TEXAS BUSINESS REVIEW

A MONTHLY SUMMARY OF BUSINESS AND ECONOMIC CONDITIONS IN TEXAS

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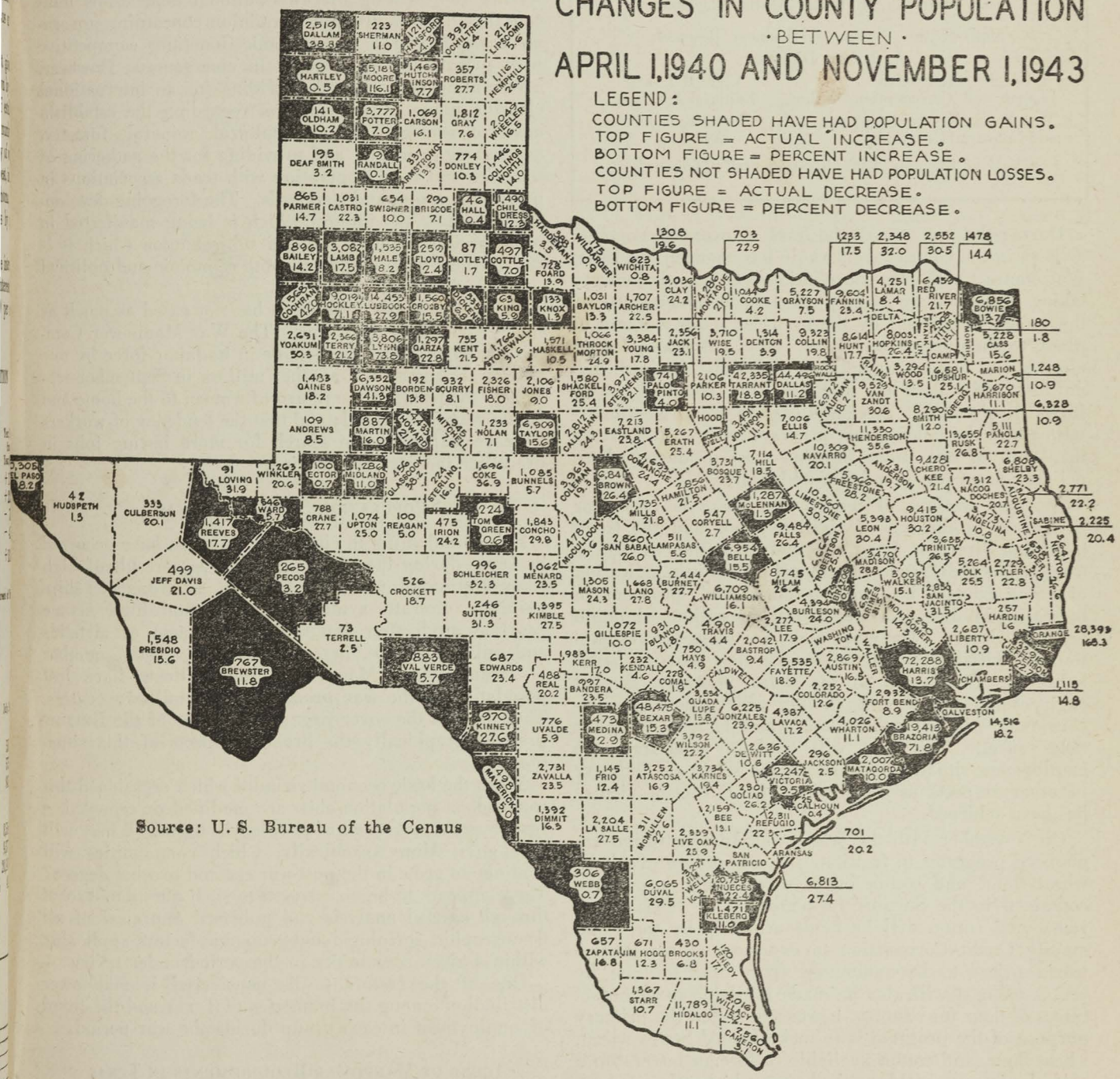
CHANGES IN COUNTY POPULATION
· BETWEEN ·
APRIL 1, 1940 AND NOVEMBER 1, 1943

LEGEND:
COUNTIES SHADED HAVE HAD POPULATION GAINS.
TOP FIGURE = ACTUAL INCREASE.
BOTTOM FIGURE = PERCENT INCREASE.
COUNTIES NOT SHADED HAVE HAD POPULATION LOSSES.
TOP FIGURE = ACTUAL DECREASE.
BOTTOM FIGURE = PERCENT DECREASE.



Source: U. S. Bureau of the Census

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Business Review and Prospect

TEXAS BUSINESS REVIEW

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During the past month the level of over-all economic activity in the country as a whole has changed but little. War contract cutbacks, cancellations and completions are taking effect but are largely offset by new demands for the armed forces and by the need for more workers in plants making urgent war items. Also, cutbacks often do not reduce current operations, but only diminish the unfilled order backlog and ease the situation as to forward shipments. Steel is a case in point, where curtailment of the landing mat program has resulted chiefly in a shift of operations to other steel products, whose delivery dates can now be moved nearer.

In some sections of the country there is room for increasing production of civilian goods and the trend is in that direction, but the actual expansion to date is small. The War Production Board shows little indication of going beyond its "spot authorization" program in increasing civilian production until the military situation becomes clearer. The more elaborate plans for resumption of civilian manufacture for the most part are being held up. One result of the delay, however, is that engineering, design and similar preparations for reconversion will be farther along when the major cutback takes effect. This fact will tend to ameliorate the employment situation and lessen the strain on industry in other respects as well, when the European victory has been achieved.

On November 11th the War Food Administration announced programs to facilitate the exportation of wheat, wheat flour, and cotton in accordance with provisions contained in the Surplus Property Act of 1944. Both wheat and cotton will be made available by the Commodity Credit Corporation to exporters at competitive world prices to be announced from time to time by C.C.C. Wheat will also be made available to manufacturers of flour for export. It was stated that the primary purpose of the program is to make United States wheat, wheat flour, and cotton available to foreign buyers on a price basis comparable with that at which other exporting countries are making wheat, wheat flour, and cotton available in world markets. The difference between the world price and the domestic support price for wheat and cotton will be paid by the government in the form of subsidies. These programs are provoking considerable speculation as to their long term economic effects, especially upon the production of cotton in the United States and also upon the cotton textile industry in this country.

Press reports from the International Business Conference representing fifty-two national delegations indicate that there is division of opinion concerning government participation in economic functions competitive with private industry except in emergency. However, a resolution was adopted providing for an international clearing house for information regarding the establishment of standards for agricultural, mineral, forestry, and fishing products; and providing for the gathering of statistics and for co-operation with trade associations in perfecting grades and standards. The foregoing developments suggest the interest which is being manifested in post-war international trade, a subject upon which it is hoped sound statesmanship—both economic and political—will be brought to bear.

The national labor situation has not eased as much as some expected by this time. The War Manpower Commission reports that the decline in its labor force by one million in August and another million in September was largely the result of the return of women to the home and young people to school; and that the tendency of workers to leave war plants in search for more lasting jobs in peacetime industry is alarming.

Population Shifts in Texas

Substantial shifts in civilian population have occurred in Texas during the past four years as a result of high concentration of war activity, such as ordnance, shipbuilding, aircraft, synthetic rubber, and high octane gasoline production and the establishment of airfields and military camps, in a comparatively small number of communities. Many towns and villages have lost population to the war production and military centers. The chart on the cover page of this issue of the Review presents graphically the broader aspects of this situation.

When the basic economic stimuli which occasioned this tremendous population shift are modified or removed, a further great movement of people will occur. Where will they go? More specifically, which communities will continue to grow in the post-war era and to what degree? There appears to be no answers to such questions except through careful analysis and unbiased appraisal of all demographic, sociologic and economic factors applicable within a given community in the period under review.

One of the factors to be considered is manpower distribution among the industries of Texas and the trend of employment in each group during the war period.

Trend of Manpower Requirements in Texas 1940–1944

The following table obtained through the courtesy of the War Manpower Commission gives estimates of manpower requirements in Texas on a semi-annual basis from July, 1940, to July, 1944, inclusive.

(In Thousands)

	July, 1940	Jan., 1941	July, 1941	Jan., 1942	July, 1942	Jan., 1943	July, 1943	Jan., 1944	July, 1944
Unemployed	280.0	270.0	180.0	140.0	100.0	80.0	60.0	55.0	60.0
Agriculture	970.0	671.0	964.0	655.0	995.0	644.6	956.0	640.0	950.0
Total nonfarm activity	1489.6	1519.7	1610.4	1687.4	1904.7	1876.6	1936.8	1884.3	1868.0
Mining and Petroleum	62.6	62.6	69.4	66.1	58.0	52.5	55.0	55.6	57.0
Construction	113.0	114.4	97.8	101.2	192.8	117.6	109.5	60.0	50.0
Manufacturing	215.3	230.3	257.4	288.2	360.0	395.5	434.5	450.5	450.0
Transportation, utilities, and Comm.	138.0	137.0	140.2	145.9	156.1	159.0	162.0	163.0	165.0
Railroads	50.7	50.2	47.3	53.1	64.1	64.2	67.1	66.1	67.1
Other	87.3	86.8	92.9	92.8	92.0	91.8	94.9	96.9	97.9
Government	86.0	90.0	138.0	186.8	241.2	263.0	281.2	260.0	264.0
Wholesale and retail trade	388.5	402.2	424.3	422.1	421.5	428.4	438.5	440.0	437.0
Finance, insurance and real estate	57.1	60.3	61.3	62.5	61.9	61.0	60.9	60.0	59.0
Business, personal, professional and domestic services	429.1	422.9	422.0	414.6	413.2	399.6	395.2	393.2	390.0
Other than Domestic	290.8	293.9	302.2	304.1	315.0	313.7	321.6	320.6	318.6
Domestic	138.3	129.0	119.8	110.5	98.2	85.9	73.6	72.6	71.4
Armed forces	33.0	57.8	111.5	123.9	223.0	413.0	479.0	507.0	555.0
Total requirements	2772.6	2517.9	2865.9	2606.3	3222.7	3014.2	3431.8	3086.3	3437.0

In the foregoing table, figures for the period July, 1940, to July, 1943, represent a known trend of employment, while those for the period July, 1943, to July, 1944, portray an estimated or projected trend. These estimated figures for July, 1944, have turned out to be very close to the original estimates, only minor corrections in two items of the original estimates having been necessary. An examination of the over-all picture for the period July, 1940, to July, 1944, shows a net decline of 220,000 in the unemployed group, and an increase of 379,400 in the non-farm employment, exclusive of military service. Among the agricultural workers there was a decline of 20,000 from July, 1940, to July, 1944.

A detailed examination of the various components which make up the total non-farm figures shows the following employment trends:

1. Mining and petroleum—A decline of 7,600 from July, 1940, to July, 1943, but an increase of 2,000 from that period to July, 1944.
2. Manufacturing—An increase of 219,200 from July, 1940, to July, 1943, and a further increase of 15,500 by July, 1944.
3. Transportation, utilities and communication—An increase of 24,000 from July, 1940, to July, 1943, and a further gain of 3,000 by July, 1944.
4. Construction—An increase of 79,800 from July, 1940, to July, 1942, but a decline of 142,800 from that date to July, 1944.
5. Government—A gain of 195,200 from July, 1940 to July, 1943, but a drop of 17,500 from that time to July, 1944.
6. Wholesale and retail trade—An increase of 50,000 from July, 1940, to July, 1943, but a decline of 500 from that date to July, 1944.
7. Finance, insurance and real estate—An increase of 3,800 from July, 1940, to July, 1943, but a decrease of 1,900 from that period to July, 1944.
8. Business, personal, professional and domestic services—A decline of 33,900 from July, 1940, to July, 1943, and a further decline of 5,200 by July, 1944.
9. The armed services—An increase of 446,000 from July, 1940, to July, 1943, and a further increase of 76,000 by July, 1944. An additional increase has occurred since the latter date.

Employment in Texas War Industries

There has been comparatively little change in the *grand total* of workers in the principal war industries of Texas during the current year, according to the War Manpower Commission, but there has been considerable variation during the year in the number of workers in the components which make up the total as the following figures show:

	January, 1944	September, 1944	(Estimated) November, 1944
Grand Total*	327,540	332,346	345,864
Ordnance	28,831	30,649	33,285
Chemicals	3,192	7,262	7,811
Synthetic Rubber	5,390	7,278	7,531
Petroleum refining	28,403	33,419	35,384
Aircraft	79,448	60,137	59,321
Shipbuilding	75,112	69,731	71,964
Iron and Steel	9,016	10,050	11,120
Non-Ferrous Metals	9,852	6,420	6,156
Machinery*	.....	13,934	14,557
Civilian Personnel	88,296	93,466	98,735
OTHER INDUSTRIES	98,254	97,679	105,634

*Excluding other industries, which in January, 1944, included *machinery*.

The figures given for the number of employed in petroleum refining is an understatement of approximately 10 per cent. Some of the workers in this group are engaged in production for civilian use. The number of workers listed in iron and steel production also is an understatement amounting to almost 25 per cent. In neither of these cases is the exact number known.

Factors Which Will Influence the Employment Situation in Texas During the Transition from War to Peace

1. Restoration of the 40-hour week, as against the prevailing 48-hour week and to some extent the 7-day week will increase the jobs, but will decrease the pay rolls. Also contributing to the increase in jobs will be the greater availability of raw materials and equipment for use in civilian production. This will affect numerous small industries, business and service occupations in every section of the State.

2. More jobs will be available because of the return of a large percentage of the 310,000 women who have entered gainful occupations to their home duties and of men who are over-age to their life of leisure; as will also the return of approximately 80,000 school children

and college students to their normal pursuits, according to estimates by M. J. Erickson, formerly labor market analyst of the War Manpower Commission.

3. As stockpiles of various raw materials have become adequate for war production, but are being held intact for possible emergency war use and are thus not made available for civilian production, labor surpluses have become more and more frequent in some areas, while severe shortages of labor have prevailed in others. This situation may be expected to become increasingly common during coming months as the process of re-adjustment from a war to a peace footing gains momentum.

4. The foregoing factors and forces will contribute to a gradual rise in the average productivity per worker as the marginal workers drop out of the labor picture. This, in turn, in conjunction with the availability of new equipment, will tend to lower the cost of production and, in time, the price of goods. Thus, after temporary setbacks, resulting from the readjustments in the transition from war to peace economy a strong undertow of forces making for increase in employment will assert itself.

5. Three shifts for labor may be expected to disappear except where the nature of the industry requires more than the one or two shifts.

6. In all of these transition processes the average citizen of Texas is deeply concerned in (a) the effectiveness of management (b) the far-sightedness of labor leaders and (c) the efficiency of government in detecting and meeting the problems presented in the rapidly changing economic conditions which lie immediately ahead.

Current Business Activity in Texas

Business activity in Texas during October compared favorably in the main with the corresponding period a year ago. Building permits in upwards of forty Texas communities totalled 39 per cent above October last year and 51 per cent more than in September of the current year; postal receipts were up 29 per cent from a year ago and 10 per cent from the preceding month; retail sales, as indicated in reports from approximately 1000 retail establishments, gained 7.4 per cent over October a year ago, 2.7 over the preceding month and 10.9 per cent during the first ten months of this year in comparison with the corresponding period in 1943. Commercial power consumption was up 15.5 per cent from October last year and 14.4 per cent over September of the current year; industrial power consumption gained 17.7 per cent over a year ago but was down 3.8 per cent from September; while residential power consumption was up 12.9 per cent from a year ago but down 6.4 per cent from September. Total power consumption in October gained 9.5 per cent over a year ago, but declined 5.4 per cent from September. Petroleum production in Texas remains well above the level of two million barrels a day, a situation which has prevailed for several months and represents a gain of 13 per cent over production in this State during October last year and amounts to 45 per cent of the current national production. Gasoline consumption by civilians in Texas during September was approximately 10 per cent above the corresponding month last year; while September sales of gasoline to the government reached a new peak of 274 million gallons or more than 250 per cent of sales to civilians in Texas.

Farm Cash Income

Cash income from agriculture in Texas during October totalled more than $179 million compared with $161 million a year ago, a gain of over 11 per cent. Aggregate farm cash income for the first ten months of the year was more than $913 million compared with $890 million during the corresponding period a year ago, an increase of nearly 3 per cent. The foregoing figures are computations made upon the basis of actual known marketings and price reports from farmers in all sections of the State. As indicated in the note at the bottom of the following table, these computations are an understatement of approximately 6 per cent.

INDEXES OF AGRICULTURAL CASH INCOME IN TEXAS

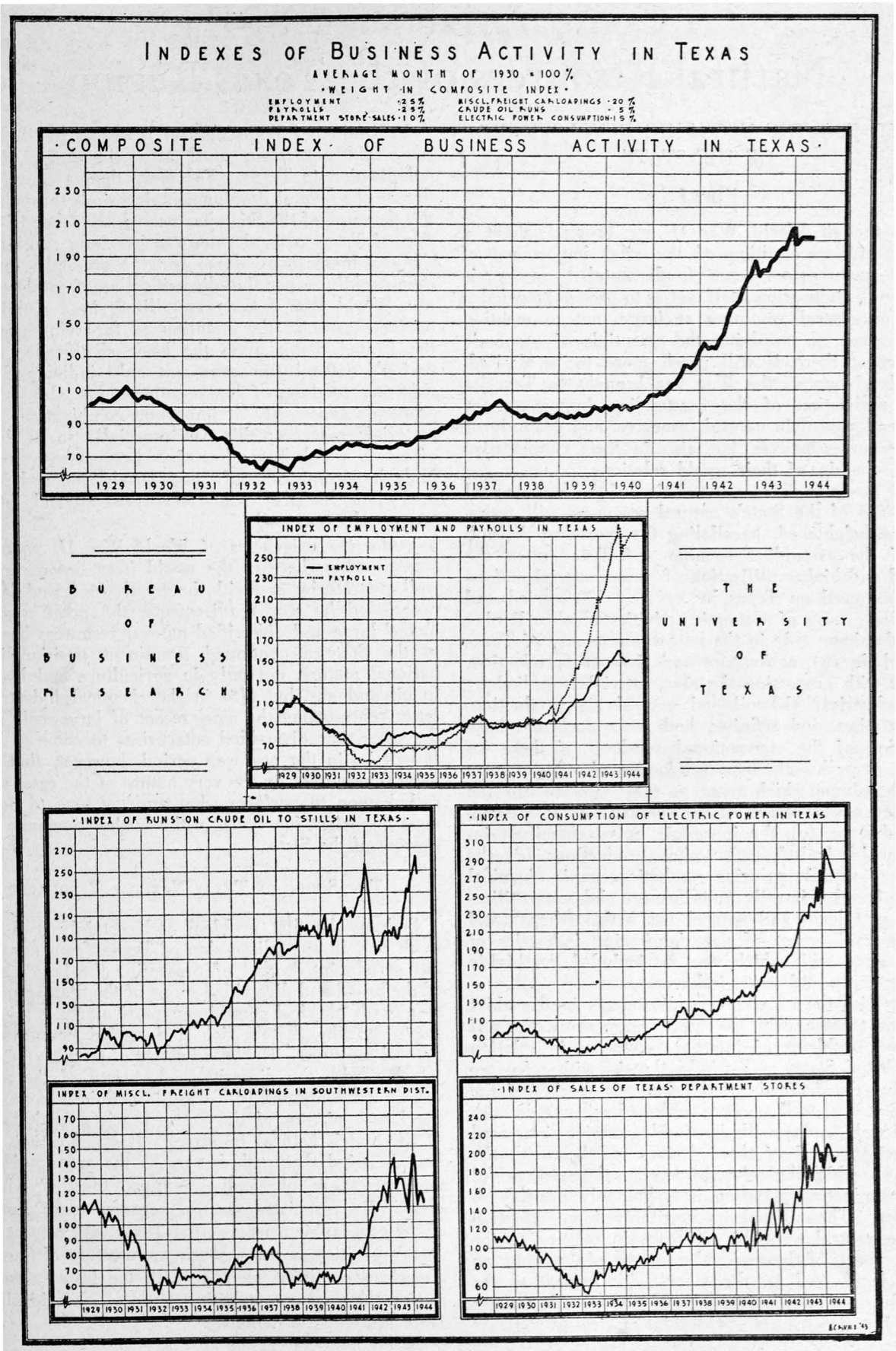
(Average Month 1928–'32 equals 100%)

Districts	Oct., 1944	Sept., 1944	Oct., 1943	Cumulative Cash Income (in Thousands of Dollars) Jan.–Oct. inclusive 1944	1943
1–N	186.5	321.0	251.6	114,849	94,164
1–S	364.7	438.5	377.1	79,499	79,488
2	173.0	105.3	148.5	89,383	85,188
3	166.8	178.5	168.4	46,285	40,874
4	218.1	82.3	138.7	154,283	155,687
5	53.7	42.1	102.7	51,562	74,545
6	120.1	208.9	172.4	28,397	38,393
7	128.0	133.3	127.7	61,914	61,393
8	195.4	152.9	141.4	95,601	97,065
9	304.8	155.9	244.4	66,812	70,760
10	232.0	162.5	244.6	24,030	28,191
10–A	734.7	324.4	271.0	100,530	64,302
State	192.1	105.4	173.2	913,145	889,809

Note: Farm cash income as computed by the Bureau understates actual farm cash income by from six to ten per cent. This situation results from the fact that means of securing complete local marketings, especially by truck, have not yet been fully developed. In addition, means have not yet been developed for computing cash income from all agricultural specialties of local importance in scattered areas throughout the State. This situation, however, does not impair the accuracy of the *indexes* to any appreciable extent.

Most of the gain in cash income during October over a year ago was derived from cotton. Ginnings exceeded those of October 1943 by 141,000 bales and the average price per bale of nearly $100 was up more than $5 from a year ago. This gain in the value of lint was approximately $14 million and the gain in the value of cotton seed was more than $4 million. The amount yet to be ginned is greater than that which remained after this date a year ago and this fact together with the higher level of cotton prices will result in a higher income from cotton during the remainder of the cotton marketing season in comparison with the corresponding period in 1943. Income from livestock is expected to maintain a slight margin of gain as a result of a moderate increase in marketings of cattle and calves and a somewhat higher level of prices for these two classes of livestock. A substantial margin of gain in the income from fruits and vegetables is indicated as a result of a larger volume of marketings and higher prices. Exclusive of federal subsidy payments, farm cash income for the current calendar year will approximate $1.2 billion.

F. A. Buechel.


INDEXES OF BUSINESS ACTIVITY IN TEXAS
AVERAGE MONTH OF 1930 = 100%
·WEIGHT IN COMPOSITE INDEX·
EMPLOYMENT ·25%
PAYROLLS ·25%
DEPARTMENT STORE SALES ·10%
MISCL. FREIGHT CARLOADINGS ·20%
CRUDE OIL RUNS ·5%
ELECTRIC POWER CONSUMPTION ·15%
·COMPOSITE INDEX OF BUSINESS ACTIVITY IN TEXAS·
INDEX OF EMPLOYMENT AND PAYROLLS IN TEXAS
EMPLOYMENT
PAYROLL
BUREAU OF BUSINESS RESEARCH
THE UNIVERSITY OF TEXAS
·INDEX OF RUNS ON CRUDE OIL TO STILLS IN TEXAS·
·INDEX OF CONSUMPTION OF ELECTRIC POWER IN TEXAS
INDEX OF MISCL. FREIGHT CARLOADINGS IN SOUTHWESTERN DIST.
·INDEX OF SALES OF TEXAS DEPARTMENT STORES

A Comparative View of the Natural Resources of the Texas Region

BASES FOR THE ECONOMIC DEVELOPMENT OF THE STATE

PART I

Even though World War II has brought about a general wide recognition of the vital importance of natural resources as bases fundamental to economic life, even to civilization itself, yet as to precise knowledge regarding natural resources at large, not to mention specific ones, as supplying the essentials of economic development there is still much more to be desired. Certainly, however, the War has brought to Texas a keener realization of the outstanding importance of Texas' endowment in natural resources, and not only of these resources *per se*, but also in their comparative aspects—that is, of their world relations.

In the post-war years, appreciation of the fundamental significance of the State's natural resources will necessarily be heightened, paralleling the increased dependence of the expanding economy of Texas upon the widened and higher utilization of these material endowments bestowed on Texas by nature. The varied and diversified groups of economic activities which will play the predominant role in the post-war economy of Texas will include (a) agriculture and livestock production, together with processing the raw materials supplied by these industries; (b) oil and natural gas production, transportation, and refining, both as regards the bulk production of the conventional products of these industries, as well as the mass production of refinery gases in large volume which serve as raw materials for the expanding newer phases of the synthetic organic chemicals industry; (c) the inorganic heavy chemicals industry, which includes magnesium production; (d) the newer and rapidly growing synthetic organic chemical industry based primarily upon a more elaborate utilization of petroleum and natural gas hydrocarbons; and (e) the development of new fabricating industries of various sorts, with which may be included the highly important pulp and paper industry.

Along with the necessary readjustments in the older industries, together with the rise to large proportions of new ones, problems of internal commerce in relation to the United States as a whole, that is, with reference to meeting the demands of the domestic market of the United States, as well as new problems having to do with international trade, will inevitably receive increased consideration. All of these factors together with the problems to which they give rise warrant the most careful and discriminating attention it is humanly possible to give them. These problems inevitably force attention upon the natural resources of Texas in relation to the broader aspects of the regional economy of the State, on the one hand, and on the other, with respect to the potentialities of an expanding economy, not only from a national but also from a world point of view as well.

Utilization of Texas natural resources in the modern sense did not begin until after the Anglo-American colonization in Texas. For more than a century now, during the several developmental periods through which the economy of the State has passed, the scope of utilization of Texas natural resources has been manifested in the ever-increasing volume and the gradually, at times even rapidly, expanding diversification of production. It was World War I that crystallized, in a definite and concrete manner, the attention of far-seeing people in the United States upon the basic significance of this nation's natural resources, not only individually with reference to those of larger volume, but also as to the economic superiority of important combinations of our material resources: this was especially so in the case of oil, in which Texas has since become so overwhelmingly important, not only as to production and refining operations, but also as to reserves, of oil and, later on, of natural gas as well.

Under the exigencies of World War II, natural resources everywhere in the world have become vital as well as strategic; and with the greatly increased demands occasioned by war requirements, the great wealth of Texas' large and diversified natural resources has given to the State a continued prominent position in the national picture, not only in agriculture and livestock, in oil and gas, but also in the chemical industry, the latter representing the most recent of large-scale and at the same time diversified enterprises to come to Texas. It will be in the post-war period, however, that Texas natural resources, in the very nature of the case, will be called upon to perform what appears now to be their most important functions, in the further economic development of the State.

THE SCOPE OF TEXAS NATURAL RESOURCES

Perhaps the first problem and certainly it is a difficult one, in any discussion of Texas, from practically any standpoint, is that of presenting the larger aspects of the broad and diversified scope of the State, especially as regards physical conditions; particularly is this so in regard to the State's rich and varied endowment in natural resources. The broad extent of territory included, together with the diversity and variety of the natural conditions contained in Texas, is definitely reflected in the larger picture of the extent, variety, and diversity of the State's natural resources. It is, of course, to be kept in mind that such factors as the extent, diversity, and variety of physical conditions, together with the genetically associated natural resources, are functions of the geographic orientation of Texas with respect to the State's position in the geologic architecture of the North American continent together with the broader facts of its location and extent with reference to world climatic belts and climatic regions.

The scope of physical conditions in Texas is also manifested in the several different natural regions of the State, these regions being individually as large as ordinary states. These major natural regions, each characterized by its own inherent environmental characteristics, including the individual groups and combinations of natural resources are, of course, well known because of the simple fact that the distinguishing features of each of these regions, individually considered, are so outstanding and therefore so conspicuous as to be readily recognizable. These regions may be considered as including East Texas, South Texas, the Black and Grand Prairies, the Western Cross Timbers, the Red Beds Plains, the Edwards Plateau, the High Plains, and Trans-Pecos Texas. In order to have a clear perspective of Texas, it is necessary not only that these several regions be seen in their general setting in the Texas scene, but also as has been noted, that the greater Texas region itself be considered in its relationships to the geologic development of the North American continent throughout the geologic past.

To sum up: The scope of Texas' natural resources therefore involves the horizontal as well as the vertical aspects with reference to the kind, characteristics, and quantity of the natural resources concerned. It is only through discriminating consideration of comparative aspects and characteristics that the broader perspective with reference to the larger features of Texas, and the details as well, can best be seen and most fully appreciated. In a brief article, however, only some of the larger features concerning the natural resources of the State can be included and the comparative relations of these resources, important though they are, will have to be dealt with even more briefly.

Climatic-Geologic Materials—Topographic Relationships

Advances made in the science of physical geography, particularly since 1900, demonstrate in a remarkable manner the inter-relationships between prevailing climatic conditions and the characteristics of surface geologic materials, together with the associated types of topography concerned in individual regions, in dealing with the genetic factors as related to the character and distribution of natural vegetation, soil resources, and water supplies. Out of these studies carried on in various parts of the world has arisen a new concept of physical geography and one which is to be regarded as absolutely necessary to comprehensive studies of natural regions, whether from a national or a state point of view.

These advances in physical geography have provided the bases out of which particularly the modern concepts of soils, both as to genetic relations and inherent characteristics, have evolved. The world's climatic regions, as well as the corresponding natural vegetation formations, were pretty well outlined by 1900. Subsequent studies have mainly added more precise knowledge of the larger picture of the world's climatic and natural vegetation regions, and of the definite relations between them. The development of modern knowledge concerning the Great Soil Groups of the world, especially as regards their relationships to climate and the interrelations of soils and natural vegetation the world over, however, has come mainly since 1900. These studies, initiated by the Russian school of geo-botanists, were carried out by a brilliant group of scientists including such Russian investigators as Dokutschajeff, Glinka, and Gedroiz, the Finnish scientist, Arrnio, the Swedish student, Tamm, the Germans, Ramaan and Stremme, and in the United States, the late Dr. C. F. Marbut, who is generally considered the outstanding soil scientist of the entire group.

Since the soil is the essential natural resource in agriculture, the results of these scientific investigators in providing more precise knowledge of the Great Soil Groups of the world have at the same time provided the fundamentals for an understanding of the economic developments in, and the individual as well as the comparative characteristics of, the larger pattern exhibited by the world's agriculture.

Types of Natural Resources

The simplest classification of natural resources with respect to their manner of occurrence, comprises two groupings: (a) those that occur at or on the surface of the lands—those characterized by horizontal aspects of distribution and differentiation—and (b) those that occur below the surface, that is, the sub-surface resources. For practical purposes, these groupings may be put in another way, a classification which coincides very nearly with the above simple division: These are the natural resources which are primarily concerned with the *production* of plants, and those which supply mineral materials in deposits or accumulations large enough to be commercially important.

In brief, the surface natural resources include those that may be regarded as functions of the inter-relationships of present day climatic-geologic materials-topographic factors—or perhaps more simply of the relations between climate and geographic geology; this group of resources includes the natural vegetation, soils, and surface water supplies. These resources are functions of the recent and present-day physical geography of natural regions: the character and kinds, as well as the areal extent of these resources, obviously of primary importance as regards their utilization, are determined by the inter-relationships of climatic factors with the surface geologic materials. Surface water supplies and moisture conditions obviously belong in this category.

The sub-surface natural resources are the minerals, and in Texas, the outstanding ones are petroleum and natural gas, the conventionally recognized non-metallics, as well as limestone, building stones, iron ores, together with underground waters, brines, and the like.

To these groups of natural resources which occur on the lands of the earth may be added the diversified marine resources of the ocean waters, including especially the mineral compounds these waters carry in solution. That the post-war industry engaged in the production of metallic magnesium in the United States will utilize largely the magnesium compounds in the waters of the Gulf of Mexico is to be expected in the light of currently known facts.

Mineral resources in particular, in contrast with soils and natural vegetation, and surface water supplies, are functions of the geologic history, this is, of the geographic geology in past geologic periods of the individual region or regions concerned. Interpretation of the characteristics as well as the mode of their occurrence naturally require a substantially broad as well as a rather precise knowledge of the past geologic periods involved—in some cases all the way from the pre-Cambrian to the present, in others, only those of more recent geologic time. As regards mineral resources, in addition to the facts of their physical occurrence with respect to the geologic formations of which they are a part, it is necessary also to know in a rather precise manner the characteristics of the major structural regions of the State, together with the occurrence of such minor or local structural conditions which are of predominant importance in determining the accumulations of the subsurface resources, especially those of oil and gas, common salt, potash, and sulphur.

No classification, however, is to be considered as being absolute; overlapping cases can usually be found. To take a well-known case, the iron ores of East Texas, being of lateritic nature, occur at or near the surface. Apparently, one phase of the formation of these ores occurred during a period when that portion of East Texas in the later Tertiary, perhaps in Miocene time, was part of a vast plane, presumably a peneplane, which since has been subjected to regional uplift, and as a consequence of the regional elevation, stream action was rejuvenated to a considerable degree. The result has been that the entire area is now rather maturely dissected, leaving as remnants of the former plane the iron-capped hills in the inter-stream areas—that is, in those areas where the dissection itself has been slowed down, in part by the occurrence of the hard, resistant cap-rock beds formed by these lateritic iron-ore accumulations. The iron ores which cap the remnantal flat-topped hills in East Texas are analogous to the ground-water laterites of humid tropical regions.

Natural Vegetation

The large divisions of the types of vegetation of the earth include three great groups: Forest, Grassland, and Desert. These designations, of course, not only express climatic conditions, particularly moisture conditions, as well as vegetational types, but they also express the predominant aspects of climatic conditions in an obvious and unmistakable manner. These major divisions of vegetation can, in turn, be subdivided on various bases, but, as a rule, the sub-divisions which are based on the relations of the plants represented to the prevailingly different physiographic conditions concerned stand out as the most expressive.

The make-up of the vegetation, that is, the floristic types to which the individual plants occurring in these various subdivisions belong, may be a function of a long period of past geologic time, but the "growth forms" of the plants themselves, taken together with their general physical appearance as expressed in what are called plant formations, are closely adjusted to the various significant factors that prevail in the physical environment, particularly the climatic factors of the region in which they now occur.

It may be stated here, in a preliminary manner, that the characteristics of the natural vegetation are genetically closely interrelated with the character of the soils on which the plants grow, and, it may be reemphasized, that in turn, the regional or general characteristics of both soils and vegetation are dependent upon the climatic conditions of the area or region in which they occur.

That most of Texas is grassland country may seem at first a surprising statement. East Texas, however, is forested; originally, however, it appears that the trees of East Texas grew in rather open forests. Throughout the various grassland regions woody vegetation of one kind or another is usually present, although it is of various kinds and it occurs in varying amounts, both as to thickness or sparsity of stand and in size of the plants. However, in certain portions of the grasslands, local, or what are called edaphic vegetational areas occur, associated mainly with certain types of exceptional conditions in the physiography. In portions of the Trans-Pecos, the low rainfall in combination with the high evaporation, together with the prevailing physiographic features, supports only a scanty vegetation, the characteristics of which express in an obvious manner the influence of the low moisture supply.

The vegetation of much of the State has been modified considerably within historic time by man and his grazing animals; the East Texas wooded country is reported to have been rather open forest when first seen by white men, and throughout the grassland regions of the State, there is hardly any question but that the woody vegetation originally was much less in evidence than it is today, save, of course, in those areas in which this woody vegetation has been mostly or entirely removed.

Much of the timber of East Texas has been cut away, and at the present these cut-over lands represent a rather wide variety of conditions as to different phases of forest reproduction. With respect to vegetational changes in the grasslands of the State since occupation by white men, overgrazing, in combination with the reduction in the number and severity of grass fires, has considerably modified the original features of the natural vegetation of these regions, thereby making possible the increase of less desirable or even undesirable grasses, weeds, and woody growths—all at the expense of the more desirable range grasses. In many if not in most cases, the growth of desirable rangeland grasses can be brought back to at least an approximation of their original conditions, but only under discriminating grazing practices involving varying degrees of difficulty and expense and care. When, however, it is considered how important these desirable native grasses have been, and unquestionably will continue to be, to the significant range livestock industry of Texas and of how expensive are the undesirable forms of natural vegetation, scientific studies of the adaptabilities of vegetation, and especially of range and pasture grasses, to the whole complex of the physical environments of the various regions or areas of the State together with the most effective means of re-establishing the native grasses, would appear to be highly necessary in conservation programs and in the

long run economical indeed, simply as a business proposition.

Types of Natural Vegetation in Texas

Forest. The East Texas forested region represents the westernmost prolongation of the great Gulf Timber Belt of Southeastern United States. At this place attention should be called to the fact that the Gulf Timber Belt together with the Atlantic Timber Belt of Southeastern United States constitutes one of the large forest regions of the United States; this region is unique in the sense that no other similar or analogous area of large size exists anywhere else in the world. It is a region unique not only as to its natural vegetation but also as regards its soil resources, and therefore as to its agriculture.

In brief, the Texas portion of the Gulf Timber Belt embraces three sub-divisions, each of which is connected quite obviously with the three major topographic groups characteristic of the Coastal Plain considered as a whole. These vegetational sub-divisions are: (1) the loblolly-hardwoods belt in the low and rather flat country immediately inland from the Gulf Coast; (2) the irregularly bounded longleaf pine areas on the slightly dissected but much better drained lands which in turn lie interiorward from the loblolly belt of the low country; and (3) the shortleaf-hardwoods which are characteristic of the somewhat more dissected areas of the northeast portion of the State. The coming in of the hardwoods on the western margins of the pine lands of the Gulf Timber Belt represents the southwestern prolongation of the oak-hickory forests from the middle Mississippi Valley, that is, from the southern portion of the Middle West. These hardwoods are characteristic of the non-limy, rather heavy textured soil areas, particularly those of the Wilcox formation in East Texas.

Woodlands are characteristic, although more or less irregularly so, of a large portion of the State, as exemplified not only in the mixed pine forests of East Texas, but also in the distinctive post oak belt of that region, and in the Eastern and Western Cross Timbers, as well as in certain other edaphic areas which occur far within the central sections of the State, and they occur in considerable areas within the eastern portions of Edwards Plateau.

Although less than a fifth of the area of Texas has true forest growth, the fact that these forests constitute one of the State's major naural resources deserves more emphasis than is usually accorded them. With the recent coming of the modern pulp and paper industry on a large scale into Texas, together with the increasing recognition which is being given to wood itself as a fundamental raw material and of wood cellulose as an important chemical raw material, there is no question but that the forests of East Texas as well as the problems of forest reproduction and conservation, will, in the future, take on considerably augmented importance.

It should be emphasized at this place that the rise of modern wood-using industries throughout the entire forest region of Southeastern United States since World War I has centered attention upon the forest resources of this vast region as a commercial source of a large number of products, the production of most of which can, and no doubt will, be considerably expanded in the immediate future.

Unquestionably, the forests of Southeastern United States are coming to be regarded as one of the great groups of natural resources of the country as a whole, and it is reasonable to assume that a new wave of industrial development based upon their more extensive and effective utilization will be in evidence in the post-war years.

In the light of this general setting, and in conjunction also with the facts concerning the forest resources of East Texas, the outlook for the further industrial utilization of the Texas forests is a particularly bright one.

The Prairies. It should at least be mentioned that the once magnificent grasslands of the Black Prairies, which were made up of a rich and dense growth of tall grasses, now practically all gone, have long since been plowed up to make way for cotton fields. The original natural vegetation of the Black Prairies was dominantly made up of tall grasses, of which big bluestem (*Andropogon furcatus*) and Indian grass (*Sorghastrum mutans*) predominated. Others included *Andropogon saccharoides* and *Sporobolus longifolius*, or long-leafed drop-seed grass. In overgrazed pastures, the predominant grass now is buffalo grass (*Buchloë dactyloides*), together with some grama grass, especially *Bouteloua curtipendula*, or side-oats grama. Johnson grass grows so well on these soils that it is a serious weed in cultivated fields. Bermuda grass also grows well in these lands.

The Black Prairies make up the largest continuous area of the Texas Prairies, and, in turn, the Texas Prairies largely comprise the entire area of the Southern Prairies. The Southern Prairies, it may be mentioned, constitute the southern counterpart of the Mid-West or Corn Belt Prairies. Altogether, the American Prairies constitute a unique soils region in the world's soils picture; soils of the Prairies type occur nowhere to any large extent in the Old World, and in the New World only to a small extent outside the United States, as their only occurrence is in South America, in a district of the Pampas of Argentina. The area of this district amounts to less than a third of the area of Iowa.

One reason for calling special attention to the Prairie soils in a discussion of natural vegetation is that very close genetic relationships obtain between the types of natural vegetation and the characteristics of the soils of a region; these relationships are characteristic as well as important in all the soil regions of the world. Another reason is the fact that in the case of Prairie soils, some of the outstanding characteristics of these soils may be regarded to a considerable degree as the direct product of the rich growth of the native tall grasses which originally characterized all of the Prairie regions.

Diversity of Grasslands in Texas. In the western and southern portions of the State, in spite of the large areas that have been put into cultivation, various short grasses still cover extensive tracts of land, and as they are the main bases for the State's grazing livestock industry, these grasses constitute one of the highly important groups of Texas' natural resources.

In the wider perspective, however, the broader aspects of types of Texas vegetation and the complexities in this

vegetation as well, all have to be seen in relation to the position Texas occupies in the larger phytogeographic, or plant geography, provinces of North America. The pine lands of East Texas, for instance, represent, as has been stated, the prolongation of the pine forests, or piney-woods country, of Southwestern United States westward well into the State. The western extension of this great forest belt terminates in the sandy lands of East Texas. In a similar manner, the tall grasses of the Texas Prairies represent the southwestern extension of the same types of grasses that are dominant in the Mid-West Prairies. In fact, the Black and Grand Prairies with their fine-textured, chemically rich, and highly granular black soils of generally high calcareous content, are appropriately designated as the Southern Prairies of the United States, and as such they comprise one of the distinctive natural regions, and one of the outstanding agricultural regions not only of the nation, but also of the world as well.

And the common short grasses, such as buffalo grass and the several grama grasses, characteristic of the plains of western Texas, represent the southern extensions of the vast areas of the short-grass lands of one of the outstanding continental interior regions of the world—the Great Plains of North America. The short-grass region which is so definitely characteristic of the sub-humid plains of North America, however, are not unique to this continent. Even still larger areas of such lands are embraced in the Steppes of European Russia and Siberia, and smaller but still comparatively large areas occur in the central and western Pampas of Argentina and in the plains of central and southern Australia. Peculiarly enough—or perhaps it isn't so peculiar to one with a scientific knowledge of the world's natural resources—the agricultural history as well as the types of agricultural utilization of all these sub-humid plains of the Middle Latitudes the world over shows a remarkable degree of similarity.

Trans-Pecos Texas is different still: owing to its geographic location as well as to certain distinctive features of its past and present environmental conditions, the Trans-Pecos is characterized by various representatives of western vegetation, including some types that are characteristic of regions as far away as the Pacific Coast. It has grasses which are representative of the Great Plains, and in addition aberrant types of vegetation occur in the Trans-Pecos which are typical of the Chihuahua desert country of Northern Mexico.

Nor should it be forgotten that Texas has numerous representatives of vegetation of the subtropics, extending northward from Mexico; these include such varied forms as the woody types of the chaparral characteristic of South Texas, the mesquite and related leguminous trees and shrubs which extend over so large a share of the State, together with the various mesquite grasses, the latter being especially prominent in the Edwards Plateau, and only less so in the Red Beds Plains. In addition, there is the live oak distribution of which extends entirely across southern United States from the Atlantic to the Pacific; live oak growth with its peculiar occurrence in mottes is characteristic not only of various areas throughout the southern part of Texas but even extends well into the central section of the State, where it occurs in certain rather definite environmental areas.

The Savanna Grassland Region. Special attention should be called to the fact that the great middle portion of Texas, from Red River to the Rio Grande and west of the Black and Grand Prairies, is predominantly a savanna grassland. The characteristic savanna glassland consists of the typically scattered mesquite trees and shrubs the undergrowth of which consists of a carpet of short grasses; this sort of vegetation is typically represented in the Red Beds Plains, the southeastern portions of the High Plains and adjacent areas of the Edwards Plateau, as well as in much of the Coastal Plains country of South Texas. This mesquite savanna plains province, which in the United States is limited in occurrence almost entirely to Texas, is one of the most distinctive of all the natural vegetation regions of North America. Certainly this vegetational province attains its highest development in Texas. There is nothing like it elsewhere in the United States, and apparently no similar natural vegetation formation occurs elsewhere in the Middle Latitudes.

Somewhat modified savanna grasslands occur in such edaphic areas as the Western Cross Timbers, the Edwards Plateau, and in the Coastal Plains of South Texas, and these are areas particularly where the native vegetation has been markedly disturbed since the coming of white men to Texas. In many sections, the woody growth has now become, at the expense of the former grasses, the dominant vegetation, as in the chaparral, or "pygmy-forest," areas of South Texas as well as in various portions of the eastern half of the Edwards Plateau.

The outstanding fact is that typical savanna grasslands are characteristic of western and southern plains areas of the State which have deep, silty, that is, fine-textured soils; wherever deviations from such soils occur, as in areas of deep sands, or in shallow soil areas underlain by consolidated limestones or sandstones, or by other sorts of rock exposures, such modifications of the habitat conditions are invariably reflected by definite variations in the vegetation; these variations present more or less sharp deviations from the characteristic mesquite shrub short-grass savanna; and it is this latter vegetation which, as has been noted, may be considered the most truly typical for the State of all vegetation formations which occur in Texas.

Throughout the northern two-thirds of the High Plains, the mesquite growth progressively decreases northward, both in stand and in size of shrub; in the Panhandle section of the High Plains there is but very little mesquite shrub vegetation except in areas of broken topography, as is the case in the broad valley lowland of the Canadian River. The prevailingly undulating to very slightly rolling lands of the Panhandle section are typical of the short-grass country as represented in the extensive plains of western Kansas and eastern Colorado; lacking the mesquite growth, these plains to the north present an appearance entirely different from the plains regions of western Texas. Much of the southwestern portion of the Texas High Plains is covered with shinnery, a dwarf oak of western affinities, botanically considered, which grows very thickly in certain areas of

deep sands. Typical shinnery areas, are as a rule, characterized also by scattered tall bunch grasses together with certain herbal types growing among the dwarf oaks.

Summing up: The mesquite savanna and short-grass country of West Texas is, of course, the southern sector of the western belt of the Great Plains.

The short-grass country so typical of the Great Plains is by no means unique to the North American continent. Another large area of similar country comprises portions of the Steppes of Eurasia. Somewhat analogous areas occur in Argentina, west of the Pampas, and in Australia a large portion of the continental interior plains is also similar, at least so far as livestock grazing activities are concerned.

The Trans-Pecos. The Trans-Pecos country is a region of sharply contrasting environmental conditions. The bolson plains characteristic of this region are short-grass lands, as are also the smoother areas, that is, the constructional areas, physiographically considered, such as occur in the Davis Mountain Plateau and on the Diablo Plateau. The light-colored soils of Reeves County in the Toyah basin are characterized by a black-brush type of chaparral; in contrast, the sandy, gravelly mesas and lower "rocky" slopes near the Rio Grande are characterized by such typical plants as sotol and lechuguilla and ocotillo which are characteristic of the Chihuahua desert in the Central Plateau of Mexico. These plants are characteristic of definite edaphic environments which occur in Trans-Pecos Texas.

Attention, too, should be called to another striking element in the distribution of vegetation in the Trans-Pecos—that of vertical zonation—in which fairly distinct vegetational zones reflect important combinations of moisture and temperature conditions which extend from the lower levels in the region to the summit areas of the mountain eminences. From the short-grass lowlands of the Trans-Pecos to the mountain summits of that region, a fairly evident vertical zonation of the vegetation is characteristic, ranging through a lower zone of diverse scrubby woody growths into one of short grasses and live oak, thence through a zone of piñon-cedar, to the more mesophytic island-like summit areas of the mountain ranges, where a rather rich woodland vegetation of pines, Douglas fir, and the like, all reflecting the unmistakable influence of a humid temperature environment, is found.

The late Dr. Robert T. Hill has written of these "isolated summit lands of moisture and verdure which stand like islands above the seas of deserts" in *The Dallas News*, August 2, 1936, as follows:

> Here and there in the great southwest border region, often at intervals of 100 miles or more, high, timber-covered damp mountain tops rise above the desert's floor.
>
> The Sangre de Cristo, the Sandia, the Sacramento, the Guadalupe, the Magdalenas, and the Chisos are examples of the summit oases in the deserts. Some reach above 8,000 feet. Although miles and miles apart and separated by large spaces of sterile, lower-lying desert plains where no tender greenness grows, these mountain tops are covered by tall pines, spruce and oaks and various other deciduous trees. There are ferns and grasses almost like one sees in the Colorado mountains or damp New England, and squirrels and birds in trees, and flowers, too, and fish in running brooks that disappear at the desert margin.
>
> Each mountain top is an island miles apart from the others and separated from one another by the arid stretches of the lower lying parched and waterless deserts; and yet the plant and animal life of each summit is as alike as if it had belonged to a once continuous humid plateau land, which had been mostly destroyed and removed away by erosion which left these island-like summits to tell the tale of former continuity. . . .
>
> If these "islands" were in the West Indian seas, instead of in the desert, naturalists would create all kinds of former connections between them by the similarities of plants and animals. If these tops are but the orphaned remnants of a once continuous near-level plateau region, below and between which the lower-lying deserts have been dug out to depths of as much as 5,000 feet, so as to destroy the former continuity of the once verdant lands, what was the mighty force that removed the vast material from the regions mostly void of outreaching streamways, to transport it to the sea?

Unquestionably, an important factor for emphasis in the distribution of the various types of natural vegetation in the Trans-Pecos country is that reflected in its vertical zonation, a distribution which in this region at large is determined predominantly by moisture relations, but which also is modified considerably by differences in temperatures, and especially by the evaporation factor which always is closely associated with temperature conditions.

The Southwest Border Zone

The comparative relationships of vegetation of the East Texas forested country, of the Texas Prairies, and of the Savanna grasslands of the Texas Plains, are readily recognized when attention is called to the more obvious aspects of these comparative features.

The outstanding characteristics of the Southwest Border Zone, a concept introduced by R. T. Hill, are not so readily perceived. In brief, however, this is a transverse continental belt of country, extending from the chaparral areas in South Texas to southern coastal California. It includes Trans-Pecos Texas, which to a large extent, is the prolongation northward across the Rio Grande of the Chihuahua country of northern Mexico. The Southwest Border Region is mostly a dry belt of country; it includes the Chihuahua as well as the Sonora desert, both of which are in Mexico, although prolongations of each extend into the United States. It may be noted that the Great Basin, a desert of internal drainage, is different from either of the deserts named above.

It is important to note that not only is the natural vegetation, and the soil resources as well, of the various sections comprising the Southwest Border Region, different from those of other regions of Texas, and of other sections of the United States for that matter, but also that the factors controlling the occurrence and volume of underground waters—and water in these lands is a critical natural resources—in this region are markedly different from those characteristic of most of the rest of the country. To discuss at all adequately the natural resources for these regions alone would require, however, a large monograph in itself.

Soil Resources of Texas

The soil resources of Texas in their areal distribution, as well as in their dominant inherent characteristics, are closely related to the various natural regions as well as to the natural vegetation formations of the State. It is, of course, the fact of interrelations of the com-

ponents which in combination make up, and at the same time give distinction to, the various natural regions that gives to the concept of natural regions its peculiar usefulness not only in the interpretation of natural resources but also in the areal aspects reflected in the diverse forms of their utilization. The concept of natural regions, especially in its genetic considerations, is obviously a product of the modern science of physical geography.

The zonal divisions which characterize the distribution of soils the world over are based upon the reaction of climatic factors, in conjunction with those of the natural vegetation, upon the disintegrated and decomposed rock materials present at the earth's surface. These global subdivisions, in which as regards their distribution, the vegetation formations correspond very closely with that of the Great Soil Groups at large, present the fundamental background for an understanding of the larger pattern in the distribution of soil resources in an area as large as Texas.

Subdivisions of these larger zonal belts including the Great Soil Groups have been brought about mainly as a result of differences in topography and of the presence or absence of certain constituents in the parent geological materials from which the mineral materials of the soils in the various areas are derived. The fundamental fact is that the larger pattern of occurrence and distribution of the world's soil resources—the Great Soil Groups—is based upon climatic factors directly. The subdivisions, however, of these larger groups are based upon modifications introduced by the occurrence of exceptional features such as factors of relief, or of the presence or absence of certain chemical compounds in the parent geologic materials. And these exceptional features, whether of relief, texture, or the occurrence of certain chemical compounds, are strong enough to influence, among other things, the water relations and the mineral content of the soils and thereby to produce local differences which deviate from the regional type, the latter being determined, of course, by the reaction to the prevailing climatic factors.

The primary division of the soils of the world—and it is genetically a fundamental division—places those soil groups that are prominently leached by circulating waters into one large category and those that are unleached into another. This division of the world's soils corresponds in the main to the climatic division of humid environments on the one hand and sub-humid (including semiarid and desert lands) conditions on the other hand.

The forests of the world, outside of river alluvial belts, and excepting, of course, the more extreme Polar regions which we may here disregard, occur in humid regions; forests occupy soils that are leached, and the degree of leaching attained in maturely developed soils in any part of the world corresponds very closely with the moisture-temperature combinations and relationships of the region concerned. It should be pointed out that river alluvial lowlands the world over constitute areas or regions that inherently differ from the adjacent uplands through which the rivers flow, and therefore both as to soils and as to their agriculture such regions or areas always have to be given individual consideration.

The climatic grasslands of the world occupy unleached soils; unleached, that is, so far as materials of the subsoils, or more precisely the materials in what is designated as the B horizon, are concerned. In fact, in the climatic grasslands, the subsoils are zones of accumulation of soluble mineral compounds rather than zones of subtraction by leaching of soluble mineral compounds as is the case for most of the humid regions of the world. These fundamentally unlike conditions are the result of the operation of different sets of factors inherent to these contrasted environments, and more perticularly, as has been stated, of the basic differences between humid and subhumid conditions. The lack of leaching is associated generally with decreased rainfall although in subhumid and semiarid regions, owing to the location of these regions in the continental interiors, and therefore to their being subjected to the extremes of a continental type of climate, evaporation is also an important factor, as it accentuates the condition of deficient rainfall. Evaporation, of course, decreases still further the scanty moisture available during the growing season, and may thereby shorten that season perceptibly. A prominent reaction apparently associated with high temperatures and accentuated evaporation in warm subhumid and semiarid regions is the formation of indurated caliche in areas having a stabilized topography; this caliche formation is but an exaggerated form of the calcium carbonate accumulation which is characteristic of the B horizon of maturely developed soils in subhumid and semiarid zones the world over. Obviously, the development of a layer of indurated caliche near the surface, thereby resulting in a shallow soil, still further intensifies the dry conditions of the areas so affected. In general, such areas are characterized by pronounced xerophytic types of vegetation. Obviously, the soils of deserts are unleached also, owing to the scanty rainfall of such areas.

The Great Soils Groups in Relation to Texas

Not all of the Great Soil Groups of the Middle Latitudes are represented in Texas; the Brown Forest soils particularly are conspicuous by their absence. Texas soils include: (a) members of the Red and Yellow soils —although the bulk of this soil group occurs in Southeastern United States; (b) the bulk of the soils of the Southern Prairies; and (c) the bulk of the southern sector of the Black Earth or Chernosem and of the Brown Grassland soils of the Western Plains of the United States.

The economic significance of the Great Soil Groups lies, of course, in their relation to the world's agriculture. Not only are the crops and products, both in diversity and in volume of product, but also as regards the quality of the product, thereby determined. The quality of most agricultural products is closely associated with the succession of seasonal climatic factors in the regions concerned; and, as has been already pointed out, a scientific knowledge of the Great Soil Groups of the world embraces the climatic features, both as to broad characteristics and detailed aspects, under which both the natural vegetation and the soils of these regions have developed.

To sum up: A scientific understanding of the Great Soil Groups is the key to the understanding of the distribution of the various elements that comprise the

world's agriculture; without such an understanding, any attempt to deal with the world distribution of the major crops or of livestock production becomes merely assemblages of numerical data which in themselves alone are not particularly illuminating or significant in arriving at any fundamental conclusions concerning the world's agriculture or that of any nation or region. Such numerical data have to be tied in with the essential facts and concepts of the physical geography of these regions, not only in a broad general way, in presenting the broad picture in perspective, but also as regards special types of production in innumerable particular areas whose physical environment deviates even if but slightly from the average for the region as a whole.

Red and Yellow Soils of Humid East Texas

In Texas the soils of forested East Texas are leached; that is, the more soluble compounds in the maturely developed soils have, to a considerable degree, been carried away in the drainage waters. The degree and depth of leaching varies with certain characteristics of the parent geologic materials as well as with the kind of topography in which these materials occur. The soils of the rest of the State are unleached, except in certain local or edaphic areas, such, for example, as the Eastern Cross Timbers and portions of the Western Cross Timbers, where the character of the geologic materials is such as to be highly favorable to the ready percolation of moisture to considerable depths. These exceptional areas, such as the outcrops of the Woodbine sands of the Eastern Cross Timbers or of the Trinity sands of the Western Cross Timbers, it should be mentioned, constitute extensive intake areas for rainfall; and the subsurface extensions toward the Gulf of these gently dipping geologic formations which serve as widespread aquifers obviously are economically of great importance as carriers and as sources of underground waters.

The leached soils of East Texas represent the western prolongation well into Texas of the Red and Yellow soils group which is characteristic of the sandy uplands of Southeastern United States and which comprise the large proportion of the area of the Old Cotton Belt. This region of Southeastern United States, it may be reemphasized, is agriculturally as distinctly unique in the world's agricultural pattern as are the soils and the natural vegetation which are so distinctively characteristic of this entire area.

The Soils of the Southern Prairies

In regard to the soils of the Prairies at large Dr. Marbut has written as follows: "As a whole the soils of this region have a producing capacity higher than that of the soils of any of the other soil regions of the United States and probably of the world. They are characterized by all those features which give soils their high productivity and in addition to these they occupy a region in which climatic conditions are highly favorable to plant growth."

The typical soils of the Black and Grand Prairies are dark in color, sharply contrasting with the typical reds and brown and grays that are characteristic of the adjacent or near-by soils in forested East Texas, or in the included strip of the Eastern Cross Timbers. The dark to black color of the Prairie soils is due directly to the relatively large amount of organic matter they contain, and which is intimately mixed into the mineral soil body; the presence of this organic matter is a result of the decay, through long periods in the past, of the grassland vegetation, particularly of the great masses of fibrous roots of the grasses which were characteristic of these Prairies; the considerable depth of the dark layer, is distinctly a consequence of the grassland conditions, for when grasses decay they leave the large proportion of the resulting organic matter *in* the soil. Under forest conditions, by way of contrast, the decaying and decayed organic matter practically all remains *on* the soil; in such cases it completely disappears within a very few years after the lands are brought under cultivation.

Of determining influence also in the soils of all large grassland regions the world over is the fact that the parent geologic materials of such soils are always relatively fine textured.

There is still another factor of fundamental importance which always has to be considered along with the organic matter and the fine grained materials in regard to the causes of dark-colored soils wherever such soils occur. This is the presence of calcareous materials.

In the case of the Black and Grand Prairies, as well as the Mid-West Prairies, all of which occur in a moderately humid environment, the content of organic matter which gives these soils their dark color is maintained *in* the soil owing to the presence of calcium carbonate in these soils; this calcium carbonate is derived from the parent geologic materials out of which these Prairie soils have developed. The calcium carbonate, which in this case is supplied as a consequence of the weathering of soft limestone or marls or limy silts, keeps the fine grained soil particles in a flocculated condition; as a consequence of this flocculation, the fine particles of the soils are assembled into aggregates or grains, and therefore the soils are described as granular. It cannot be too much emphasized that it is the calcium carbonate which keeps the colloidal material of the soil, both the organic matter and the clays, in a saturated condition, which in turn is reflected in the characteristic granular structure of these soils. That is, the granular structure of these soils (as opposed to a single grain structure which is characteristic of large portions of forested regions in the Middle Latitudes) is in large part a consequence of the presence of calcareous materials in the soil. The granular structure gives to these heavy textured soils a high degree of workability, as well as of crop plant adaptability. In those cases where the calcium carbonate of the soil layers and immediately beneath has been removed by leaching, a definite change in the fundamental character of the soils ensues, and this change is markedly apparent in the agriculture.

It should also be emphasized that the American Prairies, which include a large share of the tall grass regions of the Middle West as well as those of the Southern Prairies, are vast edaphic areas which, on account of certain determining factors, particularly those pertaining to the parent geologic materials, characteristic

of these regions, constitute exceptions to the climatic soil groupings which obtain for the world's soil zones at large. It is precisely because of this factor that the American Prairies (together with a small area in Argentina and a few even smaller Prairie-like "enclaves" in Central Europe) occupy a unique position in the world pattern of soil resources; and, as a consequence of the particular soil characteristics they possess, these Prairie regions occupy an analogous unique position and a highly important one, too, in the world's agriculture.

Prospects as to possible readjustments in the agriculture of the Southern Prairies will, of course, be given no small amount of consideration in the future. A full perspective of the range of possibilities as well as the limitations of the Texas Prairie soils for modern agriculture can be secured only through comparative studies of the agriculture of the Prairie and similar soils of the world. Such studies, however, lie beyond the limits of this article.

The Black Earth and Brown Grassland Soils of the Sub-humid and Dry Plains

Westward from the American Prairies are the sub-humid plains in which occur the highly fertile Black Earth or Chernosem soils zone of the short-grass country, and still farther westward, the Brown Grassland soils of the Dry Plains. The Prairies, the Chernosem zone, and the Brown Grassland soils constitute the great soil groups of the grassland plains characteristic of the continental interior plains of North America.

Of the Black Earth province as a whole Dr. Marbut wrote as follows about 1929: "The expression, Great Plains, as used in this discussion applies to the region lying east of the Rocky Mountains and west of a line drawn from a few miles east of the northwestern corner of Minnesota southward to Corpus Christi, Texas . . . The soils of the Great Plains may be described as sub-humid in the eastern part of the region and semi-arid in the western part.

"The characteristics of the surface soils in the former region are essentially like those of the best soils of the Prairies. . . This belt includes the darkest colored soils of the Great Plains. The layer of dark-colored soils, like that in the soils of the Prairies, is thick; it is fully as thick as in the Prairies. The rest of the Great Plains region includes brown to dark brown soils.

"The northern part of the dark-colored belt of Great Plains soils was settled in the 80's and 90's of the last century, and the southern part a little later. The former part of the belt is one in which small grains and flax growing has been well established for about a third of a century. The latter part is one in which wheat growing, grain sorghums, and cotton have been established for a quarter of a century."

Typical Black Earth soils the world over are best manifested on smooth areas; in Texas, for instance they are typical of the eastern portions of the High Plains, and in the areas with constructional relief of the Abilene-Haskell Plains, as well as in the dark-colored soils in the Roscoe area, of the Red Bed Plains. Westward from the Black Earth soils zone is the belt of Brown Grasslands soils occurring in a zone in which the rainfall is not only less in amount but also is less dependable than in the Black Earth belt. The Texas section of the Black Earth and Brown Grasslands soils includes most of the southern sector of these soil zones in North America, as distinguished from the middle and northern sectors, the latter extending far northwestward into the plains of western Canada.

The Black Earth and Brown Grasslands soil zones are not unique to the North American continent, as they occur in vast areas in southern Russia and Siberia; they extend from Russia into Roumania, and include also the discontinuous Hungarian plains of central Europe. In South America, these types of soils are characteristic of the extensive and smooth areas of the Pampas in Argentina and in somewhat modified form they are found in the plains portions of central and southern Australia. What, however, is unique in the pattern of these Black Earth and Brown Grassland soil zones in North America is the occurrence of the southern sector, embracing the southern third of these soil belts in the United States. The soils of this southern sector, however, are apparently somewhat similar to the regur or "black cotton" soils of the northwestern portion of peninsular India, but they cannot be considered as definitely analogous to the regur soils.

Concerning the Black Earth or Chernosem soils, Dr. Marbut has written of them as follows: "The Chernosem soils are dark in color, ranging from practically black to very dark brown. The dark-colored layer is thick, also ranging, in places up to 5 or 6 feet, but usually somewhat less than 2 feet. The dark-colored layer is (usually) underlain by a brown zone . . . never more than a few inches in thickness and this in turn by a zone of carbonate accumulation. This is the characteristic profile given, in general terms, of the Chernosem soils. It varies slightly from place to place, but taken as a whole in its fundamental features, it is remarkably continuous throughout the whole area occupied by the belt." As to the effects of grasses on the genesis of Chernosem soils Dr. Marbut has stated: "Grass vegetation . . . operates in such a way that its results are not attended with any such accidents [such as those affecting the disposal of organic matter in forests]. Being stored in the upper part of the soil, it is not subject to removal, at least easily, so that the effect is exerted on the soil. The grass plant becomes, therefore, because of this fact, the strongest force in the development of soils and the Chernosem soils being that group of soils whose development has been brought about by the most vigorous growth of soils [excepting the Prairies] would, of course, express its characteristics very definitely and sharply...

"The Chernosem soils, as soils, are extremely fertile. That term as here used, refers to the presence in large quantities of those chemical elements and those physical characteristics which are known to be favorable to a vigorous growth of plants. It does not refer to capacity of the land within the Chernosem belt for high production, because the term 'land' involves climatic conditions, as well as soil conditions, and the climatic conditions within the Chernosem belt are not uniformly as favorable

for production of plants, taken as a whole, as in some of the podsolic [forest soils in a humid climate] soils . . . The moisture supply is deficient. With respect to composition, however, the Chernosem soils are the most fertile of the world's soils. . . . The content of those constituents constituting what are universally regarded as plant foods is even higher than in the soils of the Prairies. This statement is based both on chemical analyses of virgin soils and rainfall in the Great Plains as contrasted with the Prairies."

West of the Black Earth zone of soils in the United States, and east of the Rocky Mountains, are belts of grassland with a progressively decreasing moisture supply westward. These soils, corresponding to those of the dry Steppes of Russia, may be divided into two subgroups: the Chestnut Colored Grassland soils and the Brown Grassland soils. Elsewhere in this paper the Chestnut colored soils are considered as belonging to the Brown Grassland soils. Of the soils in these belts Dr. Marbut has written as follows: "The Chestnut soils, as soils, are only a little less fertile than the Chernosems. They contain a lower percentage of organic matter and, therefore, have a lower percentage of nitrogen. In other respects they are just as fertile as the Chernosem soils, but their productivity as land is much less because of the lower moisture supply. The light-colored Chestnut soils are considered almost non-arable. On account of their grass cover which, however, does not constitute a continuous sod or unbroken cover, it is an important grazing region.

"The Brown [Grassland] soils also are less fertile than [either] the Chernosem or Chestnut soils, because of their lower percentage of organic matter. They are almost non-arable so far as the growth of crops without irrigation is concerned. Under irrigation, however, they are highly productive where they are kept free from the accumulation of alkali. . . ."

The Black Earth soils have developed best, that is, they have attained the maximum of their unique characteristics only in those areas where thick deposits of loose silty deposits occur on the surface; these silty materials are generally considered to be wind deposits, even though in some cases they have been reworked and redeposited by water. This relationship of the maximum development of soil characteristics of the Black Earth type holds not only for the United States but also for Russia, the Pampas of Argentina, and apparently for the regur region of Peninsular India. Not only have such geologic deposits accumulated but also they have been maintained on the smooth areas particularly because surface erosion on such lands is considerably retarded by the smooth topography. This is to say that Black Earth soils especially are characteristic of constructional surfaces which also are physiographically stable. On the other hand, in the case of physiographically unstable areas, there is constant, often considerable surface erosional action on the sloping lands, and on such areas, as a rule, the finer silty materials are thereby removed, thus exposing rock outcrops at the surface. In other words, the presence or absence of the blanket of fine-textured silty materials bears a direct relation to the character of the topography of the area concerned. Particularly important in the study of all grassland soils, therefore, is the differentiation as to whether the topography is constructional in origin on the one hand or actively erosional on the other. And, in like manner, the presence or absence of a mantle of these fine-grained materials bears a close relation to the fundamental characteristics of the soil resources of the areas concerned. Mature soils, that is, fully developed soils from the standpoint of genetic soil formation, and in consonance with the predominant climatic factors effective in the region, can evolve only in areas where the topography is practically stabilized; in addition, it is to be emphasized that a thick blanket of these fine-textured but porous materials which also are calcareous, and often highly calcareous, present optimum conditions for the development of a typical Black Earth soil dominantly under the influence of the prevailing climatic conditions, and without the influences of inhibiting factors of a more or less local nature.

Soil Resources and Texas Agriculture

The main characteristics of Texas agriculture as related to the soil resources of the State are discussed as fully as space allows in a paper of mine in preparation on "The Natural Regions of Texas." The larger features of the several waves of economic development which brought these natural resources into utilization, together with the comparative aspects involved in this utilization are dealt with in another paper of mine, also in preparation, entitled "Geographic Dispersion of Industry."

It is hoped that Part II of the current article will appear in the next issue of the Texas Business Review. Part II will be concerned with a comparative view of the mineral resources of the Texas Region.

Elmer. H. Johnson.

Cotton Subsidies

This brief description of subsidy programs for cotton is presented as a matter of great importance in the long-range business affairs of Texas and to provoke thought regarding the underlying forces and conditions responsible for the development of a more general situation situation typified by cotton, which has neither been caused nor solved by the policies to be described. This article will be followed by others analyzing the fundamental bases of cotton problems, the place of cotton in a properly adjusted economy, and specific adjustments necessary to solve the problems of cotton.

The forces which have brought about the subsity programs which have culminated in the unprecedented situation now prevailing began to manifest themselves in a large way in the loan and purchase programs of the Farm Board of 1929 to stabilize the price of major form commodities, a policy which caused the loss of nearly 500 million dollars appropriated to the Board as a revolving fund. The Farm Board plan of farm relief was to apply so-called big business methods to agriculture especially in bargaining.

The Farm Board plan was succeeded by the Agricultural Adjustment Act of 1933. It was much more elaborate. Its major objective was to raise prices of farm products to their equivalent average buying price during the five years 1909 to 1914, known as parity price. The method selected for raising prices to the desired level was acreage reduction combined with parity payments and rental and benefit payments. Farmers who complied with the minimum requirements prescribed by the Secretary of Agriculture got 3½ cents a pound on their average production up to $18 per acre on land they withdrew from cotton. In 1933 farmers who complied with the requirements of the program were entitled to a loan of 10 cents per pound which really became an above-market price loan.

In 1934 as a means of further boosting the price of cotton, the loan was raised to 12 cents per pound. Chester Davis, the AAA administrator, said, "This loan proved to be above market price and served to restrict both consumption and exports of American cotton."

The Bankhead Cotton Act passed in 1934 was primarily to force all farmers to comply with the AAA in acreage control by providing market quotas for all cotton growers under predetermined production. Each farmer was alloted a bale quota and tax exemption certificate for his alloted number of bales. A tax of 50 per cent of market value was placed on cotton sold not carrying an exemption certificate. In case a farmer failed to grow his alloted number of bales he could sell his certificates to his neighbors or release them for sale to what was known as "Surplus Tax-Exemption Certificate Pools" in which he would share profits in proportion to the number of certificates turned in and sold.

The above market price loan policy of 1934–35 which reduced both consumption and exports of cotton was changed for the crop of 1935–36 by making available to farmers a 10 cent non-recourse loan or the alternative option of selling at market price and receiving in addition what was called a "price adjustment payment" direct from the Government to bring the farm price to 12 cents, or as near that as the maximum price adjustment payment of two cents a pound would bring it. Chester Davis, the Administrator, commenting on this program, said, "Following the inauguration of these measures, both export and domestic consumption of cotton increased."

On January 6, 1936, the Supreme Court decision in the Hoosa Mills case invalidated the production control contract, and on February 10 the Bankhead Cotton Act was repealed.

The Soil Conservation Act of 1936 was designed to carry out as much of the AAA program as possible, and especially the production control features. It provided, among other things, for paying farmers for making improvements in farm management practices such as strip cropping, terracing, planting cover crops and soil building crops. Much of this was directed at acreage control, but was unsuccessful in that the acreage went up from 28 million acres planted in 1935 to 34 million in 1937. During these programs the goal was being shifted from parity price to parity income, and considerable progress was made in developing a soil conservation program.

The record crop of 1937–38 and the resulting fall in price stimulated Congress to pass the Agricultural Adjustment Act of 1937 and of 1938. The new law provided for soil conservation payments of many kinds, loans made mandatory of not less than 52 per cent of parity nor more than 75 per cent, and parity payments to those who co-operated, and market quotas for all.

In 1937 the loan rate was placed at 9 cents for middling 7/8 which proved to be above the market. In 1938 the loan price was fixed at 8.30 cents, and in 1940 at 9.21 cents.

From 1937 to now the loan has come to be thought of more and more as the real force maintaining cotton prices rather than acreage control.

Since 1941, especially, the loan has taken on much greater significance. It is now the major means in attempts to raise cotton prices to parity. Much has been said since 1942 about support prices. There are apparently these objectives to this program. One is to encourage production now by guaranteeing a price sufficient to get desired production, another is to secure parity price regardless of supply, and finally to maintain prices at or near parity two years after hostilities are declared to be over.

In order to carry out these new objectives in the case of cotton, the loan on cotton has been raised to 95 per cent of parity as of September 1 for the crop of 1944–45, but to guarantee parity for farmers the War Food Administration on September 23 directed the CCC to buy all cotton offered by farmers at parity. The post-

war support price is based on a guarantee loan of 92½ per cent of parity by the CCC.

It is recognized that these high loan rates have priced United States grown cotton out of world markets. The government proposes to remedy this by offering a subsidy of 4 cents a pound on exports of cotton effective in November.

This is the second time the export subsidy has been used to move surplus United States cotton accumulated in the country by above market price loans. On July 27, 1939, the Government put on an export subsidy of 1.5 cents a pound. Surely the export subsidy if put high enough will force American cotton into foreign markets, but the domestic market is now far more important.

Some qualities of cotton are even now selling above cut rayon fiber which can be substituted for cotton in the cotton spinning mill. It is generally expected that rayon staple fiber now selling for 25 cents per pound will be reduced to 16 cents in a reasonable time after the war. In the light of these facts, can it be said that the cotton problem has been solved?

A. B. Cox.

COTTON BALANCE SHEET FOR THE UNITED STATES AS OF NOVEMBER 1, 1944*

(In Thousands of Running Bales Except as Noted)

Year	Carryover Aug. 1	Imports to Nov. 1	Gov. Est. as of Nov. 1	Total	Con. to Nov. 1	Exports to Nov. 1	Total	Balance Nov. 1
1935–1936	7,138	22	11,141	18,301	1,412	1,440	2,852	15,449
1936–1937	5,397	32	12,400	17,829	1,856	1,613	3,469	14,360
1937–1938	4,498	22	18,243	22,763	1,729	1,626	3,355	19,408
1938–1939	11,533	40	12,137	23,710	1,637	1,054	2,691	21,019
1939–1940	13,033	37	11,845	24,915	1,941	1,744	3,685	21,230
1940–1941	10,596	30	12,847	23,473	2,064	350	2,414	21,059
1941–1942	12,376	109	11,020	23,505	2,703	439	3,142	20,363
1942–1943	10,590	†	13,329	23,919	2,864	†	2,864	21,055
1943–1944	10,687	†	11,442	22,129	2,560	†	2,560	19,569
1944–1945	10,727	126	12,320	23,173	2,430	†	2,430	20,743

The Cotton Year begins August 1.
*Figures are in 500-pound bales.
†Not available.

Employment and Pay Rolls in Texas

More and more attention is being given to data showing employment and pay rolls and hours worked. As indicated by data in this issue of the REVIEW employment data, or data indicating employment, are gathered by more than one agency. The U.S. Bureau of Labor Statistics, the agency with which the Bureau of Business Research has active co-operation, is gathering data on wage earners, except in agriculture, by major industry groups, pay rolls and hours worked. In making these reports the Bureau has the active co-operation of over 2,800 Texas firms many of which have more than one establishment in the State.

The Bureau figures are the only source of published data on monthly pay rolls and employment, hours worked, and average hourly earnings.

During October the average of hours worked in Texas was 48.4 a week and the average for hourly earnings for all employees was $1.026. Average hours worked in October increased 4.3 per cent over September. The increase in pay rolls was 4.8 per cent over September, due mainly to longer hours and overtime pay plus scattered wage rate increases.

For breakdown by industries on employment and pay rolls see Table on Employment and Pay Rolls in Texas.

The published reports of this Bureau do not include separate reports for war industries and are for wage earners only. These data are being collected and will be published as State totals for employees, including war industries.

A. B. Cox.

EMPLOYMENT AND PAY ROLLS IN TEXAS

October, 1944

	Estimated Number of Workers Employed* Sept., 1944(1)	Estimated Number of Workers Employed* Oct., 1944(2)	Percentage Change from Sept., 1944	Percentage Change from Oct., 1943	Estimated Amount of Weekly Pay Roll Sept., 1944(1)	Estimated Amount of Weekly Pay Roll Oct., 1944(2)	Percentage Change from Sept., 1944	Percentage Change from Oct., 1943
MANUFACTURING								
All Manufacturing Industries	171,051†	170,233†	− 0.5	+ 1.8	$6,054,867	$6,249,787	+ 3.2	+14.6
Food Products								
Baking	10,449	10,562	+ 1.1	+29.0	401,002	395,365	− 1.4	+56.5
Carbonated Beverages	3,853	3,672	− 4.7	− 9.6	115,777	111,258	− 3.9	− 1.0
Confectionery	1,494	1,536	+ 2.8	+ 3.0	21,498	20,838	− 3.1	+ 6.4
Flour Milling	2,242	2,167	− 3.4	− 6.7	79,557	75,259	− 5.4	+10.0
Ice Cream	1,527	1,502	− 1.7	+ 8.8	41,096	43,486	+ 5.8	+23.9
Meat Packing	6,594	6,370	− 3.4	− 4.4	214,611	213,339	− 0.6	−15.9
Textiles								
Cotton Textile Mills	5,105	4,979	− 2.5	−12.8	119,182	120,637	+ 1.2	− 7.3
Men's Work Clothing	3,983	4,004	+ 0.5	− 4.4	73,948	73,879	− 0.1	− 0.9
Forest Products								
Furniture	1,179	1,182	+ 0.2	−34.1	33,210	34,082	+ 2.6	−21.9
Planing Mills	1,788	1,704	− 4.7	−16.8	55,304	55,016	− 0.5	− 0.4
Saw Mills	14,797	14,879	+ 0.5	− 6.0	287,937	292,753	+ 1.7	− 6.9
Paper Boxes	894	926	+ 3.6	− 6.0	22,210	23,119	+ 4.1	− 1.0
Printing and Publishing								
Commercial Printing	2,244	2,244	± (6)	− 3.4	82,657	80,789	− 2.3	+ 6.3
Newspaper Publishing	3,977	3,869	− 2.7	− 8.4	123,048	119,803	− 2.6	− 4.6
Chemical Products								
Cotton Oil Mills	2,513	2,764	+ 9.9	−26.2	41,432	50,119	+21.0	−22.6
Petroleum Refining	25,264	25,070	− 0.8	+ 8.9	1,444,084	1,547,983	+ 7.2	+20.2
Stone and Clay Products								
Brick and Tile	1,533	1,481	− 3.3	− 1.8	29,377	28,020	− 4.6	+ 9.7
Cement	733	717	− 2.3	−33.7	29,305	29,937	+ 2.2	−24.3
Iron and Steel Products								
Structural and Ornamental Iron	2,273	2,394	+ 5.3	−12.0	75,656	81,866	+ 8.2	+ 1.6
NONMANUFACTURING								
Crude Petroleum Production	28,098	27,723	− 1.3	+ 8.0	1,611,419	1,553,552	− 3.6	+16.2
Quarrying	(3)	(3)	− 0.6	− 8.3	(3)	(3)	+ 1.4	+ 0.1
Public Utilities	(3)	(3)	− 2.4	− 1.4	(3)	(3)	− 2.4	+ 2.6
Retail Trade	213,396	219,134	+ 2.7	− 6.7	5,308,615	5,435,417	+ 2.4	+ 6.1
Wholesale Trade	62,022	60,701	− 2.1	− 0.1	2,442,197	2,502,914	+ 2.5	+ 9.9
Dyeing and Cleaning	2,841	2,883	+ 1.5	+ 5.4	68,566	68,706	+ 0.2	+12.5
Hotels	19,545	19,169	− 1.9	− 0.9	349,850	348,148	− 0.5	+ 9.5
Power Laundries	14,457	13,737	− 5.0	− 2.5	250,995	251,262	+ 0.1	+ 5.9

CHANGES IN EMPLOYMENT AND PAY ROLLS IN SELECTED CITIES(4)

	Employment P—ercentage Change Sept., 1944 to Oct., 1944	Employment P—ercentage Change Oct., 1943 to Oct., 1944	Pay Rolls Percentage Change Sept., 1944 to Oct., 1944	Pay Rolls Percentage Change Oct., 1943 to Oct., 1944		Employment Percentage Change Sept., 1944 to Oct., 1944	Employment Percentage Change Oct., 1943 to Oct., 1944	Pay Rolls Percentage Change Sept., 1944 to Oct., 1944	Pay Rolls Percentage Change Oct., 1943 to Oct., 1944
Abilene	− 4.3	− 6.7	− 0.8	+ 9.6	Galveston	− 1.3	− 18.0	− 6.9	− 11.5
Amarillo	− 2.9	− 1.5	− 5.0	− 2.5	Houston	+ 0.6	− 16.6	+ 16.0	+ 1.8
Austin	− 3.6	− 4.5	+ 0.6	+ 3.4	Port Arthur	− 0.4	+ 8.4	+ 5.4	+ 21.1
Beaumont	+ 0.6	+ 1.5	+ 1.5	+ 2.0	San Antonio	− 1.5	− 2.4	− 0.5	+ 3.1
Dallas	− 0.7	+ 3.7	− 1.7	+ 26.5	Sherman	− 7.3	+ 33.4	+ 0.5	+ 55.7
El Paso	− 0.3	+ 3.4	+ 0.7	+ 17.6	Waco	− 1.8	− 1.7	− 1.6	+ 10.9
Fort Worth	− 0.1	− 24.9	+ 1.1	− 14.6	Wichita Falls	+ 9.4	− 9.9	+ 15.4	− 1.5
Corpus Christi	+ 2.9	(3)	+ 8.5	(3)	STATE	− 0.7	− 8.4	+ 4.8	− 0.4

ESTIMATED NUMBER OF EMPLOYEES IN NONAGRICULTURAL BUSINESS AND GOVERNMENT ESTABLISHMENTS(6)

	1942(1)	1943(3)	1944		1942(1)	1943	1944
January	1,170,000	1,385,000	1,429,000(2)	July	1,317,000	1,450,000(1)	1,448,000(2)
February	1,199,000	1,397,000	1,433,000(2)	August	1,352,000	1,441,000(2)	1,446,000(2)
March	1,226,000	1,415,000	1,433,000(2)	September	1,373,000	1,448,000(2)	
April	1,222,000	1,433,000	1,435,000(2)	October	1,384,000	1,455,000(2)	
May	1,251,000	1,458,000	1,435,000(2)	November	1,389,000	1,461,000(2)	
June	1,291,000	1,478,000	1,448,000(2)	December	1,413,700	1,470,000(2)	

*Does not include proprietors, firm members, officers of corporations, or other principal executives. Factory employment excludes also office, sales, technical and professional personnel.
†Does not include strictly war industries.
(1)Revised.
(2)Subject to revision.
(3)Not available.
(4)Based on unweighted figures.
(5)Less than 1/10 of one percent.
(6)No change.
Not including self-employed persons, casual workers, or domestic servants, and exclusive of military and maritime personnel. These figures are furnished by the Bureau of Labor Statistics, U.S. Department of Labor.
Prepared from reports from representative Texas establishments to the Bureau of Business Research co-operating with the Bureau of Labor Statistics.
Due to the national emergency, publication of data for certain industries is being withheld until further notice.

OCTOBER RETAIL SALES OF INDEPENDENT STORES IN TEXAS

	Number of Establishments Reporting	Percentage Changes in Dollar Sales: Oct., 1944 from Oct., 1943	Oct., 1944 from Sept., 1944	Year 1944 from Year 1943
TOTAL TEXAS	987	+ 7.4	+ 2.7	+10.9
STORES GROUPED BY LINE OF GOODS CARRIED:				
APPAREL	112	+ 6.4	− 1.2	+12.9
Family Clothing Stores	26	− 3.4	+ 3.7	+ 7.3
Men's and Boys' Clothing Stores	34	+ 1.4	+ 4.1	+ 5.5
Shoe Stores	16	+ 0.9	− 3.3	+ 5.8
Women's Specialty Shops	36	+12.3	− 4.6	+19.1
AUTOMOTIVE*	83	+ 9.5	+ 5.2	+ 6.2
Motor Vehicle Dealers	75	+10.1	+ 4.6	+ 6.3
COUNTRY GENERAL	99	+ 6.9	+ 1.7	+ 9.4
DEPARTMENT STORES	62	+ 7.4	+ 3.8	+13.3
DRUG STORES	106	+10.6	+ 0.5	+11.6
DRY GOODS AND GENERAL MERCHANDISE	32	+ 0.5	+ 7.1	+ 7.1
FILLING STATIONS	25	+ 7.2	− 7.1	+ 6.2
FLORISTS	22	+30.1	+15.0	+27.9
FOOD*	126	+ 8.5	− 5.6	+11.5
Grocery Stores	29	+ 2.3	− 4.6	+ 6.8
Grocery and Meat Stores	90	+ 9.2	− 5.9	+12.6
FURNITURE AND HOUSEHOLD*	71	+ 6.6	+11.0	+ 1.1
Furniture Stores	63	+ 9.6	+11.1	+ 2.6
JEWELRY	27	−11.5	+ 6.3	− 0.7
LUMBER, BUILDING, AND HARDWARE*	169	+11.4	+11.0	+ 5.3
Farm Implement Dealers	14	+20.4	+ 0.03	+26.2
Hardware Stores	52	+ 8.2	+ 9.6	+20.3
Lumber and Building Material Dealers	101	+ 9.3	+13.5	− 1.5
RESTAURANTS	35	+ 6.4	+ 2.5	+11.4
ALL OTHER STORES	13	+ 3.1	+ 0.8	+ 5.5
TEXAS STORES GROUPED ACCORDING TO POPULATION OF CITY:				
All Stores in Cities of—				
Over 100,000 Population	168	+ 8.9	+ 3.6	+13.9
50,000–100,000 Population	129	+ 7.6	+ 0.2	+ 8.9
2,500–50,000 Population	455	+ 4.1	+ 2.8	+ 8.2
Less than 2,500 Population	235	+ 6.6	+ 4.5	+11.1

*Group total includes kinds of business other than the classification listed.
Prepared from reports of independent retail stores to the Bureau of Business Research, coöperating with the U.S. Bureau of the Census.

OCTOBER CREDIT RATIOS IN TEXAS DEPARTMENT AND APPAREL STORES

(Expressed in Per Cent)

	Number of Stores Reporting	Ratio of Credit Sales to Net Sales 1944	1943	Ratio of Collections to Outstandings 1944	1943	Ratio of Credit Salaries to Credit Sales 1944	1943
All Stores	63	44.9	46.1	65.3	66.7	0.9	1.0
Stores Grouped by Cities:							
Austin	6	39.0	40.9	74.1	75.2	1.2	1.0
Dallas	9	53.6	54.4	62.6	65.4	0.7	0.7
El Paso	3	38.2	41.6	64.5	66.5	1.3	1.1
Fort Worth	6	42.5	42.2	68.9	71.2	1.0	1.1
Houston	8	42.2	42.0	65.1	59.3	1.2	1.3
San Antonio	5	37.6	41.9	66.5	62:9	1.2	1.4
Waco	5	44.4	46.1	65.0	67.2	1.1	1.0
All Others	21	38.8	38.9	70.7	81.3	1.0	0.8
Stores Grouped According to Type of Store:							
Department Store (Annual Volume Over $500,000)	21	44.4	45.3	68.5	67.2	1.0	1.0
Department Stores (Annual Volume under $500,000)	9	38.1	39.4	63.1	68.3	1.2	1.1
Dry-Goods-Apparel Stores	3	37.2	39.6	69.4	70.7	1.7	1.5
Women's Specialty Shops	16	50.9	51.9	59.7	64.3	0.7	0.7
Men's Clothing Stores	14	41.5	43.2	58.5	68.6	1.2	1.1
Stores Grouped According to Volume of Net Sales During 1943:							
Over $2,500,000	20	44.3	44.6	65.8	66.7	1.0	0.9
$2,500,000 down to $1,000,000	11	35.6	42.4	68.9	69.9	1.2	1.2
$1,000,000 down to $500,000	13	37.4	38.6	67.7	71.4	1.0	1.0
Less than $500,000	19	26.8	30.0	68.2	66.0	2.3	2.2

NOTE: The ratios shown for each year, in the order in which they appear from left to right are obtained by the following computations: (1) Credit Sales divided by Net Sales. (2) Collections during the month divided by the total accounts unpaid on the first of the month. (3) Salaries of the credit department divided by credit sales. The data are reported to the Bureau of Business Research by Texas retail stores.

BUILDING PERMITS

	October, 1944	October, 1943	September, 1944
Abilene	$ 4,750	$ 32,088	$ 12,325
Aamarillo	62,842	41,869	96,504
Austin	81,961	35,179	97,308
Beaumont	83,047	27,157	32,235
Big Spring	26,295	3,331	17,925
Brownsville	8,176	4,469	13,240
Cleburne	2,455	*	5,874
Coleman	400	3,500	0
Corpus Christi	287,834	93,153	137,109
Dallas	457,399	1,161,384	251,909
Del Rio	3,850	4,722	2,195
Denton	3,875	6,675	4,770
Edinburg	736	635	17,300
El Paso	132,872	20,319	69,518
Fort Worth	329,476	373,650	193,616
Galveston	76,076	102,029	55,202
Gladewater	3,950	650	7,550
Graham	9,000	500	1,390
Houston	1,145,470	330,245	653,049
Jacksonville	9,000	0	7,750
Kenedy	0	0	0
Kerrville	5,735	777	1,700
Lubbock	88,521	22,772	117,131
McAllen	11,395	5,000	50,805
Marshall	9,384	7,100	19,771
Midland	32,350	3,400	15,430
Palestine	4,150	2,100	2,207
Pampa	4,271	18,260	4,700
Paris	10,255	8,970	4,150
Plainview	19,895	4,650	15,975
Port Arthur	20,753	44,908	19,762
San Antonio	713,912	260,701	463,162
Seguin	6,550	975	6,950
Sherman	11,576	10,155	12,010
Snyder	0	1,800	0
Sweetwater	14,820	15,305	1,705
Texarkana	22,750	*	15,430
Tyler	35,157	18,132	18,411
Waco	20,834	32,777	43,333
Wichita Falls	15,970	23,699	20,007
TOTAL	$3,777,742	$2,723,036	$2,509,409

*Figures not available.

NOTE: Compiled from reports from Texas chambers of commerce to the Bureau of Business Research.

POSTAL RECEIPTS

	October, 1944	October, 1943	September, 1944
Abilene	$ 54,104	$ 44,820	$ 56,474
Amarillo	67,070	54,357	56,544
Austin	113,691	84,627	108,651
Beaumont	58,495	42,921	46,508
Big Spring	14,868	11,540	11,814
Brownsville	14,851	13,294	11,606
Brownwood	34,213	20,610	26,591
Childress	7,680	5,579	6,172
Cleburne	8,167	4,853	5,933
Coleman	5,722	4,218	4,246
Corpus Christi	82,613	60,845	70,076
Corsicana	11,794	10,643	10,562
Dallas	647,593	512,785	579,075
Del Rio	8,738	6,373	6,552
Denison	12,915	10,013	10,043
Denton	16,087	12,694	10,088
Edinburg	6,436	4,220	4,629
El Paso	122,249	90,301	96,848
Fort Worth	317,905	221,999	313,315
Galveston	62,598	48,000	49,890
Gladewater	5,834	4,419	4,068
Graham	4,053	3,544	3,814
Harlingen	17,351	11,848	13,930
Houston	455,486	355,361	399,297
Jacksonville	6,810	5,426	5,031
Kenedy	2,860	2,656	2,162
Kerrville	5,706	4,338	4,329
Lubbock	49,875	37,573	33,559
Lufkin	10,047	6,918	7,742
McAllen	9,908	7,192	7,132
Marshall	14,901	10,770	11,089
Palestine	11,048	8,034	8,564
Pampa	14,714	10,249	10,270
Paris	23,126	18,708	25,073
Plainview	7,860	5,813	6,394
Port Arthur	33,209	26,326	28,232
San Angelo	29,082	19,937	23,082
San Antonio	298,934	258,553	270,211
Seguin	5,544	4,190	4,509
Sherman	16,787	11,669	12,829
Snyder	3,344	2,662	2,763
Sweetwater	9,642	7,647	7,329
Temple	19,278	15,579	16,078
Texarkana	34,096	24,531	28,915
Tyler	39,249	30,830	30,528
Waco	68,553	51,389	54,553
Wichita Falls	50,284	42,137	41,390
TOTAL	$2,915,070	$2,252,991	$2,548,490

NOTE: Compiled from reports from Texas chambers of commerce to the Bureau of Business Research.

LUMBER

(In Board Feet)

	Oct., 1944	Oct., 1943	Sept., 1944
Southern Pine Mills:			
Average Weekly Production per unit	194,565	238,575	201,770
Average Weekly Shipments per unit	197,845	222,181	214,581
Average Unfilled Orders per unit, end of month	1,481,767	1,553,258	1,443,752

NOTE: From Southern Pine Association.

TEXAS COMMERCIAL FAILURES

	Oct., 1944	Oct., 1943	Sept., 1944
Number	0	0	0
Liabilities*	0	0	0
Assets*	0	0	0
Average Liabilities per failure*	0	0	0

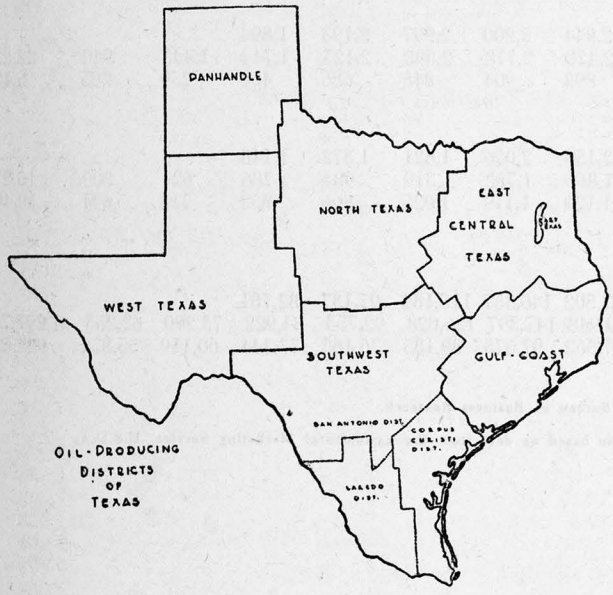
*In thousands.

NOTE: From Dun and Bradstreet, Inc.

PETROLEUM

Daily Average Production (In Barrels)

	Oct., 1944	Oct., 1943	Sept., 1944
Coastal Texas*	537,700	519,350	543,050
East Central Texas	149,500	135,250	149,800
East Texas	371,350	368,700	370,950
North Texas	148,800	138,300	147,750
Panhandle	98,800	88,100	98,700
Southwest Texas	334,400	288,150	341,750
West Texas	492,800	354,050	504,050
STATE	2,133,350	1,891,900	2,156,050
UNITED STATES	4,725,950	4,398,750	4,735,250



Gasoline sales as indicated by taxes collected by the State Comptroller were: September, 1944, 111,519,573 gal.; September, 1943, 101,616,354 gal.; August, 1944, 111,393,741 gal.

September sales of gasoline to the United States Government as recorded by motor fuel distributors in Texas were 274,236,278 gallons.

*Includes Conroe.

NOTE: From American Petroleum Institute. See accompanying map showing the oil producing districts of Texas.

CEMENT

(In Thousands of Barrels)

	Sept., 1944	Sept., 1943	Aug., 1944
Texas Plants			
Production	597	730	554
Shipments	527	683	560
Stocks	907	818	837
United States			
Production	8,746	11,380	9,003
Shipments	10,221	12,296	10,758
Stocks	17,000	19,704	18,478
Capacity Operated	44.0%	56.0%	44.0%

NOTE: From U.S. Department of Interior, Bureau of Mines.

OCTOBER RETAIL SALES OF INDEPENDENT STORES IN TEXAS

(By Districts)

	Number of Establishments Reporting	Percentage Changes: Oct., 1944 from Oct., 1943	Oct., 1944 from Sept., 1944	Year 1944 from Year 1943
TOTAL TEXAS	987	+ 7.4	+ 2.7	+10.9
TEXAS STORES GROUPED BY PRODUCING AREAS				
District 1–N	67	+14.2	+ 2.3	+12.0
Amarillo	24	+12.3	− 2.7	
Plainview	13	+ 1.2	− 6.9	
All Others	30	+19.0	+ 9.9	
District 1–S	28	+ 4.7	+ 7.5	+11.2
Lubbock	18	+ 6.4	+ 2.9	
All Others	10	− 0.8	+26.2	
District 2	73	− 1.6	*	− 0.7
District 3	30	+12.7	+ 3.2	−13.0
District 4	239	+ 7.9	+ 6.5	+13.7
Dallas	35	+ 7.2	+ 1.1	
Fort Worth	38	+ 4.1	+ 2.2	
Waco	27	+ 4.3	− 2.4	
All Others	139	− 0.9	+ 2.4	
District 5	104	+ 4.0	+ 6.4	+ 9.7
District 6	45	+13.7	− 1.1	−15.6
District 7	51	+10.9	− 2.1	+15.9
District 8	178	+10.6	+ 2.7	+ 9.0
Austin	14	+ 7.0	− 0.5	
Corpus Christi	25	+10.9	+ 2.4	
San Antonio	50	+12.7	+ 4.1	
All Others	89	+ 5.3	+ 0.6	
District 9	106	+ 7.4	+ 7.2	+ 8.6
Houston	45	+11.8	+ 8.1	
All Others	61	− 0.8	+ 5.4	
District 10	25	+10.9	*	+15.5
District 10A	41	+ 3.6	*	+12.6

*Change of less than .5%

NOTE: Prepared from reports of independent retail stores to the Bureau of Business Research, coöperating with the U.S. Bureau of the Census.

COMMODITY PRICES

	Oct., 1944	Oct., 1943	Sept., 1944
Wholesale Prices:			
U.S. Bureau of Labor Statistics (1926=100%)	104.0	103.0	104.0
Farm Prices:			
U.S. Bureau of Labor Statistics (1926=100%)	123.4*	122.2	122.7
Retail Prices:			
Food (U.S. Bureau of Labor Statistics (1935–1939=100%)	136.4	138.2	137.0
Cost of Living Index (1935–1939 =100%)	126.4	124.4	126.5
Department Stores (Fairchild's Publications January, 1931=100%)	113.4	113.1	113.4

*Preliminary.

DAIRY PRODUCTS MANUFACTURED IN PLANTS IN TEXAS

Product and Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
CREAMERY BUTTER (1000 lb.)													
1944*	2,043	2,126	2,765	3,535	4,008	3,527	3,569	2,792	2,535	2,140			
1943*	2,636	2,743	3,076	3,652	4,544	4,120	4,363	3,584	2,621	2,582	2,236	1,924	38,071
1930–39 average	2,074	2,109	2,392	3,138	3,556	3,166	4,113	2,867	2,513	2,608	2,301	2,211	32,048
ICE CREAM (1000 gal.)‡													
1944*	1,115	1,211	1,520	1,687	2,491	2,944	3,200	2,997	2,193	1,894			
1943*	1,125	1,187	1,396	1,770	2,302	2,478	2,778	2,898	2,125	1,744	1,443	940	22,237
1930–39 average	215	262	434	570	752	893	904	845	686	460	259	205	6,486
AMERICAN CHEESE (1000 lb.)													
1944*	902	956	1,229	1,884	2,273	2,159	2,076	1,621	1,372	1,148			
1943*	914	948	1,063	1,594	2,010	1,866	1,782	1,319	984	786	621	809	15,272
1930–39 average	554	590	737	1,050	1,215	1,129	1,119	1,025	866	852	718	641	10,496
MILK EQUIVALENT OF DAIRY PRODUCTS† (1000 lb.)													
1944*	67,873	71,519	92,663	119,889	144,977	137,502	140,357	115,184	97,137	82,781			
1943*	80,106	83,301	94,470	118,447	149,577	139,948	147,397	126,028	92,753	84,922	73,290	62,253	1,291,709
1930–39 average	54,675	57,139	67,456	89,641	104,323	97,562	97,075	89,185	76,165	73,444	60,119	55,872	922,656

*Estimates of production made by the Bureau of Business Research.
†Milk Equivalent of Dairy products was calculated from production data by the Bureau of Business Research.
‡Includes ice cream, sherbets, ices, etc.
NOTE: 10-year average production on creamery butter, ice cream and American cheese based on data from the Agricultural Marketing Service, U.S.D.A.

OCTOBER, 1944, CARLOAD MOVEMENT OF POULTRY AND EGGS

Shipments from Texas Stations

	Cars of Poultry						Cars of Eggs					
	Chickens		Turkeys		Shell		Frozen		Dried		Shell Equivalent†	
*Destination	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943
TOTAL	26	8	11	3	29	28	104	67	65	119	757	1,114
Intrastate	11	0	5	2	14	13	42	36	26	5	306	125
Interstate	15	8	6	1	15	15	62	31	39	114	451	989
Receipts at Texas Stations												
TOTAL	22	6	2	2	65	70	92	16	29	9	481	174
Intrastate	5	1	1	1	19	34	50	9	11	7	207	108
Interstate	17	5	1	1	46	36	42	7	18	2	274	66

*The destination above is the first destination as shown by the original waybill. Changes in destination brought about by diversion factors are not shown.

†Dried eggs and frozen eggs are converted to a shell egg equivalent on the following basis: 1 rail carload of dried eggs=8 carloads of shell eggs, and 1 carload of frozen eggs=2 carloads of shell eggs.

NOTE: These data furnished to the Division of Agricultural Statistics, B.A. E., by railroad officials through agents at all stations which originate and receive carload shipments of poultry and eggs. The data are compiled by the Bureau of Business Research.

OCTOBER SHIPMENTS OF LIVE STOCK CONVERTED TO A RAIL-CAR BASIS*

	Cattle		Calves		Swine		Sheep		Total	
	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943
Total Interstate Plus Fort Worth	7,066	6,990	2,434	2,105	686	1,244	937	1,235	11,123	11,574
Total Intrastate Omitting Fort Worth	1,405	790	386	222	34	88	778	331	2,603	1,431
TOTAL SHIPMENTS	8,471	7,780	2,820	2,327	720	1,332	1,715	1,566	13,726	13,005

TEXAS CAT-LOT SHIPMENTS OF LIVE STOCK FOR YEAR TO DATE

	Cattle		Calves		Swine		Sheep		Total	
	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943
Total Interstate Plus Fort Worth	51,917	52,864	10,572	8,984	12,798	14,026	12,647	11,844	87,934	87,718
Total Intrastate Omitting Fort Worth	6,587	6,917	1,354	1,781	801	666	2,130	1,150	10,872	10,514
TOTAL SHIPMENTS	58,504	59,781	11,926	10,765	13,599	14,692	14,777	12,994	98,806	98,232

*Rail-car Basis: Cattle, 30 head per car; calves, 60; swine, 80; and sheep, 250.

Fort Worth shipments are combined with interstate forwardings in order that the bulk of market disappearance for the month may be shown.

NOTE: These data are furnished the United States Bureau of Agricultural Economics by railway officials through more than 1,500 station agents, representing every livestock shipping point in the State. The data are compiled by the Bureau of Business Research.

TEXAS CHARTERS

	Oct., 1944	Oct., 1943	Sept., 1944
Domestic Corporations:			
Capitalization*	$886	$264	$1,135
Number	57	21	48
Classification of new corporations:			
Banking-Finance	1	2	3
Manufacturing	6	4	2
Merchandising	17	5	15
Oil	2	1	2
Public Service	0	0	0
Real Estate Building	8	7	4
Transportation	3	1	3
All Others	20	1	19
Number capitalized at less than $5,000	11	7	10
Number capitalized at $100,000 or more	0	0	2
Foreign Corporations (Number)	15	4	15

*In thousands.

NOTE: Compiled from records of the Secretary of State.

PERCENTAGE CHANGES IN CONSUMPTION OF ELECTRIC POWER

	Oct., 1944 from Oct., 1943	Oct., 1944 from Sept., 1944
Commercial	+15.5	+14.4
Industrial	+17.7	− 3.8
Residential	+12.9	− 6.4
All Others	−23.5	−12.2
TOTAL	+ 9.5	− 5.4

Prepared from reports of 10 electric power companies to the Bureau of Business Research.

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