BULLETIN

OF

THE UNIVERSITY OF TEXAS

STUDIES

IN THE

Industrial Resources of Texas

STUDIES BY TEXAS APPLIED ECONOMICS CLUB

Edited by

LEWIS H. HANEY

Published by the University six times a month and entered as second class matter at the postoffice at Austin, Texas

VON BOECKMANN-JONES CO., PRINTERS, AUSTIN, TEXAS

1915

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NO. 3 JANUARY 10, 1915

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Cultivated mind is the guardian genius of democracy. . . . It is the only dictator that freemen acknowledge and the only security that freemen desire.

President Mirabeau B. Lamar.

The benefits of education and of useful knowledge, generally diffused through a community, are essential to the preservation of a free government.

President Sam Houston.

PREFACE

This is a statistical study of some of the more fundamental conditions that concern the character and productivity of Texas industry. Texas being an agricultural State, especial attention has been given to soil, climate, crops, and rural population; but several of the leading extractive and manufacturing industries are dealt with,—the lumber industry, cotton seed products, railways. The results of the Federal Census of 1910 having only just been made public, it seemed highly appropriate to devote the work of the Texas Applied Economics Club during the past year to the task of picking out and putting together some of the scattered data concerning our State, with the idea that these data might mean something definite and important to us. It is believed that statesmen, farmers, investors, and general students of public questions will find here not only interesting conclusions, but also important bases for further thought.

The editor would call the attention of statesmen and legislators to the importance of the facts concerning climate and soil as throwing light on the problem of diversification; to the needs of Texas for railways and the needs of railways for revenue, as set forth succinctly on page 91; to the need of some policy concerning immigration and education and earnings if the efficiency of the population as a labor force is to be maintained. The richest natural endowments placed in the hands of an ignorant and wasteful people will be in vain. To the farmer it may be observed that food for thought lies in a comparison of the varying yields per acre according to the soil or the kind of crop or the relative amount of implements and live stock used. Also the difficulty of exaggerating the importance of taking into consideration the risk in farming due to the differences in temperature and rainfall, is clearly shown in these studies. In most Texas industrial undertakings, but above all in farming, it behooves the one in charge of the enterprise to examine well the great fluctuations that characterize our climate from season to season and from year to year, and to count insurance as one of his costs. The attempt to figure the expenses and income of irrigation, too, though crude and imperfect, should be of interest.

But aside from these more special interests, there are matters of general social importance to be gathered from such facts as are presented in the following pages. To what citizen of Texas is it not of interest to know the truth as to the relative growth of negro and white population? What of the Mexican element? Are the more desirable elements in immigration to the State continuing to come? Are the people crowding to the cities?—and a host of similar questions. Again, how is the population of the State using its resources? How do the yields of our principal crops compare with those of other States? Are we making the best use of such an important natural resource as our forests? How does our equipment with railways show up? And, again, what is the average individual bank deposit, or the average individual wealth in this State?

Like its predecessors, Bulletins No. 236 and No. 298,* this pamphlet is largely the work of undergraduate students of Economics in the University of Texas. Though the editor has given much time to directing and revising the work, it is still their work, and it has not been possible to verify all data and conclusions. In the editor's judgment, however, the work is a credit to the young men of this State. As an attempt to digest a mass of statistics, made with a truth-loving desire to throw light upon the industrial conditions and resources of their State, this publication needs no further explanation or apology.

The Economics Club is especially indebted to Mr. Alexander Deussen of the School of Geology for advice, references, and material.

LEWIS H. HANEY.

***No. 236, "Some Corporation and Taxation Problems of the State" (1912); No. 298, "Studies in Agricultural Economics" (1913). There is still a small supply of these bulletins available.**

Errata: Page 28, line 29, for "climate" read "weather."

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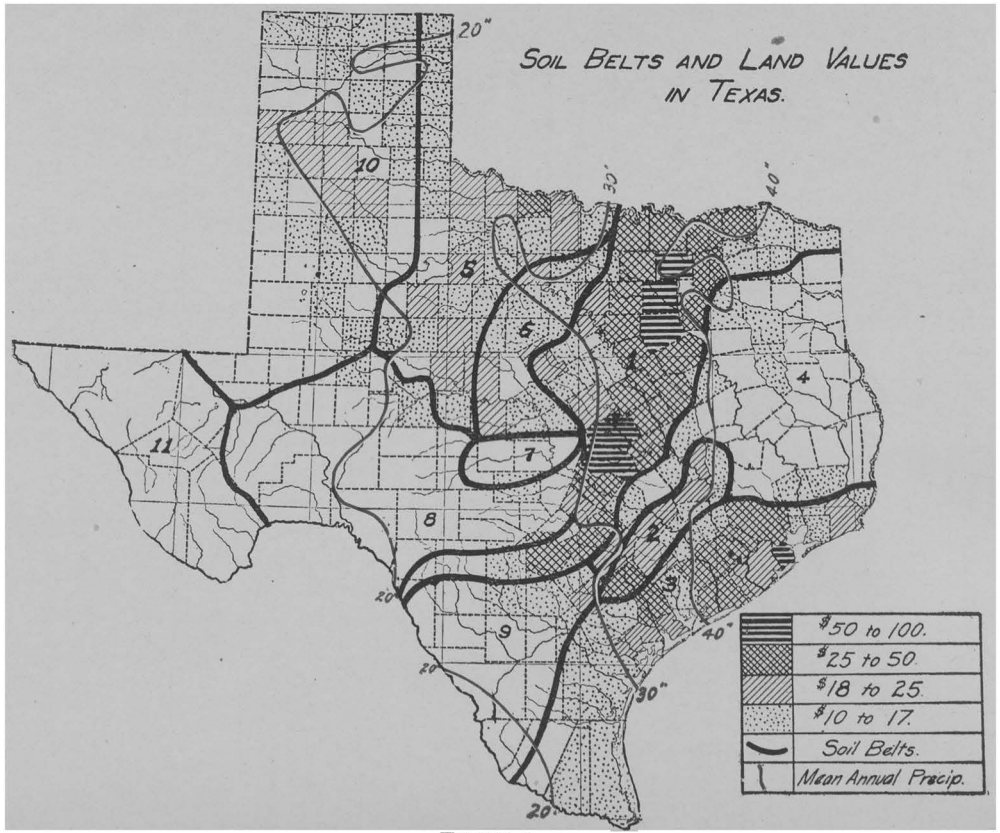
SOIL BELTS AND LAND VALUES IN TEXAS.
20"
30"
40"
10
5
6
1
4
11
7
8
2
3
9
$50 to 100.
$25 to 50.
$18 to 25.
$10 to 17.
Soil Belts.
Mean Annual Precip.

FIGURE 1.

STUDIES IN THE INDUSTRIAL RESOURCES OF TEXAS

ECONOMIC COMPARISON OF TEXAS SOIL BELTS.*

LEWIS H. HANEY

(Assisted by Alex Spence.)

The object of the following paper is to set forth as concisely as possible the chief economic facts concerning the great soil belts or regions into which Texas is divided. To this end the pertinent data presented in the United States census of 1910 have been tabulated by counties, the counties grouped into soil belts, and the totals drawn off. In several cases the boundaries of soil belts cut across county lines so as to make it difficult to classify, and consequently results are not absolutely accurate; but relative accuracy is believed to have been maintained, and the figures are as accurate as those of the census. The great labor of compilation has prevented making all the comparisons and correlations that might profitably be made.

A glance at the map on the preceding page (Fig. 1) shows that Texas is made up of many different soil belts. A little closer scrutiny shows that these differences find expression in important differences in land values. Roughly, at least ten main divisions must be distinguished, and these, with the number by which they are indicated on the map, are as follows:

1. Black Land Belt (Houston black clay).
2. Central Neocene Area (black sandy loam).
3. Coast Prairie (Houston black clay).**
4. East Texas Timber Belt (sands and sandy loam).
5. Permian Plains (red loam prairie soils).
6. Carboniferous Area (sands and black clays, underlain by sandstone and conglomerates).

*The preparation of this paper was assigned to Mr. Spence. He, however, found the work involved too great; and at the last minute the writer completed his data and made the correlations. The writer regrets that so important a subject could not have received fuller treatment.

**Largely used as cattle ranges, being difficult to drain; but where drainage is possible is good for farming.

7. Llano Country (granitic sand, Crawford black clay, and fine red sandy soil).

8. Edwards Plateau (Crawford stony clay and red-brown soil of limestone derivation).*

9. Tertiary Southwest (brown sands and sandy loams, and brown and black clays.

10. Staked Plains (fine sandy loams, etc.).

11. Trans-Pecos Area (brown sandy loams).**

The order to simplify as much as possible, the Neocene Area is not considered separately in presenting much of the data, but is thrown partly into the East Texas region and partly into the Coast Prairie belt.

In area, the most important of these soil belts is the Staked Plains region, its 31,000,000 acres comprising 18 per cent of the entire area of the State. Next come the East Texas and the Black Land belts, with 14 per cent and 12 per cent of the total area, respectively.

It is not area, however, but the amount of land in farms that counts most. Here, again, the Staked Plains lead with 19 per cent of the total. It is notable that the Black Land belt jumps to second place in the order of land in farms, the proportion being about 15 per cent of the total. The East Texas belt, however, falls to fourth place; and the Edwards Plateau comes up to third (11.8 per cent).

But one must know how much of the land in farms is improved. The Black Land belt is first here, and actually contains one-third of all the improved farm lands of the State! The percentages of area, improved land, and population of the various belts are thrown into contrast by the following table:

Soil Belt. (In order of improved land.)	Area.	Improved Land.	Population.
Black land	12.0%	33.4%	37.3%
East Texas	14.1	21.5	23.9
Permian	8.2	13.2	7.9
Staked Plains	18.7	9.7	3.5
Coast Prairie	9.8	8.6	12.6
Carboniferous	5.8	8.5	6.9
Tertiary Southwest	7.5	2.2	2.9
Edwards Plateau	10.1	1.7	2.1
Llano	1.5	.9	.8
Trans-Pecos	11.9	.2	1.8

*Largely shallow, very stony, and best suited for stock.

mo st entirely in irrigated valleys.

It is easily seen that 36 per cent of the land area (Black Land, East Texas, and Coast Prairie) contains 63 per cent of the improved land and 74 per cent of the population of the State.

When the various belts are compared as to value of crops, we find that 42 per cent of the total value comes from the Black Land belt, and East Texas is second with 25 per cent. The only other sections worth mentioning on this score are the Permian (10 per cent), Coast Prairie (8.5 per cent), and the Carboniferous (7 per cent). The same general order prevails when the value of domestic animals and poultry is considered, the chief exception being that the Staked Plains region comes up to third place with 12 per cent of the total. And the value of animals is more evenly distributed among all the belts.

There is a total of 219,500 tenant farms in the State. Of these, 69 per cent are in the Black Land and East Texas belts. Only 6 per cent are found in the whole of the Stated Plains, Tertiary Southwest, Edwards Plateau, Llano, and Trans-Pecos areas.

Coming now to a comparison of the average conditions within each soil belt, we will first make the average farm the basis of contrast, next the average acre, then the individual member of population.

1. *Comparison of average farms.* If all land in farms is included, unimproved as well as improved, the average farm of some of the Texas belts is enormous. In the Trans-Pecos region, for example, the average is 6105 acres; and in the Edwards Plateau and the Staked Plains the averages are 1565 and 1490 acres, respectively. These, of course, are the less densely settled, grazing sections. At the other extreme come the East Texas and Blank Land belts, having average farms of only 90 and 117 acres.

But much land in farms is wild and unimproved. We must know how large the average improved acreage is to judge the relative productivity. On this basis, the order is considerably changed and the differences greatly reduced. Indeed, none of the Texas belts shows a very large average size for improved land per farm. The Trans-Pecos drops from first to last with only 37 acres improved; while the Black Land, Carboniferous, and Coast Prairie regions rise to high rank with 64 to 71 acres. The complete data are given in the next table. It will be observed that, while in all but two sections (Black Land and East Texas)

the average Texas farm is larger than the average for the United States, in all but two sections (Staked Plains and Permian) the area improved is smaller. This is the normal result of the predominance of cotton, tenancy, and less effective use of labor.

In most sections the chief purpose of farming is the production of some crop, and the productivity of the improved part of the farm can certainly be judged by crop values. We find that the Black Land belt, which ranked sixth in improved acreage per farm, stands first in value of crops ($884) per farm. The Permian and Cost Prairie belts rank second and third in both columns. East Texas, standing No. 9 in improved acreage, ranks sixth in value of crops per farm. But the Staked Plains fall from first to eighth ($520).

Comparison of Average Farms.

Soil Belt. (In order of improved acreage per farm.)	Average Farm.* (Acres)	Average Improved Acreage.	Average Value Crops Per Farm.
Staked Plains	1,490	182	$520
Permian	312	97	786
Coast Prairie	302	71	765
Tertiary Southwest	738	65	599
Carboniferous	229	64	609
Black land	117	64	884
Edwards Plateau	1,565	62	542
Llano	501	56	498
East Texas	90	44	573
Trans-Pecos	6,105	37	394

Thus, the *average* farmer of the Staked Plains runs a farm whose total area is 1490 acres,* but he only tends to 182 acres of improved land, from which he gets crops valued at $520. The *average* Black Land farmer only manages 117 acres, of which the small amount of 64 acres is improved; but he gets crops valued at $884.

2. *Comparison of averages per acre.* The first question which arises in one's mind in thinking of acres of land is one of value. On this score, a glance at the map (Fig. 1) is illuminating. The valuable lands in Texas are narrowly concentrated in a few definite soil belts. In only one county outside the Black Land belt did farm land values exceed $50 on the average in 1910. It is nearly

*The area in farms includes all sorts of wild and unimproved land, and does not mean much for West Texas.

correct to say that in 1910 in no county in Texas did farm lands average over $25 per acre outside of the Bland Land and Coast Prairie belts. And it is clear that the chief reason for this is the character of the soil, the most valuable soils in these two belts being of the black clay ("black waxy") variety. The mean annual precipitation, of course, plays an important part—to say nothing of temperature— but the bulk of the black clay soils lie inside the 30 inches rainfall line. (No county having an average land value of $18 or over per acre lies outside the 20-inch precipitation belt, and very few showed as high a value as $10 per acre.) Especially notable is the fact that the East Texas belt shows almost entirely white on the map, indicating almost no counties with an average land value as high as $10.

The facts covering average values per acre and average value of all crops per improved acre, are set forth in the following table:

Soil Belts. (In order of value per acre.)	Value Per Acre.	Value of Crops Per Acre. (Improved.)
Black land	$ 32	$13.0
Coast Prairie	18	10.7
Permian	17	8.0
Carboniferous	16	9.4
East Texas	12	12.7
Staked Plains	10	2.8
Tertiary Southwest	9	9.0
Llano	9	8.7
Edwards Plateau	5	8.7
Trans-Pecos	3	10.4*
Neocene	20	12.9

The Black Land belt comes first in value of land per acre. It is composed almost entirely of black clay soil and lies mostly within the 30-inch rainfall line. The Coast Prairie belt, which, though largely black clay, is not entirely so; and which has in about one-third of its area a rainfall of less than 30 inches, comes second in value per acre. The Permian belt, consisting of sandy loans and clays derived from the red Permian rocks, and lying almost entirely outside the 30-inch precipitation line, is third. Fourth, comes the Carboniferous soils, which are sandy and sandy or gravelly loam, interspersed with tongues of the Crawford black clay type. East Texas, with its light sandy soils, heavy rainfall, and timber growth, stands fifth in land value per acre.

*High because largely irrigated valleys.

There is a general relation between crop yield per acre of improved land and value per acre of all farm land; but notable exceptions occur in the case of East Texas, Trans-Pecos, and Staked Plains. These differences are partly due to the inherent properties of the soil, as for example, East Texas soils have less natural fertility than the Black Lands; and partly they are due to the fact that the Trans-Pecos and Staked Plains belts have so very small a proportion of their farm land acreage in crops. Also, the prevalence of negroes, and the wooded character of the land, play a part in East Texas. But in the case of East Texas there is another reason, consisting in a larger use of live stock and machinery per acre of land in farms than is found in several of the belts that outrank it in land value. This helps explain the relatively great crop yield as compared with land value.

Stock and Machinery Per Acre of all Farm Land.			Value of Land Per Acre.
Soil Belts.	Domestic Animals and Poultry.	Implements and Machinery.	
Black Land	$4.90	$1.17	$32
East Texas	3.80	.80	12
Coast Prairie	3.30	.64	18
Carboniferous	3.20	.62	16
Permian	3.00	.55	17
Llano	2.40	.39	9
Tertiary Southwest	1.88	.22	9
Staked Plains	1.80	.18	10
Edwards Plateau	1.60	.14	5
Trans-Pecos	1 00	.05	3

The above table shows that few of the Texas soil belts are adequately equipped with domestic animals and machinery. For the United States as a whole, the average is about $5.60 per acre in animals, and $1.45 per acre in implements and machinery. As the average value of land in the United States is $32.40 per acre, this makes these two items about 17 per cent and 4.5 per cent of the value of the farm land investment. Considered separately, then, the Black Land belt is the only one that approaches the average value of animals and machinery per acre for the United States. Considered in relation to land values, the Black Land belt falls considerably below the average, its animals being in value but 15 per cent of the land and its machinery but 3.6 per cent. It is in proportion to land values that East Texas makes the best showing, its percentage being 32 per cent for animals and 6.6 per cent for machinery.

3. *Comparison of averages per capita.* It is one of the commonest errors—and one not confined to the layman—to overlook the relation of agricultural output to the number of persons concerned. Or, put in other words, it is a common mistake to overemphasize the returns per acre. The returns per man are more important. A few facts may well be added, therefore, to indicate how the several soil belts show up when considered in relation to their respective populations.

First, one wonders how many persons are supported by an acre of land in each belt or region. Passing over "all farm land," as having relatively little significance, we find that the amount of *improved* land per capita ranges from 19 acres in the Staked Plains down to only 5 acres in the Tertiary Southwest. In the Black Land belt there are about 8 acres of improved land for each person living outside cities of 25,000 inhabitants or over. In East Texas the number is 6.2; in the Coast Prairie, 6.3.

What, now, is the yield per capita in crops from these varying average amounts of improved land? By comparing the values of crops per capita, we can throw a truer light upon the productivity of the various soil belts,—truer because more human.

Omitting large cities and towns, the Bland Land belt comes first in crops per capita, with $111. Second comes the Permian area with $95. The Carboniferous area is third, and East Texas a close fourth. The Trans-Pecos region is a poor last, with only $17 in crop value per capita.* It is notable that, while East Texas was second in value per acre (improved), that region is only fourth in value per capita. The Coast Prairie belt was third on a per acre basis, but drops to sixth on a per capita basis. The Trans-Pecos makes the worst showing, being fourth in output per acre and tenth in output per capita. On the other hand, the Permian region, which stood low in yield per acre, is actually second in yield per capita; and the Staked Plains and Carboniferous areas also makes a better showing on the per capita basis.

*This figure does not include the city of El Paso.

Soil Belts (In Order of Crops per Capita).	Value Crops Per Capita.	Improved Land Per Capita.	Implements and Machinery Per Capita.	Domestic Animals Per Capita.
Black Land	$111	8.0	$17.3	$72
Permian	95	11.0	20.9	114
Carboniferous	81	8.6	19.0	100
East Texas	80	6.2	10.9	52
Llano	69	7.9	27.6	176
Coast Prairie	68	6.3	17.3	90
Staked Plains	55	19.0	29.0	148
Edwards Plateau	50	5.7	22.2	265
Tertiary Southwest	47	5.1	12.9	110
Trans-Pecos	17	16.0	15.9	291

The foregoing table throws some light on the reasons for the better showing made by several belts on the per capita basis. Of course, other things, such as population, climate, etc., enter in, but the fact that the Permian region stands so high in value of crops per capita can be fully explained only when it is observed that this region stands fourth in the equipment of its population with farm machinery. So, too, with the Carboniferous and Staked Plains areas.

Unfortunately the writer has not the separate figures for horses and mules, and consequently the statistics of domestic animals are of relatively little significance in this connection. The prevalence of cattle ranching in several of the belts would make comparisons difficult in any case.

Had time and equipment permitted, much information of interest might have been gathered as to the relation between the kind of crop and the soil. Thus, wheat is most largely grown in the Permian region, rice in the Coast Prairie, fruits in the East Texas region, and cotton in the Black Land and Carboniferous belts. The following table showing the percentage of cotton in the total crop value may be of interest:

Importance of Cotton.	Per Cent.
Carboniferous	64
Black Land	62
Tertiary Southwest	58
Permian	56
Neocene	53
Llano	51
East Texas	46
Edwards Plateau	41

	Per Cent.
Coast Prairie	20
Staked Plains	19
Trans-Pecos	0.1

In conclusion a word of information concerning the prevalence of tenant farms may not be amiss. Tenancy is confined to no particular class of soil, nor to any particular grade of land as to value. Thus, in the East Texas region, 50 per cent of the farms are tenant farms, while in the more valuable Coast Prairie the percentage is only 45 and in the Permian soils it is 54. The percentage of tenant farms in the different belts is as follows:

	Per Cent.
Black Land	60
Permian	54
Neocene	53
East Texas	50
Carboniferous	47
Tertiary Southwest	45.3
Coast Prairie	45
Staked Plains	36.2
Llano	36
Edwards Plateau	33
Trans-Pecos	17

In a general way it is clear that tenancy is most prevalent in the most productive and most valuable soils.

THE CLIMATE OF TEXAS IN RELATION TO ITS CROPS.

ALEXANDER DEUSSEN.

The most important element in the climate of a country, as related to its crops, is temperature. All crops require a certain quantity of heat to complete the full cycle of growth and reproduction, but the amount of heat required, above the initial point of 42.8 degree F., is variable for different species of plants. For example, corn requires a greater quantity of heat for its full development than does wheat.

It may be roughly stated that the production of cereals, including wheat and oats, is limited to those countries where the mean temperatures range from 40 to 60 degrees. Corn may be grown where the mean temperatures range from 50 to 70 degrees. Cotton and tobacco are roughly limited to those districts where the mean temperatures range from 60 to 70 degrees. Rice and sugar cane are in general limited to the humid portions of those areas having temperatures above 65 degrees. Oranges are limited as a rule to those districts where the mean temperatures are above 70 degrees.

Fig. 2 shows by means of isothermal lines the average temperatures of different portions of the State.

It will be noted from the map that the portion of Texas represented by the Staked Plains (which includes the Panhandle) and a part of the area lying west of Pecos River, is in general north of isotherm 60. The greater portion of the State lies within the limits of isotherms 60 and 70. A narrow strip extending back from the coast thirty or forty miles lies south of isotherm 60, but differs from the remaining portion of the area between isotherms 60 and 70 in its very high humidity. The region about the mouth of the Rio Grande lies south of isotherm 70 and is included in the tropical zone.

These facts readily account for the great diversity of crops grown in the State, including the wheat and oats of the Panhandle district and the counties of the North Texas, corn and cotton in the district east of the 99th meridian, tobacco in east Texas, and sugar and rice in the coast district

A season sufficiently long between low temperatures is a neces-

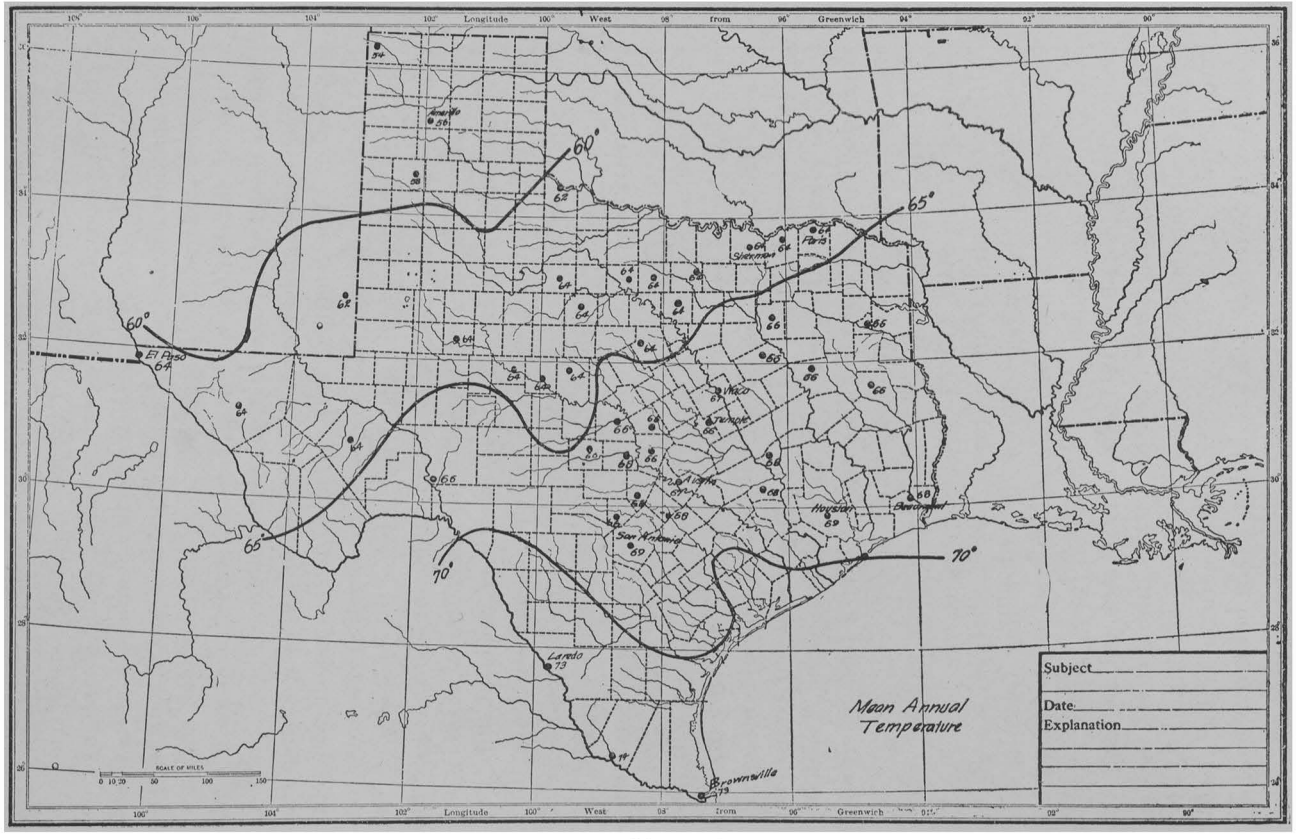
Longitude West from Greenwich
Amarillo
El Paso
Sherman
Paris
Waco
Austin
San Antonio
Houston
Beaumont
Laredo
Brownsville
60°
65°
70°
Mean Annual Temperature
Subject
Date
Explanation
SCALE OF MILES

FIGURE 2.

sity for certain crops to enable them to grow to maturity. Different species of plants vary in the length of season required. Cotton, for example, requires a very long growing season, and on this account its growth is restricted to the Southern States, where this condition obtains. Corn can mature in a much shorter season, which explains also in part why corn thrives in the northern portion of the United States. There are varieties of corn that differ in the length of season required to mature.

Texas is especially favored with the advantage of a long growing season. The length of this season is of shortest duration in the Panhandle district. It increases in duration towards the south. In the Brownsville district it attains the maximum. In this portion of the State the season is of sufficient length to permit more than one crop to mature in the course of a year.

The interval between low temperatures is of sufficient duration to permit the maturity of wheat and oats in any portion of the State. The same is true for corn, peaches, apples, vegetables, etc. Cotton, however, is restricted to the territory south and east of the Staked Plains.

The occurrence of frost has a vital relation to crops. Wheat will endure a frost if the ground is fairly moist; corn will tolerate light freezes but not severe ones; cotton is very easily injured by even light frosts; oranges will not tolerate temperatures much below freezing. A great disadvantage in the growing of peaches in the State is the occurrence of frosts in the early spring. A spell of warm weather may cause the trees to bud; later a frost may come and the crop may be seriously injured.

The following maps give facts relating to frosts and low temperatures in the State (Figs. 3-5).

It will be noted from figures 3 and 4 that in the Panhandle district the average date of the last killing frost in the spring is April 15, but killing frosts have occurred as late as May 23. In the autumn the first killing frosts usually occur about November 1, but killing frosts have occurred as early as October 16. About the latitude of Austin killing frosts in the spring occur on the average about March 12, but killing frosts have occurred as late as April 12. In the autumn killing frosts occur about November 18, but killing frosts have occurred as early as October 12.

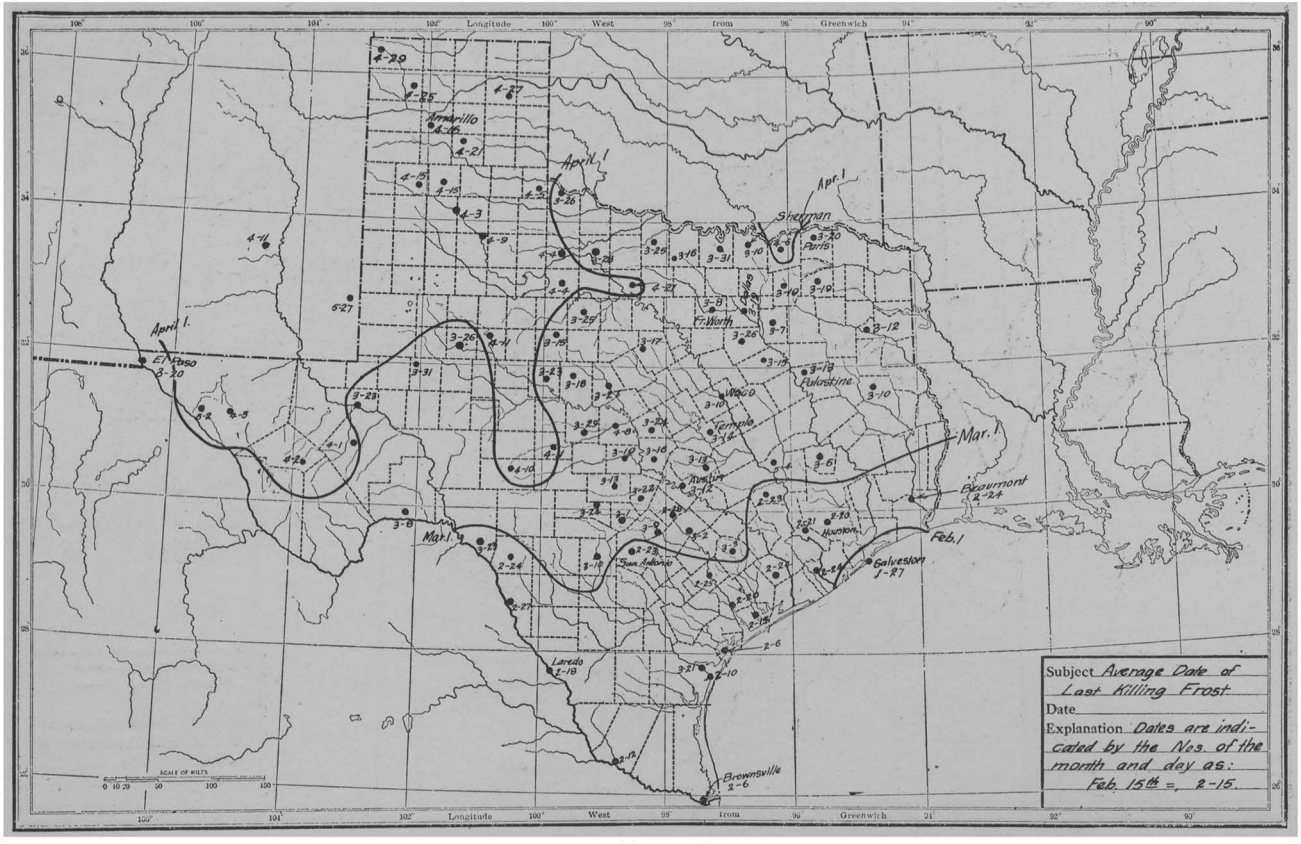
Longitude West from Greenwich
Amarillo
April 1
Apr. 1
Sherman
Paris
Ft. Worth
Palestine
Waco
Temple
Austin
San Antonio
Laredo
Brownsville
Houston
Galveston
Beaumont
Mar. 1
Feb. 1
El Paso
Subject Average Date of Last Killing Frost
Date
Explanation Dates are indicated by the Nos. of the month and day as: Feb. 15th = 2-15.

FIGURE 3.

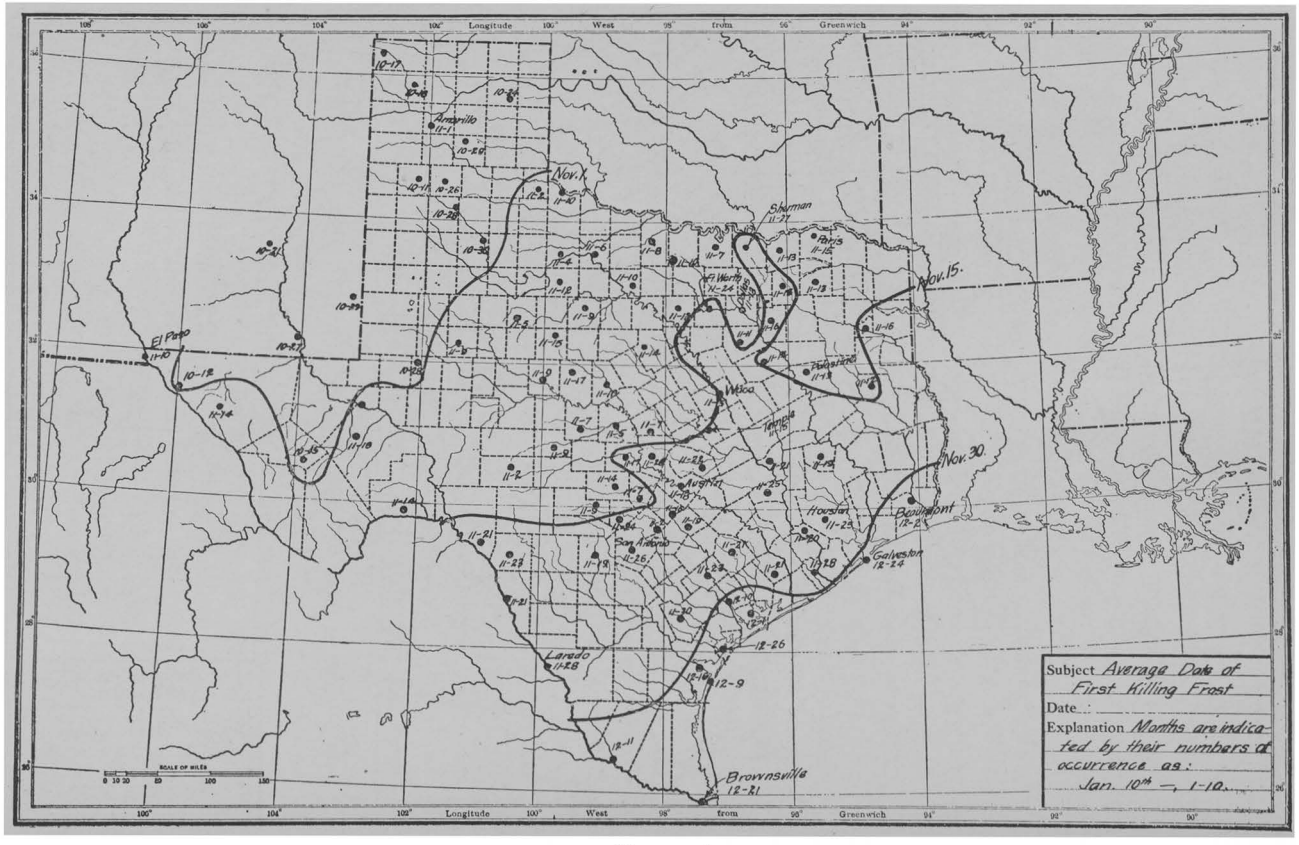
Longitude West from Greenwich
Amarillo
Nov. 1
Sherman
Paris
Ft. Worth
Nov. 15
El Paso
Waco
Palestine
Austin
San Antonio
Houston
Beaumont
Galveston
Nov. 30
Laredo
Brownsville
SCALE OF MILES
Subject Average Date of First Killing Frost
Date
Explanation Months are indicated by their numbers of occurrence as: Jan. 10th —, 1-10.

FIGURE 4.

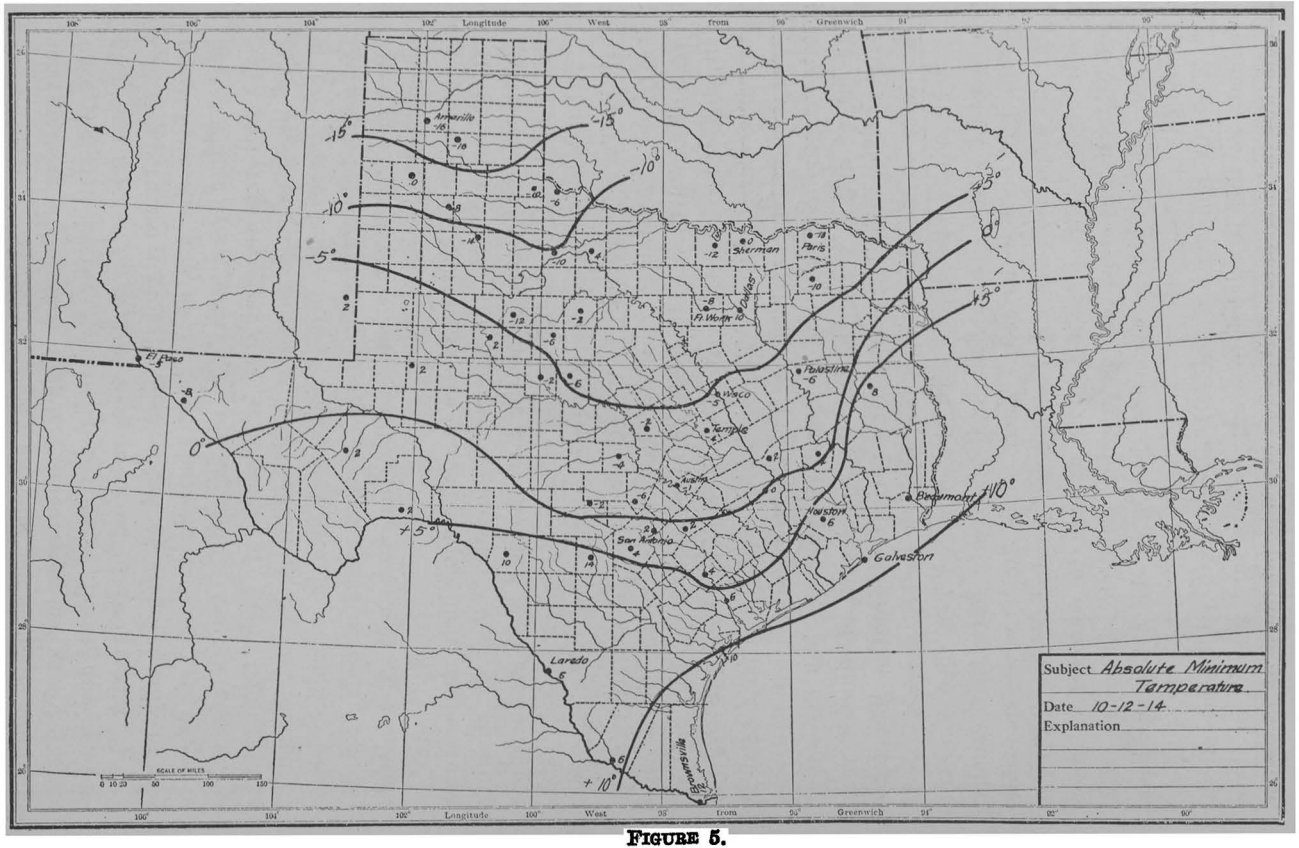
Subject Absolute Minimum Temperature
Date 10-12-14
Explanation
Longitude West from Greenwich
Amarillo
Sherman
Paris
Ft. Worth
Dallas
El Paso
Waco
Temple
Austin
San Antonio
Houston
Beaumont
Galveston
Laredo
Brownsville
SCALE OF MILES
-15°
-10°
-5°
0°
+5°
+10°

FIGURE 5.

It will be noted from the map showing the absolute minimum temperatures of the State that temperatures as low as -20 degrees have occurred in the Panhandle district of Texas, and temperatures as law as 12 degrees have occurred at Brownsville.

A temperature factor in the control of crops equally as important as the one of sufficient heat is the one of excessive heat. Plants vary greatly in their ability to tolerate excessixe temperatures, and the occurrence of high temperatures is of the greatest importance in determining the distribution of crops. For example, wheat does not thrive in a country where the mean temperature for the six hottest weeks exceeds 78.8 degrees F. On the other hand, cotton, rice, and sugar cane tolerate much higher temperatures.

(Some rough idea as to the prevalence of high temperatures can be gained from the accompanying map (Fig. 6) showing maximum temperatures, and the map showing mean temperature for June that is appended to this article. (Fig. 15.)—Ed.)

Related to excessive temperatures are the hot winds that prevail in Texas in certain years. These winds do not occur every year, and are confined mostly to that portion of the State lying west of the 97th meridian. They carry excessively hot and dry air, and come from the west or southwest in the months of June to September, inclusive. The air which strikes one feels as if it were coming from a furnace. The strips that these winds devastate at any one time are comparatively narrow, but the entire radius of action when blowing for any length of time is very large. They usually occur during periods of drouth. The temperatures at such times have been as high as 116 degrees.

Such winds play havoc with the crops. When they come in June and strike a corn field in the tasseling stage they usually completely destroy the crop. These winds are largely responsible for the uncertain results that attend the growing of corn in Texas west of the 97th meridian. The damage to cotton and other drouth resisting crops such as sorghum, milo, etc., is not so great if rain falls within a reasonable time after the hot winds have prevailed.

Next to temperature, rainfall is the most vital element in climate as this is related to crops. Crops vary greatly in their moisture requirements. Likewise, in their tolerance of excessive

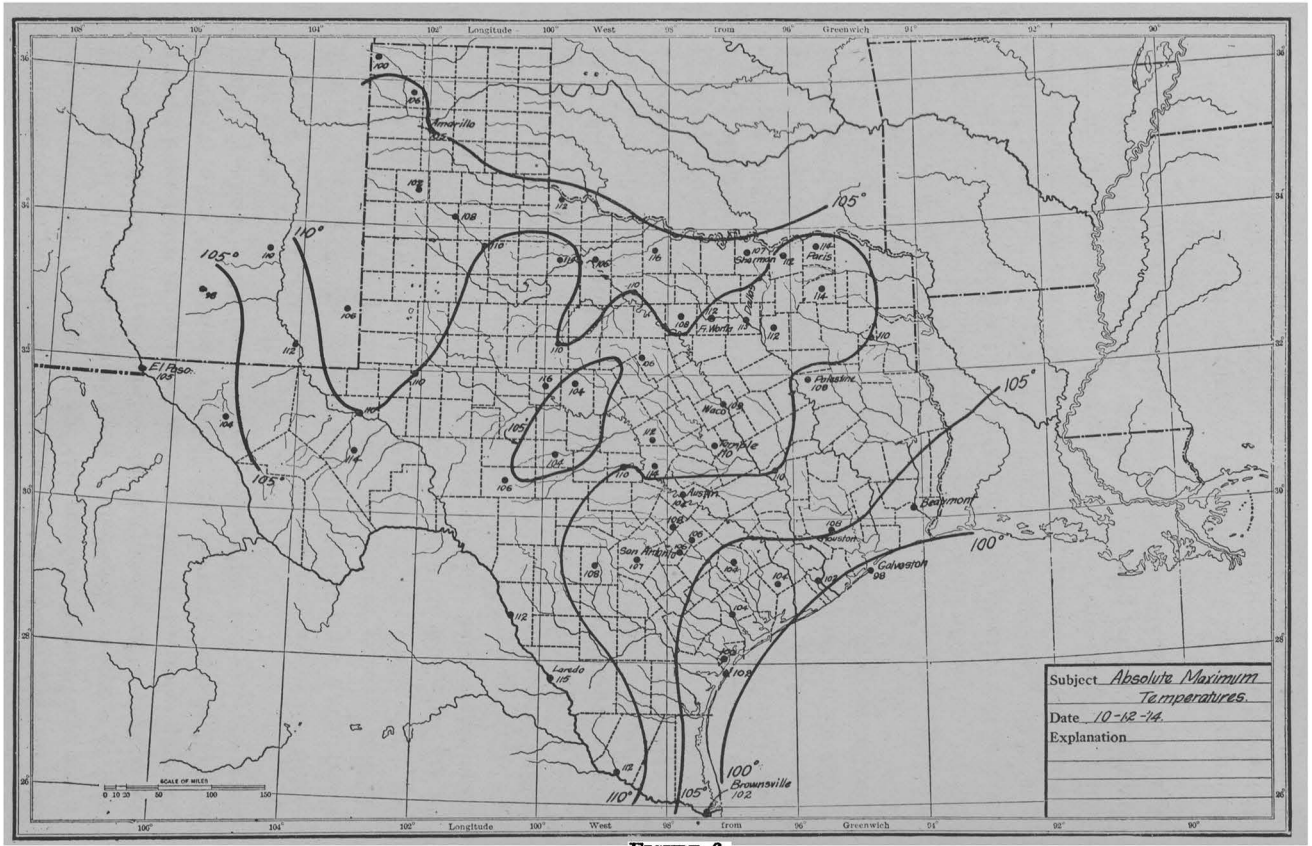
Longitude West from Greenwich
Amarillo
El Paso
Sherman
Paris
Ft. Worth
Palestine
Waco
Corsicana
Austin
San Antonio
Houston
Beaumont
Galveston
Laredo
Brownsville
105°
110°
100°
Subject Absolute Maximum Temperatures.
Date 10-12-14.
Explanation
SCALE OF MILES

FIGURE 6.

moisture, crops vary greatly. Cotton and sorghum, for example, can be produced in areas where the rainfall is relatively small as compared to areas in which corn is produced. Above a certain limit the distribution of rainfall in the course of a year is of greater importance in its effect on crops than is the total amount. However, when the annual rainfall gets below a certain limit—usually the limit of 18 inches a year—irrigation has to be resorted to if possible.

Fig. 7 is a map showing the mean annual rainfall of the State. It will be noted that in general several rainfall belts which trend north and south may be recognized. The belt of greatest rainfall (40 to 50 inches) is in the eastern part of the State along the Louisiana line; the belt of least rainfall (10 to 20 inches)is in the western part of the State; the intermediate belts are situated between the maximum and minimum belts.

It is a somewhat curious fact that while the temperature belts of Texas in general follow parallels of latitude and have an east-west trend, the rainfall belts follow meridians of longitude, and have a north-south trend. As a consequence the State is cut into a number of squares which have entirely different climates due to different combinations of temperatures with rainfall. These different climates are in turn associated with different crops. For example, while the temperature conditions in the Panhandle district of Texas or in the Brownsville district of Texas are well suited for the growth of corn, the rainfall conditions, on the other hand, are not suited. In consequence the corn crop is of very minor importance in the districts named.

The line of 20 inches roughly follows meridian 101. West of this line irrigation is necessary for the culture of crops. In the belt of 20 to 30 inches the rainfall may be greatly deficient in certain years, and at these times irrigation is needed. The irrigation enterprises of the State are confined largely to the district west of the line of 30. Such drouth resistant crops as milo, kafir corn, sorghum, and Durum wheat are also largely cultivated (without the aid of irrigation) in the belt bounded by the lines of 20 and 30 inches.

The line of 30 inches roughly separates the timbered portion of the State from the prairie land. The latter is well adapted to the grazing of cattle. The cattle industry is for this reason

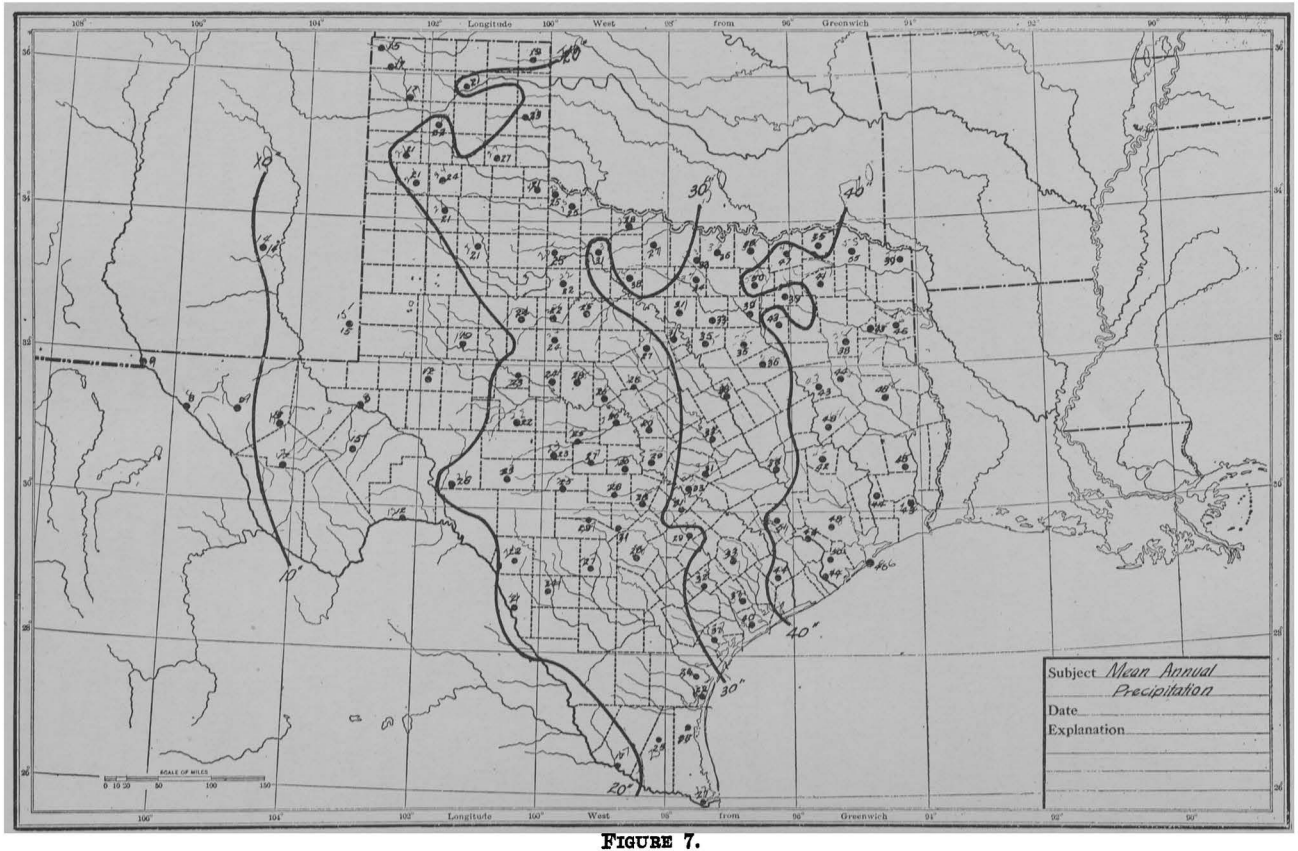
Longitude West from Greenwich
10"
20"
30"
40"
Subject Mean Annual Precipitation
Date
Explanation
SCALE OF MILES
0 10 20 50 100 150

FIGURE 7.

largely confined to that part of Texas west of the rainfall line of 30 inches.

The distribution of rain in the course of the year is very vital from the standpoint of crops. It is most desirable that the major portion of the rainfall occur during the growing season with the least rainfall during the harvest period. Crops differ very materially, however, as regards their rainfall requirements at different intervals. For example, wheat does best where there is adequate but not excessive rainfall at frequent intervals from the time it is sown in the fall or the latter part of winter until it begins to bloom in the latter part of spring. Very moderate rainfall is then required up to the time of ripening. Excessive or continual rain at this stage is disastrous. Thereafter during the season of harvest no rain whatsoever is the ideal condition. Corn, on the other hand, will get along with moderate amount of rain at fairly frequent intervals during the early period of growth, but from the time it begins to tassel until the ear has thoroughly filled out abundant moisture is required. Cotton will get along with moderate rainfall at fairly frequent intervals during the growing season; it will endure without material suffering drouths of from three to six weeks duration. Dry weather, however, after the bolls have opened and the cotton is ready to pick is a highly desirable condition; rainfall during this interval is very injurious to the crop.

The following diagram will show the distribution of rainfall at selected stations within the State. (Fig. 8.)

It will be noted that at Amarillo, in the Panhandle district, the maximum rainfall occurs in July, the minimum in March; the maximum does not exceed 4 inches and the minimum is less than 1. The total annual is 21.9. The rainfall is adapted for the culture of wheat and oats and especially of the drouth-resistant varieties. It is not adapted for corn because of the small quantity. It would be sufficient for cotton, but Amarillo is north of the northern isotherm for cotton. The rainfall is well adapted for milo, kafir corn, and sorghum.

At El Paso the greatest rainfall occurs in July (2.2); the least in April (0.2). The total for the year is 9.3. This quantity is not sufficient for the practice of agriculture without irrigation.

Under irrigation crops of alfalfa, sorghum, milo, cotton, etc., can be grown.

At Abilene the greatest rainfall occurs in May (3.8); the least in January (0.9). The total for the year is 24.5. Wheat and oats can be planted, but are not certain crops. The rainfall is not sufficient for corn. Cotton, milo, kafir corn, and sorghum are well adapted to this district.

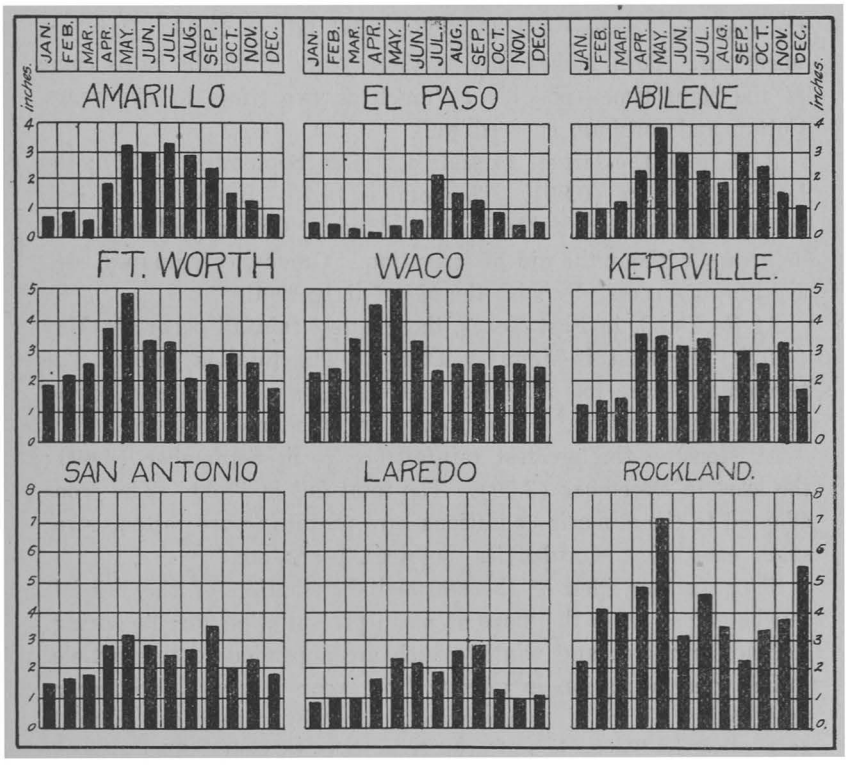

FIGURE 8.

At Fort Worth the greatest rainfall occurs in May (4.79); the least in December (1.77). The total annual rain is 33.36. Wheat and oats thrive fairly well in this climate. Corn is an uncertain crop. Cotton and sorghum are very successful.

At Waco the greatest rainfall occurs in May (5.0); the least in January (2.26). The total fall is 36.22. The temperatures are too high for successful wheat culture. Oats thrive moderately

well, but the large rainfall in May is not favorable. Corn is uncertain. Cotton and sorghum are well suited for this climate.

At Kerrville the greatest rainfall occurs in July (3.76); the least in January (1.06). The total annual fall is 29.39. Wheat and oats do fairly well in this section. Corn is more or less uncertain, due to the insufficient quantity of rain. Cotton and sorghum are well adapted to this district.

At San Antonio the greatest rainfall occurs in September (3.52); the least in January (1.41). The total fall is 27.95. Oats are uncertain. Corn makes only in those years when the rains come at the right time—possibly as much as two times in five years. Cotton and sorghum succeed well.

At Laredo the largest rainfall comes in September (2.75); the least in January (0.80). The total is 19.75. Supplemental irrigation is found profitable in this section. Cotton and milo can be grown without the aid of irrigation. Onions, cantaloupes, etc., are grown successfully with the aid of irrigation.

At Rockland, in East Texas, the greatest rainfall occurs in May (7.07); the least in January (2.18). The total is 48.22. The temperatures are too mild for wheat and oats. Corn and cotton thrive in this section, in addition to tomatoes, potatoes, etc.

At Houston the greatest rainfall occurs in September (4.49); the least in December (3.00). The total fall is 47.92. The crops adapted to the climatic conditions here prevailing are cotton, corn, sugar cane, rice, strawberries, potatoes, pears, etc.

Some further idea of the seasonal distribution of the rainfall can be gained from the maps of mean precipitation for the spring, summer, autumn, and winter which are appended to this article.

The great variation in climate from year to year is an important factor. It is a comparatively rare thing that the rainfall at a place in Texas is uniform from year to year. The average annual fall is not determined by a uniform fall each year but it is the mean of two extremes, one a period of drouth, the other, one of excessive rain. This fact has an important relation to the crops of the State. Cotton and sorghum tolerate such variation in the rainfall fairly well; they can endure long periods of drouth and can get along with a small quantity of moisture; on the other hand, they are not greatly injured by excessive moisture. A crop like corn, however, is not well adapted for such rainfall

conditions, and particularly in those regions where the mean annual fall is less than 30 inches. At the time that the corn is forming ears it must have abundant moisture; and for the greater portion of the State this is most often not the case.

The following diagram shows the annual variation in rainfall at a number of selected stations within the State for a period of years. (Fig. 9.)

At El Paso the annual rainfall varies from 2.3 to 19.1. At Amarillo the variation is from 15.60 to 27.39. At Abilene as little as 14.97 inches of rain has fallen in a year and as much as 35.30 in other years. At Fort Worth 18.11 inches was the rainfall in 1899 and 47.61 in 1889. At Waco the rainfall has varied from 22.13 in 1893 to 60.20 in 1905. At Kerrville the fall has varied from 15.92 to 35.54. At San Antonio only 14.92 inches of rain fell in 1909 and 41.91 in 1880. At Laredo the rainfall has varied from 4.31 to 36.38. At Rockland the rainfall was 34.33 inches in 1909 and 56.91 in 1905. At Houston the rainfall was 27.09 in 1901 and 62.51 in 1907.

NOTE.—The editor would add a few observations not noted in the preceding discussion. It seems that a comparison of the maps showing first and last frosts (Nos. 3 and 4) may be correlated with the map of land values (No. 1) with interest. It will be observed the most of the most valuable land lies in the regions that show a period which on the average is exempt from frosts between about March 10 and November 15. This is about a 250 days period, which presumably insures a long growing period.

The close correlation between land values and mean annual precipitation appears from map No. 1. The most valuable lands lie in the belt between 30 and 40 inches precipitation, though irrigation makes some exceptions. Also, in the Staked Plains country (10), the land averaging between $18 and $25 is included in a projection of the 20-inch line. The same point could be made for a correlation of spring rains and land values, the most valuable lands all lying in territory having 10 inches of rain, on the average, in March, April, and May.

It is also not without point to note that the valuable cotton lands lie in counties whose mean precipitation for September, October, and November is under 10 inches; and rain is not wanted at that time.

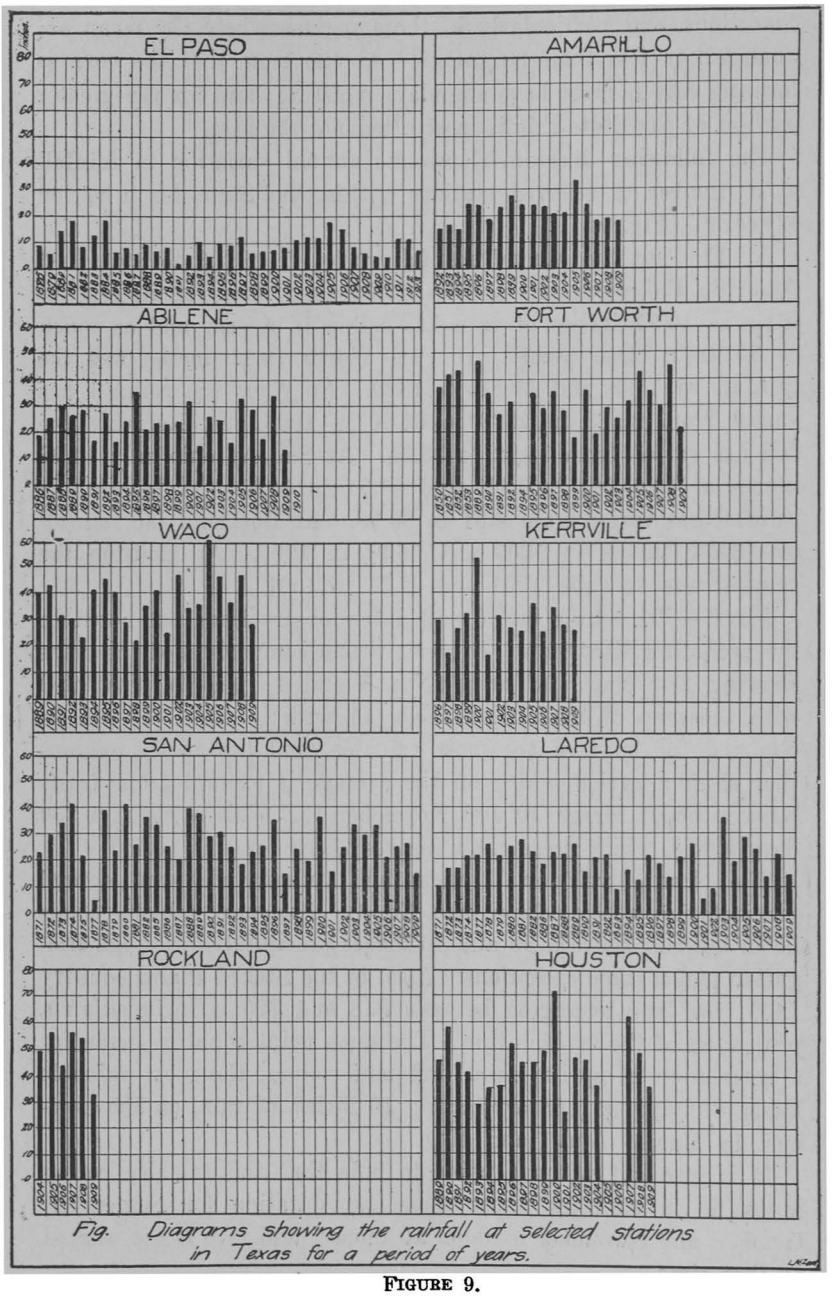
EL PASO
AMARILLO
ABILENE
FORT WORTH
WACO
KERRVILLE
SAN ANTONIO
LAREDO
ROCKLAND
HOUSTON
Fig. Diagrams showing the rainfall at selected stations in Texas for a period of years.

FIGURE 9.

The relation between wheat and temperature is fairly close, the Texas wheat belt being largely confined to the area which has an absolute maximum under 110 degrees and an average for June of under 78 degrees. Also some relation between wheat and a summer rain of from 5 to 11 inches is indicated.

The following seven maps, prepared by W. T. Donaldson, show seasonable distribution of temperature and rainfall:

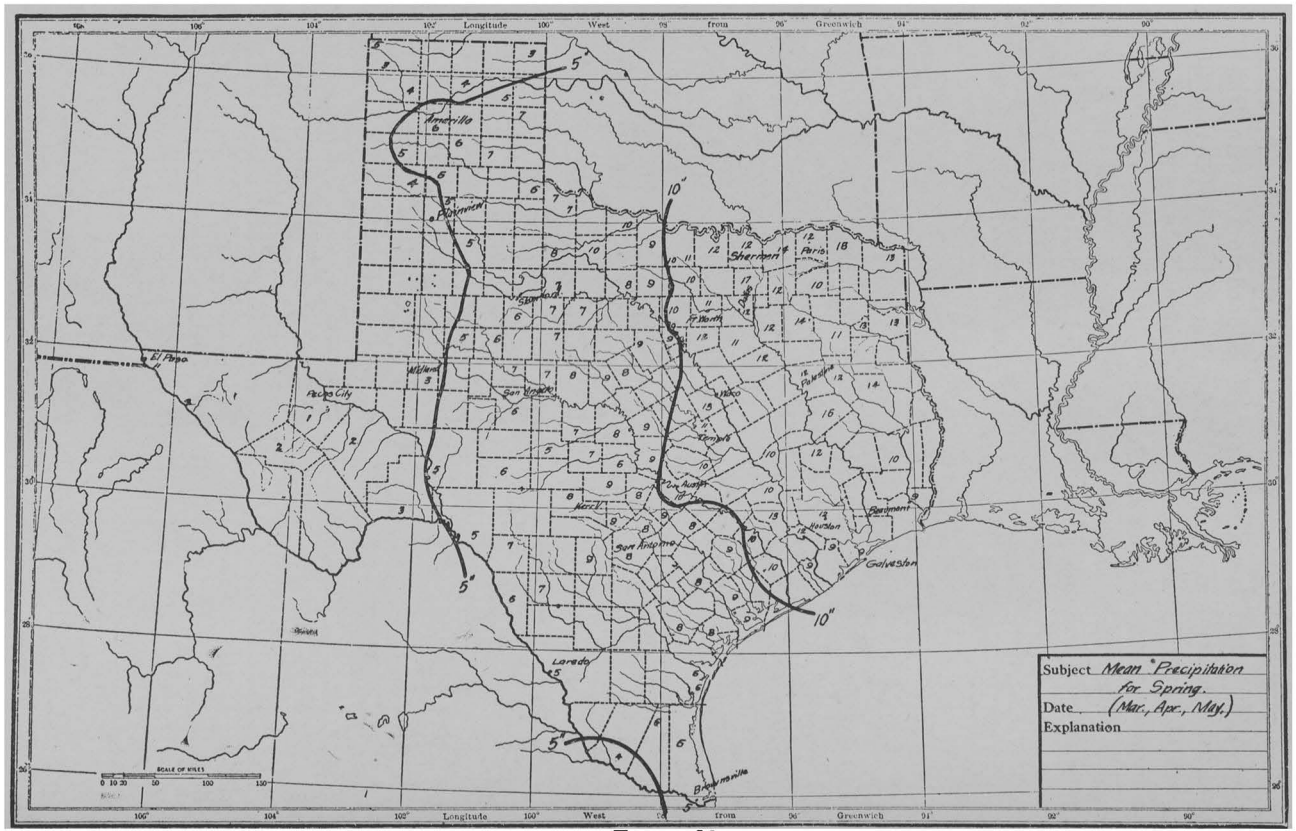
Subject Mean Precipitation for Spring.
Date (Mar., Apr., May.)
Explanation
Amarillo
Pampa
Sherman
Paris
Ft Worth
Waco
Temple
Austin
San Antonio
Houston
Galveston
Beaumont
Laredo
Brownsville
El Paso
Pecos City
Longitude West from Greenwich
SCALE OF MILES

FIGURE 10.

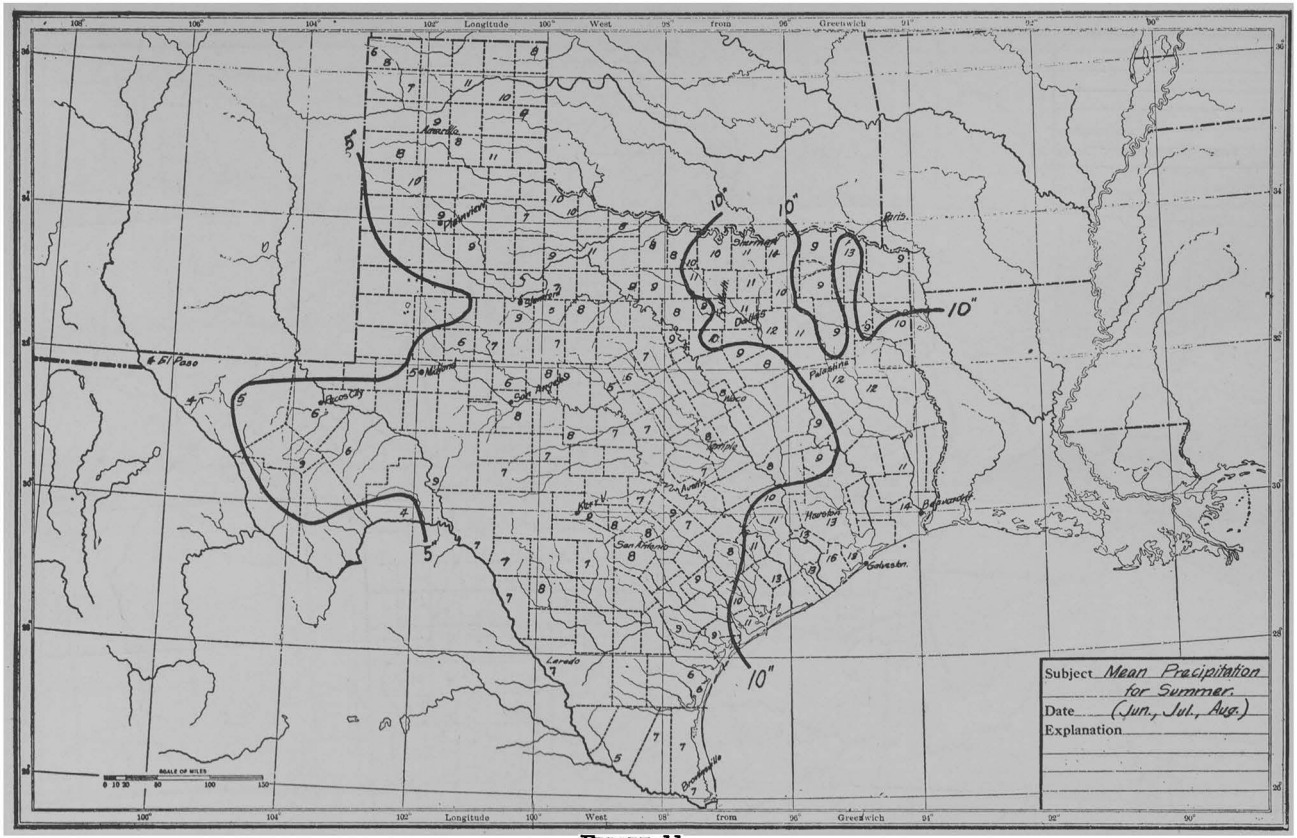
Subject Mean Precipitation for Summer.
Date (Jun., Jul., Aug.)
Explanation
Longitude West from Greenwich
Amarillo
Plainview
Abilene
Sherman
Paris
Dallas
Palestine
El Paso
Las Cruces
Del Rio
San Antonio
Houston
Galveston
Beaumont
Laredo
Brownsville
SCALE OF MILES

FIGURE 11.

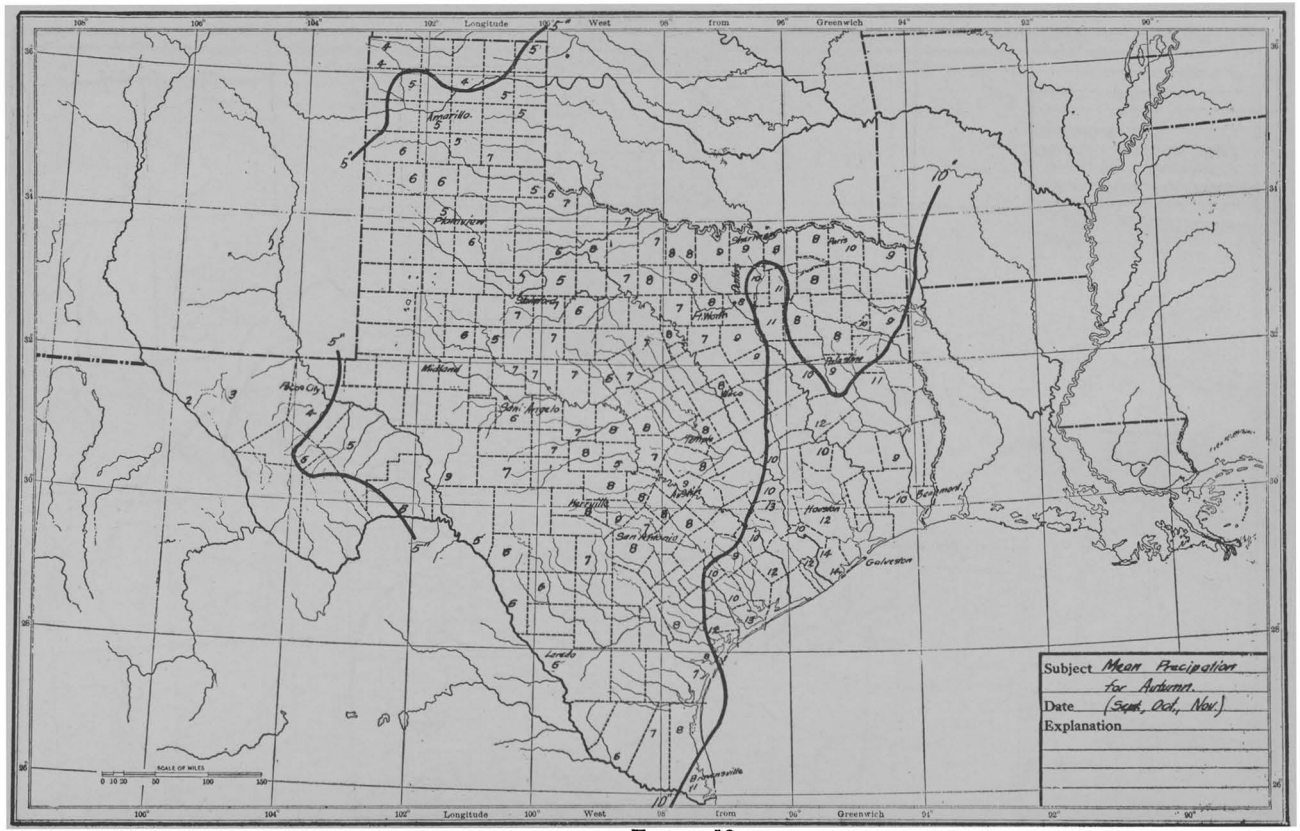
Longitude West from Greenwich
Amarillo
Pecos City
Midland
San Angelo
Abilene
Fort Worth
Waco
Austin
San Antonio
Laredo
Houston
Galveston
Beaumont
Subject Mean Precipitation for Autumn
Date (Sept., Oct., Nov.)
Explanation
SCALE OF MILES

FIGURE 12.

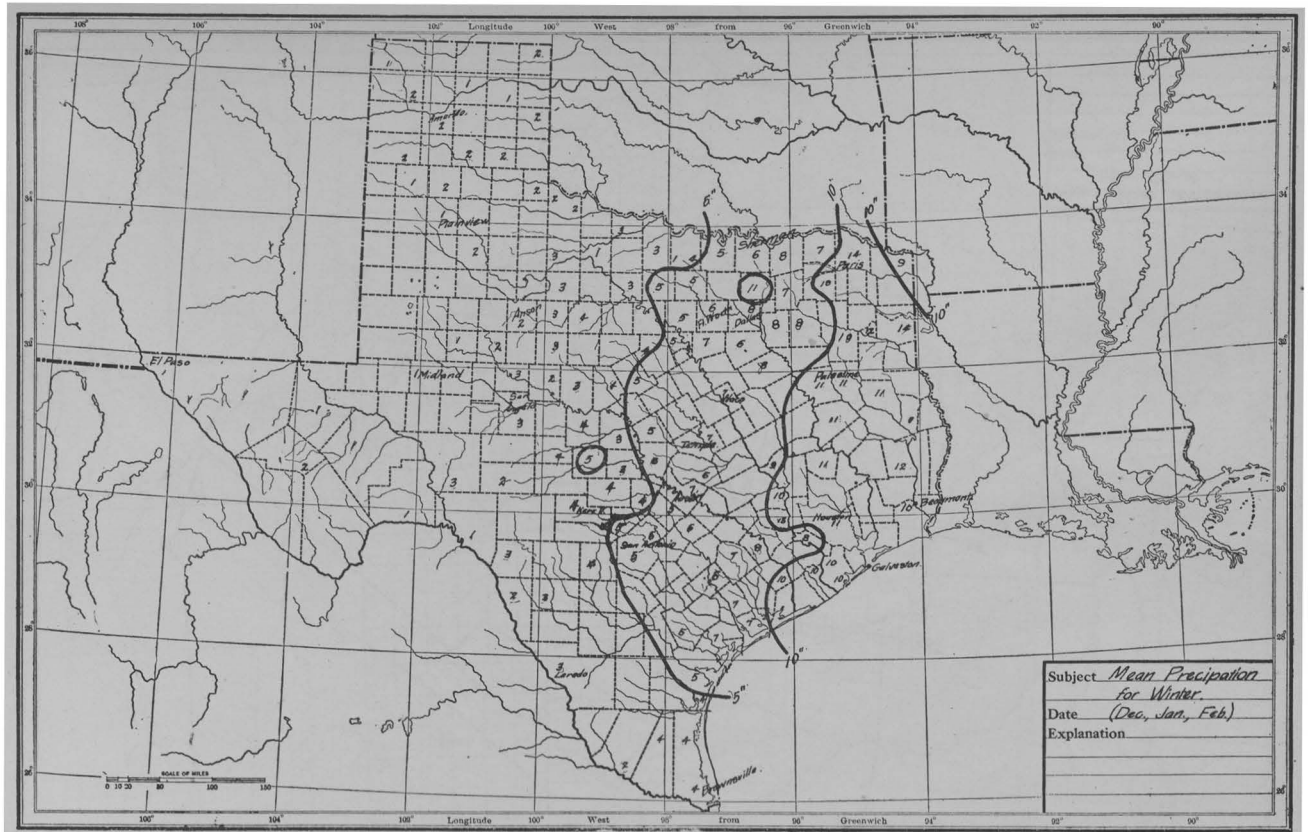
Longitude West from Greenwich
El Paso
Midland
Pecos
Sherman
Dallas
Waco
Palestine
Beaumont
Galveston
Laredo
Brownsville
San Antonio
Subject Mean Precipitation for Winter.
Date (Dec., Jan., Feb.)
Explanation
SCALE OF MILES
0 10 20 50 100 150

FIGURE 13.

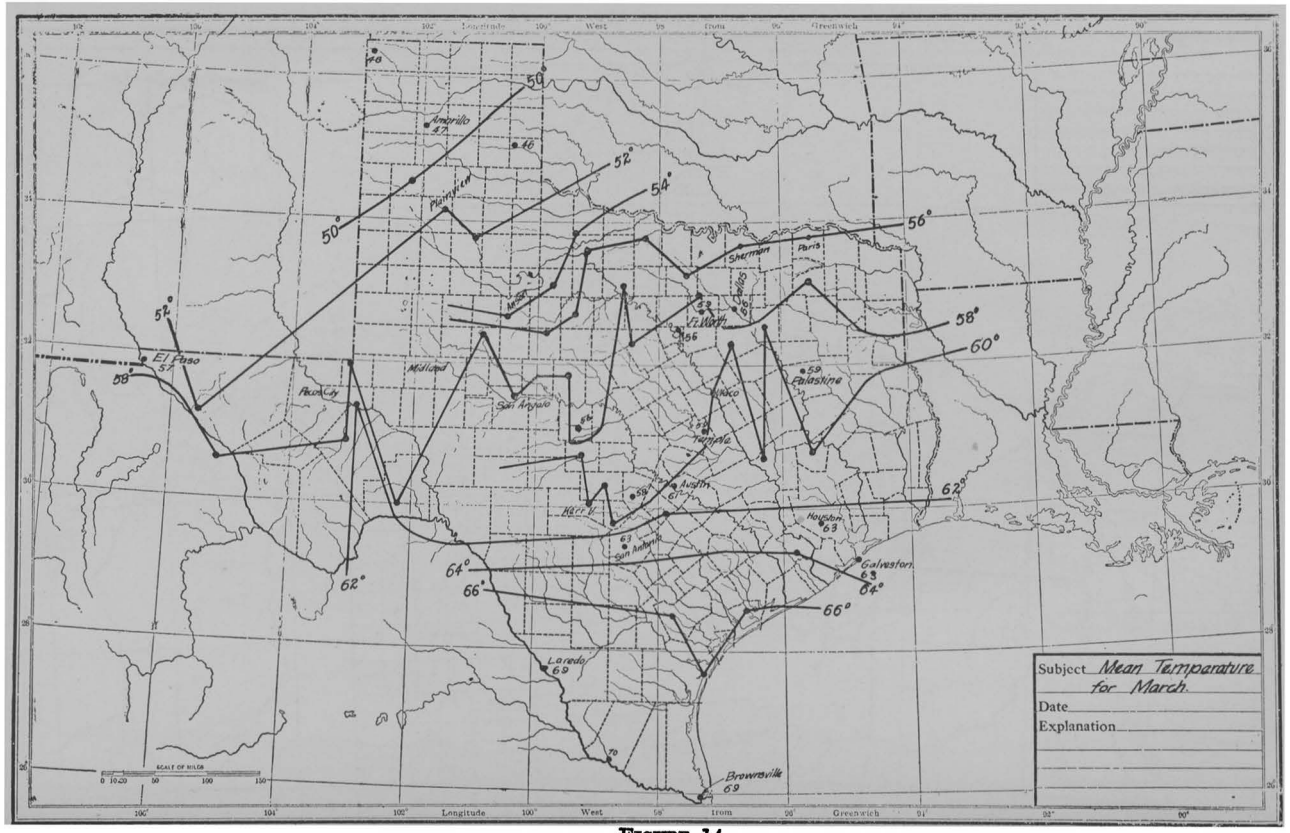
Subject Mean Temparature for March.
Date
Explanation
Amarillo 47
Plainview
Sherman
Paris
Ft. Worth
Waco
Palestine
El Paso 57
Pecos City
Midland
San Angelo
Austin 61
Harrell
San Antonio
Houston 63
Galveston 63
Laredo 69
Brownsville 69
50°
52°
54°
56°
58°
60°
62°
64°
66°
Longitude West from Greenwich

FIGURE 14.

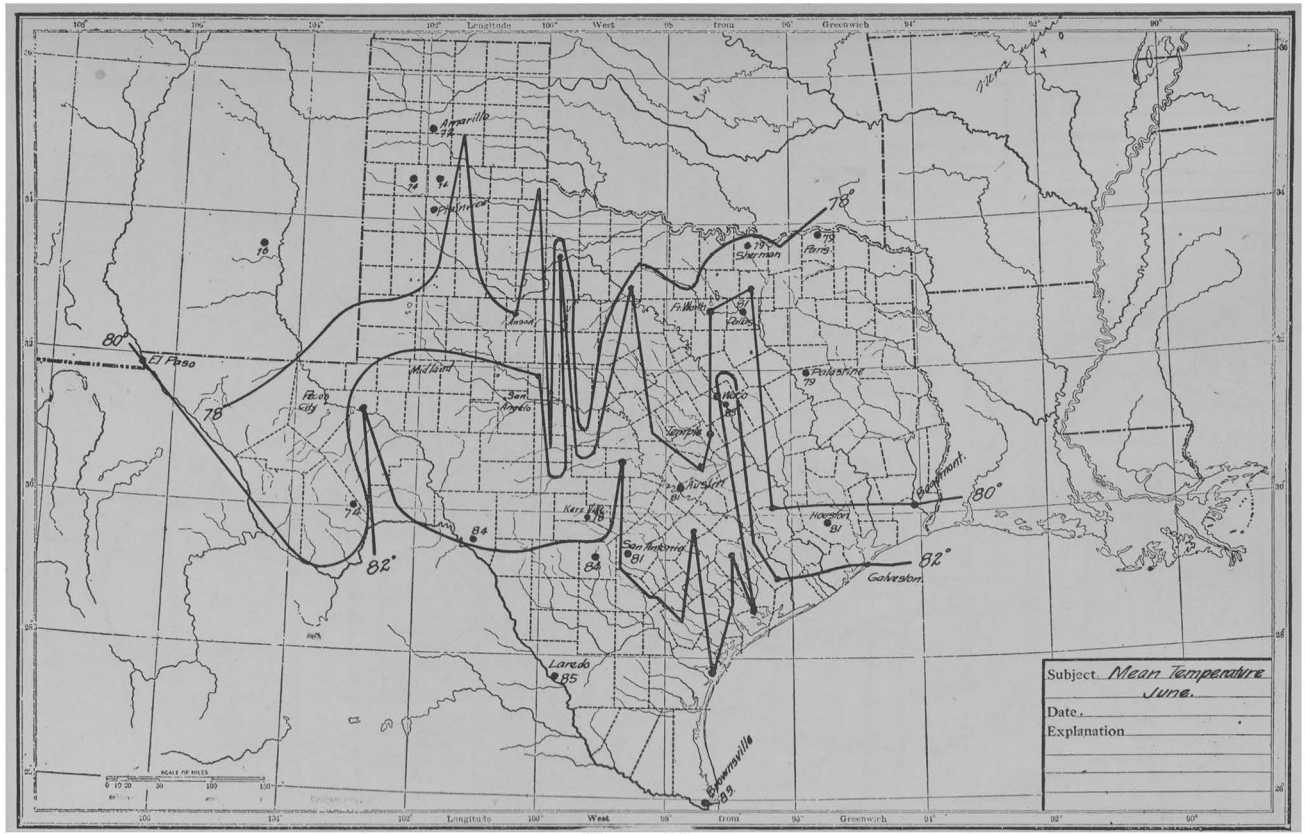
Longitude West from Greenwich
Amarillo
Pampa
Abilene
Sherman
Paris
Ft. Worth
Dallas
Palestine
Waco
Temple
Austin
Kerrville
San Antonio
Houston
Galveston
Beaumont
Laredo
Brownsville
El Paso
Fort Davis
Midland
San Angelo
80°
78°
82°
80°
82°
78°
Subject Mean Temperature June.
Date
Explanation
SCALE OF MILES

FIGURE 15.

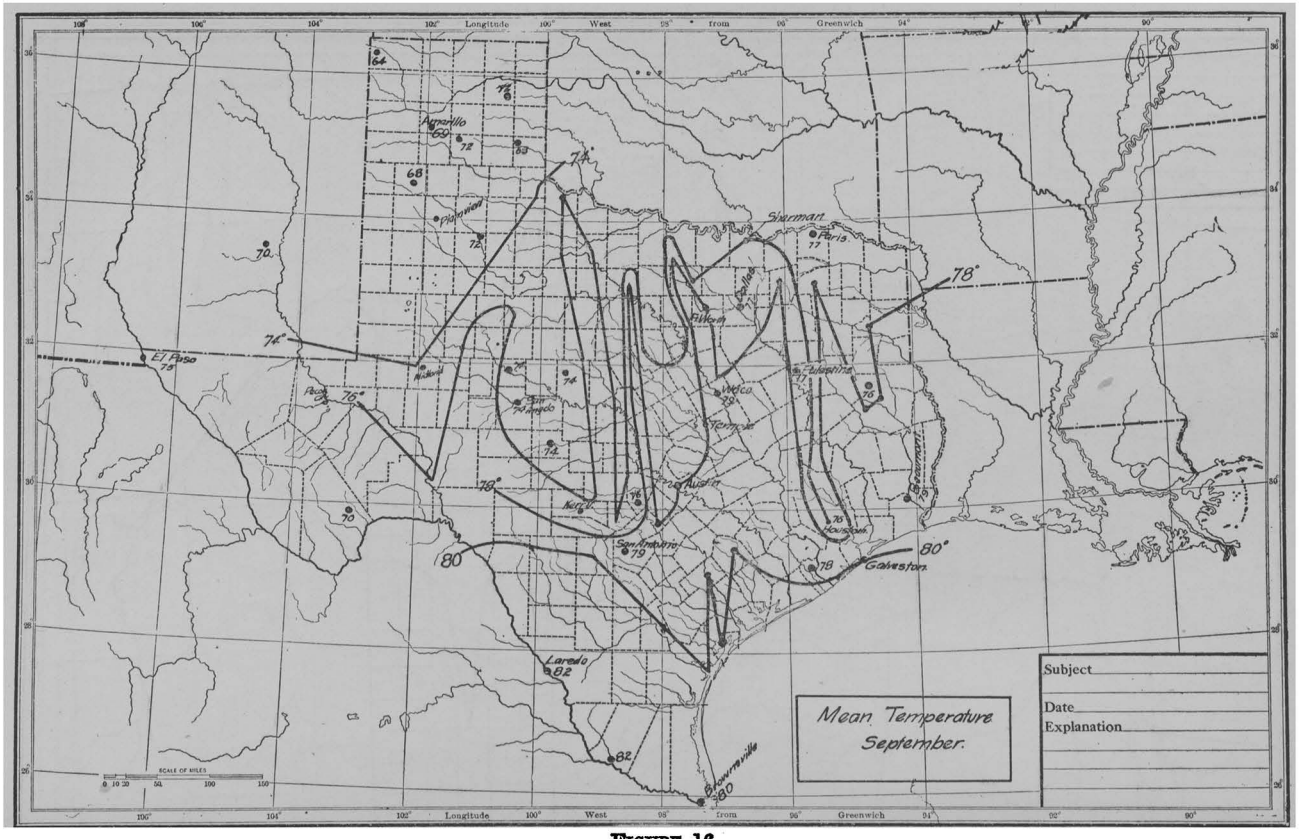
Longitude West from Greenwich
Amarillo
Plainview
Sherman
Paris
El Paso
Abilene
San Angelo
Waco
Palestine
Austin
Houston
San Antonio
Galveston
Laredo
Brownsville
Mean Temperature
September.
Subject
Date
Explanation
SCALE OF MILES

FIGURE 16.

THE POPULATION OF TEXAS AND ITS POTENTIALITIES AS A LABOR FORCE.

W. E. LEONARD.

Fifty years of labor in Texas have established the beginnings of many industries. These are of the broad extensive type and character. In this work a relatively unskilled body of workers has served the State well. But now the demand comes—and it is heard on every hand—for intensive cultivation and for the manufacture of Texas products. But what of the Texas population as a labor force for these newer obligations? Does it possess, or can it readily acquire, the necessary qualities? The following analysis is made with the intention, and with the hope, of throwing some light on these questions.

The Population of Texas.

In 1910 the total population of this State was 3,896,542. This shows an increase of 27.8 per cent over the population of 1900.* To form some idea of the labor force as distinguished from the population there must be made certain deductions. First, of those below or above the normal working period of life. If 15 years be accepted as the minimum age for employment, 38.6 per cent must be subtracted, and if 65 years be placed as the normal maximum age, a further deduction of 2.8 per cent must be made, a total of 41.4 per cent. This leaves 58.6 per cent, or 2,240,000 as the potential working force of the State. But, in the second place, other deductions must be made. How large these numbers are is impossible to say. The following groups certainly would be found: Those incapacitated by illness or accident; those capable of work, but who are supported in complete idleness, both men and women; those who are incorrigibly idle, the semi-criminal loafers and vagabonds, and, finally, those under institutional care.** Could all

*Abstract of Thirteenth Census, p. 136.

**There were in custodial care on January 1, 1910, the following:

In asylums for the insane	4,053
Paupers in alms houses	861
Juvenile delinquents	185
In municipal jails	94
In County jails	610
In State penitentiaries	3,523
Total	9,326

Bulletin United States Census, Nos. 119, 120, 121.

In 1914 it is estimated that in addition to those in asylums there are 1,042 insane elsewhere, viz. 209 in county jails; 111 on poor farms; 307 with relatives; 415 idiots, making a total of 5,090.

non-producers be enumerated it might appear that one-half of the population is supporting the other one-half.

It is often profitable to compare our own State with other States. In Iowa, for instance, which is an agricultural State somewhat like Texas, there is a potential working population of 63.3 per cent of the total population, while in Massachusetts, a strictly manufacturing State, there is 67.7 per cent. Again, if the ages 20 to 55 be accepted as the period when the capacity to labor is at its maximum, there are in Texas 41.1 per cent; in Iowa, 47.1 per cent; in Massachusetts, 52.7 per cent of the most productive age. So that not only have the older Northern States a larger proportion of their people living within the whole span of the working life, but also a larger proportion in the most vigorous part of the life, that is, between the years 20 and 55. This is explained in part by the fact that immigration to the Northern States has increased the population between these ages, and by the probable fact of a higher birth rate in Texas.

The differences in favor of the older communities, however, are partially, if not wholly overcome by two important facts: (1) Texas has a much smaller proportion of people living above the upper limit of 65 years, that is, 2.8 per cent, as compared with 5.6 per cent for Iowa, and 5.2 per cent for Massachusetts. (2) In Texas there are 107.4 males to each 100 females, giving for the State a total excess of 138,710 males. Probably more than 100,000 of this number are in the working period of life. Moreover, this excess in Texas is made up of white males, since among negroes the sexes are equal in number. In Massachusetts, on the other hand, there are only 96 males for each 100 females. Undoubtedly this makes a great difference in the effectiveness of a labor force.

THE MARRIAGE AND BIRTH RATE.

In Texas, 62.7 per cent of the women are married; in Iowa, the percentage is 60, while in Massachusetts it is 52.1. There are no data showing the relative birth rates directly. If, however, the number of married women be compared with the number of living children under 15 years of age (see Table 1) we get an approximation to the birth rates, although it is incomplete. Upon the basis of this comparison, the birth rate in Texas is about 34 per cent higher than in Iowa and 48 per cent higher than in Mass-

achusetts. By the same comparison it appears that the birth rate among negroes is only 5 per cent higher than among white women. Texas is, in fact, a new State; it is largely agricultural, and these facts explain the higher birth rate.

Table 1. Proportion of Children to Married Women.

Married Women and Children.	Texas.	Iowa.	Mass.
White.			
Married women	591,444	439,591	637,299
Children under 15 years	1,236,009	680,254	900,244
Average children per woman	2.09	1.55	1.40
Black.			
Married women	121,959	3,008	7,232
Children under 15 years	268,421	3,808	9,242
Average children per woman	2.20	1.26	1.28

Abstract of 13th Census, p. 135; 162.

DISTRIBUTION BETWEEN CITY AND COUNTRY.

It may no longer be said that Texas is among the most rural of States, for the rapid growth of cities has begun. The Federal census for the ten-year period, 1900 to 1910, reveals the fact that the total city population of Texas increased 82 per cent, while the average increase for the seven larger cities, not including Galveston, was nearly 93 per cent, clearly indicating, not only a rapid city growth, but also that the most rapid increase is found in the larger cities. To be contrasted with this is a rural increase of 18.9 per cent. Of the whole population, at the present time, 24.1 per cent live in cities, whereas, in 1900, only 17.1 per cent were city dwellers.

Moreover, Texas cities are becoming more industrial in character and this introduces into them a new kind of labor problem. It means the coming of the factory type of worker, who, on the average, is a less skilled worker than those found in commercial cities. Moreover, these workers are employed on a day or hour basis; they hold no very close personal relationships with their employers. The result is that such workers come to have common class interests and feelings, and out of these spring the labor problem in its acuter forms, as all industrial cities bear witness. In such cities the question of seasonal unemployment assumes a constantly recurring problem of increasing difficulty, and this problem our Texas cities may not hope to escape.

COMPOSITION OF THE POPULATION—NATIONALITY AND RACE.

The first group to be distinguished consists of the native whites. It includes 54 per cent born in the State and 21 per cent who come from other States. Thus 75 per cent of the population is native American.

The foreign element may be said to include two parts: (a) The foreign born, making 7.4 per cent; (b) natives of foreign or mixed parentage, 11.2.*

The chief national and race elements in the population of Texas is shown in outline form below.

It is interesting to note that 82.3 per cent of all the people are white, and that only 17.7 per cent are negro. Moreover, the latter element is declining relatively, since thirty years ago every fourth person was a negro, while at the present time approximately every sixth person belongs to that race.

Among the whites, Texans born of Texas parentage are most numerous, comprising 56.7 per cent of the people. Those of native American stock, but born in other States of the nation, come next in order with 24.4 per cent, while the foreign elements of various degrees make up 18.8 per cent. However, of this 18.8 per cent, about one-half, 9.5 per cent, are natives of Texas, born of foreign parents. Thus the whole white population native to Texas—but regardless of parentage—aggregates 66.2 per cent.

*National and Race Groups in the Population of Texas, 1910.***

I. *Whites* (3,206,493)—*82.3 per cent* of total population.

1. Native Americans of native parents—

	Per Cent.
(a) Of native Texas parentage (1,820,556....	56.7
(b) Of American parentage born in other States or possessions (784,037).....	24.4

2. Foreign elements—

(a) Of foreign or mixed parentage, but natives of Texas (306,867).....	9.5
(b) Of foreign or mixed parentage, natives of other States (55,049).....	1.8
(c) Foreign born (239,984).....	7.5

*These are not strictly speaking "foreign." The reader will note that census usage is not followed here. (Ed.)

**Thirteenth Census, Vol. I, pp. 748; 762; 753; 750-753; 894.

II. *Negroes* (690,049)—*17.7 per cent* of the total population.

1. Natives of Texas (602,761)—87.3 per cent.
2. Natives of other States (87,288)—12.7 per cent.

One of the most important contributions to the white population of Texas has been immigration from other States. From 1870 on to about 1890, the movement seems to have been from the Southern States chiefly, so that by 1900 more than 670,000 persons registered as their birth place one of the twelve States in the South. But in 1910 this number declined to 665,000, which is about 1 per cent less than in 1900. This is explained by saying that a high death rate of the earlier comers slightly overbalances those coming at the present time. In short, the old historic line of migration westward seems to be narrowing. On the other hand a new line of immigration is now appearing. It comes from the States to the north and the far northeast. From 1900 to 1910 there was an increase of more than 54,000, or 42.2 per cent of those in Texas who give one of twelve Northern States as their birth place. The States of Iowa, Nebraska, and Kansas show increases approximating 100 per cent, while Massachusetts shows an increase of 33⅓ per cent, and New York not far from 50 per cent. Should this continue the day is not far distant when New Yorkers in Texas will outnumber Virginians.

Table 2: Contributions to Texas Population of Persons Born in Other States, 1900-1910.

Southern States.	1910	1900	Northern States	1910	1900
Virginia	17,861	21,832	Masschusetts	2,055	1,524
West Virginia	2,415	1,355	New York	11,187	8,325
North Carolina	18,863	23,065	Pennsylvania	10,428	6,122
South Carolina	14,914	19,861	Ohio	16,349	10,588
Georgia	70,510	77,950	Indiana	17,769	11,586
Florida	3,361	3,799	Illinois	34,592	25,246
Kentucky	48,973	47,232	Michigan	5,221	3,081
Tennessee	134,702	131,389	Wisconsin	4,341	2,377
Alabama	123,245	129,945	Iowa	11,794	5,986
Mississippi	84,718	90,584	Missouri	59,061	51,676
Louisiana	61,270	49,036	Nebraska	3,803	2,001
Arkansas	84,125	75,630	Kansas	12,960	6,673
Total	664,957	670,678	Total	189,566	135,185
Decrease, 5,721, or 8-10 of 1%			Increase, 54, 381, or 42.2%		

See 12th Census, Vol I, p. CXXVI.
13th Census, Vol. I, p. 730.

A second important contribution to the white population of

Texas is through foreign immigration. The foreign born in the State now number 239,984, and concerning these people certain tendencies should be noted. The most important fact, doubtless, is the rapid increase of the Mexicans, who not only are the most numerous, but are also coming more rapidly than any other people whose immigration is important. It is estimated that 75 per cent of all Mexican immigrants to the United States comes to this State. There are, all told, probably 275,000 in Texas at the present time. They must be regarded as permanent additions to the population.

Of about the same type are the Italians, who, although small in number, show a rapid increase. The Russians are increasing even more rapidly than the Italians. A point of great significance appears in connection with the Germans. In 1900 there were in the State nearly 50,000 Germans, foreign born, while in 1910 there were scarcely 45,000, a decrease of 10 per cent in ten years. This seems to indicate that these excellent people are immigrating to the State in fewer numbers. Another group of excellent people who are decreasing is the Irish, who are fewer by 13 per cent than in 1900.

Table 3: Changes in Immigration of Foreign Born to Texas, 1900-1910.

Country of Birth.	1910	1900	%Increase +; %Decrease −.
All countries	241,938	179,357	+34.9
Mexico	125,016	71,062	+75.9
Germany	44,929	49,859	− 9.9
Austria	20,570	16,696	+23.2
Italy	7,190	3,942	+82.4
Russia	5,739	3,070	+86.6
Ireland	5,357	6,173	−13.2
England, Scotland and Canada	14,070	13,114	+ 7.2
Sweden	4,706	4,388	+ 7.2
All other countries	14,717	11,447	+30.0

13th Census, Vol. I, p. 809.

There yet remains one large group to be mentioned, namely, those born in this country but of foreign parentage. Of these there are 361,914 in Texas; 306,867 were born in this State, and hence are natives, while 55,049 were born in other States of the nation. In this group the German element is large, 28.5 per cent, but large because of past rather than present immigration. These people are rapidly fusing with the natives of native parents of the

State and their national identity will soon disappear. On the other hand, the Mexicans and Italians, whose numbers are increasingly most rapidly, retain their general national characteristics, however long they may have lived in the State. Thus, there appears a tendency to increase that part of the foreign element which is so distinct in type as not to fuse readily with the native peoples. The social and political significance of this is apparent to all.

Table 4: Foreign Born and Natives of Foreign Parentage, 1910.

	Foreign Born.	Natives of Foreign Parents.	Percentage of all Foreigners.
Mexicans	124,238	108,682	38.7
Germans	44,917	126,859	28.5
Austrians	20,566	32,534	8.8
English	8,463	17,797	4.4
Irish	5,355	17,559	3.8
Italians	7,190	6,823	2.3
Other Nationalities	.....	.....	13.5
Total	239,984	361,914	100

In numbers—688,958—the negro is a less conspicuous figure in Texas life than thirty years ago. In fact, there has been a steady decline in his relative importance (Table 5.) Of the entire population of the State in 1880, the negroes constituted 24.7 per cent; in 1890, 21.8 per cent; in 1900, 20.4 per cent, but in 1910, only 17.7 per cent, a decline in thirty years of exactly 7 per cent. This may be attributed very largely to white immigration into the State. Moreover, the *absolute* increase of the negro has not been large, from 1880 to 1900 being about 2 per cent a year, while for the last ten years it has fallen to almost 1 per cent a year.

Table 5: Showing Relative Increase of Whites and Negroes.

	From 1880 to 1890	1890 to 1900	1900 to 1910
Increase of Whites	45%	39%	50%
Increase of Negroes	24%	27%	11%

Distribution of population by race and nationality. These national and race groups are rather highly localized in different

parts of the State, as shown by the accompanying map. (Fig. 17.) It is believed these are rather permanent, except in the case of cities. Probably more than 95 per cent of all negroes occupy the eastern half of Texas. In other parts of the State their coming is not cordially welcomed. On the other hand, the Mexican can hardly compete with the negro in those sections where the negro is most numerous.

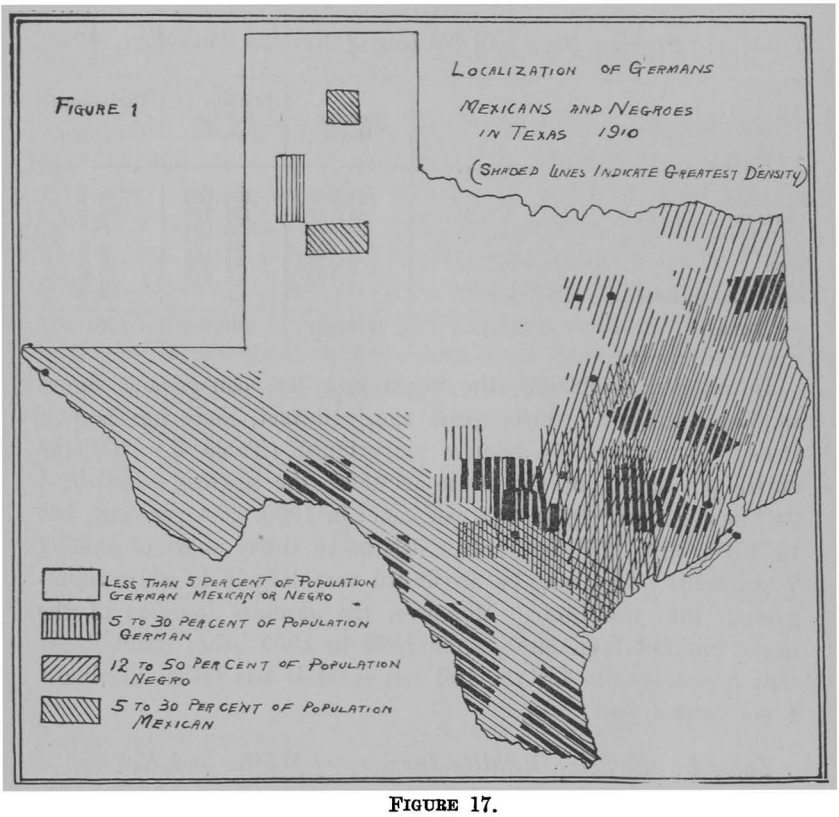

FIGURE 17.

The Germans have settled most numerously in the south-central part of the State in an area, which until recently, was very sparsely settled by either negro or Mexican.

Although 24.1 per cent of the whole population of Texas live in cities, among the foreign groups this percentage rises to 33.2 per cent, showing, as elsewhere in the nation, the foreigner's in-

stinct for the city rather than the country.* But this preference varies greatly among the different nationalities. (Table 6.) The Austrians apparently show some aversion to the city, only 9.8 per cent living there. Of the Mexicans, 28.9 per cent are city dwellers, and of the Germans, 29.6. Among all other groups approximately 50 per cent or more go to the city, in the case of the Russians, the percentage being 64.9.

Table 6: Urban and Rural Dwellers Among Texas Foreign Born and Natives of Foreign Parentage, 1910.

	Urban.	Rural.	Per Cent Urban.
All Foreigners	200,320	401,578	32.2
Austrians	5,226	47,874	9.8
Mexicans	67,715	165,205	28.9
Germans	50,958	120,818	29.6
Italians	6,774	7,239	48.3
English, Scotch, Welch, Canadians	23,333	19,300	54.7
Irish	14,216	8,698	62.0
Russian	6,897	3,718	64.9

At the present time the negroes are showing a tendency to migrate to the city, especially to the larger cities. (Table 7.) While in 1910, 74 per cent of the negroes lived in the country districts, their increase there during the preceding years amounted to less than 10,000, or about 2 per cent. However, the 26 per cent living in cities show an increase of almost 60,000 over their number in 1900. This is an increase of 58 per cent for all cities. Undoubtedly the tolerance shown them in the cities, together with their social disposition, accounts for this movement.

Table 7: Increase of City Dwellers Among Negroes, 1890-1910.

	1890 to 1900	1900 to 1910
Rural increase, per cent	22.4	1.9
Urban increase, per cent	50.1	58.1
Urban increase, eight larger cities, per cent	35.9	59.3

This exodus of the negro from the rural districts may have two important influences upon industry in Texas. First, it may help the growth of city industries which are dependent upon unskilled

*It is doubtful if it is instinct that leads foreigners to crowd our cities. Often it is ignorance of opportunity or lack of equipment for American agricultural life. (Ed.)

labor. These industries will be of the rougher sort and somewhat seasonal in character. It may, however, have a far more important bearing upon the cotton producing sections of the State, for this movement will give the cotton growers adjacent to these cities a differential advantage over cotton producers on equally good cotton lands which are so remote that they cannot count with certainty on a labor supply. Thus the acreage on the nearby cotton lands may be increased to the limit, while on remote lands, it will be more definitely limited, often to the labor force of the farmer's immediate family. This disadvantage of the remote farmer can be largely overcome through a State Labor Exchange, for which Texas has made no provision.*

THE LABOR FORCE IN THE CHIEF INDUSTRIES OF TEXAS.

Agriculture. Of all occupations in Texas that of agriculture stands foremost. It alone absorbs more than 60 per cent of all the labor of the State.

As everyone knows, tenancy has been increasing in Texas. The statistics for farm laborers are even more significant as here shown:

	1910.	1900.	Increase Per Cent.
Laborers on home farm**.	193,650	138,832	39.4
Laborers working out.....	140,288	94,188	48.9

While tenancy is increasing more rapidly than ownership, it appears also that the number of farm laborers who work for wages has increased even more rapidly, having increased, according to the figures, practically 50 per cent. Home workers have increased 39.4 per cent, and this may mean one of two things, either an increase of child labor or a continued residence of sons in the home before they venture out for themselves.

The increase of farm wage-earners probably means an increas-

*See University of Texas Bul. No. 298, pp. 70, 75. (Ed.)

**Females are not included because the two census periods cannot be correctly compared as to these workers.

It seems incredible that there should be 170,000 child workers in agriculture between the years 10 and 15. This, to be sure, includes "home workers." But of this number 21,391 are spoken as "working out," that is, working for persons other than their parents. Those "working out" in other industries than agriculture number 12,492, so that, in round numbers it may be said that approximately 35,000 children 10 to 15 years old have become wage earners in the sense of working for other people for wages. Nearly one-third of them are between the years of 10 and 13. The ratio between boys and girls is 2 to 1.

ing difficulty in acquiring necessary capital to become tenants; hence men remain laborers longer, and on the other hand, present-day agriculture is increasing the demand for such workers. From the standpoint of labor the large number of farm laborers and their rapid increase becomes one of the State's most significant questions, for it may mean a movement from tenancy to a wage labor system.*

One of the more favorable circumstances in Texas agriculture is the increase in farm wages. (Table 9.) In twenty years, 1893 to 1913, the increase of wages under all forms of payment averages 45 per cent. During the past four years day wages have increased 16 per cent; monthly wages, 4 per cent with board, and 9 per cent without board. These are substantial gains. This increase is considerably larger than that which has come to workers in manufacturing industries, and this may serve as an automatic check in the movement from country to city.

A farm hand's work day is 10¼ hours for the spring, summer, and autumn months; for the winter, 8¾ hours. Only five other States have longer working days than Texas.

*Table 9: Farm Hand Wages in Texas.***

	1893	1899	1909	1913	1893-1913 Perc. inc.	1909-1913 Perc. inc.
Per month with board	$13.58	$12.94	$18.47	$19.20	41	4
Per month without board	18.96	17.98	25.14	27.50	45	9
Per day with board	.72	.....	.93	1.08	50	16
Per day without board	.90	.....	1.16	1.34	49	15

It is possible to get some idea of the labor necessary to produce a cotton crop. Take, for illustration, the year 1912. The acreage was 11,338,000. This, multiplied by an estimated hired labor cost of $12.87† per acre, gives a total cost for labor of nearly $146,000,000. At the prevailing day's wage for that year, $1.35, this would make 1,122,390 days' labor, which, if distributed over seven months of the year, would afford employment for about 160,000 workers each day during this period. It is

*This may be a beneficial movement. Tenancy is not desirable for the hopelessly inefficient, and there are many such in Texas agriculture. (Ed.)

**Farmers' Bulletin No. 584, pp. 16-17.

†As reported by the Taft Ranches, 1912.

safe to say the labor involved in producing the cotton crop equals, if, indeed, it does not surpass, all other forms of labor on the farms combined. The value of the cotton crop in 1912 was $281,740,000, so that the labor cost was slightly over one-half of its value on the market.

Manufacturing. Among the industries of Texas that of manufacture ranks second in numbers employed, though far below agriculture in this respect. In this industry there are 84,575 people engaged, of whom 70,230 are wage earners. In 1889 the wage earners in manufacture constituted 1.6 per cent of the population, but in 1909—twenty years later—this class represented 1.8 per cent, showing a slight tendency for manufacture to increase relatively more rapidly than other industries. Among the industries employing more than 1000 workers are the following:

Lumber	23,518
Cars and repair shops	9,782
Printing	4,408
Slaughtering	3,639
Oil and cotton seed	3,073
Foundries	2,925
Brick and tile	1,935
Cotton goods	1,590
Ice	1,437
Bakeries	1,390
Flour and mill products	1,216

It is interesting to note that the butter and cheese industry stands at the bottom, employing only 84 wage-earners; patent medicine comes next with 145 wage-earners.

Distribution of manufacturing wage earners. In the distribution of the wage earning population in manufacture there appears no tendency to a concentration in the larger cities; in fact, so far as statistics show anything, the tendency appears to be in the direction of a wide diffusion to all parts of the State. (Table 10.) But there are several facts which must be kept in mind: (1) In case of the large-scale industries, corporations usually establish their plants, not in the city itself, but in a nearby suburb, whose population figures as a small city, and yet as a matter of fact such industrial communities form a part of the life of the large

adjacent city. (2) The small cities of Texas have been establishing during the past ten or fifteen years a multitude of small industrial plants, as bakeries, printing establishments, brick, tile

Table 10: Distribution of Wage-earners in Manufacture.

	1899	1909	Inc. %
Cities of 50,000 or more	9,656	15,384	59.3
Cities 10,000 to 50,000	7,171	10,919	52.2
All other portions	21,777	43,910	101.6

and cement works, etc., which, once established, will in most cases grow slowly. If the full facts were known they might show some tendency towards the concentration of manufacturing wage-earning classes in large cities or in immediately adjacent industrial communities, although statistics do not show this to be the case.

Women and Children Wage Earners in Manufacture. While in Texas the population from 1900 to 1910 increased 27.8 per cent, wage earners among children under 16 years of age increased 37.1 per cent, and women workers 129.3 per cent. In these facts may be found some first signs of the factory system, more apparent for the State as a whole than for the cities. For the eight larger cities, the increase of child workers has been but 15.1 per cent, and of women 98.1 per cent. This clearly indicates the increased attention given to schooling for children in our cities of the largest size. The very rapid increase of wage earners among women is highly significant.

Wages in manufacture. While material increases in average wages have come to all but a few wage groups, the lower paid workers appear to have been, if anything, more fortunate than the better paid workers, as may readily be seen from the accompanying wage chart (Fig. 18). Increases in the annual wage ranging from $25 to nearly $200 have come to all groups whose wages were below $450 per year, a percentage increase of 15 per cent to approximately 50 per cent. This is the more interesting because workers in these industries are either unorganized, or organization is yet in its infancy. On the other hand, average wages in the groups above $450 have not risen so uniformly. Several industries show an actual falling off. It may have been due to many causes—faulty data, or some reorganization of the industry.

Nearly all cases where wages have fallen are found in industries dealing with food preparations, tobacco, and gas being the only exceptions. The most serious fall in wages was in the confectionery business, one in which no organization of labor is possible, the workers being made up of women and young girls.

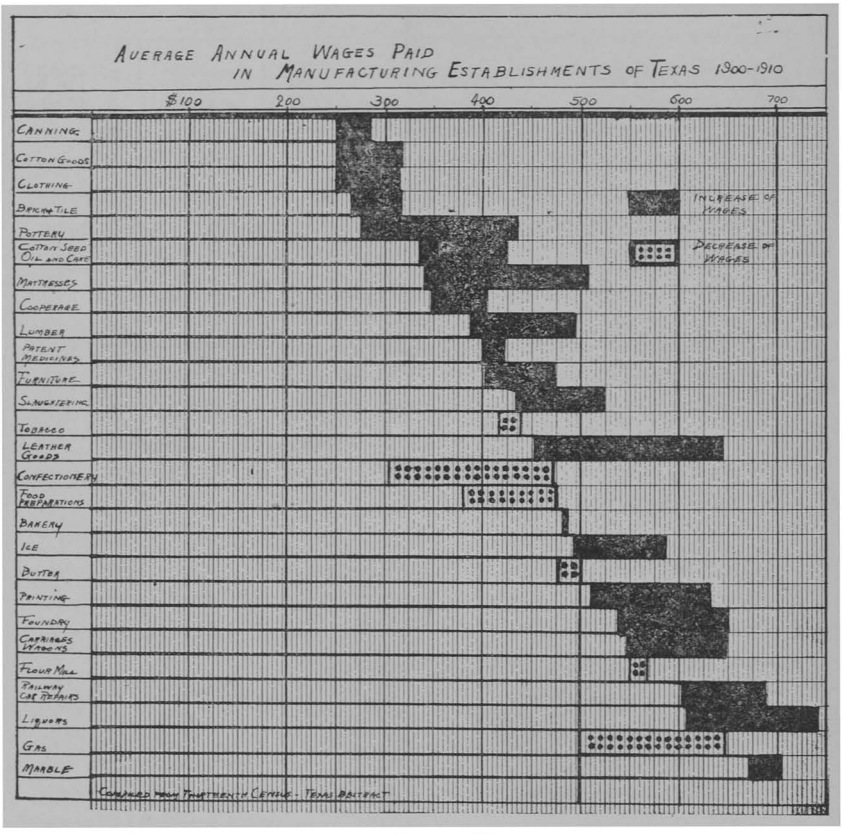

FIGURE 18.

Hours of Labor. The long work day still remains in many Texas industries. (Table 11.) The standard week is one ranging from 54 to 60 hours. In Texas only 66 per cent of the workers in manufacture have these hours; in Iowa, 76 per cent; in Massachusetts, 88 per cent. The long week of over 60 hours embraces in Texas 20 per cent of the wage earners; in Iowa, 8

per cent; in Massachusetts, 2 per cent. The short week, less than 54 hours, has about the same percentage in each State.

*Table 11: Hours of Labor Per Week in Texas Manufacturing Industries. (Showing Extremes.)**

	Less Than Sixty hours Per Week.	Sixty hours Per Week.	More Than Sixty hours Per Week.
Cotton Goods	0.0%	25%	75%
Oil, Cotton Seed, and Coke	1%	6%	92%
Flour Mills	9%	23%	67%
Lumber	9%	72%	19%
Bakeries	15%	63%	22%
Meat Packing	46%	53%	1%
Foundries	73%	26%	0%
Printing	87%	11%	1%

Texas Abstract, 13th Census, p. 778.

Transportation.—The railway and express companies rank third as employers of labor. Including the employes in repair shops (about 12,900), the number comes to 64,900 in 1910.** About 55 per cent of this number may be regarded as skilled workers, and these receive very satisfactory wages. Engineers are the highest paid, receiving $4.48 per day; conductors, $3.98; train dispatchers, $3.07; station agents, $2.38; section foremen, $1.82, and finally, section men, $1.28, being the lowest paid workers. These were the average wages for 1910. Between 1905 and 1910 machinists and carpenters (numbering 12,290) received average increases of about 4 per cent. Strictly unskilled laborers (numbering 26,958) got an increase of 5.4 per cent, while all other railway employees, 22,660, chiefly skilled, received an advance of 20 per cent. It is in this latter group that labor organization has made its influence felt.

Mining, including petroleum.—In this industry there are 6,957 wage-earners, whose average annual wage is $582. From 1902 to 1909 wages and salaries increased 67.9 per cent. For all branches of this industry an eight-hour day is found for 53.6 per cent of all

*The Building Trades of the larger cities have secured the shortest week, 48 hours, generally, and among the brick-layers, carpenters, gas fitters, plasterers, plumbers, steam fitters and structural iron workers, a forty-four hour week prevails.
Labor Bureau Bulletin, 131, p. 30.

**The Railroad Commission (1913) reports approximately 70,000 wage-earners in transportation.

the workers, and in the bituminous coal industry, 70.6 per cent have this day.

THE LABOR UNION MOVEMENT.

It is from the last three industries—manufacture, transportation, and mining, together with the building trades, that labor unions are chiefly recruited in this State. A vigorous forward movement in the organization of labor seems to have begun shortly before 1900. In that year the State Federation of Labor was organized, and this not only gave coherence to the union movement, but ever since then it has been an active organizing agent. Its present strength and influence is unquestionably great, and is increasing. There are in the State some 600 locals, and in twenty cities are found central labor councils, these representing the local interests of labor in any community. These locals and city councils are federated with the State organization, and this with the American Federation of Labor.

The trade union type undoubtedly prevails, although there are a few "industrial unions," as among the dock workers, and in the brewing industry. It is this latter type of organization which promises a rapid growth in the future. The radical forms of unionism have not yet appeared in Texas, nor has socialism any very strong following among the wage earners of the State.**

The most conservative statement as to the number of union men in Texas is 50,000, and of these 10,000 belong to the railway brotherhoods. Other estimates place the number at 90,000, but the former number is more likely the truer statement. The laws of Texas are very favorable to organization, and there is no reason to doubt that unionism, among those groups where it is possible, will rapidly increase.

It is greatly to the credit of the movement that only conservative policies have been advocated. On the whole, the labor press of the State is well edited, and has no very racial tendencies.*

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*Report has it that the "I. W. W." has made an attempt to organize the unskilled Mexicans into industrial unions, but this apparently has failed. At least, up to the present this organization has made no headway in Texas, not even in the East Texas Lumber Mills. The unskilled workers here—Mexicans and negroes—are not good material out of which to create radical labor organizations.

**The most radical paper in the State—*The Rebel*—a socialist weekly, apparently is making its strongest appeal, not to trade union men, but to the farm tenant classes. This is said to be the official paper of the Renters' Union.

In all there are some twenty periodicals which reach a rapidly growing labor constituency.

The influence of unionism is best shown in the work of the joint legislative committee. This committee is made up of representatives of the State Federation of Labor and from the unaffiliated railway orders. This joint committee appears as a lobby before each session of the Legislature, and urges such labor legislation as has been mapped out for it by the State convention at its annual meeting. In the last Legislature (the Thirty-third) the following measures were supported: The Initiative and Referendum; Workman's Compensation; Railway Hospital bill; Full Train Crew; Fifty-four-hour law for Women, and other similar measures.

The State Federation of Labor, 1913, set forth the following declaration of principles: Opposition to child labor; compulsory education; initiative and referendum; opposition to convict labor in competition with free labor; an eight-hour law; repeal of poll tax law; public ownership of public utilities; equal payment for equal work regardless of sex; separation of land values from improvements; civil service system; abolition of fee system; employers' liability; State care of tubercular patients.

THE UNSKILLED AND UNORGANIZED GROUPS.

From the standpoint of labor efficiency Texas has several groups of about the same type. Of these, the most numerous are the negroes, 690,049 in 1910; then the Mexicans, 232,920, and finally, in part, the Italians, 14,013. Together these groups number 937,000. and constitute 24.5 per cent of the whole people of the State. For the heavier work of construction in the building trades; in the building of railroads, and sewers; in the opening up of mines and lumber camps; at the wharves and railway stations as freight handlers, the negro appears to be the preferred worker, due to his superior strength and his ready adaptability to team work.*

However, as an isolated farm worker, the Mexican is superior to the negro, and it is here where he is best known and most

*In the construction of the great Austin dam it has been estimated that a negro could do three-fourths as much as a white man, and that a Mexican could do only one-half as much.

appreciated. This is especially the case in the truck growing regions. In the work of clearing land, where little supervision is needed; in the lonely work of herding upon the plains, he does a kind of work which the negro could not do. In one kind of farm work does the negro excel, and that is in the "cotton patch."

On an earlier page a relative decline of the negro population was noted. But this decline in numbers does not mean that he plays a less important part in the industrial life of the State. It may mean quite the opposite. The kind of work allotted to the negro has undoubtedly vastly increased during these years, and since the white man is not willing to invade the black man's sphere, there comes to be a strengthened rather than a diminished demand for negro labor. This is true only in those parts of the State where there are many negroes. This growing importance of the negro is in part confirmed by his improved financial condition as attested by an increasing home ownership, as follows:

	Per Cent of Negroes Owning Homes.	Per Cent Free of Debt.
1890	24.3	22.7
1900	29.3	22.0
1910	29.6	23.3

This shows two favorable things, first, an increase of 5.3 per cent of home owners, and, second, an increase of .6 of 1 per cent in homes free of all debts. This is only made possible through better wages and the development of thrift among them.

THE FUTURE.

The industrial future of Texas rests largely upon two equally important considerations. The first is the conservation of her natural resources. The second consideration concerns the kind of labor force at whose hands a wise and judicious conservation is to be achieved. Of the two factors in production, land and labor, the first is absolutely limited, and, except through conservation, is beyond human power to modify. The second factor, labor, however, is subject to some modification through intelligent public policy.

Two policies. By one policy the State accepts the idea of a numerous body of laborers of indifferent skill, assuming that through competition among them a low wage may result, enabling our industries to compete in cheapness of production with other States and even nations. In numbers, according to this theory, safety lies. Another policy would place far greater emphasis upon skill, intelligence, and a higher wage scale, believing that only through a better labor type can our industries be placed in a position of permanent security. The higher wage scale acting upon the standard of living increases efficiency so that the cost of production is not necessarily increased; in fact, as has often been shown, costs may be decreased.

Thus, in a very real sense the ultimate position of Texas industries turns upon the character and quality of the labor force, and here attention is especially called to two points often overlooked. In the first place, can we conserve properly our natural resources except as we have the right kind of labor? Should they be low-standard, unprogressive workers, they will, as too often in the past, be wasteful of raw materials of every kind. They will fail in any attempt to apply the intensive methods in agriculture.

The second point. From what source is capital to come in the days of an increasing need for it? In the older countries it comes from the frugal savings of a multitude of industrial workers. Should we rely upon a thriftless labor type we can expect no other result than that earnings will be utterly consumed as rapidly as made. For capital the industries must then fall back upon large-scale savings—never adequate—and upon foreign capital. It is a pertinent question to ask whether any State can permanently prosper if its dependence is upon capital which its own life and labor does not create.

If this reasoning is sound, Texas can remain indifferent to the labor-type question only at her industrial peril. Her industrial development is calling for the newer and less wasteful methods, and these methods must be acquired by the workers. It, therefore, behooves the State to secure for its labor forces that industrial education and training by which the transition to the new may be successfully made.

PRINCIPAL CROPS OF TEXAS: IMPORTANCE AND RELATION TO TENANCY AND SIZE AND VALUE OF FARMS.

A. B. COX.

The statistics show that Texas produces more than thirty different agricultural products in commercial quantities. Of this number, six—cotton, corn, hay and forage, wheat, oats, and maize and kafir corn—stand out as being of general importance, both because of their annual value and of the large per cent of improved land and labor devoted to them.

Texas' importance as a farming State is often not fully appreciated. There were in the United States, in 1909, 311,293,382 acres in crops with acreage reports, and Texas had 5.9 per cent of that, or had 18,389,092 acres, and ranked fourth among the States in the amount of acreage devoted to such crops.

The *value* of all crops in Texas in 1909 was $298,133,466. Of the crops under consideration—those for which we have acreage reports—the value was $262,439,163. The total value of all crops in the United States in 1909 was $5,487,161,223. On the basis of value, Texas ranked third among the States and had 5.2 per cent of the total.

The above named crops occupied 74.8 per cent of the improved land in Texas in 1909 and were distributed as follows: Cotton, 36.3 per cent; corn, 28.8 per cent; hay and forage, 4.8 per cent; milo maize and kafir corn, 2.1 per cent; oats, 1.6 per cent, and wheat, 1.2 per cent. In 1912, the total per cent was much larger because of the very large increase in the acreage given to cotton, corn, oats, wheat, and maize.

These same five crops represent 88 per cent of the value of all crops with acreage reports. Cotton alone represents 63.3 per cent; corn, 17 per cent; hay and forage, 4.3 per cent; maize, 2 per cent; oats, 1.2 per cent, and wheat, 1 per cent.

For the United States the percentages of values run as follows: Corn, 26.6 per cent of value of all crops with acreage reports; cotton, 15 per cent; hay and forage, 15 per cent; wheat, 12 per cent; oats, 7.6 per cent, and milo maize about .002 per cent. The total for these crops amounts to about 75.8 per cent of the value

of all farm products, so that as a whole the crops represent about the same proportional importance in the nation that they do in the State, yet the separate per cents are very different.

The importance of the principal crops as shown by the statistics for Texas will be discussed in connection with each crop.

COTTON.

Cotton is by far the most important single crop grown in Texas. There were, in 1909, 27,360,666 acres of improved land in Texas farms, of which 18,389,092 acres were in crops with reported acreage; and 9,930,179 acres, or 54 per cent, of this latter amount was in cotton. The statistics show further that 75.8 per cent of all the farms reported the growth of cotton. The value of the cotton crop was far in excess of any other crop in the State. The value of the cotton and cotton seed was $188,673,954 in 1909, and the value of the cotton alone was $162,735,041. The average valuation of the cotton per acre was $16.39, the largest valuation per acre of any field crop except rough rice. In 1912 there were 11,000,000 acres planted to cotton and the value of the crop of 4,645,309 bales was about $321,430,000, or a total valuation per acre of $29.20.

Notwithstanding the fact that the production of cotton is pretty widely distributed, the bulk of cotton production shows considerable concentration. There were 65 counties in 1912 that produced 74 per cent of the cotton, or 3,431,284 bales, which shows that, though there were about 225 counties reporting some cotton, the area of great production is narrowly defined. The greatest concentration of cotton production is in what is known as the calcareaus prairie belt,* extending from Red River through the central portion of the State almost to the gulf. There are about 25 counties in this belt that produce on the average more than 50,000 bales each, and a total of about 2,000,000 bales, or nearly one-half of the Texas crop. The ten leading counties in this group (Ellis, McLennan, Hill, Williamson, Navarro, Collin, Kaufman, Fannin, Dallas, and Limestone) produced in 1912, 1,131,477 bales. Each of three counties in this group—Ellis, McLennan and Williamson—produced on an average more than 100,000 bales

*"Black Land Belt."—See above, Fig. 1. (Ed.)

annually from 1908 to 1913, inclusive. The banner county for average production in the five years was Ellis, it having produced an average of 123,621 bales. Ellis also shows the highest production for any one year, which was 178,353 bales, in 1912.

The importance of the above outlined belt as a cotton producing section may be further emphasized by the large acreage devoted to cotton. There were 30 counties, mainly in this belt, that reported over 100,000 acres in cotton, or a grand total of 4,615,477 acres out of the 9,930,179 in 1909. These 30 counties have only 10.7 per cent of the total land area of the State, but contain 47 per cent of the area in cotton. There were 5 counties (Ellis, Hill, McLennan, Williamson, and Navarro) that had over 200,000 acres in cotton. The average yield per acre in the named counties in 1909 was only .283 bales. It should be remembered, however, that 1909 was a bad year for cotton in these counties. They produced only 340,527 bales in that year, and in 1912, with almost the same acreage, produced nearly twice as much—663,000 bales.

Cotton production in Texas since the Civil War has constantly grown more and more to be an industry of the whites. In 1860 the bulk of the cotton was produced by negro labor. The large majority of the whites then thought that because of the heat and strain of cotton production the white man could never make a successful cotton producer. The opening up, largely after the war, of the central prairie region, the high price of cotton, and the more liberal use of machinery soon demonstrated to the white man that he could farm cotton and make a profit. In 1909 there were only 16,611 negro farmers in the thirty most productive cotton producing counties, and 118,911 white farmers. The five leading cotton producing counties in 1909 as mentioned above had only 3280 negro farmers and 24,032 white farmers. The negroes are usually small tenant farmers, so that they could not cultivate more than one-tenth of the cotton area in these counties. There was only one county, Robertson, that ranked as a large cotton producer that had more negro than white farmers. There are, moreover, many large cotton producing counties that have no negro farmers. This is especially true of the central west, where the negro has nothing to do with either the growing or harvesting the crop.

There are no statistics showing the exact relation of tenancy

to the per cent of cotton farming, though figures show that tenancy is largest in the great cotton counties. In 1909 there were 195,863 farmers who owned, or who partly owned and partly rented their farms, and there were 219,572 tenants. There were, therefore, 52.8 per cent of the Texas farmers tenants. The thirty leading cotton counties show 63.2 per cent of tenancy and ten leading counties that have been mentioned, 67.4 per cent, which shows beyond question that tenancy has a tendency to increase with the increased concentration of cotton culture.

The average sized farm for the State was 269.1 acres, while for the thirty leading cotton counties it was 122.52 acres. The improved land to the farm in the State averaged 65.5 acres, and in the thirty selected counties 67.75 acres. The average value of all farm property in the State was $5311, and for the thirty selected counties it was $5327. The average price of land for the State was $14.53 and for the thirty selected counties, $33.25.

CORN.

Corn is the only crop in Texas that approaches cotton in importance. In 1909 there were 5,130,152 acres in corn, which comprised 18 per cent of the improved land in farms and 27.9 per cent of the land reporting crop acreage. The corn acreage in Texas was .052 per cent of the total acreage in the United States. In 1912 the Texas acreage had risen to 7,300,000.

In 1909 Texas produced 75,499,000 bushels, valued at $57,379,000. In the same time the United States produced 2,552,190,000 bushels valued at $1,477,223,000. The production per acre in Texas was 14.7 bushels, and in the United States, 25.94. In 1912 Texas raised 152,300,000 bushels with an average of 21 bushels per acre, and the United States, 3,124,746,000 with 29.18 bushels per acre. The average production per acre for Texas in the ten years, 1903 to 1912, inclusive, was 20.38 bushels, and for the United States for the same period, 27.01 bushels.

In 1909 there were 69 per cent of Texas farms that reported corn acreage. This, however, was much smaller than the proportion in 1899, when it was 86.1 per cent. The general growth of the crop may be further illustrated by the fact that in 1909 only four counties reported no corn. The bulk of the corn grown, however, is confined to a comparatively small portion of the State.

There were 121 counties that planted more than 10,000 acres in corn and 35 counties that had more than 50,000 acres. The three leading corn counties are Collin, with 145,656 acres; Grayson, with 131,903, and Fannin, with 121,006.

The statistics show that the principal cotton producing counties also lead in corn production. The amount of tenancy, land values, etc., therefore, will show to be practically the same. This is true, not only because the cotton land is good corn land, but because the crop competes less with cotton.

The average value of the corn crop per acre in 1909 in Texas was $9.86, and in 1912, $13.44. In the United States the per acre value was $15 in 1909, and $14.22 in 1912. In no year of the decade did the per acre value of the crop in Texas exceed the per acre value of that of the United States. This was true, notwithstanding the fact that in every year except 1908 the price of corn in Texas was from 5 to 15 cents higher per bushel in Texas than in the United States as a whole. During the last ten years corn has averaged 60 cents per bushel in Texas and 49.63 cents in the United States. The total value of our corn crop of 1912 was $98,112,000, and the total consumption amounted to $128,000,000, showing that Texas spent $29,888,000 outside the State for corn.

OATS.

Oats is becoming relatively less important as a farm crop in Texas. In 1909, 7.2 per cent of the farms of Texas reported oats, while in 1899, 21.7 of the farms reported oats. In 1909, 440,000 acres, or 1.6 per cent of the improved land was given to oats, and in 1899, 847,225 acres, or 4.3 per cent of the improved land area. This shows an actual total decrease of 48.1 per cent during the decade, 1899 to 1909. The acreage in 1909 was exceptionally low. The average acreage for the decade, 1903 to 1912, amounts to 762,019. In 1912 Texas had 865,000 acres planted to oats and reaped 31,140,000 bushels at a total estimated value of $13,390,000.

The area of greatest oat production in Texas may be roughly outlined by drawing lines from the extreme corners of Williamson county to the corners of Cooke and Fannin. This triangular region includes about twenty-five counties and embraces four-fifths of the oat crop of Texas. It includes the richest counties in the

State. Oats are used to a large extent in these counties to fit into a sort of crop rotation, and will doubtless become more important as the necessity of rotation becomes more apparent.

Since oats is not the dominating crop in these counties, statistics for the size of farms, land values, and percentage of tenancy would be misleading if emphasized as being directly attributable to oats. The facts seem to show that as the importance of the oat crop increases the value of the land per acre falls off, the size of the farm increases, and the amount of tenancy becomes less.

If we compare Texas with the United States, we find that she ranked sixteenth in 1909 in point of acreage and thirteenth in 1899. In point of production, Texas ranked twenty-seventh in 1909 and seventeenth in 1899. The figures show further that, taking the ten-year period, 1903 to 1912, the average for Texas was 29.37 bushels per acre and for the United States, 29.64 bushels. The average per acre value of the crop, however, in Texas was $13.83, while for the United States it was only $10.70. This is possible because during the ten years the average price in Texas was 49 cents and in the United States 37 cents.

WHEAT.

The wheat crop of Texas is one of somewhat varying importance, yet it can be stated definitely that Texas has a wheat belt, and that on an average she is a very important factor in determining the wheat production of the United States. Texas ranked in 1909 about fifteenth as a wheat producer, though that is unfair to the State, for the 1909 crop represented the smallest acreage and yield since 1870, and in no year since 1909 has the acreage been half as small as in that year. Indeed, the average yield has been over four times as great.

There are about thirteen counties in the State, most of which are along the valley of the Red River west from Fannin county,* which produced two-thirds of the wheat in 1909, and had 57 per cent of the 326,000 acres in wheat. Denton county was the largest producer, but the area of large production extended well into the Panhandle district. Texas produced ten million bushels

*See above, pp. 14, 26, 31.

in 1908, ten and one-half million in 1910, and more than eleven million bushels in 1912. The average yield per acre in Texas in 1909 was only 7.85 bushels, while in the United States it was 15.4. In 1912 the average yield in Texas was 15 bushels, and in the United States, 15.9. In only two years in the last decade, 1903-1912, did Texas have a larger average yield per acre than the United States, the average yield in Texas for the ten years being 11.02 bushels, and for the United States, 14.11 bushels.

The average crop value per acre for wheat farms in Texas is comparatively high. In 1912 the per acre value for Texas was $13.95, while in North Dakota it was $12.24; Nebraska, $12.14, and in Kansas it was only $11.47. This relatively high acreage value was due to higher prices in Texas.* The average price of wheat in the ten years, 1903-1912, in Texas was 96 cents, and in the United States it was 83 cents.

The average size of farms in the wheat belt in 1909 was 502.43 acres—much larger than the total average—and the average improved land per farm was 132.08 acres. The average per cent of tenancy in the 24 most important wheat counties was 47.8, 5 per cent less than for the State at large. There were 14 counties out of the 24 that reported no negro rural population, and the leading wheat county, Denton, had 92.9 per cent white.

HAY AND FORAGE.

The term hay and forage includes a number of grasses and grains, which taken together comprise one of the most important crops in Texas. The 1909 census shows that hay is an important crop in practically every county in the State. There were 51 counties that had over 10,000 acres in hay or that produced more than 10,000 tons. These 51 counties are practically all situated in the region west of the 97th meridian and north of the 31st parallel.

There were 72,280,776 acres given to raising hay and forage in the United States in 1909, and Texas was one of twenty-two States which had more than one million acres devoted to that purpose. The increase in acreage in the United States in the decade, 1899-1909, was 17.2; in Texas for the same period the increase was 75.8 per cent.

*Wheat land, however, shows a lower value than cotton. It is about the average for all farm land. (Ed.)

The value of the Texas crop of 1912 was conservatively estimated at $15,500,000 and the total consumption at $120,925,000. The figures show much larger farms, on an average, for all the 51 hay counties, and if the counties which are properly classed as cotton, corn, and grain counties, are barred, the average size of the farms would be about 550 acres. The hay region reported very few negroes and less foreigners. The land is comparatively cheap, and the average amount of tenantry is about 47 per cent.

KAFIR CORN AND MILO MAIZE.

Kafir corn and milo maize are comparatively recent developments as commercial farm products. The statistics of 1899 are the first to give any figures as to the amount planted, and then there were only 266,513 acres. Texas ranked third among the States, with 22,813 acres devoted to these crops. In 1909, there were 1,635,153 acres planted, and Texas ranked first, having 573,384 acres. The per cent of increase in the United States was 240.40, and in Texas was 1115.6! The value of the crop in Texas in 1912 was estimated at $6,000,000. The figures show a very rapid increase in the importance of these crops.

The importance of kafir and milo is especially emphasized when it is considered that these crops are not replacing others, but are gaining fastest in regions where other crops are too uncertain to be of very great commercial value. The area of greatest concentration in milo maize and kafir corn begins approximately in Taylor county, or the 100th meridian, and extends along that meridian from the 31st to the 33rd parallel. Westward it reaches to about the 102nd degree. It is distinctly a southwestern crop in the United States, and Texas and Oklahoma produce practically all that is raised.

The distinct characteristics of this belt is the absolute dominance of whites. The per cent of whites in many of these counties is 100 per cent, and the average is above 99.5 per cent. The percentage of tenancy is on the average below 50 per cent. The value of the land is comparatively low.*

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*See above, Fig. 1, and pp. 24, 26, 27.

COTTON SEED PRODUCTS OF TEXAS.

W. D. WRIGHT.

There are few industries in the State of Texas that have undergone the development that we have witnessed in the cotton seed industry. We find in the revised code of Mississippi of 1857 two provisions in regard to cotton seed. One of them is that any person who permits cotton seed to remain near his gin, after receiving five days notice to destroy it, shall be subject to a fine of twenty dollars per day for each day that the seed shall be left there after due notice has been given; the other article provides that anyone throwing the seed into any stream where people get drinking water, or where there are fish, shall be subject to a fine of two hundred dollars for each offense.

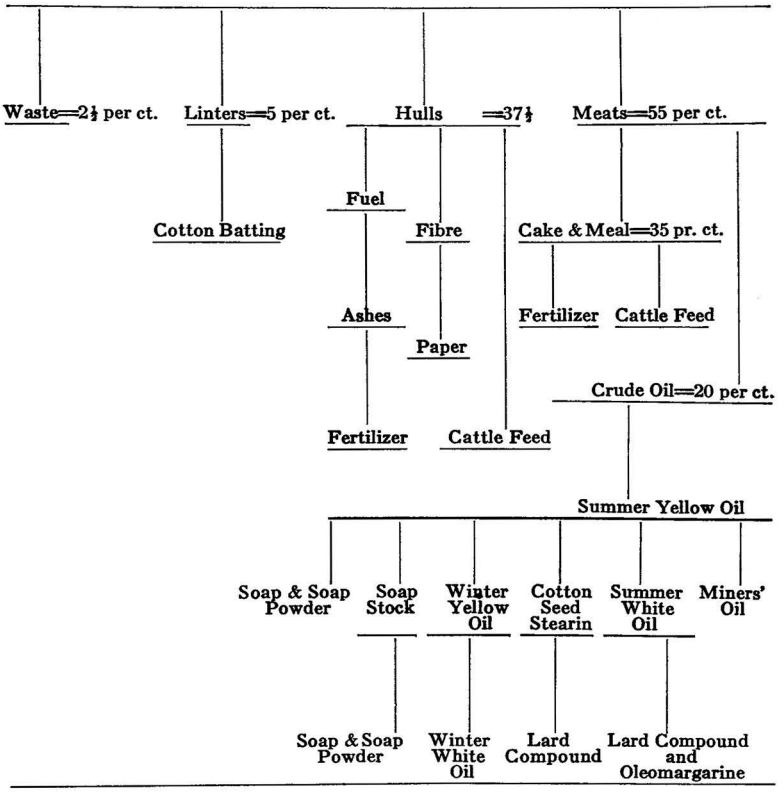
Cotton seed was first considered as having a value in 1773, when the Society of Arts in London received a cask of cotton seed, which had been received from the West Indies, to obtain the oil. From this time, the development was very slow in England and even more so in the United States. The growth in this country is shown by the following figures:

In 1867 there were 4 cotton oil mills in the United States.
In 1870 there were 26 cotton oil mills in the United States.
In 1880 there were 45 cotton oil mills in the United States.
In 1890 there were 119 cotton oil mills in the United States.
In 1900 there were 327 cotton oil mills in the United States.
In 1910 there were 841 cotton oil mills in the United States.
In 1910 there were 209 cotton oil mills in Texas.
In 1912 there were 227 cotton oil mills in Texas.

Until 1885 the oil was used only for making soap, and for food in Italy and in France. The hulls were used for fuel and the cake as a feed for live stock only to a very limited extent. At the present time there is no part of the seeds except the dirt that comes from them that has not a commercial value. The hulls are used for fuel, as a fertilizer, in the manufacture of paper, and as a roughage for stock. The meats furnish cake and meal, which are used as a food for stock and as fertilizer. There are some who maintain that the meal makes an excellent food for people,

and cakes and bread have been made of it that have been very appetizing. Nevertheless, as a human food its use is in a very elementary stage, and oil, from which we derive soap and soap powder, elements of lard compounds, oleomargarine, and miner's oil, is the chief product.

PRODUCTS OF COTTON SEED. PROPORTIONED BY WEIGHT.*



*Lamboon Cotton Seed Products.

In 1909 there was $21,506,000 invested in the manufacture of these products in Texas, which was 23 per cent of the total investment in the United States. The total value of the products in 1909 was $29,000,000, of which $6,500,000 was added by manufacture. This gives it second or third rank as an industry in the State, according to the value of capital invested or value of output. (Cotton ranks first, and meat packing second, if we con-

sider the value of output rather than capital invested as a criterion.) The value of all products in 1912 was $39,690,000. Of this $8,000,000 was added by manufacture, making a total value of $47,690,000. There was used at home, $7,644,000 worth of this, leaving the State with a balance of $40,046,000.

In 1909 there were 3923 persons engaged in this industry, 99 per cent being males above the age of sixteen years. There is a great variation in the total number of employes each month in the State, varying from 5762 in November to 932 in June. The laborers work more hours per week in the cotton seed industry than in any other. Of the 3073 wage-earners, 2721 work seventy-two or more hours per week.

The reason for the extra long hours is that there is an enormous expense connected with the running of the machinery, and it is a great saving to run as long as possible without stopping. The manual labor is a small expense as compared with the other items.

There is great variation in the amount invested in each establishment as compared with other industries. There are establishments that represent an investment of a few hundred dollars, while the largest is valued at $250,000. The average is probably about $40,000.

As to the number of wage-earners employed in each mill: 23 employ from 1 to 5; 128 employ from 6 to 20; 37 employ from 21 to 50; 5 employ from 51 to 100; 1 employs more than 100.

The great bulk of the employes work in those mills that employ from 5 to 50 persons.

The large part of the cotton seed comes from a strip about two hundred miles wide, running north and south, just a short way east of central Texas. However, we find a little cotton in almost every county except those in the extreme west and along the coast. Practically all the oil mills are located within this belt. All of the sixteen refineries of the State are in this belt. (See Fig. 19.)

As for the market for the products, the larger part of the hulls, and cake, and meal is consumed in Texas for stock food. The linters are used in almost every industry that requires padding, much of the linters going out of the State. A very small part of the oil is consumed in Texas, most of it being exported to Ger-

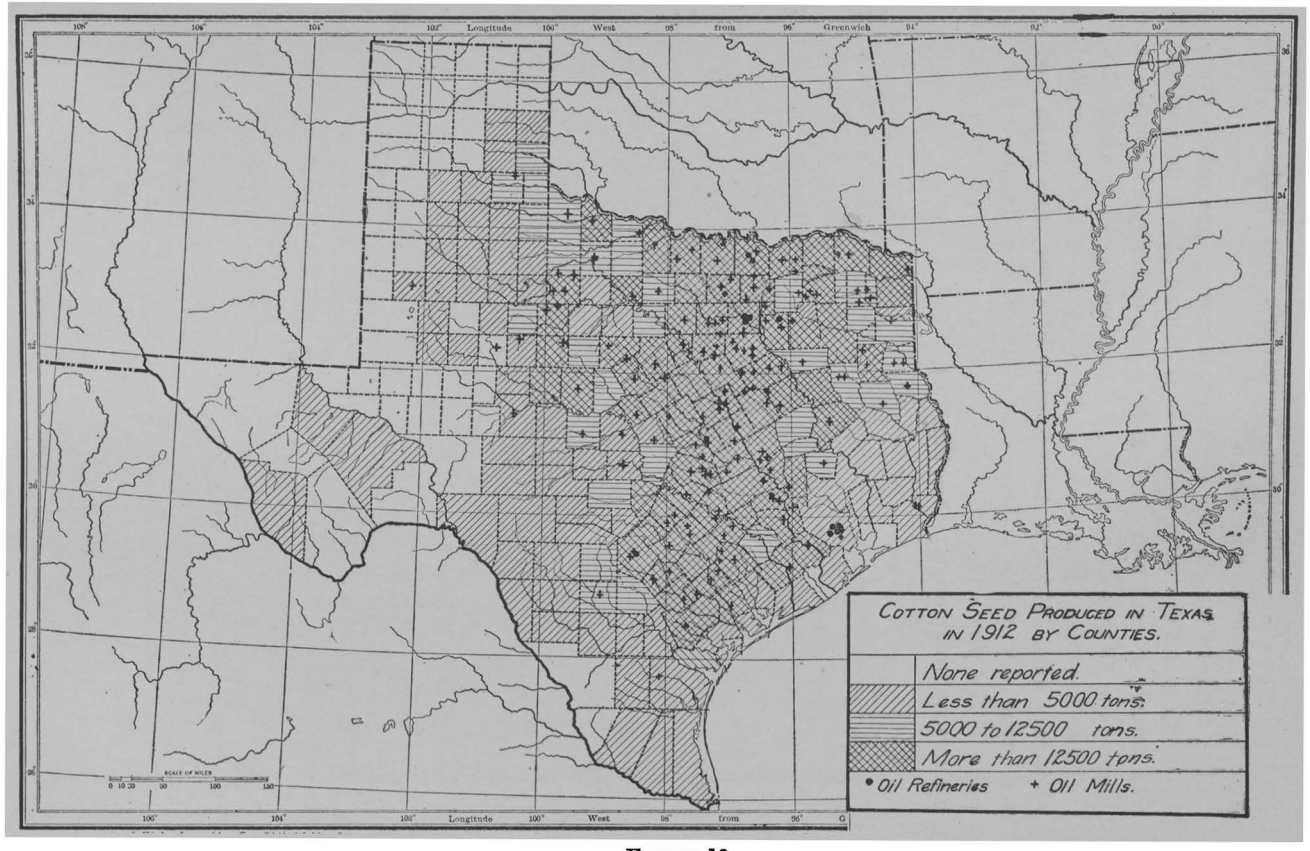

Longitude West from Greenwich
COTTON SEED PRODUCED IN TEXAS IN 1912 BY COUNTIES.
None reported.
Less than 5000 tons.
5000 to 12500 tons.
More than 12500 tons.
• Oil Refineries
+ Oil Mills.
SCALE OF MILES

FIGURE 19.

many, France, The Netherlands, Switzerland, and England. Less goes to Italy, China, and Japan.

The oil furnishes by far the most important products. From the average ton of cotton seed there is derived 37.6 gallons of oil, 713 pounds of cake and meal, 943 pounds of hulls, 23 pounds of linters, and 39 pounds of waste. (Percentages given on page 67.)

There has been an increase in the per cent of the seed milled each year since 1874 with the exception of a few years when seed was unusually cheap. There was a fluctuating decline in the price of the products until 1898; since this time there has been a corresponding incline. (See Fig. 20.)

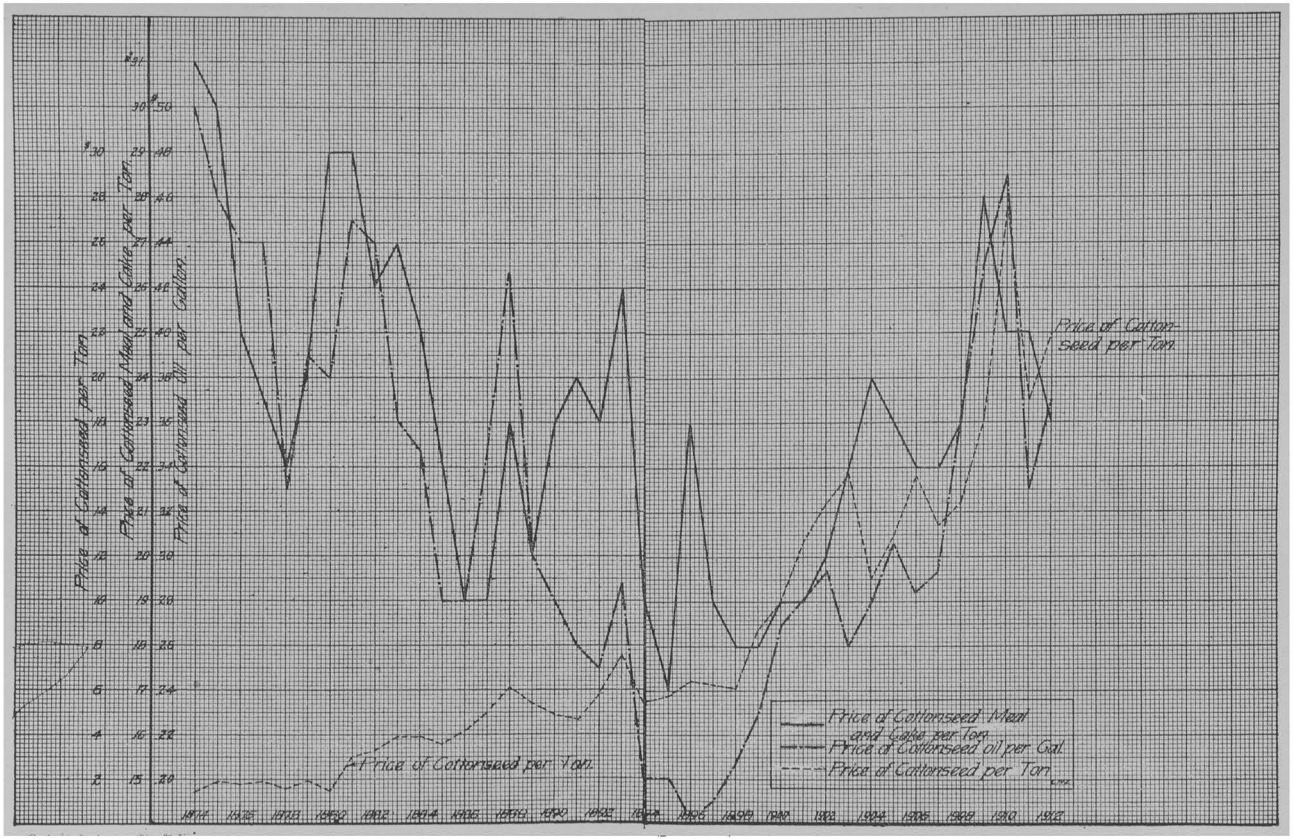

Price of Cottonseed per Ton
Price of Cottonseed Meal and Cake per Ton
Price of Cottonseed Oil per Gallon
Price of Cottonseed per Ton
Price of Cottonseed per Ton
Price of Cottonseed Meal and Cake per Ton
Price of Cottonseed oil per Gal.
Price of Cottonseed per Ton

FIGURE 20.

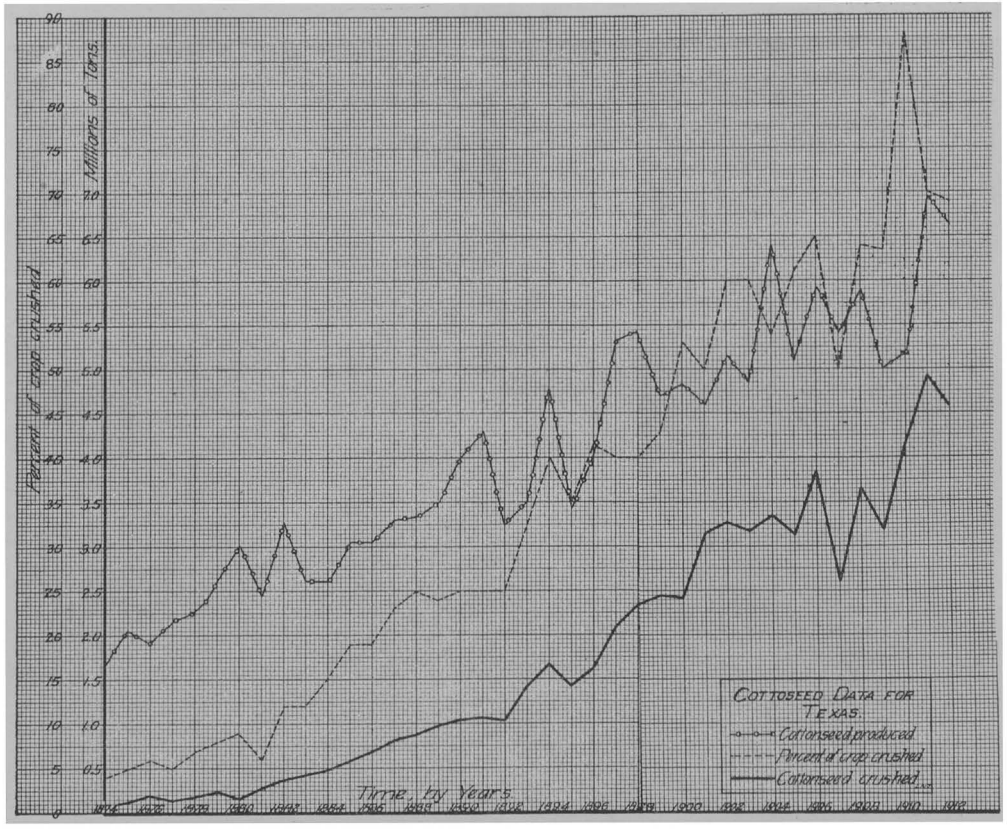

Percent of crop crushed
Millions of Tons.
Cottonseed Data for Texas.
Cottonseed produced
Percent of crop crushed
Cottonseed crushed
Time, by Years.

Figure 21.

THE LUMBER INDUSTRY OF TEXAS.

C. LOHMAN.

TIMBER RESOURCES.

Texas, though the largest State in the Union, and with more forested area than any other State, has a total "stand" much smaller than those of several other States. One estimate places the wooded acreage at 40,000,000 acres,* but it is a difficult thing to draw the line between forested and non-forested areas, and much of the land that does contain tree growth is incapable of producing much merchantable timber.

Texas, as we may suppose, with its large area, varies greatly in climate and physiography, and supports valuable forests. Practically the whole range of forest trees known to the temperate zone is represented in this State. In the swamps of the east and southeast grow the tupelo and cypress; in the high, dry western plateaus, we find the cactus; while between these extremes, we have one hundred and fifty species.

No careful estimate has ever been made of the standing commercial timber for the entire State. The United States Bureau of Corporations has given the results of a very careful investigation for the East Texas belt, and, though this covers practically all the commercial timber of the State available to the mills, to be complete, the timber possibilities of other areas should be considered. Before going into the "stand" and "cut" for the State, then, it is well to review all the timber features and characteristics.

GENERAL SURVEY OF TEXAS TIMBER.

The East Texas timber belt covers the eastern part of the State, extending to the Trinity River in the north, and to the Brazos in the south. The area is characterized by abundant rainfall—over 50 inches—low elevation, and warm temperature. Toward the Brazos River, the timber is checked by the drier climate. In the coast plain, along the swamps and sluggish streams, grow the cypress—a most valuable wood, but now largely cut off—tupelo, magnolia, sweet-gum, and other species. In the alluvial bottoms

*"Wood Using Industries of Texas," June 1913.

of the rivers grow hardwoods—oak, the most important in quantity and value; ash, hickory, gum, holly, and other species. In the interior of the coast plain are the loblolly pines and hardwoods; the pines growing on the sandy ridges, the hardwoods in the half-swampy flats. In Hardin county is the "Big Thicket" of hardwoods, famous as an almost impenetrable forest. North and east of this area lie the long leaf pines. The higher altitude, better drainage, and open texture of the soil are ideal for the thriving of this pine. Naval stores of recent years have been procured from these trees. Texas has the last of the large stands of the long leaf pine. Then between this area and the Red River, extending west to the Black prairies, are the short leaf pines and the accompanying hardwoods.

The other portions of the State are quickly sketched. The Grand and Black prairies, extending between the Brazos and Nueces Rivers and south to the coast plain, contain mostly live oak, while in the river bottoms are some magnificent oaks but of small stand. The Edwards Plateau, lying mostly to the west of the 98th meridian, contains a characteristic timber. Along the canyons and streams are luxuriant growths of various hardwoods. On the hills and bluffs is a mixed timber—post oaks, mountain oaks, and cedar brakes of extensive area. Their greatest importance is in conserving the water supply. Their commercial importance is mostly as a source of fuel, railway ties, blocks and poles, and the like. In the Rio Grande Plain, south of the Edwards Plateau, we have chaparral, a rapidly spreading species, but stunted and of little commercial importance. Over the whole of West Texas is rapidly spreading the mesquite, which gives promise of becoming a valuable tree. And lastly, we have the Cordilleran region—the southern plateau of the Rockies, extending into Texas west of the Pecos River. The mountains rise to the heights of from six to nine thousand feet. The foothills and slopes have timber analagous to that of Edwards Plateau, but the higher canyons and summits have Rocky Mountain species, as yellow pine, red fir, and oaks, but such amounts are small and are inaccessible to mills.

STAND AND CUT IN EAST TEXAS BELT.

Thus having reviewed the timber features of the State as a whole, let us now turn to a study of the stand and cut, acreage, and character of ownership of the stand. Attention will be confined to the East Texas area, and the information will be drawn largely from the report of the United States Bureau of Corporations on the lumber industry. The cut for 1909 as given by this report is identically the same as that given by the census for 1909. All the logging and sawmills, and practically all the planing mills, are located in this area; and hence we infer from this and from the above that the East Texas belt comprises all the valuable, available forests of the State. The counties comprising this area are forty-eight in number, of which the following mark its western boundary: Fannin, Hunt, Kaufman, Henderson, Anderson, Leon, Grimes, Walker, and Harris.*

Let us look first into the supply of standing timber. The report shows no publicly owned timber in this area, and so the figures signify only privately owned timber. The total stand comprises 66,000,000,000 of board feet, divided as follows: long leaf pine, 22.4 billions feet; short leaf pine, 22.5 billions feet; cypress, .2 billions feet; hardwoods, 20.9 billions feet. Of the hardwoods, 33 per cent is oak—the most valuable species—19 per cent gum, 3 per cent hickory, 4 per cent ash, and 41 per cent of other species.

Over against this stand may be placed the cut for 1909, the significance of which is revealed by the following table:

STAND Billions of Feet.	CUT Thousands of Feet.	Per Cent of Total Stand Cut 1909.
66	2,099,130	3.2

This table shows that in 1909 Texas cut 3.2 per cent of her total stand of timber. From this we may deduce some idea of the length of time it will take before the entire stand is cut. If the cut were to remain the same each year, and there were no increase in stand from natural growth or artificial reforestration, it is seen that the life of the lumber industry in Texas would be limited to about thirty-one years. Up to the present little or no

*For this and other sections cf. Fig. 1, and pp. 7-8.

progress has been made toward the introduction of scientific forestry into the management of our forests, and so the increase in stand from this source appears negligible. As to the increase from natural growth, only an expert could place an estimate. It would be considerable, but at all events, in the light of present conditions, fifty years would be a liberal estimate for the life of the industry in this State.

In the relation of annual cut to stand there are striking differences between yellow pine on the one hand and hardwoods on the other, for the cut of yellow pine in Texas was 4.5 per cent of the stand of this species, while the cut of hardwoods was only .4 per cent of its stand. In other words, the present annual drain is eleven times as great upon the yellow pine supply as upon the supply of hardwoods.

In this connection it is well to compare this State with Louisiana. The industry in that State is older than it is in Texas, and hence has reached a higher degree of development. The stand there is larger by 53.8 billion feet, and naturally the cut is larger than in Texas, exceeding ours by 1,452,000,000 feet.

CONCENTRATION OF OWNERSHIP.

Now let us confine our attention to the concentration of timber ownership in this East Texas area. Here is found very great concentration, indeed. Three holdings alone comprise together 14.6 billion feet, or 22.1 per cent of the total stand. But of this 14.6 billion feet, 12.2 billion feet are long leaf pine, comprising 54.5 per cent of the total long leaf stand of the State. This is enormous concentration. And of these holdings, only .5 billion feet of hardwoods is included, which suggests the purity of the long leaf stand. The eighty-one largest holdings of the State embrace 55.3 per cent of the total stand, or 72.2 per cent of the most valuable woods—the yellow pine. That is, 72.2 per cent of the yellow pine of this State is distributed among eighty-one holdings, no one of which contains less than 60 million feet of timber. The hardwoods, it is interesting to note, are in smaller holdings; 80.4 per cent are in holdings, not one of which contains as much as 60 million feet. All this shows the excessive concentration of the ownership of the most valuable species.

It is well at this point to bring in the acreage of timber hold-

ings, and the approximate average stand per acre. In connection with the above, this will help to bring out the concentration by showing that the purest stands and the largest average stand per acre are found among the largest holdings. Holdings are not classified by the number of acres held, but by the amount of feet of timber held. A large acreage may have only a relatively small amount of timber. But where there are holdings of large acreage, and yet a high average stand per acre, then there is great concentration. Thus the East Texas area is placed at 9,336,000 acres, with an average stand of 7.1 thousand board feet per acre. Of this acreage, the 14.6 billion of feet compressed in the three largest holdings, stand on 1,090,000 acres, giving an average stand of approximately 13.4 thousand board feet per acre—a very high average. The average stand per acre for Louisiana and Mississippi are 11.3 and 10.1 thousand board feet per acre. Of the eighty-one holdings, comprising 55.3 per cent of the total stand as shown above, the stand rests on 4,150,000 acres, less than half the total acreage, making an average stand of 8.8 thousand feet per acre. The smaller holdings—those below 60 million feet—rest on 5,186,000 acres with an average stand per acre of only 5.7 thousand board feet. Thus the smaller holdings comprising only 44.7 per cent of the total stand, contain over half the acreage, thus making a small acreage stand per acre, and emphasizing the concentration of the largest and purest stands in a few hands.

As to the causes of such concentration of ownership in this State, it is not our purpose to inquire. We are concerned only with the fact that such concentration exists. It may be well, however, to mention the fact that land grants to railways which account for much concentration in the Northwestern and Pacific States, have never been a cause of consequence in this State. Texas has controlled her own public lands, and though she has granted over 32 millions of acres of land to railways, the most of this was non-timbered land. Just what per cent was timbered is not shown, but in 1909 the Southern Pacific Railroad, which controls several roads to which grants were made, held only a half billion feet of timber in Louisiana and Texas together. A Texas law requiring railways to alienate all patented lands received from the State within twelve years of the date of patent,

works against their retaining this land. Nothing is given to indicate the identity of the owners of the large holdings.

VALUE OF THE STAND.

The value of this standing timber is a difficult thing to ascertain. The value of timber varies so much with location, quality, and stand, that it is difficult to estimate the value of the timber resources of any one State. The following table shows somewhat the rise in stumpage values* for two species:

KIND.	Average Value Per Thousand Feet.		
	1899	1904	1907
Cypress	$1.58	$3.42	$4.37
Yellow Pine	1.12	1.68	3.16

The value of the long leaf pine in Texas, as shown by various sales and quotations, ranges from $1 to $5 per thousand feet, while loblolly pine ranges up to $2.50 per thousand feet. The value of cypress in Louisiana averages about $4.65 per thousand feet. Investigation indicates that the value of any given piece of southern pine taken at random is likely to have increased from threefold to tenfold during the decade 1898-1908. The greatest relative advance is found in timber where value at the first of the period was small, as gum, which had no market until 1900.

Now when we consider that the total stand of yellow pine in this State in 1909 was 44.9 billion feet, and its average value is at least $3.16 per thousand feet, we begin to realize the enormous value of these timber holdings and their economic importance. For this alone would reach the sum of almost $142,000,000. Then there are 21.1 billion feet of cypress and hardwoods. And it is significant that three holders owning 14.1 billion feet of this total yellow pine represent values something $44,500,000—great concentration of valuable timber. And these three holdings show a gain during the years 1899-1907, if the average price holds good, of over $28,700,000. To whom does this increase in price bring advantage? Population increases, the demand for lumber

*"Stumpage value"—value of the standing timber.

increases, and the supply decreases. This brings higher prices, and results wholly to the advantage of those who have secured control of the forests. "The power of the great timber owners increases, not only as the timber passes more and more into their hands, but also as its value rises."

LUMBER MILLS AND WOOD-USING PLANTS.

The thirteenth census of the United States defines the lumber and timber products industry as including "logging operations, the sawmills, shingle mills, planing mills, and wooden packing-box factories." The industry in the United States is a very important one, ranking third among all manufacturing industries in the value of its products, second in value added by manufacture, and first in the number of wage earners employed. Only slaughtering and meat packing, and foundry and machine shop products industries take precedence in the value of the products.

In Texas, too, this industry is of large importance. In value of its products, it ranks third among the manufacturing industries of the State, slaughtering and meat packing ranking first, and the flour mill and grist mill products industry, ranking second. The industry represents 11.8 per cent of the total value of manufactured products. As to wage workers and value added by manufacture, the lumber and timber products industry is the most important. Among the manufacturing industries it gives employment to 33.5 per cent of all the wage workers, and represents 22.4 per cent of the total value added by manufacture. And the statistics show an increase of 70.6 per cent during the period 1904-1909, in the value of its products. In 1909, there were 4588 manufacturing establishments and 799 of these were lumber and timber products establishments—17.4 per cent of the total.

WAGE WORKERS AND LABOR CONDITIONS.

Let us first examine the industry in the light of wage workers and labor conditions. In 1909 it gave employment to 25,843 persons, 91 per cent of whom were wage workers. Of the 23,518 wage workers it is of interest to note that only 51 were females and 305 were workers under 16 years of age—comprising 24.2 per cent of all wage workers under 16 employed in manufacturing industries. The prevailing hours of labor in the industry are

60 to 72 hours; 72.1 per cent of the workers labor 60 hours, while 19 per cent work between 60 and 72 hours.

FORM OF BUSINESS ORGANIZATION AND SIZE OF ESTABLISHMENT.

Now turn to the establishments themselves and look into the conditions in respect to character of ownership or legal organization. The important distinction is between the corporation and other forms of ownership. In 1909 only 22.8 per cent of the total were under corporate ownership, but in respect to value of products, employes, and value added by manufacture, these latter establishments gave employment to 73.3 per cent of the wage workers, and their products represented 74.7 per cent of the total value, and 72.3 per cent of the total value added by manufacture. This means that the largest establishments are corporate ones, and they dominate the industry.

The relative prevalence of corporations and partnerships in this industry as compared with other manufacturing industries is worthy of notice also. Of eight selected industries, there are four reflecting approximately a similar percentage of partnerships and corporations—flour mill and grist mill products, foundry and machine shops products, lumber and timber products, and leather goods. The four remaining industries, on the other hand, show a different tendency. The bread and other bakery products industry shows a great tendency to retain the individual form of business organization, as only 15.8 per cent of the total number of concerns are under firm and corporation form. A similar situation prevails in the printing and publishing industry. The manufactured ice industry and oil, cotton seed and cake industry show the reverse—in the former, 70.3 per cent of the concerns are under corporate management, in the latter, 88.7 per cent are under the corporate form.

The lumber and timber products industry, however, is one of two extremes—it represents an industry in which both corporate and individual forms flourish. Of the total number of concerns in the industry 43.8 per cent are individual ones, 33.4 are under firm management, while 22.8 per cent are under corporate form. The explanation is found in the broad scope of the industry, for as defined by the United States census report, it includes everything from logging operations and sawmills to planing mills and

box factories. Hence, one infers that the individual form of business organization is prevalent in the latter phase of the industry, while logging operations and sawmills are largely carried on under the corporate form.

The tendency for the industry to become concentrated in large establishments or the reverse, is also of interest from the standpoint of industrial organization. The average size of establishment as measured by the number of wage earners, value of products, and value added by manufacture, is the best index. Of the 799 establishments, only 83 had value of products exceeding $100,000. These had an average of 14,917 wage-earners, or 63.4 per cent of the total number in all lumber and timber products establishments, and reported 66.3 per cent of the total value of products and 64.5 per cent of total value added by manufacture. On the other hand, small establishments—those having a value of products less than $5000—constituted a considerable proportion of the total number of establishments—33.5 per cent; but the value of their products amounted to only 2.1 per cent of the total. A further way to bring out the feature of size is to classify according to the number of wage earners employed. Of the 799 establishments, 606 employed only 18.6 per cent of the wage workers, while 50 establishments gave employment to 34.8 per cent of the total number of wage workers. Evidently the large concerns dominate the industry. There is no manufacturing concern in Texas employing over 1000 wage workers.

A study of the expense distribution can result only in showing the relative importance of the different classes of expense which make up the total. Wages comprise the largest element—42 per cent—while only 39.8 per cent went for materials. The fuel most largely used was bituminous coal, with wood coming second.

The following table brings out a peculiarity of expense attached to the lumber and timber products industry as compared with two other important Texas industries:

INDUSTRY.	Per Cent of Total Expenses Reported.		
	Salaries.	Wages.	Materials.
Lumber and timber products	5.4	42.0	39.8
Oil, cotton-seed and cake	3.2	4.8	86.2
Slaughtering and meat packing	1.7	4.6	91.4

These percentages show the difference in the character of the industries—lumber and timber products industry being one in which the material manufactured is of large bulk, requiring a great amount of labor to manufacture it. The other industries, on the other hand, are ones in which material constitutes the greatest amount of expense—the labor expense is small.

It is well to note what degree this industry plays in the industrial life of the larger cities of Texas. The great majority of the establishments are scattered well over the eastern part of the State, where extends the great timber belt. But while in the four largest cities—San Antonio, Dallas, Houston, and Fort Worth—there are only 36 establishments, these represent 10.8 per cent of the total value of products of the entire industry. Houston is first with 12 establishments, representing a value of products of $1,080,544, while Dallas is second with 11 institutions producing products valued at $720,447.

A comparison with the same industry in Louisiana is well at this place. We saw in the early part of the paper that Louisiana had a much larger stand of good timber than had Texas. It is natural to expect, then, the industry to be of larger proportions, especially when the industry in Louisiana is one of the oldest in that State, and is well developed. It gave employment in 1909 to 46,072 wage earners; in Texas the number was 23,518. The value of products for the industry represented 28.1 per cent of the total of all manufacturing products, while in Texas it was only 11.8 per cent. And lastly, during the years 1904-1909, value of products increased 63.8 per cent, while in Texas the increase was only 52.2 per cent. In respect to wage workers, character of ownership, size of establishment, etc., Louisiana is much similar to Texas. Conditions of one are reflected in the other, as is to be expected of two contiguous timber States.

WOOD-USING INDUSTRIES.

We now come to the wood-using industries of Texas. The thirteenth census in setting forth the manufacturing industries of the State, gave information on 799 establishments engaged in the lumber and timber products industry. This included sawmills, some planing mills, box factories, and other establishments. But the wood-using industries go further; they take the wood up where

it leaves off at the mills, and carry it on to a finished state in the form of a manufactured article. Unfortunately, there is some overlapping in data, as the census includes some wood-using plants among the lumber and timber products establishments, but to get at a basis for discussion, we must look at these industries as a unit and dissociate them from the lumber and timber products industry.

In 1910 the wood-using establishments manufactured 762,336,-112 feet of lumber. Of this amount 9 per cent was shipped into the State, and consisted of kinds not largely grown in Texas. Of foreign woods used in Texas factories, there were five—the African and American mahogany, Mexican white pine, Spanish cedar and teak—but they totaled only a little more than a half million feet of lumber. Woods of 129 different kinds were found in use, 115 of which are species grown in Texas.

Among the wood-using establishments of Texas, there are represented 13 industries—planing mill products; miscellaneous; sash, doors, blinds, and general mill work; boxes and crates (packing); car construction; furniture; agricultural implements; fixtures; tanks; vehicles and vehicle parts; handles; trunks and valises; and patterns. The planing mill products industry is by far the most important, representing in 1910, 77 per cent of the total output of the wood-using industries. The average cost of lumber used as raw material is less in this industry than for any other, being $11.79 per thousand feet of lumber. And of all the establishments enumerated in this single industry, no one was further west than Waco; all were located throughout this East Texas timber area, where stood the supply. The highest average cost for raw material was in the making of fixtures, with the cost of $49.05 per thousand feet. This is because the best grades of wood must be used, even though cheap woods are used.

Of interest, too, is the fact that no industry secured all its supply in the State. The one using the largest amount of Texas grown lumber is the planing mill products industry, which drew only 1.76 per cent of its total supply from outside. The makers of tanks bought the largest percentage of material from outside, bringing in 96.52 per cent, or 833,000 feet. This 833,000 feet was cypress bought from Louisiana. The amount of wood used

for all industries totaled 762,336,112 feet, with an average cost of $13.30 per thousand feet; 91.5 per cent was grown in Texas.

Of the foreign woods, the African mahogany was all used in the sash, doors, blinds, and general mill work industry, representing an average cost of $150 per thousand feet. The American mahogany was used in four industries—car construction; fixtures; furniture; and sash, doors, blinds, and general mill work—with an average cost ranging from $151.82 per thousand feet in car construction, to $250 per thousand feet in the furniture industry. The teak was all used in boat finishing, representing an average cost of $220 per thousand feet. The Mexican white pine was all used in the sash, doors, blinds, and general mill work industries; the Spanish cedar in the making of cigar boxes. The average cost per thousand feet was $48.46 and $31.15, respectively.

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IRRIGATION IN TEXAS.

B. L. PARTEN.

Extent of Irrigation in Texas. Irrigation as an industry in Texas is in most sections yet in its experimental stage. The greatest developments have been in the rice region lying along the coast of the Gulf of Mexico, and in the belt of counties along the Rio Grande River from El Paso to Cameron county.*

The section of Texas lying in the above named region is well adapted to the industry of rice growing. The low altitude and wet climate found there are two conditions necessary to the proper cultivation of rice. One could safely predict that there is a great possibility in Texas for turning thousands of acres of our best lands now lying idle in marshes into rich rice fields.

As stated above, the region of the State lying along the Rio Grande River is being provided with irrigation facilities. The soil in these counties is unusually fertile and of it can be properly supplied with water will yield returns which, as will be shown later, abundantly reward those who invest their money wisely in the projects.**

*The rice irrigation district is made up of the following counties:

County.	% of Area Irrigated.	County.	% of Area Irrigated.
Brazoria	2.00	Jackson	2.00
Chambers	6.90	Jefferson	12.90
Colorado	1.20	Liberty	0.10
Fort Bend	1.40	Matagorda	8.40
Galveston	1.00	Orange	4.50
Harris	2.40	Wharton	7.60

**The counties in which irrigation has received most attention, that is, those outside of the rice growing belt, and the percentage of the area in each under irrigation is as follows:

County.	% of Area Irrigated.	% of Land in Farms.	County.	% of Area Irrigated.	% of Land in Farms.
Bexar	.60	.60	Menard	.60	.70
Brown	.10	.10	Mills	.30	.30
Cameron	1.90	5.40	Nueces	.10	.10
Comal	.10	.10	Pecos	.10	.10
El Paso	.40	1.00	Presido	.10	.10
Hardeman	.80	1.30	Reeves	.80	2.50
Dimmit	.40	.80	San Saba	.30	.30
Hays	.10	.10	Starr	.10	.10
Hidalgo	1.40	3.20	Uvalde	.20	.30
Irion	.20	1.00	Val Verde	.10	.20
Kimble	.30	.30	Ward	3.10	5.00
Kinney	.40	.60	Webb	.20	.40
La Salle	.20	.20	Wichita	.40	.50
Loving	.20	.50	Zavalla	.10	.20
Maverick	.10	.60	Tom Green	.70	.70

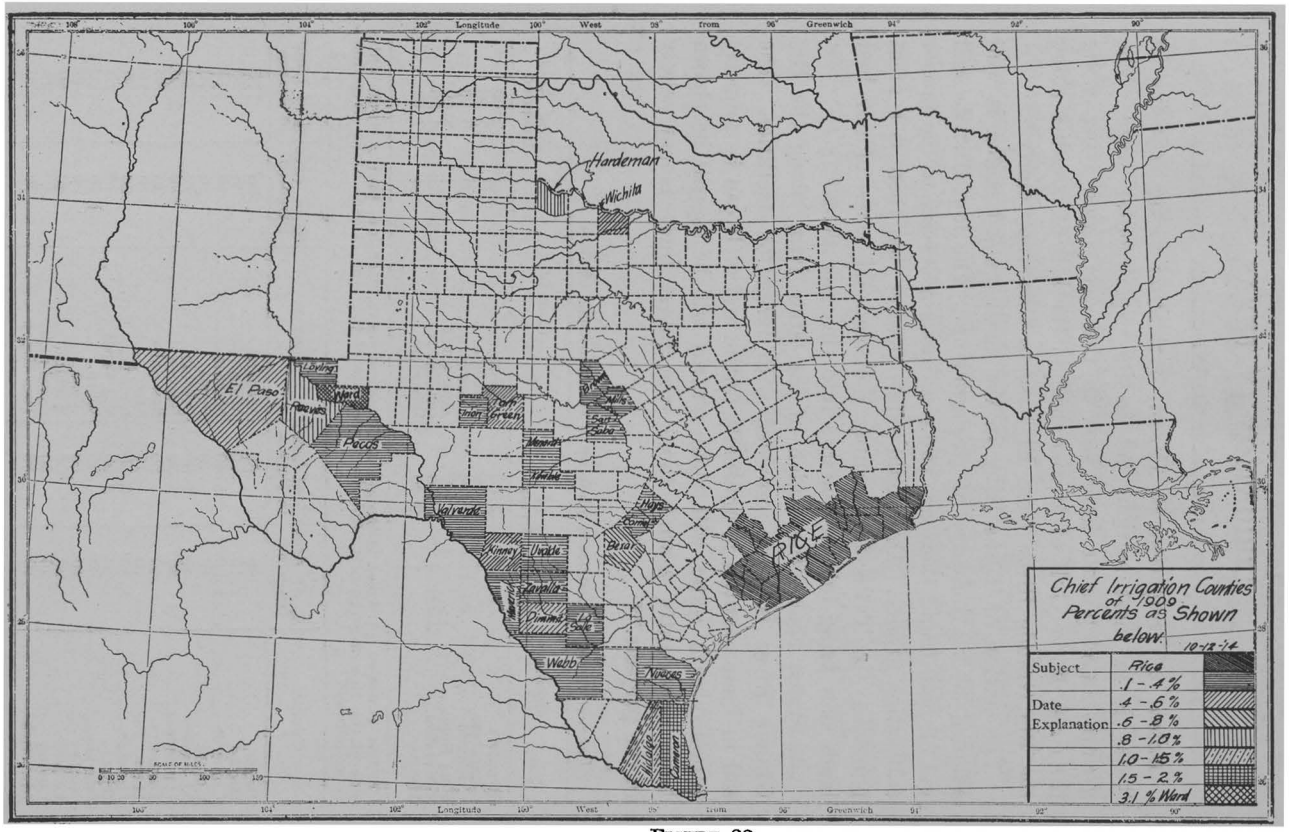
Longitude West from Greenwich
Harderman
Wichita
El Paso
Loving
Ward
Ranges
Pecos
Union
Green
Menard
Val Verde
Kinney
Uvalde
Zavalla
Dimmit
La Salle
Webb
Nueces
RICE
Chief Irrigation Counties of 1909 Percents as Shown below.
Subject Rice
Date
Explanation
.1 - .4 %
.4 - .6 %
.6 - .8 %
.8 - 1.0 %
1.0 - 1.5 %
1.5 - 2 %
3.1 % Ward
SCALE OF MILES

FIGURE 22.

The map attached shows the locations of these various counties and give the percentages as represented above.

To make a brief summary of irrigation in Texas, we find: (1) That the approximate area of the State is 167,934,720 acres; that the acreage irrigated is (1910) 164,283 acres, or that approximately but one-tenth of one per cent of the total land area is under irrigation. (2) The number of all farms is (1910) 417,-770; and there are 4150 farms under irrigation, or approximately 1 per cent. (3) The number of acres cultivated is 112,453,067, and 164,283 acres are under irrigation, or approximately .1 per cent.

Acreage irrigated, classified as to source of water supply. The following table shows the acreage irrigated, exclusive of that of rice, in 1909, according to the source of water supply:

Source of Supply.	Acreage Irrigated, 1909.	
	Amount.	Per Cent Distribution.
All sources	164,283	100.00%
Streams	134,692	82.00%
Lakes	458	.30%
Wells	9,682	6.00%
Springs	13,068	8.00%
Reservoirs	6,203	3.80%

While more than four-fifths of the acreage irrigated in 1909 was supplied from streams, there has been considerable utilization of other sources of supply. The State has many large springs, the water from which is being used for irrigation.

The principal crops. The following table shows the crops that are made by irrigation farming and the value of yield per acre:

Crop.	Irrigated Crops in 1909.			
	Acreage.	Amount	Average Per Acre.	Value.
Corn	9,068	191,474 bu.	21.1	$162,467
Oats	2,496	60,015 bu.	24.0	38,668
Wheat	1,386	26,681 bu.	19.3	23,408
Kaffir corn and milo maize	1,154	29,449 bu.	25.5	19,612
Alfalfa	13,778	43,771 tons	3.18	80,460
Grasses	5,009	6,655 tons	1.33	598,911
Wild salt and prairie grass	593	773 tons	1.30	10,743
Coarse forage	4,651	14,108 tons	3.03	153,626
Cotton	7,474	2,299 ba.	0.31	143,157
Sugar cane	1,759	36,665 tons	20.84	90,170
Potatoes	961	90,089 bu.	93.70	81,052
Onions	1,842	.....	.....	297,440
Cabbages	1,416	.....	.....	143,671
Other vegetables	4,178	.....	.....	646,651

Note on the net returns per acre. In determining the net returns per acre on irrigated land, a person has to consider a great many items,—the chief ones of which are feed, labor, interest on the investment in land and plant, etc. An attempt is made below to estimate the chief expenses with as much accuracy as is possible. It is a rough attempt to ascertain the respective importance of each item in so far as it affects the final net returns per acre. We find that:

Cost of feed per average farm in irrigated counties is....	$148 15
Cost of fertilizer per average farm in irrigated counties is	7 72
Cost of labor per average farm in irrigated counties is....	302 90
Interest on buildings per average farm in irrigated counties is	14 96
Interest on improvements and machinery per average farm in irrigated counties is.....	17 78
Interest on value of domestic animals per average farm in irrigated counties is.....	26 97
Depreciation of buildings per average farm in irrigated counties is	9 35
Depreciation of improvements and machinery per average farm in irrigated counties is.....	11 11
	$538 94

There are 63¼ acres per average farm. This makes the average cost per acre, for items above considered, $8.52. To this we add as interest on land value, $11.38, and as a minimum for seed, 50 cents, which brings the total up to $20.81.

The following expenses must be added for irrigated farms:

Average cost of operating and maintaining irrigation per acre	$ 3 25
Interest on cost of irrigation enterprises per acre (10 per cent)	2 15
Depreciation on cost of irrigation enterprises per acre (20 years)	1 07
	$ 6 47
	20 81
	$ 27 28

This makes a grand total of over $27 for all expenses in making each crop.*

The average returns per acre for the year 1910, from which year these statistics were compiled, are shown to be $43.05. Thus by subtracting the total average cost per acre ($27.28) from the average returns ($43.05), we find a clear average profit of approximately $16 per acre.

The increased value of irrigated land. In studying such a subject as "Irrigation" the question comes to one's mind, "Does the value of the land so increase because of the presence of irrigation facilities as to justify the expenditure of large sums of money on it?" Is it a paying business to the capitalist? Of course, the statistics to be relied on in working up such a question are not the fullest to be desired. But according to the reports of the last census, the following results have been obtained:

The value of irrigation enterprises per acre of land ranges from $1.76 in Loving county to $54.44 in Comal county, the arithmetical average being $21.57. From the compilation of various statistics we have found that the average value of all land in the

*The reader will remember that this is a pretty daring attempt to reduce scattered statistics to some definite form. Also it deals only in averages, and applies to no particular farm. (Ed.)

counties being considered is $28.83. Thus by adding the cost of enterprises per acre and the average original value of the land we find that an acre of such land on the average may be bought and provided with irrigation equipment for about $50. Now, by capitalizing the average profits of $16 per acre (as was found above) at 10 per cent, we find that the value of land already under irrigation should amount, on the basis of earning capacity, to $160 per acre. Subtracting the amount of the actual cost of an acre and its irrigation equipment ($50.40) from the capitalized value per acre, we find that there is an increased value of $110.

If the results obtained bear any significance whatever they show that irrigation in Texas has so far proved to be a profitable business, and there is little doubt but that within a few years a great part of our western plains, which at present rely on a very uncertain rainfall for water supply, will be developed into irrigated farms.

(Aside from obvious incompleteness in statement of operating expenses (e. g., management, depreciation, seed), the chief weakness in the foregoing appears to be the assumption of a $28 value of land. This figure seems to incude the value of irrigated land. The roughness of the whole estimate is increased by the variety of crops and conditions averaged together.) Ed.

THE RAILWAY SERVICE IN TEXAS.

R. RANDOLPH

Miles of line, increase and character. The following table gives a fair idea both of the absolute and of the relative extent* of the railways of Texas:

Nation or State.	Total Mileage.	Proportion to Total Mileage. (Per cent.)	Increase June 30, 1909. (Miles.)	Number of Miles of Line per 100 Sq. Mi. Territory.	Number of Miles of Line Per 10,000 Inhabitants.
United States	240,438	100.00	3,604	8.08	26.14
Texas	14,243	5.94	761	5.44	36.65
Illinois	11,875	4.94	29	21.20	21.07
Pennsylvania	11,290	4.70	88	25.18	14.73

Texas has a greater mileage than any other State in the Union, having over one-sixteenth of the total mileage in the United States. Illinois and Pennsylvania are next in absolute mileage. But absolute mileage does not indicate much, except when compared with the territory and population. When we consider the vast area of Texas we realize that her mileage, though high in an absolute sense, is very low in a relative sense, and that she has not been as well developed by the railways as even the average State in the Union. Her relatively high mileage per 10,000 inhabitants is explained by the fact that a great many of the railways traverse great stretches of territory still sparsely settled.

It is interesting to note that Texas leads also in railway expansion. In the year 1910, which is probably an average year, Texas showed an increase in mileage twenty-six times as great as Illinois and nine times as great as Pennsylvania. But, the question naturally arises: Are the railways constructing new lines as fast as they can afford to, i. e., has the expansion been in proportion to the increase in net income? For the year 1910 alone there was an increase in mileage of 5 per cent while there was an actual decrease in income from operation of .8 per cent. On the other hand, for the period of the twenty years preceding, there was an

*For the sake of uniformity with other papers, the statistics are given for 1910; they are taken from reports of the Interstate Commerce Commission and the Texas Railroad Commission.

increase in mileage of 60 per cent as compared with an increase in income from operation of 220 per cent (and with an increase in the number of tons of freight handled of 330 per cent). The answer to the question is that for the last two decades as a whole the expansion of mileage has not been proportional to the increase in income, while for the last few years of that period there has been rapid expansion in spite of a decrease in income:

Almost 100 per cent of the tracks of Texas railways today is of standard gauge, and laid with steel rails. There are only 22 miles of narrow gauge track and 14 miles of iron rails left.

Equipment and employes. As for the equipment, the table on page 93 indicates the locomotives and cars, and also employes, reduced to an average number per 100 miles of railway line:

	Total Number Locomotives in Service.	Locomotives Average Per 100 Miles of Line.	CARS							
			Passenger Service.	Passenger Cars Av. Per 100 Miles of Line.	Freight Service.	Freight Cars Cars Av. Per 100 Miles of Line.	Total Cars in Service.	Total Per 100 Miles of Line.	Total Employes.	Employes. Average Per 100 Miles of Line.
United States	58,947	24	47,095	19	2,135,121	888	2,290,331	952	1,699,420	706
Texas	2,026	14	1,239	8	44,832	315	49,763	348	61,908	435

Traffic and earnings. Before commenting on the above table it will be well to tabulate some traffic statistics which will form a basis for comparison:

	Average for United States.	Average for Texas.
Revenue per ton per mile	.75 cents	1.026 cents
Revenue per passenger per mile	1.93 cents	2.3 cents
Per cent of earnings from freight	70%	68.9%
Operating ratio	66.3%	76.5%
Net operating revenue per mile of road	$ 3,800	$ 1,677
Capitalization per mile of line	$62,600	$32,179
Train load	380	235
Passengers per train	56	50
Density of traffic (ton miles per mile of line)	1,000,000	440,095

Comparison with averages for the United States. The above tables show that, in respect to equipment and traffic conditions, Texas ranks far below even the average for the United States. It is naturally to be expected that the equipment is fairly proportional to the density of traffic, capitalization, and net operating revenue. The percentages which the Texas figures show as compared with the average for the United States, are as follows:

Density of traffic is 44 per cent of U. S. average.

Net operating revenue is 44 per cent of U. S. average.

Capitalization per mile of line is 51 per cent of U. S. average.

Number of locomotives per mile of line is 58 per cent of U. S. average.

Number of cars per mile of line is 37 per cent of U. S. average.

Number of employes per mile of line is 61 per cent of U. S. average.

Hence, traffic conditions do not warrant much extension of equipment by the railways.*

The other side of the question is: Is there a demand for better equipment? The only available basis for measuring the demand is, at best, a rough approximation—the ratio of population to mileage or of area to mileage. On the basis of the ratio of population to mileage, for Texas—

Population per mile of line is 71 per cent of U. S. average.

*Unless it be in cars. Also the average locomotives are probably so low in traction power that the relatively large number means little. Of course the writer assumes that the United States average is fair and adequate. (Ed.)

Number of locomotives per mile of line is 58 per cent of U. S. average.

Number of cars per mile of line is 37 per cent of U. S. average.

Number of employes per mile of line is 61 per cent of U. S. average.

On the basis of the ratio of area to mileags, for Texas—

Number of square miles per mile of line is 148 per cent of U. S. average.

Number of locomotives per mile of line is 58 per cent of U. S. average.

Number of cars per mile of line is 37 per cent of U. S. average.

Number of employes per mile of line is 61 per cent of U. S. average.

The conclusion to be drawn from the statistical evidence is that there is at least a potential demand greater than the immediate supply of equipment, and it is to be expected that such demand will be met by additional equipment whenever earnings of the railways will justify such an extension.

(Obviously the trouble lies in the relatively low traffic density and net earnings. It would seem that the *average* Texas acre, and the *average* Texan are not as productive of tonnage as is the average citizen of the United States.—Ed.)

Investment, capitalization, and rates. The last phase of the service is the problem of the economy of the service. Are the railways making capital investments for the development of the State in proportion to its demands? Are they making capital investments as fast as their financial condition warrants? And, finally, are the rates reasonable in an absolute sense?

On the basis of the ratio of population to mileage, for Texas—

Population per mile of line is 71 per cent;

Capitalization per mile of line is only 51 per cent;

of the average for the United States.

On the basis of the ratio of area to mileage, for Texas—

Area per mile of line is 148 per cent;

Capitalization per mile of line is only 51 per cent;

of the average for the United States. Hence, there is a potential field for profitable railway investment.

But does the present financial status of the railroads warrant a larger investment? For Texas—

Density of traffic is 44 per cent;

Net operating revenue per mile of line is 44 per cent;

Capitalization per mile of line is 51 per cent;

of the average for the United States. Hence, on the other hand, the railways have really made capital investments faster than earnings and traffic warranted, in spite of the fact that they have not been able to develop the resources of the State in proportion to its demands.

This conclusion has been based on the assumption that, on the whole, the railways are not overcapitalized in Texas, but that capitalization and capital mean practically the same thing. On the same assumption largely hinges the question of the absolute reasonableness of the rates. The writer, in making the assumption, accepts the conclusion reached by Mr. R. F. Higgins,* who, in a paper presented before the Applied Economics Club, says: "Such comparisons as have been made and such statistics as have been considered in the preceding paragraphs certainly tend to show by a preponderance of evidence that water has been squeezed out of the average railway capitalization in Texas."

As held in Smyth vs. Ames,** the rates should be high enough to allow a fair return on the investment. For Texas, the capitalization per mile of line is 51 per cent of the average for the United States, while the net operating revenue is only 44 per cent of the average for the United States. The rate of return on the capitalization was less than 5 per cent. For the last few years there has been an average decrease in net operating revenue of over 3 per cent annually. The logical conclusion to be drawn, then, is that, from the point of view of both the public and the railways, the demands for some increase in rates is justifiable.

As a final statement, the mileage in Texas is relatively small in comparison with the area and population; there is a greater demand for equipment and further investment than the railways are able to meet; and only with some increase in the rates can further development and construction be hoped for.†

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*R. F. Higgins, Bulletin of the University of Texas, No. 236, June 22, 1912, p. 108.

**Smyth vs. Ames, 169 U. S., 466.

†The editor would note that the effect of increased rates on traffic complicates the situation and makes conclusions less clear.

A SUMMARY OF THE BANKS OF TEXAS.

F. L. VAUGHAN.

In making a survey of the present financial institutions of Texas, it is well to note at the same time the historical growth of the banks of the State.

National banks. In 1880 Texas had only 13 national banks, these having a total capitalization of $1,300,000. Between then and 1892 this number increased to 223, with a capitalization of $26,315,000. A slow but steady growth of national banks thus characterizes the first chapter in the history of the financial institutions of Texas.

But 1893, the year of the disastrous financial panic, saw a cessation in the growth of banks; in fact, their number actually decreased until 1900, when the industries of the country had again resumed their normal condition. Stagnation and retrenchment, therefore, form the earmarks of the second period.

The third stage in the development of national banks, extending from 1900 to 1909, furnishes a time of revival and prosperity. In this short span of nine years the number of banks more than doubled, increasing from 223 to 535. Capital stock, deposits, and loans rose in like proportion.

About 1909, however, this growth suffered a setback owing to the operation of the State Banking Act of Texas. From this date until now the number of national banks has varied little, although their capital stock, deposits, and loans have steadily grown.

The following statistics express in a nut shell the development just outlined:

Year.	Loans and Discounts	Number of Banks.	Capital Stock.	Individual Deposits.
1880	2,044,000	13	1,300,000	2,081,000
1885	13,777,000	68	6,880,000	9,184,000
1890	48,814,000	189	22,227,000	30,450,000
1892	52,933,000	223	26,315,000	32,065,000
1895	51,189,000	214	21,380,000	33,253,000
1898	42,838,000	196	19,205,000	37,895,000
1900	56,453,000	223	19,619,000	49,749,000
1905	105,467,000	440	32,295,000	101,285,000
1908	133,262,000	535	40,868,000	115,843,000
1910	177,016,000	519	44,076,000	145,249,000
1912	186,764,906	515	46,781,000	147,668,914

The growth of the national banks in Texas, as measured by that in the whole country, has been relatively rapid. In 1880 Texas had .6 per cent of all the national banks in the country; 1892, 5.9 per cent; 1908, 7.8 per cent; 1912, 7 per cent.

The percentages of the loans and discounts, capital stock, and individual deposits of the national banks of Texas to those of the nation are much less than the percentage (7 per cent) shown above; they have increased, however, at a more rapid rate. These ratios for 1912 were: Loans and discounts, 3.1 per cent; capital stock, 4.5 per cent; individual deposits, 3.6 per cent.

State banks. In 1905 Texas enacted a State banking law; since that date the number of State banks has multiplied at a phenomenal rate. This increase, together with the growth in their principal resources and liabilities, is shown in the following table:

Year.	Loans and Discounts.	Number of Banks.	Capital Stock.	Individual Deposits.
1906	9,202,200	136	4,875,500	9,566,500
1907	21,734,700	309	10,006,700	16,260,800
1908	21,270,200	340	10,690,500	22,570,600
1909	38,773,800	515	16,128,500	41,321,600
1910	45,403,600	621	20,197,500	50,584,500
1911	61,044,900	679	23,310,500	44,050,500
1912	.....	.....	.....	.....
1913	87,981,000	832	32,576,500	84,602,200

As has been stated, the growth of State banks in Texas placed a damper upon the normal increase of national banks in this State. Today the amount of the capital stock of the former equals about two-thirds of the latter; while the number of the one almost doubles that of the other. These comparisons can be better understood after one considers that the minimum capital of the State banks is $10,000; of the national, $25,000.

In other words, the statistics show many State banks with a small capital, indicating that most of these institutions are located in the small towns. The State Banking Act serves a great purpose, making possible the creation of many small banks to promote the interests of rural communities.

Private banks. One can find very few statistics showing the strength of the private banks in Texas. In 1901 there were 168 such institutions, having a total capitalization of $4,582,000.

All banks. The Texas Bank Directory of 1911 gives 1327 State,

national, and private banks for Texas. This same authority credits these banks with a total capital and surplus of $113,055,-617, and total individual deposits of $206,664,471.

Other statistics. The following data, based upon the census of 1910, express in a brief and comparative way the number of banks, together with their chief resources and liabilities, of Texas and the United States. For the whole country there was one bank for every 3982 inhabitants; for this State, one for every 2804 people. Further, the former had one bank for each 131 square miles; the latter, one for each 194 square miles. Thus the banks of this State, like the railways, rank well when compared with the population, but poorly when measured by area.

At the same time, a loan of $136 existed for every person in the United States; a loan of only $62 existed for every inhabitant of Texas. The capital stock of all the banks of the nation averaged $20 per capita; of the State, $18. The individual deposits per inhabitant for the former equalled about $166; for the latter, $53. Of the preceding items no one varies so much during a year as does the deposits subject to check. The following figures, showing the net deposits subject to reserve requirements for Texas in 1910 bear eloquent testimony for the preceding statement:

Date.	Amount.
January 31	$111,602,108
March 29	103,092,457
June 30	94,848,064
September 1	90,222,482

These statistics show the movement of money to and from Texas, largely owing to crop moving conditions. This will be lessened, it is thought, under the regional bank system.

The preceding discussion, it is hoped, has served to give a birdseye view of the rapid growth and present status of the financial institutions of Texas. With a regional bank now located in the State, one may confidently expect even a more rapid development of banking facilities.

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THE WEALTH OF TEXAS.

RAYMOND MYERS.

It is difficult to obtain a just estimate of the wealth of Texas. In the first place, statistics are lacking upon many values and it is difficult to find statistics for any one year. My estimation cannot be for a year later than 1909 for the latest United States census, from which the bulk of my facts must be obtained, was compiled in that year. It has been necessary to capitalize incomes, to apply prices to amounts, to alter values for assessments to obtain a true value, to consult encyclopedias, almanacs, and reports of commissions. The result can only be approximate.

My method has been to include those items that the census included in getting the approximate wealth of the United States. The items the census included were the following: Real property and improvements, live stock, farm implements and machinery, gold and silver coin and bullion, railways and equipment, street railways, telegraphs, telephones, Pullman and private cars, ship and canals, privately owned waterworks, privately owned central electric and power stations, agricultural products, manufacturing products, imported merchandise, mining products, clothing and personal adornment, furniture, carriages and kindred property.

The wealth of Texas consists in large part of her land with which she is more blessed than any State in the Union. The area of Texas is 262,398 square miles. According to the thirteenth census (1909) 112,435,067 acres of this are contained in farms at a valuation of $1,633,207,135, the buildings at $210,001,000, the implements and machinery at $56,790,260, and domestic animals, poultry and bees at $318,646,509. Thus the value of farms plus their appurtenances amounts in Texas to $2,218,644,904.

The value of the products from these farms is proportionally great. The products may be divided into two classes: Live stock and crops. The value of milk, cream, butter that was sold, and cheese that was made in 1909, was, according to the thirteenth census (1909), $15,679,924.

The total production of wool, which was partly estimated, was valued at $2,202,342, and poultry and eggs at $19,424,546. The

value of the domestic animals sold from farms was $78,647,800, and the value of domestic animals slaughtered was $15,151,953. Thus the live stock products totaled $131,106,565.

We now pass to the crops. The census (1909) valued the cereals at $67,109,923, other grains and seeds at $1,559,436, seeds without acreage given at $62,067, hay and forage at $12,824,433, potatoes at $1,825,150, sweet potatoes and yams at $2,197,799, tobacco at $26,034, cotton at $162,735,041, cotton seed at $25,938,913, broom corn at $140,533, sundry minor crops at $140, making a total value of crops of $275,039,469.

Orchard fruits were valued at $1,060,998, grapes at $78,325, nuts at $562,542, tropical fruits at $122,678, making total of fruits $1,824,543.

Forest products off the farm amounted to $8,925,662, sugar cane $1,669,683, sorghum $955,769, sugar beets, $5919, and miscellaneous crops $25,314, making a total of $2,656,685.

The Bureau of Corporations in its report on the lumber industry, in Part I, says in regard to standing timber, that the stand in Texas in 1909 was about 66 billion feet, 68 per cent of which was yellow pine. Applying the value of 1907 (the closest that could be obtained) to the stand of 1909 gives the approximate value of $242,000,000 for timber.

It is estimated that the capital invested in the production of timber is $25,000,000, the capital invested in the manufacture of products is $45,552,000, and the value added by manufacture is $21,197,000. So the capital invested, plus the value added by manufacture, is $91,749,000.

An attempt will now be made to round up the remaining acres of Texas' vast area. The entire area is 167,934,720 acres, of which 153,395,067 acres have been accounted for. From the Texas Almanac we find that 5,000,000 acres consist of swamp lands, which are estimated to be worth $75,000,000. Beside this, 3,000,000 acres consist of overflow lands which are valued at about $75,000,000. About 2,113,280 acres are under water and are not valued. Thus 163,508,347 acres are accounted for, which leaves 4,426,373 acres in town lots, waste lands, public parks, etc. Figures can be found for the value of town lots which by the assessment rolls of 1909 are valued at $475,420,521. From the tax assessor of this county I learn that all over the State all assessments are made

at about 60 per cent of the value. Then $475,420,521 is 60 per cent of the real value, which is, then, $792,367,535.

The United States Geological Survey gives the figures on minerals. For the year 1909 this survey valued the output of Texas minerals, including petroleum, coal, clay and its products, natural gas, asphalt, stone, sand and granite, salt, silver, lime, mineral waters, lead, tin, gold, gems and precious stones, copper, cement, fuller's earth, quick silver, and brick, at $17,217,807. The census of 1909 gives the amount of capital invested in mines, quarries, and wells at $19,575,969.

An idea of the 1910 value of fishing may be gotten from the reports of the bureau of the census, Department of Commerce and Labor. For the calendar year 1908 the value of all fisheries products was estimated at $445,889; and the capital employed at $454,331.

In manufacturing may be found one of the largest items of the State's wealth. The census of 1909 gives the capital invested in manufacturing, including land, buildings, machinery, tools, implements, equipment, cash and sundries, at $216,876,000, the value of products turned out at $272,896,000, and the cost of materials at $178,179,000. The value added by manufacture is thus $94,717,000. A duplication occurs in the case of timber, above considered. So, deducting $45,552,000 from capital invested in the manufacture and $21,997,000 from the value added by manufacture, we get a just estimate of these items in all other manufacturing industries, which is, capital invested, $171,324,000; value added by manufacture, $73,520,000.

Texas has good transportation facilities, consisting of steam railways, street railways, interurban lines, steamboats, and sailing vessels. The railways have spread a network over the State and have become of incalculable value and convenience to its people. In the nineteenth annual report (1910) the Railroad Commission valued the railways of the State as follows: Roadbed, $173,954,568.48; general property, $33,462,965.95; rolling stock and equipment, $22,721,026.89. The aggregate total value was $230,138,561.32.

The street railways have not only done efficient service in the principal cities of the State, but are connecting cities as well. The income of street railways in 1907 was $832,000, and in 1912,

$1,456,000. Capitalizing these incomes at 5 per cent gives their value in 1907 at $16,640,000, and in 1912 at $29,120,000. The increase is thus $12,480,000, the yearly increase is $2,496,000, and in two years the increase would be $4,992,000. Then the value in 1909 would be approximately $21,630,000.

Steamboats and sailing vessels are, by the assessment rolls of 1909, placed at $1,798,475, which is 60 per cent of the real value, which is then about $2,997,000.

The mercantile stock, consisting of products in stores, the 1909 assessment rolls have placed at $85,102,125. The real value probably is about $142,136,000.

It is difficult to obtain a just estimate of private and public property. Church property was valued in 1906 according to the census at $26,890,675, and Y. M. C. A. property at $1,350,000. The census of 1909 gives the value of animals not on farms at $26,269,303. Automobiles, wagons, bicycles, and motorcycles are valued by the 1909 assessment rolls at $14,722,743, which places the real value at about $24,537,000.

Under the head of miscellaneous property, the assessment rolls group other properties to the value of $51,144,782, which makes an estimated real value of $85,241,000.

The income of electric light and power properties for the year 1909 was $6,783,000; expenses, $4,924,000, which gave net income at $1,859,000. This, capitalized at 5 per cent, gives $37,180,000.

The report of the Commissioner of Insurance and Banking (1910-1911) give the amount of currency in State banks at $4,010,-941.23, and specie at $1,383,519.71. There is, then, $5,394,460.94 of lawful money in the State banks.

In the report of Comptroller of the Currency (1910) the amount of lawful money in 523 national banks in 1909 was given as $16,892,000.

While it is true that some of the cash included in the above report is on deposit out of the State, yet the amount of money out of banks and in general circulation and in the Treasury of the State is not included, and these two items tend to offset each other.

The total value of all the forms of wealth that I have considered is, then, $4,798,770,000.

There are some operators who subject the products obtained to

certain manufacturing processes on the premises before marketing. Since these have been included both for manufacturing and mining, there is involved a duplication of $437,990 which should be deducted from the above total, making the grand total of the wealth of Texas $4,798,159,000.

Thus I have arrived at a figure that I trust is approximately correct. The difficulty of getting a just estimate of a State's wealth is notorious, for one is beset with difficulties on all sides. I can only hope that I have arrived at an estimate close enough to be of some value.

The figures show that Texas is well up among the States in wealth. She has over one-twenty-seventh of the wealth of the United States which is estimated to be $130,000,000,000.

The population of Texas according to the last census was 3,896,-542. The wealth per capita is, then, approximately $1231.

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