in 1928, which represented less than 2 per cent of the state's total wood consumption. Softwoods constituted 83 per cent of the material entering this industry compared with 37 per cent furnished by hardwood. Chestnut, cypress and southern yellow pine were other casket and coffin woods of commercial importance. Figure 74 indicates the proportion of each of our wood species used in Tennessee's casket and coffin industry.

TABLE XXXIX. CASKETS AND COFFINS: WOOD SPECIES USED, TENNESSEE, 1928

Species	Per cent of total
Chestnut	36.1
Cypress	35.4
Southern yellow pine	22.2
White pine	2.0
Eastern red cedar	1.8
Walnut	.7
Yellow poplar	.2
Mahogany	.1
Eastern white cedar and spruce	.1
Total	100.0

Fixtures. Approximately 2 1/2 million board feet of hard and soft-woods were used in the manufacture of fixtures in Tennessee in 1928, which amounted to only one-half of one per cent of our total wood consumption. Softwood species supplied this industry with 44 per cent of its wood supply whereas hardwoods, comprised mainly of oak and red gum, furnished 56 per cent of the total. Yellow pine was by far the most important softwood. The relative proportion of the different species used by this industry are shown in Figure 75.

TABLE XL. FIXTURES: WOOD SPECIES USED, TENNESSEE, 1928

Species	Per cent of total
Southern yellow pine	34.5
Oak	32.9
Red sap	16.8
Yellow poplar	4.6
Hemlock	3.4
Douglas fir	2.8
Eastern white cedar and spruce	1.7
Cypress	1.3
Birch	.8
Ash	.7
Redwood	.7
Total	100.0

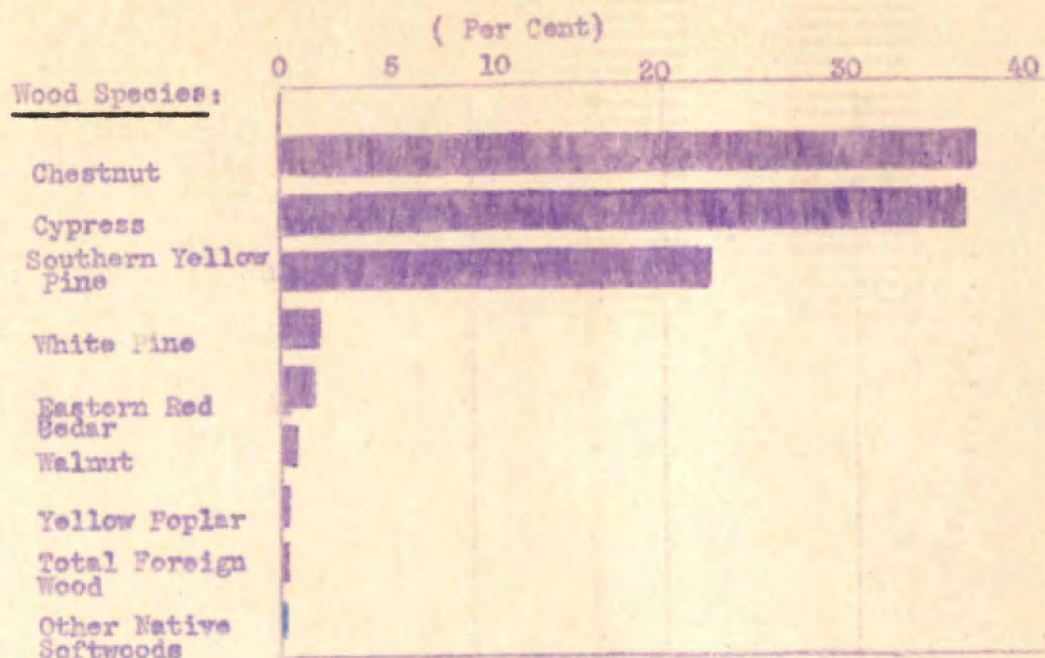


Figure. 74. Caskets and Coffins: Per Cent of Wood Species used in Tennessee, 1928. Source: Table. XXXIX.

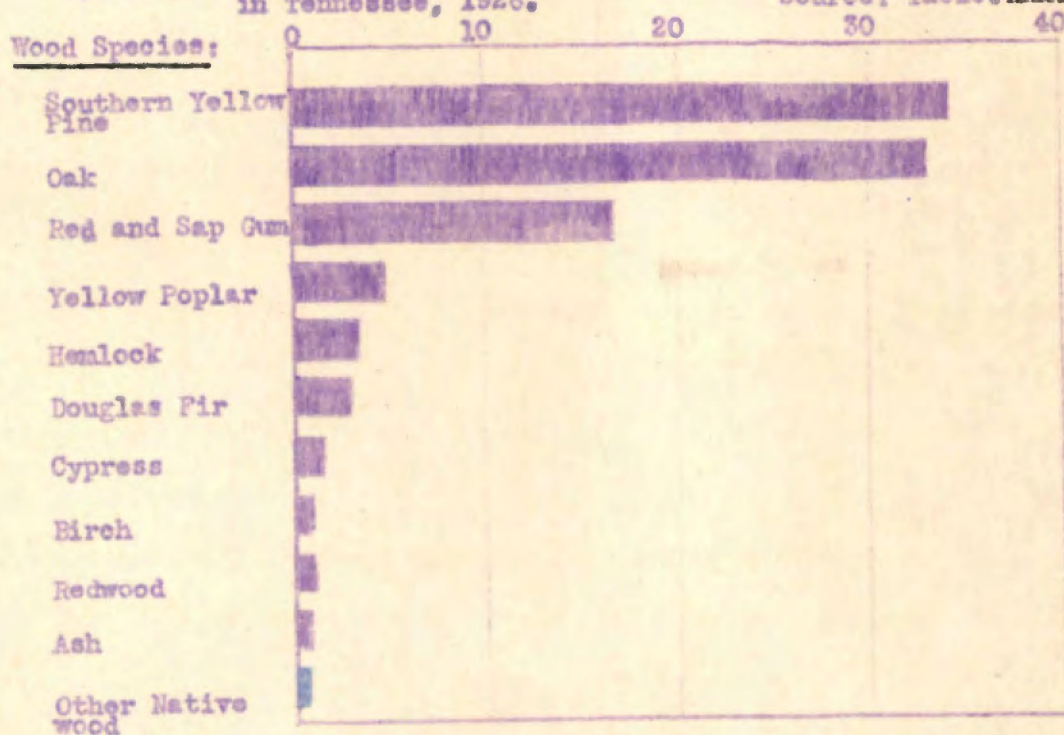


Figure. 75. Fixtures: Per Cent of Wood Species used in Tennessee, 1928.

Source: Table. XL.

Chairs and Chair Stock. In 1928 the manufacture of these products demanded almost 9 million board feet of timber, over two-thirds of which was oak and red gum. Other woods used in the order of their importance were elm, hickory, beech, chestnut, yellow poplar, and ash (Figure 76).

TABLE XLI. CHAIR AND CHAIR STOCK: WOOD SPECIES USED, TENNESSEE, 1928

Species	Per cent of total
Oak	39.2
Red and sap gum	35.5
Elm	6.6
Hickory	4.9
Beech	4.8
Chestnut	3.4
Yellow poplar	2.9
Ash	2.7
Total	100.0

Planing Mill Products. consisting of products worked to pattern but excluding lumber merely dressed, was our largest wood consuming industry in Tennessee in 1928, using nearly 50 per cent of over 247 million board feet of our wood material. Nine-tenths of the wood used by this industry consisted of oak, whereas only slight amounts of maple and Southern yellow pine were used (Figure 77).

TABLE XLII. PLANING MILL PRODUCTS: WOOD SPECIES CONSUMED, TENNESSEE, 1928

Species	Pct. of total	Species	Pct. of total
Oak	90.0	Red and sap gum	.2
Maple	3.3	Hemlock	.1
Southern yellow pine	3.2	Chestnut	.1
Yellow poplar	1.8	Typelo	*
Eastern red cedar	.4	Walnut	*
Beech	.4		
Birch	.4	Total	100.0

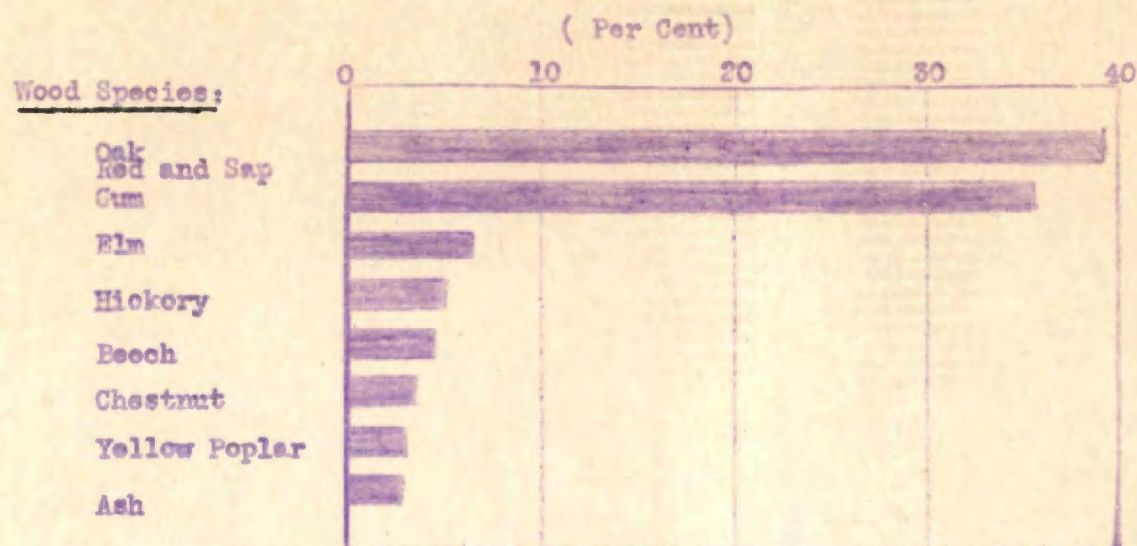


Figure 76. Chairs and Chair Stock; Per Cent of Wood Species used in Tennessee, 1928.

Source: Table. XLI

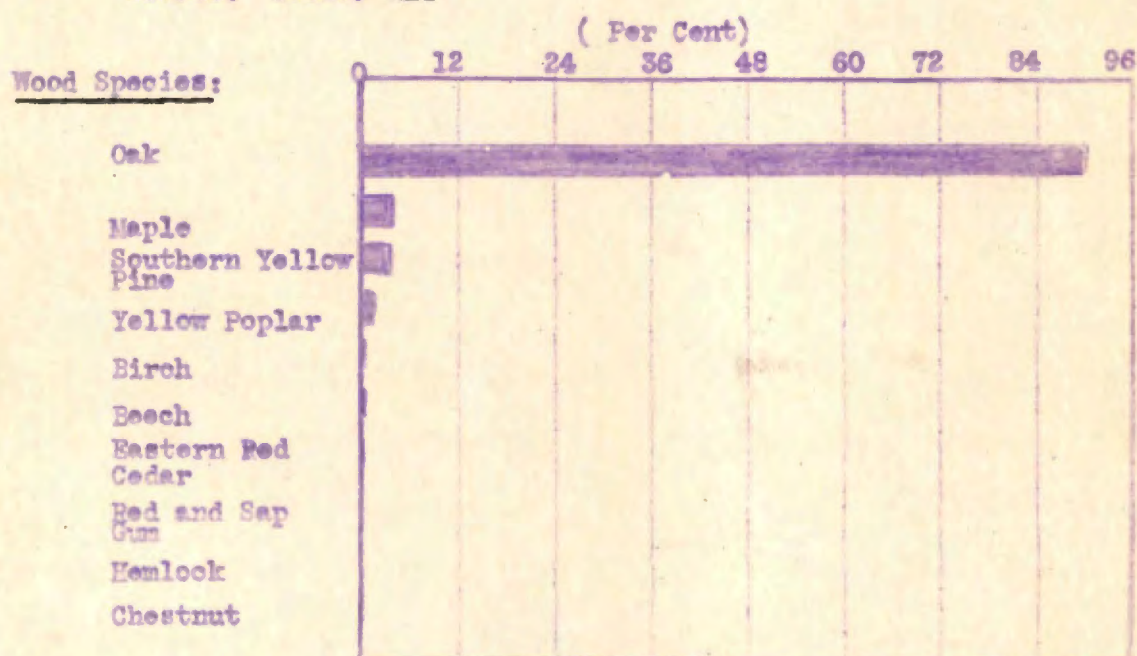


Figure 77. Planing Mill Products; Per Cent of Wood Species used in Tennessee, 1928.

Source: Table. XLII

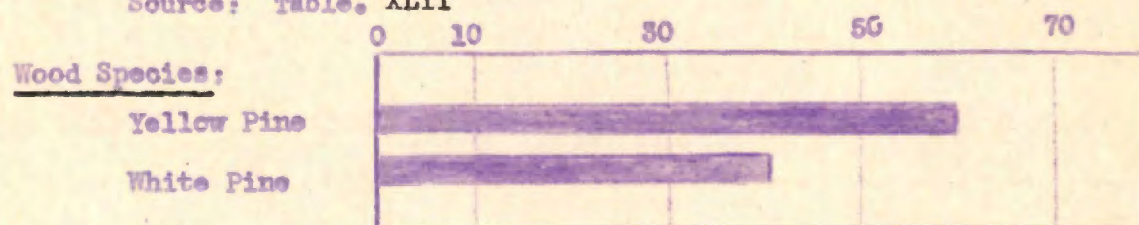


Figure 78. Signs and Supplies; Per Cent of Wood Species used in Tennessee, 1928.

Source: Table. XLIII.

Signs and Supplies. The wood industries of Tennessee manufacturing signs and supplies in 1928 consumed only white and southern yellow pine. This industry consumed only 335,000 board feet of lumber which represented less than one-tenth of one per cent of the timber used industrially in this state. Figure 73 indicates the proportion of the two softwoods used by this industry.

TABLE XLIII. SIGNS AND SUPPLIES: WOOD SPECIES USED, TENNESSEE, 1928

Species	Per cent of total
Southern yellow pine	59.7
White pine	40.3
Total	100.0

Sash, Doors, Blinds, and General Mill Work used 38 million board feet of lumber, 54 per cent of which was hardwood. Yellow pine is the principal wood, constituting over 43 per cent of the total timber consumption of this industry in 1928 (Figure 78).

TABLE XLIV. SASH, DOORS, BLINDS, AND GENERAL MILL WORK: WOOD SPECIES USED, TENNESSEE, 1928

Species	Pct. of total	Species	Pct. of total
Southern yellow pine	43.4	Eastern red cedar	1.3
Oak	18.0	Maple	1.2
Yellow poplar	11.3	Redwood	1.0
Chestnut	10.0	Douglas fir	.4
Cypress	4.0	Elm	.3
Western yellow pine	2.3	Ash	.1
Basswood	2.1	Tupelo	.1
Red and sap gum	2.1	Walnut	.*
White pine	2.0	Total	100.0

* Less than one-tenth of one per cent.

(Per Cent)

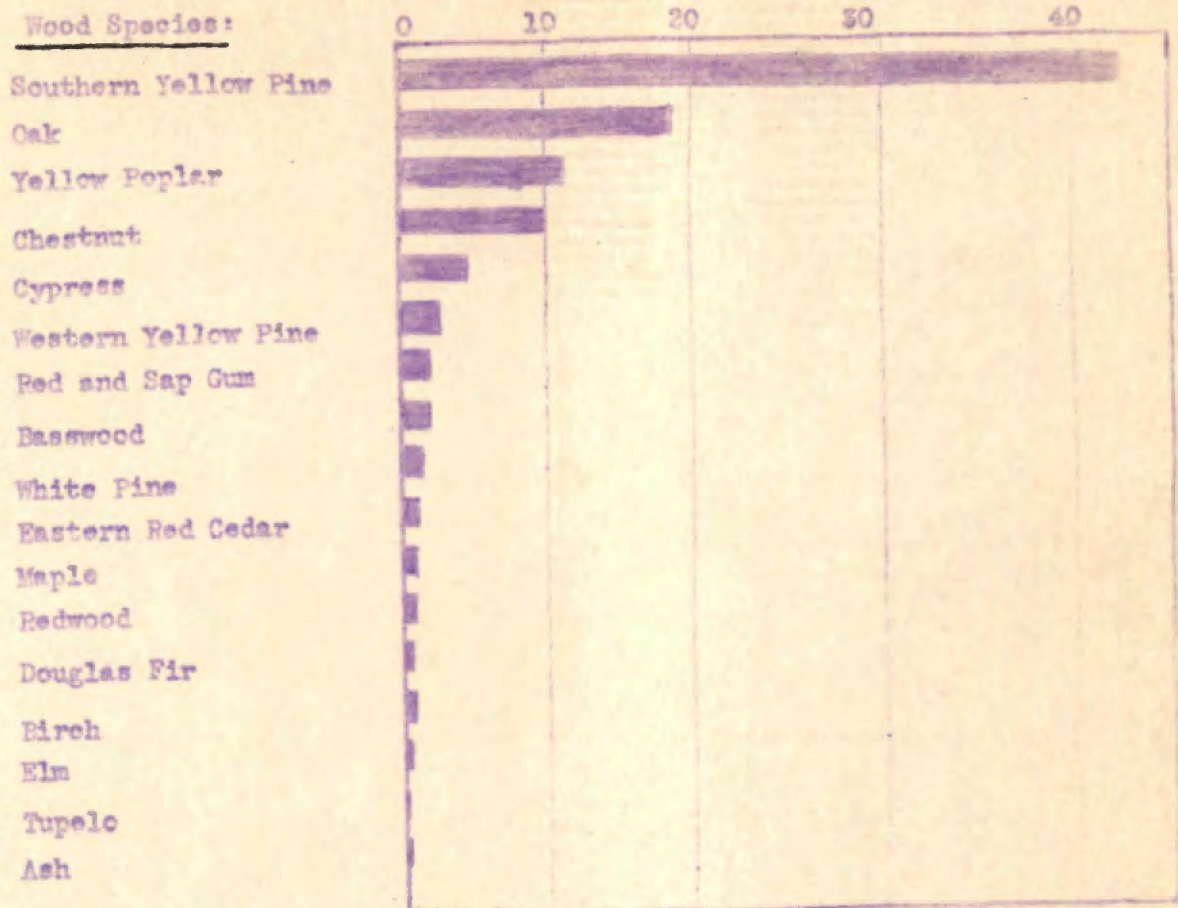


Figure. 79. Sash, Doors, Blinds and General Millwork: Per Cent Wood Species used in Tennessee, 1928. Source: Table XLIV.

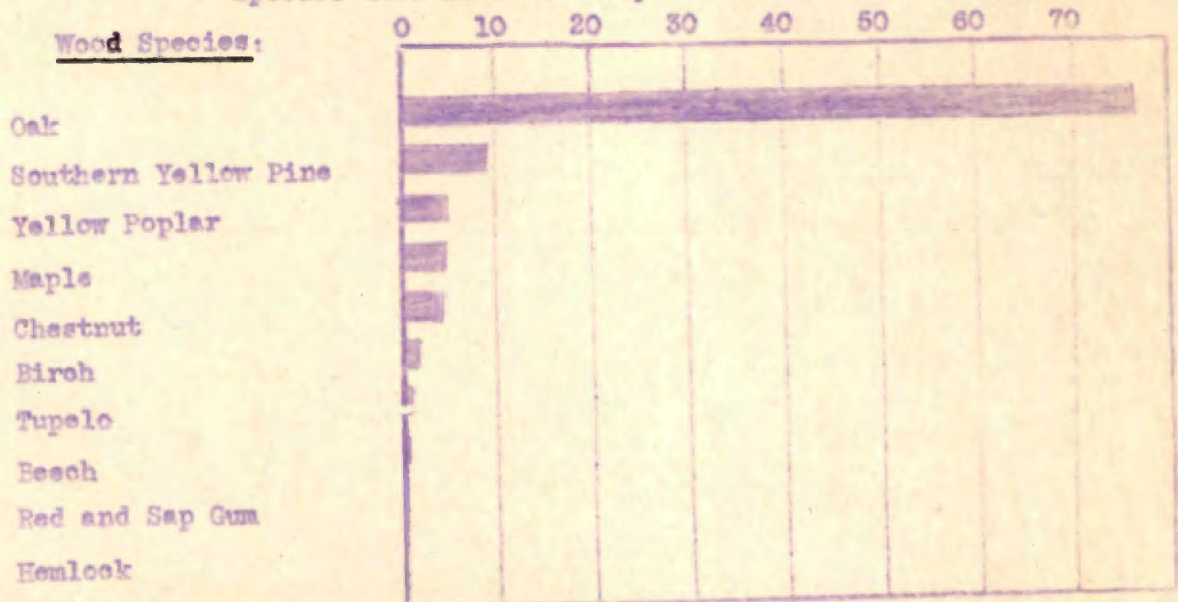


Figure. 80 Refrigerators and Kitchen Cabinets: Per Cent of Wood Species used in Tennessee, 1928. Source: Table XLV.

Refrigerators and Kitchen Cabinets. Industries manufacturing these products consumed more than 5 million board feet of timber products in 1928, which was one per cent of Tennessee's total wood consumption for that year. Nine-tenths of the material going into this industry is made up of hardwoods, the bulk of which is ^{supplied} by oak (Figure 80).

TABLE XLV. REFRIGERATORS AND KITCHEN CABINETS: WOOD SPECIES CONSUMED, TENNESSEE, 1928

Species	Per cent of total
Oak	75.9
Southern yellow pine	9.0
Maple	4.6
Yellow poplar	4.6
Chestnut	3.7
Birch	1.2
Beech	.4
Tupelo	.4
Red and sap gum	.1
Hamlock	.1
Total	100.0

All Other Industries. This classification includes miscellaneous industries whose combined consumption is too small to warrant a separate classification, such as laundry appliances, agricultural implements, shade and map rollers, brooms and carpet sweepers, wooden ware and novelties, pencils and pen holders, shuttles, spools and bobbins, electrical machinery and apparatus, professional and scientific instruments, trunks and valises, butchers' blocks and skewers, patterns and flasks, tanks and silos, and gates and fencing. ⁽¹⁾ These industries together consumed

(1) U.S.D.A. Forestry Service, Lumber Used in Manufacturing, 1928, p. 80-81.

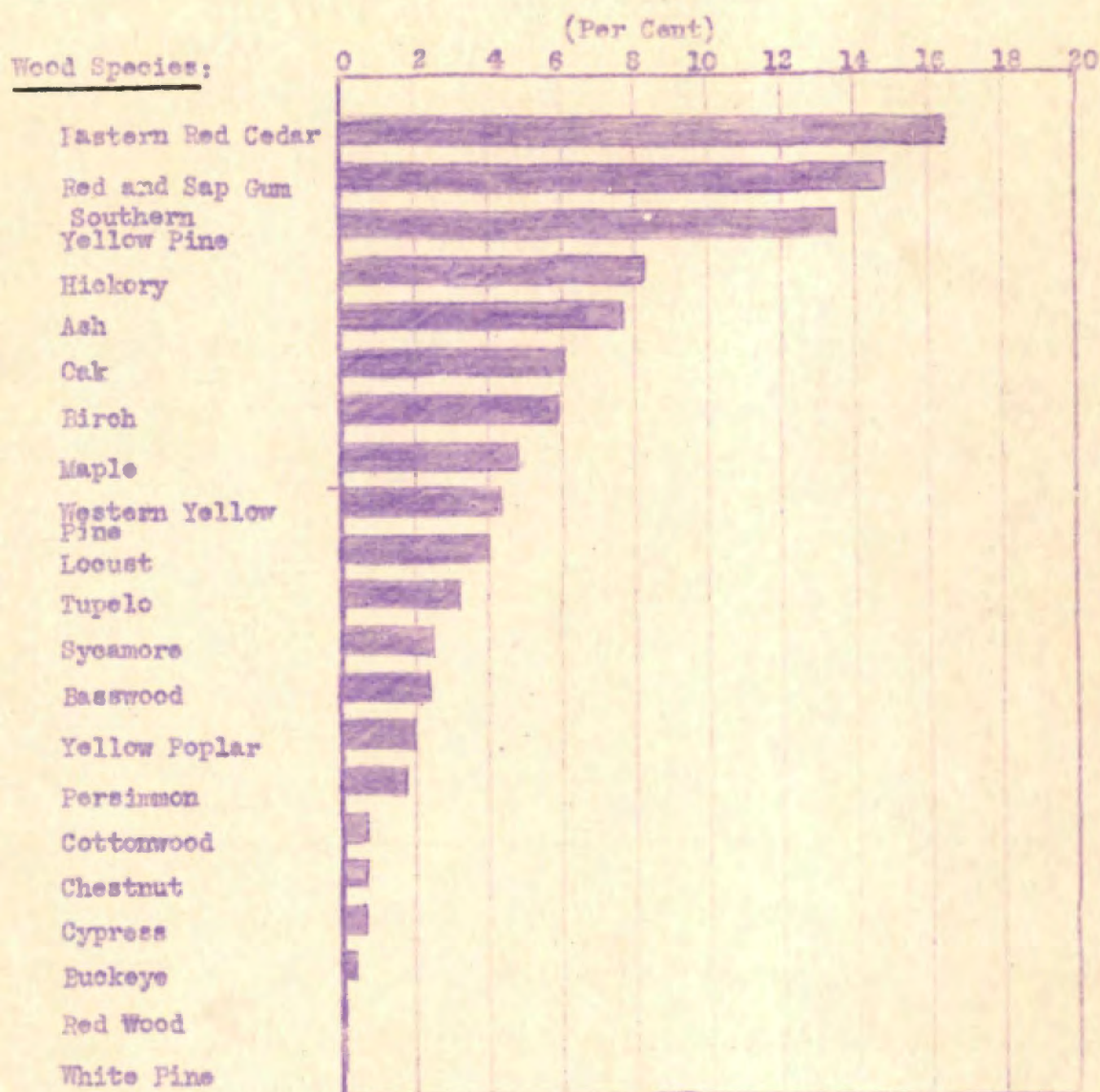


Figure. 81. All Other Industries * : Per Cent of Wood Species used in Tennessee, 1928.

Source: Table. XLVI.

* All Other Industries includes all Miscellaneous Wood using Industries which are too small to be classified separately.

less than 4 per cent of our total wood used in 1928. Hardwoods furnished approximately two-thirds of the total consumption of 17 million board feet. The principal softwoods used were eastern red cedar, southern yellow pine and western yellow pine whereas our leading hardwoods were red and sap gum, hickory, oak, birch, maple, locust and tupelo in the order named. The proportion of each wood species going into our small miscellaneous industries is shown in Figure 81.

TABLE XLVI. ALL OTHER INDUSTRIES: WOOD SPECIES USED IN
TENNESSEE, 1928

Species	Per cent of total
Eastern red cedar	16.5
Red and sap gum	15.1
Southern yellow pine	13.6
Hickory	8.2
Ash	7.8
Oak	6.1
Birch	5.9
Maple	4.7
Western yellow pine	4.3
Locust	3.9
Tupelo	3.2
Sycamore	2.5
Basswood	2.4
Yellow poplar	1.9
Persimmon	1.8
Cypress	.8
Chestnut	.6
Cottonwood	.6
Buckeye	.3
Redwood	.1
White pine	.1
Total	100.0

Products Manufactured from Specified Timber Species in
Tennessee

During 1928 approximately half of the total wood requirements in

this state went into the manufacture of planing mill products, which includes products worked to patterns, such as floors, ceilings and sidings, but excluding lumber merely dressed. The other principal wood industries were box and crate manufacturers, 8.8 per cent; furniture factories, 8.5 per cent; sash, doors, blinds, and general mill work, 7.5 per cent; and motor vehicles, 5.4 per cent (Figure 82). Minor wood industries in the order of their importance were manufacturers of handles, car construction and repair, baskets and fruit packages, caskets and coffins, chair and chair stock, non-motor vehicles, refrigerators and kitchen cabinets, sporting and athletic goods and fixtures. All of the remaining wood using industries not otherwise classified accounted for slightly more than three

TABLE XLVII. TOTAL WOOD INDUSTRIES: COMPARISON OF AMOUNTS OF LUMBER USED BY THE PRINCIPAL WOOD INDUSTRIES IN TENNESSEE, 1928

Industry	Amount (1000 bd. ft.)	Per cent of total
Planing mill products	247,847	48.2
Boxes and crates	45,116	8.8
Furniture	43,504	8.5
Sash, doors, blinds and general mill work	38,755	7.5
Vehicles (motor)	27,529	5.4
Handles	23,947	4.7
Car construction and repair	18,529	3.6
Baskets and fruit packages	14,500	2.8
Caskets and coffins	9,699	1.9
Chairs and chair stock	8,916	1.7
Vehicles (non-motor)	7,480	1.5
Refrigerators and kitchen cabinets	5,471	1.0
Sporting and athletic goods	2,910	.6
Fixtures	2,460	.5
Signs and supplies	335	-
All other industries	17,033	3.3
Total all industries	514,031	100.0

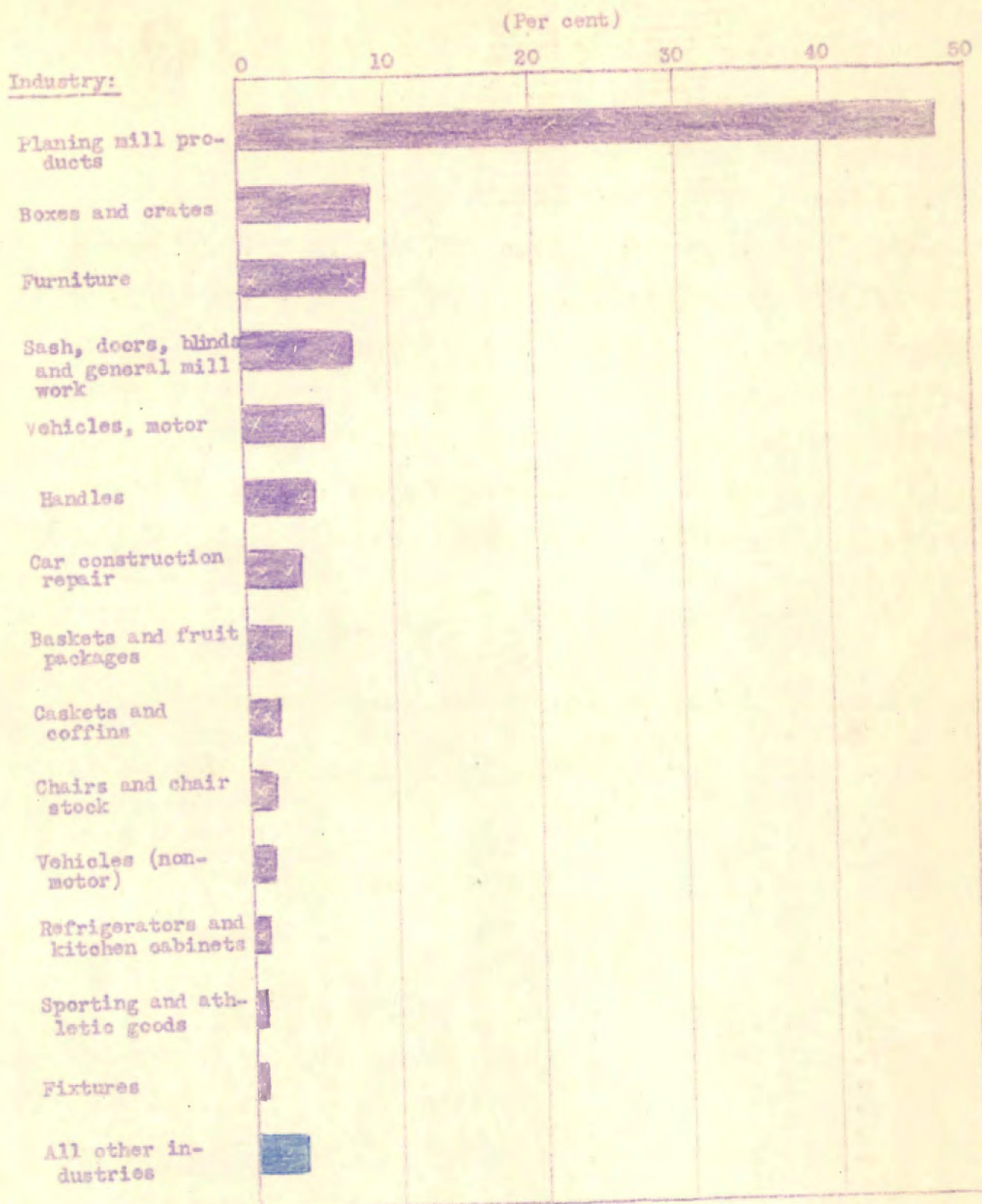


Figure 82. Total Hard and Softwoods: Per Cent Used by Wood Using Industries in Tennessee, 1928.

Source: Table XLVII.

(1)
per cent of our total wood consumption.

All Hardwood, 1928. Eighty-four per cent, or 431,000,000 board feet, of all the wood used by wood industries in Tennessee, is furnished by hardwood species. Planing mill products are our largest consumers of hardwoods using over 55 per cent of the total consumption. Furniture was the next largest consumer with 9.5 per cent as compared with motor vehicles with 6.4; boxes and crates, 5.6 per cent; handles, 5.5 per cent; and others as shown in Table XLVIII.

TABLE XLVIII. ALL HARDWOODS: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Planing mill products	55.3
Furniture	9.5
Vehicles (motor)	6.4
Boxes and crates	5.6
Handles	5.5
Sash, doors, blinds and general mill work	4.1
Baskets and fruit packages	3.5
Chair and chair stock	2.1
Vehicles (non-motor)	1.7
Refrigerators and kitchen cabinets	1.2
Car construction and repair	.9
Caskets and coffins	.8
Sporting and athletic goods	.7
Fixtures	.3
All other industries	2.6
Total	100.0

(1) Includes laundry appliances, agricultural implements, shade and map rollers, brooms and carpet sweeps, wooden ware and novelties, pencil and penholders, shuttles, spools and bobbins, electrical machinery and apparatus, professional and scientific instruments, trunks and valises, butchers' blocks and skewers, patterns and flasks, tanks and silos, and gates and fencing.

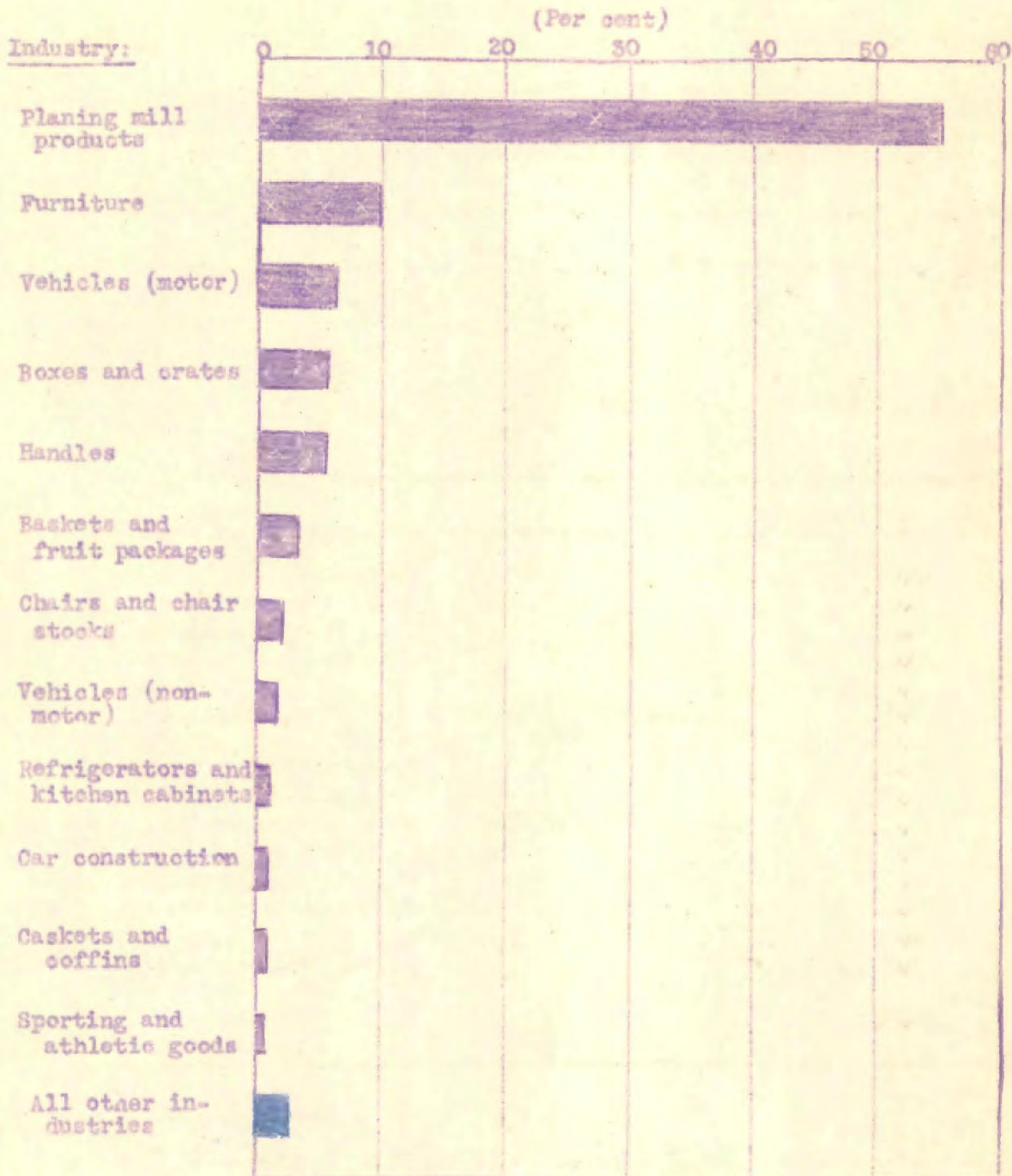


Figure 83. All Hardwoods: Per Cent Used by Wood Using Industries, Tennessee, 1928.

Source: U.S.D.A., Requirements of Lumber Industries, 1928, p. 81.



Figure 84. Hardwoods: Per Cent of Total Consumption Used by Specified Wood Industries, U. S., 1930.

Source: U.S.D.A., Lumber Used in Manufacturing, 1928,

The major uses of hardwood timber here in the United States are in boxes and crates, furniture, planing mill products, and motor vehicles in the order named. Other uses are indicated in the following table:

TABLE XLIX. TOTAL HARDWOODS: REQUIREMENTS OF THE WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Boxes and crates	19.0	Shuttles and spools	.7
Furniture	18.2	Toys	.4
Planing mill products	15.9	Sporting and athletic goods	.4
Vehicles (motor)	12.6	Ship and boat building	.4
Sash doors	8.6	Boxes (cigar and tobacco)	.4
Chair and chair stock	2.7	Machinery and apparatus (electric)	.3
Car construction and repair	2.7	Laundry appliances	.3
Baskets and fruit packages	2.6	Frames and moulding pictures	.3
Handles	2.1	Plumbers woodwork	.3
Fixtures	1.5	Brushes	.3
Woodenware and novelties	1.4	Trunks and valises	.2
Instruments (music)	1.4	Sewing machines	.2
Refrigerators and kitchen cabinets	1.3	Instruments (professional and scientific)	.2
Vehicles (non-motor)	1.2	Dowels	.2
Agricultural implements	1.1	Dairymens supplies, etc.	.2
Caskets and coffins	1.0	Brooms and carpet sweepers	.2
Boot and shoe findings	.8	Butchers' blocks	.1
		Machine construction	.1
		Printing materials	.1

Source: Figure 84.

Ash. The handle industries in Tennessee consumes over one-third of this wood. Other principal uses of ash are sport and athletic goods, non-motor vehicles, and chairs and chair stocks (Table L).

TABLE L. ASH: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Handles	35.2
Sporting and athletic goods	10.3
Vehicles (non-motor)	8.8
Chairs and chair stock	6.1
Boxes and crates	4.7
Sash, doors, blinds and general mill work	.6
Fixtures	.4
Car construction and repair	.1
All other industries	33.6
Total	100.0

Source: Figure 35.

The ash requirements of the wood industries throughout the United States is shown in Table LI.

TABLE LI. ASH: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Vehicles (motor)	29.8	Planing mill products	1.2
Handles	18.7	Wooden ware and novelties	1.1
Refrigerators and kitchen cabinets	11.0	Baskets and fruit packages	.7
Boxes and crates	7.0	Plumbers woodwork	.5
Furniture	6.4	Brooms and carpet sweepers	.4
Agricultural implements	5.4	Toys	.4
Sporting and athletic goods	4.8	Machinery and apparatus, electrical	.3
Sash, doors, blinds, etc.	3.1	Fixtures	.3
Car construction and repair	2.3	Printing material	.1
Vehicles (non-motor)	2.1	Laundry appliances	.1
Ships and boats	1.6	Musical instruments	.1
Chair and chair stock	1.3	Airplanes	.1
Dairymen, Poulterers and apiarists supplies	1.2	Total	100.0

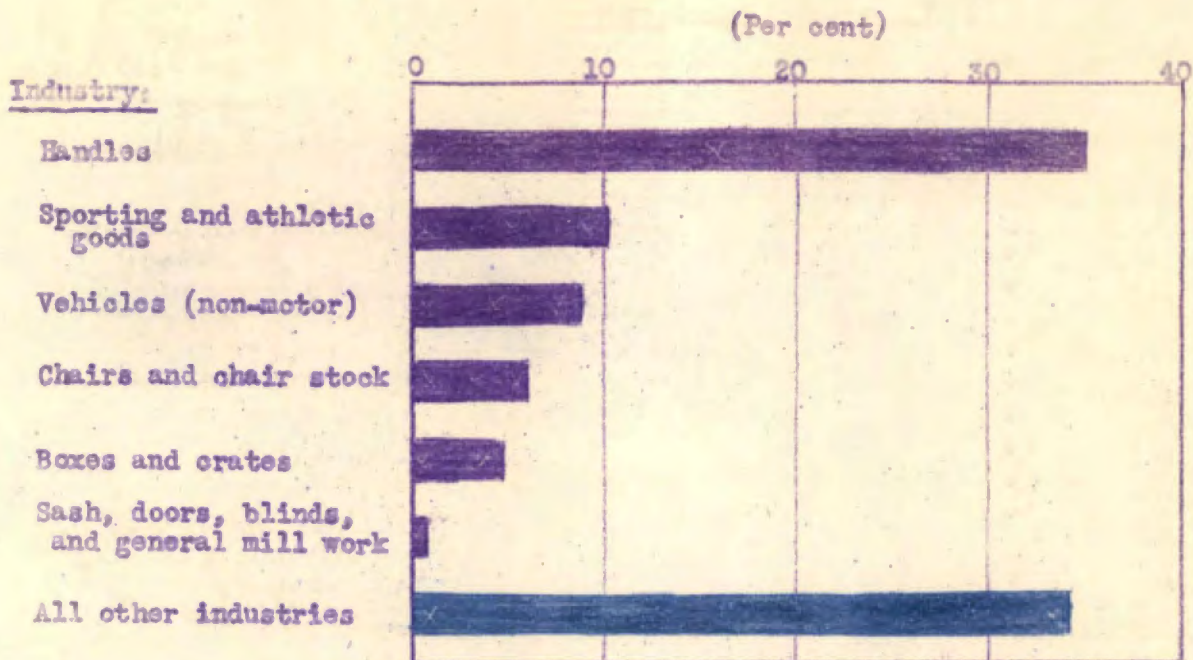


Figure 85 . Ash: Per cent Used by Wood Using Industries, Tennessee, 1928

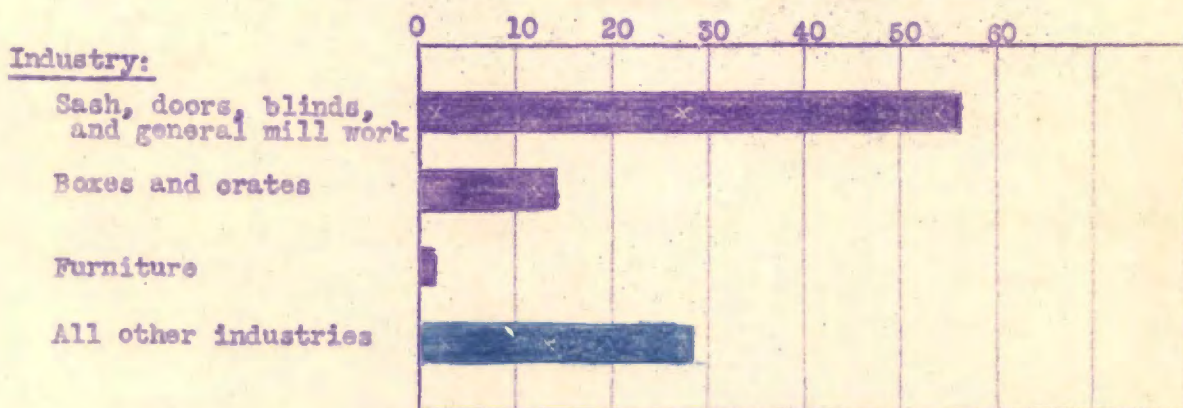


Figure 86. Basswood: Per Cent Used by Wood Using Industries, Tennessee, 1928

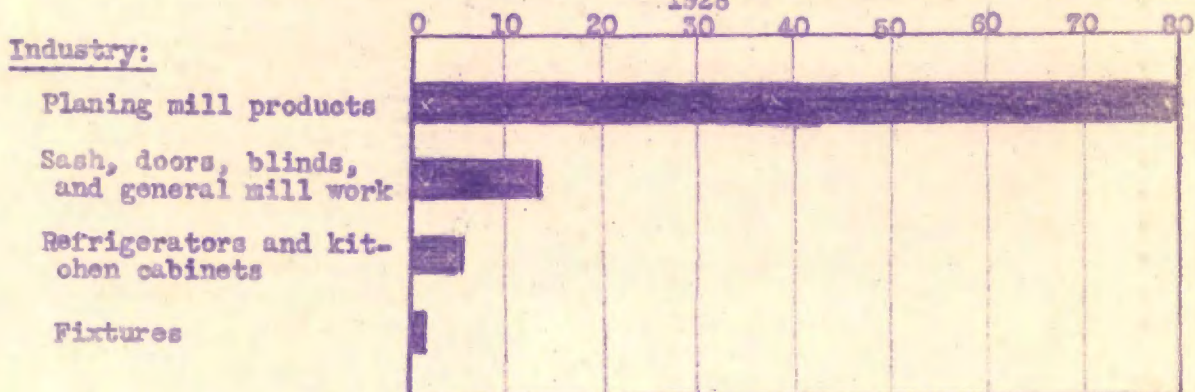


Figure 87. Birch: Per Cent Used by Wood Using Industries, Tennessee, 1928

Source: U.S.D.A. Forestry Service, Lumber Used in Manufacture, 1928, p. 81

Basswood. Slightly more than half of this wood used by industries in Tennessee goes into the manufacture of sash, doors, blinds and general mill work. The only other important use of this wood is in the manufacture of boxes and crates, which use approximately 1/6 of our total industrial consumption (Table LII).

TABLE LII. BASSWOOD: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Sash, doors, blinds and general mill work	55.8
Boxes and crates	13.9
Furniture	1.7
Fixtures	0.1
All other industries	28.2
Total	100.0

Source: Figure 86.

Basswood is used in a large number of industries in the United States but its principal uses are in boxes and crates which consume two-fifths

TABLE LIII. BASSWOOD: REQUIREMENTS OF WOOD USING INDUSTRIES, UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Boxes and crates	39.7	Vehicles (motor)	.8
Sash, doors	15.1	Clocks	.7
Furniture	7.3	Refrigerators and kitchen cabinets	.6
Frames, picture moulding	5.0	Printing materials	.5
Trunks	4.2	Machinery & apparatus, electric	.3
Woodenware	3.8	Handles	.3
Toys	3.2	Car construction & repair	.3
Fixtures	3.0	Ship and boat building	.2
Baskets and fruit packages	2.6	Caskets and coffins	.2
Dairymen, etc., supplies	2.5	Brushes	.2
Musical instruments	2.3	Boxes, cigar and tobacco	.2
Planing mill products	1.4	Sporting and athletic goods	.1
Vehicles (non-motor)	1.4	Shuttles, spools, etc.	.1
Laundry appliances	1.2	Motion pict. & theater mac.	.1
Instruments (prof. & scient.)	1.1	Machine construction	.1
Agricultural implements	1.0	Chairs and chair constr.	.1
Matches	.8	Airplanes	.1

Birch. Four-fifths of this wood used in Tennessee industries in 1928 went into planing mill products. The remainder was used in sash, doors, blinds and general mill work, refrigerators and kitchen cabinets and fixtures (Table LIV). The birch requirements of wood using industries in Tennessee during this year was 1,256,000 board feet of lumber.

TABLE LIV. BIRCH: REQUIREMENTS OF WOOD USING INDUSTRIES, TENNESSEE, 1928

Product	Per cent of total
Planing mill products	79.6
Sash, doors, blinds and general mill work	13.5
Refrigerators and kitchen cabinets	5.2
Fixtures	1.6
Total	100.0

Source: Figure 87.

The proportion of birch used in the lumber industries throughout the nation is shown in the following table:

TABLE LV. BIRCH: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Boxes and crates	21.4	Brushes	.4
Sash, doors, etc.	18.1	Vehicles (non-motor)	.4
Furniture	18.1	Boots and shoes	.3
Woodenware	6.2	Machine construction	.3
Planing mill products	5.3	Dairymens, etc., supplies	.3
Vehicles (motor)	4.9	Agricultural implements	.3
Shuttles	4.5	Sport goods	.2
Chairs and chair stock	3.4	Machinery & apparatus,	
Fixtures	3.3	electric	.2
Dowels	1.9	Frames and moulding	.2
Handles	1.7	Caskets and coffins	.2
Musical instruments	1.5	Car construction	.2
Plumbers wood	1.3	Butchers' blocks	.2
Toys	1.1	Ship and boat building	.1
Laundry appliances	1.1	Refrig. & kitchen cabinets	.1
Baskets	.6	Instruments (prof. & scient.)	.1
		Bungs and faucets	.1
		Airplanes	.1

Beech. Planing mills used almost one-third of the beech timber used in industry in 1928. Appreciable amounts were used in the manufacture of chair and chair stocks, furniture, sporting and athletic goods, and baskets and fruit packages. Lumber constituted 100 per cent of all the beech timber used.

TABLE LVI. BEECH: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Planing mill products	29.1
Chairs and chair stock	15.7
Furniture	9.9
Sporting and athletic goods	6.4
Baskets and fruit packages	6.4
Car construction and repair	2.1
Refrigerators and kitchen cabinets	.1
All other industries	31.8
Total	100.0

Source: Figure 88.

TABLE LVII shows the relative proportion of beech going into the wood using industries in the United States.

TABLE LVII. REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Boxes and crates	21.3	Fixtures	.6
Furniture	15.5	Butchers' blocks & skewers	.5
Chairs and chair stock	10.8	Dowels	.4
Baskets and fruit packages	8.9	Agricultural implements	.4
Planing mill products	7.5	Musical instruments	.3
Brushes	7.1	Car constr. & repair	.3
Woodenware	4.8	Sporting & athletic goods	.2
Handles	3.6	Instruments (prof. & scient.)	.2
Brooms	3.6	Gates and fencing	.1
Motor vehicles	3.0	Whips, canes and umbrellas	.1
Sash, doors, etc.	3.0	Pump and wood pipes	.1
Laundry appliances	2.8	Plumbers' woodwork	.1
Shuttles	1.7	Caskets and coffins	.1
Vehicles (non-motor)	.8	Boot and shoe findings	.1
Dairymen's supplies, etc.	.7		
Toys	.8		

Buckeye. Ninety per cent of all the buckeye lumber consumed in Tennessee's wood industries was used in the manufacture of boxes and crates in 1928. The remaining 10 per cent was distributed to all other industries (Figure 89).

In the United States, approximately 62 per cent of the buckeye timber used in industry in 1928 was manufactured into boxes and crates (Table LVIII). The furniture industry used about 22 per cent of the annual consumption.

TABLE LVIII. BUCKEYE: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Boxes and crates	62.0
Furniture	22.3
Toys	8.5
Fixtures	3.3
Trunks and valises	2.1
Caskets and coffins	1.1
Machinery and apparatus, electrical	.5
Vehicles (motor)	.2

Cherry. This wood is used mainly for decorative purposes since its scarcity and high market value confines its use to high priced products. The total cherry consumption in this state is about equally divided between furniture and car construction, as shown in Table LIX.

TABLE LIX. CHERRY: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Furniture	51.3
Car construction	48.7
Total	100.0

Source: Figure 90.

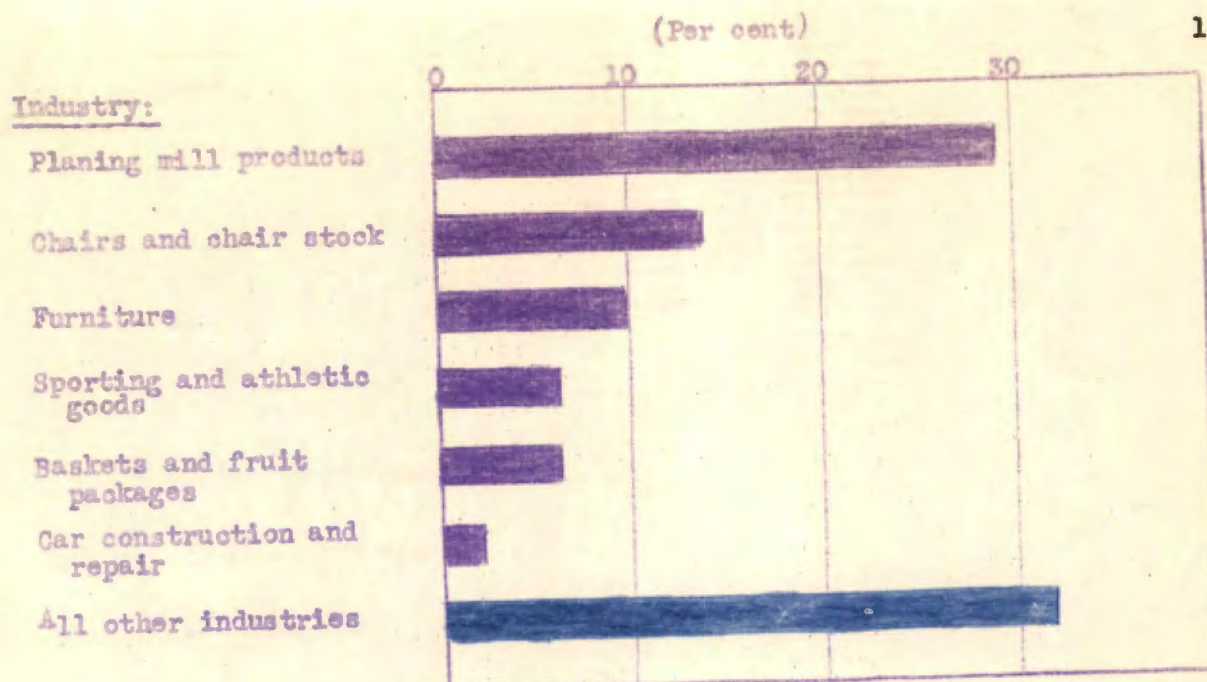


Figure 88. Beech: Per Cent Used by Wood Using Industries, Tennessee, 1928

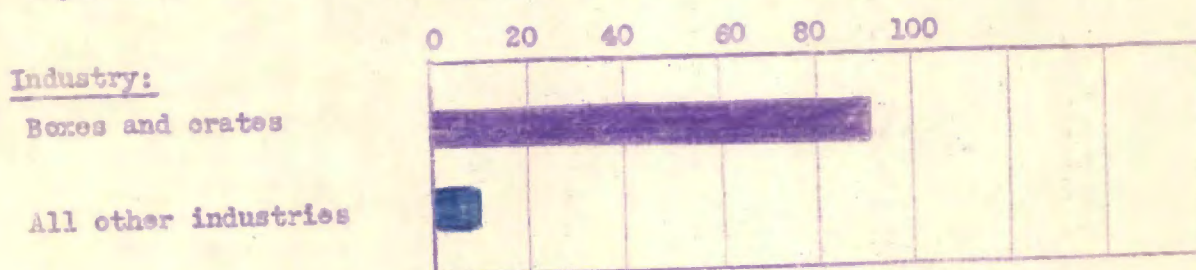


Figure 89. Buckeye: Per Cent Used in Wood Using Industries, Tennessee, 1928

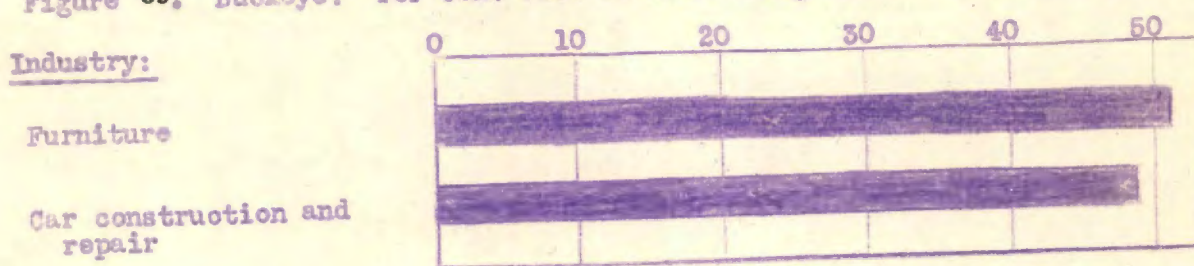


Figure 90. Cherry: Per Cent Used in Wood Using Industries, Tennessee, 1928

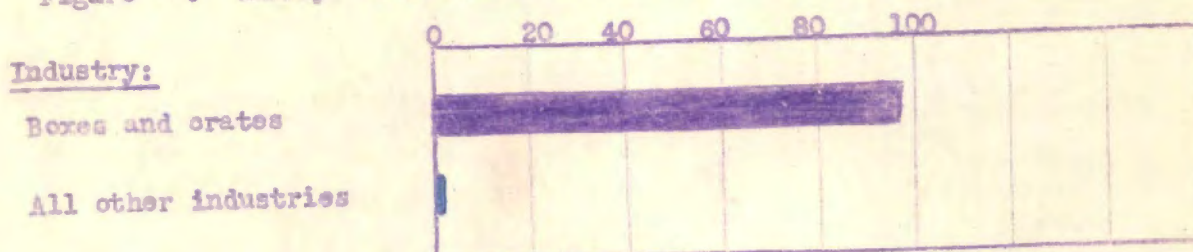


Figure 91. Cottonwood: Per Cent Used in Wood Using Industries, Tenn., 1928

Source: U.S.D.A. Forestry Service, Lumber Used in Manufacturing, 1928, p. 81.

In the United States this valuable wood is used principally in the manufacture of printing material and furniture. Table LX shows the relative importance of these and other uses of cherry in the United States.

TABLE LX. CHERRY: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Printing material	40.1
Furniture	22.9
Car construction	8.5
Sash, doors, etc.	7.0
Instruments (professional and scientific)	4.1
Woodenware	3.2
Fixtures	2.9
Laundry appliances	2.8
Handles	2.2
Instruments (musical)	1.7
Baskets and fruit packages	1.7
Patterns and flasks	.8
Toys	.7
Boxes and crates	.4
Planing mill products	.2
Chairs and chair stock	.2
Caskets and coffins	.2
Plumbers' woodwork	.1
Frames and picture moulding	.1
Refrigerators and kitchen cabinets	.1
Brushes	.1
Total	100.0

Cottonwood. This wood is used almost entirely in the manufacture of boxes and crates, due to its lightness and strength. Practically all of this wood enters lumber industries in the form of lumber.

TABLE LXI. COTTONWOOD: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Boxes and crates	97.4
All other industries	2.6
Total	100.0

Source: Figure 91.

The proportionate distribution of cottonwood in the wood industries in the United States in 1928 is indicated in Table LXII, which shows box and crate factories as the principal consumer of this species of lumber.

TABLE LXII. COTTONWOOD: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Boxes and crates	78.9
Vehicles (motor)	6.3
Furniture	3.9
Agricultural implements	2.5
Baskets and fruit packages	2.2
Vehicles (non-motor)	2.0
Refrigerators and kitchen cabinets	1.4
Sash, doors	.8
Laundry appliances	.5
Dairymens supplies, etc.	.5
Fixtures-	.2
Chairs and chair stock	.2
Woodenware and novelties	.1
Trunks and valises	.1
Toys	.1
Signs and supplies	.1
Total	100.0

Chestnut. This rapidly vanishing hardwood had two principal group uses in 1928, namely sash, doors, blinds, and general mill work, and caskets and coffins. These and other uses of chestnut in Tennessee and indicated in Table LXIII.

TABLE LXIII. CHESTNUT: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1929

Product	Pct.of total	Product	Pct.of total
Sash, doors, blinds and general mill work	38.3	Chairs & chair stock	2.9
Caskets and coffins	34.7	Refrig. & kitchen cab.	2.0
Boxes and crates	10.3	Baskets and fruit pkg.	1.0
Furniture	6.8	All other industries	1.0
Planing mill products	2.9	Total	100.0

Source: Figure 92.

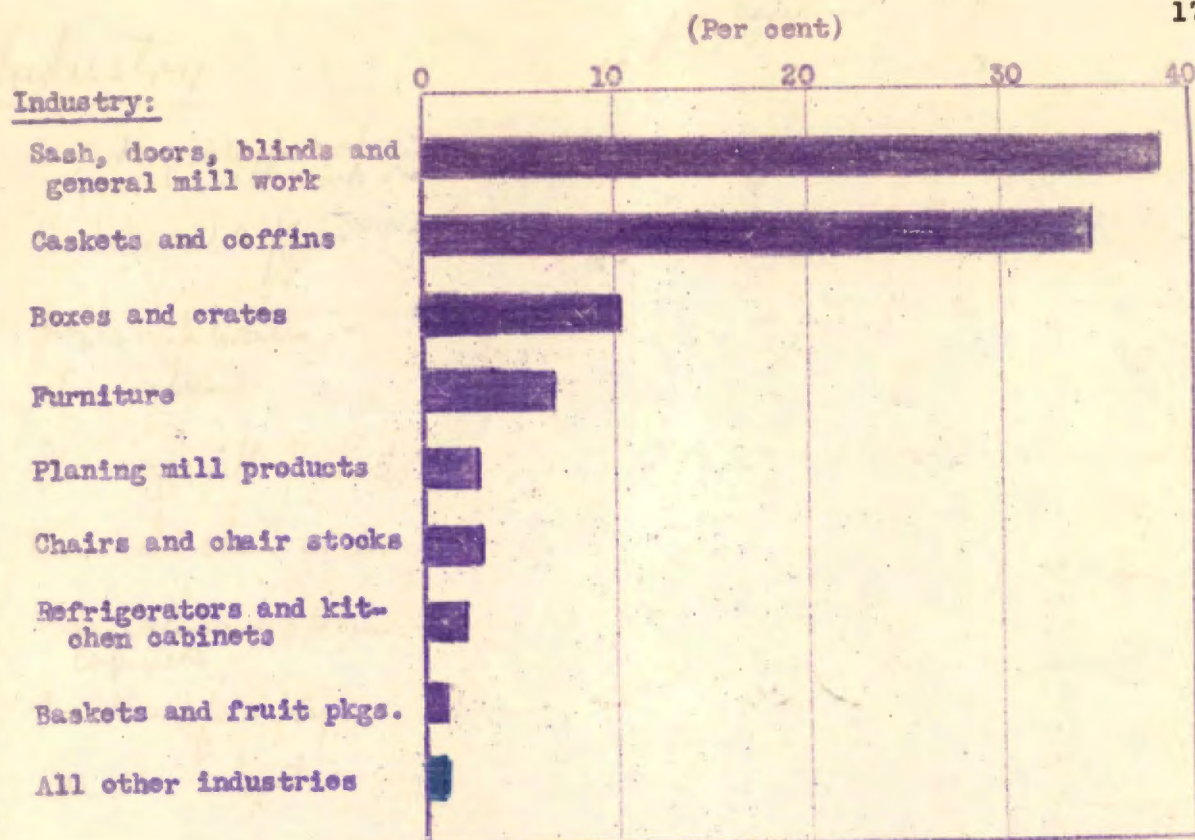


Figure 92. Chestnut: Per Cent Used by Wood Using Industries, Tenn., 1928

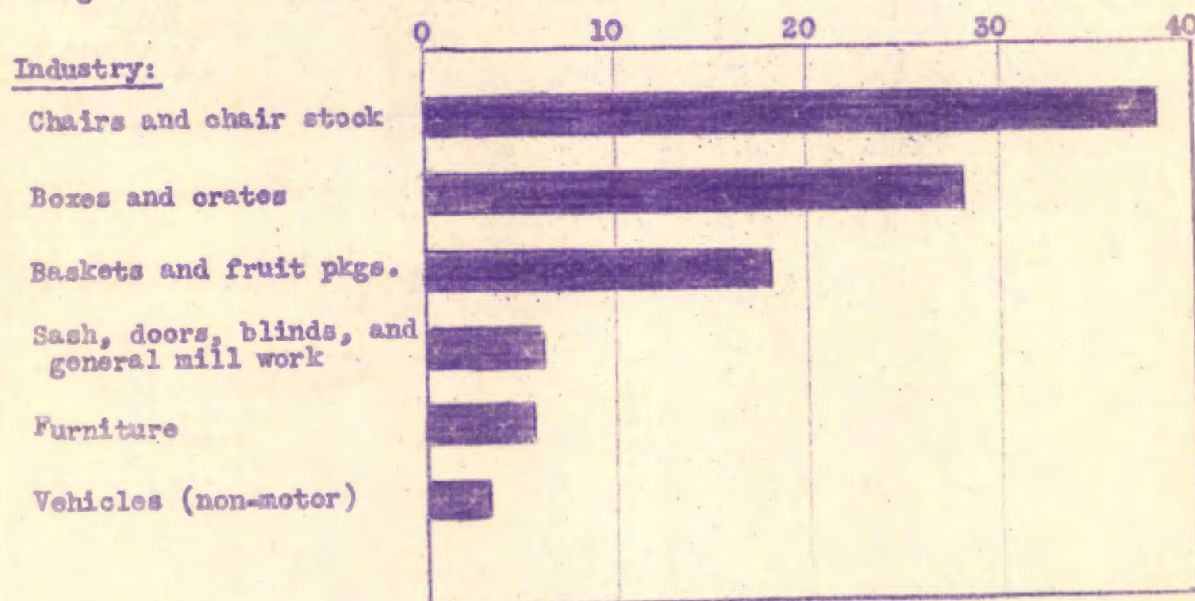


Figure 93. Elm: Per Cent Used by Wood Using Industries, Tennessee, 1928

Source: U.S.D.A. Forestry Service, Requirements of Wood Using Industries, 1928, p. 81

The industrial uses of chestnut in the United States are shown in Table LXIV.

TABLE LXIV. CHESTNUT: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Furniture	38.8	Signs and supplies	.2
Caskets and coffins	21.1	Laundry appliances	.2
Sash, doors, etc.	15.2	Woodenware	.1
Instruments (musical)	12.2	Toys	.1
Boxes and crates	5.5	Plumbers woodwork	.1
Fixtures	2.2	Machine construction	.1
Planing mill	1.0	Clocks	.1
Refrigerators and kitchen cabinets	.8	Baskets and fruit packages	.1
Chair and chair stock	.8		
Car construction	.5	Total	100.0
Sewing machines	.4		
Dairymens supplies, etc.	.2		

Elm. The principal uses of elm in Tennessee is in the manufacture of chairs and chair stock, boxes and crates, and baskets and fruit packages which collectively consumed over three-fourths of ^{the} total elm consumption. Sash, doors, blinds and general mill work, furniture and sporting and athletic goods used the remainder of this species as indicated in Table LXV.

TABLE LXV. ELM: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Products	Per cent of total
Chairs and chair stock	38.3
Boxes and crates	28.1
Baskets and fruit packages	17.8
Sash, doors, blinds and general mill work	6.1
Furniture	5.8
Vehicle (non-motor)	3.2
Total	100.0

Source: Figure 93.

The principal factory uses of elm in the United States are indicated in Table LXVI.

TABLE LXVI. KLM: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Vehicles (motor)	43.1	Dairymens supplies, etc.	.4
Bones and crates	21.6	Car construction	.4
Furniture	11.8	Instruments (musical)	.2
Baskets	7.3	Sewing machines	.1
Chairs and chair stocks	4.9	Printing materials	.1
Refrigerators and kitchen cabinets	3.6	Planing mill products	.1
Sash, doors, etc.	1.5	Handles	.1
Agricultural implements	1.3	Bones, cigar and tobacco	.1
Needleware	.7		
Toys	.6	Total	100.0
Vehicles (non-motor)	.5		
Patterns and flasks	.4		
Fixtures	.4		

Hickory. This species is one of our strongest, toughest and heaviest native woods. Because of its toughness and ability to withstand shocks it is used largely in the manufacture of handles, vehicles and other articles where strength and toughness are the main consideration. Motor vehicle industries consume one-half of the hickory timber used in industry in Tennessee. More than a third goes into the handle industries. Small amounts of this wood are also used in the manufacture of non-motor vehicles and chair and chair stocks (Table LXVII).

Lumber constituted only 28 per cent of the hickory used in this state in 1928.

TABLE LXVII. HICKORY: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Vehicles (motor)	50.3
Handles	37.8
Vehicles (non-motor)	8.5
Chairs and chair stock	.8
All other industries	2.6
Total	100.0

Source: Figure 94.

Handles and motor vehicles also consume more than three-fourths of our hickory lumber used in industry in the United States (Table LXVIII).

TABLE LXVIII. HICKORY: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Handles	43.2	Furniture	.5
Vehicles (motor)	34.0	Baskets	.5
Vehicles (non-motor)	12.5	Planing mill products	.2
Agricultural implements	2.9	Instruments (prof. and scientific)	.2
Woodenware	1.4	Gar construction	.2
Bowels	1.0	Pumps and wood pipe	.1
Sports and athletic goods	.9	Dairymens supplies, etc.	.1
Shuttles	.7	Boxes and crates	.1
Chairs and chair stock	.6	Total	100.0
Sash, doors	.5		

Locust, one of our heaviest and strongest woods, was used entirely in the miscellaneous wood industries in Tennessee during 1928. Practically no locust lumber was consumed in the state in 1928. (Figure 95)

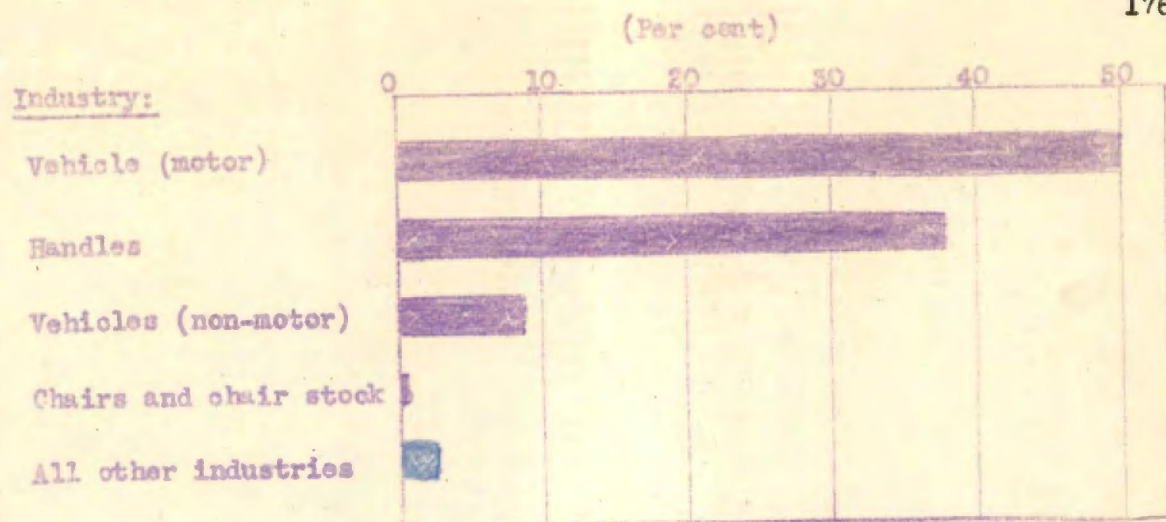


Figure 94. Hickory: Per Cent Used by Wood Using Industries, Tennessee, 1928

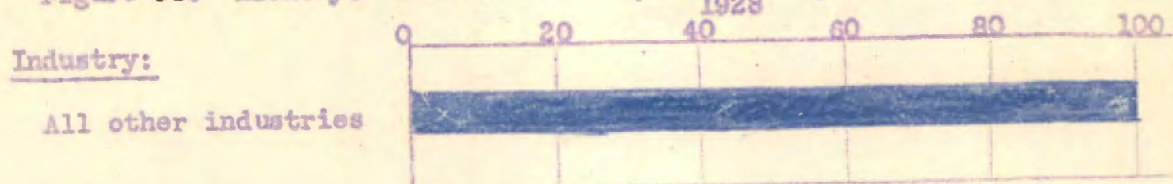


Figure 95. Locust: Per Cent Used by Wood Using Industries, Tennessee, 1928

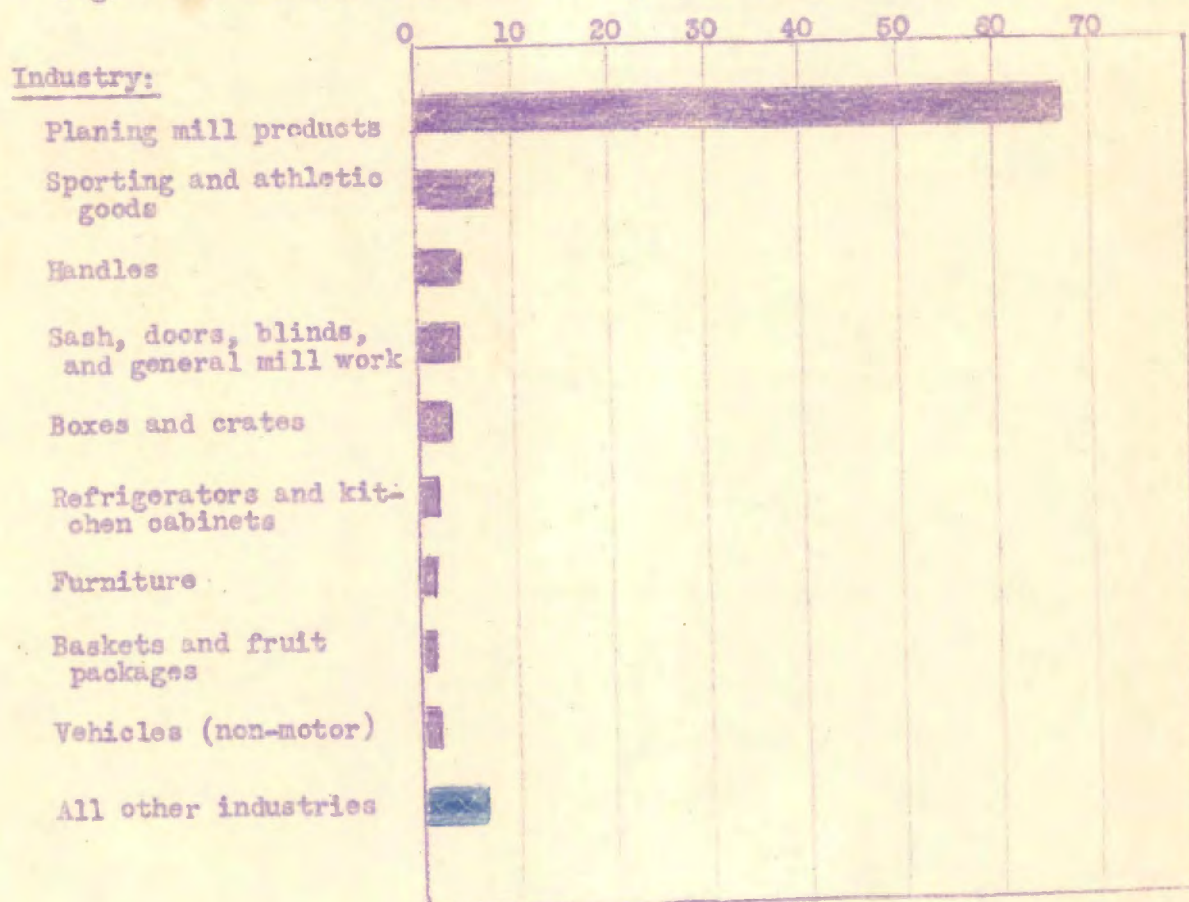


Figure 96. Maple: Per Cent Used by Wood Using Industries, Tennessee, 1928

Source: U.S.D.A. Forestry Service, Requirements of Lumber Industries, 1928, p. 81.

In the United States 99.6 per cent of the industrial consumption of locust timber was used in the manufacture of electrical machinery and apparatus in 1928.

Maple. This wood is put to quite a large number of different uses in Tennessee, although the bulk of this species goes into the manufacture of planing mill products. Table LXIX shows the relative importance of the uses of maple.

TABLE LXIX. MAPLE: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Planing mill products	67.3
Sporting and athletic goods	3.1
Handles	4.9
Sash, doors, blinds and general millwork	3.9
Boxes and crates	3.2
Refrigerators and kitchen cabinets	2.0
Furniture	1.5
Baskets and fruit packages	1.2
Vehicles (non-motor)	1.2
Car construction and repair	.1
All other industries	6.5
Total	100.0

Source: Figure 96.

The proportion of maple consumed by specified wood industries throughout the United States is indicated in Table LXX.

TABLE LXX. MAPLE: REQUIREMENTS OF WOOD INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Vehicles (motor)	27.1	Instruments, professional and scientific	.7
Planing mill products	25.0	Vehicles (non-motor)	.7
Boxes and crates	11.8	Refrigerators and cabinets	.6
Furniture	9.8	Fixtures	.5
Boots and shoes	6.2	Butchers' blocks	.4
Chairs and chair stock	2.5	Plumbers woodwork	.3
Sash, doors, and blinds	1.7	Dowels	.3
Woodenware and novelties	1.5	Brushes	.3
Shuttles	1.4	Brooms, etc.	.3
Musical instruments	1.3	Machine construction	.2
Baskets and fruit packages	1.3	Laundry appliances	.2
Sports and athletic goods	1.2	Whip and umbrella	.1
Agricultural implements	.9	Sewing machine	.1
Handles	.8	Pulleys and conveyors	.1
Car construction	.8	Printing material	.1
Toys	.7		
Machinery and apparatus, elec.	.7	Total	100.0

Oak. One-half of our total consumption of timber in Tennessee consists of oak, of which approximately nine-tenths is used in the manufacture of planing mill products. This state, besides producing practically all of her own supply of oak, exports more of this wood than any other state. The widespread use of our leading hardwood species in Tennessee is shown in Table LXXI.

TABLE LXXI. OAK: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Pct. of total	Product	Pct. of total
Planing mill products	87.8	Vehicles (non-motor)	.8
Sash, doors, blinds and general millwork	2.8	Boxes and crates	.7
Furniture	2.1	Handles	.4
Refrigerators and kitchen cabinets	1.6	Fixtures	.3
Car construction and repair	1.4	Vehicles (motor)	.1
Chairs and chair stock	1.4	All other industries	.7
		Total	100.0

Source: Figure 97.

The relative proportion of oak consumed in the United States by each of the principal wood industries is shown in Table LXXII.

TABLE LXXII. OAK: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Planing mill products	46.9	Caskets	.8
Sash and doors	10.0	Plumbers woodwork	.5
Car construction	9.9	Handles	.3
Vehicles (motor)	7.5	Musical instruments	.2
Furniture	6.8	Baskets	.2
Boxes and crates	4.6	Sewing machines	.2
Chairs and chair stock	3.7	Sport goods	.1
Vehicles (non-motor)	1.9	Machinery and apparatus,	
Agricultural implements	1.7	electric	.1
Fixtures	1.5	Dowels	.1
Refrigerators and cabinets	1.4	Woodenware	.1
Ships and boats	1.2		
		Total	100.0

Red (and Sap) Gum. Practically all of the red gum consumed in Tennessee is manufactured into either furniture, boxes and crates, or baskets and fruit packages. Minor uses of this wood in the state include chair and chair stock, sash, doors, blinds and general mill work, fixtures, planing mill products, car construction and repair. Approximately two-thirds of red gum entering our manufacturing industries in 1928 was in the form of lumber.

TABLE LXXIII. RED (AND SAP) GUM: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Pct. of total	Product	Pct. of total
Furniture	43.8	Fixtures	.7
Boxes and crates	23.6	Car construction and	
Baskets and fruit packages	17.7	repair	.01
Chairs and chair stock	5.1	All other industries	4.1
Sash, doors, blinds and general			
mill work	1.3	Total	100.0
Planing mill products	.7		

Source: Figure 98.

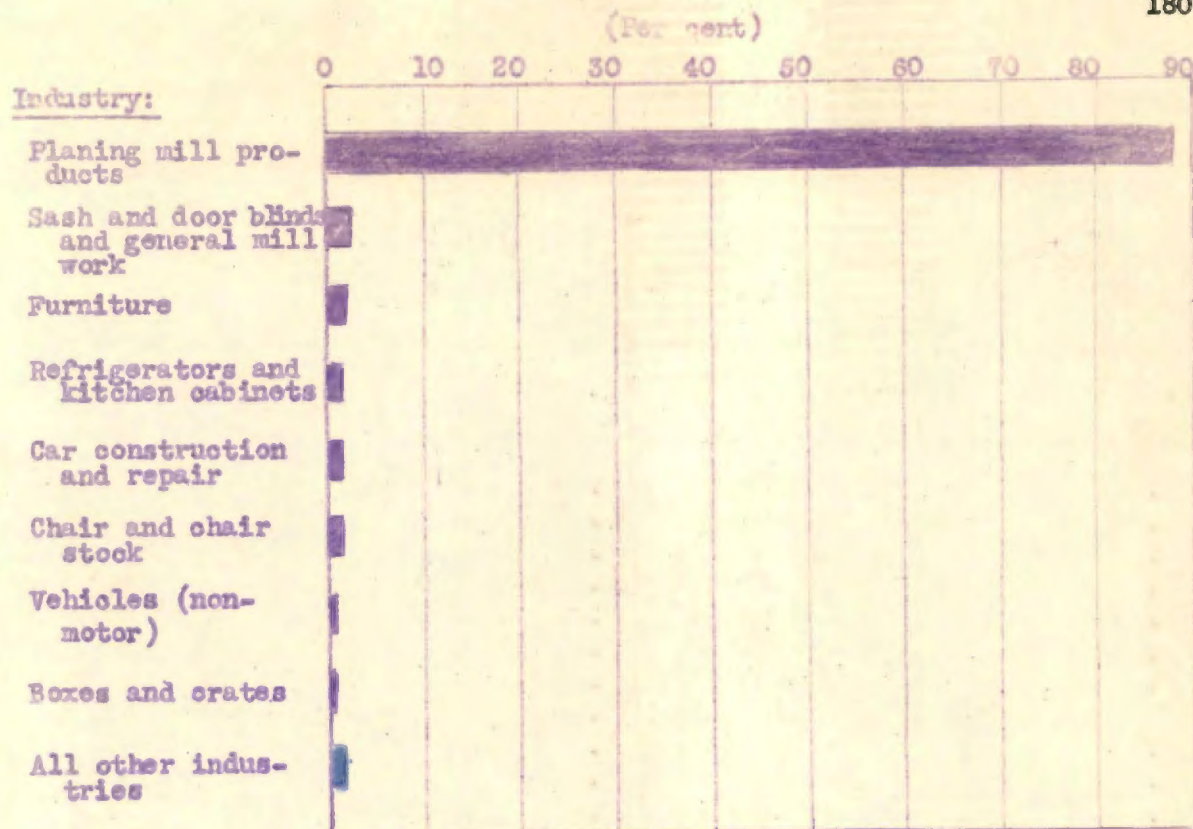


Figure 97. Oak: Per Cent Used by Wood Using Industries, Tennessee, 1928

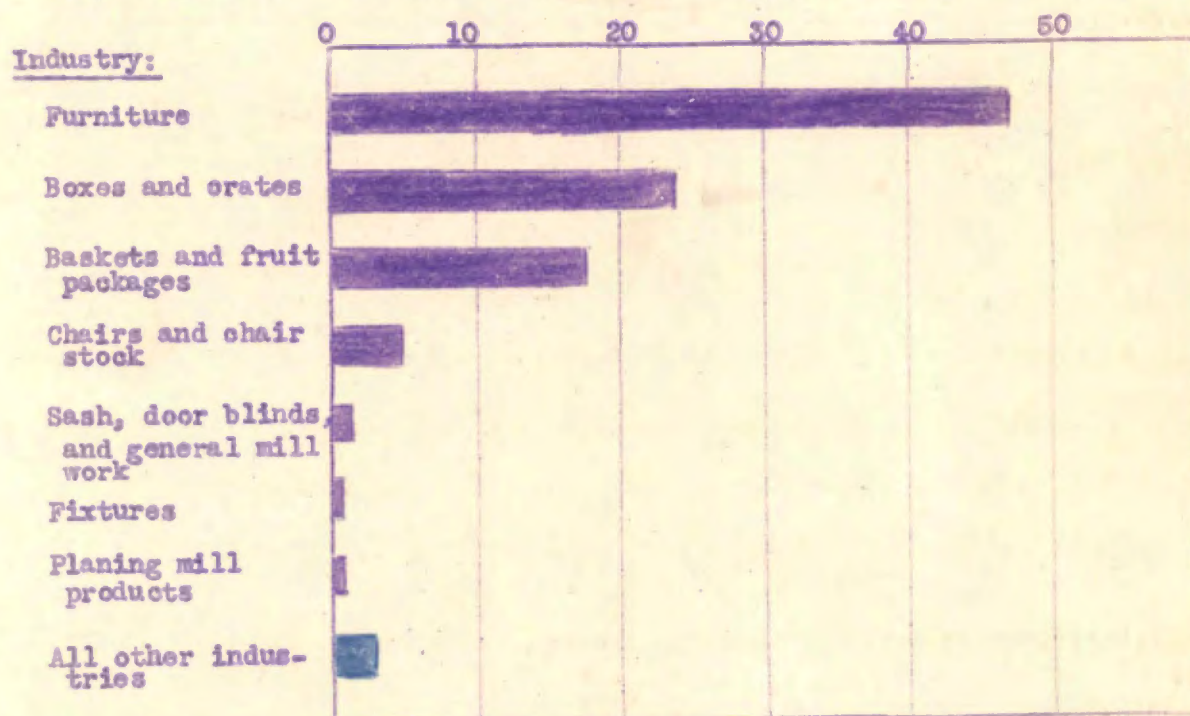


Figure 98. Red and Sap Gum: Per Cent Used by Wood Using Industries, Tenn., 1928.

Source: U.S.D.A., Requirements of Lumber Industries, 1928, p.81.

The proportion consumed by each wood using industry here in the United States is shown in the following table:

TABLE LXXIV. RED AND SAP GUM: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Furniture	32.9	Caskets and coffins	.2
Boxes and crates	26.8	Boxes (cigar and tobacco)	.2
Vehicles (motor)	13.4	Laundry appliances	.2
Sash, doors	8.1	Sewing machines	.2
Baskets and fruit packages	6.3	Toys	.2
Planing mill products	2.4	Woodenware and novelties	.2
Chairs and chair stock	2.1	Trunks and valises	.1
Musical instruments	.9	Handles	.1
Fixtures	.9	Machinery and apparatus, electrical	.1
Frames and moulding	.7	Brooms and carpet sweepers	.1
Agricultural implements	.6		
Vehicles (non-motor)	.6		
Refrigerators and cabinets	.6	Total	100.0

Persimmon. The main use of this wood in Tennessee is in the manufacture of sporting and athletic goods which take over three-fourths of the total consumption by industries. It is commonly sold to manufacturers in a form other than lumber.

TABLE LXXV. PERSIMMON: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Sporting and athletic goods	78.2
All other industries	21.8
Total	100.0

Source: Figure 99.

The relative amounts of persimmon timber used by the wood using industries in the United States are given in Table LXXV. Approximately two-thirds of this wood goes into the manufacture of sporting and athletic goods with one-fourth used in shuttles, spools, and bobbins, and approximately one-tenth in motor vehicles.

TABLE LXXVI. PERSIMMON: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Sporting and athletic goods	66.5
Shuttles, spools, and bobbins	19.7
Vehicles (motor)	9.7
Baskets and fruit packages	2.3
Handles	.6
Brushes	.6
Boot and shoe findings	.6
Total	100.0

Sycamore. Two-thirds of all the sycamore timber processed in Tennessee in 1928 was used in the manufacture of basket and fruit packages. Small miscellaneous industries consumed almost one-fifth of the industrial requirements, while only a small amount was used in the manufacture of sporting and athletic goods, furniture, and boxes and crates. Only 23 per cent of the sycamore used by wood industries was purchased in the form of lumber.

TABLE LXXVII. SYCAMORE: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Baskets and fruit packages	64.5
Sporting and athletic goods	8.6
Furniture	6.6
Boxes and crates	1.3
All other industries	18.6
Total	100.0

Source: Figure 100.

(Per cent)

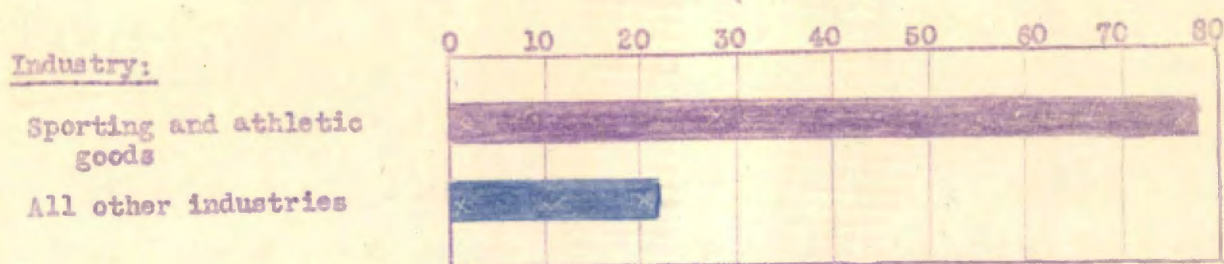


Figure 99. Persimmon: Per Cent Used by Wood Using Industries, Tennessee, 1928

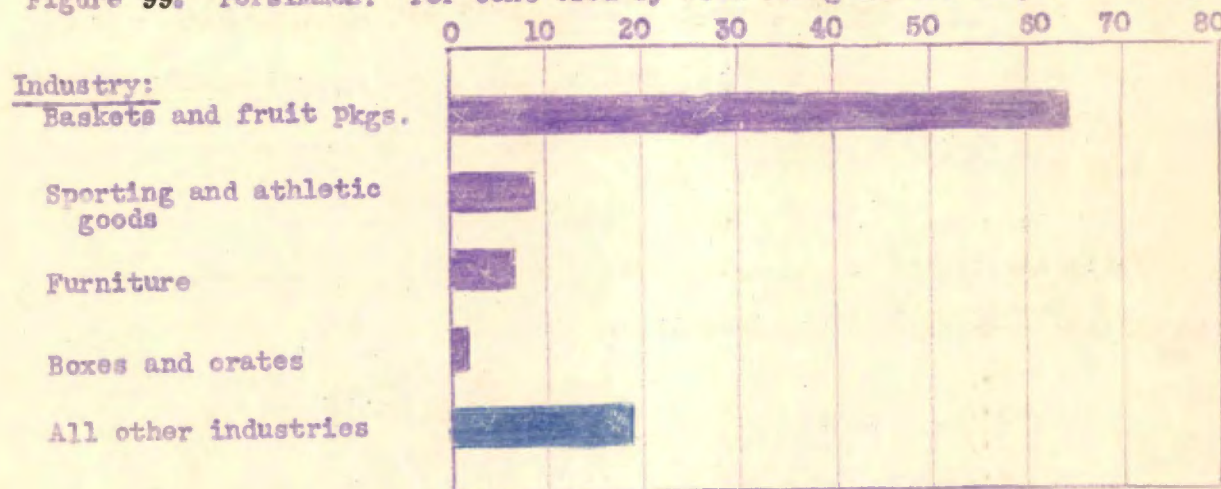


Figure 100. Sycamore: Per Cent Used by Wood Using Industries, Tennessee, 1928

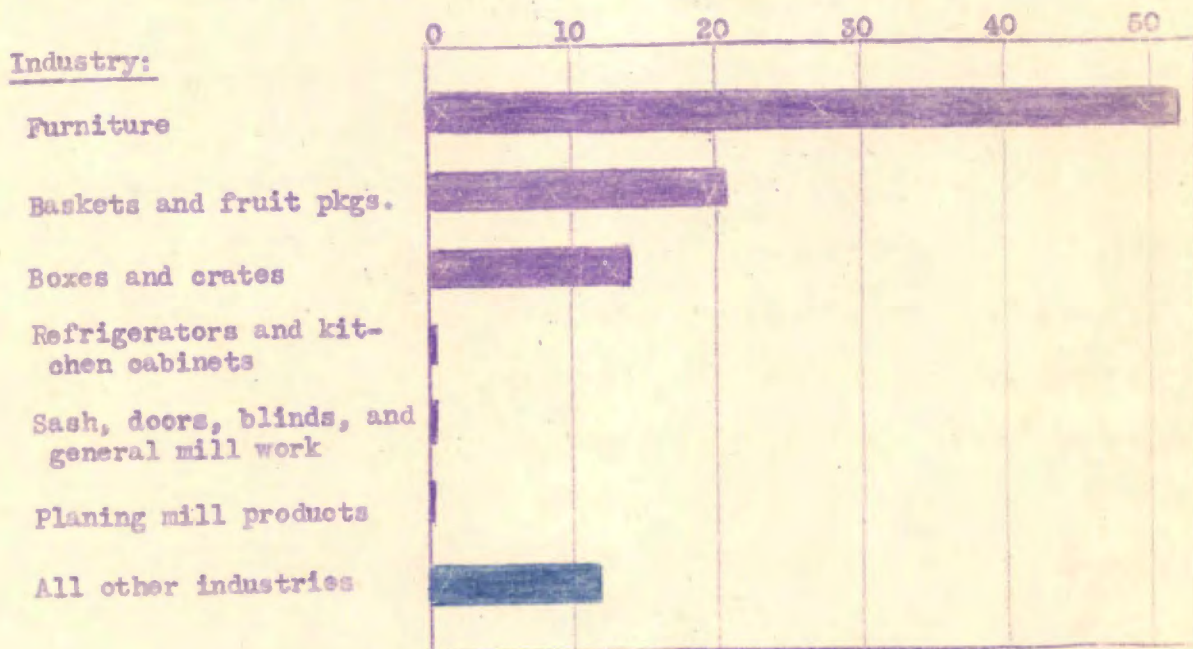


Figure 101. Tupelo: Per Cent Used by Wood Using Industries, Tennessee, 1928

Source: U.S.D.A., Requirements of Lumber Industries, 1928, p. 81.

In the United States, approximately one-third of the sycamore timber used in industry was made into furniture in 1928. Approximately 36 per cent was used in the manufacture of boxes and crates, and motor vehicles, combined, and 11 per cent ^{went} into baskets and fruit packages (Table LXXVIII).

TABLE LXXVIII. SYCAMORE: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Furniture	35.3	Toys	.6
Boxes and crates	18.4	Sporting and athletic goods	.5
Vehicles (motor)	18.4	Fixtures	.5
Baskets and fruit pkg.	11.4	Plumbers woodwork	.4
Refrigerators and kitchen cabinets	3.9	Pulleys and conveyors	.3
Woodenware and novelties	2.3	Handles	.3
Laundry appliances	1.6	Musical instruments	.2
Chairs and chair stock	1.4	Butchers' blocks and skewers	.2
Shuttles, spools and bobbins	1.3	Brushes	.1
Boxes (cigar and tobacco)	1.3	Total	100.0
Sash, doors, etc.	.8		

Tupelo. This is one of the softer hardwoods. It is of medium weight, close grained, and difficult to split but has very good working qualities. ⁽²⁾ In Tennessee its chief use is in furniture manufacture which uses over half of the state's total consumption. Over one-fourth is used by baskets and fruit packages whereas less than 1/6 goes into boxes and crates. Other industrial uses of tupelo in Tennessee are given in Table LXXIX.

(2) Kellog, page 309.

TABLE LXXIX. TUPELO: REQUIREMENTS OF WOOD USING INDUSTRIES IN
TENNESSEE, 1928

Product	Per cent of total
Furniture	52.3
Baskets and fruit packages	20.7
Boxes and crates	14.0
Refrigerators and kitchen cabinets	.5
Sash, doors, blinds and general mill work	.5
Planing mill products	.3
All other industries	11.6
Total	100.0

Source: Figure 101.

By far the most important uses of tupelo in the United States is in the manufacture of boxes and crates and furniture (Table LXXX).

TABLE LXXX. TUPELO: REQUIREMENTS OF WOOD USING INDUSTRIES IN
THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Boxes and crates	42.5	Chairs and chair stool	1.6
Furniture	20.2	Laundry appliances	.4
Sash, doors, blinds, and general millwork	7.4	Sewing machines	.3
Boxes (cigar and tobacco)	6.5	Plumbers woodwork	.3
Vehicles (motor)	5.9	Vehicles (non-motor)	.2
Planing mill products	4.6	Trunks and valises	.1
Baskets and fruit packages	4.6	Machine construction	.1
Woodenware and novelties	3.2	Fixtures	.1
Refrigerators and kitchen cabinets	1.7	Brooms and carpet sweepers	.1
		Total	100.0

Walnut is chiefly a furniture wood due to its rich color, fine figure and susceptibility to high polish. Over three-fourths of this valuable

wood consumed in Tennessee, therefore, goes into the furniture industry.

TABLE LXXXI. WALNUT: REQUIREMENTS OF WOOD USING INDUSTRIES
IN TENNESSEE, 1928

Product	Per cent of total
Furniture	76.4
Planing mill products	14.2
Caskets and coffins	8.4
Sash, doors, blinds and general mill work	1.0
Total	100.0

Source: Figure 102.

In the United States, a slightly smaller percentage of walnut -- 62 per cent -- is used in the manufacture of furniture than in Tennessee (Table LXXXII).

TABLE LXXXII. WALNUT: REQUIREMENTS OF WOOD USING INDUSTRIES
IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Furniture	61.3	Brushes	.2
Fixtures	10.1	Woodenware and novelties	.1
Sash, doors, etc.	8.2	Ship and boat building	.1
Musical instruments	5.3	Machinery and apparatus,	
Chairs and chair stock	4.4	electric	.1
Sewing machines	3.3	Clocks	.1
Planing mill products	2.6	Car construction and	
Caskets and coffins	1.2	repair	.1
Sporting and athletic goods	.6	Boxes and crates	.1
Vehicles (motor)	.5	Airplanes	.1
Frames and moulding	.2	Total	100.0
Toys	.2		

Willow. The only use made of willow, in manufacturing in Tennessee, was in the box and crate industry. A total of only 300,000 board feet

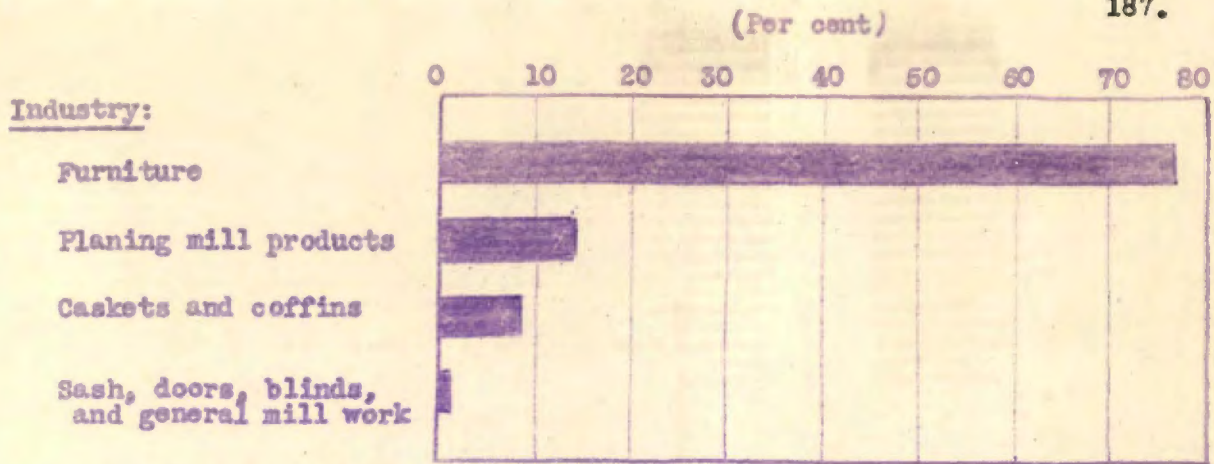


Figure 102. Walnut: Per Cent Used by Wood Using Industries, Tennessee, 1928

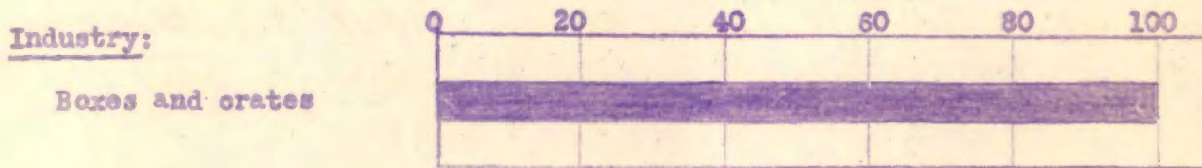


Figure 103. Willow: Per Cent Used by Wood Using Industries, Tennessee, 1928

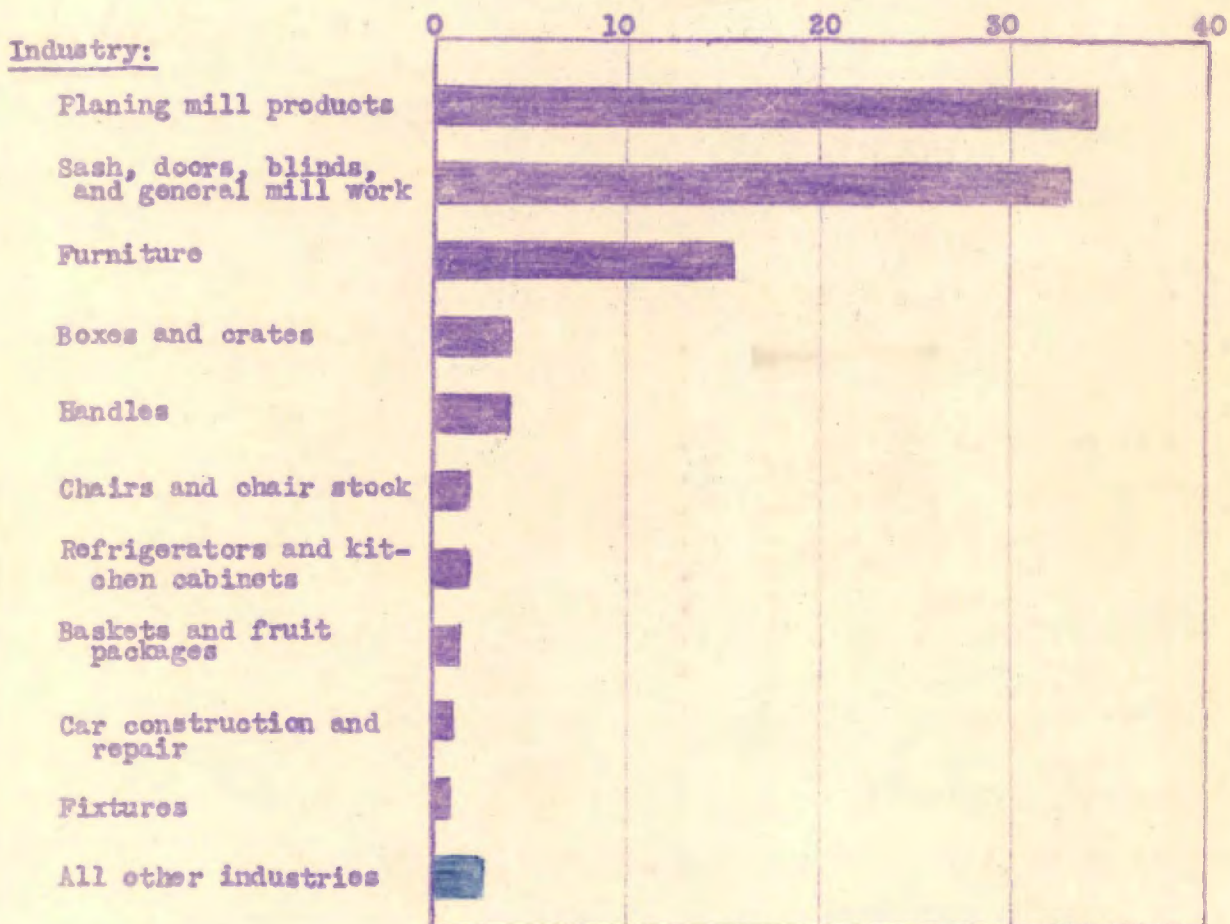


Figure 104. Yellow Poplar: Per Cent Used by Wood Using Industries, Tennessee, 1928.

Source: U.S.D.A., Requirements of Lumber Industries, 1928, p. 81.

of lumber was used in 1928 (Figure 103).

In the United States approximately two-thirds of the willow timber used in industries in 1928 was used in connection with the manufacture of boxes and crates. A variety of other uses is also shown in Table LXXXIII.

TABLE LXXXIII. WILLOW: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Boxes and crates	63.1
Furniture	13.0
Fixtures	5.7
Baskets and fruit packages	3.0
Artificial limbs	3.0
Sash, doors, blinds, and general mill work	1.9
Woodenware and novelties	.3
Vehicles (motor)	.3
Caskets and coffins	.3
Sewing machines	.1
Vehicles (non-motor)	.1
Total	100.0

Yellow Poplar. This is a light, soft, fine grained, easily worked, but durable wood. Its chief use in Tennessee is in the manufacture of planing mill products which consume over half of the annual production (Table LXXXIV). Other uses of poplar in Tennessee are in furniture, motor vehicles, boxes and crates, handles, sash, doors, blinds and general mill work, baskets and fruit packages, and the other minor uses, as indicated in Table LXXXIV.

Ninety-eight per cent of the yellow poplar timber sold to the wood industries in this state in 1928 was in the form of lumber.

TABLE LXXXIV. YELLOW POPLAR: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Planing mill products	55.3
Furniture	9.5
Vehicles (motor)	6.4
Boxes and crates	5.6
Handles	5.5
Sash, doors, blinds and general mill work	4.1
Baskets and fruit packages	3.3
Chairs and chair stock	2.1
Vehicles (non-motor)	1.7
Refrigerators and kitchen cabinets	1.2
Car construction and repair	.9
Caskets and coffins	.8
Sporting and athletic goods	.7
Fixtures	.3
All other industries	2.6
Total	100.0

Source: Figure 104.

Yellow poplar is used principally in the manufacture of furniture; boxes and crates; sashes, blinds and doors, in the United States (Table LXXXIV). Almost a third of this wood is used in the manufacture of furniture.

TABLE LXXXIV. YELLOW POPLAR: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Furniture	30.6
Boxes and crates	20.0
Sash, doors, etc.	15.6
Vehicles (motor)	8.1
Musical instruments	4.9
Planing mill products	4.1
Fixtures	3.0
Refrigerators and kitchen cabinets	2.4
Woodenware and novelties	1.7

(continued)

TABLE LXXXV. YELLOW POPLAR: REQUIREMENTS OF WOOD USING INDUSTRIES
IN THE UNITED STATES, 1928 (Continued)

Product	Per cent of total
Baskets and fruit packages	1.5
Car construction and repair	1.4
Toys	1.0
Boxes (cigar and tobacco)	1.0
Caskets and coffins	.6
Bungs and faucets	.5
Agricultural implements	.4
Chairs and chair stook	.4
Dairymens supplies, etc.	.4
Vehicles (non-motor)	.4
Handles	.2
Frames and picture moulding	.2
Trunks and valises	.2
Signs and supplies	.2
Sewing machines	.2
Sporting and athletic goods	.1
Shuttles and spools and bobbins	.1
Ship and boat building	.1
Printing material	.1
Patterns and flasks	.1
Machine construction	.1
Laundry appliances	.1
Clocks	.1
Brushes	.1
Total	100.0

Total Softwoods, 1928. Tennessee's wood industries consumed 82 million board feet of softwood timber in 1928 which is approximately one-sixth of the total wood consumption by industries in the state. One-half of the total softwood was consumed in the manufacture of sash, doors, blinds and general mill work and in boxes and crates. Over one-third of this kind of wood was used in car construction and repair, planing mill products, and caskets and coffins (Table LXXXVI).

(per cent)

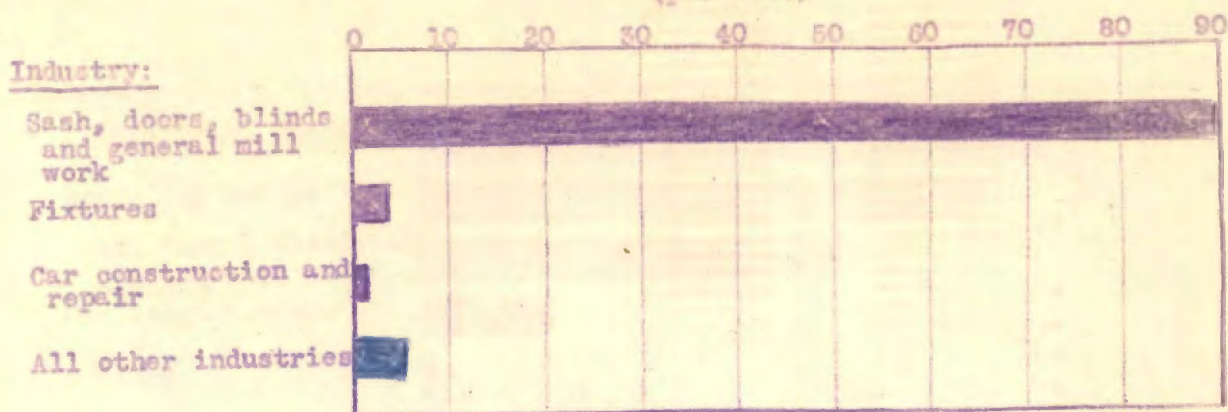


Figure 105. Redwood: Per Cent Used by Wood Using Industries, Tennessee, 1928

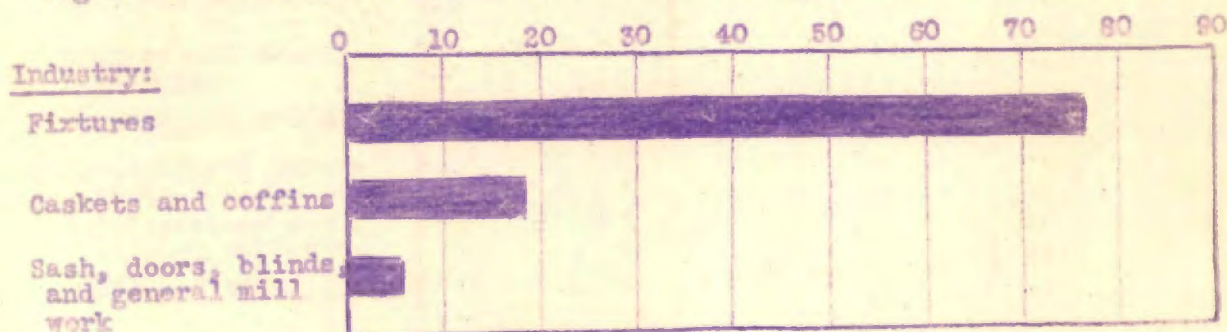


Figure 106. Other Native Softwoods: Per Cent Used by Wood Using Industries, Tennessee, 1928.

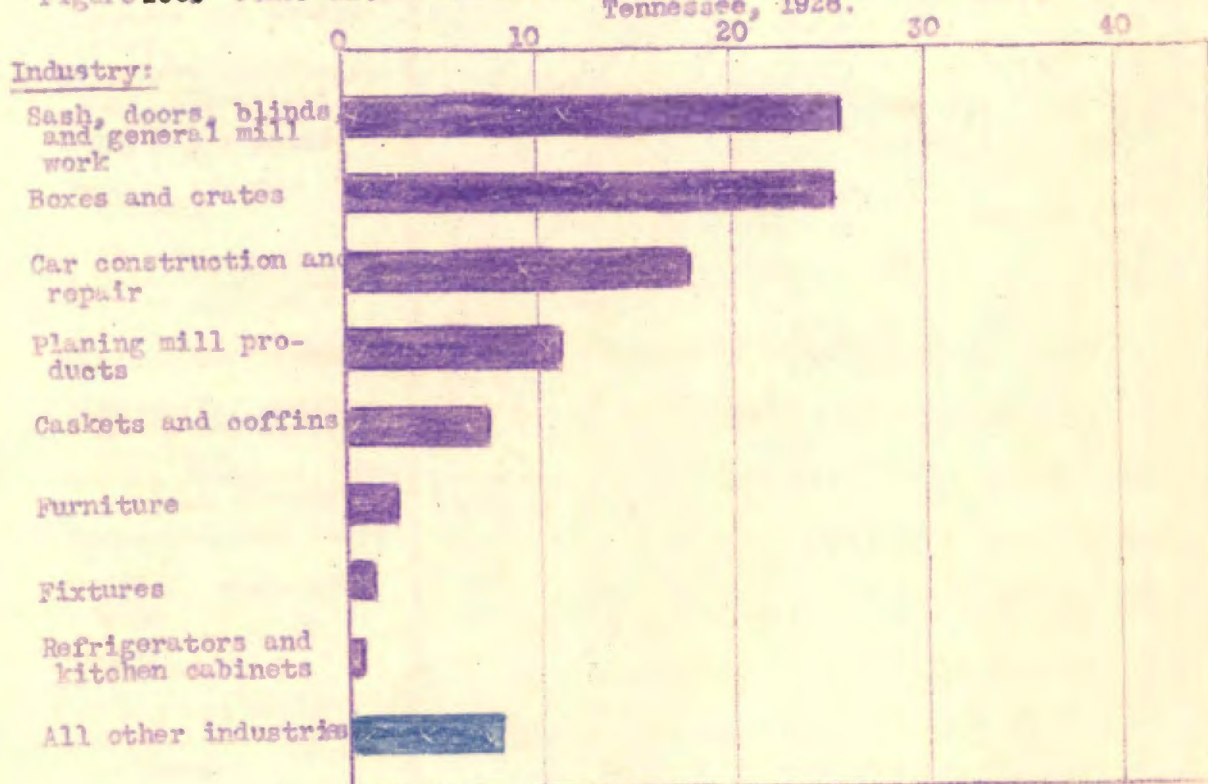


Figure 107. Total Native Softwoods: Per Cent Used by Wood Using Industries, Tennessee, 1928

Source: U.S.D.A. Forestry Service, Lumber Used in Manufacture, 1928, p.60.

(Per cent)

Industry:

Planing mill products

Boxes and crates

Sash, doors, blinds and
general mill work

Car construction

Matches

Vehicle (motor)

Ship and boat bldg.

Baskets and fruit
packages

Caskets and coffins

Agricultural imple-
mentsRefrigerators and
kitchen cabinets

Tanks and silos

Furniture

Woodware and novel-
tiesMachinery and appara-
tus: electrical

Signs and supplies

Pencils and pen
holders

Fixtures

Machine construc-
tion

Pattern and flasks

Dairymen's, poultry-
men's and apiarist
suppliesMotion pictures, the-
atrical scenery

Pumps and wood pipes

Rollers, shade and
maps

Toys

Trunks and valises

Airplanes

Brooms and carpet
sweepers

Musical instruments

Laundry appliances

Figure 108. Softwood: Per Cent Used in Wood
Using Industries in the U.S., 1928

Source: U.S.D.A., Lumber Used in Manufacturing,
1928.

TABLE LXXXVI. ALL SOFTWOOD: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Sash, doors, blinds and general mill work	25.6
Boxes and crates	25.3
Car construction and repair	17.9
Planing mill products	11.2
Caskets and coffins	7.4
Furniture	2.7
Fixtures	1.5
Refrigerators and kitchen cabinets	0.6
Signs and supplies	0.4
Baskets and fruit packages	0.2
All other industries	7.5
Total	100.0

Source: Figure 105.

In the United States practically $1/3$ of our total softwood consumption goes into planing mill products, with boxes and crates; sash, doors, blinds, and general mill work; and car construction and repair as our other important uses. Figure 106 shows the relative amounts of softwood used by the different types of industries in the United States.

Eastern Red Cedar. Approximately one-third of the eastern red cedar used by Tennessee's wood industries in 1928 went into the manufacture of furniture and one-seventh into planing mill products (Table LXXXVII). Other less important products made from cedar in the state were sashes, doors, blinds, and general mill work, and also coffins and caskets. Small miscellaneous industries not separately classified used almost half of Tennessee's total consumption.

TABLE LXXXVII. CEDAR: REQUIREMENTS OF WOOD USING INDUSTRIES,
TENNESSEE, 1928

Product	Per cent of total
Furniture	31.3
Planing mill products	14.1
Sash, doors, blinds and general mill work	7.7
Caskets and coffins	2.7
All other industries	
Total	100.0

Source: Figure 107.

As in Tennessee, furniture and planing mill products were the principal uses of cedar throughout the United States. The relative amounts consumed by our wood industries are shown in Table LXXXVIII.

TABLE LXXXVIII. EASTERN RED CEDAR: REQUIREMENTS OF WOOD USING
INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Furniture	47.1
Planing mill products	27.6
Pencils and pen holders	11.0
Woodenware and novelties	8.9
Sash, doors, blinds, and general mill work	3.7
Ship and boat building	.8
Caskets and coffins	.6
Sporting and athletic goods	.2
Toys	.1
Boxes and crates	.02
Total	100.0

Cypress. Two-thirds of all the cypress timber consumed by Tennessee's wood industries went into the manufacture of caskets and coffins. The manufacture of such products as sash, doors, blinds, and general mill work

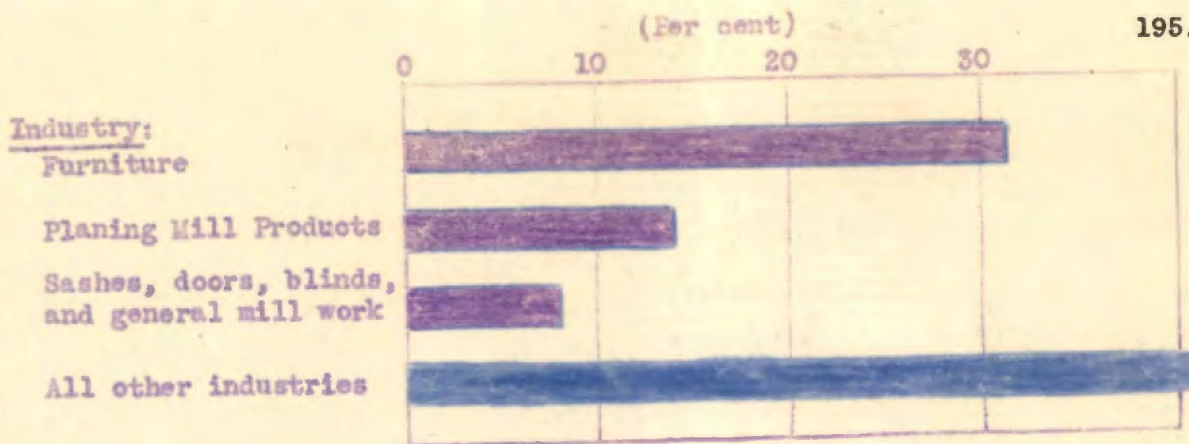


Figure 109 Eastern Red Cedar: Per Cent Used by Wood Industries, Tennessee, 1928

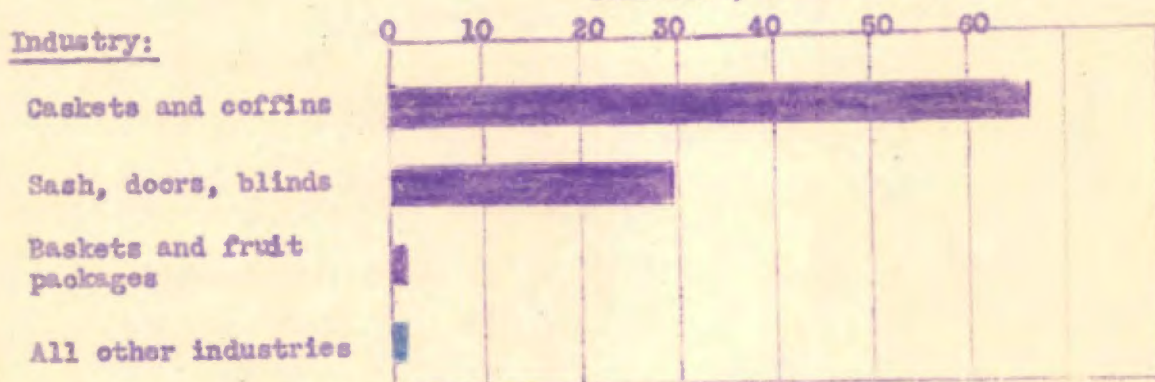


Figure 110 Cypress: Per Cent Used by Wood Industries, Tennessee, 1928

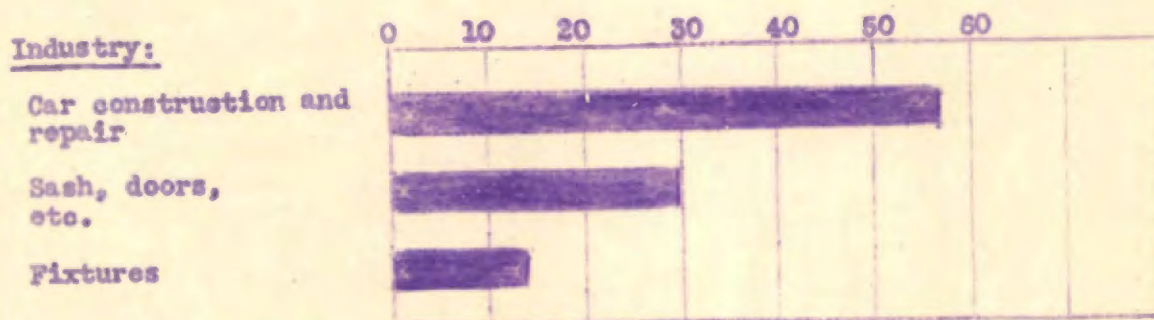


Figure 111 Douglas Fir: Per Cent Used by Wood Industries, Tenn., 1928.



Figure 112 Hemlock: Per Cent Used by Wood Industries, Tenn., 1928

Source: U. S. D. A. Forestry Service, Lumber Used in Manufacture, 1928, p. 80.

required practically all of the remaining industries, of which our principal consumers were manufacturers of baskets and fruit packages and fixture companies (Table LXXXIX).

Ninety-three per cent of the cypress required by wood industries in Tennessee in 1928 was in the form of lumber.

TABLE LXXXIX. CYPRESS: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Caskets and coffins	66.0
Sash, doors, blinds, and general mill work	29.6
Baskets and fruit packages	1.9
Fixtures	0.6
All other industries	1.8
Total	100.0

Source: Figure 108

The relative proportion of cypress entering the wood using industries in the United States is shown in Table XC.

TABLE XC. CYPRESS: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Sash, doors, blinds, and general mill work	42.3	Ship and boat building	.5
Planing mill products	25.1	Fixtures	.4
Caskets and coffins	13.2	Signs and supplies	.3
Boxes and crates	8.6	Woodenware and novelties	.2
Tanks and silos	3.0	Agricultural implements	.1
Laundry appliances	1.2	Pumps and wood pipe	.1
Car construction and repair	1.0	Brushes	.2
Refrigerators and kitchen cab.	.8	Chairs and chair stock	*
Vehicles (motor)	.8	Gates and fencing	*
Dairymens supplies, etc.	.7	Machine construction	*
Baskets and fruit packages	.6	Machinery and apparatus, elec.	*
Furniture	.5	Trunks and valises	*

Douglas Fir. Although this wood constituted only one-hundredth of one per cent of our total wood consumption in 1928, it is nevertheless of commercial significance in that it may assume a more prominent position in the state's wood industries with the growing scarcity of many of our native woods. The use of Douglas fir in Tennessee is confined to three industries with car construction and repair companies as our principal users. These industries consume over half of the total amount. Sash, doors, blinds, and general mill work industries use approximately one-third and manufacture of fixtures about one-seventh (Table XCI).

TABLE XCI. DOUGLAS FIR: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Car construction and repair	56.8
Sash, doors, blinds, and general mill work	29.2
Fixtures	14.0
Total	100.0

Source: Figure 109.

Hemlock: Approximately three-fourths of the hemlock timber consumed in Tennessee goes into the manufacture of planing mill products other than lumber merely dressed. Over one-fifth is used in the manufacture of fixtures, and slightly less than one-twelfth in car construction and repair (Table XCII).

TABLE XCII. HEMLOCK: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Pct. of total	Product	Pct. of total
Planing mill products	70.0	Car constr. & repair	7.6
Fixtures	21.2	Refrig. and cabinets	1.3
		Total	100.0

Source: Figure 110.

Over one-half of the hemlock timber in the United States is used in the manufacture of boxes and crates and more than one-fourth goes into planing mill products. Table XCIII shows the relative proportion of this wood used by different wood industries here in the United States.

TABLE XCIII. HEMLOCK: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Per cent of total
Boxes and crates	57.5
Planing mill products	28.9
Sash, doors, blinds, and general mill work	9.2
Car construction and repair	1.3
Refrigerators and kitchen cabinets	.7
Furniture	.6
Brooms and carpet sweepers	.6
Woodenware and novelties	.5
Fixtures	.3
Caskets and coffins	.2
Laundry appliances	.07
Musical instruments	.05
Agricultural implements	.03
Total	100.0

Southern Yellow Pine. This species is by far the most important soft-wood used in this state, and is being used in the manufacture of a large number of products. Almost one-third is used in the manufacture of boxes and crates, compared with one-fourth going into sash, doors, blinds, and general mill work and over one-fifth into car construction and repair. These and other uses of southern yellow pine are shown in Table XCIV.

TABLE XCIV. SOUTHERN YELLOW PINE REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Boxes and crates	29.8
Sash, doors, blinds and general mill work	26.0
Car construction and repair	21.9
Caskets and coffins	3.3
Fixtures	1.3
Refrigerators and kitchen cabinets	.8
Furniture	.4
Signs and supplies	.3
Baskets and fruit packages	.2
All other industries	3.6
Total	100.0

Source: Figure 111.

Table XCV shows that the main uses of Southern yellow pine in the United States are in the manufacture of planing mill products, boxes and crates, sashes, doors, blinds, and general mill work, and in car construction and repair.

TABLE XCV. SOUTHERN YELLOW PINE: REQUIREMENTS OF WOOD USING INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Planing mill products	41.4	Furniture	.2
Boxes and crates	25.0	Refrigerators and kitchen cabinets	.2
Sash, doors, blinds, and general mill work	16.7	Tanks and silos	.1
Car construction and repair	8.9	Airplanes	*
Agricultural implements	1.4	Brushes	*
Vehicle (motor)	1.3	Bungs and faucets	*
Baskets and fruit packages	1.1	Chair and chair stock	*
Ship and boat building	1.0	Elevators	*
Machine construction	.7	Equipment, playground	*
Signs and supplies	.6	Frames and moulding, picture	*
Caskets and coffins	.3		
Brooms and carpet sweepers	.3	Total	100.0

* Less than one-tenth of one per cent.

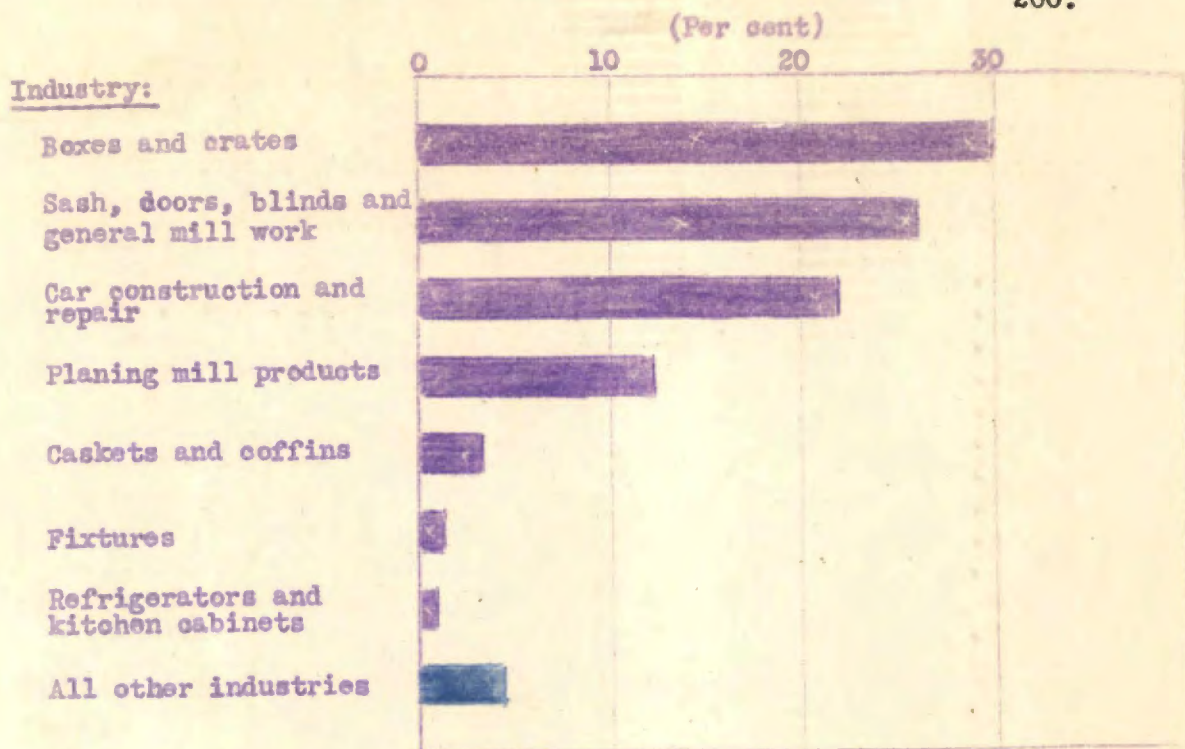


Figure 113. Southern Yellow Pine: Per Cent Used by Wood Industries, Tenn., 1928

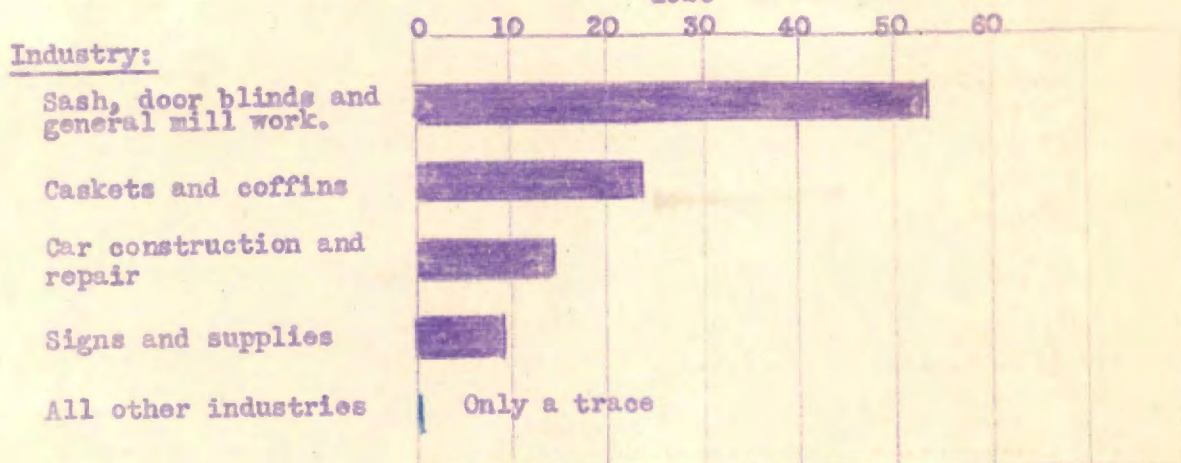


Figure 114. White Pine: Per Cent Used by Wood Industries, Tenn., 1928



Figure 115. Western Yellow Pine: Per Cent Used by Wood Industries, Tenn., 1928

Source: U. S. D. A. Forestry Service, Lumber Used in Manufacture, 1928, p. 80.

White Pine. This softwood is largely confined to four wood industries; namely, sash, doors, blinds and general mill work, caskets and coffins, car construction and repair, and signs and supplies. All the remaining miscellaneous industries consumed considerable less than 1 per cent of the total white pine used. Ninety and four-tenths per cent of all white pine used in Tennessee was in the form of lumber.

TABLE XCVI. WHITE PINE: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Sash, doors, blinds and general mill work	52.9
Caskets and coffins	23.4
Car construction and repair	14.1
Signs and supplies	9.0

Source: Figure 112.

The relative amounts of white pine entering the different wood industries throughout this nation are shown in Table XCVII.

TABLE XCVII. WHITE PINE: REQUIREMENTS OF WOOD INDUSTRIES IN THE UNITED STATES, 1928

Product	Pct. of total	Product	Pct. of total
Boxes and crates	51.6	Gates and fencing	.5
Sash, doors, etc.	21.0	Fixtures	.3
Planing mill products	10.3	Motion picture machinery	.2
Matches	8.0	Refrig. and cabinets	.2
Patterns and flasks	1.5	Pumps	.2
Car construction & repair	1.1	Trunks and valises	.1
Caskets and coffins	.7	Sport and athletic goods	.1
Toys	.5	Shuttles, spools, etc.	.1
Signs and supplies	.5	Dairymens supplies, etc.	.1
Woodenware and novelties	.4	Machine construction	.01
Elec. machinery and apparatus	.4	Agricultural implements	.07
Ship and boat building	.3	Baskets and fruit packages	.03
Laundry appliances	.3	Instruments, prof. & scient.	.07
		Total	100.0

Western Yellow Pine. Almost one-half of the western pine wood consumed in Tennessee was used in the manufacture of boxes and crates, whereas the sash, doors, blinds and general mill work industries consumed one-fourth of this wood. Although none of our western softwoods were of great commercial significance in the state's wood industries, western yellow pine was our most important western softwood during that year. All this wood used in Tennessee during 1928 was shipped into the state in form of lumber.

TABLE XCVIII. WESTERN YELLOW PINE: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Boxes and crates	48.1
Sash, doors, blinds and general mill work	28.5
All other industries	23.4
Total	100.0

Source: Figure 113.

Redwood timber used in Tennessee is approximately one-tenth of one per cent of the state's total lumber consumption. Approximately nine-tenths of this wood is used in the manufacture of sash, doors, blinds, and general mill work. Industries using less than 5 per cent include fixture and car construction and repair factories (Table XCIX).

TABLE ICIX. REDWOOD: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Sash, doors, blinds and general mill work	82.3
Fixtures	3.7
Car construction and repair	1.6
All other industries	5.4
Total	100.0

Source: Figure 103.

Other Native Softwoods. This classification includes eastern white cedar and spruce. They are used mainly in the manufacture of fixtures, caskets and coffins, and to a slight extent in the sash, doors, blinds and general mill working industries (Table C). Lumber constituted 89 per cent of all white cedar and spruce timber used in our wood industries.

TABLE C. OTHER NATIVE SOFTWOODS: REQUIREMENTS OF WOOD USING INDUSTRIES IN TENNESSEE, 1928

Product	Per cent of total
Fixtures	76.5
Caskets and coffins	18.2
Sash, doors, blinds, and general mill work	5.5
Total	100.0

Source: Figure 104.

CHAPTER VI

TIMBER MEASUREMENTS

In general the average farmer can usually estimate accurately the amount and value of common field crops produced since he deals with these year after year and is familiar with both their yield and current values. However, when timber is to be marketed the farmer not being so familiar with wood measurements relies almost entirely upon the estimates of the buyers who frequently underestimate the timber's true value. According to the Extension Forester of the University of Tennessee, farmers of this state also almost invariably underestimate the true value of their woodlot. As a result they often sell their timber at a price far below its actual stumpage value.

The purpose of this chapter is to present the various methods of estimating timber to aid the farmer in marketing his forest products to the best advantage.

Purpose of Timber Estimate

A timber estimate is an inventory of the merchantable contents on any piece of growing timber with the definite purpose in view of fixing its present value.⁽¹⁾ However, too much money should not be spent in obtaining an accurate estimate of standing timber of low value since the net returns

(1) Pennsylvania Extension Circular 149, Farm Woodlot Timber, p. 14.

from the sale of the wood will not justify it. It has been estimated that a cost exceeding one per cent of the stumpage value of the timber may be considered high. On the other hand, an accurate costly estimate may be much more economical than an estimate where the actual stumpage is far greater than the estimated stumpage.⁽²⁾ This has been particularly the case in many instances in Tennessee where inexperienced owners of farm woodlands have accepted a lump sum for a certain stand of timber far below its actual timber value.

Stumpage Value

"The stumpage or sale value of standing timber is the difference between the value of the product on the market and the cost involved in harvesting and marketing."⁽³⁾ In arriving at stumpage values a reasonable profit of from 20 to 25 per cent should be allowed on the combined investment in equipment, labor and timber. This can be expressed in the following formula:⁽⁴⁾

$$\text{Stumpage price} = \text{selling price} - (\text{cost of logging plus cost of manufacturing plus depreciation}) - \text{profit}$$

It therefore is quite evident that in order for the farmer to obtain a reasonable stumpage value he must be familiar with both the current marketing prices as well as with the costs involved in harvesting and marketing.

(2) Chapman, H. H., and Demeritt, D. B., Elements of Forest Mensuration, p. 114.

(3) Lodwick, J. Elton, Marketing Woodland Products in Virginia, p. 13.

(4) Ferguson, J. A., Farm Forestry, p. 167.

Another thing to consider is that the stumpage value of any tree should be determined on the basis of the product of the highest value which can be cut from it. As an illustration, if eastern cedar lumber is worth \$40 a thousand feet at a marketing point and the total cost of logging, sawing, and hauling, including a fair profit on the business is \$26, the value of the standing timber is \$14 per thousand board feet. In the same manner the stumpage values of poles, ties or any other primary timber product can be determined.

Two main factors influence the stumpage value. These are labor costs and the accessibility of the stand. High labor cost add to the expense of harvesting and marketing and consequently reduces the net stumpage price of the farmer. Also tracts of timber located in sections difficult to reach can be marketed only after increased hauling costs and consequently such timber is worth less than more favorably situated tracts. ⁽⁵⁾

Methods of Selling Timber in Tennessee

Tennessee's farm timber may be sold either by boundary for a lump sum; by scale measurement of rough products using different log, cord and rick ⁽⁶⁾ scales; by piece, for such products as ties and poles; and by lumber scale of the sawed products. ⁽⁷⁾ The first method, selling timber by lump, lot, or boundary, is commonly practiced in this state since it offers less trouble to the farmer and is more advantageous to the purchaser because he can often obtain the wood at a much lower price than if

(5) Lodewick, op. cit., p. 13.

(6) A rick is a cord eight feet long, four feet high and of a width equal to the length of one stick.

(7) Sterrett, W. D., Marketing Woodlot Products in Tennessee, p. 142.

one of the other methods had been used. In order to sell to the best advantage by the boundary, for a lump sum, a careful estimate of the amount and value of the standing timber is required. To do this most farmers are too inexperienced and for this reason should rely upon one of the other methods. However, when several or more buyers are induced to bid on the same tract, competition may force their bids up to a point near the actual timber values. Also if the farmer can hire a skilled estimator to determine the contents of his stand, he may be able to bargain competitively with timber dealers.

The use of scale measurements are advocated for measuring many farm woodland products especially where the measurement of each individual tree has been considered. By estimating the length and diameters of the merchantable logs in the tree and deriving the contents of each log by the use of some accepted log rule, or volume table, even the inexperienced estimator can fairly accurately determine his timber stand. Here, again, a skilled estimator may be used to an advantage in estimating the contents of the marketable timber. In small timber, selling by the cord or rick is preferred to selling log scale because of the unfairness of most log rules in the marketing of small logs.

Selling by piece is perhaps the simplest method since it is relatively easy to estimate the number of poles, crossties, etc., that can be cut from a given tree. However, in order to sell to the best advantage it is important that the estimator be acquainted with the specifications and relative values of the different grades of each class of products so as to utilize the trees to the best advantage.

Theoretically, selling timber by the lumber scale of sawed products would be the most favorable to the farmer since he would be credited with the actual amount of lumber sawed from the timber. However, since grading sawed lumber is a complicated process requiring considerable skill, most farmers must rely on someone else to do their grading for them. If considerable timber is to be sold as lumber, a skilled grader might be hired to protect the farmer. If only a small amount of lumber is to be sawed by any one individual, a group of farmers may cooperate in having their lumber sawed and graded. The main disadvantage of selling timber as lumber is that the settlement would be delayed longer than when the timber is sold on the stump or in the log.

Units of Measurement

(8) Board Feet. A board foot, represented by a board 12 inches wide, one inch thick and 12 inches long, is the most widely used unit of measurement in American lumbering and forest practices. Logs as well as lumber are usually measured on the basis of board feet and as a rule are sold at a specified price per 1000 board feet. The rule of finding the board-foot contents of a piece of lumber may be obtained by multiplying the width by the thickness of the board, or other pieces, in inches, and multiplying this product by the length in feet and dividing the result by 12.

Often when lumber is sawed into thickness less than those called for, the common practice is to reckon the contents of the timber as if the full

(8) Bentley, John, Jr., Estimating Timber in the Farm Woodlot, p. 5.

thickness were provided. In planing 1-inch boards on one or both sides, the finished pieces will be slightly less than one inch, but they are nevertheless considered as full size because a board of full size was used in the beginning.

(9)

Cubic Foot Measure. A cubic foot is represented by a block or cube of wood one foot high, one foot wide and one foot thick. In this country this measure is confined almost entirely to research studies where the greatest accuracy is demanded. However, in the sale of woods of high unit value, particularly certain tropical woods, this method of measurement is used to some extent. In Europe the cubic meter is the most common unit of measure used in forest practice.

(10)

Cord. This unit is represented by a pile of wood 4 feet wide, 4 feet high and 8 feet long. Sometimes, however, a short cord is used which consists of wood 18 to 24 inches in length or any other odd length and stacked in piles 8 feet long and 4 feet high. Ordinarily a cord contains from 60 to 100 cubic feet of solid wood depending on the length of the sticks, the diameter of the sticks, the method of piling, whether the sticks are split or round, and whether they are green or dry. Fuelwood and pulpwood are often cut into five foot lengths which when piled 4 feet high and 8 feet long contain 160 cubic feet, and is called the long cord. This unit is used almost entirely in the measurement of pulpwood, fuelwood, acid wood and sometimes peeled bark. Since the straightness of the sticks have a decided effect on the amount of wood in a cord, it is nearly

(9) Bentley, op. cit., p. 5.

(10) Ibid., p. 5.

always true that there will be less solid wood in a cord of hardwood sticks than in a cord of softwood sticks. Seventy per cent is a safe average factor to use in computing the actual number of feet in a cord (8 x 4 x 4), which is approximately 90 cubic feet to each cord.

The Standard. This is a unit of measurement more common to the early days of lumbering, although it still persists to a limited extent in certain sections of the country. A log 13 feet long and 19 inches in diameter at the small end is spoken of as a standard and is roughly equivalent to 200 board feet. Other standards are also used.⁽¹¹⁾

The Piece. Poles, posts, piling, cross-ties and mine timbers are usually cut, measured, and marketed on a piece basis. However, in order to be marketed this way the timber must usually satisfy certain requirements as to size and quality. On the other hand, pieces of small girth are often measured by the linear foot, in which case the value is determined by the length with no consideration being given to the diameter or girth.⁽¹²⁾

Determining the Height of Standing Timber

Ocular Estimate. Where the dimensions of every tree in a given area must be recorded, the time consumed in actually measuring the height and diameter is a considerable item of expense. Often the estimator can train his eye to read a large percentage of the tree measurements

(11) Bentley, op. cit., p. 5

(12) Ellick, J. S., An Outline of General Forestry, p. 134.

purely by observation, using the various instruments merely as a check. In training the eye to estimate diameters, the greatest progress is made by repeated guesses followed immediately by the measurement of the tree, which is then closely observed to fix the known diameter and correct the faulty observation. It is a general tendency in ocular estimating to over-estimate small trees whereas large trees are under-estimated. (13)

Measuring Pole. One of the most satisfactory methods of determining log lengths in standing trees is with the aid of an eighteen foot pole on which cross pieces 1 foot long are nailed at 10, 14 and 18 foot intervals. In estimating, one person holds this marker against and parallel to the trunk of the tree while the estimator stands off a distance of 25 feet or more and notes the number of logs that can be cut from the tree. The 10-foot crosspiece indicates an 8-foot log, the 14-foot piece a 12-foot log and the 18-foot piece a 16-foot log, allowing a stump of two feet. By the aid of the crosspieces the observer can easily get the exact length of the first and most valuable log, and where the crosspieces are of known length the top diameter of the log can be estimated very closely by a comparison with the length of the crosspiece. A rather close estimate can be made of the second and third logs by comparing them with the dimensions of the first log. (14)

Scale or Cruising Stick. This method of timber estimating is coming more into vogue since it requires only a very short time to determine the height and diameter of trees to be measured. The application of this

(13) Chapman and Demeritt, op. cit., p. 237.

(14) Lamb, G. H., Marketing Farm Woodlot Products in Maine, p. 8.

device is explained under the section on scaling (page 216).⁽¹⁵⁾

Shadow Method.⁽¹⁶⁾ The height of a tree may be determined by comparing the shadow of a tree to be measured with the shadow of a pole of known length, set perpendicular to the earth. In computing the height of the tree, multiply the length of the shadow of the tree by the length of the pole, and divide the product by the length of the pole's shadow. This method, however, is applicable only in an open woodland where there ^{is} no dense foliage cluster to obliterate the tree's shadow.

The Abney level is used to determine the height of trees by the measurement of verticle angles. This instrument is light, rugged and sufficiently accurate for most measurement purposes. However, it cannot be used in estimating very tall trees because of the effect of refraction on observations of the bubble through the tube from beneath. Customarily, heights are read directly in feet at a distance of 100 feet from the base of the tree. Readings may be made at a distance of fifty feet from the tree base, but in this case the results must be divided by two to get the height, since each per cent is then equivalent to but 5 feet. Because of its cost, the Abney level may not be as desirable for ordinary farm purposes as one of the methods previously described, although it ^{frequently} is used at the present time in commercial timber work.⁽¹⁷⁾

(15) Mattoon, W. R., and Barrows, W. B., Measuring and Marketing Farm Timber, p. 22.

(16) Bentley, op. cit., p. 18.

(17) Chapman, H. H., Forest Mensuration, pp. 238-239.

Various hypsometers have been developed and are used somewhat in estimating tree heights. Some of the more popular hypsometers on the market are the Forest Service, Christen, Chapman, Demeritt, Klausner.

Measurement of Diameters

Measurement of Logs. Perhaps the easiest means of measuring the diameter of a log is by the use of an ordinary yard stick or foot rule. In most practical work, it is usually sufficient to record measurements to the nearest inch; that is, a measurement of 5.4 inches is recorded as 5 inches, while one 5.6 inches is recorded as 6 inches. Commonly, however, when the measurement is halfway between inch graduations, it may be raised or lowered to the nearest even inch. (20)

Measurement of Diameters of Standing Trees. The Caliper is the most accurate instrument used in measuring the diameters of standing trees, or a point on a felled tree that has not been cut. This instrument consists of two arms, each perpendicular to a graduated scale, with one arm being fixed at the end and the other is movable. In measuring a tree or log at the designated place, the device is opened wide enough to allow the arms to fit around the tree. However, in the case of an irregularly shaped log the diameter should be taken at the widest and narrowest place and an average of the two measurements should then be taken. (21)

(18) *Ibid.*, pp. 237-24.

(19) Chapman and Demeritt, *op. cit.*, pp. 102-107.

(20) Bruce Donald, and Schmittner, *F. I., Forest Mensuration*, p. 5.

(21) In standing timber the point at which the usual measurements of tree diameters are made is a distance on the tree 4.5 feet from the average ground level occupied by the tree. This height is designated as "diameter at Breast high and is commonly abbreviated to d.b.h. (In European countries where the metric system is used the breast height is equivalent to approximately 4 feet and 3 inches.)

Some of the main disadvantages of the Caliper are:

1. It is inaccurate when not in adjustment.
2. Calipers of sufficient size to measure large trees are very inconvenient to carry and handle.
3. The movable arm sometimes sticks when the scale is wet or dirty. (22)

The Diameter Tape is another device for measuring the diameter of standing trees. The circumference of the tree is measured and the graduations on the tape at intervals of 3.1416 inches, permit the direct reading of the diameter. Usually the longer tapes are provided with a hook on the end which facilitates anchoring the end of the tape to the tree. Some of the advantages of this method are:

1. It is easy to carry.
2. No frequent adjustments are required.
3. In the case of irregular trees only one measurement is required.

Some of the disadvantages of this method are:

1. It requires more time than some of the other instruments to make the measurements.
2. Care must be taken that the tape passes directly around the tree since a sag on one side may result in a serious error.
3. When measuring irregularly shaped trees this instrument will give results somewhat too large but accurate enough for ordinary purposes.

The Biltmore Stick. This gives only a rough estimate of the diameter of standing timber. This stick consists of a straight rule about 30 inches long and so graduated that when held horizontally against the side of the tree, with the observer's eye exactly 25 inches from the tree, the diameter may be read directly. In making this measurement the observer's head must be held motionless and the stick moved until

(22) Bruce and Schumacker, op. cit., p. 5.

the end is exactly in line with the eye and one side of the tree. The graduation on the stick, which is in line with the other side, then corresponds to the diameter.

Some of the disadvantages of this method are:

1. The principal source of error in making readings with this instrument is that the 25-inch distance from the eye to the tree is difficult to maintain.

2. Only a slight deviation may cause considerable error, especially in the measurement of larger trees.

3. Calculations from this method cannot be made as accurately as those made by the rule, Caliper, or tape. However for all practical purposes the accuracy of this instrument is sufficient. (23)

(24)

Dendrometers are instruments that have been devised to determine diameters of standing trees at points too high to be reached by hand. The results of this instrument have been only moderately accurate and for this reason it may be more desirable to rely on ocular estimates for ordinary farm purposes.

Scaling Timber

Scaling is the measurement of the contents of logs usually by means of a scale stick, with deductions made from full or gross scale for defects which reduce the sound board foot contents. The scale stick is a lath-like or rectangular shaped stick on which inches are marked along one edge and the volume values according to some specified log rules are placed along the other edge. No separate tables are required since the board foot contents of the log are read direct from the scale stick. (25)

Method. (26) After the length of the log has been determined either by

(23) Bruce and Shumacker, op. cit., pp. 9 and 10.

(24) Ibid., p. 10.

(25) Illick, op. cit., p. 137.

(26) Bruce and Shumacker, op. cit., pp. 162-163.

estimate, or by measure, the scale stick is laid across the small end of the log and the volume of the log read directly. Of course the diameter is estimated in ^{the} case of standing timber (see page 217 for methods). If the logs are over 16 feet long they are measured as two or more short logs of approximately equal length and with the diameter of the larger log increased by the amount of taper present. Failure to do this will result in serious underestimates if the Scribner, Doyal or some other log rules are used, which do not make allowances for taper.

Figure 116 illustrates the procedure followed in estimating tree diameters and heights with the aid of cruising or scaling sticks. In the A part of this figure is illustrated the measuring of tree diameters. "If the stick is held horizontally against the trunk of the tree at a specified distance from the eye, the observer is able to read directly the diameter of the tree outside of the bark. This measure is taken at a height $4\frac{1}{2}$ feet above the average level of the ground."⁽²⁷⁾

Measurement of tree heights is shown in the B part of this same figure. "The stick is graduated so that, when held a specified distance from the eye of the observer who stands a specified distance from the tree, the observer can read the number of 16-foot-log lengths in the tree. The principal is that of two similar triangles."⁽²⁸⁾

(27) Matton and Barrows, op. cit., p. 22.

(28) Ibid., p. 22.

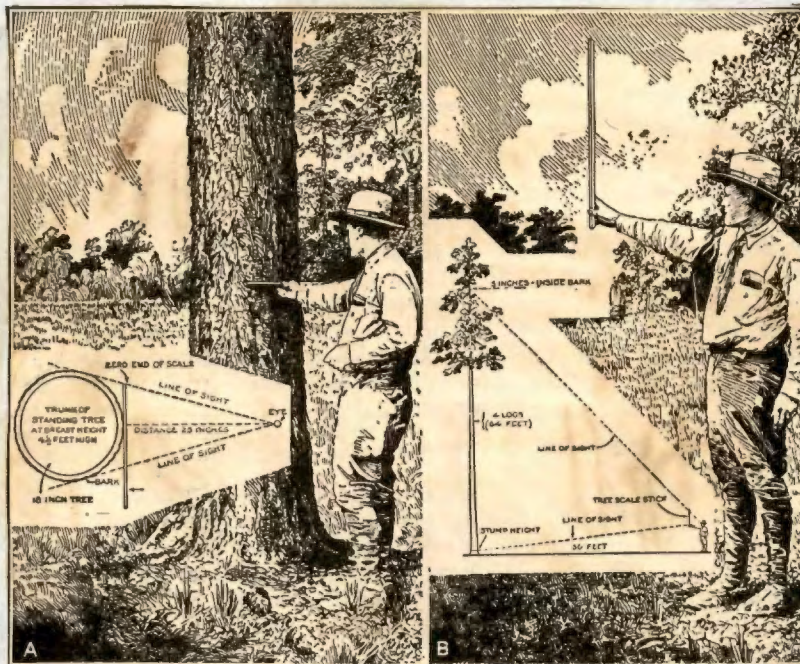


Figure 116. Scale or Cruising Stick; Method of Estimating the Diameter and Height of Standing Timber

Source: Nattoon, Wilbur R. and Barrows, William B., Measuring and Marketing Farm Timber, Farmers Bulletin No. 1210, United States Printing Office, Washington, D. C., 1930.

(29)(30)

Deductions for Defects.

Logs possessing defects of such character that some of the boards sawed will be unfit for lumber, proper deductions from the scale of the log must be made in order to allow for this loss. However, where the log defects merely lower the grade of the merchantable product but do not reduce the volume of sound lumber, no deductions from the actual log measurements will be made. In the case of minor defects as knots, etc., which are so large or numerous that they render the lumber unmerchantable, the entire log may be culled or left in the woods. If that portion of the log beyond the deducted length is below merchantable size it is included in the amount of lumber deducted, e.g., if, in a log 10 feet long with an 8-foot minimum length for lumber, it is necessary to deduct more than 2 feet from the length, the entire log is rejected; whereas, in a 16-foot log, an 8-foot deduction may be made with no further loss in scale.

Surface defects, such as rotten sapwood or a surface zone full of checks may be determined by merely scaling inside of the defects.

Center defects are commonly found in logs in the form of heart rot. The method of determining the amount to deduct is to imagine a square or rectangle circumscribed about the defect. The contents of this imaginary figure is then determined and is reduced by 20 per cent to allow for loss in saw kerf. The U. S. Forestry Service, in measuring center defects, authorizes the following rule: "If the diameter of the defect is 9 inches or less, add one-half; if it is 20 inches or over, add one

(29) Chapman and Demeritt, op. cit., p. 174.

(30) Bruce and Schumacker, Forest Mensuration, p. 165.

quarter; the deduction is then the scale of the resulting diameter."

End defects are commonly determined by reducing the length of the log depending on the extent of the defect. In making deductions of this sort, it must be remembered that the outer part of a swelled butt of a log is usually wasted in slabbing, and hence the defect here is negligible.

In order to determine the amount to deduct from very crooked logs, the scaler must sight along the log estimating the length that will be affected by the crook and the portion of it that will be lost.

Deductions for checks, or cracks across the face of the log, may be determined in the same manner as ^{for} circular rot.

Deductions for shake ⁽³¹⁾ are made by first considering the whole circle inside the shake as defective and then adding the scale of this circle.

Deductions may or may not be made for blue stain, advance rot and sound knots since these defects in many cases affect the quality of wood but have no effect on the quantity produced.

One of the handiest cruiser sticks is known as the Biltmore stick. It is being marketed by the Federal Land Bank of Springfield, Massachusetts at cost. A set of cruiser sticks, consisting of a log scale stick and a tree scale stick based on the International rule, used for measuring and estimating the contents of logs and of standing trees is also distributed at cost by this same institution. The tree scale stick is applicable to white pine, spruce, hemlock, white and red oak, and other important timber trees. A similar set of log-scale and tree-scale sticks, applicable particularly to the four important kinds of southern pine are distributed

(31) Shake is a circular crack that follows an annual ring.

at cost by the American Forestry Association, Washington, D. C.

"The measuring stick for estimating standing trees has five scales, with which one can do the following:

1. Measure diameters of any tree from 5 to seventy-two inches.
2. Measure the number of logs in standing trees up to 80 feet.
3. Show the contents in board feet of hardwoods.
4. Show the contents in board feet of softwoods.
5. Show the number of standard cords (4 x 4 x 8 feet) from both soft and hardwoods." (32)

Use of Log Rules in Scaling. A log rule is a tabulated form constructed from mathematical formulae, drawn diagrams or actual mill tallies which attempts to show the volume of sound logs of different lengths and diameters. (33) Some of these rules enjoy widespread application whereas others are restricted to certain territories where they are known to give satisfactory results. Altogether, more than 40 log rules (34) are used in the United States, but detailed consideration in this report will be given to only those of commercial importance in this state; namely, the Doyle, Scribner, Scribner Decimal C and the International Log rules. In using ~~one~~^{of} the log rules to find the volume of any log, all the estimator must do is substitute the log's diameter and length to similar dimensions in the log table and the resulting value will be the estimated contents of the log. As an illustration, a 18-foot log having a diameter of 18 inches will saw out 181 board feet of lumber by the International Log Rule (Table GK).

(1) International Rule. This is the most desirable log rule since its log values are close to the amount of lumber that can be

(32) Merrill, Leon S., Estimating Timber in the Farm Woodlot, p. 14.

(33) Illick, op. cit., p. 136.

(34) Mattoon and Harrows, op. cit., p. 16.

TABLE CI. INTERNATIONAL LOG RULE

((The contents of logs in board feet, by using a circular saw, cutting one-fourth inch kerf, and sawing carefully by good methods.))

Diameter of log at small end and in- side bark (inches)	Length of log in feet												
	8	9	10	11	12	13	14	15	16	17	18	19	20
4-----	2	2	3	3	4	5	5	5	6	7	7	8	9
5-----	4	5	6	7	7	8	9	11	12	13	15	16	17
6-----	7	9	10	11	13	14	16	18	19	21	23	25	27
7-----	12	14	15	17	19	21	24	26	28	31	34	36	39
8-----	16	19	21	24	27	30	33	36	39	42	46	49	52
9-----	23	26	29	33	36	40	43	47	51	55	59	63	68
10-----	29	33	37	42	45	51	54	59	64	69	75	82	89
11-----	36	42	46	52	57	63	68	74	80	86	95	100	107
12-----	44	51	57	62	70	77	83	91	97	105	111	119	129
13-----	52	60	68	76	83	92	100	108	116	124	134	143	151
14-----	62	71	80	98	98	107	117	127	136	147	158	168	176
15-----	73	82	94	104	114	125	136	146	157	170	181	195	204
16-----	84	96	108	119	131	144	156	167	181	194	207	222	233
17-----	96	110	123	136	149	163	177	192	205	221	235	251	265
18-----	110	124	139	155	169	185	201	218	232	250	267	282	300
19-----	123	140	156	175	190	210	225	244	261	280	299	317	337
20-----	138	157	174	197	212	232	251	270	290	310	330	352	374
21-----	152	172	193	215	234	256	279	299	321	344	366	389	412
22-----	168	192	214	238	259	282	307	330	354	379	404	429	453
23-----	186	212	235	260	285	310	337	362	388	415	445	470	498
24-----	203	232	257	285	311	339	367	398	424	452	484	514	543
25-----	223	253	281	311	339	370	400	433	462	494	526	560	590
26-----	241	273	304	337	368	402	435	468	502	537	570	606	640
27-----	262	296	329	364	400	434	471	504	543	580	617	657	692
28-----	281	319	356	395	432	470	509	545	586	623	664	706	748
29-----	303	344	383	425	463	505	546	587	630	670	712	756	801
30-----	326	369	411	455	498	542	586	628	674	719	765	810	858
31-----	348	397	442	488	532	582	628	670	724	771	819	868	918
32-----	373	424	471	520	570	621	672	718	773	821	874	927	979
33-----	397	452	503	557	608	662	715	766	822	877	929	988	1042
34-----	423	481	534	592	647	702	760	817	876	932	990	1052	1109
35-----	450	509	567	627	685	747	805	872	930	992	1050	1117	1176
36-----	477	540	599	662	727	790	853	920	984	1052	1114	1184	1244
37-----	503	570	635	702	767	835	906	974	1042	1109	1178	1251	1317
38-----	532	603	672	742	811	880	954	1028	1098	1174	1245	1320	1388
39-----	561	635	710	783	858	932	1004	1082	1158	1237	1312	1289	1467
40-----	594	671	749	823	902	983	1059	1139	1226	1300	1381	1462	1543

Source: U. S. D. A. Farmers' Bulletin No. 1210, Measuring and Marketing Farm Timber, pp. 16-17.

actually sawed out by using good methods. Regardless of its desirability, this rule is not used to any commercial extent at the present time due to the widespread use of older and less efficient rules. It is quite common in using this rule, however, to find a small overrun on small logs and a small underrun on large logs. Because of its accuracy in estimating log values, the International Rule is used in practically all scientific work where errors in the older log rules would be intolerable. As a means of comparison, a 18-foot log measuring 10 inches in diameter inside the bark at the small end would scale 64 board feet by the International Rule compared with 36 feet scaled by the Doyle Rule or only about half of the amount that can be actually sawed. (35)

This rule has been devised by working out a mathematical formula that will give the yield of a log in terms of its diameter and length. A one-half inch taper is allowed for every four feet of length and the extent of taper is based on the actual measurements of a large number of logs. The International rule is constructed to allow one-eighth inch loss in saw kerf and one-sixth inch in shrinkage. However, when a heavier kerf is cut than that allowed in the rule, modifications to the rule can be made. This rule has been calculated on the basis of cutting nothing but one inch boards, consequently for other thicknesses the results may vary slightly.

Figures 106 and 107 show the values given by this rule in comparison with certain other log rules.

(35) Bentley, op. cit., p. 7.

(2) Doyle Rule. Although the Doyle rule is one of the most unsatisfactory of all log rules it is receiving widespread application in this state at the present time, especially in the Morris Watershed area where the T.V.A. found it to be the only log rule used. This rule is unfair to the seller in measuring logs below 28 inches in diameter whereas the values given for very large logs are too high.

The Doyle rule is based on a mathematical formula which was formulated many years ago when sawmill operations were not very efficient and no

TABLE CII. OVERRUN BY DOYLE RULE; ACTUAL MEASUREMENTS OBTAINED FROM 12-FOOT LOGS OF DIFFERENT DIAMETERS

Diameter of log at small end	Scale by Doyle rule in board feet	Actual output of inch lumber in board feet	Overrun in per cent
6	3	14	366
8	12	30	150
10	27	50	85
12	43	76	56
14	75	108	44
16	108	144	33
18	147	186	26
20	192	234	22

Source: Chapman and Demeritt, Elements of Forest Mensuration, p. 195.

consideration was then given to log taper. Consequently the resulting inaccuracy of this rule is due to its allowance of a uniform factor for slabs and saw kerf regardless of the size of the log. Since a large proportion of the logs milled in Tennessee at the present time are small in diameter it follows that the mill cut overruns the scale by 20 to 40 per cent or even more if the logs are sound. ⁽³⁶⁾⁽³⁷⁾ In a twelve foot

(36) Bentley, op. cit., p. 8

(37) Chapman, op. cit., p. 68.

log having a diameter of 8 inches there will be an overrun of 366 per cent. In other words, the Doyle rule will estimate the log's volume as 3 board feet, whereas the log will actually saw out 14 feet of lumber (Table CII).

It has been estimated by the Forestry Division of the T.V.A. that a large percentage of portable sawmills in Tennessee would have to shut down if the Doyle Log rule were discarded since they are dependent on their overrun to take care of the deficit, inefficient operations, and low quality timber. (38)

Figure 117 shows the yield for the Doyle rule in comparison with the International, Decimal C and Scribner Rules. For 16-foot logs 5 inches in diameter the former rule gives only 8 per cent of the actual log contents whereas the Scribner rule gives 66 per cent more lumber than the log will saw out. In logs under 28 inches in diameter the Doyle rule underestimates the log contents whereas in all logs over 28 inches in diameter it assigns a value above what the log will actually saw out.

(3) Scribner Rule. This log rule is one of the oldest and most widely used log rules in existence. It is calculated from the use of diagrams which are drawn to scale to represent the small ends of logs of different sizes on which are marked off the different boards that might be sawed. From the diagrams the board contents of each board is computed and by adding the contents of all the boards the volume of the log is determined.

The Scribner rule underestimates the amount of lumber that can be

(38) T.V.A. Forestry Division, Utilization and Drain of Forest Products in Norris Dam Watershed, p. 25.

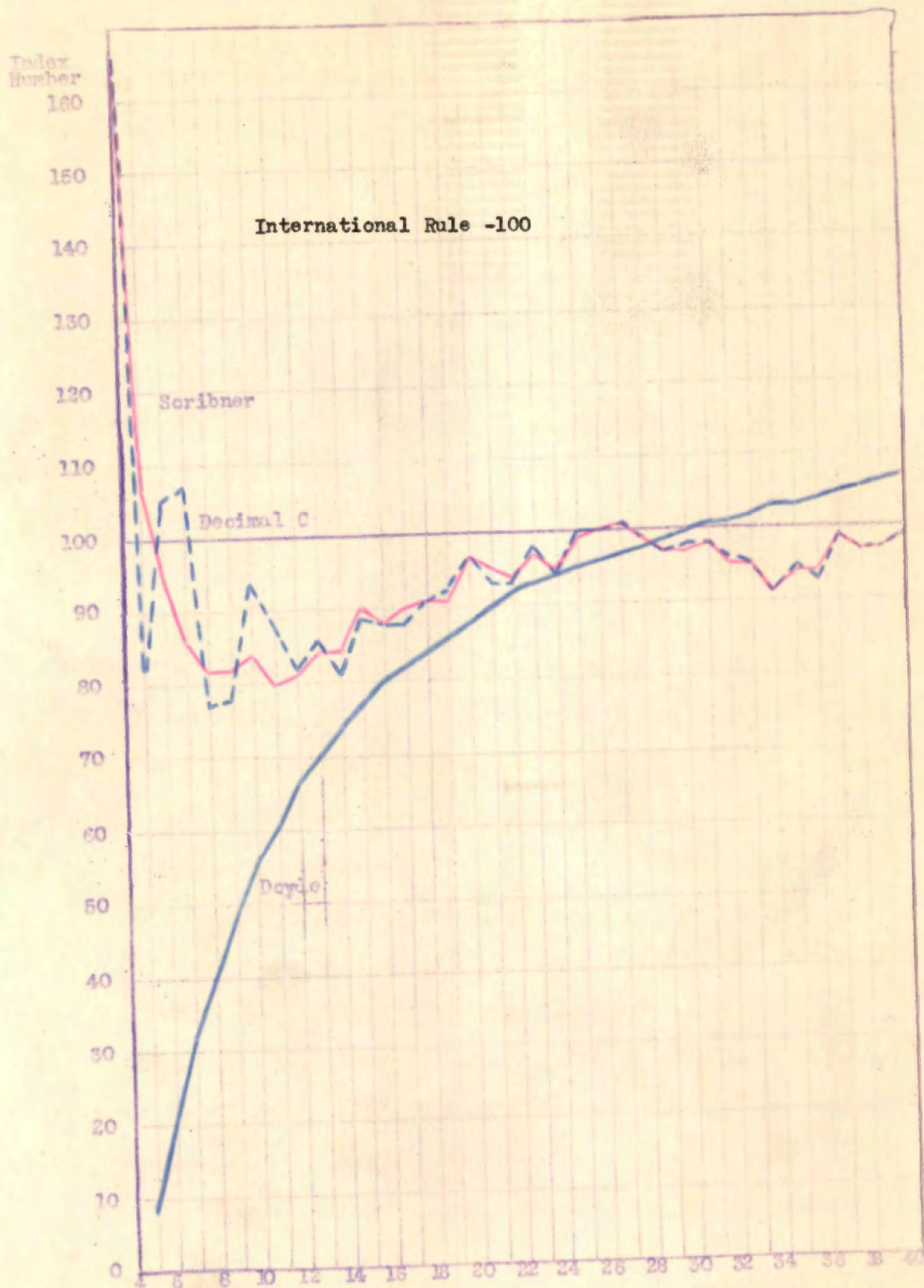


Figure 117 Index of Volume of 16 Foot Logs of Varying Diameters as Measured by Certain Principal Log Rules in Comparison with the International Rule.

Source: Table CIII

produced, although it does allow a particularly high per cent of overrun in the case of small diameters. There are two explanations of this overrun. First, since this rule was constructed some eighty years ago, there have been devised more efficient sawmill operating methods by which a better utilization of timber can be realized. Second, no allowance is made for taper which must be considered in modern mills since additional short length boards can be cut from tapering logs.

Although this rule is fairer than the Doyle rule, careful sawing should result in 10 to 20 per cent more lumber from second-growth timber than is credited by the Scribner rule.

Figure 106 shows that small logs under 6 inches in diameter yield a greater volume when measured by the Scribner rule than by the International rule. However in logs whose diameter is 6 inches or more the Scribner rule assigns values, with the exception of 26 and 27 inch logs, under those given by the International rule. For logs up to 28 inches in diameter, this rule is preferred by the sellers of timber to the Doyle since it gives higher log values. The Scribner Decimal C values follow fairly closely with those of the Scribner.

(4) Scribner Decimal C. This log rule is quite similar to the Scribner rule, since it too is based on the use of diagrams. The Federal government has adopted this rule in the measurement of all its timber, although its use by private commercial organizations has never been very great. The government instructions in the measurements of logs over 16 feet in length is that they will be scaled as two or more logs, as far as practical, in lengths not less than 12 feet. However, exceptions are made where it is possible to manufacture crossties. All diameters will

be measured to the nearest inch inside of the bark at the top end of the log. Logs having a diameter exactly halfway between inches will be thrown to the next lower inch. (39)

The Scribner Decimal C, like the Scribner rule, gives too high values to logs of very small diameters and low values to large logs (Figure 117).

(5) Certain Minor Log Rules. Quite a wide range exists in the measurement of the same size logs by the various minor log rules as indicated in Figure 118. As estimated by these rules, there is a range in the volume of a 16-foot log 5 inches in diameter of approximately 220 per cent in terms of the International Log Rule values. The Blodgett or New Hampshire Rule gives a volume of 19 board feet to a log of this size whereas the Doyle and Scribner Log rule estimates the contents of the same log at one board foot. In three of our minor rules the Champlain, the Square of Three Fourths and the Banger Rule, the values run above the actual contents, whereas the Herring and the Doyle-Scribner Rules assign values below what the log will actually turn out. Of the other minor rules compared here, the Holland and Maine yield exceedingly low volumes for logs under 6 inches in diameter whereas in large logs their values are too high. The Blodgett and New Hampshire, Humphrey or Vermont, and the Cumberland and River Log rules give exceedingly high values for small logs but underestimate the volumes of large logs.

(39) U. S. D. A. Forestry Service, Instructions for the Measurement of National Forest Timber.

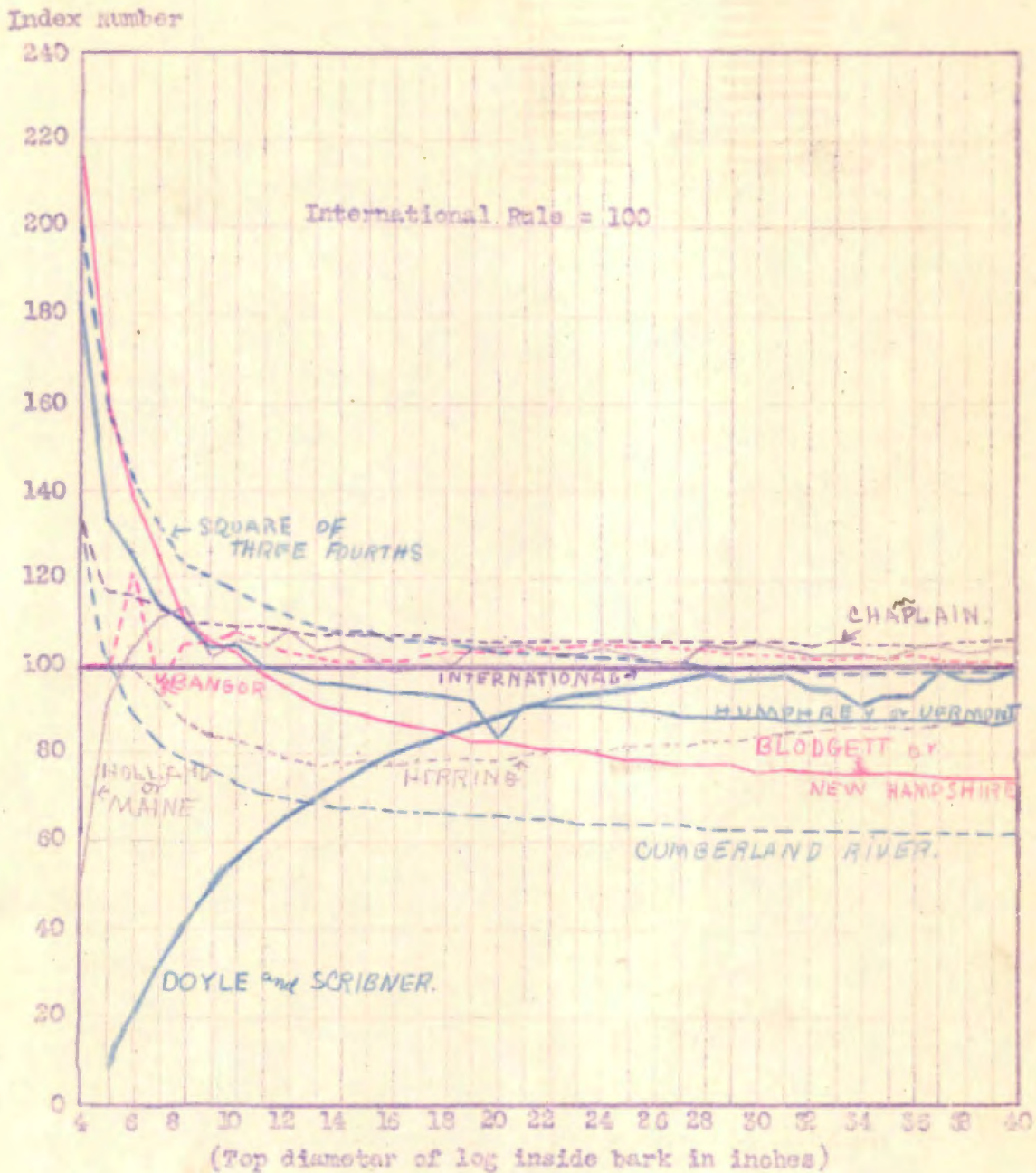


Figure 118 Index of the Volume of 16 Foot Logs of Varying Diameters
As Measured by Certain Minor Log Rules in Comparison with the
International Rule.

Source: Table CIII

TABLE CIII. INDEX OF VOLUMES OF 16-FOOT LOGS OF VARYING
DIAMETERS AS MEASURED BY CERTAIN LOG RULES IN COM-
PARISON WITH THE INTERNATIONAL LOG RULE

(International = 100 per cent)

Diameter	Inter- na- tional	Scribner	Scribner Decimal C	Doyle	Doyle and Scrib- ner	Holland or Maine	Blodgett or New Hampshire
4	100	168	166	-	-	50	217
5	100	108	83	8	8	92	158
6	100	95	105	21	21	105	137
7	100	86	107	32	32	111	125
8	100	82	77	41	41	113	110
9	100	82	78	49	49	102	106
10	100	84	94	56	56	106	103
11	100	80	88	61	61	104	98
12	100	81	82	66	66	108	95
13	100	84	86	70	70	103	91
14	100	84	81	74	74	104	90
15	100	90	89	77	77	102	89
16	100	88	88	80	80	99	87
17	100	90	88	82	82	100	86
18	100	92	91	84	84	100	85
19	100	92	92	86	86	104	83
20	100	97	97	88	88	104	83
21	100	95	93	90	90	105	82
22	100	94	93	92	92	103	81
23	100	97	98	93	93	103	81
24	100	95	94	94	94	104	80
25	100	99	100	95	95	103	79
26	100	100	100	96	96	101	79
27	100	101	101	97	97	101	78
28	100	99	99	98	99	105	76
29	100	97	97	99	97	104	78
30	100	97	98	100	97	105	76
31	100	98	98	101	98	104	77
32	100	95	96	101	95	103	76
33	100	95	95	102	95	103	76
34	100	91	91	103	91	103	76
35	100	94	95	103	94	102	76
36	100	94	93	104	94	104	76
37	100	99	99	105	99	105	75
38	100	97	97	105	97	103	75
39	100	97	97	106	97	104	75
40	100	99	99	107	99	104	75

(continued)

TABLE CIII. INDEX OF VOLUMES OF 16-FOOT LOGS OF VARYING
DIAMETERS AS MEASURED BY CERTAIN LOG RULES IN COM-
PARISON WITH THE INTERNATIONAL LOG RULE (cont.)
(International = 100 per cent

Diameter	Humphrey or Vernont	Bangor	Chamber- land River	Square of Three- Fourths	Herring	Champlain
4	183	100	133	200	100	133
5	133	100	100	158	100	117
6	126	121	89	142	100	116
7	114	96	82	132	93	114
8	110	105	79	123	87	110
9	104	106	76	120	84	110
10	106	108	73	117	83	109
11	100	106	71	114	81	109
12	99	103	70	111	79	108
13	96	102	69	109	78	107
14	96	101	68	108	79	107
15	95	101	68	108	79	107
16	94	101	67	108	78	107
17	94	102	67	108	79	107
18	93	103	66	106	79	106
19	92	103	66	104	79	106
20	84	103	66	103	79	106
21	91	104	65	103	80	106
22	91	104	65	103	80	106
23	91	105	64	102	81	106
24	91	105	64	102	81	106
25	90	106	64	102	82	106
26	90	105	64	101	82	106
27	89	104	64	101	82	106
28	89	104	63	100	83	106
29	89	103	63	100	83	106
30	89	103	63	100	84	106
31	88	103	63	100	85	106
32	88	102	63	99	85	105
33	88	102	63	99	86	106
34	88	102	62	99	86	106
35	88	102	62	99	86	105
36	88	102	62	99	86	105
37	88	101	62	99	87	106
38	88	101	62	99	87	106
39	87	101	62	99	88	106
40	88	100	62	99	89	106

Log Rules for Cedar. Firms purchasing cedar in Tennessee often buy the logs on the basis of the values given by certain cedar log measurement tables. Two cedar log tables are illustrated below. One is used by the Mitchell Manufacturing Company, of Stevenson, Alabama, and the other is used by the Gulf Red Cedar Company, of Lebanon, Tennessee. Both tables give high values for logs under 10 inches in diameter and low values for logs over 10 inches. Figure 119 shows a comparison of the values of these rules with the International rule, using a 8-foot log of various diameters. In a 4-inch log the Mitchell rule gives twice as much lumber as the International rule.

TABLE CIV. INDEX OF VOLUME OF 8 FOOT CEDAR LOGS OF VARYING DIAMETERS
AS MEASURED BY CERTAIN CEDAR LOG RULES IN COMPARISON WITH THE
INTERNATIONAL RULE

(International = 100 per cent)

Diameter	International Rule	Mitchell Co. Cedar Rule	Gulf Red Cedar Co. Cedar Rule
4	100	200	*
5	100	175	*
6	100	143	*
7	100	117	*
8	100	119	119
9	100	104	104
10	100	100	100
11	100	97	97
12	100	98	95
13	100	96	96
14	100	94	94
15	100	92	92
16	100	90	89
17	100	89	*

* Data not available.

However, as the diameter of the log increases the log values of the cedar rule decreases until in a 17-inch log the board foot contents indicated by

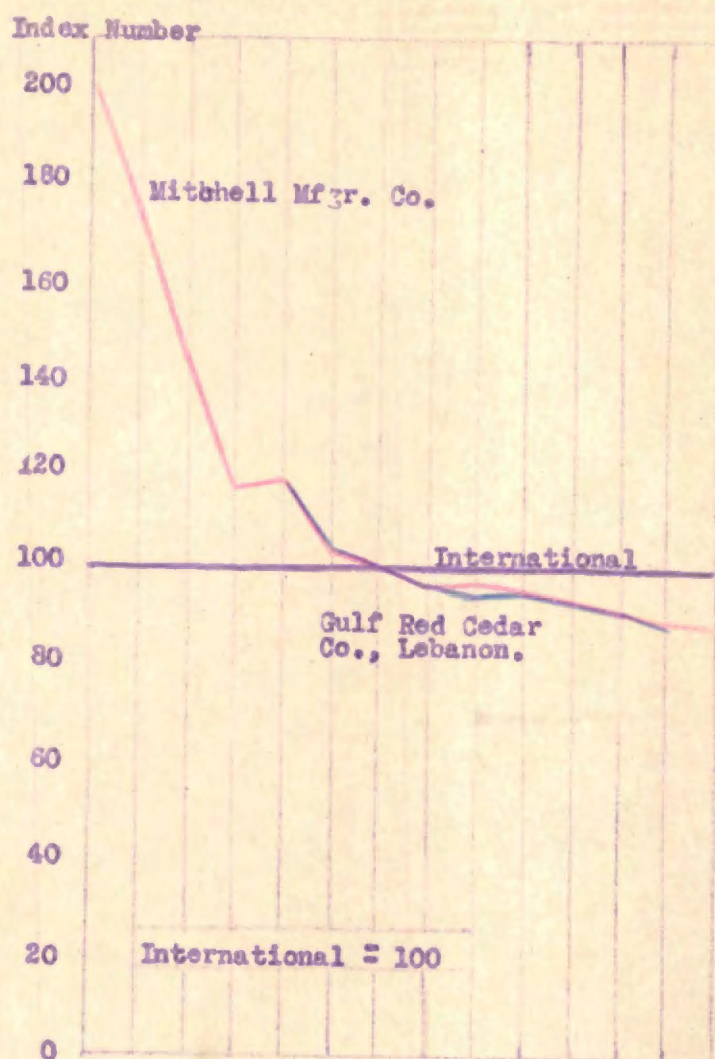


Figure 119. Index of volume of 8 foot Cedar logs of varying diameters as measured by certain Cedar log rules in comparison with the International Rule.

Source: Table.

the Mitchell Rule is 15 per cent less than that of the International rule. The individual values given by these two cedar rules conform rather closely, although the Mitchell rule begins with a 4-inch log and the Gulf rule with an 8-inch log.

TABLE CV. CEDAR LOG RULE USED BY MITCHELL MANUFACTURING COMPANY OF STEVENSON, ALABAMA *

Diameter in inches	Number board feet cut from logs of specified size						
	Length 5 feet	Length 6 feet	Length 7 feet	Length 8 feet	Length 9 feet	Length 10 feet	Length 12 feet
4	3	3	3	4	5	6	7
5	4	5	6	7	8	9	10
6	7	8	9	10	12	13	16
7	9	11	12	14	16	18	22
8	12	14	16	19	21	23	29
9	15	18	21	24	27	30	36
10	18	22	26	29	33	37	44
11	22	27	31	35	40	45	54
12	27	32	37	43	48	53	64
13	31	37	44	50	56	62	75
14	36	43	51	58	65	72	87
15	42	50	58	67	75	83	100
16	47	57	66	76	85	95	114
17	53	64	75	85	96	107	128

*According to this manufacturer, crooked logs that will not cut out are measured accordingly. Each stick must show at least $2/3$ red heart wood. Five feet is shortest length log that this company uses.

TABLE CVI. CEDAR LOG RULE USED BY THE GULF RED CEDAR COMPANY OF LEBANON, TENNESSEE

Diameter in inches	Number board feet cut from logs of specified size			
	Length 6 feet	Length 7 feet	Length 8 feet	Length 10 feet
8	14	16	19	23
9	18	21	24	30
10	22	26	29	37
11	27	31	35	45
12	32	37	42	53
13	37	43	50	62
14	43	50	58	72
15	50	58	67	83
16	57	66	75	95

Use of Volume Tables in Scaling Trees. These tables are tabulated statements showing the average contents of different sizes of a given tree species, and are based on measurements taken from a large number of felled trees (Tables CVII and CVIII). At the present time they are available for a large number of our common species. These tables can be expressed in board feet, cords, cubic feet, or in the number of posts, ties or other units of measure. However, the estimate obtained by their use is much more nearly correct when it is based on a large number of trees than when a small number is used.

The advantages of a volume table lies in its convenience of application and the time saved by using it instead of some other method in estimating timber. Through the process of mentally dividing trees into logs and scaling them on paper, as is often followed in timber estimating, it is sometimes possible by the help of reliable volume tables to shorten the work and obtain the estimate by measuring only the diameters and heights⁽⁴⁰⁾ of the trees. With these two measurements known, the estimated volume of the tree may be obtained from the volume table.⁽⁴¹⁾ However, the greatest disadvantage to its use is that the values given by the volume table are only good when the table used has been constructed from trees growing under conditions similar to those prevailing in the locality in question.

One thing that should be considered in the use of volume tables is that only those tables should be used in a locality where conditions are

(40) Bentley, op. cit., p. 20.

(41) Height in merchantable saw logs.

TABLE CIII. HARDWOOD VOLUME TABLE: CONTENTS IN BOARD FEET OF DIFFERENT DIAMETERS AND MERCHANTABLE HEIGHTS

(Stump height, 2 feet. Trees over 75 years old. Southern Decadal 6 rule.)

Diameter of tree breast-high (inches)		Number of 16-foot logs						Volume --- board feet		Diameter of top (inside bark) Inches	Trees Beats	
1	1½	2	2½	3	3½	4	4½	5				
20	20	32	42	53	64	81	120	-	-	3	-1	
21	21	33	43	54	65	82	120	98	-	6	1	
22	22	34	44	55	66	83	120	98	-	6	2	
23	23	35	45	56	67	84	120	98	-	6	3	
24	24	36	46	57	68	85	120	98	-	6	4	
25	25	37	47	58	69	86	120	98	-	6	5	
26	26	38	48	59	70	87	120	98	-	6	6	
27	27	39	49	60	71	88	120	98	-	6	7	
28	28	40	50	61	72	89	120	98	-	6	8	
29	29	41	51	62	73	90	120	98	-	6	9	
30	30	42	52	63	74	91	120	98	-	6	10	
31	31	43	53	64	75	92	120	98	-	6	11	
32	32	44	54	65	76	93	120	98	-	6	12	
33	33	45	55	66	77	94	120	98	-	6	13	
34	34	46	56	67	78	95	120	98	-	6	14	
35	35	47	57	68	79	96	120	98	-	6	15	
36	36	48	58	69	80	97	120	98	-	6	16	
37	37	49	59	70	81	98	120	98	-	6	17	
38	38	50	60	71	82	99	120	98	-	6	18	
39	39	51	61	72	83	100	120	98	-	6	19	
40	40	52	62	73	84	101	120	98	-	6	20	
41	41	53	63	74	85	102	120	98	-	6	21	
42	42	54	64	75	86	103	120	98	-	6	22	
43	43	55	65	76	87	104	120	98	-	6	23	
44	44	56	66	77	88	105	120	98	-	6	24	
45	45	57	67	78	89	106	120	98	-	6	25	
46	46	58	68	79	90	107	120	98	-	6	26	
47	47	59	69	80	91	108	120	98	-	6	27	
48	48	60	70	81	92	109	120	98	-	6	28	
49	49	61	71	82	93	110	120	98	-	6	29	
50	50	62	72	83	94	111	120	98	-	6	30	
51	51	63	73	84	95	112	120	98	-	6	31	
52	52	64	74	85	96	113	120	98	-	6	32	
53	53	65	75	86	97	114	120	98	-	6	33	
54	54	66	76	87	98	115	120	98	-	6	34	
55	55	67	77	88	99	116	120	98	-	6	35	
56	56	68	78	89	100	117	120	98	-	6	36	
57	57	69	79	90	101	118	120	98	-	6	37	
58	58	70	80	91	102	119	120	98	-	6	38	
59	59	71	81	92	103	120	120	98	-	6	39	
60	60	72	82	93	104	120	120	98	-	6	40	
61	61	73	83	94	105	120	120	98	-	6	41	
62	62	74	84	95	106	120	120	98	-	6	42	
63	63	75	85	96	107	120	120	98	-	6	43	
64	64	76	86	97	108	120	120	98	-	6	44	
65	65	77	87	98	109	120	120	98	-	6	45	
66	66	78	88	99	110	120	120	98	-	6	46	
67	67	79	89	100	111	120	120	98	-	6	47	
68	68	80	90	101	112	120	120	98	-	6	48	
69	69	81	91	102	113	120	120	98	-	6	49	
70	70	82	92	103	114	120	120	98	-	6	50	
71	71	83	93	104	115	120	120	98	-	6	51	
72	72	84	94	105	116	120	120	98	-	6	52	
73	73	85	95	106	117	120	120	98	-	6	53	
74	74	86	96	107	118	120	120	98	-	6	54	
75	75	87	97	108	119	120	120	98	-	6	55	
76	76	88	98	109	120	120	120	98	-	6	56	
77	77	89	99	110	120	120	120	98	-	6	57	
78	78	90	100	111	120	120	120	98	-	6	58	
79	79	91	101	112	120	120	120	98	-	6	59	
80	80	92	102	113	120	120	120	98	-	6	60	
81	81	93	103	114	120	120	120	98	-	6	61	
82	82	94	104	115	120	120	120	98	-	6	62	
83	83	95	105	116	120	120	120	98	-	6	63	
84	84	96	106	117	120	120	120	98	-	6	64	
85	85	97	107	118	120	120	120	98	-	6	65	
86	86	98	108	119	120	120	120	98	-	6	66	
87	87	99	109	120	120	120	120	98	-	6	67	
88	88	100	110	120	120	120	120	98	-	6	68	
89	89	101	111	120	120	120	120	98	-	6	69	
90	90	102	112	120	120	120	120	98	-	6	70	
91	91	103	113	120	120	120	120	98	-	6	71	
92	92	104	114	120	120	120	120	98	-	6	72	
93	93	105	115	120	120	120	120	98	-	6	73	
94	94	106	116	120	120	120	120	98	-	6	74	
95	95	107	117	120	120	120	120	98	-	6	75	
96	96	108	118	120	120	120	120	98	-	6	76	
97	97	109	119	120	120	120	120	98	-	6	77	
98	98	110	120	120	120	120	120	98	-	6	78	
99	99	111	120	120	120	120	120	98	-	6	79	
100	100	112	120	120	120	120	120	98	-	6	80	
101	101	113	120	120	120	120	120	98	-	6	81	
102	102	114	120	120	120	120	120	98	-	6	82	
103	103	115	120	120	120	120	120	98	-	6	83	
104	104	116	120	120	120	120	120	98	-	6	84	
105	105	117	120	120	120	120	120	98	-	6	85	
106	106	118	120	120	120	120	120	98	-	6	86	
107	107	119	120	120	120	120	120	98	-	6	87	
108	108	120	120	120	120	120	120	98	-	6	88	
109	109	120	120	120	120	120	120	98	-	6	89	
110	110	120	120	120	120	120	120	98	-	6	90	
111	111	120	120	120	120	120	120	98	-	6	91	
112	112	120	120	120	120	120	120	98	-	6	92	
113	113	120	120	120	120	120	120	98	-	6	93	
114	114	120	120	120	120	120	120	98	-	6	94	
115	115	120	120	120	120	120	120	98	-	6	95	
116	116	120	120	120	120	120	120	98	-	6	96	
117	117	120	120	120	120	120	120	98	-	6	97	
118	118	120	120	120	120	120	120	98	-	6	98	
119	119	120	120	120	120	120	120	98	-	6	99	
120	120	120	120	120	120	120	120	98	-	6	100	

* Given volumes of trees about as sawed out in average practice.

Correction factors for different species

chestnut, for diameters up to 40 inches, subtract 10 per cent
 chestnut oak, for diameters from 32 to 40 inches, add 10 per cent
 white oak, for diameters from 18 to 40 inches, add 10 per cent
 Other common hardwoods, for all diameters, use the table without change

Source: W. D. Stewart, Marketing Woodlot Products in Tennessee, pp. 152-153.

TABLE CVIII. SOFTWOOD VOLUME TABLE: CONTENTS IN BOARD FEET OF
DIFFERENT DIAMETERS AND MERCHANTABLE HEIGHTS

(Stump height, 2 feet. Diameter (inside bark) of top, 6 inches. Trees
over 75 years old. Scribner Decimal C rule.)*

Diameter of tree, breast- high (inches)	Number of 16-foot logs							Basic Trees
	2	2½	3	3½	4	4½	5	
	Volume - board feet							
8	37	52	66	75	84	-	-	12
9	41	58	70	82	93	-	-	9
10	47	66	77	92	100	120	-	12
11	53	74	86	100	120	140	-	13
12	60	83	97	120	140	160	200	8
13	68	94	110	130	160	190	220	4
14	77	110	120	150	180	210	240	7
15	-	120	140	170	200	240	270	11
16	-	130	160	190	230	270	310	20
17	-	150	180	220	260	300	340	21
18	-	170	210	250	280	330	380	20
19	-	190	230	280	320	370	420	34
20	-	210	260	310	360	410	470	27
21	-	-	290	350	400	460	520	33
22	-	-	320	390	440	510	570	40
23	-	-	360	430	490	560	620	37
24	-	-	400	470	540	620	680	37
25	-	-	440	520	600	680	740	47
26	-	-	480	560	660	740	810	52
27	-	-	-	600	720	800	880	43
28	-	-	-	650	780	870	950	45
29	-	-	-	-	840	940	1,030	39
30	-	-	-	-	910	1,010	1,100	47
31	-	-	-	-	-	1,060	1,180	40
32	-	-	-	-	-	1,150	1,260	44
33	-	-	-	-	-	1,230	1,340	39
34	-	-	-	-	-	-	1,420	36
35	-	-	-	-	-	-	1,500	34
36	-	-	-	-	-	-	1,580	29

*Gives volumes of trees about as sawed out in average practice.

Correction factors for different species

Hemlock: For diameters from 8 to 10 inches, add 10 per cent

For diameters from 11 to 20 inches, add 22 per cent.

Red Spruce: For diameters from 8 to 10 inches, add 5 per cent

For diameters from 11 inches and up, add 25 per cent.

Shortleaf Pine: For diameters from 10 inches and under, add 15 per cent

For diameters from 11 to 19 inches, add 25 per cent

For diameters from 20 to 23 inches, add 35 per cent

For diameters from 24 inches and over, add 40 per cent.

White pine and other common conifers, for all diameters, use the table
without change.

Source: W. D. Sterrett, Marketing Woodlot Products in Tennessee, pp. 154-155.

practically the same as those that prevailed in the locality where the volume tables were constructed. In other words, it would not be wise to use a table for estimating white oak in Tennessee that was constructed from measurements of New England white oak.

However, the highest degree of accuracy in timber estimating is obtained by measuring each tree of marketable size and deriving its contents from a local volume table.

Trees may be separated in the tally by groups of species such as white oak, black oak, etc., or all may be thrown together. A separation of species is advisable and should be made when a difference in stumpage values exist, and there is a sufficient amount of higher priced wood to pay for the trouble of keeping separate tallies. (42)

Tables CVII and CVIII are volume tables for hard and softwood trees and may be applied to Tennessee conditions with certain corrective factors given at the bottom of the tables. In using these tables it is necessary to measure the diameter of each tree and its merchantable height, then look up in the table the volume for a tree of this size and apply any necessary corrective factors given at the bottom of the volume table. Suppose, for instance, that the diameter of a white oak tree is 25 inches and from this tree three 18-foot logs can be cut making the total merchantable height 48 feet. Looking these values up in the hardwood volume table we get 610 board feet. But since 10 per cent must be added to white oaks over 18 inches the total corrected volume of the tree amounts to 671 board feet.

(42) Chapman and Demeritt, op. cit., pp. 112-113.

Estimating Stands of Timber in Boundaries

If the farmer has had considerable experience at estimating timber, or if his woodlot is small, it might be possible for him to estimate his stand fairly accurately. On the other hand, it must be remembered that in order to obtain an accurate estimate of standing timber considerable skill and experience are required, and where the woodlot is large and contains a large quantity of valuable material, it may prove advisable to secure the services of an experienced estimator.

Methods of Estimating Standing Timber in Which All the Trees Are Counted. 1. The Single-Log Method ⁽⁴³⁾ involves estimating the entire merchantable portion of the tree as one log. The procedure followed in making this estimate is as follows:

(a) Estimate the entire length of the merchantable section of the tree.

(b) Then, estimate the top and bottom diameters of each log inside the bark.

(c) Average these diameters and find the contents by the International Log Rule.

2. The Tree to Tree Count ⁽⁴⁴⁾ is one of the most accurate methods for inexperienced estimators providing the work is done carefully. This method requires the ability to judge diameters at different places on the tree and also requires the use of a tally sheet and log tables.

(43) Bentley, *op. cit.*, p. 47.

(44) Balland, J. W., Marketing of Woodland Products, p. 40.

By this method the estimator determines the lengths of the various logs which are of merchantable size in each tree, together with the top diameter inside the bark of each log and enters these data in the proper place in the tally sheet according to the diameter and length. Since considerable skill is required in estimating diameters it may be necessary for the inexperienced estimator to measure the tree at a point breast-high, or about $4\frac{1}{2}$ feet above the ground, in order to provide a check on the measurement of the top diameters of the log. In estimating the diameters of logs at different heights, the estimator must allow for the average thickness of the bark since measurements are made inside the bark. A good idea of the amount to deduct may be obtained by taking measurements of bark on felled trees. The advantage of this method is that it allows the operator to make allowances for defects before making his entries on the tally sheet.

(3) The Average Tree Method ⁽⁴⁵⁾ requires the counting of all the trees in the stand, estimating the board foot contents of the average size tree and multiplying this by the total number of trees in the lot. The greatest disadvantage to this method is the selection of a tree that will represent the average size tree of the woodlot and that will give a correct estimate of the stand. For ordinary farm estimates this method should be disregarded since an error in estimating the average size of tree might throw the total estimate off considerably.

(4) The Diameter Class Method ⁽⁴⁶⁾ is more commonly used than the average tree method but is less desirable for ordinary farm

(45) Gallard, op. cit., p. 49.

(46) Ibid., p. 49.

purposes than either of the first two methods. This method involves the determination of the breast-height diameters of all trees in the lot and tallying them in the respective inch diameter class; that is, the 9-inch trees together and all 10-inch trees together. Next multiply the contents of the average tree of each diameter class by the number of trees in that class, and add the results obtained for each class to secure the total volume of the entire lot. Trees estimated should be marked with chalk, crayon or some other method to avoid counting any tree more than once. (47)

Estimating Standing Timber When Only Part of the Trees Are Counted..

Timber estimates through the use of sample areas or partial measurements are sometimes made since they reduce the time and labor required in making estimates and therefore reduce cost of estimating. If the farmer has considerable acreage in timber, it may be more desirable to use one of the area methods of timber estimating rather than rely on one of the tree count methods previously described. However, in most cases the farm woodlot is small enough to use one of the more accurate methods in which each of the individual trees in the stand is considered separately.

Some of the rules governing sampling are:

(1) As the size of the tract diminishes, the per cent covered must increase in order to secure an equal degree of accuracy.

(2) Sampling for timber stands of similar character must be controlled purely by mechanical location since there is a tendency, on the part of the estimator, to select stands for measurement which are

(47) Gallard, op. cit., p. 49.

above the average for the woodlot.

(3) When the rectangle method is used, strips must intersect stands of timber of similar character at right angles rather than traverse them lengthwise. Often serious errors have been made by running strips along stream bottoms or in coves instead of intersecting them.
(48)

The area methods considered here are two: the quarter-acre circle method and the rectangular measurement method. Of the two methods, the quarter-acre circle method is more adaptable to farm woodlands and for this reason a more detailed description of it is given.

(1) Quarter-Acre Circle Method. This method consists in an accurate measurement of representative quarter-acre plots with the final estimate being calculated from the actual measurements obtained in these representative plots. In making estimates of timber stands by this method, one should proceed as follows: Select a representative quarter-acre area. In order to be sure that one has an area exactly one quarter of an acre, select some tree or other mark as the center of the circle and count all the trees within a 59 foot radius from the center. Since a difference of only two feet in the radius may throw the results off considerably, the inexperienced estimator should measure the radius with a tape line. Especial attention should be paid to counting the trees on the area only once which may be accomplished by marking the trees with chalk as they are counted. After the trees have been tallied according to the number

(48) Chapman and Demeritt, op. cit., p. 115.

of logs they will cut and their top diameters as previously described, the logs may be scaled and the total contents of the plot may be determined by adding together the number of board feet in each log. ⁽⁴⁹⁾ The question may arise as to how many sample plots should be taken in order to obtain a good estimate. Usually the plots will decrease as the uniformity of the stand increases; also with a greater number of sample plots, the accuracy of the estimate increases. In general the number of plots selected should be sufficient to include representative parts of the stand.

(2) Rectangular Method. This method is more adaptable to measuring large timber areas where the plots are square or rectangular in shape and in which the exact areas are known. In using this method of estimating timber, strips usually 40 rods long and 4 rods wide are run through the woods and all the timber within these strips are measured and the estimate of the whole area is calculated on basis of these measurements. ⁽⁵⁰⁾

The sample strips should be wider for old than for young stands, since a greater range in diameters are contained in the older stands. The width of the strip suitable for a desirable sample should also be wider for the large timber species, such as old growth southern yellow pine, than for the smaller species, such as spruce or balsam in the North. ⁽⁵¹⁾

When farm conditions justify the use of an area method of estimating timber the quarter-acre circle is preferred.

Estimating Stands of Forest Products Other Than Logs from Standing Timber

Poles and Piling have top diameters small enough to utilise practically

(49) Bentley, op. cit., p. 21

(50) Ibid., p. 21.

(51) Chapman and Demeritt, op. cit., p. 115.

the entire stem of the tree. Generally these items are estimated by tallying each tree suitable for a piece under its proper length. (52)

Railroad Crossties. In estimating the number of crossties in a tract of timber, the most accurate results are obtained by using a tie "log rule". Table CIX contains a log rule which estimates the number of each grade of ties that can be cut from 8 1/2 foot bolts of different diameters. By tallying the diameters inside the bark of all bolts of this length, the tie log rule will give a close approximation of the yields of ties of each of these three grades. This method of estimating ties is quite similar to that employed in estimating board-foot volume of standing timber by using a log rule. One disadvantage is that it might be practically impossible to find a volume table applicable to local conditions. (53)

TABLE CIX. LOG RULE FOR THREE GRADES OF TIES

Diameter inside bark in inches at small end of bolts 8 1/2 feet long	Ties		Additional feet board measure
	Number of ties produced	Grade number (U.S. standard)	
7	1	2	-
8	1	2	-
9	1	3	-
10	1	5	2
11	1	5	5
12	1	5	15
13	2	3	12
14	2	3	19
15	1	5	19
or	1	3	-
or	2	3	27

(continued)

(52) Chapman and Demeritt, op. cit., p. 222.

(53) Ibid., pp. 295-297.

TABLE CIX. LOG RULE FOR THREE GRADES OF TIES (cont.)

Diameter inside bark in inches at small end of bolts 8 1/2 feet long		Ties		Additional feet board measure
		Number of ties produced	Grade number (U.S. standard)	
16		1	5	-
1	or	1	3	31
	or	2	3	43
17		2	5	35
	or	3	3	25
18		4	3	16
	or	3	3	-
	or	1	2	20
19		3	5	31
	or	4	3	26
	or	4	2	38
20		3	5	45
	or	4	3	36
	or	5	2	30
21		2	5	-
	or	2	3	34
	or	4	3	52
	or	5	2	38
22		3	5	40
	or	1	3	-
	or	5	3	45
	or	1	5	20
	or	5	2	-
23		4	5	55
	or	5	3	60
	or	7	2	25
24		4	5	45
	or	1	3	3-
	or	6	3	52
	or	7	2	44
25		5	5	68
	or	1	2	-
	or	7	3	18
	or	8	2	40
26		4	5	-
	or	2	3	33
	or	1	2	-
	or	8	3	36
	or	9	2	47

Source: Elements of Forest Mensuration, by Chapman and Demeritt, pp. 296-297.

(54)

Mine Props and Mine Timbers. Since a considerable number of mine props are purchased by the piece, perhaps the simplest method would be to estimate the number of bolts that can be cut from each tree. When the cubic contents is the basis on which mine timbers are sold, it is much easier to estimate the standing timber. Here the top diameter to which the props are merchantable would give the basis for the cubic contents of the tree and a standard merchantable cubic volume table would give the contents of the tally.

(55)

Post Timbers. Since posts are quite similar to mine props in character, they may be estimated in virtually the same manner as mine timber. Because posts are cut more uniformly to standard lengths, it may be easier to count the trees and estimate the number of round posts that can be cut from the average tree. Tree volume tables may also be used in estimating post timbers. Where split bolts are used, the number can be computed from the contents of bolts of timber of the proper length.

The Disadvantage of Marketing Small Logs

In marketing farm timber small logs should not be cut since cutting them reduces the net profit from the timber tract. A good policy to follow in selling standing timber from the farm woodlot is that live timber does not need to be sold at a sacrifice since it continues to grow rather than deteriorate when left standing. (56) The marketing cost becomes relatively large for small diameter trees, whereas the marketing costs of trees over 20 inches in diameter are fairly constant.

(54) Chapman and Demeritt, op. cit., p. 289.

(55) Ibid., p. 289.

(56) Pennsylvania Extension Bulletin 149, Farm Woodlot Timber, p. 31.

This increased expense in the case of small diameter logs is due to a greater number of pieces that are required to produce a thousand feet of lumber. Hence, the sawing cost per unit is increased due to a decreased output of the mill.

Table CX shows the range in marketing cost per 1000 board feet of different diameter logs. These data are taken from actual mill scale studies on second growth short leaf pine stands cut on a circular saw. Although the figures are not applicable to every operation their relative

TABLE CX. EFFECT OF SIZE OF TREE ON LOGGING,
SAWING, AND HANDLING

Cost of pine lumber

Diameter of tree 4 1/2 feet above ground (inches)	Stump di- ameter (inches)	Costs per 1000 board feet						Number of pieces of 1 inch lumber per 1000 ft. of lumber
		Fell- ing	Skid- ding	Loading and hauling	Saw- ing	Stack- ing	Load- ing	
9	10.3	\$1.92	\$2.43	\$6.89	\$3.48	\$0.82	\$0.78	233
10	11.5	1.64	1.95	6.70	2.94	0.80	0.77	229
12	14.0	1.25	1.45	6.16	2.22	0.75	0.72	214
14	16.5	1.13	1.20	5.72	1.83	0.63	0.60	180
16	18.8	1.06	1.07	5.37	1.58	0.50	0.48	144
18	21.1	1.05	1.02	5.09	1.46	0.44	0.42	126
20	23.4	1.02	1.01	4.90	1.32	0.41	0.38	117
22	25.7	1.01	1.00	4.68	1.26	0.40	0.40	115
24	27.8	.99	1.00	4.52	1.21	0.40	0.40	114
25	28.6	.99	.99	4.49	1.19	0.40	0.40	113

Source: Ledewick, J. Elton, Marketing Woodland Products in Virginia,
P. 24.

value should hold true, nevertheless, under present Tennessee conditions. It is evident that when considered on the basis of 1000 feet of lumber

produced, the marketing costs decrease with an increase in diameter.

In estimating small logs it must be borne in mind that the waste at the sawmill in slabs and edgings will amount to quite a large percentage of small logs, whereas when the size of the log increases the per cent waste constantly decreases. In a 10-inch log (Table CXI) the waste due to slabbing and edging amounts to more than one fourth of the log's total volume, whereas in the case of a 40-inch log the waste amounts to one-fourteenth of the total. In other words, the smaller the log the greater will be the per cent of loss due to the manufacturing of the product.

TABLE CXI. COMPARISON OF WASTE DUE TO SLABS AND EDGINGS IN LARGE VERSUS SMALL LOGS

Diameter at small end of log in inches	Waste due to slabbing and edging in per cent	Comparative ratios of 10-inch with 20 and 40 inch logs as to:	
		Total cubic contents	Loss from slabbing and edging (approximate only)
10	27.75	1	1
20	14.44	4	2
40	7.27	16	4

Sources: Chapman and Demeritt, Elements of Forest Mensuration, pp. 188-189.

It has been found that the percentage of high grade lumber increases with the size of the tree, which means a higher value for the timber produced from the larger trees. Considering this increase in higher grades with a decreasing harvesting cost for large trees, the advantage of confining our cuttings to large trees becomes more evident.

The T. V. A. Forestry Department concluded that as a general rule the handling of trees under twelve inches in diameter at the small end is not considered profitable. (57) Good quality trees below these limits should be left standing. However, if they are defective, crooked, or occupying space which should be taken by faster growing trees they should be removed.

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