FOREST STATISTICS OF KENTUCKY

CENTRAL STATES
FOREST EXPERIMENT STATION
Columbus 13, Ohio
PHILIP A. BRIEGLEB, DIRECTOR

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FOREST STATISTICS OF KENTUCKY

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FOREWORD

The Forest Survey is a Nation-wide activity of the Forest Service. The fivefold purpose of the Forest Survey is (1) to make a field inventory of the present supply of standing timber; (2) to find out how fast this supply is being increased through growth; (3) to find out how fast it is being diminished through industrial and domestic uses, windfall, fire, disease, and other causes; (4) to determine the present consumption and the probable future trend in requirements for forest products; and (5) to interpret and correlate these findings with existing and anticipated economic conditions, as an aid in formulating both private and public policies for use of land suitable for forest production.

The Forest Survey is conducted in the various regions by the forest experiment stations of the Forest Service. In Kentucky the project is directed by the Central States Forest Experiment Station with headquarters in Columbus, Ohio.

This Survey Release presents the more significant preliminary statistics on the forest area, timber volume, timber growth, and timber drain for the State of Kentucky. Later, an analytical report for the State will be published which will interpret statistics on forest area, timber volume, growth, and drain in the light of existing and anticipated economic conditions.

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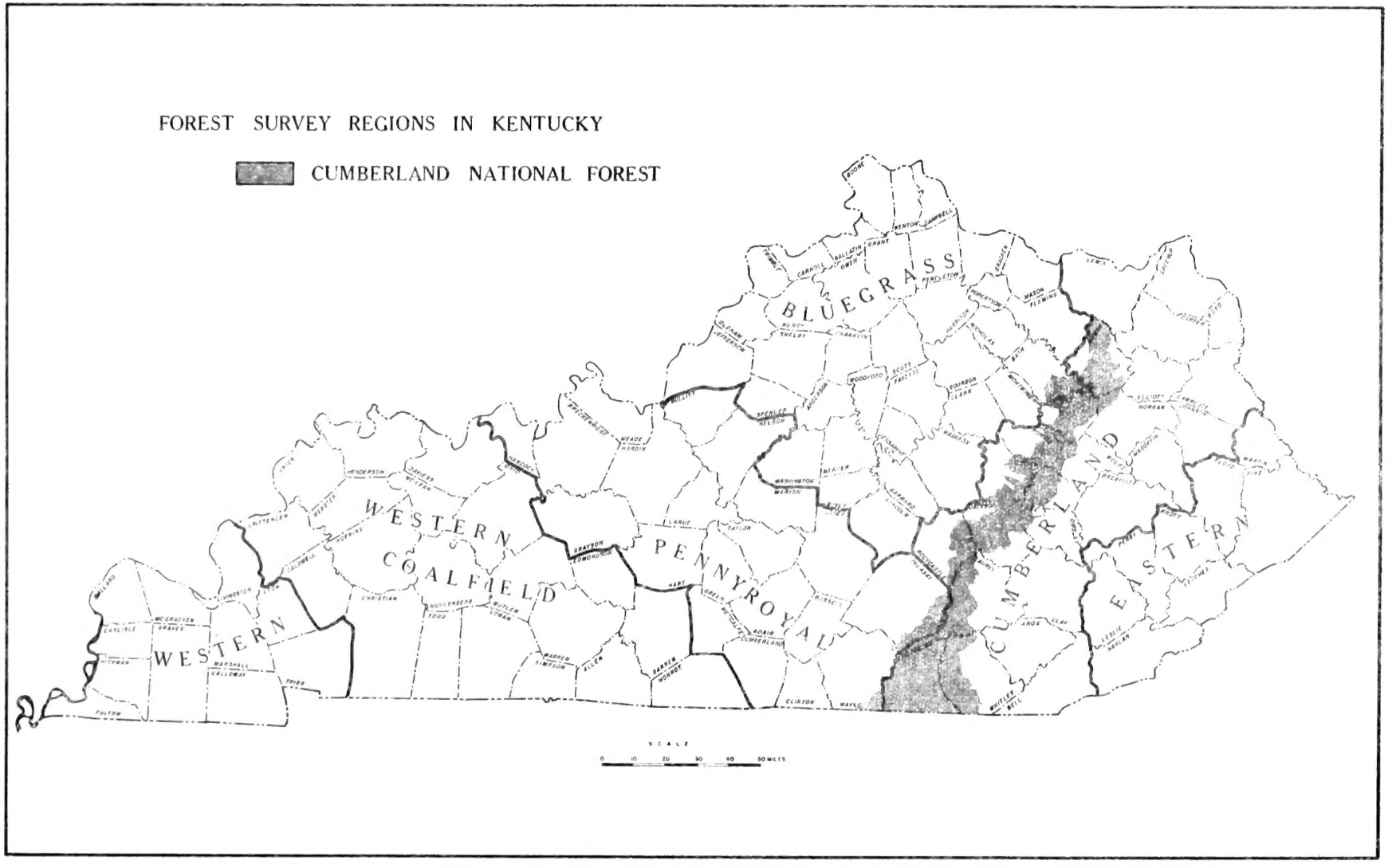
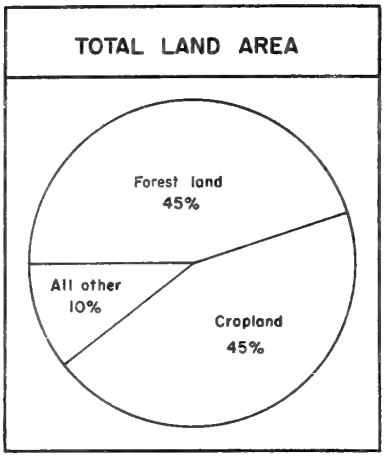
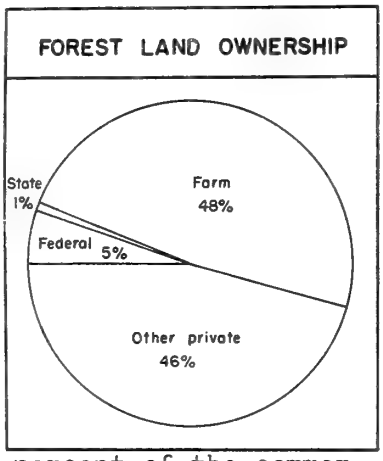

FOREST SURVEY REGIONS IN KENTUCKY
CUMBERLAND NATIONAL FOREST
BLUEGRASS
WESTERN COALFIELD
PENNYROYAL
CUMBERLAND
EASTERN
WESTERN
SCALE
0 10 20 30 40 50 MILES

SIGNIFICANT FOREST STATISTICS FOR THE STATE OF KENTUCKY

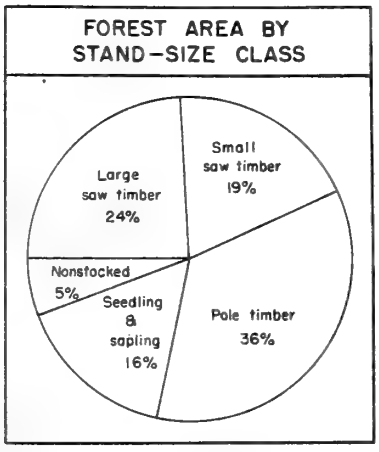
AREA



Forty-five percent (11.5 million acres) of Kentucky's total land area is classed as forest land. All of the forest land[1/] is of commercial importance though about 51,000 acres are reserved from timber use. The proportion of land in forest varies from as little as 2 percent in Bourbon County in the Bluegrass Region to over 90 percent in some counties of the Cumberland and Eastern Regions.



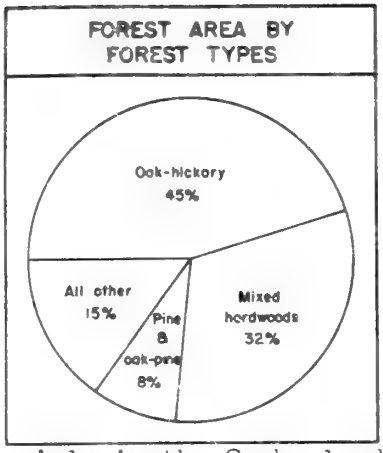
Ninety-four percent of the forest land is privately owned. About half of the privately owned forest area is on farms. Most of the publicly owned forest land is in the Cumberland National Forest. The State owns only about 53,000 acres of forest land.



Forty-three percent of the commercial forest area supports saw-timber stands. These are classed as large and small, depending upon the size of trees making up the volume. More than half of the saw-timber area is classed as large saw timber and averages over 5,000 board feet per acre. The small saw-timber stands average 3,000 board feet per acre. The large saw-timber area is more concentrated in the two eastern regions where 1.7 million acres of this class are found.

Pole-timber stands make up a little over one-third of the forest area. These stands average 432 cubic feet per acre. The nonstocked area is of relatively small importance in Kentucky. Stands of this class average 52 cubic feet per acre. Given adequate protection from fire and grazing, most nonstocked areas will eventually become satisfactorily stocked.

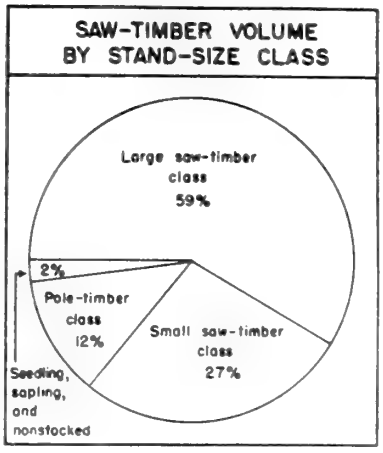
1/ For definitions of terms used see page 34.



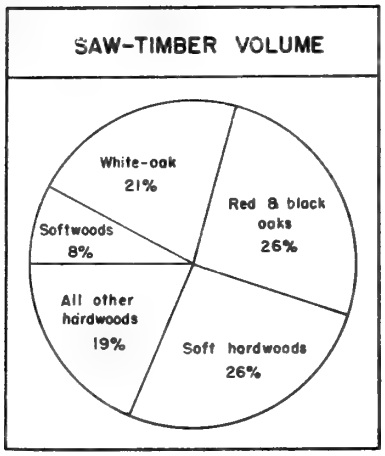
More than 75 percent of the forest land is included in two types--oak-hickory and mixed hardwoods. Various oaks and hickories comprise 85 percent of the oak-hickory type which is found mainly on the drier upland sites. The mixed hardwoods type, which occurs mainly on the moist but well-drained sites, is usually found on cool, lower slopes and in coves. Principal species of this type include yellow-poplar, white and red oaks, hickory, beech, maple, ash, basswood, elm, walnut, and hemlock. The important pine and oak-pine types of Kentucky occur mainly in the Cumberland Region and are most concentrated on the Cumberland National Forest. The other types recognized by the Forest Survey are widely scattered throughout the State.

SAW-TIMBER VOLUME

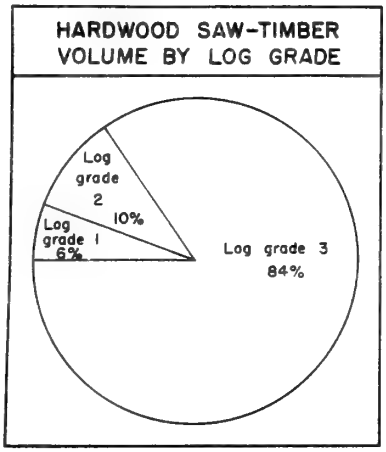
Of the 24.7 billion board feet[2/] (Int. 1/4-inch log scale) of saw timber, 86 percent is on areas classed as saw timber. About 59 percent is on areas classed as large saw timber. The heaviest concentration of saw-timber volume is in the Eastern Region where the forest area averages 3,349 board feet per acre. The average volume per acre for the state is 2,154 board feet.



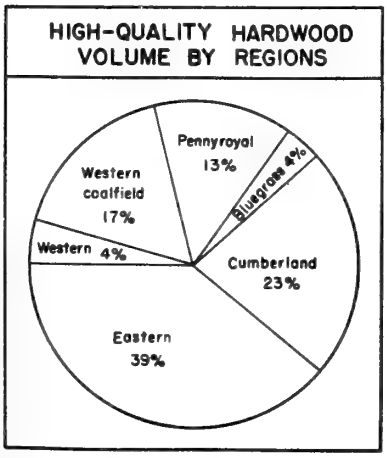
2/ The saw-timber volume is substantially increased over the figure estimated for the 1945 forest reappraisal report; the forest area is decreased slightly. Present figures differ from the 1945 estimates, partly because different definitions of forest area and commercial volume were used. but mainly because insufficient information was available in 1945 to make a more accurate estimate. The data presented here are based upon the first thorough and systematic survey of Kentucky forests.



Ninety-two percent of the board-foot volume is in hardwood species, with various species of oak comprising 47 percent of the total. Species that are often classed as soft hardwoods, such as cottonwood, yellow-poplar, basswood, and gum, make up about one-fourth of the volume. Over three-fourths of the softwood volume is shortleaf and Virginia pine.



Nearly 85 percent of the hardwood saw-timber volume is in low-quality (grade 3) logs. For the most part, hardwood trees will not contain grade 1 and 2 sawlogs until they have reached the 16-inch d.b.h. class. Accordingly, 8 billion board feet of the 19 billion board feet in grade 3 sawlogs are in trees that are too small to qualify for a higher grade. Many of these trees will contain high-quality logs after they have had a chance to grow. Some of the remaining 11 billion board feet in grade 3 sawlogs is in top logs that also are too small to qualify for a higher grade. Much of the low-quality volume, however, is in logs that are too rough and defective ever to qualify as grade 1 and 2 sawlogs.



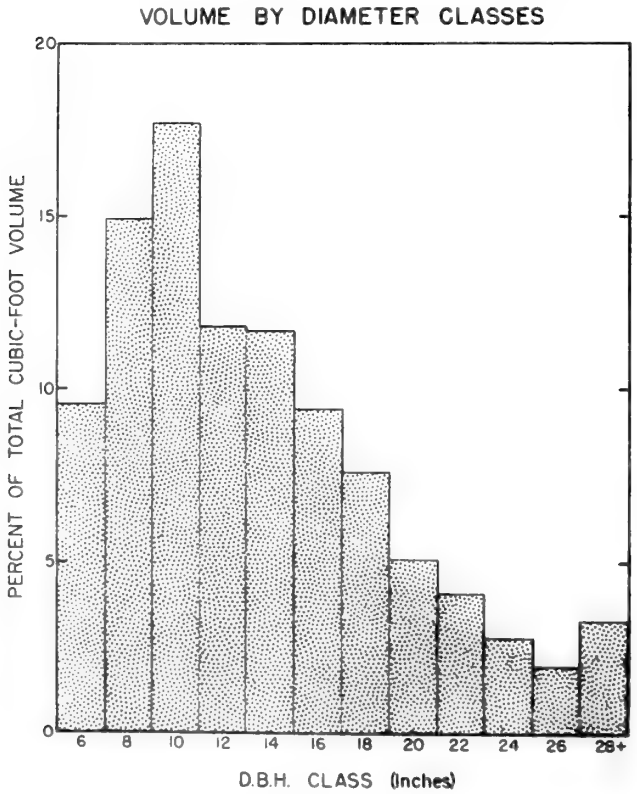
Nearly 40 percent of the high-quality (grade 1 and 2) volume is in the Eastern Region even though this region contains less than 25 percent of the board-foot timber volume. Much of the large timber in this region remains because it was considered economically inaccessible at one time. Seventy-five percent of the board-foot volume in the Eastern Region is in trees 16 inches or larger in diameter.

In addition to the large volume of low-quality sawlogs, 1,686 million cubic feet of sound wood occurs in cull trees. About one of every five saw-timber-size trees is a sound or rotten cull, occupying valuable growing space in the stands.

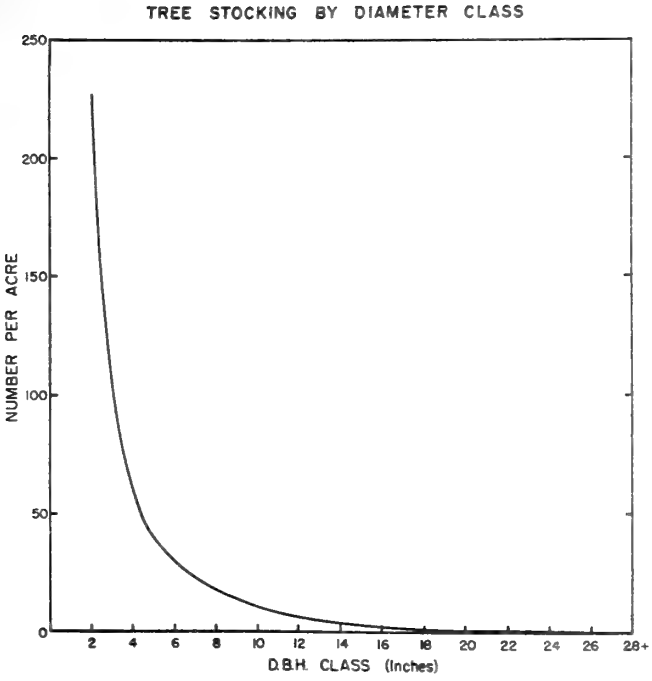
Sawlog quality of existing stands is greatly influenced by past stand treatment, especially cutting practices, fire, and grazing. Commercial operators primarily concerned with immediate returns naturally tend to high-grade uneven-aged, mixed-hardwood stands. This practice of cutting only certain desired species and only the best trees of these species, results in a gradual stand deterioration which is most noticeable in the low quality of trees left in the stand. The quality and character of Kentucky forests will not improve until cutting practices designed to grow large, high-quality trees are accepted and until the stands are protected from fire and grazing.

GROWING STOCK VOLUME

The growing stock, which includes all sound trees 5.0 inches d.b.h. and larger, has a volume of 6,570 million cubic feet. This is an average of 574 cubic feet per acre of commercial forest land in the state. The best stocking, based on the average cubic-foot volume of growing stock per acre, is in the Western Region which has 666 cubic feet per acre; the Bluegrass Region, with 387 cubic feet per acre, has the poorest stocking.



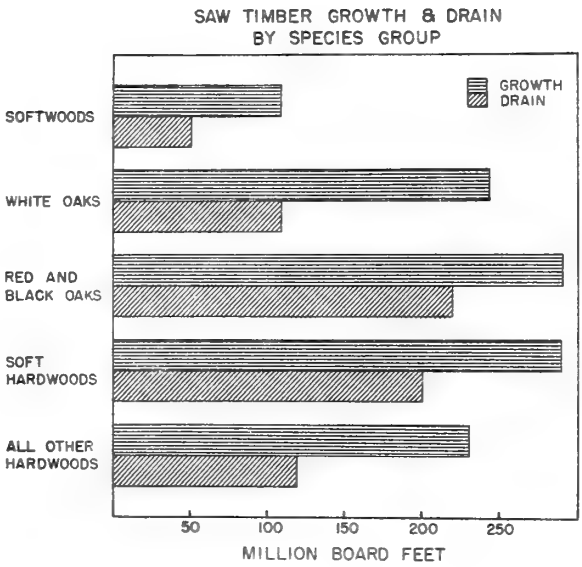
About 42 percent of the growing stock volume is in trees of the 6-inch, 8-inch, and 10-inch diameter classes. Broken down into 2-inch diameter classes, the greatest proportion of the cubic-foot volume shows up in the 10-inch class. Much of the volume in pole-size trees is found on saw-timber areas; only about one-fourth of the growing-stock volume is on pole-timber areas. In general, the desirable commercial species are as well or better represented in the pole-size trees as they are in the trees of saw-timber size.

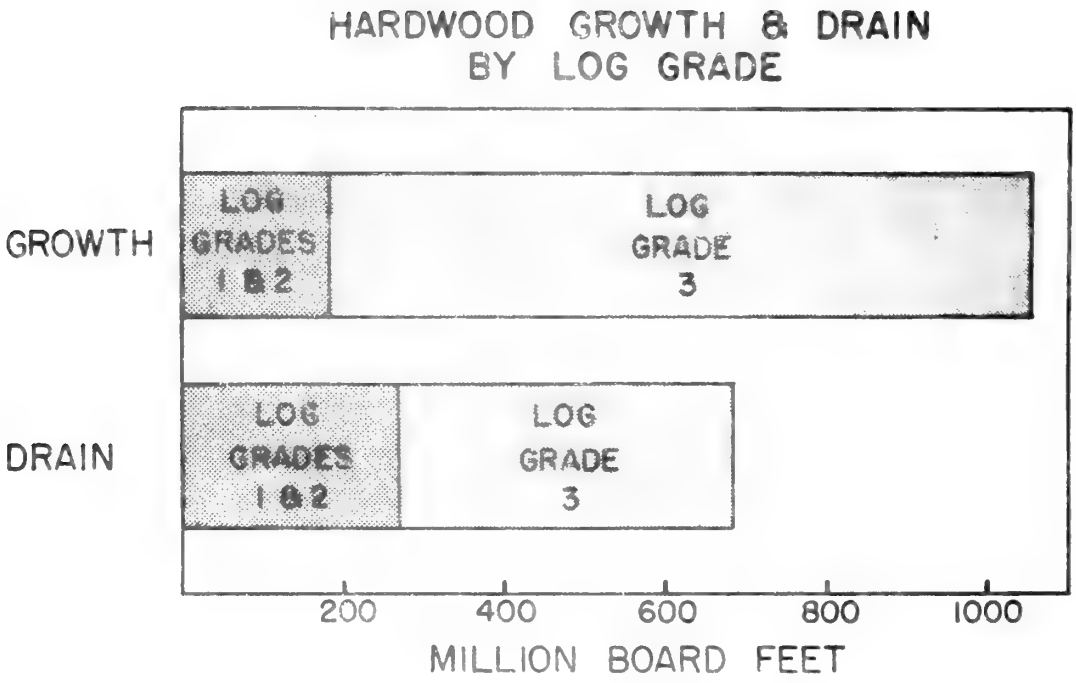


The forest area averages 364 trees per acre. About 80 percent of these are in the 2-inch and 4-inch diameter classes. The 6-inch, 8-inch, and 10-inch diameter classes have more than three times as many trees as the 12-inch and larger diameter classes. While the growing-stock volume indicates a generally understocked condition of the forest areas, the species of trees in the stands and the number of trees in the small diameter classes indicate that for the most part, the volume of Kentucky forests could be built up rapidly by applying sound management practices.

GROWTH-DRAIN BALANCE

The total annual net growth of Kentucky's forest in 1949 was 1,189 million board feet and the drain in 1948 was only 734 million board feet. (For purposes of comparison, the 1948 drain figure can be considered representative of the total drain in 1949.) Furthermore, each of the principal species groups shows an excess of growth over drain. However, the over-all picture is not as favorable as these statistics would make it appear.





A breakdown of the 682 million board feet of hardwood drain into sawlog grades shows that about 264 million board feet were in high-quality (grade 1 and 2) sawlogs. Study of hardwood growth shows that the annual increase in grade 1 and 2 sawlog volume is only about 180 million board feet. Thus we have a sizeable deficit in the growth of high-quality hardwood timber. Softwoods are growing annually more than twice as much saw timber as is being cut.

SIGNIFICANCE OF THE FOREST STATISTICS

The forests of Kentucky are of sufficient importance in area and character to materially affect the welfare of the State and also to contribute considerably to the national welfare. While the State is vitally interested in the wise use and development of its forests, the eventual outcome is in the hands of the farmers and other private owners who control 94 percent of the forest area. Any program designed to improve the forests of Kentucky must arouse the interest and enlist the cooperation of the private owners.

The forests of Kentucky are understocked. This is indicated by the number of trees per acre and by the average of 2,154 board feet of saw timber and 574 cubic feet of growing stock per forest acre. It is reasonable to expect that Kentucky forests could eventually support 2 to 3 times as much saw timber and growing stock if properly managed and protected from fire and grazing.

Timber is not being cut too rapidly--rather, the forests aren't growing enough, and too much of the amount being grown is on low-quality trees. The present growth, averaging 104 board feet per acre, is only one-half to one-third as much as the stands could be growing. Increasing the growth to 200 to 300 board feet per acre would more than compensate for the present drain of high-quality timber, even if the present relationship between high-grade and low-grade volume remained unchanged. However, substantial increase in volume growth is unlikely without also improving the composition and quality of the stands by removing the cull trees and merchantable trees of relatively low quality.

Besides being understocked in both board-foot and cubic-foot volume, the stands contain a high proportion of low-quality and cull timber. About one of every five saw-timber-size trees is an unmerchantable cull. Woodland grazing, repeated burning, and "high-grading" cutting practices have all contributed to the present condition of the stands. Woodland owners and woods operators must be convinced that these practices are detrimental to their interests. Economical ways must be developed to enable the woodland owners to remove the cull and low-quality trees from competition in the stands. Forests of Kentucky are not likely to improve appreciably in quality until most of the forest land is protected from fire and grazing and until most of the forest landowners and woods operators accept improved cutting practices.

STATE SUMMARY TABLES

Table 1.--Forest and nonforest area by regions, 1949

Regions	Total land area[1]	Forest area		Nonforest area	
	Thousand acres	Thousand acres	Percent	Thousand acres	Percent
Western	2,196	725	33	1,471	67
Western Coalfield	5,492	1,792	33	3,700	67
Pennyroyal	4,772	2,119	44	2,653	56
Bluegrass	5,649	1,221	22	4,428	78
Cumberland	5,268	3,838	73	1,430	27
Eastern	2,136	1,802	84	334	16
All regions	25,513	11,497	45	14,016	55

1/ Source: Area of the United States 1950, U. S. Bureau of the Census. Does not include 339,840 acres listed by Bureau of the Census as inland waters.

Table 2.--Commercial forest area by ownership class, 1949

Ownership class	Commercial forest area[1]	
	Thousand acres	Percent
Federal:		
National forest	406	3.5
Other	217	1.9
Total	623	5.4
State	53	.5
County and Municipal	(2)	(2)
Private	10,770	94.1
All ownerships	11,446	100.0

1/ Does not include 45,000 acres of forest land in Mammoth Cave National Park and 6,000 acres in state and municipal ownerships that are reserved from commercial timber use.

2/ Totals 590 acres for the state, which is included in the 10,770 thousand acres in private ownership.

Table 3.--Commercial forest area by forest type and stand-size class, 1949

Forest type	Total		Large saw-timber stands	Small saw-timber stands	Pole-timber stands	Seedling and sapling stands	Non-stocked stands
	Thousand acres	Percent	Thousand acres				
Pine	234	2.1	4	116	80	34	--
Redcedar-hardwoods	490	4.3	6	19	275	125	65
Oak-pine	726	6.3	50	256	220	166	34
Oak-hickory	5,186	45.3	1,321	1,109	1,868	687	201
White oak	311	2.7	27	117	167	--	--
Beech-maple	393	3.4	202	81	80	20	10
Mixed hardwoods	3,603	31.5	906	388	1,235	786	288
Bottomland	503	4.4	237	125	115	12	14
All types	11,446		2,753	2,211	4,040	1,830	612
Percent		100.0	24.1	19.3	35.3	16.0	5.3

Table 4.--Saw-timber volume on commercial forest area by species and stand-size class, 1949

Species	Total	Large saw-timber stands	Small saw-timber stands	Pole-timber stands	Seedling and sapling stands	Non-stocked stands
	Million bd. ft.	Per-cent	Million board feet			
Shortleaf pine [1]	1,039	4.2	198	697	124	19	1
Virginia pine	523	2.1	13	380	114	10	6
Other softwoods [2]	392	1.6	276	51	64	1	--
Post-oak group	611	2.5	312	151	129	12	7
Chestnut oak	2,256	9.2	1,632	400	193	31	--
White oak	2,315	9.4	1,129	817	326	31	12
Black oak	4,121	16.7	2,319	1,221	514	62	5
Northern red oak	1,526	6.2	969	386	167	3	1
Other red oaks	810	3.3	512	209	89	--	--
Hickory	2,631	10.7	1,562	713	308	46	2
Ash	418	1.7	246	125	46	--	1
Elm	357	1.4	187	97	63	9	1
Cottonwood	124	.5	105	4	13	1	1
Yellow-poplar	1,830	7.4	1,164	413	213	35	5
Basswood	509	2.1	434	53	22	--	--
Sweetgum	462	1.9	271	122	65	1	3
Blackgum	584	2.4	391	125	59	9	--
Sugar maple	526	2.1	388	91	26	21	--
Soft maple	326	1.3	187	75	62	2	--
Sycamore	347	1.4	202	84	58	2	1
Beech	1,959	7.9	1,545	286	96	25	7
Black walnut	266	1.1	127	71	51	14	3
Other hardwoods	723	2.9	390	178	130	18	7
All species	24,655		14,559	6,749	2,932	352	63
Percent		100.0	59.0	27.4	11.9	1.4	0.3

1/ About 6 percent white pine.
2/ Approximately 74 percent hemlock, 16 percent redcedar, and 10 percent baldcypress.

Table 5.--Saw-timber volume on commercial forest area by species and tree-diameter class, 1949

Species	Total	10 inches	12-14 inches	16-18 inches	20-22 inches	24-26 inches	28 inches and larger
			Million board feet				
Shortleaf pine	1,039	171	527	220	92	--	29
Virginia pine	523	184	292	47	--	--	--
Other softwoods	392	51	100	104	73	49	15
Post-oak group	611	--	307	188	87	22	7
Chestnut oak	2,256	--	566	513	412	336	429
White oak	2,315	--	1,171	604	255	148	137
Black oak	4,121	--	1,628	1,512	654	286	41
Northern red oak	1,526	--	413	516	273	181	143
Other red oaks	810	--	267	264	150	85	44
Hickory	2,631	--	1,219	720	379	197	116
Ash	418	--	155	129	77	27	30
Elm	357	--	170	75	60	25	27
Cottonwood	124	--	28	43	31	19	3
Yellow-poplar	1,830	--	636	681	315	174	24
Basswood	509	--	122	228	129	30	--
Sweetgum	462	--	186	167	66	30	13
Blackgum	584	--	227	176	107	61	13
Sugar maple	526	--	163	118	122	59	64
Soft maple	326	--	145	117	49	5	10
Sycamore	347	--	89	77	77	54	50
Beech	1,959	--	411	503	470	342	233
Black walnut	266	--	144	78	44	--	--
Other hardwoods	723	--	314	171	140	38	60
All species	24,655	406	9,280	7,251	4,062	2,168	1,488
Percent	100.0	1.7	37.6	29.4	16.5	8.8	6.0

Table 6.--Hardwood saw-timber volume by species group and log grade, 1949

Species group	Volume	Log grade 1		Log grade 2		Log grade 3	
	Million bd. ft.	Million bd. ft.	Percent	Million bd. ft.	Percent	Million bd. ft.	Percent
White oaks[1/]	5,182	347	6.7	547	10.6	4,288	82.7
Red oaks[2/]	6,457	267	4.2	551	8.5	5,639	87.3
Other hardwoods	11,062	694	6.3	1,132	10.2	9,236	83.5
All hardwoods	22,701	1,308	5.8	2,230	9.8	19,163	84.4

1/ Includes white oak, chestnut oak, and post-oak group.
2/ Includes black oak, northern red oak, and other red oaks.

Table 7.--Total cubic volume of sound wood on commercial forest area by species and class of material, 1949

Species	Total	Growing stock			Tops and limbs[1]	Cull trees[2]
		Total	Saw-timber trees	Pole-timber trees		
	Million cubic feet					
Shortleaf pine	222.8	222.1	175.2	46.9	--	0.7
Virginia pine	177.0	174.8	96.6	78.2	--	2.2
Other softwoods	120.9	117.7	77.8	39.9	--	3.2
Post-oak group	311.8	214.2	98.3	115.9	55.1	42.5
Chestnut oak	881.0	511.1	344.1	167.0	192.8	177.1
White oak	1,018.2	744.8	360.5	384.3	202.0	71.4
Black oak	1,513.6	993.4	652.1	341.3	365.3	154.9
Northern red oak	479.4	311.8	237.0	74.8	132.6	35.0
Other red oaks	275.2	185.9	127.5	58.4	71.5	17.8
Hickory	1,133.9	809.7	411.4	398.3	230.4	93.8
Ash	228.3	157.9	67.4	90.5	37.7	32.7
Elm	241.5	160.8	56.7	104.1	31.7	49.0
Cottonwood	34.9	22.2	19.5	2.7	10.9	1.8
Yellow-poplar	606.1	406.8	283.2	123.6	158.7	40.6
Basswood	172.3	101.6	77.5	24.1	43.4	27.3
Sweetgum	184.8	131.9	73.1	58.8	40.8	12.1
Blackgum	263.3	146.2	94.4	51.8	52.8	64.3
Sugar maple	274.1	161.0	80.0	81.0	44.9	68.2
Soft maple	248.2	126.9	51.5	75.4	28.8	92.5
Sycamore	117.6	79.1	53.2	25.9	29.8	8.7
Beech	1,008.5	353.9	290.0	63.9	162.4	492.2
Black walnut	128.3	91.0	43.0	48.0	23.9	13.4
Other hardwoods	531.1	345.0	114.4	230.6	64.1	122.0
Noncommercial species	62.6	--	--	--	--	62.6
All species[3]	10,235.4	6,569.8	3,884.4	2,685.4	1,979.6	1,686.0
Percent	100.0	64.2	38.0	26.2	19.3	16.5

1/ Merchantable hardwood saw timber only.
2/ Includes sound portion of tops and limbs of cull trees.
3/ Does not include volume of standing dead chestnut estimated to be 134.0 million cubic feet.

Table 8.--Cubic volume of growing stock on commercial forest area by species and stand-size class, 1949

Species	Total		Large saw-timber stands	Small saw-timber stands	Pole-timber stands	Seedling and sapling stands	Non-stocked stands
	Million cu. ft.	Percent	Million cubic feet				
Shortleaf pine	222.1	3.3	33.3	141.7	41.4	5.4	0.3
Virginia pine	174.8	2.7	3.6	101.4	62.8	5.9	1.1
Other softwoods	117.7	1.8	53.9	15.1	45.6	2.0	1.1
Post-oak group	214.2	3.3	58.2	60.2	89.5	4.4	1.9
Chestnut oak	511.1	7.8	285.5	103.0	116.2	6.4	--
White oak	744.8	11.3	232.6	263.7	233.2	11.3	4.0
Black oak	993.4	15.1	416.8	293.4	264.3	18.0	.9
Northern red oak	311.8	4.7	170.8	88.0	52.2	.6	.2
Other red oaks	185.9	2.8	92.2	50.0	42.0	1.7	--
Hickory	809.7	12.3	339.6	231.0	222.4	14.7	2.0
Ash	157.9	2.4	61.2	39.8	53.7	.6	2.6
Elm	160.8	2.5	51.8	36.1	63.7	4.1	5.1
Cottonwood	22.2	.3	18.0	.9	3.1	.1	.1
Yellow-poplar	406.8	6.2	207.3	97.7	92.5	8.3	1.0
Basswood	101.6	1.6	80.0	14.8	6.7	.1	--
Sweetgum	131.9	2.0	51.3	39.1	40.5	.5	.5
Blackgum	146.2	2.2	78.3	36.9	24.4	5.6	1.0
Sugar maple	161.0	2.5	87.6	40.0	28.9	4.2	.3
Soft maple	126.9	1.9	57.2	36.6	31.2	1.7	.2
Sycamore	79.1	1.2	33.8	16.9	24.9	1.9	1.6
Beech	353.9	5.4	256.4	64.2	26.4	5.9	1.0
Black walnut	91.0	1.4	30.0	20.3	33.2	4.4	3.1
Other hardwoods	345.0	5.3	113.5	68.9	145.3	13.7	3.6
All species	6,569.8		2,812.9	1,859.7	1,744.1	121.5	31.6
Percent		100.0	42.8	28.3	26.5	1.9	0.5

Table 9.--Cubic volume of growing stock on commercial forest area by stand-size class and tree-diameter class, 1949

Stand-size class	Total	6-8 inches	10 inches	12-14 inches	16-18 inches	20-22 inches	24-26 inches	28 inches and larger
				Million cubic feet				
Large saw-timber	2,812.9	326.9	264.9	474.6	741.8	506.1	294.1	204.5
Small saw-timber	1,859.7	423.7	379.8	725.2	259.5	55.2	12.3	4.0
Pole-timber	1,744.1	803.2	486.6	313.1	101.6	31.3	3.0	5.3
Seedling and sapling	121.5	45.4	21.6	22.1	16.1	11.4	4.9	--
Nonstocked	31.6	12.6	9.0	5.8	1.9	.3	2.0	--
All classes	6,569.8	1,611.8	1,161.9	1,540.8	1,120.9	604.3	316.3	213.8
Percent	100.0	24.5	17.7	23.4	17.1	9.2	4.8	3.3

Table 10.--Average volume per acre by stand-size class, 1949

Stand-size class	Average volume per acre	
	Board feet	Cubic feet[1/]
Large saw-timber stands	5,288	1,021.8
Small saw-timber stands	3,052	841.1
Pole-timber stands	726	431.7
Seedling and sapling stands	192	66.4
Nonstocked stands	103	51.6
All classes	2,154	574.0

1/ Growing stock only.

Table 11.--Net growth and normal mortality of growing stock on commercial forest area by species group, 1949

Species group	Live saw-timber volume		Total growing stock	
	Current annual net growth	Current annual normal mortality	Current annual net growth	Current annual normal mortality
	Million board feet		Million cubic feet	
Softwoods	133	7.0	20.9	2.0
Hardwoods	1,056	76.0	246.4	23.9
Total	1,189	83.0	267.3	25.9

Table 12.--Commodity drain on growing stock on commercial forest area by product and species group, 1948

Product	Live saw-timber volume		Total growing stock	
	Softwood	Hardwood	Softwood	Hardwood
	Million board feet		Million cubic feet	
Sawlogs	49.7	501.4	7.1	71.2
Fuelwood	--	104.5	--	44.5
Fence posts	2.1	4.8	2.8	5.4
Veneer bolts	.3	10.5	.1	1.4
Cooperage bolts	--	49.5	--	6.9
Pulpwood	.1	.7	.1	1.2
Handle bolts	--	6.1	--	.9
Hewn ties	--	3.1	--	.5
Round mine timbers	--	--	--	16.5
Misc. timbers	--	1.0	.1	2.0
Total	52.2	681.6	10.2	150.5

SUPPLEMENTARY TABLES

The following tables summarize the foregoing data in a form that will be found in all Forest Survey state or subregional reports. Readers can thus combine or compare these data with similar data for other areas.

Table 13.--Land area by major classes of land, 1949

Class of land	Area
	Thousand acres
Forest:	
Commercial	11,446
Noncommercial:	
Reserved from commercial timber use	51
Unproductive for timber use	0
Total forest land	11,497
Nonforest	14,016
Total, all classes	25,513

Table 14.--Commercial forest land area by ownership and stand-size classes, 1949

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling and sapling stands	Non-stocked 1/
	Thousand acres				
Federal:					
National forest	406	227	148	31	0
Indian	0	0	0	0	0
Other	217	101	80	31	5
Total	623	328	228	62	5
State	53	28	18	5	2
County and municipal	(2/)	--	--	--	--
Private	10,770	4,608	3,794	1,763	605
All ownerships	11,446	4,964	4,040	1,830	612

1/ Includes areas not classified elsewhere.
2/ Totals 590 acres for the state and is included in the 10,770 thousand acres in private ownership.

Table 15.--Area of commercial forest land by major forest types, 1949

Forest type	Thousand acres
Pine	234
Redcedar-hardwoods	490
Oak-pine	726
Oak-hickory	5,186
White oak	311
Beech-maple	393
Mixed hardwoods	3,603
Bottomland	503
Total	11,446

Table 16.--Net volume of live saw timber and growing stock on commercial forest land by stand-size class, 1949

Stand-size class	Saw timber	Growing stock
	Million bd. ft.	Million cu. ft.
Saw-timber stands	21,308	4,672.6
Pole-timber stands	2,932	1,744.1
Seedling and sapling stands	352	121.5
Nonstocked and other areas not classified elsewhere	63	31.6
Total	24,655	6,569.8

Table 17.--Net volume of live saw timber and growing stock on commercial forest land by ownership class, 1949

Ownership class	Saw timber	Growing stock
	Million bd. ft.	Million cu. ft.
Federal:		
National forest	1,109	288.9
Indian	0	0.0
Other	476	132.9
Total	1,585	421.8
State	141	36.2
County and municipal	(1/)	(1/)
Private:		
Farm	11,671	3,110.9
Industrial and other	11,258	3,000.9
Total	22,929	6,111.8
All ownerships	24,655	6,569.8

1/ Less than 0.5 million board feet or 0.05 million cubic feet.

Table 18.--Net volume of live saw timber and growing stock on commercial forest land by species, 1949

Species	Saw timber	Growing stock
	Million bd. ft.	Million cu. ft.
Softwoods:		
Shortleaf and loblolly pines	978	213.0
Other southern yellow pines	523	174.8
White and red pines	61	9.1
Hemlock	289	56.1
Cypress	38	8.6
Other eastern softwoods	65	53.0
Total softwoods	1,954	514.6
Hardwoods:		
White oaks	2,315	744.8
Red oaks	1,526	311.8
Other white oaks	2,867	725.3
Other red oaks	4,931	1,179.3
Sugar maple	526	161.0
Soft maples	326	126.9
Beech	1,959	353.9
Sweetgum	462	131.9
Tupelo and blackgum	584	146.2
Ash	418	157.9
Hickory	2,631	809.7
Cottonwood and aspen	124	22.2
Basswood	509	101.6
Yellow-poplar	1,830	406.8
Black walnut	266	91.0
Other eastern hardwoods	1,427	584.9
Total hardwoods	22,701	6,055.2
All species	24,655	6,569.8

Table 19.--Net volume of live saw timber on commercial forest land by diameter class groups and species, 1949

Species	Diameter class groups (inches)						
	10:	12 :	14 :	16 :	18 :	20+ :	Total
	Million board feet						
Softwoods:							
Southern yellow pines	355	437	380	151	99	79	1,501
White and red pines	--	--	2	7	10	42	61
Other eastern softwoods	51	53	47	50	54	137	392
Total softwoods	406	490	429	208	163	258	1,954
Hardwoods:							
White oak	--	615	556	275	329	540	2,315
Other white oaks	--	423	450	345	356	1,293	2,867
Red oaks	--	181	232	297	219	597	1,526
Other red oaks	--	901	994	996	780	1,260	4,931
Sugar maple	--	83	80	57	61	245	526
Beech	--	188	223	246	257	1,045	1,959
Sweetgum	--	84	102	97	70	109	462
Tupelo and blackgum	--	105	122	109	67	181	584
Yellow-poplar	--	302	334	336	345	513	1,830
Other eastern hardwoods	--	1,177	1,209	1,005	633	1,677	5,701
Total hardwoods	--	4,059	4,302	3,763	3,117	7,460	22,701
All species	406	4,549	4,731	3,971	3,280	7,718	24,655

Table 20.--Net volume of all timber on commercial forest land by class of material and species group, 1949

Class of material	Total	Softwoods	Hardwoods
	----Million cubic feet----		
Growing stock:			
Saw-timber trees:			
Sawlog portion	3,858.0	323.2	3,534.8
Upper stem portion	26.4	26.4	(1/)
Total saw timber	3,884.4	349.6	3,534.8
Pole-timber trees	2,685.4	165.0	2,520.4
Total growing stock	6,569.8	514.6	6,055.2
Other material:			
Sound cull trees	203.3	3.2	200.1
Rotten cull trees	1,482.7	2.9	1,479.8
Hardwood limbs	2/ 1,880.6	--	1,880.6
Salvable dead trees	3/ 134.0	--	134.0
Total other material	3,700.6	6.1	3,694.5
Total, all timber	10,270.4	520.7	9,749.7

1/ The volume of upper stem portion of hardwoods is estimated to be 99.0 million cubic feet. The figure is not included with growing stock in this or any of the other tables because the volume cannot be distributed by the classes called for in some of the tables.

2/ The column headed "Tops and limbs" in table 7 includes this figure plus the 99.0 million cubic feet estimated to be in the tops of sound hardwood saw-timber trees.

3/ Standing dead chestnut only; this figure is not included in table 7.

Table 21.--Net annual growth, annual mortality, and commodity drain on live saw timber and growing stock on commercial forest land by species group, 1949 [1]

Item	Saw timber			Growing stock		
	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
	-Million board feet-			-Million cubic feet-		
Net annual growth	1,189	133	1,056	267.3	20.9	246.4
Annual mortality	83	7	76	25.9	2.0	23.9
Commodity drain:						
Timber products	692.2	52.2	640.0	154.7	10.2	144.5
Logging waste	41.6	--	41.6	6.0	--	6.0
Total [1]	733.8	52.2	681.6	160.7	10.2	150.5

1/ Though commodity drain was determined for the year 1948 (table 22), the total drain figure can be considered representative of the total drain in 1949.

Table 22.--Total output of timber products and commodity drain on live saw timber and growing stock, 1948

Product	Volume of products cut[1]			Commodity drain on saw timber			Commodity drain on growing stock		
	Standard unit	Number	M cu. ft.	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
				Million bd. ft.			Million cu. ft.		
Sawlogs	M bd. ft.[2]	508,240	70,589	551	50	501	78	7	71
Veneer logs and bolts	M bd. ft.	9,614	1,335	11	(3)	11	2	--	2
Cooperage logs & bolts	M bd. ft.	44,042	6,117	49	--	49	7	--	7
Pulpwood bolts	Std. cords[4]	47,225	3,366	1	--	1	1	--	1
Fuelwood	Std. cords	1,506,232	95,907	105	--	105	45	--	45
Posts	M pieces	13,544	10,305	7	2	5	8	3	5
Hewn ties	M pieces	75	434	3	--	3	1	--	1
Mine timbers	M cu. ft.	16,497	16,497	--	--	--	16	--	16
Miscellaneous[5]	M cu. ft.	3,572	3,572	7	--	7	3	--	3
Total	xxxx	xxxx	208,122	734	52	682	161	10	151

1/ Includes material from both growing stock and other miscellaneous sources.
2/ International 1/4-inch rule.
3/ Less than 500,000 board feet.
4/ Rough wood basis.
5/ Includes chemical wood, excelsior, handle stock, shingle bolts, etc.

FOREST SURVEY PROCEDURE

The inventory of the forest resources of Kentucky was made during a period of 4 years. The work started in the Western Region in May 1948 and continued eastward through the State until November 1949. Because aerial photographs for the Eastern Region were not available at that time, work was temporarily stopped in Kentucky. After obtaining aerial photographs of the Eastern Region, the field crews returned to Kentucky in January 1951 and the inventory work was completed in June of that year. The tabular data can be generally interpreted as applying to the stands as they existed on January 1, 1949. No attempt has been made to adjust the data of the various sub-units to 1949 status. Since growth exceeds drain, the error, if any, probably tends to make the 1949 inventory data too great. The difference, however, is believed to be small in comparison with the sampling error. The sampling procedure used involved an office study of aerial photographs and a field examination of systematically selected forest and nonforest plots.

The proportion of forest land in each county was obtained by placing a transparent template marked with uniformly spaced dots over aerial photographs and by counting the number of dots falling on forest and nonforest areas. The percentage of forest dots in a county, multiplied by the total area, gave a preliminary estimate of the forest area. This was later adjusted after field examination indicated the number of plots that had changed from forest to nonforest since the data of aerial photography and vice versa.

The location of systematically selected dots falling on forest land was marked on the photographs. The acre surrounding each marked dot was examined under stereoscope and was classified by stand-size class on the basis of the height, crown width, and density of trees on the plot. Plots to be examined in the field were systematically drawn from those classified under the stereoscope. This selection was weighted, giving the most weight to the larger stand-size classes. In addition, several nonforest plots were selected for field examination to measure the movement of open land to forest since the photographs were taken.

The locations of the selected field plots were marked on the photographs, which were then sent to the field. Crews of two men each located these points on the ground. On forest land, a 1/5-acre plot was established for which species, size, quality, and growth of trees were recorded.

The following tabulation gives the number of dots and plots examined for the State as a whole:

Number of photo dots counted for forest-area determination	147,286
Number of forest plots stereoscopically examined on photos	12,677
Number of forest plots field examined	2,604
Number of nonforest plots field examined	685

ACCURACY OF DATA

Statistical analysis of forest area and timber volume data shows the following sampling errors[3] for the State as a whole:

Forest area		Growing stock volume	
(M acres)	(Percent)	(Million cu. ft.)	(Percent)
±103.5	±0.9	±100.1	±1.5

These estimates of sampling error do not include errors resulting from the development and application of volume tables and cull factors, or from mistakes in measurement or judgment. All phases of field and office work were closely supervised to keep these errors to a minimum. Since the percentage error increases with each subdivision of the total, small acreages or volumes may have large errors and may therefore indicate only relative magnitudes.

3/ At one standard error; that is, the chances are two out of three that the calculated acreages and volumes do not differ from the totals that would have been obtained by 100-percent measurement by more than the errors shown here.

EXPLANATION OF TERMS USED

Forest land.--Land bearing forest growth or land from which the forest has been removed but which shows evidence of past forest occupancy and which is not now in other use. To qualify as forest, an area must (1) be at least 100 feet wide; (2) be at least 1 acre in area; (3) have a sufficient number of trees to provide 10 percent crown coverage; or (4) lacking 10 percent crown coverage, be likely to remain in forest use.

Commercial forest land.--Forest land bearing or capable of bearing timber of commercial character (usually saw timber) and economically available now or prospectively for commercial use and not withdrawn from such use.

Reserved forest land.--Forest land withdrawn from timber utilization through statute, ordinance, or administrative order.

Noncommercial forest land.--Forest land incapable of yielding usable wood products because of adverse site conditions, or so physically inaccessible as to be permanently unavailable economically, and not withdrawn for specified purposes.

Forest types

Pine.--Stands in which pine species comprise at least 60 percent of the dominant and codominant trees.

Redcedar-hardwoods.--Stands in which redcedar comprises at least 20 percent of the dominant and codominant trees.

Oak-pine.--Stands in which pine species comprise 20-60 percent of the dominant and codominant trees.

Oak-hickory.--Hardwood stands in which oaks and hickories comprise at least 60 percent of the dominant and codominant trees.

White oak.--Hardwood stands in which white oak (*Quercus alba*) comprises at least 60 percent of the dominant and codominant trees.

Beech-maple.--Hardwood stands in which beech and sugar maple comprise at least 60 percent of the dominant and codominant trees.

Mixed hardwoods.--Stands of mixed hardwood species not qualifying for other hardwood types. Principal species include yellow-poplar, elm, maple, basswood, ash, beech, hemlock, and black locust in mixture with oaks and hickories.

Bottomland.--Stands on the alluvial bottoms of rivers and streams. The principal species include sycamore, willow, elm, blackgum, sweetgum, soft maple, oaks, hickory, cottonwood, and cypress.

Tree classes

Saw-timber tree.--A live softwood (coniferous) tree at least 9.0 inches d.b.h. or live hardwood tree of commercial species at least 11.0 inches d.b.h., with a sound butt log at least 8 feet long, or with at least half of the gross volume of the tree in sound material.

Pole-timber tree.--A live tree of commercial species at least 5.0 inches d.b.h. but less than saw-timber size that is now merchantable or gives promise of becoming merchantable.

Seedling and sapling trees.--Trees of commercial species less than 5.0 inches in diameter at breast height.

Cull tree.--A live tree at least 5.0 inches d.b.h. that does not qualify as a saw-timber or pole-timber tree because of species, poor form, limbiness, rot, or other defect.

Volume estimates

Board-foot volume includes the sound volume of sawlogs in merchantable saw-timber trees to a minimum top d.i.b. of 6 inches for softwoods and 8 inches for hardwoods. Volume deductions have been made for rot, crook, and other defects. Board-foot volumes are shown in the International 1/4-inch log rule, which approximates green lumber tally.

Cubic-foot volume

Total volume includes the sound wood inside bark in both sound and cull living trees 5.0 inches d.b.h. and larger, from the stump to a minimum top diameter of 4.0 inches inside bark. It includes the upper stems of softwood trees and the upper stems and limbs of hardwoods.

Growing stock includes the volume of sound wood inside bark in (1) the sawlog portion of hardwood saw-timber trees to a minimum top d.i.b. of 8 inches, (2) the stem

of softwood saw-timber trees to a minimum top d.i.b. of 4.0 inches, and (3) pole-timber trees to a minimum top d.i.b. of 4.0 inches.

Stand-size class

Large saw timber.--Stands having a minimum net volume of 1500 board feet per acre in saw-timber trees, with more than half of this volume in trees 15.0 inches d.b.h. and larger.

Small saw timber.--Stands having a net volume of 1500 board feet per acre in saw-timber trees, with at least half of this volume in trees smaller than 15.0 inches d.b.h.

Pole timber.--Stands with less than 1500 net board feet per acre but at least 10 percent stocked with pole-timber and larger trees and with at least half the minimum stocking in pole-timber trees.

Seedlings and saplings.--Stands not qualifying either for saw timber or pole timber but having at least 300 seedlings and saplings of commercial species per acre.

Nonstocked.--Commercial forest land not qualifying for any other class.

Hardwood log grades[4/]

Grade 1.--Butt logs at least 14.0 inches (upper logs at least 16 inches) in diameter inside bark at the small end. Minimum length of butt logs is 10 feet; 8 feet for upper logs. Five-sixths of the surface on the three best faces must be clear of defect. Two clear cuttings are allowed on any face, but the minimum length of cuttings is 7 feet for butt logs and 5 feet for upper logs. Cull deductions including sweep cannot exceed 25 percent for butt logs and 40 percent for upper logs. Such logs will normally yield at least 65 percent No. 1 common and better lumber.

Grade 2.--Logs at least 12 inches in diameter inside bark at the small end. Minimum length is 8 feet. Two-thirds of the surface on the three best faces must be clear of defect. Three clear cuttings are allowed on any face, but

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4/ The hardwood log grades used are essentially those published as "Interim Sawlog Grades for Southern Hardwoods," by C. R. Lockard and R. D. Carpenter, Southern Forest Experiment Station, 1946. Persons interested in detailed specifications should consult this publication.

the minimum length of cuttings is 3 feet. Cull deductions including sweep cannot exceed 50 percent. Such logs for most species will normally yield more than 40 percent No. 1 common and better lumber.

Grade 3.--Logs at least 8 inches in diameter inside bark at the small end. Minimum length is 8 feet. Minimum standards require that these logs be at least 50 percent sound and qualify at least for manufacture of local-use lumber or railroad ties and timbers. Such logs for most species in Kentucky will normally yield 20 to 25 percent No. 1 common and better lumber.

SPECIES LISTED

Softwoods

Shortleaf pine includes:	
Shortleaf pine	- *Pinus echinata*
Pitch pine	- *Pinus rigida*
White pine	- *Pinus strobus*
Virginia pine	- *Pinus virginiana*
Other softwoods include:	
Cypress	- *Taxodium distichum*
Redcedar	- *Juniperus virginiana*
Hemlock	- *Tsuga canadensis*

Hardwoods

Post oak group includes:	
Post oak	- *Quercus stellata*
Swamp white oak	- *Quercus bicolor*
Swamp chestnut oak	- *Quercus prinus*
Overcup oak	- *Quercus lyrata*
Bur oak	- *Quercus macrocarpa*
Chinquapin oak	- *Quercus muehlenbergii*
Chestnut oak	- *Quercus montana*
White oak	- *Quercus alba*
Black oak includes:	
Black oak	- *Quercus velutina*
Scarlet oak	- *Quercus coccinea*
Northern red oak includes:	
Northern red oak	- *Quercus borealis*
Swamp red oak	- *Quercus falcata* var. *pagodaefolia*
Other red oaks include:	
Southern red oak	- *Quercus falcata*
Pin oak	- *Quercus palustris*
Willow oak	- *Quercus phellos*
Water oak	- *Quercus nigra*
Shingle oak	- *Quercus imbricaria*
Hickory	- *Carya* spp.
Elm	- *Ulmus* spp.
Soft maple includes:	
Red maple	- *Acer rubrum*
Silver maple	- *Acer saccharinum*
Boxelder	- *Acer negundo*
Sugar maple	- *Acer saccharum*
Sycamore	- *Platanus occidentalis*
Ash	- *Fraxinus* spp.
Yellow-poplar	- *Liriodendron tulipifera*

Basswood	- *Tilia* spp.
Cottonwood	- *Populus deltoides*
Sweetgum	- *Liquidambar styraciflua*
Blackgum	- *Nyssa sylvatica*
Blackgum (swamp)	- *Nyssa aquatica*
Beech	- *Fagus grandifolia*
Black walnut	- *Juglans nigra*

Other hardwoods - include all other commercial hardwood species.

Noncommercial species include species that do not normally have commercial value such as hawthorn, redbud, hornbeam, hophornbeam, alder, and serviceberry.

TERRITORY SERVED BY THE

CENTRAL STATES FOREST EXPERIMENT STATION

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE