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A CURSORY SURVEY OF THE FOREST RESOURCE OF THE EAST TEXAS POST OAK BELT

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FOREWORD

The Forest Survey, which is a part of the United States Forest Service, was authorized by the McSweeney-McNary Forest Research Act of 1928 to make a Nation-wide study of our forest resources. The fivefold object of this study is: (1) To make an inventory of the present supply of timber and other forest products; (2) to ascertain the rate at which this supply is being increased through growth; (3) to determine the rate at which this supply is being diminished through industrial and local use, windfall, fire, and disease; (4) to determine the present requirement and probable future trend in the requirement for timber and other forest products; and (5) to correlate these findings with existing and anticipated economic conditions, in order that policies may be formulated for the effective use of land suitable for forest production. In the South, the Forest Survey functions as an activity of the Southern Forest Experiment Station with headquarters at New Orleans, Louisiana.

In this release no attempt is made to determine the rate of growth or to present detailed information on the utilization and drain of forest materials. The inventory is based on an extensive field survey made by the author in April and May 1937, and by J. W. Cruikshank in May 1939, in cooperation with the Texas Forest Service. The field survey was made by observers using an automobile equipped with a crop-meter and covered a network of 3,552 miles of roads well distributed over the unit. The extent of the various land-use classes was recorded on the crop-meter, and the estimate of area in each of the land-use classes and forest types was computed from the percentages so obtained. The character of the stand and the saw-timber and cordwood volume were determined by measurements and records taken on many representative sample plots.

A check of the area of forest land was made by Chris Nelson, Jr., of the Texas Forest Service through a study of aerial photograph mosaics covering approximately one-third of the area. It showed that the crop-meter method produced an underestimate of the forest area because land cleared for agriculture occurs in greater proportion along roads and highways than elsewhere. From this check a corrective factor was obtained which, when applied, increased the figure for forest acreage by about 10 percent of the total gross area. The figures for brush and mesquite were increased in proportion and those for the various agricultural classifications reduced accordingly. Timber-volume estimates were based on the corrected forest acreages and the per-acre volumes determined from the sample plots.

These procedures made possible the survey of a large area in a relatively short time and at small expense, but the results obtained are only rough approximations and do not approach the accuracy obtained by the line-plot survey used throughout the other Survey units of the South, where higher forest values justified greater expenditure.

Note: Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration official project 65-2-64-14.

A CURSORY SURVEY OF THE FOREST RESOURCE OF THE EAST TEXAS POST OAK BELT

General Description

The area covered by this report[1/] lies in the eastern half of Texas and may be called the East Texas post oak belt. It is irregular in outline, approximately 400 miles long and 20 to 80 miles wide, and contains a total land area of 11,661,700 acres. From Lamar County on the north, it extends southwest to Atascosa and Bee Counties (see fig. 1). On the east, it is bounded by the East Texas pine Survey units and the coastal prairies; on the west, by the blackland prairies; and on the south, by the brushy plains. The natural limits of the post oak belt extend across the county lines selected as the western boundary of Texas Survey Unit No. 2, and a considerable additional area and volume of post oak in that unit is dealt with in Forest Survey Release No. 40, "Forest Resources of Northeast Texas."

The terrain of this area is characterized by low rolling hills separated by wide flat valleys. The general elevation ranges from 250 feet to 500 feet above sea level. Drainage flows in a southeasterly direction, contributing to the Sulphur, Sabine, Neches, Trinity, Navasota, Brazos, Colorado, Guadalupe, San Antonio, and other rivers, which cross or border the area.

Light-colored sandy soils low in organic matter prevail throughout the upland timbered areas that make up the major portion of this unit. The principal soil series represented are Norfolk, Susquehanna, Lufkin, Kirvin, and Ruston. The soils of the prairie areas are brown, gray, and black loams or clays of the Crockett, Wilson, and Houston series. While prairie soils occur to a considerable extent in Hopkins County near the north end of the unit, they are found on only a small part of the area north of the Brazos River; south of the Brazos they occur with increasing frequency. A belt of prairie land, occasionally broken by patches and strips of timber, extends southwestward through Washington, Fayette, and Gonzales Counties and the western parts of Austin, Colorado, Lavaca, and DeWitt Counties, to the indentation in the southern boundary of the unit (fig. 1).

Rainfall in this area averages from 25 inches annually in the extreme southwestern part to about 40 inches in the northeastern part. Most of the unit, however, has between 30 and 40 inches per annum, fairly well distributed throughout the year. The lightest precipitation usually occurs in July, August, January, and February. The summers are warm, with a mean temperature for June, July, and August of 82° F. in the area north of the Brazos River, and 84° F. in the area south of the river. Winters are mild except for short cold periods—generally accompanied by a "norther"—when the thermometer often drops 30° or more in a few hours. In the winter months the mean temperature ranges from 55° F. in the southern part of the unit to 46° F. at the northern end.

1/ Texas Survey Unit No. 3.

According to the 1930 Census, the total population was approximately 530,000, an average of 29 per square mile. No cities or towns in the unit had a population in excess of 10,000, and only 13 of them exceeded 2,500. Agriculture provides the chief occupation of more than half of the gainfully employed workers of this area. Cotton and corn are the principal crops, but dairying and the raising of stock and poultry contribute materially to the farm income throughout the region and are particularly important in the southern part.

Table 1 shows a classification of the area according to present land use. Forests cover 4,401,100 acres, or 38 percent of the total. Much of this area is fenced and used as range for livestock. Agricultural land, making up over 54 percent of the unit, is shown under three classifications: "Cultivated" land is now in crops and has been cleared 5 years or more; "newly cleared" land is cropland or pasture cleared of forest growth within the past 5 years; "other agricultural" includes pasture and small amounts of idle and abandoned cropland. The brush and mesquite land, which, like the forested land, is mostly fenced for stock range, makes up 6 percent of the unit. The area occupied by towns, villages, roads, railroads, and other cultural features accounts for the remaining 2 percent. Land clearing and the reversion of abandoned agricultural land to forest are both proceeding at a slow rate in this region, and the general conclusion is that very little change is currently taking place in the total forest area.

Table 1.—Area of the unit classified according to land use

Land use	Area		Proportion of total	
		Acres		Percent
Forest		4,401,100		37.8
Nonforest:				
Agricultural:				
Cultivated	2,919,100		25.0	
Newly cleared	81,700		0.7	
Other agricultural	3,393,500		29.1	
Total agricultural		6,394,300		54.8
Brush and mesquite		657,700		5.6
Towns, rights-of-way, etc.		208,600		1.8
Total forest and nonforest		11,661,700		100.0

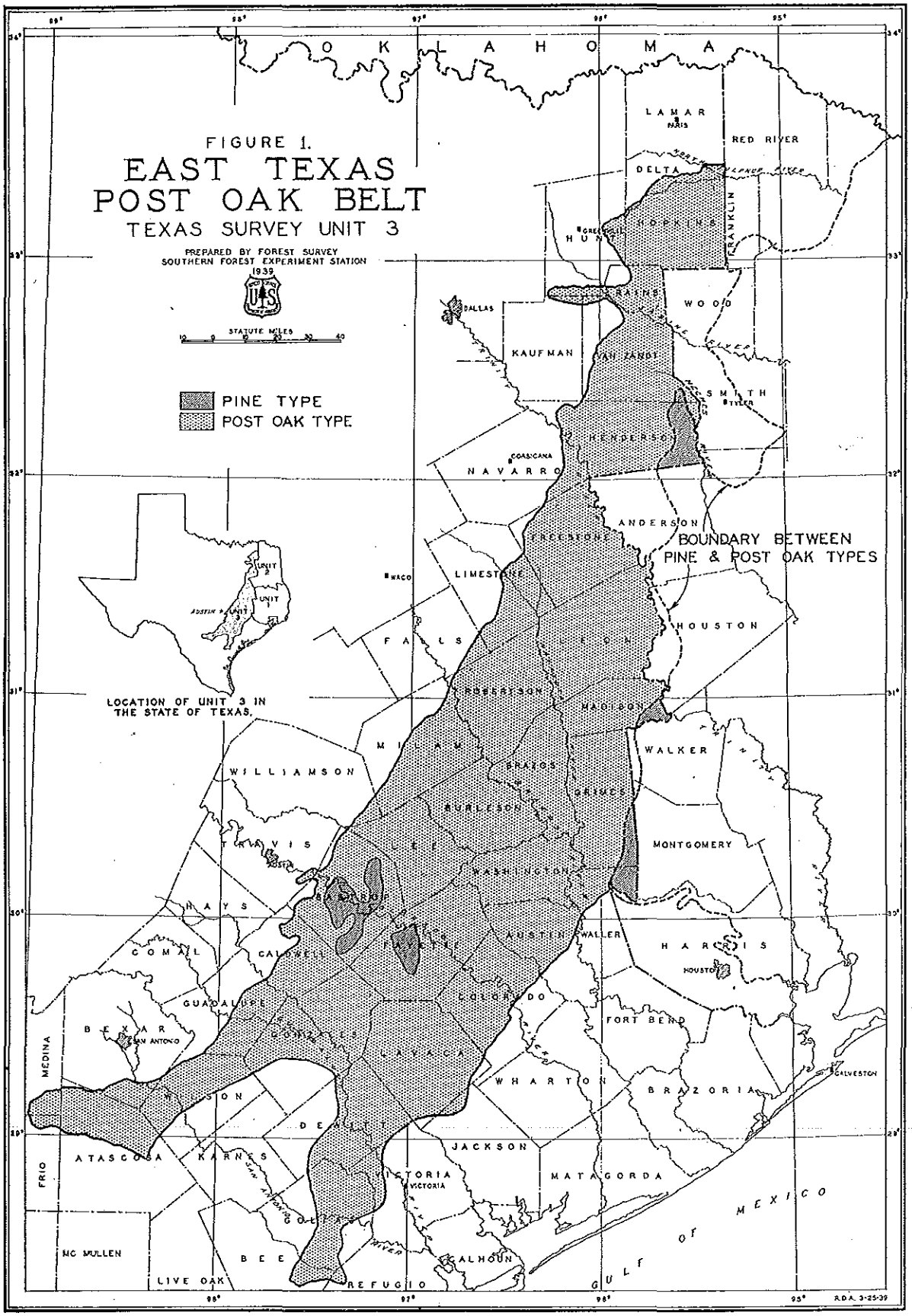
FIGURE 1.
EAST TEXAS
POST OAK BELT
TEXAS SURVEY UNIT 3
PREPARED BY FOREST SURVEY
SOUTHERN FOREST EXPERIMENT STATION
1939
STATUTE MILES
PINE TYPE
POST OAK TYPE
BOUNDARY BETWEEN
PINE & POST OAK TYPES
LOCATION OF UNIT 3 IN
THE STATE OF TEXAS.
OKLAHOMA
LAMAR
RED RIVER
DELTA
FANNIN
HUNT
FRANKLIN
RAINS
WOOD
DALLAS
KAUFMAN
VAN ZANDT
SMITH
HENDERSON
NAVARRO
ANDERSON
FREESTONE
LIMESTONE
HOUSTON
FALLS
LEON
ROBERTSON
MADISON
WALKER
MILAM
WILLIAMSON
BRAZOS
GRIMES
MONTGOMERY
TRAVIS
LEE
WASHINGTON
HAYS
COMAL
CALDWELL
AUSTIN
WALLER
HARRIS
GUADALUPE
COLORADO
FORT BEND
BEXAR
GONZALES
LAVACA
WHARTON
BRAZORIA
MEDINA
WILSON
DEWITT
JACKSON
ATASCOSA
KARNES
VICTORIA
MATAGORDA
FRIO
MC MULLEN
BEE
GOLIAD
CALHOUN
LIVE OAK
REFUGIO
GULF OF MEXICO
R.D.A. 3-25-39

Description of the Forest

In table 2 the forest area is classified into four main forest type groups and two principal forest conditions. The scrub-hardwood types occur chiefly on the light sandy upland soils and occupy 93 percent of the forest area. In these types post oak predominates, often occurring in almost pure stands. Blackjack oak and hickory are common associates, and replace the post oak entirely in some of the scrub-hardwood stands. Elm and hackberry occur frequently along the borders of the prairies, and live oak is common in the southern portion of the belt. The trees in this scrub-hardwood type group are short-boled and limby. At maturity, they average 40 to 50 feet in height throughout most of the unit, but where the forest gives way to prairie or brush areas they seldom exceed 30 feet.

Table 2.—Forest area classified according to forest type group and condition

Forest type group	Saw timber	Cordwood and reproduction	Total	Proportion of total forest area
	Acres			Percent
Scrub hardwood	-	4,090,000	4,090,000	93.0
Commercial hardwood	57,300	115,500	172,800	3.9
Pine	20,800	50,000	70,800	1.6
Cedar	-	67,500	67,500	1.5
All type groups	78,100	4,323,000	4,401,100	100.0

The commercial hardwoods are found chiefly in the river bottoms and to a smaller extent on the better sites in the uplands. The principal species are redgum, oaks, pecan, elms, and cottonwood. In the bottoms along the Trinity River, the largest areas of this type group occur; here the trees have the size and quality characteristic of the species elsewhere in the South. Similar stands in smaller quantities are found along the Neches, Sabine, and Sulphur Rivers; but along the rivers to the south and west of the Trinity this type group occurs in progressively decreasing quantities. Furthermore, the trees become shorter and of poorer quality, while the stands contain less redgum and more elm and pecan.

The pine types are very limited in area and somewhat scattered as to distribution. They occur in several places along the eastern border of the unit, where it meets and partly overlaps the main pine belt of East Texas. Small isolated areas or "islands" of pines are also found in Bastrop and Fayette Counties, but the timber, though of commercial quality, is shorter than the general run of southern pine. The average usable length for saw timber varies from one 16-foot log per tree on the dry, gravelly ridges, to two and one-half logs per tree on the better sites. On the eastern side of this unit, both loblolly and shortleaf pines are found, while loblolly alone is found in Bastrop and Fayette Counties. The cedar types, which consist chiefly of Eastern redcedar, either pure or mixed with scrub hardwoods, also occur chiefly in these two counties.

Uses of the Forest

Because the timber in the scrub-hardwood type is short and poor in quality, it has very little value for saw timber. In the local economy, however, this timber is highly important as a source of fuel wood and materials for general farm use. Studies in East Texas indicate that the average rural farm family uses 8 to 10 cords of fuel wood per year. It follows that a total of about three-fourths of a million cords of wood are consumed annually on the farms of the post oak region, as virtually every farmstead uses wood for fuel. At $2.50 per standard cord stacked in the woods, this firewood has a value of close to 2 million dollars. In addition to the firewood used locally, a considerable quantity of scrub hardwood is shipped to the larger cities, such as Houston, Dallas, and Austin. Several small communities reported shipping from two to six thousand cords per year at a selling price of $2.50 to $3.00 per cord loaded on the car. Most of this commercial fuel wood is cut during the winter months, and its sale provides a supplementary income that is indeed welcome to the farmers of this area.

It is estimated that at least three-fourths of the fence posts used in this region are cut from scrub hardwood, chiefly post oak. It is difficult to estimate the total number of posts required annually, but the number is enormous, as practically all of the land is under fence. In recent years the use of cedar posts from the Cedar Brakes region farther west has increased, but they cost from 4 to 10 cents each, delivered in the county; consequently, a majority of the farmers still cut their posts themselves from their own woodlots.

Several portable sawmills are at work in the pine stands of Leon, Bastrop, and Grimes Counties and the bottomland hardwood stands of the larger rivers. Most of their output of lumber and rough construction materials is used locally, but a small quantity is shipped outside the unit. A cedar mill at Bastrop, in Bastrop County, produces cabinet lumber that is sold largely to outside markets. A few other small mills, some of which are run in connection with cotton gins that in turn use the slabs and edgings for fuel, are found here and there in the unit, operating at very irregular intervals. These mills for the most part do custom sawing for cash or a share of the product. They saw lumber for local consumption from the better quality post oaks and the cottonwoods, elms, and red oaks of the stream bottoms.

In addition to providing fuel wood, fence posts, rough construction material, and lumber to the value of several million dollars yearly, the forests are of undoubted benefit in preventing erosion and retarding run-off on land that is not suited for agriculture or is not now in demand for agricultural purposes. Their effectiveness in controlling erosion needs to be increased, however, as overgrazing and burning have so reduced the ground cover and compacted the soil that run-off is too rapid and gullies are all too numerous.

New developments in the pulp and paper industry may create new values in the hitherto despised post oaks. A pulp mill has successfully used

bleached pulp made from Texas post oak mixed with pine sulphate pulp to produce coated magazine papers on a commercial scale. Should this use become general in the industry, the position of Texas as a source of pulping material will be strengthened.

Volume Estimates

On the basis of data from sample plots in the various forest types, the estimate of the volume of usable material is shown in table 3. Saw-timber volume includes pines 9.0 inches or more d.b.h. (diameter at breast height) and, in the commercial hardwood areas, hardwoods 13.0 inches d.b.h. or larger. Cordwood volumes include not only the saw-timber material listed, but also the sound material in cull trees and the entire usable volume of all sound trees both large and small, except that no material under 4 inches in diameter is included in the commercial types nor under 2 inches in diameter in the scrub-hardwood types. The smallest trees tallied as containing such material were 5.0 and 3.0 inches d.b.h., respectively. All cordwood volumes include bark.

Of the total volume of 33,348,700 cords, 91 percent is in the scrub-hardwood types, which furnish the greater part of the fuel wood cut in this area. The average stand for the scrub-hardwood types is almost 7½ cords per acre.

Table 3.—Saw-timber and cordwood volumes

Species group	Saw-timber volume (lumber tally)	Cordwood volume[1]
	M board feet	Cords[2]
Hardwoods	186,500	[3]32,691,000
Pines	67,600	477,300
Cedar	-	180,400
Total	254,100	33,348,700

1/ These volumes include the saw-timber volumes in the column to the left.
2/ Standard cords (4 x 4 x 8 feet).
3/ 30,437,700 cords are in the scrub-hardwood type.

Fire Damage

Table 4 shows the fire damage as determined from the sample plots examined during the survey. It is evident that by far the greatest damage occurs in the pine types. In the commercial hardwood types of the bottomlands, fire protection is less difficult and fires are less frequent because of the naturally moist conditions (and the consequent lack of dry forest litter) that prevail at most seasons of the year. The fires that do occur, however, not only kill some trees, but also reduce the quantity and quality of the saw timber in many of the surviving ones by burning them at the base and permitting decay to begin.

Table 4.—Area of each forest type group classified according to presence or absence of fire damage

Forest type groups	No evidence of fire	Evidence of fire, but no damage	Fire damage evident
		Percent	
Scrub hardwoods	71	6	23
Commercial hardwoods	94	2	4
Pines	6	17	77
Cedar	91	0	9

The scrub-hardwood types, though not so subject to fire as the pines nor so severely damaged, show definite evidences of fire; much of the decay in the larger trees is traceable to this cause. While large expenditures for fire protection may not be justified by commercial timber values in these types, better protection than they now receive would result in increased water infiltration and storage capacity of the soil. The result would be improved maintenance of stream flow and reductions in erosion, flood peaks, and silt load of streams.

Good Management and the Public Interest

The species making up both the commercial and the scrub hardwoods reproduce themselves prolifically by seed and sprouts. Cut-over areas will restock naturally to a satisfactory degree, for where seed trees are lacking, sprout growth usually forms a new stand. Although inherently capable of restocking adequately, many of the scrub-hardwood stands are understocked. Probably the chief reason for this is found in the efforts of many landowners to maintain open stands favorable to the growth of grass for livestock. Fire is next in importance as a cause of the depletion of the forest cover. Besides being poorly stocked, many of the stands have been allowed to deteriorate in quality as a result of the continued cutting of the best trees, while partly rotten and poorly formed trees are left to occupy space that should be maintaining trees of better quality. The lack of data on forest growth and drain makes an accurate determination of the present trend impossible, but it seems likely that a gradual reduction of growing stock is still under way. Improvement in the quality and yield of the scrub-hardwood stands is possible, but it depends upon action by the owner to effect proper coordination of grazing with good forest management practices, including fire protection. It is obvious that there will be no material improvement in forest management until and unless there is a marked improvement in the extent and character of the market for the wood produced.

The pine types, though small in extent, are important to this region as a source of local supply for much-needed construction material. The land on which they grow is not well suited for agriculture, and the continued production of saw timber is desirable. At present, however, the pine stands have been so heavily cut over that the yields of saw timber per acre will be very low for a long time. In most cases enough trees have been left to re-

stock the land to pine, but frequent fires have prevented the survival of many pine seedlings. Hardwoods seem to be replacing the pine in the most heavily cut sections of Bastrop County. If new stands of pine are to develop, fires must be controlled. Once protection from fire is assured, natural reproduction will keep the stands well stocked and productive if an adequate number of seed trees is left at each cutting.

The forests of the East Texas post oak belt do not compare with the commercial forests of the South in the production of lumber or other high-priced commodities, but they are nevertheless of very great importance to the people in the extensive area in which they are found. They provide annually several million dollars' worth of forest products such as fuel wood, fence posts, farm construction materials, and lumber. Much of this material is produced by farmers for their own use. Some is cut and sold by the rural population and furnishes a needed source of cash income during slack seasons. Over and above these benefits, the forests serve as a natural cover to prevent both wind and water erosion in an area where soils without adequate vegetative cover erode severely and deteriorate quickly. There is a good chance that they may eventually become a source of raw material for the pulp and paper industry.

These facts would seem to justify immediate action on the part of landowners to effect better forest management, as well as greater expenditures by State and Federal agencies to provide (1) assistance in protection from fire and overgrazing, (2) research in management methods, and (3) extension services to the forest landowners.